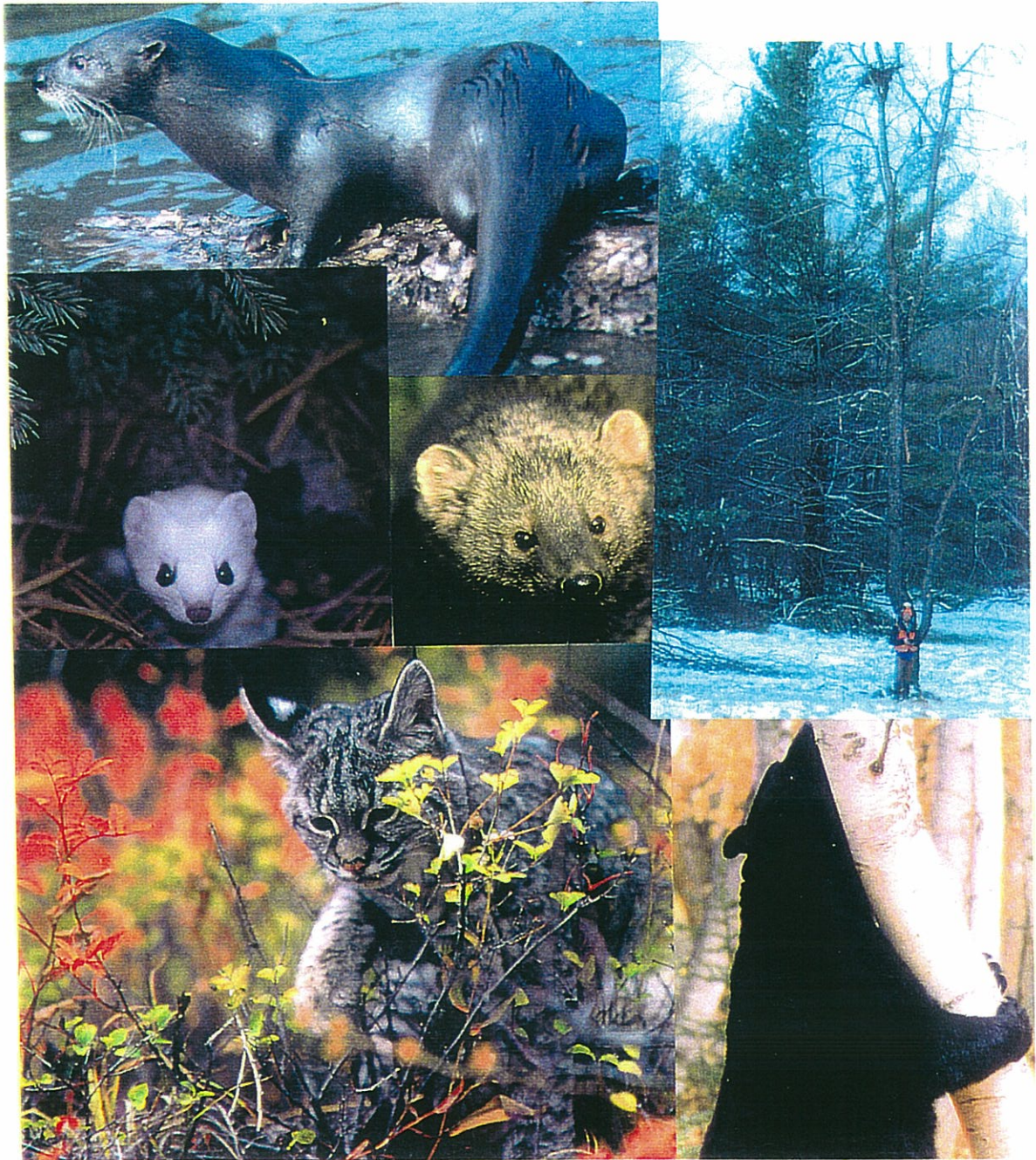


WILDLIFE HABITAT ASSESSMENT  
OF THE MONIQUE AND LESTER ANDERSON LANDS  
LINCOLN, VERMONT



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July 31, 2000  
Morse & Morse Forestry  
And Wildlife Consultants  
Jericho, Vermont

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Text and photography - Susan C. Morse

July 31, 2000  
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**SUSAN C. MORSE**

**WILDLIFE HABITAT ASSESSMENT OF THE MONIQUE AND  
LESTER ANDERSON LANDS  
LINCOLN, VERMONT**

**DESCRIPTION OF THE PROJECT**

Morse & Morse Forestry and Wildlife Consultants was contracted in June of 1998 to conduct brief investigations of three separate parcels of farm and forested lands—all located near one another in Lincoln, Vermont. The owners of these properties, Monique and Lester Anderson, have retained the services of Morse & Morse to prepare the following report so that our findings may be included within a larger ecological inventory. Other surveys have assessed the floristic, physiographical, soils potential, forest history, herpetological and avian resources found within each of the Anderson properties. Collectively, all of the surveys are intended to evaluate the overall conservation value of these properties. Such a report will enable the Andersons to more effectively steward their lands, as well as prepare plans which would serve to preserve and enhance their rich biodiversity and necessary ecological infrastructure.

**PROJECT OPERATIONS**

Following an introductory project orientation session hosted by Lester and Monique at their Wells farm house (June 22, 1998), additional time was devoted to gathering and receiving various documents including: 1) forest stand maps, 2) property maps (showing tax boundaries), and the 3) "Significant Habitat Map" for the town of Lincoln, prepared by The Vermont Department of Fish and Wildlife's Heritage Office. Additional documents studied included correspondence from Vermont Fish and Wildlife biologist, Larry Garland (included in the appendix of this report), and Marc Lapins's "Preliminary Summary Report" covering each of the Anderson properties' forest and wetlands ecosystems and flora.

Mr. Lapin is serving the Andersons as the overall project coordinator, and will be assembling all aforementioned reports into the final ecological inventory. I am particularly appreciative of his report for it provided an excellent introduction to the properties themselves, as well as the scope of the project as a whole. Indeed, Lapin's report was especially stimulating insofar as it established an ever-appropriate context in which our wildlife investigations proceeded.

A total of 33 hours were spent afield examining riparian, wetland and upland habitats searching for animal tracks and sign, as well as assessing the qualities and connectivity of each property's habitats. It was agreed that we would concentrate our search to occur within the late

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fall and winter seasons in order to maximize detection of wildlife sign in snow. Five separate field excursions were conducted, spanning mid-November through mid-February.

