



(overleaf)

Figure 10.1. What you see is what
you know.

10. Aliens



INVASIVE SPECIES

Our local university is a monstrous state institution with 30,000 students crammed into less than a square mile of its campus. Manhattan, for comparison, has a population density of 26,000 people per square mile. At our university, in between two dormitory complexes, sits a little, neglected wild area.

Locals call this place “The Orchard,” but that name is just a legacy of some long-past history—certainly no visitors to this land in the past couple decades would call it an orchard, although if you search carefully, here and there you can find a half-living apple tree that still bears fruit. More prominently, you’ll find isolated eight-foot sections of wooden fences scattered about, and the student oral histories still tell of when the equestrian team used to jump horses over these fences.

Every Sunday morning, while the debaucherous students lingered in bed with hangovers and the bookworm students battled theory in the library stacks, members of the Woodsy Club would converge on this forgotten piece of land to find their place in nature. That was two decades ago.

Standing here today with Juno and Alder, things have changed. But I’m happy to see many familiar faces in the tangled mess be-

Figure 10.2. The Orchard (a) in 1962, and (b) in 2005. The black triangle indicates our location at this chapter's site. (a: USGS; b: MassGIS, Sanborn LLC)



fore us (fig. 10.1). We're in the middle of a strange undulating sea of eye-level multiflora rose, bush honeysuckle, Oriental bittersweet, porcelain berry, and privet. The low thicket is punctuated by regularly spaced shaggy forms—short dead trees covered in vines that remind me of Snuffleupagus—that jut about ten feet higher than the surrounding shrubs. In the snow before us, a row of golf-ball-sized dots leading away, alternating slightly from side to side, marks the trail of the animal I had hoped to find here. About one hundred yards ahead, to the west, there's a young forest with lots of aspen in the canopy.

The *Field Naturalist* students stand in a circle under the aspens,



staring down at the handouts I've just given them. A couple of the students fiddle with reddish-brown strips of dogbane bark in their fingers. Their eyes on the sheets of paper, they try to make sense of the maps that depict a series of aerial photographs over the past half century (fig. 10.2). The black-and-white photograph shows that this whole area was in active agriculture in 1962. However, after cultivation was ended, part of the land turned into a forest and part of it turned into a shrubby tangle of invasive species. Why did the two parts end up so different?

Looking at the invasive thicket, I wonder if I'm the only person with a deep fondness for these plants and this place (fig. 10.3).



Figure 10.3. Berries of Oriental bittersweet and other exotics overflow in The Orchard.

All winter long, on the south end of The Orchard, a crew armed with big tractors, cherry pickers, and chainsaws has been hacking away at the plants. It's a heroic attempt to wrest the land back from the grasp of the noxious invasive species and reestablish the native beauty that belongs here. Does anyone else's heart break at the site of this cleanup?

Multiflora rose was historically planted along hedgerows to divide up fields and used to prevent soil erosion. Privet is used for both hedges and flower arrangements. Oriental bittersweet is prized for its decorative orange berries. Porcelain berry sports pastel blue and pink fruits, like little round Easter eggs. All four of these plants originally came from Asia. And all four of them are now despised invaders of the eastern United States.

Usually, when a species is brought from a faraway land, it will die out. Even if it finds a way to survive, it will rarely thrive, much less spread. But with so many species in the world, every once in a while, a new arrival will be perfectly suited to thrive and rapidly

overtake a local ecosystem. And it only takes one such species to do major harm.

Why do our native American bittersweet and our native roses occupy modest niches in local ecosystems, while the Asian bittersweet and roses swoop in and take over? Often immigrating species leave behind their enemies—predators, parasites, and competitors—like refugees fleeing persecution. But more like imperial colonists than asylum seekers, invasive species find themselves in the seat of power in their new land, freed from constraints and able to grow relatively unchecked. Some species, like garlic mustard, even bring along new weapons that the other local plants aren't used to dealing with. Garlic mustard engages in chemical warfare by poisoning the soil around its roots—just like the allelopathy our native beech trees use to thwart competitors, but with a whole new set of toxic compounds unfamiliar to our local species.

While non-native plants crowd out native plants, the impacts ripple out through the local food webs. Fewer local insects feed on non-native plants. This, in turn, impacts the bug-eating species, as shown by recent work by Desirée Narongo and her colleagues. In neighborhoods of Washington, DC, that were landscaped with non-native plants, Desirée found that chickadee babies die at significantly higher rates because they are malnourished. Mama and Papa chickadee can't find enough bugs to feed their children in these yards, so the young chickadees starve to death.

Everywhere you go, it seems, the world is threatened by invasive species—and many of the invaders are exported from here. North American beavers are wreaking havoc in Argentina. Eastern US bullfrogs are killing off pond species in the western United States, Europe, and Asia. Eastern US gray squirrels are taking over the habitat of Europe's native red squirrels by first infecting them with deadly poxvirus.

When it comes to invasive species, islands are often particu-

larly vulnerable. Islands tend to be simple, sheltered systems with just a few native species. So new invaders can really flip everything on its head.

Consider New Zealand. The island system has been on its own evolutionary trajectory for millions of years, refusing to participate in the fads of the major continents. There are no native land mammals, except marine mammals and two bat species, which has prompted many birds to trade in their wings, emit strong smells for communication, and approach strangers without fear.

But when Sydne and I visited New Zealand, it was like a giant zoo, harboring all manner of mammals brought by people from all corners of the world. The most abundant wild animals include European hedgehogs, Australian possums, California quail, and Indian mynas. It was a real treat for us to see these weird critters, but they decimate the local flora and fauna. To protect native species, the exotics need to be exterminated. In the United States, as elsewhere, hunters have been key leaders in the conservation movement. Sometimes, however, there's a sense of antipathy between the hunting interests and environmentalists seeking to preserve nature in pristine parks separate from human influence. But in New Zealand it seems the primary goal of most conservation agencies is to kill as many mammals as possible. Shoot, trap, poison, build fences to keep them out. All mammals are pests. Hunting is strongly encouraged in national parks.

The best examples of native ecosystems left in New Zealand are in little habitat islands with intensive management. Often they circle these habitats with big fences to keep invaders out, then they embark on a massive campaign to purge the interior of non-native species.

At the entrance to Trounson Kauri Park on New Zealand's North Island, we found tacked to the wall a piece of paper listing the number of animals killed each year by the Department of Conservation in this two-square-mile park. Over the prior eight years, the fig-

ures included 639 cats, 354 short-tailed weasels, 74 least weasels, 21 ferrets, 1,603 hedgehogs, 1,145 rabbits, 1,458 possums, 1,457 rats, 67 blackbirds, and 150 other birds.

If you are both an animal lover and a conservation lover, how do you come to terms with killing for conservation? For the past fifteen years, my cat, Annie, has been my best friend. I can't stomach killing cats. But I can't kill a fly either. For me it all goes back to my existential fear of my own death. I hate killing just as I hate wars. Yet killing is normal in nature. Though I can't picture killing a single chicken, I know that billions of chickens are killed each year for meat. And none of those chickens would have been born in the first place if not for the meat industry. The numbers are so big and theoretical that it's hard to engage with emotionally. It makes me think about the thousands of people who died in the three-day Battle of Gettysburg. That was a huge waste of human life, but then again, that was 1863, so all those people would be dead anyway by now. So how do you score that at the end of the day?

But what are we talking about here? Must we probe into our feelings on life and death? As I was taught in graduate school, conservation biology is a "value-laden science." There is no objective conservation—it is entirely informed by the fundamental morals that guide our personal life choices. To understand how we see a landscape, we must first explore the values that motivate us.

WHALE WRESTLING

From the North Island of New Zealand, it's a three-and-a-half-hour ferry ride to the South Island. It was there that we met the whales (fig. 10.4).

The positive spin is that seventeen of the stranded pilot whales made it back out to sea. But for us the experience was devastating—though there were some moments of beauty. Perhaps we gave



Figure 10.4. A rescue attempt for a pod of pilot whales stranded at Farewell Spit in New Zealand.

them some comfort, and one final swim, but none of the forty individual whales we worked with survived that week. There was mom and baby, who talked to each other continuously. We moved baby next to mom so that they could see each other, and they seemed to appreciate it. In the rising tide baby could swim first and kept wandering a bit away, then coming back to nudge still-stuck mom on the nose, saying “Mom! Come on! Let’s go! Why are you still lying there?”

There was the playful teenager who, as we began to swim out, would sidle up to the rescuers, take a breath, then roll upside down for a belly rub from one of us. There was the other energetic youngster who Sydne escorted out but who could really only be controlled by guiding the larger whale that I escorted and to whom the youngster would always excitedly return.

After it was all over, the horrible question that I couldn't get out of my mind was, "Did they shoot mom first or baby first?" Perhaps they had two guns.

