Not Just the Trees

Incorporating Human Ecological Literacy into Forest Management Beyond Biodiversity and Carbon Sequestration in Rural Landscapes

A non-degree-required thesis submitted to the
Master of Landscape Architecture Program
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May, 2025
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Acknowledgments

For me, landscape architecture is about people; how they are affected by the landscape, and the people that change it. I would like to thank the many people that enabled me to explore this further through my graduate studies:

CL Bohannon
Michael Luegering
The Garden Club of America
Beth Meyer
Joe and Patti of VDOF
Erica Stowe and Luke Longanecker
Martha and Paul Gibson
Mandy Kenny
Pui and Emily Shield
The UVA landscape professors
my incredibly talented MLA cohort

and to Daniel, your encouragement and support
made this degree more than just a daydream.

Abstract

The fragmentation and parcelization of Virginia's 16 million acres of forest have allowed management to become disconnected by both administrative and physical boundaries. With diminishing resources from state and federal conservation agencies, we can look to bolstering collaboration between private landowners to help steward the future of Virginia's forests, 82% of which are privately owned. This thesis introduces a Field Guide designed to empower individual landowners and landscape architects by connecting scientific knowledge with practical, accessible tools for managing forested landscapes.

The Field Guide uses a system of ecological cues—observable patterns within the landscape that signal key ecological processes or disturbances. These cues, informed by theories in ecopsychology on visual perception and patterns, help users increase their ecological literacy through steps meant to expand their understanding. The Guide enables landowners to recognize and respond to these cues through a structured dichotomous key that leads to translated Best Management Practices (BMPs). This framework fosters ecological literacy by providing users with the tools to assign meaning to the cues they notice on their land, therefore bettering management plans on their own or with the guidance of landscape architects and conservation agents. The Field Guide helps landowners recognize overlapping ecological cues across neighboring parcels, encouraging shared management strategies even when values differ. Ideally a free and publicly available resource, this approach fosters collaboration, helping to maintain ecological integrity across social and ecological disconnection. For example, identifying an invasive species leads the user to a set of BMPs that consider the species' location, the size of its population, and proximity to sensitive areas like water sources in the removal strategies. Other cues include indicator species that signal an opportunity in an area, or the lack of a specific species can also indicate a needed shift in strategies to encourage a specific ecological type. The Guide includes visually translated management strategies that help land-changers carry out these practices on the ground, enhancing their connection to the landscape through hands-on action.

As forest parcels are increasingly divided and managed independently, ecological systems become fragmented, which can undermine their health and longevity. Landscape architecture plays a vital role in shaping the future of forested landscapes. By integrating ecological understanding into management practices, landscape architects can ensure that maintenance aligns with long-term ecological goals. This book serves as a critical tool for bridging the gap between scientific research and practical land management. A locally specific and didactic tool, the Field Guide encourages translation opportunities or concerns over decades and generations. It is an invitation for landowners and designers to embark on a lifelong journey of stewardship, ultimately leading to a collaborative enhancement of landscape literacy within Virginia's forests.