During all but one brief field trip which I made alone on June 5<sup>th</sup>, I was grateful for the assistance of UVM graduate student Sean Lawson, who volunteered his time to contribute his newly learned GPS mapping skills to the project.

At my suggestion, Mr. Lawson agreed to work under the supervision of Robert Turner, of R.J. Turner Company. Sean used Mr. Turner's equipment, and benefited from his instruction on its proper use and GIS mapping potential. Sean's many hours spent in the field with me enabled us to produce the maps which are included in this report, and spatially depict where wildlife presence or important habitat features were discovered.

As this report is being compiled, I must add special mention of my appreciation for the extra time Robert Turner devoted to the final preparation of the above-mentioned maps.

## INTRODUCTION

It is Anderson's goal that their lands be conserved in such a manner as to preserve and perpetuate their precious natural resources. At the same time, Lester and Monique have visited upon these landscapes a variety of human uses. They reside-fully or partially-on two of the properties. They regularly frequent miles of trails and logging roads, in order to hike, ski and otherwise enjoy the properties' natural beauty and solitude. The Andersons graciously permit non-motorized access to local hunters who respect and enjoy the privilege. The Andersons desire that their forests be managed, and thus they periodically extract timber resources. And Monique in particular, takes great pride in managing and preserving the various properties' open farm fields, fruit tree orchards, and the remains of historic rural human dwellings.

What do we mean by habitat? Indeed, how can wildlife habitat be mentioned in the same context as logging and cutting farm fields? Habitat is simply home—the physical space where wildlife live according to each specie's needs. Habitat is as complex as the myriad influences which function and make it "whole". Habitat requirements vary with each specie's life requisites, which for all species includes food, water, cover, and space. A specie's home range—the amount of space a given individual uses—spans 20-60 acres in the case of an ermine, 2-10 square miles in the case of a moose, 15-30 square miles for a bobcat, and up to 50 square miles for a black bear.

It is therefore essential that habitat resources be recognized and conserved for what they are—resources which must be available and safely accessed by wildlife now and through time. Wildlife species select habitats by optimizing these needs against the thermal and security risks which they encounter in their daily lives. The best habitat for most wildlife is habitat which enables them to reproduce and meet their energy needs while offering a minimum of challenges. Hazards associated with lots of human activity, including roads, traffic, pets, pollution and introduced invasive species all cause wildlife habitat to be less suitable and productive.

As we embark upon developing an ecological inventory for three foothill properties adjacent to the Green Mountains in north-central Vermont our ultimate success will depend upon a clear-minded appreciation of *the overarching goals* which have inspired the project in the first place. Equally important, *the questions we ask* at the project's inception will appropriately guide

the process of field investigations, data interpretation and summarization—or utterly confound our effectiveness. The simple *terms we use* should likewise be clear.

For example, more than 30 years ago, I was taught in college that “wildlife” meant “wild animals”, and that I could conduct sound forestry and wildlife habitat management practices for the “benefit of wildlife.” Today, “wildlife”—may more appropriately be included in what we mean by “biodiversity”, including all life at all levels—genetic, species, community and ecosystem. “Management” of any species, or any component of habitat, has a variety of effects upon the biodiversity of the region—including positive (i.e. desirable or planned for) and negative. By creating so called positive “edge habitat” for the benefit of white-tailed deer and game bird species, the manager may or may not be cognizant of the disruption or perturbations he or she may be causing to deleteriously affect other species of “wildlife”—including plants and the environment which support them.

Any attempt to quantitatively appreciate how one can preserve and perhaps improve wildlife habitat productivity on the Anderson lands must first understand what species are using what habitats, both on the Anderson lands and throughout the neighboring region. How do the Anderson farms fit into the scheme of things? Are these thousands of acres surrounding these properties that perhaps are part of the larger home range of a wide ranging species like black bear or bobcats? Upon reviewing the regional topo map found in the appendix of this report we see that there are indeed thousands of acres of public and private forest lands which are relatively “connected” on a landscape scale. A bear could easily emerge unimpeded from the Green Mountain National Forest, eat apples in the Lewis Creek Wildlife Management area, dine on hazelnuts in the Lincoln Town Forest, and mark a balsam fir and eat beechnuts on the Guthrie-Bancroft farm. What are the potential movement corridors that allow bears and other species safe travel to and from various portions of their home range? How does the dispersing young bull moose leave his mother’s winter and early spring range higher in the Green Mountains, and journey to feed within Pierce Farm’s beaver flow and associated shrubby meadows?

Given the appropriate complexity of what we mean when we think about *wildlife habitat*, our focus must include more than the “featured species”, such as game species, which have received all our attention in the past. Nevertheless, knowledge gained about the presence and habitat uses of various wide-ranging mammal species will help us develop necessary long-range conservation goals which must acknowledge and seek to perpetuate the Anderson properties’ physical connectivity to surrounding wildlands. Increasingly, conservation biologists are stressing that the preservation of biodiversity and all its necessary ecosystem variety and processes depends upon region-wide planning and preservation.

In this capacity, the *conservation value* of the Anderson lands is both local and regional. It is *local* for the natural beauty and biodiversity which clearly exists within these parcels; and it is *regional* for the intact and connected diversity of additional habitats which enrich and sustain them.

We must increasingly think “big picture” when it comes to the stewardship in our charge, because global trends point to an alarming depletion and fragmentation of forested and wetland habitats—with an unprecedented loss of biodiversity as a consequence. For example, how do the Anderson properties fit into the larger regional wildlands picture? How do they contribute to habitat connectivity and the healthy physical and genetic exchange of plant and animal species throughout Vermont, or throughout the entire Northern Forest Eco-Region?

A growing number of conservation biologists are alarmed about the effects of fragmentation irreversibly damaging healthy ecological functions and systems. Removing more forest, and inviting more roads and human access into an otherwise unfragmented habitat dramatically increase the disturbance and mortality factors which compromise the security and stability of wildlife residents therein. Acre by acre, the disruptions and disappearing habitats represent losses which are incremental and cumulative in impact.

The Andersons are fully aware of the urgent need to plan for wildlife habitat conservation on a landscape scale. Yet they also wish to clarify certain goals and methods by which they may restore or stimulate habitat productivity for a variety of wildlife on their property. When seeking to improve habitat productivity for wildlife one must take into account the seasonal usefulness of various habitat attributes, as well as differences in needs—including differences among species, differences among the sexes of each species, or different needs experienced by different age classes or life stages within each species. Other questions the Anderson should ponder include the following: Which species fulfill all of their life cycle needs within the boundaries of Guthrie, Pierce or Wells farms? Which species are present only some of the time? Regarding the latter, what habitats or specific food and cover resources seem to be important—at what times of the year?