Whale rescues are a mixed bag; some are very successful and some end like ours. Before that week, I knew nothing about whale rescues.

Monday night, after leaving the ferry from the North Island, we slept in our car on the side of the road next to a camper van owned by a German military policeman and his uncle. Before going to bed the Germans offered us beers and we chatted for an hour or so. Then the nephew received a text message from his brother back home. On the television screen in Germany, *60 Minutes* was telling the story of a pod of stranded whales that needed help. The whales were only 180 miles from where we sat on the side of the road. We quickly scrapped our plans, found Project Jonah's Facebook page, and prepared ourselves for an early morning four-hour drive to the site of the whale rescue. On the way we stopped by a kayak rental place where they lent us wetsuits for free, without even asking our names.

We arrived on Tuesday afternoon, two days into the rescue effort. On Sunday ninety-nine pilot whales had stranded themselves on Farewell Spit, a fifteen-mile strip of sand that juts out into Golden Bay. Seventeen whales had already refloated themselves on Monday night and headed out to sea, forty-two had died, and forty remained alive on the beach.

New Zealand has more whale strandings than any other country, and every year or so, a big pod lands on this beach. It's a huge intertidal zone, virtually flat for miles. As we were told, once a whale gets in there, it's hard for her to know which direction leads to deeper water and which leads to the beach. During migration, pilot whales travel in big pods and are particularly loath to leave any member behind. If one sick whale ends up on the beach, it can pull the rest of the pod in. Project Jonah members also blamed hu-

man sonar, military equipment, and predatory orcas for driving pods onto the beach.

Managing massive whale rescue efforts is the primary purpose of Project Jonah, a well-supported nonprofit with a long history going back to 1974. Within hours of this stranding report, the organization leapt into action. Volunteers from Australia and across New Zealand set down their hamburgers mid-bite, booked airplane tickets, and hopped in their cars to come save these helpless mammals.

There are two primary modes of a whale rescue: keep the whales protected and comfortable while the tide is out, then try to get them floated out to sea when the tide comes in.

When the tide is out, donated sheets protect the animals from a sun that causes black whale skin to quickly burn off and swirl about in puddles below. Pillowcases filled with sand prop animals upright for comfort and so that their blowholes remain above water as the tide comes in. Holes dug in the sand underneath the animals relieve pressure from the two pectoral fins, which are not designed to hold the weight of a whale on land. Finally, buckets of water continuously cool the whales.

As the tide comes in, all the linens come off in a frenzy, and each whale is held by one or a few people. On Farewell Spit the tide comes in extremely fast and cold. Before moving to deeper water, any whales stranded on the outskirts must be carried with slings over to the main pod, which can only be done with the bit of buoyancy provided by the incoming tide. Any sick or badly stranded animals that might hold the pod back have to be shot. When conditions allow, as they did on Monday and Wednesday, one vocal lead whale is strapped to inflatable pontoons. This lead whale is dragged behind a motorboat and is meant to draw the pod in the right direction.

As the incoming tide lifts the whales, each of us holds on to our own whale as best we can and carries her out. When the water

gets too deep to stand, we swim as a group arranged in a half circle behind the pod, working with a couple of motorboats to herd the whales like cattle. If all goes well, we follow them out until low tide, some six hours after high tide, and leave them headed in the correct direction in deep water.

Rescuing whales is one of the most strenuous feats I have ever attempted. Waiting all day in the relentless sun and wind for high tide, wet to the bone. Digging your bare fingers through abrasive sand and sharp shells. Listening to the intermingling calls of intelligent whales and overtasked volunteer organizers, all worried and frantic. Drawing motivation from the occasional gunshots that mark the end of another life deemed unsavable. Watching stressed whales flail, bleed, vomit, and die. Moving limp, two-ton animals on dry land. Trying not to inhale the smells of the whale breath and shit.

Then when you can stand and they can float, you spend a couple hours wrestling the whales in cold water. When the water gets above your shoulders, you spend a couple hours trying to out-swim the whales. When you can no longer control your shivering, you take a motorboat to shore where you sit amid the smells and sounds and bloody rain of rotting whale corpses violently exploding from internal pressure buildup. When you warm up, the boat takes you back out, this time two miles into the bay, where they drop you off to chase the whales through frigid water some more. When complete darkness falls, you return to your tent and get up at dawn to do it again.

Yet to refloat a pod of whales is one of the most beautiful things I've ever done. You become part of the pod. The tide rushing past your ankles brings excited anticipation to you and the whales, as both species begin to talk and fidget more. Thirty minutes of rising tide fills a desperate situation with hope as huge, lifeless black lumps turn into graceful gliders. A body that has been pinned prostrate for twelve hours now rolls intently from side to side and up-

side down, weightless and frictionless. Friends reunite against all odds from opposite sides of the pod. In deep water the sun shimmers off many receding black fins, and people hold hands in a circle around them. Then the shapes drift out of sight, slipping into an unseen life that you have touched.

Everything went perfectly on Wednesday night. Exactly why they were stranded again by Thursday morning, we don't know. But it was the sixth time the whales had been stranded at low tide in the past four days, and they were worn out. Some of them may have been the same whales that were stuck nearby two weeks earlier. We were working well into a world-renowned bird breeding habitat where public access is usually restricted. We had expended enormous amounts of physical, emotional, and financial efforts for the cause. The last few days had entailed hundreds of volunteers, many Department of Conservation officials, a couple large beach buses, an industrial digger, and lots of donated sheets and food. For the sake of all involved, the decision was made to end the effort. At least the seventeen survived.

SAVING SALAMANDERS

Another, smaller-scale rescue operation takes place each year a mile and a half northeast of The Orchard. Spotted salamanders live most of their lives underground in mammal burrows in upland forests. But on the first warm, rainy night of the year, they emerge and migrate hundreds of yards down to their breeding ponds. They mate for a couple weeks, then march right back up to their home burrows. But if people break the connection between the pond and the uplands, it spells trouble for the salamanders.

At this particular site there's a road. More to the point, there is a regular onslaught of tires that squish salamanders on the road. So every spring for years, the local children and nature lovers



Figure 10.5. A spotted salamander rescued from the road.

would come out to this site to direct traffic and help the salamanders across the road. The “bucket brigade” would walk along with flashlights, scooping up nine-inch-long black and yellow salamanders from one side of the road and dumping them on the other.

Then researchers installed a set of shoebox-wide tunnels under the road for the salamanders to use. Importantly, they installed fences along the roadsides that guide the salamanders into the tunnels. For the most part these tunnels are a big success. Still, enthusiasts converge every year to watch and to help the occasional individual who jumps the fence. It’s a wonderful point of connection between the community and nature (fig. 10.5).

But it’s not like spotted salamanders are particularly rare. There are tens of thousands of spotted salamander populations in the state. On the drive to participate in the annual salamander crossing festivities, I and others roll our tires over many other salamander crossing spots that don’t happen to be famous.

With the salamanders and with the whales, we become emotionally entangled with the individuals whose lives are on the line. At some point it's not so much about the species as a whole but about our relationships with the animals. And it's about saving the things we know and love.

ANIMAL FORMS

For me, The Orchard is a place I know deeply. As I look up at that little glacially sculpted hill in the distance, I see myself emerging from a debris hut constructed of sticks and leaves one October morning. The night had been a bit scratchy, but I woke up toasty and surprised to see snow on the ground as I pushed my way out of the leaf door.

For ten winters The Orchard was the destination for the first field trip in the annual animal tracking course that Charley and I taught. Why here? Because there's a lot going on.

I park the van in the lot by The Orchard, and our animal tracking students spill out. There's a fresh layer of snow on the ground, and Charley and I lead the class to a spot where the snow is undisturbed. Before we look at footprints, we first have to teach about animal gaits—how animals move.

I get down on all fours and pretend to be a raccoon. Pausing frequently, I lean onto my back legs, dig for frogs in the mud with my front hands, and munch on the morsel. Then I keep walking. Some students guess the species correctly, then we look at the track pattern in the snow. The tracks of my left rear foot land next to my right front foot, but slightly offset. Likewise, my right rear and left front feet are paired. This is an unmistakable pattern that virtually always signifies raccoon. Driving the van over a bridge at forty miles an hour, you could spot the remnants of a month-old,

melted-out raccoon trail on the ice below and be completely confident of the species.

Again walking on all fours, I then spread my weight evenly between my front and back legs and creep deliberately forward. At several points I pause mid-step with one foot in the air and three feet on the ground. Then I push on, keeping my head level the entire time. As I glide forward, I carefully slip my right rear foot into the track of my right front foot and the same on my left side.