Introduction

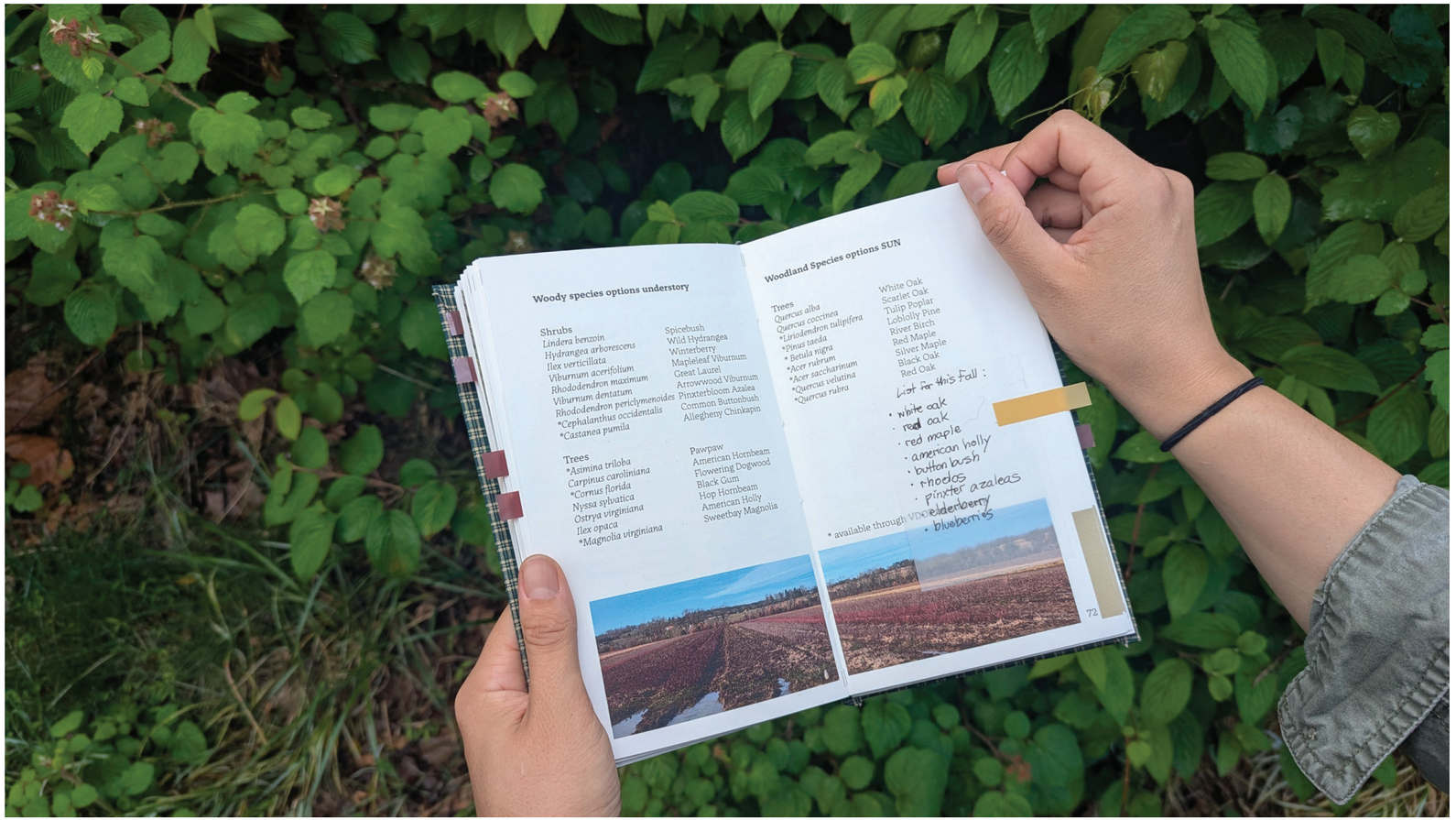
Virginia has over 16 million acres of forested land, approximately 59% of the total land area of the state. With 82% of forests privately owned, the fate of the state's forests is left to individuals. Adding in constant land use changes and continued fragmentation and parcelization, effective ecological stewardship of these lands is necessary to sustain these forests (Forest Resource Information, n.d.; Virginia's Forest Composition, n.d.). However, most current forest management decisions are made with singular priorities and value judgments and, therefore, fall short of a resilient and connected strategy. Currently, there is a trend of forest fragmentation not only with physical disconnections but also through the invisible boundary of property lines. The Forest Service reported the median privately owned parcel size was 11 acres in 1994 (Hodge et al., 1998; Thompson & Johnson, 1996)— assumed to be even lower 30 years later. Property sizes have decreased throughout history as large tracts of land have been broken up through generations for economic benefit. This creates many smaller parcels that are separated physically or administratively and managed differently. VDOF Watershed Management Specialist Patti Nylander describes the challenges that foresters and logging companies are dealing with now, as forests are split into these smaller and smaller parcels. "A small woodlot owner who is interested in doing more with their property will seek professional advice on what to do, which is great! As the landscape is fragmented and there are more owners of smaller woodlots, more and more people are becoming forestland owners who are seeking guidance and recommendations on what to do with their property. It can be challenging for natural resource