Some of these and other questions will be briefly explored in the following Field Summaries. For each farm, the associated Field Summary provides a chronological list of the wildlife species whose tracks and sign I encountered during field trips. In addition, notes I made in the field regarding any habitat considerations are also discussed. Certain recommendations pertaining to the Andersons' future forest management goals are also included. The accompanying maps for each parcel will help orient the Andersons and other readers of this report to specific locations where some wildlife sign was found, or areas in which abundant wildlife tracks or activity was noted. Likewise, areas in which I recommend various forest management options can also be located on the map.



**SUSAN C. MORSE**

**FIELD SUMMARY –NOVEMBER 13, 1998**  
**GUTHRIE PARCEL (South)**

- With Sean Lawson imputing my observations on his GPS data receiver, today's route and reconnaissance findings will be roughly plotted on a GIS map which accompanies the final report (see Observed Wildlife Habitat and Sign: Guthrie Parcel).

Starting at Monique's wonderful poleshed, we proceeded to investigate the southern half of the former Guthrie farm. Before entering the forest we noted an abundance of valuable soft mast-producing trees and woody shrubs growing along the edge of the field. Serviceberry, black cherry, raspberry, hawthorn and various sizes of wild and cultivated apple trees offer a bounty of foods for numerous species of wildlife—whose sign we discovered. Fox and coyote scat, deer tracks, rubs, and scat, and bear claw scars were quickly recognized evidence of these mammals' utilization of the area. Porcupine, small rodents, grouse and numerous other bird species are also sure beneficiaries of Monique's field and orchard maintenance labors!

- I did observe one possible additional project for Monique's consideration. Non-native buckthorn trees as well as an abundance of older gray birch are currently crowding the crownspace of valuable hawthorn trees and viburnum shrubs. The latter should be "released".
- Buck rubs and scrapes were abundant along the field-edge border, specifically concentrating on sapling-to-pole-sized quaking aspen trees. The buck rub, or "hooking" is caused by the white-tailed male during the pre-rut, and rutting periods, spanning all of the months of autumn, including early December. Rubs on trees and scrapes in the soil, are used in conjunction with glandular secretions which communicate a deer's sexual and social status to other deer.
- Healthy productive deer, bucks and does alike, are handsome symbols of the health of their habitat. Vermont's deer, especially in the more upland forests, are often severely stressed by poor habitats coupled with winter's often harsh conditions. Suitable winter habitat dwindles to less than 7% of Vermont's total usable forest cover. Thousands of the State's deer have starved to death in their winter "yards", due to the cumulative impact of too many deer and not enough nutritious browse and adequate cover. The heavy browse pressure we noted within the adjacent forest may suggest that deer numbers are once again climbing to unhealthy numbers. Or perhaps we're merely seeing the impacts of an acceptable number of deer which have resorted to using this area heavily during the past several "easy" winters. Further study of the deer situation on this property may be warranted, both for the health of the deer, and the forest which supports them.
- We next passed through a recent cutover area. This poorly drained site predisposed many remaining trees to topple due to windthrow. The wetter portions of this zone should perhaps be excluded from any harvest operations in the future. I recommend further research which would better define appropriate forest practices on this ground. The

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possibility of woodland seeps and vernal pools within this zone also argues that forestry operations be discouraged here altogether in the future.

In addition to providing an important buffer, further protecting adjacent open wetland and stream habitats, a no-cut zone throughout the wetter portions of this area will assure the protection of unusual plants as well as important habitats.

For example, **seeps** are cool moist habitats sought after by species such as the redback and northern two-lined salamanders, wood frog, spotted turtle, American woodcock and common snipe. A seep may serve as a critical seed catchment and source of winter foods for ruffed grouse, wild turkey and numerous other birds and mammals. Seeps in winter are less inclined to remain frozen over (especially in early and late winter), and thus offer both available food and water when such resources are otherwise unavailable. Remote forestland seeps, filled with spring's meltwater juxtaposed with a nearby "greenup" of tender digestible sedge growth and other forbs, provides black bears with important thermal relief and foods.

**Vernal pools** are contained basins which collect with spring's snowmelt and rain. They are ephemeral pools and are usually dry by mid to late summer. Drying of the pools is vital to their contribution to the breeding habitat of numerous obligate species (species which must use vernal pools!) including wood frog, spotted and Jefferson salamanders and fairy shrimp. Pools which dry up by summer prevent their use by fish, which would prey upon the deposited eggs and developing young amphibians. Logging in or near vernal pools is known to physically destroy the pools, as well as disrupt surrounding down woody materials and other recesses in which adult and migratory young amphibians seek necessary shelter. Furthermore, the opening of pool surfaces to more sunlight (by removing adjacent trees) may hasten their evaporation, or possibly introduce harmful effects of increased UV radiation (affecting eggs and developing amphibians). More research on the latter issue is needed, however a conservative approach here is more than justified.

- Proceeding through the wetland area I noticed an increasing amount of bear sign particularly as we neared the brook. Several **mark trees**-new and old alike-were testimony to one or more bears' fidelity to this habitat's cooling waters, suitable wallow sites, abundant spring foods and remoteness from human-caused disturbances. Mark trees are scratched, bitten and rubbed by bears in order to leave visual and olfactory communications for other bears.

The wounded trees (or shrubs) serves as a visual cue which attracts attention and possibly also prepares a more suitable roughened and/or sappy surface which enhances the "message" which is delivered via the bear's scent. A bear's most powerful sense is his or her sense of smell, so these mark trees speak volumes we know little about. It is believed that bears use these and other marking behaviors to mutually avoid one another, or find one another during the mating season.

- We crossed the brook and briefly traversed the hardwood and mixed hardwood forest which offered a rich ecotone of additional habitat diversity adjacent to the aforementioned coniferous, mixed woods, open wetlands and stream. We found and marveled at a huge boundary tree-a fine old white ash-which also had been marked by a bear! This was the first area in which I noted the occurrence of beaked hazelnut, a woody shrub whose fruits are much relished by numerous wildlife species, including black bear, fisher, squirrel, chipmunk, ruffed grouse and wild turkey. Other mast-producing species were also



present, including American hornbeam, eastern hophornbeam, and three different species of viburnum. Lots of grouse sign, including tracks and scat were also noted here.