Some students give each other sideways looks of concern about my sanity, while others eagerly guess that I'm trying to be a cat. Inspecting my footprints, we see the tracks evenly spaced along the length of the trail, alternating back and forth from left to right. This is a direct-register walk, where the back foot lands directly on top of the front foot tracks. I circle three of my tracks and explain that, when an animal is in a walking gait, circling three tracks gives you an approximate size of the animal.

Next we demonstrate the "trot." Standing on your right leg, you put your left leg and right hand out in front, with your left hand by your side. Then, all at once, you switch sides. Hopping onto your left leg, you put your right leg and left hand out in front. The whole class dances to this beat, then I get down on all fours next to my walking cat trail. I hesitate for a minute wondering if this is really a good idea. I start by trotting in place—standing on my left front and right rear feet, then hopping to the opposites. After a few such switches, I add forward momentum and trot out through the snow. I try to picture a dog bouncing casually across a field next to her owner. I stop to pee on Charley's leg and trot on.

Inspecting my trotting trail, we see that it is essentially the same pattern as the walking trail—my rear foot landed directly in the track of my front foot on each side. The tracks are evenly spaced along the trail, alternating left and right.

I call a volunteer student and have her walk on her two legs,

like a normal human. Then I have her come back to the starting point and run as fast as she can next to her walking trail. How do the trails differ? One student points out that the running trail is messier—the snow is exploded out of each track. True, but what about the pattern of track spacing? Another student says the running tracks are further apart.

“In which direction?”

“Well, the direction she was running.”

“Yes, the strides are longer. What else?”

Awkward silence.

“What if you look from the end down the length of the trail?”

“The walking one is further apart.”

I bend down and, quietly drawing in the snow, trace lines along the edges of the two trails, showing the trail width—the straddle. The students now see that when she ran, she stretched her legs out in longer strides, and this resulted in a narrower trail width. Looking back at my walking cat and trotting dog trails, we see the same features. In the trotting trail the strides are longer and the straddle is narrower.

At this point I break open a backpack full of old gloves and ask all the students to walk and trot on all fours. Most oblige, and laughter erupts as a dozen adult humans tumble around in the snow trying to place their front and hind feet in a line.

Back in our circle, having covered the “alternating gaits,” where the left and right sides of the body take turns, we move on to the more exciting “bounding gaits,” where the animal throws her whole body through the air. Here, the front legs work together as a team, as do the back legs.

Channeling my inner gray squirrel, I squat in the snow and apologize to my wrists. Then I leap off of my back legs, reaching before me with my front legs. My front legs come down first, but only for an instant. Just as my rear legs are swinging down, my front feet spring off, letting my rear feet slip past into the snow. My

rear knees bend and launch me again flailing through the air. After five such bounds I crash ungracefully.

In my trail we see my tracks arranged in little clusters of four. Within each cluster my two front feet are next to each other and in the back of the group. My two rear feet are wider apart and toward the front of the group—remember they swung past my front feet as they landed.

The rabbit trail I create is much like that of the squirrel, except my front feet are more in line and staggered with one far in front of the other. Whereas the wide stance of a squirrel is designed for climbing trees, rabbits are built for making sharp turns around bushes while dodging bobcats.

I move on, attempting more difficult bounding gaits with diminishing success but growing laughter—loping fox, galloping dog, and, finally, the weasel, to which I attribute chronic back pain.

Why are we crawling around like animals? Tracking students come expecting to learn the shapes of footprints. They want to hear that dog feet are overall long and narrow because they are built for forward movement, that dog feet are symmetrical, that dog tracks display big meaty claws, that most of a dog's weight is forward on her big toe pads, and that the negative space in a dog's footprint forms an "X," as in, "X marks the Spot." Cats, built more for balance, have wider feet with toe pads that are much smaller than their heel pads, claws that rarely register, and asymmetric tracks wherein there is one leading toe that juts forward. Extending my middle finger to the students, I offer the mnemonic "Cats have catitude." Such generalizations work pretty well to divide species into appropriate taxonomic groups, from cats to dogs to weasels to rodents and so on.

But looking at individual footprints is just a small piece of what Charley and I do in tracking. The overall trail pattern tells you a lot of information, and sometimes, such as when the tracks are old or melted, it's the only information you have. Like foot morphology,

the way that animals move tends to depend on what taxonomic group they belong to. Knowing the base gait of each animal, and then recognizing this trail pattern, helps you identify the species. Of course, cats can trot, dogs can walk, and everyone can gallop when they want to. But those aren't the most comfortable ways for them to move. If an animal is doing something other than its natural gait, you've got to stop and ask why.

VOLEY-VOLE

Charley and I lead the students along a trail that separates the aspen forest from the overgrown invasive tangle, heading toward a grassy field on the north end of The Orchard. By the edge of that field are some large shagbark hickories that I remember from one of my first Woodsy Club adventures. It was September, and we sat gathering hickory nuts, cracking them open, and devouring the delicious flesh inside. It was the first time I'd just been out in nature foraging for nuts.

In the middle of the field, there's a large patch of dogbane that we later gathered to make natural rope. The inner bark of dogbane is one of the strongest plant fibers you can find, and, twisting it in a reverse-wrapping technique, you can quickly make a remarkably strong rope. I once gave a 1/8-inch thick dogbane string to my roommate in college who was much stronger than me and asked him to break it with his hands. Grabbing one end in each hand, he strained his muscles, clenched his jaw, blew air out his mouth, puffed up his cheeks, and turned his face bright red. The string held.

When Charley and I arrive at the dogbane patch with our class, the snow is gone from much of the field, leaving the grass exposed. In the middle of the field, we find a fresh dig in the grasses with a tiny scrap of dark, mangled fur next to it. Sniffing the grass on

top of the dig, I inhale a strong skunky smell—red fox pee. Here a fox had stood patiently listening until a vole, running through a tunnel in the grass below, was in just the right position. The fox pounced and caught the vole, then left a spot of urine to claim the hunting grounds.

Prior to colonization, red foxes in North America were a boreal species, living mostly in Canada and mountains of the West. In the 1600s, English people obsessed with foxhunting brought over European foxes and introduced them to the Colonies. These introduced foxes proved to be generalists and spread throughout the continent, displacing our native gray foxes and the native populations of red foxes.

When Charley and I bring students into The Orchard fields, they want to track the foxes. But Charley and I want to show them the voles. The voles are the reason the foxes come here. We bend down and part the grasses with our hands. Within seconds, little vole tunnels appear. We tell the students to go find their own vole tunnels. Each trail is about one inch wide, edged with clipped grasses, and decorated with rice-grain-sized scats that fade from green to black.

Voles, sometimes referred to as field mice, are the basis of the meadow food chain (fig. 10.6). Foxes, coyotes, weasels, and raptors are all here to eat them. But they're often overlooked by humans.

One fall, Charley and I were studying for an upcoming wildlife tracker evaluation, and we needed to work on distinguishing vole tracks from those of white-footed mice. Looking at gaits can be helpful in telling voles from mice. Mice, like squirrels, are built for bounding along and climbing. Voles are built for trotting along through short tunnels. If voles were to bound through their tunnels, they would keep hitting their heads on the tunnel ceiling. By trotting instead of bounding, voles can keep a more consistent height. Vole tracks crossing an expanse of mud or snow will often show this preference clearly. You'll see an evenly spaced row of

Figure 10.6. A juvenile meadow vole.



footprints alternating between left and right. Mouse tracks crossing through the open, on the other hand, usually show up as little clusters where all four feet land and then launch the animal through the air again.

But sometimes it's helpful to know how the shape of individual mouse and vole footprints differ. So Charley and I set out to catch a vole. We borrowed some small mammal traps from a wildlife researcher in my department and scattered them across the fields of the university. Every day, Charley and I checked the traps. Every day, they were empty. After a week of this, we gave up. I collected the traps and threw them in the passenger seat of my car.

That evening I got in my car and headed north to the small cabin where I lived fifteen miles away. Halfway through my trip, driving on a two-lane state highway, I saw one. There, shimmering in a light rain, scurrying around on the black road surface, illuminated by my headlights, was a little, gray, vole. On the side of the road was a small grassy shoulder in front of a big patch of gold-

enrod in someone's yard. I swerved onto the shoulder and threw my car into park. Grabbing one of the traps from the passenger seat, I leapt out of the car and dashed over to the vole. It just sat there, staring at my headlights. I bent over and gingerly pinched the scruff of its neck. I picked it up and gently dropped the vole into the trap.

"Voley-Vole," as she came to be known, lived in a ten-gallon glass aquarium in my cabin. We ran her through sand, mud, and flour. We studied the thin lines of her toes. In our collection of animal track plaster casts, numbers 262, 263, and 264 still show her footprints. Annie liked to sit on top of her cage looking down. I fed her garlic mustard from my yard, along with bird seeds and guinea pig food.