Fragmentation and Parcelization over physical and administrative boundaries

professionals to meet the increased demand." (P. Nylander, personal communication, October 25, 2024). It takes a similar amount of time for extension agents and foresters to write a forest management plan for a parcel that is 10 acres as it does for a parcel that is 100 acres. Of course, these underfunded and understaffed agencies go where their time is most efficient, the larger parcels. This was even before our federal government began reducing our conservation and natural resource agencies (Max Matza, 2025; Maxine Juselow, n.d.; Taylor, 2025). The general minimum lot size for a logging company to harvest is 25 acres due to economies of scale, and with the median lot size already below this, forested areas are fragmenting smaller than experts are willing to manage. This leaves a large population of small lot landowners on their own to make decisions that affect over 50 % of Virginia's landscape. With the increased threat of climate change pressures, including pests, diseases, and shifting weather patterns, nimble and connected management is more important than ever.

Currently, land management information is disseminated state, local, and federal conservation agencies. This process begins with landowners contacting any number of government agencies to provide expertise for their property. But there are more requests than agents available. When agents are able to assist private landowners, the black box of BMP research and suggestions is applied to the property and land management practices are suggested. The four big agencies that attribute information to forest and land management in Virginia are the Virginia Cooperative Association that works with Virginia Tech on research and development of forestry practices specific to the timber industry (Woodland Management | Virginia Cooperative Extension | Virginia Tech, n.d.). The Department of Conservation and Recreation provides Best Management Practices in the policy realm (Soil and Water Conservation Programs, n.d.). The Virginia Association of Soil and Water Conservation Districts, which is broken into 47 districts, such as the Thomas Jefferson District that Albemarle, Nelson, Fluvanna, and Louisa Counties make up. The Virginia Association provides BMP guidance and tax incentives through the Conservation and Assistance program (VCAP) (Virginia Association of Soil and Water Conservation Districts, 2023). Most of the BMPs that this Field Guide engages with are grounded in the DCR, VCAP, and VDOF policies.

The fourth and most invovled agency, the Virginia Department of Forestry was founded with the mission to promote research to benefit the forests of Virginia, which includes but is not limited to "the instruction and encouragement of private owners in preserving and growing timber for commercial and manufacturing purposes" (About-the-Virginia-Department-of-Forestry, n.d.). VDOF offers many free educational opportunities for private citizens. They include traveling to visit other BMP application sites and online short courses (Forest Resource Information, n.d.). VDOF foresters also provide forest management plans, which are written for specific sites, but are often not updated following the initial plan because of insufficient resources.



The Field Guide in use: several species lists are provided for the user to determine the right plant for the right place.

A single individual can make a difference in the face of overwhelming change, just by continuing to care for their land.

Connecting management plans across property lines is challenging but achievable, particularly when ecological literacy forms the foundation of these plans. Ecological literacy, first introduced by Frank Herbert in the science-fiction novel, *Dune* and later researched and written by Professor David Orr, emphasizes that understanding the baseline ecological processes of our environment enables humans to avoid disrupting the very systems that sustain life (Orr, 1992). This understanding is constantly expanded, shifted, and expounded upon by individuals and invested agencies as we continue to shape and live in the natural world. Land management is a huge part of this, as humans are making the decisions that affect the very foundational processes of large-scale ecosystems, including the forested landscapes throughout Virginia. Hownever, landscape architecture can have a greater impact on the relationship between the landscape and the land-changers. As Rebecca Koonce notes, "The difference lies not only in the scale but in the intention behind the work. Land management and planning through landscape architecture and design connotes intention, precision, control, and emotional investment" (Koonce, n.d.). This research attempts to answer the question of how human perception can be used to build ecological literacy and therefore influence land management strategies that connect forests across administrative and physical boundaries. By developing management strategies grounded in scientifically researched Best Management Practices (BMPs) and informed by the values of landowners, a specifically crafted tool can connect ecological processes with human-scale action. And by expanding landowners' perceptions to recognize larger ecological patterns, this approach can enhance ecological literacy and foster more holistic, connected forest management across fragmented landscapes. Referencing the writing methods of notable ecologists and botanists throughout history and therefore engaging with the most successful communication strategies, human-scale perception can expand into large-scale patterns, thereby attempting to increase the ecological literacy of private landowners. This also allows for landscape architects to engage more deeply with the process of shifting a landscape towards a specific goal, not just the final end result. Leveraging human psychology in the ecological realm of persception is key to this change.