- During the final two hours of the day we gradually made our way back, exploring alder swamp habitats and the nearby borderline woods shared by neighbor and wildlife enthusiast, David Brown. The fruits of his labors to release and increase the productivity of his wild apple orchard were impressive indeed. The snow beneath the apples, hawthorns and black cherry trees was a maze of deer, squirrel, and fox tracks seeking abundant fruit, and coyote—possibly seeking fruits and deer. Scattered butternut trees and a recently climbed chokecherry (by a bear) were also noted.
- The day ended wonderfully at the base of a black cherry tree in Monique's field. (see photo) The large tree had been climbed and "nested" by a black bear seeking its fruit. Notice how the fairly large diameter branches in the crown of the tree were folded or broken into a central location where the bear fed upon the cherries. Notice how the branches are pulled into the bear's location from multiple directions. No ice storm achieves this kind of damage. What you cannot see in this photo is the smile on Sean's face as he records this last and most special GPS entry for the day!

### FIELD SUMMARY – JANUARY 5, 1999

- Though out of chronological order, the following entry from this brief field trip should be included with the Guthrie (south) field summary. The following is straight from my field book:

"Few tracks on an otherwise perfectly trackable snow almost made me doubt the wisdom of my coming here, except... at the "eleventh hour" on my way out to the truck as dusk was approaching I hit the jackpot. Clear tracks of a smallish bobcat pussyfooting the edge of this wetland proves there's a kitty in these woods!"

At the top of the food chain, bobcats are more susceptible to increased mortality and possible cumulative population declines, particularly in upland habitats where winters are harsh. Deep snow and prolonged bitter cold temperatures challenge a bobcat's often meager energy budget. Travel and therefore hunting successes are limited. Unlike its cousin the boreal forest Canada lynx, the smaller footed bobcat flounders and expends precious energy just moving through deep powder. Cold temperatures further tip the balance, especially when bellies are empty. Kittens and even their mothers have been known to perish in such winters; they simply don't have the experience and/or the body mass reserves to wait it out.

In the face of such challenges bobcats do best in a home range which includes a diversity of habitat types—which in turn support a wide variety of prey species, including mice, voles, grouse and other occasional bird fare, squirrels, chipmunks, woodchucks, snowshoe hare, cottontail rabbits, occasional beavers, porcupines and deer. Secluded remote wetlands and/or rocky inaccessible terrain provide bobcats with excellent hunting and security habitat. Thick young softwood growth, interspersed with a mosaic of other different habitat types, including brushy field edge, wetlands, and a variety of other forest age classes and cover types all add up to quality wildcat county. Guthrie has much to offer.



**SUSAN C. MORSE**

**FIELD SUMMARY-NOVEMBER 19, 1998**  
**GUTHRIE PARCEL (North)**

- Moist fresh snow offers a great substrate for today's record of tracks. As we walk along to enter North Guthrie's woods we skirt the edge of Monique's field, taking time to examine the abundance and condition of mast-producing trees and shrubs. Our efforts were quickly rewarded for I discovered a broken-topped pin cherry sapling, complete with the fresh claw scars of the bear which fed in the tree. An adjacent young black cherry was also broken. This time it appeared that the same bear broke the immature tree's top, not to access its non-existent fruits but to access the ripe grapes which were abundant on a vine in its crown. Small mammal claw scars and hairs of raccoon were also discovered at this site.

In a few locations along the field edge, some cherries, hawthorns, service berries and viburnum species are being suppressed by surrounding gray birch trees. In one location, if done correctly, there's an opportunity to remove a whole stand of gray birch and hopefully stimulate expansion of nearby black raspberries.

- Upon entering the forest along a woodsroad we eventually came upon our first mammal tracks. First one set, then multiple tracks' comings and goings took us to the scattered remains of a nearby white-tailed deer, undoubtedly harvested by a bowhunter, or perhaps coyotes. The sign was too old to tell, and the snow cover too fresh. Our fisher had made a few journeys to the carcass to gnaw on the bones which were strewn about, and investigate the spilled contents of the intestines. On other occasions I have observed fisher to consume the partially digested contents of the rumen for example, seemingly enjoying the applesauce or creamed corn content therein. Fishers eat an astonishing variety of other foods—a veritable smorgasbord. Squirrels, ruffed grouse, small rodents, songbirds, snowshoe hare, cottontails, carrion and occasional porcupine make up the mainstay of their wildlands' diet. Closer to towns and farms, fishers eat road kills, bird feeder suet and seeds, and occasional housecats. Virtually every kind of fruit a fisher can sink its teeth into are also eaten, including: apples, cherries, grapes, viburnum fruits, serviceberries, mountain ash berries, hawthorn fruits, rosehips, bechnuts and hazelnuts.
- Northwest of where we found the fisher sign, the forest cover gradually changed to include more enduring hardwoods, including sugar maple, occasional beech, black cherry, yellow birch and even some fine butternut and black birch specimens. Fisher and gray squirrel tracks were plentiful in this zone. Ruffed grouse tracks and scat were seen. The distribution of oak and other nut-producing trees throughout Guthrie woods is an interesting subject to ponder. Suitable soils and growing conditions are essential if these species are to be competitive, thrive and persist.

But that first lone oak or two, growing among red maples, aspen and red spruce; what's the story here? Tracks of gray squirrels rooting among snow and leaves, and the

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raucous cries of blue jays overhead provided one answer. Dispersal and subsequent germination of acorns is made possible by the "scatter hoarding" activities of squirrels, chipmunks and blue jays which bury thousands of seeds for food. A gray squirrel may carry an acorn and plant it a few hundred yards from the parent oak. A blue jay may airmail an acorn to a possible new growing environment a few miles away. In fact, blue jays are believed to be the single most important agent of oak species' northward expansion since the melting of glacial ice at the close of the Pleistocene.

As I do my field work among the thousands of acres of my customers' properties I am increasingly intrigued by the gradual and I believe, steady increase in the distribution of red oak. I'm seeing more and more oak seedlings and saplings—*away* from valley habitats where *Quercus rubra* is more common. Obviously, as we've observed, wildlife play an integral role in oak species' seed dispersal. But the *expansion* of red oak over time into distant habitats where red oak have not existed in many decades (or more) due to human exploitation is a curious phenomenon. When I observe the brave presence of a young oak within an otherwise oak-less woods I can't help but consider possible mechanisms for such an occurrence. Just a hypothesis—but I'm pretty convinced it has to do with the relative numbers of the various seed dispersing and seed consuming mammals which are found in abundance within a given habitat.

Down in the valley, where a greater percentage of oak species thrive in a diversity of age classes, squirrels and jays "plant" more oaks with each passing year. However, proportionately fewer numbers of these and other mammal and bird acorn consumers in upland habitats could actually increase the percentage of acorn germination in the outlying forests in which they were cached.