Once we understood Voley-Vole's footprints, I intended to release her where I had found her. But winter set in, and I felt bad dumping her in the snow with no home or food. So she stayed through winter. When spring came, I was swamped with classes and kept forgetting to take her on my daily commute past the spot where I'd found her. Eventually, in a spring cleaning frenzy, I decided to just take action and dump her in the yard at my cabin. Maybe, Charley likes to say, Voley-Vole was now trained to eat garlic mustard and would help cut back its invasion into that forest.

Six months later we bought a house. In front of that house was a big patch of goldenrod near a grassy road shoulder. I didn't realize it right away, but that house is where Voley-Vole came from. We had traded places. I now lived with Voley-Vole's family, and, so it seems, they were hell-bent on revenge.

A set of healthy apple trees grew in the yard of our new house and gave us delicious fruits the following summer. A year after we moved in, working beneath the winter snow, the voles girdled all our apple trees. In spring I found the lower half-foot of the trunks completely stripped of outer and inner bark. With no green grass in winter, apple trees are a great snack for the tiny herbivores.

Figure 10.7. Elm tree girdled by voles.



Plus tree bark has sodium and other minerals that the voles are deprived of in winter. Other herbivores, like moose and deer, have the same winter craving for bark, and their sign on trees is even more dramatic. Our apple trees all died. One of them even had its roots so chewed up that I was able to lift it out of the ground with one hand.

Voley-Vole's family didn't stop at the apples. They girdled and killed an elm that was eight inches in diameter (fig. 10.7). They girdled a chestnut tree that we had planted. They chewed our garden hoses to bits. We planted new apple trees and surrounded them



Figure 10.8. A ring of pines surrounds the beaver meadow where the coyote barfed-up voles. (Google Earth)

with two-foot-high hardware cloth to keep the voles out. The following winter the snow accumulated to about two and a half feet, and the voles found a route over the top of the barrier. The following spring we found our new apple trees girdled high off the ground.

The girdling of our elms and chestnuts surprised me because I thought voles wouldn't like them. Apparently I was wrong. Which trees voles choose to munch on is important. It can determine, for instance, the course of forest succession. Many trees, like aspens, oaks, and pines, have developed complex chemical defenses to

ward off would-be herbivores. In a field full of voles, pine saplings will survive while ash and maple saplings will get gobbled up.

Researchers working with beavers and quaking aspen have shown that as the beavers cut back shoots, the trees will respond by producing even more beaver-repellent chemicals in the subsequent shoots they grow. At the landscape level beavers show how herbivore preferences can alter forest composition (fig. 10.8). In the forest around the edge of the meadow where I climbed into the beaver lodge, there's an abundance of pines, unlike in the forest a few steps beyond. You'll find many old beaver ponds encircled by such rings of pine. Venturing only a short distance from the pond, the beavers selectively ate the choice hardwoods and left the distasteful pines to grow in this zone.

ALARMS

As our tracking class walks back from the field where the dogbane grows, we pass the weeping willow under which Woodsies used to gather making willow baskets and eating wild grapes. These are fox grapes—the wild precursor to Concord grape and other cultivars. In the forest behind my house, some of these grow giant, arm-thick vines that stretch up into the tall canopy. They're too high for me to taste the grapes, although, in a thirsty pinch, I could cut into these vines as a quick source for water—I've heard big ones will sometimes pour water out like a faucet when cut. Those vines behind my house puzzle me. I think of grapes as early successional species. So do the vines date back to when the forest looked more like The Orchard? Did they grow up along with the trees? It would be interesting to count the growth rings on lots of thick old vines and their associated trees. Well, those grapes are dead now. A couple years ago our neighbor severed the grape vines at the bases, presumably displeased at their tangled appear-

ance and seeing them as parasites of the trees. But I love the tangled appearance: the fruit feed wildlife, and each vine seems to have struck a long-lasting relationship with the tree it depends on to reach the sun. I wonder, did these vines gush water when my neighbor cut them?

In The Orchard, near the still-living grapes, the tracking students notice a big flock of robins. “Don’t they fly south for the winter?” “Yes,” Charley answers. Some robins do, but not all head south to Florida. Many just stick around where they can find a good winter food source. The Orchard is overflowing with tasty berry-producing plants like multiflora rose, privet, and bittersweet.

I pluck a rose hip off the end of a thorny bush, pop it in my mouth, and suggest that the students do the same. I carefully separate the thin, red, sweet, tangy, vitamin-C-filled skin from the bulky wood-like seeds inside. I spit the seeds onto the ground. Someone once told us that if you chew up the rose seeds, it will make your butt itch. Because of that, Juno now likes to chew and swallow the seeds.

Amid the loud chattering of robins, Charley launches into a lesson on bird language. At the most basic level, if you listen to the birds, they will often warn you of predators. If you learn to read them, you can tell what and where the predator is. In college, while I was trotting barefooted behind a red fox in the woods, several blue jays joined the parade, noisily dive-bombing the fox as we went. This summer we learned to follow the gray foxes through our meadow by listening to the family of house wrens fledged from Juno’s birdbox. While Charley is explaining bird language to our class, as if on cue, the robins and all other birds suddenly get miraculously quiet. Are they responding to us? We wait for several seconds, then a Cooper’s hawk glides overhead.

One evening this summer, while doing our nightly tick check on the kids, I heard robins chirping loudly outside. Then I noticed a chorus of other species join in. I popped the screen off our

second-floor bathroom window, and Juno and I leaned out. Back in the forest, about mid-canopy, woodpeckers, thrushes, and various songbirds were excitedly flitting about and screaming. Then the alarm cloud shifted to another position in the forest, still about halfway up the trees. I knew exactly what species they were after. I told Juno to stare at the spot in the woods with all his concentration and wait. After a few minutes we caught a glimpse of the barred owl flying away through the trees.

In that forest behind our house is a network of trails—mostly wide logging roads used by ATVs, the occasional pickup truck, and sometimes logging skidders. Recently, Annie has been following us on long hikes there. On Annie's first hike, we reached the crest of the first hill where another trail splits off. Annie, who had been walking down the center of the trail the whole time, approached a knee-high hemlock sapling that leaned in from the edge. As she sniffed it, her ears turned backward, her spine stiffened, and her fur stood up a bit. Then she crept off to the opposite side of the trail and walked into the woods a couple feet. The hemlock looked to me like a classic place for a bobcat to spray, and a quick sniff confirmed my suspicion. As we continued our hike, Annie, now aware that she was not the top cat in those woods, walked in the forest parallel to the trail a few feet from the edge.

Months later, on a 90-degree May day, Sydne and I returned home a bit before sunset to find Hannah Harvester, our nanny, walking down the trail behind our house with Juno and Alder, frazzled. They had walked the mile up to The Crevice, and Annie, kidney failure and heart disease be damned, had followed them the whole way. The whole way, that is, until about ten minutes before they returned home. Right around the first trail intersection, she had disappeared. They tried but couldn't find her. Annie had never been up that route before, and she's not one to wander far alone—her instinct if left alone in unfamiliar territory is to hunker in place until I rescue her. I dashed up to find her, calling her name

as I went, in part to get her attention and in part to ward off any wandering coyotes or fishers. If this was going to be Annie's end, at least she was outside, which is where she's happiest.

When I got to where Annie was last seen, I stopped and listened. All was quiet. Except, in one particular direction, there was a subtle, multispecies alarm call coming from within the forest. A few birds and a chipmunk were softly chirping. Their energy seemed to be directed at the ground, at a spot perhaps fifty yards away. Because of the way the trail turns, the alarm call was actually on a straight-line path back to the house, even though it was far off-trail. I headed to the spot and found, perched on top of a cliff, sprawled out beneath a hemlock, an exhausted, but satisfied, calico.

BROWSE

A few minutes after the hawk passes over our animal tracking class in The Orchard, the robins, cardinals, and other birds resume their various conversations. With my back to the aspen forest, I lean over into the rose thicket on the other side of the trail and point to where one of the stems has been clipped. All that's left of the thin stem is a little stub, cut sharply at a 45-degree angle. Who did this?

Deer don't have upper incisors in the front of their mouths. When they bite things, they leave behind ragged tears. It's the rodents and rabbits, with their sharp incisors, that make such clean, angled cuts. Like on the hemlock twigs nipped by large, quill-covered rodents at The Crevice. In The Orchard it's rabbits, not porcupines. Rabbits love multiflora rose. We call such thickets "rabbitat." I ask all the students to spread out, crouch down, and find their own examples of where rabbits have clipped rose stems. Within a minute everyone starts finding rabbit browse.

Eastern cottontail browse, to be precise. If we were in a dense thicket in the understory of a forest, I'd expect to find snowshoe hares. But here among open fields and shrubs, it'll be cottontails. Historically, it actually would have been New England cottontails that lived here, but today they are threatened with extinction.