The Ecopsychology of Reading the Landscape

The idea that humans see patterns in the landscape is a well-established fact. Gestalt perception theory argues that humans see objects as wholes, not just instances or parts of the whole. It also means that the whole has an entirely different value than just the sum of its parts. The principles of Gestalt psychology include but are not limited to proximity, similarity, symmetry, continuity, and past experience. These are the ways that humans combine attributes in perception. This psychological theory was a part of the basis that James J. Gibson elaborated on to research ecological perception (Heft, 2001). Gibson expanded on the Gestalt theory into his ecological perception theory; that every landscape aspect can be read to include the future or past affordances it provides or how it fits into the context of other aspects. This runs parallel to ecological literacy, which is understanding the existing affordances of an ecological cue, and landscape literacy is understanding what opportunities that aspect may provide with human intervention, discussed later in this section. These theories of perception build and expand on each other. Translating this to the landscape means we see plants as an entire plant, not just the leaves or the flowers. This can easily be seen in how trees are identifiable from across a field or a bird in flight is identified from afar. Extending this perception, it is possible to view plant communities, animal habitats, or ecological forms as patterns and therefore as a whole. Perception is defined in the field of psychology as the process and interpretation of sensory information from the environment to create a meaningful experience (APA Dictionary of Psychology, n.d.). Ecological perception, as defined by Gibson, is a direct and natural process where organisms perceive the environment and its affordances (opportunities for action) without needing complex cognitive interpretation. This means that ecological perception, and therefore ecological literacy, is innate in our minds and only needs a cue to steer our cognition towards. This perception is something that can be learned through practice and experience. Meaningful perception is often the missing piece in land management for landowners. Martha Brookes Hutcheson, one of the first women landscape architects, implores the individual gardener to understand that they are a part of a greater network and the more we know, "the more we will make use of the great variety in growth already ours… which might lend itself so wonderfully... It is at our very door" (Hutcheson, 2001).

People's experiences in natural settings have been researched extensively. Recent studies on nature immersion and forest bathing confirm that humans need to be in nature, not separate from it (Morita et al., 2007). But what draws people into nature and keeps them coming back? The theory of place attachment, as defined by Altman and Low, is a three-dimensional framework that operates between person, process, and place (Low & Altman, 1992). By engaging with this bond, even with global mobility available nowadays, people still relate and want to protect the places they love. Rachel and Stephen Kaplan researched the cognitive effects of perceiving natural spaces and their separate attributes. They found that trees have the highest correlation to satisfaction with a landscape. Other vegetation is appreciated, but trees rank highest for humans in appreciating a specific natural scene (Kaplan & Kaplan, 2011, p. 111). The Kaplans' research also supports the idea that "participation can lead to unique solutions that speak to local needs and fit the local context. Genuine impact can lead to a greater sense of ownership, stewardship, and community. People are sensitive to signs of making a difference" (Kaplan et al., 2010, p. 123). By increasing the place attachment of a specific place through understanding the existing processes and placing value on the assets of the site, the management of the site can become more place-based (Brown & Raymond, 2007). Increasing this value is based on building ecological literacy through perception and recognition.