Within eastern deciduous forests it is known that nearly 100 wildlife species feed on acorns, including squirrels, jays, white-footed mice, white-tailed deer, wild turkeys, ruffed grouse, porcupines and black bear. Tracking bear in Arizona, and bear, deer, grouse and turkeys in New England, I have come to appreciate how thoroughly these foraging animals find, root and consume countless germinating acorns during spring. Add this level of post-winter consumption to the already appreciable consumption of oak seeds during the previous late summer and fall—it's a wonder oaks get to reproduce at all!

In summary, I'm convinced that the more upland forests, where we are now witnessing the pioneering arrival of oak seedlings, have much to teach us about how forests function. Away from the human-dominated valley habitats—away from the environments in which our farming and increasingly our suburban activities-oak seed consumers are fewer in number. Corn fields, hay crops and bird feeders alike all sustain higher populations of deer, turkeys and gray squirrels, and hence a greater challenge to oak regeneration. The value of even the most unlikely habitats in which oak seeds are now germinating on Guthrie farm's uplands is that the march of plant and animal dispersal is indeed a remarkable thing. I agree with Mr. Lapins's conclusion that future research on the Anderson lands has "great potential". The current mix of plant community types and species will continue to change with time. It would be fascinating to gather a baseline of data cataloguing what is out there now, so that we may better appreciate what's coming.

- An even greater diversity of tree species greets us as we move out of the mixed hardwoods area, northwest towards the steep banks overlooking Baldwin Creek and Route 17. An abundance of American beech, yellow birch and eastern hemlock are noted,

making me wonder about the appropriateness of describing all of this stand (type #7) as “northern hardwoods”. More fisher tracks, gray squirrel tracks and nutmeat “hoards” were observed throughout this zone.

- Moving along the Andersons’ property boundary we head south, then east through some drier forest cover. Scattered red spruce are competitive again on rocky thin-soiled outcrops. Beech, hophornbeam, white ash and a great deal more red oak contribute much to nutmeat and seed mast which numerous birds and mammals rely upon.

Evidence of black bear climbing and “nesting” American beech branches in order to access beechnuts was recorded. Beechnuts are critically important to Northern Forest bears. Bears will eagerly climb fruit-laden beeches in August and September, and climb to the outermost portions of the crown where sun-ripened nutmeats abound. They will break dozens of 1 to 2” thick branches with their paws and teeth. Superficially resembling giant nests (hence the misnomer) concentrations of piled branches may supply the meticulous and patient bruin with hundreds of nutmeats at a single feeding. Beech nuts are rich; containing 22-30% protein and up to 50% fat. A bear’s necessary weight gain is guaranteed during years when beechnuts are plentiful.

- More fisher tracks, gray squirrel tracks and the tracks of several foraging wild turkeys were seen in this zone. Fruit producing blueberry and wild currant plants, along with occasional viburnum were noted in the understory. In addition to providing foods, these and other plants in the forest’s shrub layer contribute to a habitat’s necessary structural diversity.

Structural diversity provides necessary concealment and diverse foraging cover for wildlife. Across an expanse of multiple habitat types (for example, all of Guthrie farm) vertical and horizontal diversity are essential for wildlife. **Vertical diversity** describes the variety and complexity of vegetation layers from the ground up. Including short herbaceous plants, larger herbaceous plants, woody shrubs, understory trees and overstory tree canopy, vertical diversity is a measure of the denseness of foliage layering and stem density. **Horizontal diversity** measures the mix of various different habitat types across a given larger landscape. A mosaic or patchwork of multiple habitats is more valuable and meets more needs of more species of wildlife than would one or two types of habitat alone. Guthrie farm is impressive in this respect.

Any forest management goals for this property should consider these concepts. Specific no cut zones, continued careful “open” and “brushy field” management, as well as other future silvicultural activities throughout the forest may be deliberately designed to perpetuate if not improve upon the structural and habitat diversity of this property.

- At day’s end Sean and I spent a delightful final hour exploring forest and brushy habitat in and around a small wetland due west of Monique’s field. Here we found numerous examples of moose barking, walkovers, and highlined balsam fir which had been browsed by moose.

Moose barking is identified by the distinctive parallel scarring caused by the animal’s lower incisors as he or she scraped upward in order to remove and eat the bark of trees. Thin-barked younger specimens of red, striped, and mountain maples are wounded in this way. Mountain ash in higher terrain are also barked-both in the fall and late winter/early spring seasons. Because moose choose these few species, and no others to any great extent, and because this foraging behavior occurs during seasons when certain

nutrients may not otherwise be available, I suspect that these giant ungulates are stripping bark in order to possibly access specific mineral salts in the inner bark's sap.

The browse line on balsam fir shows the height to which a foraging moose will reach in order to eat foliage. With adult moose standing 5-6 ½' tall at the shoulder one can appreciate how high a moose's munching lips could reach! Less sturdy willows, maples, birch and cherry trees are often broken and browsed in less lofty comfort. Called walkovers, moose have straddled and merely walked over these trees in order to reach the otherwise unreachable nutritious and palatable terminal buds and stems.

- Before leaving the wetland I discovered three bear mark trees; two were older marks on balsam fir, one was somewhat newer, more subtle, and was possibly associated with a nearby large white pine. Additional field visits to this site could possibly confirm the use of this pine by a sow with her cubs of the year. Called "babysitter trees", older conifers (especially pines and hemlocks) are used as "refuge trees." Mother will hide her cubs in the crowns of these trees while she leaves them so that she may forage alone in open or potentially dangerous habitats. The latter sign was not mapped. More evidence is needed.



**SUSAN C. MORSE**

**FIELD SUMMARY – DECEMBER 16, 1998**  
**WELLS PARCEL**

- Our route took us along a much used hiking trail due east of the Wells farmhouse. Despite its history of logging activity, and its continuing use for the Andersons' hiking and skiing pleasure, the abundance of animal sign I observed was encouraging. Within 10 minutes of the house and mowed lawn, Sean was kept quite busy recording the sign or important habitats we encountered.

Within the early-succession sapling/old field ecotone we found a rich abundance of mast-producing trees and shrubs. I recommend periodic treatment to release, thin and perpetuate this valuable resource. In particular, I noticed several opportunities to stimulate the expansion and/or well-being of various fruit-making species including serviceberry, pin cherry and apple. I recommend a light (winter only) removal of competing ash and maple species to gradually achieve this goal. (Given the nature of the species to be removed this would be an excellent opportunity to gather some easily accessed fuelwood).