After farms were abandoned and early successional thickets grew in, New England cottontails rejoiced at all the new habitat. In the early 1900s there were more New England cottontails than ever before, but the celebration was short-lived. As forest succession proceeded, the rabbit-friendly habitats were shaded out by trees, and the populations crashed. Conservationists, concerned with the lack of rabbits to hunt, imported over 200,000 eastern cottontails from the Midwest to bulk up the New England populations. Eastern cottontails had never before lived here, and they brought a secret weapon: their eyes.

A pair of eastern cottontails and a pair of New England cottontails are foraging side-by-side under the safety of dense shrubs. While brown pellets—the size and shape of M&Ms—accumulate around snapped twigs, the last of the good food is depleted under the safety of the shrub. However, there is still some food out in the open. One of the eastern cottontails, whose genes were trained in the open country of the Midwest, hops out away from the cover. One of the New England cottontails nervously considers for a moment, then stiffens her spine and joins her in hopes of better food.

A coyote, out doing her nightly rounds, trots onto the scene and spots the foraging rabbits. The eastern cottontail, whose eyes have about 40 percent more exposed surface than those of the New England cottontail, sees the coyote first and dashes for safety. The small-eyed New England cottontail doesn't see the danger until it's too late.

Back under the shrub, the remaining New England cottontail faces a choice: go out with the bold eastern cottontails to forage in the open where she just watched a coyote eat her sister and she

knows there's still a hungry red fox nearby, or stay under the shrub and starve.

In this way, patch by patch, the slightly larger and more versatile eastern cottontails have thrived while the New England cottontails have died off.

COYOTES

One Sunday afternoon in October of my junior year of college, I was driving back from my grandparents' house, where I had been visiting my dad. It had been a month since he was diagnosed with pancreatic cancer, and, on my drive back to college, I knew I needed to find my Woodsy community for support. I would be late for the fire in The Orchard, where the plan was to boil Jerusalem artichokes with bear grease. I was still on the interstate with about twenty miles to go when I saw a dead coyote lying next to the metal guardrail.

The eastern coyote is a modern invention. Historically, coyotes were a western animal. In the East we just had wolves. But then we killed all our wolves, and coyotes marched eastward to fill in the newly opened niche. As they moved in, the invading coyotes interbred with some of the remnant wolves on the edges. They finally arrived in this area in the 1950s. Fortified by wolf DNA, these new eastern coyotes are much bigger and more prone to working in packs than western coyotes.

When I reached The Orchard that Sunday, we decided to add "coyote skinning" to our plan for the day. One Woodsy, Mary, came with me to retrieve the animal. We first stopped by my college where I, always the hypochondriac, raided a janitor's closet for plastic bags and gloves to protect us from any coyote-borne illnesses. Retracing my drive, we arrived at the coyote, and I pulled off onto the side of the interstate. As I set my hand into the fur on

her side, I could feel the coyote's warmth still radiating. Mary and I lifted her up and set her on some plastic bags in the trunk of my gray Volvo. Somberly, we headed back to The Orchard as the sun dropped in the sky.

The rest of the Woodsies sat around a campfire in the forest up on the small hill at the east end of The Orchard. We laid the coyote down in the dry leaves near the fire. For a while we sat in silence just admiring the beautiful animal. Sunlight filtered through the trees onto her patches of gray, brown, reddish, and white fur. After paying our respects we got to work.

We carefully cut skin away from muscle, peeling back her outer layers. As the skin came off her legs, I held on to a foot and moved it in a running motion. We watched in awe as the ligaments and muscles, now unmasked, retracted and extended before our eyes. We skinned the coyote late into the night. The palpable emotional intensity grew throughout the process. It was no longer a coyote; it was one of us lying there in the leaves with our skin coming off. Our inner workings were being exposed for the first time. At the final stage we suspended the skinless body from a tree, head down. Her inverted skin, still attached at the nose, hung like a mirror image looking upward. I wondered what would happen if any of the other 30,000 university affiliates had wandered into this late-night scene, where a band of humans stood in the light of a campfire around the gruesome spectacle of two inside-out dogs attached at the nose hanging from a tree.

Her feet were too difficult to skin, so we hacked off the bottom six inches of her legs, and I later placed them in salt to cure—I wanted to keep them to study her tracks. The feet quickly took on a rotting smell, so I hung them in a white plastic crate outside my second-story dormitory window. During my last night on campus that semester, I was up late cleaning my room before an early morning trip home for winter break. I decided it was time to part with some of the larger rocks on the floor of my room. The window

above my bed pivoted sideways to open and seemed like a great place to eject the rocks. But the window was closed. In a flash of brilliance, I invented a game where I would stand in the middle of my bedroom and gently toss a rock toward the closed window. Then, racing the rock, I would leap up onto my bed and open the window before the rock got there.

I won the first race, and the rock went sailing out of my open bedroom window. I won the second race too—but there was one problem. When I had closed the window after the first race, the latch had slipped down. So, although my hand reached the window before the rock, the window didn't open properly. The metal frame stayed fixed while my hand and the rock went through the glass together. Big shards of glass and one rock rained down into the snow, as my wrist gushed blood.

I wrapped my bloody hand in a towel and secured it with a rope. After a trip to the emergency room, I called campus facilities to have them come fix my window during winter break. It was then that I remembered the coyote feet hanging in the crate outside the window. I really didn't want college officials finding the coyote feet—I was already flagged for climbing on the roof of the gym, for searching out the campus steam tunnels by prying up manhole covers with a crowbar, and for the lockpick set that arrived in the campus mailroom in a box marked "guns and ammo." So in the wee hours of the morning, with one arm wrapped in bandages, I carted my crate of coyote feet far into the woods behind the college and lashed them to a tree. After winter break I eventually moved the feet to a different tree where they stayed for years, slowly deteriorating.

The coyote's carcass sat for a while in a Woodsy's basement freezer, but before we could eat it, a plumber searching for an outlet unplugged the freezer and forgot to plug it back in. Three days later there was a warm freezer full of spoiled meat. The coyote skin was passed back and forth among Woodsies and now sits in

a plastic storage tub with other Woodsy memories in the back of my house.

TRAILCAM

In writing this chapter I decided I wanted to have pictures of the actual individual animals that live in The Orchard. Really, there's one species in particular that I'm after—the predator that typifies this habitat. I have a few old shots from a decade ago when I disassembled a film camera and a motion-sensing chime and wired the two together. But I'd like some better images. So this winter I ordered a cheap digital trail camera online, set it up in The Orchard, and set out to check it every week or so.

When we first visit The Orchard this winter, Juno is excited to find and collect sumac berries. Staghorn sumac is one of the few native plants that grows in the tangle. Its big head of red berries, when dunked in water, makes a delightful lemony beverage—high in vitamin C—that we call “sumaconade.” The sumac shrubs where I used to collect berries on the south end of The Orchard have been shaded out. We still see the stems, covered in fuzz, resembling velvet-covered deer antlers, but no fruit.

We walk further north and spot a bunch of red berries several feet into a thicket of multiflora rose. The cluster of fruit sits atop spindly stems as if drawn by Dr. Seuss. I fight my way through the sharp rose thorns that grab my clothes and hold me back with their backward curve. Thwarted, I return to the trail and try another route in. Again, the thorns keep me at bay. After one last attempt I retreat and we look for berries elsewhere. The next bunch we see is at the top of a fifteen-foot sumac tree. Too high. At last we find some at just the right height and near the trail. We snap off a few clusters, plunge them into our water bottles, and enjoy instant sumaconade.

On Christmas day it snows six inches. After eating out for Chinese, we go to check the trailcam. Sydne and Alder fall asleep in the car, so Juno and I walk into The Orchard to dig the camera out of the snow. We're the first animals out after the storm, and it's a lot of work for Juno's little legs to plow through the snow.

About fifty feet from the camera, it gets really hard for Juno to walk. I forge a trail ahead of him, and he walks behind, holding my hand. I take very short strides, punching holes just the right distance for Juno's feet to glide into as mine lift out. Coyotes will do the same thing for each other to save energy. Often, when following what looks like one perfect coyote trail, the trail will fan out into the trails of several different animals that were all stepping exactly in each other's tracks. Juno beams as we walk toward the camera, "Dadda, you and me are coyotes!" I'm big coyote and he's little coyote.

The camera flashes at us as I bend down to pop the memory card out. I set my laptop in the snow and transfer the images. We expect to find the picture of ourselves as we approached the camera. Instead, all we see on the screen is a big, beautiful coyote. On some level, we truly believe, as documented by the camera, that we have actually transformed into coyotes. Juno and I howl the whole way back to the car.