- Current and historic claw scars were observed on apple trees within the above-mentioned zone. These scattered trees are much relished because they can be accessed by bears (and other wildlife) with minimum of exposure. Thick herbaceous and shrubby understory provides excellent concealment and resting cover for all sorts of apple harvesters including, deer, fox, coyote, fisher, grouse, porcupine and bear.

Forestry activities to perpetuate the productivity of these trees will need to practice an occasional light opening of the understory—just enough to stimulate its production, while periodically cutting it back to prevent its eventual conversion into a competitive woody understory. Some further tracking on snowcover should be considered in order to ascertain the nature of favored game trails and resting locations. With this knowledge in hand we may then do a better job of both conserving and enhancing qualities this habitat now provides.

- Within minutes of the aforementioned fruit-producing habitat I was delighted to discover our first black bear mark tree. Most prominent alongside the trail, the white birch made quite a bulletin board. Its clawed and bitten surface was quite visible against the white background of the light-colored bark. Its "scent message" would have been readily interrupted by other bears passing through.

Years ago, while endeavoring to make sense of black bear mark trees, I developed an approach which has since enabled me to interpret some of the features which previously made no sense to me. I knew that bears bite trees as well as claw-mark them. A double pattern on smaller diameter trees where the bear was able to wound the tree with all four canine teeth made sense. However, the more frequently

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encountered single marks (what I now teach students as the “dot-dash pattern”) eluded me at first, until I started taking “Yorick” my bear skull along. Placing the skull’s mouth up to the wound I learned that I could eventually make the teeth fit perfectly into the wounds of a mark tree. I could simulate how it happened. Single scars in a dot-dash pattern were made on larger trees because the bear needed to tilt his or her head at an angle so as to allow one upper and one lower canine to achieve the bite. Positioning the head so that the skull’s teeth were firmly lodged in their final resting place when the bite was completed, I could recognize the following patterns which are typical of all bites which do not succeed in biting off and removing a chunk of the tree’s bark or wood:

1. canine-caused scars come from opposing directions, just like the teeth which made them. Woodpecker bill scars, bullet wounds or other mechanical injuries will not show this pattern. (see photo of white birch mark tree) I have deliberately inserted canine sized small sticks into the holes to demonstrate their opposing nature.
  2. the “dot-dash pattern” is the result of a bear’s upper tooth lodged in place while the lower jaw scratches its canine towards the fixed position of the opposing jaw.
  3. in order to make such a bite, and exert the force necessary to wound the tree a bear will reach around the back of the tree with one or both paws and grasp, if not pull, firmly in the opposite direction. Thus clasping the tree firmly (while crouched, standing beside, or even clinging to the bole of the tree while above ground) a bear may perform the sheer gymnastics of marking. Learning to recognize these patterns one can “read the sign” accordingly.
- Further along the trail I discovered another mark tree—this time on white pine. Again, the bite mark and claw scars demonstrated the bear’s position when he or she made the mark. The pine was beside a well-used game trail which entered the woodsroad from the south. This is “textbook” marking behavior as I have grown to expect it. Over the years, various marking behaviors occurring in the same situations, even on the same kinds of trees, have taught me that there is often surprising predictability to where one should *look for*, and hence *find* bear mark trees. The following are some of my observations:
    1. 25 years of data I’ve collected throughout the Green Mountains has revealed that more than 76% of all trees species marked occur on only 4 species of trees. In the order of occurrence (not necessary preference) balsam fir, white birch, striped maple and red pine are most commonly chosen by bears. Possibly these species’ offer greater wound visibility, ease of wounding, sap scent attractions, or scent-capturing substrate. Possibly some combination of the above may also provide an incentive.
    2. Curiously, white birch has a counterpart in the rocky mountain west—quaking aspen, and for lack of balsam fir it seems any easily wounded sappy-barked fir will do—even douglas fir or white, limber or pinyon pines which are not firs!
    3. Statistically, two other species of trees in the north woods account for another 14% of the data I’ve catalogued. White cedar figures prominently in Maine, Minnesota, the Adirondacks and the Northeast kingdom in Vermont. Perhaps

*Thuja occidentalis* would assume a greater role than one of the “big four”, except that it’s not abundant where most of my data has been collected.

4. White pine, apropos of this report, has been marked a great amount, particularly young smooth-barked trees which are “soft and sappy.” This tree (see photo) was indeed soft; it was easily wounded and undoubtedly provided the bear with a desirable mix of aromatic sap which may serve to attract nearby bears. Such a sappy medium may also provide an excellent substrate for holding onto and preserving the marker’s own hair and scent, thus extending the life and usefulness of the *message*.
5. Predictable ways bears move through their habitat, coupled with their desire to choose a prominent location and/or a distinctive tree to mark, all can guide us as we look for bear sign on Wells farm or any of the other Anderson properties. Again and again, ridgelines and gametrails along riparian areas were marked, because bears’ movement corridors are found here. Intersections of trails (such as the game trail/woodsroad junction where the above-mentioned pine was found) are useful places to look for bear marking sign.
6. Wetland edge offers multiple places to look—the principle being that bears will mark where their messages can be readily encountered and read. Places where bears will be traveling more frequently offer a great “coarse filter” for our search. Wildlife trails along inlets, outlets, incoming ridgelines, eskers, kame terraces, and beaver dams are commonly marked. In addition, mark trees will often be found in thickly forested (softwood) peninsulas or other favored feeding resting and security habitats, (often in the vicinity of large evergreen “babysitter trees” and cooling “wallow sites”). Such areas are marked year after year if bears are using these habitats.
7. Throughout the forest where a bear may roam seeking its seasonal food and cover necessities, any large or conspicuous tree or object may be marked. Such a tree may be conspicuous because it is huge when compared to surrounding trees, or it may be more noticeable because it has already been “marked” by human landowners as part of their boundary! Trail signs, power and phonline poles, and even outbuildings will also be marked, particularly if they are made of creosoted wood.

The Andersons have learned first hand the value of this maxim shared during our first Keeping Track® class held at Wolfrun: “About half of tracking is **knowing where to look**, and the other half is **looking**”. Sean and I were most satisfied with the first half of our Wells farm outing, and the degree to which we easily documented presence of bear on this property.

- Scattered serviceberry and apple trees found along the woodsroad are valuable producers of foods otherwise unavailable in the forest especially as one climbs towards the summit ridge. Should some future logging activity occur nearby, the Andersons



might request that group-selection cuts be prescribed to occur around salvageable fruit trees in order to release them and perpetuate their value to wildlife.