The next time I return to check the camera, I bring both Juno and Alder. While we wait for my computer to boot up, we attend to another mission. All winter we've been trapping mice in our house, using the same little trap that once held Voley-Vole. We don't have the heart to kill the mice, but we don't like them in our house either. So we dump them into a little ten-gallon aquarium, along with scraps of leftover human food, cat food, and bird food.

When we caught the first mouse, it was well below zero out, and I figured she would freeze to death in the cold. So we held on to her for a while. Juno and I constructed a little cardboard house for the mouse with multiple rooms, nesting material, and food stor-

Figure 10.9. White-footed mice in temporary housing.



age. The triangular silhouette of the cardboard house vaguely resembled the real house we live in. We transported the mouse in this house out to The Orchard and let her go.

After the first mouse, just to be safe, I set the trap again to see if there were any more. There were. It turns out that a single mouse nest can have dozens of individuals in it. That's how they keep each other warm in winter. I wondered if the first mouse, even with its extravagant house, was able to keep herself warm after we moved her to The Orchard. The next triangular house had two mice in it, and we placed it in the same spot in The Orchard next to the first mouse. I figured maybe the three mice would find each other again. The next house had four mice in it, and it was so cute to watch them huddled together in a line on top of the house inside the aquarium at night (fig. 10.9). Are they so different from pilot whales? I soon lost count, but we've now delivered over twenty mice to The Orchard.

We place our latest mouse house in the growing pile and return to the computer to download the images from the trailcam. The

images show rabbits, gray fox, deer, joggers, and mice, possibly from our house, but not the one species I'm after.

By mid-winter we now have two cameras to check on, but one of them is aimed at our mailbox. A few weeks ago the kids and I built a new mailbox for our house to withstand the plow. Out in front of the "Wildlife Habitat" sign, the mailbox looks like a life-sized black bear. We named it Ursula. But in the night someone's been intentionally ramming it with their plow, so I pointed a camera at it, programmed to catch any nighttime activity.

TRAILING CATS

On the last field trip of our animal tracking class, Charley and I park the van at the entrance to a huge forested area. After about a half hour, we pick up the trail of a bobcat. The students are elated, and we decide to spend the day trailing the cat. We follow as it walks through the open forest. Walking at the rear of the gaggle of students, Charley and I notice where the trail pattern changes in front of an old rotting stump. But the students, now far up ahead, have breezed on by this stump in their excitement at chasing down the trail.

We call the students back to smell the fresh pee on the stump. Always pay attention to changes in the trail pattern, and never pass up an opportunity to smell pee when you know exactly who made it. Basically like house cat pee, this scent always reminds me of the sickly sweet smell of someone's basement who has too many cats. We continue following the cat as it skirts the edge of a beaver pond, where we stop for lunch. After lunch we again pick up the trail, following the cat back into the forest. Then Charley and I spot a dense thicket of white pines in the distance, and we give each other a knowing look.

If you follow a bobcat for long enough, it will inevitably take

you to a horrible thicket, be it mountain laurel, young white pine, blackberry, or multiflora rose. This is where they hunt. In this particular case we expect snowshoe hares to be on the menu. Inside the thicket should be a rectangular impression in the snow where the cat sat, waiting for lunch to be served. A hunting lay is a great track for students to see. But the rabbits and the cat love the thicket because it is virtually impenetrable for larger species. Twelve humans breaking their way through the pines without losing the trail or destroying it seems unlikely. Eager to experience the world through the eyes of a bobcat, the students follow in. Charley and I walk around to the other side of the thicket and wait.

On another day of our animal tracking course, we trail an opossum at The Orchard. We follow the trail to a hole in the ground. I recount the experience of waiting by the little cave behind my house in Nashville just after sunset and having an opossum nearly trip over me as it darted out of the hole and along the top of the log I was sitting on. Charley and I decide to come back that evening and wait for the opossum.

Opossums aren't built to survive a New England winter, and they never used to live here. Then they discovered shelter in the warmth of houses and the extra food in people's garbage cans. Only by relying on humans can opossums survive the winters. In the summer they fan out across the landscape. But those that don't come back to humans before the following winter will die. In this way they have been steadily marching northward.

When the sun goes down, Charley and I return to the hole at The Orchard to wait. After a half hour, a dark shape emerges from the thicket a hundred feet west of us. It's a bobcat. It walks up the bank of a road and out into the middle of the traffic lane, right in front of a large public transit bus, which the cat casually ignores. Under state law, drivers are required to stop for pedestrians crossing the road, and the cat's self-assured stance implies that she knows this. The bus driver brakes and the cat pauses, shoots a long

look over at us, then ambles on to the other side of the road into a forest of oaks, maples, and ash.

Bobcats. They're the main reason we bring tracking students to The Orchard. It's the only place I know where you can always find their sign. Why? Because the big, tangled thicket stocked full of rabbits is bobcat heaven. For the past twenty years, The Orchard has consistently held the densest concentration of bobcats of any place we've visited. On full-day field trips out to expansive forests, we might expect to see bobcat sign every three or so days. In The Orchard we always expect to find bobcat sign within the first half hour.

It's not that there are a lot of different bobcats here, it's just that the one family of cats doesn't wander far. Out in the forest a bobcat may prowl a territory that covers many square miles. But where there's unlimited cover and food, why bother going anywhere?

MOVING THE CAMERA

The second week in January, I return with Alder to The Orchard. We've just dropped Juno off at school, picked up new batteries for the camera, and left a prescription at CVS. We have about fifteen minutes before the prescription will be ready for pickup. I figure it shouldn't take long to swap out the batteries. The problem with the batteries is that the camera is pointed west. As the sun sets, it shines into the infrared sensor and triggers it continually, eating up the power.

I'm superstitiously hopeful that we'll have caught a bobcat—so that the universe can repay us the balance from yesterday's tragedy at our mailbox. At around 8:00 AM on Sunday morning, someone stole our entire bear, mailbox and all. I'd set the stupid trail-cam on our driveway to stop triggering at 7:00 AM. The camera had watched the entire federal crime unfold but didn't capture a

single image. Devastated, the kids and I are determined to build a new bear. This time I'm going to hide a GPS tracker inside.

At 15°F, it's a frigid morning. I nestle Alder into the carrier on my back and put on my down jacket so that it covers both him and me. My jacket is too small, leaving my middle and upper arms exposed, with only the ends of my arms in my sleeves. The fabric pulls my arms awkwardly backward, and I feel like I'm imitating a T-Rex.

On the walk in we see trails of cottontails and coyotes. The snow is deep, and the cottontail tracks are following in our packed-down rut in the center of the paths from previous visits. At the camera, I swap out the batteries and download the pictures onto my laptop. No bobcat. We head down to the pile of mice in houses we've dumped twenty yards away and add a few more to the pile. There, next to the mice, is a fresh bobcat trail. I remember weeks earlier seeing a bobcat trail following almost exactly the same path into a dense stand of glossy buckthorn, an invasive shrub. I pause for a minute and consider the prominent pin oak standing above the buckthorns. Peeking my head into the thicket, I see that the trunk of the oak is covered in moss.

It's the biggest tree around, near a trail intersection, with a fuzzy surface great for retaining smells; this must be a bobcat scent post. With Alder still on my back, I crawl in to have a closer look. Including the trail we follow in, at least three bobcat trails emanate from the tree. I might be missing a trail, or maybe two of the trails merge into one—because there should be an even number.

I can clearly see where the bobcat paused, squaring up its feet as it sprayed urine backward onto the mossy trunk. I lean my nose in and am rewarded with the pungent smell of cat. Two feet from the tree is a little rectangular hunting lay in the snow where the cat sat hidden in the brush, looking through the edge into the open. Inspecting the individual footprints, my first impression is that

there are two different cats—a slightly larger male with rounded toes and a slightly smaller female with more tapered toes.

Now with a fresh set of batteries, the camera is still aimed at the wide trail that forms the center of this chapter's opening image. I have in my mind a picture of the bobcat strolling down the center of the path at that very spot. There was, after all, a bobcat trail in the snow when I took the central photo in this chapter's opening image; it's just so subtle that it doesn't show up in the image. And that spot is, after all, where there used to be a bobcat latrine a decade ago—where dozens of scats were piled in the center of the trail as a blaring message to the world.

But most of the time, the trails of the bobcats I follow in The Orchard, just like the trails of the rabbits, dart in and out of the shrubs. They cross the paths back and forth and sometimes follow the path center for a short time before heading back into the thickets.

Maybe I'm trying to capture a picture of a bobcat in a spot where bobcats don't really want to be. The center of that path is more of a place that coyotes and foxes feel comfortable (figs. 10.10–10.12). Recently, I've been considering placing catnip in the path to lure the cats into the picture. But that feels like cheating. I want to honestly capture nature how it really is. And now there's a natural scent lure attracting bobcats right here on this tree, made by the cats themselves.