- A bear-marked sugar maple was discovered on top of the ridge. It was suspiciously close to a cluster of red spruce blowdowns. A cluster of recently downed trees, still thick with foliage, and an impenetrable mass of trunks and root wads—created an ideal location for a possible winter den site. I've recorded bears denning in situations like this and marking is often seen in the vicinity.
- Compare the photo of Sean standing beside a red maple tree (barked by a moose 10+ years ago) with the Guthrie photos of "recent" and "very old" barking scars. This tree, and several red maples nearby were wounded as moose fed on the bark. In this photo the thick roll of new growth tissue is evidence that the wound occurred several years ago, and may successfully close together to "heal over" the original wound's surface area. Recent wounds lack the rolled growth. By contrast, wounds which are quite old may smooth together all former wound edges into a newly unified bark which barely shows a trace of the parallel incisor scrapes.  
Note that Sean is 6'5" tall, with a reach of approximately 8'. The moose which barked this tree was indeed a tall creature!
- Just beneath the summit ridge we encountered numerous fresh fisher tracks. Though we stayed on our chosen course, we nevertheless were able to track the fisher for several minutes and discover what the animal had been up to. Multiple tracks told of journeys coming and going from a probable den site located in a spruce/red maple blowdown. Trips to outlying beech, maple and yellow birch hardwoods showed where the fisher opportunistically hunted for prey and fruit. The interspersed forest ecosystems contribute invaluable to the fisher's well-being.
- In keeping with our expectations, a black bear marked and climbed a large white ash boundary tree which we discovered on the northern property line.
- Red maple, red spruce, birch and occasional large black cherry trees were found, along with numerous seeps throughout the northern corner of the ridgeline. The Andersons may choose to release individual cherry trees and thus contribute to their productivity and longevity. However, great care should be taken so as to not disturb valuable microsites featuring seeps, possible vernal pools and unusual wetland and woodland flora.
- Descending the slope, paralleling the east/west boundary line, we discovered two more venerable giants whose history of animal visitations was unique. One tree was immense for its species; the nearly 30" (DBH) Eastern hophornbeam gripped the earth with a fantastic gnarled root system. Numerous scratchmarks of raccoon and squirrel told of repeated climbs to seed-laden branches. Roots, reminiscent of gothic flying buttresses, provided innumerable small chambers and crevices in which to hide and store food.  
The other old giant was a 40" (DBH) white ash which was recently marked by a black bear, and no doubt has been marked many times in recent decades! A nearby spring may be a focal point for bears seeking cooling relief, while this grand tree provides a sanctuary for generations of bears.
- At the conclusion of the day Sean and I explored a series of wetland habitats paralleling the north/south boundary line north of the Wells house. Abundant

softwood cover juxtaposed with open wetland glades drew us further and further north until we recognized that we had gone off of the Andersons' property. It was here that the wetland bench was most interesting. Mossy tangles of red spruce created cool dark refuges while open patches offered a bounty of sedges and spring forbs.

Upon returning to the Anderson boundary I noticed a huge old maple (another line tree perhaps?) thrusting its massive overstory above the younger conifers all around it. *Thinking bear*, we had to investigate. Sure enough, the maple had been marked over multiple years (see photo). Possibly the tree serves as a sow's preferred babysitter tree while she feeds in the nearby coolness and concealment of the spruce wetland.

I recommend further research regarding this habitat's ecological status, former human history, current and future value to wildlife, and eligibility to be conserved.



**SUSAN C. MORSE**

**FIELD SUMMARY-FEBRUARY 17, 1999**  
**PIERCE PARCEL**

- We first investigated habitats and sign found on the northeast corner of the property. Traversing the powerline corridor we noted the abundance of fruit-producing trees and shrubs found growing along the open edge of the swath. Here's an easy opportunity to further stimulate the productivity of serviceberry, hawthorn, cherry, raspberry, occasional butternut and viburnum species--simply by eliminating competing trees and shrubs. If existing hardwoods and softwoods are permitted to grow, they will not only crowd the crown-space of desirable mast-producing species, they will also hasten the return of the powerline maintenance crew who may be overly zealous in removing all plantlife within the corridor, including species beneficial to wildlife. Animal species whose tracks and sign we observed along the corridor and adjacent mixed wood habitat include: eastern coyote, red fox, deer, ruffed grouse and snowshoe hare.
- Throughout the Norway spruce, red and white pine plantation areas we encountered relatively little wildlife tracks and sign. However, white-tailed deer have been known to use Norway spruce plantations as wintering areas, particularly when stands are young (8-15" (DBH)) and still offer optional and thermal cover within densely layered foliage. Of all native and commonly planted exotic spruces *Picea abies* is remarkably shade-tolerant. It retains its lower branch needle cover for many years while growing. Crown closure, featuring the interlocking and overlapping crowns of evergreens, provides a protective "roof" over the bedding ground of wintering deer. Energy-draining hardships caused by deep snow, chilling winds and heat loss are thereby minimized. A network of familiar well-packed trails within the "yard" further safeguard deer—providing reliable escape routes from predators.  
 This spruce plantation still provides excellent crown closure and is in close proximity to abundant browse species along the powerline corridor, and within the mixed-hardwoods and wetland edge habitats paralleling the Isham Brook beaver flow. Additional field investigations should be scheduled for early spring in order to determine this stands' usefulness to wintering deer.
- Red and white pine stands were full of red squirrel tracks and seedcone caches. Snowshoe hare tracks were encountered in two locations: (1) along the northern mixed hardwood and red pine plantation's shared boundary (2) east of the red pine stand on the edge of the field and the beaver flow. At both locations, it appeared that *Lepus americanus* is currently finding the right mix of security cover and forage within the various coverts which several intermingled habitat types provide. Nearby fields provide herbaceous foods, including grasses, clover, succulent forbs and fruit. Tender new growth of woody shrubs and small saplings are abundant in the brushy wetland

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edge, and throughout portions of the mixed wood stands. Sign of snowshoe hare feeding on hardwood new growth, buds and bark of saplings and seedlings was also evident.

Though we did not observe evidence of this nature, it is nevertheless quite likely that hare are finding food and cover resources within the softwood plantations as well—particularly along the outside edges of each stand, where younger naturalized conifer seedlings provide more cover and food.

- As we approached the open and brushy meadow wetland along Isham brook we were not at all surprised to find sign of black bear. Right opposite the abandoned beaver lodge I discovered a balsam fir which had been marked.
- Along Isham brook we also noted the tiny bounding tracks of an ermine (short-tailed weasel). Nostip to tailtip this smallest of Vermont's native mustelids might only be 13" long, weighing a mere 2-4 ounces. By late fall,, both the ermine and its larger cousin the long-tailed weasel will complete a remarkable "molt", and exchange their summer brown coats for their winter white coats which protectively blend with the snow. Both species have black-tipped tails which are thought to provide a life-saving false target for avian predators.

Weasel pay a huge price for their tubular snake-like body shape. Though rodents' subnival chambers and pathways may be more easily hunted, heat loss from the long skinny bodies requires that weasels produce a metabolic output nearly double that of other mammals of bulkier build.

Today's tracks—bounding alongside Isham brook and zigzagging through willow thickets and alder tangles... today's tracks tell all. The ermine is hunting in order to fuel its metabolic furnace. To compensate for its off-the-charts energy expenditures (especially in winter) our weasel must eat as much as 30-40% of its body weight each day! When people see the carnage in the chicken coop (those many headless victims!) they are apt to think of the weasel as a Evil Incarnate—a Charles Manson with an unforgivable lust for killing. Actually, the weasel is not so much ferocious and cruel as it is driven. The weasel is driven with a wild passion and boldness born of *absolute necessity*. "Surplus killing" is common among the weasel clan. Given a chance, every one of those dead chickens will be cached in the pantry-so to speak-for future use.

- Evidence of the beavers' extensive modification and occupation of Isham brook's drainage along the northeastern edge of Pierce farm is impressive! Though currently abandoned, the broad expanse of beaver flow marsh and adjacent wetland forests of willow and alder are living testimony to the industrious and lasting achievements of *Castor canadensis*.

During the past several decades, Vermont's steadily increasing beaver numbers, with their associated impoundment's and flows, have profoundly influenced the ecology of woodland stream habitats. Where water levels are reliable, beavers build dams and inundate whole "flats" with expansive ponds, or construct staircased pools which drop with the terrain. Such flooded areas, and the marsh and wet-meadow habitats which succeed them, are dynamic and vital influences in the environment.

Beavers are a **keystone species**—their contribution to the ecosystems in which they live is disproportionately significant. their impact on their habitat, and all that live there far outweighs the beavers' numerical abundance. Beavers, and the changes they

bring upon the landscape, vastly enrich ecosystem functions and diversity. Beavers are hosts to an extraordinary bounty which is enjoyed throughout the food web from mink to moose.

Enjoying the unique beauty and biological richness of the Isham brook flowage through Pierce farm, Sean and I imagined the various transformations of this landscape—before, and now, after the return of beavers. Undoubtedly, this fertile flat was made so by beavers. Beavers probably occupied Isham brook's watershed for thousands of years. Then, within a mere three centuries, the European demand for beaver hats decimated beaver population across the entire continental U.S. Native American and colonist trappers first nearly eliminated the beaver throughout the northwest by the close of the 17<sup>th</sup> century. Another 100 years was all it took for fur traders to then practically wipe out beavers throughout the entire west. The disappearance of the beaver from habitats as diverse as Isham brook, the upper Mississippi and Missouri rivers and even southwestern desert riparian watersheds caused incalculable losses of biodiversity.

With the return of beaver, here, along Isham brook, the following can once again take place. Beaver-caused ponds cause streamside woodlands to drown and die, creating essential resting and nesting sites for great blue herons, hooded mergansers, wood ducks, tree swallows and osprey. Other wetland-dependant species utilize both the ponded and marshy habitats, including muskrat, salamanders, frogs, turtles and numerous fish species. The late naturalist, John Kulish of New Hampshire, used to refer to returning beaver swamps in our northwoods as the "New Deal" for otters and mink—"a chain of fish markets."

During the 25 years I've studied similar beaver-initiated neighborhood improvement programs at Wolfrun, my data has shown a steady increase in river otter and mink numbers. I'm convinced there's a commensalistic relationship between beavers and river otters, particularly in upland mountain habitats where beaver flows increase and extend the otter's opportunities to forage—both geographically and seasonally. Commensalism involves two different species which associate with one another in the same habitat, where one species—i.e. the otter—clearly benefits from the relationship.

Ever-renewing beaver engineered habitats provide highly productive wetlands. Such wetlands both collect and decompose tons of organic matter, in turn making available nutrients for plants and animals alike. Small invertebrates, and fish are nourished, which in turn feed many animals, including otter and mink at the top of the food pyramid.

Even after Isham's beaver dam gives way, and marsh and wetland tree and shrub communities dominate in the ecosystem, the rewards of the beavers' former occupancy are enduring. Deer, moose, black bear, raccoon, all of the local candid and feline predators, and numerous species of birds visit these habitats with regularity. Some human neighbors regard the beaver as a "nuisance", and wetlands as "unproductive land." Nothing could be farther from the truth.

- Crossing Isham Hollow Road, Sean and I continued our field investigations within the southern half of the property. After crossing a large field, we entered the forest along an access road which lead us to oldfield white pine woods grading into Hemlock forest

types. We observed a diminishing abundance of structural diversity and understory regeneration the further south we proceeded. Especially within the steeper terrain overlooking the confluence of Isham and another unnamed brook, we noted the dominance of lovely mature hemlocks, but little else.

Hemlock forests have been identified throughout Vermont for their invaluable contributions to the rather finite resource discussed earlier, "deer wintering areas". In addition to crown closure, factors such as south facing aspect and steepness of terrain may also contribute to quality winter habitat for deer. This Isham brook Hemlock ravine provides all such qualities, however its nearby opportunities for winter foods could be improved upon. The best deer winter range features an interspersion of coniferous forest shelter with easily accessed small glades and/or brushy edge habitats in which deer can safely find adequate browse.

I recommend that the Andersons arrange a meeting with a wildlife/forester and a representative of Fish and Wildlife. These professionals could help investigate this habitat further, and discuss possible harvest options which could stimulate the production of additional winter food for deer.

- Traveling north, Sean and I next inspected habitats along the north/south boundary line. Food-producing trees and shrubs were encountered throughout, including black cherry, beech, red oak, serviceberry, viburnum and beaked hazelnut. We discovered recent sign of bear feeding in a beech tree within 50' of the southwest property line corner. Further north, we traversed a forested wetland. Here we found sign of snowshoe hare and long-tailed weasel. I commented to Sean, "the wee white hunter often preys upon the big white bunny."
- Our final hour was spent exploring the field edge and northern mixed-hardwood forest habitats northwest of the Pierce farm house and barn. Abundant sign of white-tailed deer was found throughout this portion of the property. Tracks of red fox and snowshoe hare were also found, within sight of Monique's field overlooking the house.