Leaving the pin oak, I trudge through the snow back to the camera where it is strapped to a thick bittersweet vine. I unglove my hands and work quickly to free the camera before the cold cripples my fingers. Then I carry the camera back to the pin oak in the thicket fifteen yards away. I set it up on a small tree a few feet from the oak, aimed right at the spot where the urine is sprayed. I can already see the photograph of a bobcat standing in front of this tree marking it, and it makes me smile.



Figure 10.10. A coyote in The Orchard.

I walk back to the spot where the camera used to be and start packing up my computer. Perhaps it's because the sun has shifted in the sky, or perhaps it's because I'm more relaxed, but suddenly a big perfect bobcat footprint pops out at me in the snow a foot from where the camera had just been. The cat had actually stepped right in front of the camera—just like those bastards who stole our bear—I guess it was after the batteries had died.

Why hadn't I noticed any of this trail before? As I look for more tracks, I realize that the cat was mostly walking in the deep footprints of a deer, matching its strides as best it could so as to avoid unnecessarily having to punch new holes in the snow. Oh well, I suppose the scent post is still a better bet for the camera.

Still on my back and ready for a nap, Alder has grown impatient with all my bending, fiddling, and staring at the ground. His fussing spurs me to move on. I finish packing up, hoist my equipment onto my shoulders, and start the trek back through the snow, walking along the trail that separates the aspen forest from the invasive tangle. Step after step through the deep snow, I grow exhausted. I can really feel why the rabbits were using the packed-down rut—even though it's an exposed travel route they would

never have chosen otherwise. And I can feel the tired bobcat stepping in the deer tracks, which also led into the packed-down rut. If only it had batteries, the camera aimed at that rut would have captured all the animals. Just as fences funnel salamanders into the tunnel under the road, the snow is funneling all The Orchard's animals into that rut. For predicting animal movements, that snow rut is a temporary goldmine that will soon melt away.



Figure 10.11. A gray fox in The Orchard.



Figure 10.12. A red fox in The Orchard.



Figure 10.13. A bobcat by its scent tree in The Orchard, perhaps looking up at a squirrel.

A few feet from my car, I click the remote to unlock the door. I pause. Alder has fallen asleep on the walk. I see the picture that the tracks painted of the cat marking the pin oak. The scent post will be there long after the snow melts—but not that snow rut in the trail center. I turn from my car and run down to move the camera once more from the scent post back to the spot where it was looking at the rut in the center of the path. I need to talk to my therapists about decision making.

A few days later a warm rain melts all the snow. With the rut now gone, I move the camera back to the scent post. After a month looking at the center of the path, the only predators the camera captured were coyotes and gray foxes. Within a week of looking at

the pin oak twenty yards away, the camera captured three bobcat visits (fig. 10.13). Satisfied, I put the camera back on the main path and, after a while, catch a few cats there as well.

GROUNDS

I wonder if the bobcats in the photos I've captured are the offspring of the bobcats that kept an eye on us in college two decades ago—perhaps the little kittens we tracked here after we graduated. I wonder, too, what's next for these bobcats? How much longer will The Orchard be their home? Will forest succession finally convert the thicket to a forest?

I want the bobcats to stay here forever. But The Orchard that we love—the chaotic tangle—is just a stage in transition. Like racing rocks to a window, there is blinding joy in this moment, but it's bound to end. One way or another, that rock is going out. Does the metaphor work for all of conservation? For all of life?

The immediate threat to this habitat is the fleet of chainsaws and brush hogs cleaning it up. Over the past couple decades, two huge new parking lots have already taken big bites out of The Orchard, and it's been cut in half by a highway-like paved trail lined by grassy shoulders and thirty streetlights. Now they're cutting down the invasive thicket that shelters the bobcats. Is there a specific management plan that the grounds crew is executing with specific conservation goals? I want to know.

One morning after we drop Juno off at school, Alder and I visit the university physical plant, the office that heads up groundskeeping. We walk through the fancy modern entrance, surrounded by solar panel displays and free physical plant schwag. Alder makes friends with Alice at the front desk and another staff member standing nearby, but I'm having a hard time explaining my ques-

tion. To start, nobody seems to know that The Orchard exists. I'm not talking about new building construction, it's a question about ecological management. You know, landscaping?

Eventually, Alice decides to lead us out back to the "Sustainability Trailer." We walk through a maze of hallways and then outside through a rear metal exit door. Crammed between buildings in a corner of a parking lot is a little white-sided modular office trailer. Once inside, Alice calls out, "Hello?" She checks the main office, then looks through all the cubicles for anybody to talk to.

She turns back to lead us out. "OK, nobody's here right now, but maybe you want to call and leave a message for Ezra."

Just then an ancient man materializes from the last cubicle that Alice had checked. With a slow drawl, he asks, "Hello, can I help you at all?"

"Oh hi! Heh! This gentleman was—is here seeking information about the—what's going up on—what's going on, on, um, Orchard Hill."

"OK. Yeah."

"Can you help him?"

"Uh, I don't have access to that, I'm sorry. Uh, Kyle is in today, he's poking arou—"

"Who?"

"Kyle is the one he'll want to talk to."

"Karla?"

"Kyle, Kyle Lawson."

"Karl Larson?"

"Yeah."

"OK, he's in?"

"Yeah, he's in."

"OK, I haven't seen him. Um, I'll just, I'll try to get him his, do you have a card, one of his cards?"

"He's probably up with, uh—"

“Upstairs?”

“—Jason probably, Jason, maybe, you know him?”

“Yeah, I do. Thank you.”

“He’s probably talking with him. I’ll tell him, uh, if he walks in that you’re looking for him, so where would—”

“Excuse me?”

“If he comes in I’ll tell him you’re looking for him.”

“Yeah, I, my name is Alice, I work at the front desk.”

“Oh, OK.”

“OK?”

“OK.”

“Thank you.”

Friendly as they are, it’s pretty clear to me that I’m not going to get anywhere by trying to engage the bureaucracy in this office complex. As Alice leads me back through other offices in the main building, she laments that folks are in meetings all day long, which is why it’s hard to track down people and information. Alice is hopeful that the assistant director of Custodial & Grounds will be able to offer me insights, but she’s not in her office. A few days later, when I catch the assistant director on the phone, she doesn’t know anything about the operation in The Orchard either.

Before we leave Facilities, back at the front desk, Alice hands us a pile of free plastic cups and six pads of sticky note paper emblazoned with the university insignia and the phrase, “We’re Here to Help!” She gives Alder a green lollypop and me some phone numbers and email addresses.

Exiting the building, I have a strong urge to cleanse myself. I feel like I’ve been coated in a gray layer of dust that’s slowing my joints and smothering my skin. It’s not a physical dust, it’s the emotional debris that saddles me whenever I try to deal with large, Kafkaesque institutions that feel so removed from reality. We drive straight to The Orchard.

WILD CATS

On the path to the camera sits a big orange tractor. Inside sits Steve. A big friendly man. He asks if I heard the bird squawking, and then he makes a noise that reminds me of a blue jay. He's been mowing The Orchard for fifteen years. He sees bobcats all the time, all different sizes. Once he saw a big one followed by three little ones cross in front of his tractor. With as much enthusiasm, he tells me he's seen red cardinals in here too. He tells about the deer that know him and his tractor and the hawks that circle around while he mows, waiting to scoop up the mice in his wake.

He tells me of the mountain lion he took pictures of behind his father's house and the mountain lion tracks he saw nearby. Though wildlife officials deny it, Steve's pictures prove that mountain lions live here. This piques my interest, as fifteen years ago I spent over a year trying to verify the presence of mountain lions—also known as cougars, panthers, catamounts, golden ghosts, and a variety of other local names—here in the Northeast.

Eastern cougars are considered officially extinct, having been absent from our landscape since the last of them were intentionally exterminated, with bounties and mass killings, over a hundred years ago. But locals up and down the East Coast still see them every year.

It wasn't hard for me to collect over sixty sightings from folks who had seen mountain lions. Some of these stories were very convincing—biologists and hunters detailing extended close encounters in broad daylight. During that year, I consumed all the literature on the topic, some of which is published in a pseudoscientific journal called *Cryptozoology*, alongside studies of bigfoot, the Loch Ness monster, chupacabras, and other unlikely creatures.

Toward the end of that year, I got to pet a live mountain lion down in West Virginia. It purred loudly and aggressively as it rubbed its cheeks against my fingers through a chain-link fence.

The visit to the captive cat was part of a field trip during the second-ever Eastern Cougar Conference, filled with serious academics, riled-up nutjobs, and lots of in-between folks. One thing unified most attendees of the conference: we wanted to believe, in defiance of the official dogma, that eastern cougars still existed. Then I saw one myself.

I was on my way to Nashville, having just left Cumberland Gap National Historic Park on the border of Kentucky and Tennessee. Like all parks along the Appalachians, it too has had its share of eastern cougar sightings. I reached I-40, which runs the length of Tennessee, at about 11:00 AM and headed west to Nashville. It was a clear, sunny day, and traffic on the interstate was light.

Cruising along at sixty-five miles per hour, I noticed an animal creeping out onto the road from the shoulder, up on a small rise about 150 yards in front of me. At first I thought it was a deer. It was big and had a light tan color. But it wasn't quite a deer. It was lower, and it had a long, swooping tail. As I approached, the form became clearer and clearer. I slowed my car until I was going about twenty-five miles per hour and the animal was about fifteen yards in front of my car. The golden animal, with its muscular front and elegant tail, was creeping along in a slow, steady, catlike walk. "Oh my god, I can't believe it! I'm actually seeing a mountain lion!" Clear as day. It was incredible.

And then, when it was about ten yards in front of me, and my car was almost at a complete stop, suddenly, it was a dog. A dog that just happened to be walking funny. A dog that just happened to be tan. A dog that just happened to have a long, swooping tail. I guess, even in the best of circumstances, the best of observers can make mistakes. My eyes had taken in a few bits of information, and my brain had filled in all the holes in between, painting a perfectly complete mountain lion.

In life we don't really see that much. Mostly our brains are just painting pictures. The ability of people to see and hear things is

often limited not by our eyes and our ears but instead by our ability to interpret clues and understand context. As a kid, I used to help my naturalist mentor survey for frogs on the roads while driving along rural highways in the rain at night. Years later, driving my college students in a big van on a rainy nighttime salamander adventure, I spotted a tiny spring peeper on the road ahead, and the students were astounded at my eyesight. But I don't have great eyes. I didn't really see the whole frog. It's just that I've trained my brain to know the difference between how light bounces off wet rocks and wet frogs in the road.

Once, while playing ultimate Frisbee, I had an ocular migraine that robbed my ability to see what was directly in the center of my vision. Instead of seeing a black hole, my brain stitched together the things on either side. When I looked at the face of any player on the field, in the place where their head should have been, their neck just ended. Above the neck I simply saw the grass in the unbroken field behind them. My brain was doing its best with the information it had.

Over the past few decades, there have been a handful of pieces of physical evidence—like scats and hair samples—of mountain lions in the Northeast. But the DNA of some of those animals was traced back to South America—apparently South American mountain lions are more popular in the illicit pet trade, and sometimes people let their pet mountain lions go. One mountain lion was hit by an SUV on a Connecticut highway a few years ago, but that animal had just made a 2,000 mile trip from the Black Hills of South Dakota.

Is there a self-sustaining population of mountain lions here? The habitat seems to be here in the East for them to survive, but it's hard to find any signs of them. When you go out West, it's easy to find definitive tracks and scats of mountain lions. Slowly but surely, western cougars are migrating east, and someday soon

there will likely be established cougar populations in the East, if not descendants of the original eastern cougar. But not yet.

Why are we so eager to see mountain lions in the East? Once they are here in big numbers, we'll probably be terrified of them. But for now we want to believe in the mythic power of these gorgeous creatures to overcome all odds and hide in plain sight. Partly, it's connected to why I love tracking. I tend to get more of a thrill from seeing animal footprints than from seeing the animal itself. The tracks have intrigue and mystery and clues to follow and treasures to discover. When I see the animal, it's just, well, an animal. It's vulnerable flesh and blood meekly trying to survive. It peers back at me with disdain. But when I'm still following a trail, the end of it might yet lead me to God herself. If eastern cougars really have persisted, then anything could be possible. Meanwhile there is another real, flesh-and-blood, spectacular wild cat still thriving in our midst, unseen by almost everyone. Can we pin our dreams to the bobcat?

When I ask Tractor Steve to send me a copy of his mountain lion photograph, he demurs. It was a long time ago, the picture would be hard to find, and it wasn't that much to look at anyway. Like most sightings of eastern cougars, this all-but-perfect account ends just shy of being provable.

Steve and I move back to talking about, as he sees it, this little sanctuary that he's lucky enough to have worked in for the past fifteen years. When I ask him about the invasive plant cleanup, he gives me the same sort of response that everyone else has given me. They're cleaning up the invasive species, what else is there to say? It's just something helpful the crew is doing to keep themselves busy in the slow winter months. Isn't it obvious why?

I mean, yes, of course it's obvious. Nobody, especially not university donors and parents, wants to see a messy tangle of shrubs. That's why they're starting on the part visible from the road. And

invasive species are bad. This is a way to help the environment. It's a win for everyone. What's to question?

But for me it's not obvious. When parents and donors look at the thicket, they see chaos. I see bobcats. Without the experience of following bobcats day after day, a brain just can't paint the full picture from the few bits of light reflecting off the rose thorns.

Juno says he's going to write a letter to the university to save The Orchard. I share the impulse, but, at the same time, I know it's driven by a misleading sense of nostalgia. It's hard to hold on to the perspective that The Orchard as we see it today, just like every other piece of nature, is, and must be, a fleeting thing. Besides, the invasives are so robust that the effort to remove them will likely fail. Still, I break out some crayons and one of the "We're Here to Help" pads, and we start drafting a letter.

What will be there after the work crews are done? I imagine big trees standing watch over a grassy lawn. Simple, clean, and devoid of wildlife habitat. It's true that the ecosystem now here isn't filled with native plants. But a grassy lawn is no better. These roses are providing habitat for cottontails, skunks, opossums, gray foxes, red foxes, fishers, coyotes, and, my favorite, bobcats. Yes, multi-flora rose invades and wrecks many forests, and non-native species in general do a terrible job of supporting native insect diversity. But what was it that they invaded here? Not a native forest.

Standing under the aspens, the *Field Naturalist* students notice patterns on the aerial photographs from fifty years ago (see fig. 10.2). On the west side, the ground is flat and smooth as one would expect a farm field to look. But on the east side, small dark dots, barely perceptible, are formed in neat rows. Today, from the ground, each of these dots looks like a giant Snuffleupagus. Fifty years ago, these were manicured rows of apple trees.

Then the field and the apple trees were abandoned. In the field, wind-dispersed seeds rained down on the dirt. Maple, ash, aspen. As the young seedlings raced skyward, they fought off the vora-

cious voles. Spewing defensive compounds, the aspens got a leg up on the competition and survived to form a young forest.

Over among the rows of apple trees, flocks of robins, cedar waxwings, and bluebirds sat in the apple branches feasting on fruit. Their poop rained down, filled with seeds of privet, rose, bitter-sweet, grape, and all the other small fruits made for the birds. Back when The Orchard was meticulously pruned and maintained, some of these fruit-bearing shrubs crouched under the apple trees and horse jumps where the lawnmowers couldn't quite reach. When the mowers stopped running, the shrubs lying in wait sprang from every corner, marched across the land, crawled over the aging apple trees, and suppressed any tree seedling that tried to grow.

Thus, it was the teeth of herbivores and mowers from decades ago that shaped today's Orchard where bunnies and bobcats thrive. So it is only fitting that similar teeth now shape the future.

Well, I suppose the teeth are merely the workers out on the ground. Ultimately, these teeth are responding to the choices of human society. What happens to The Orchard in the long run really depends on the whims of the bureaucracy that owns it. Here, as in much of our world, nature's fate is shaped largely by decision makers sitting within a forest of drywall who have never set foot in the actual forests their policies will impact—people who feel no real relationship with nature. But relationships are the heart of humanity. Whether we choose to save the cat, the whale, the salamander, or the mouse depends on which creatures we've formed a relationship with.

* * *

The world is waiting to know: How will we choose to value nature? More fundamentally, how will we perceive nature? Will you see The Orchard as a mess or a wildlife sanctuary? Will you write off the thicket as a worthless web of invasive species or cherish it as

home to bobcats? Ought it be tamed or set free? What stories will you make from the places around you? Will you wander off the map and get to know your landscapes? Will you forge connections with wild places? Will you bang rocks together to see how they break? Will you ask the oaks and pines for a story? Will you taste pine needle tea? Will you listen as the birds reflect on you? Will you wonder why the scat is placed where it is? Will you forge personal relationships with individual animals, species, and ecosystems? Will you build your life's meaning and fill your memories with the natural world? Will you carry your children on your back up mountains and down rivers, and will you set them free to roam in your nearest wild space so that they grow up as native citizens of nature? I hope so. The way to begin is to set down this book, set down all books, set down all things, and wander, unencumbered, without direction, outside.

MAJOR LESSONS FOR INTERPRETING A LANDSCAPE

- Where did the species at your site originate?
- What personal values do you carry when you evaluate the worth of the things before you?
- What signs of animals do you see, and how do the animals see this landscape?
- Stop and listen to the birds. Learn to use them as interpretive guides.