Understanding a landscape before intervening in it requires more than just technical knowledge; it demands ecological literacy grounded in

The Field Guide used as translation tool and register for observations.

perceptual and cultural awareness. Garret Eckbo once observed that rural landscape patterns, developed across generations, are "perhaps our most direct and continuous expression of the joint operations of man and nature"(Eckbo, 1950). This deep interweaving of human culture and ecological process confirms that rural communities already possess a form of landscape intelligence, though it may not always be recognized or fully activated in the face of modern change. Yet, as Joan Iverson Nassauer points out in Messy Ecosystems, Orderly Frames, "people do not know how to see ecological quality directly" (Nassauer, 1995). Our ability to perceive ecological function is filtered through cultural lenses. What looks like "nature" may, in fact, obscure crucial ecological processes. We often live in and move through landscapes, unaware of the functions that sustain them. In rural regions, these functions have been shaped and reshaped by centuries of management decisions: some beneficial, others suppressive. Diverse woody canopy undergrowth around fallen deadwood or warm-season meadows with desiccating grasses may be seen as untidy or in need of correction when, in fact, they represent essential ecological structures. Often, conservationists have to dispel the myth that landowners need to stay out of their forests to keep these spaces 'natural' (P. Nylander, personal communication, October 25, 2024; E. L. Stowe & L. Longanecker, personal communication, March 2, 2025). This may stem from the commonly held belief that humans are separate from nature.

This misalignment between ecological function and cultural perception has often led to interventions that prioritize aesthetics over systems thinking. For instance, during the Dust Bowl era, the FDR-era windbreak belt project introduced tree planting across the prairie, a gesture that made visual sense but misunderstood prairie ecology. Ecologists at the time recognized that the solution was not to insert a foreign element but to reinforce the native processes that made prairies resilient to begin with (Martin, 2022). Nassauer contrasts the "wild" with the "tended," associating human care with visual order. While this binary can help explain how people interpret landscapes, it oversimplifies the relationship between function and form. In reality, a landscape can be both wild and cared-for, ecologically rich and culturally legible. In rural contexts, where land is often both lived-in and worked-upon, these nuances are especially critical. For instance, a functioning stormwater BMP that appears "neat" might signal success to a passerby, while a neglected one—overflowing with trash—communicates failure. This reveals a deeper human impulse to read care as order and order as correctness. But ecological literacy asks us to go further: to see function within forms that may not immediately resonate as "tidy." Nassauer highlights that humans tend to perceive landscapes at the human scale, not the ecosystem scale. This can limit our ability to understand broader ecological patterns, but it also presents an opportunity. Experience matters: walking, touching, and seeing are ways we form relationships with place. These sensory experiences build ecological understanding over time, leading to more appropriate, grounded forms of stewardship.

As climate change intensifies and forests continue to fragment, relying solely on aesthetic interventions is no longer sufficient. The goal is not to reshape ecological processes to fit human perception but to reshape human perception to recognize and respect ecological processes. This

Evolution of Field Guides:

This timeline documents some of the important moments along the evolution of field guides beginning with herbaria books. The huge influx of publications later in the 20th and 21st centuries especially by women authors has cemented the modern field guide in environmental education and ecological literacy for the professional and amatuer

shift doesn't require abandoning rural traditions but draws on them, expanding them, and embedding them within a deeper awareness of the land's living systems. Ecological literacy is the broader definition of this, as humans can shift their perception to understand the overall systems that they live within. Landscape literacy, introduced by Anne Whiston Spirn adds humans into the mix (Spirn, 1998). Ecological processes occur without human intervention, but that is becoming less common in the current Anthropocene. Landscape literacy is built through the relationship between landscape and landscape-changer, identifying the opportunities and weaknesses that the ecology affords us.

Field guides have been used to help people move through the landscape since the 1800s, when the first written field guide was published in France in 1803 by Jean-Baptiste Lamarck on the Flora of France (Candeias & Scharf, n.d.). Dichotomous keys used in field guides revolutionized botany, and field work enabled the taxonomic classification system to evolve within the academic world of botany. Florence Miriam Bailey wrote the first birding field guide for North America in 1889 (Scharf, 2009). This was at the beginning of amateur naturalism's popularity, which led to the popularity of conservation and ecological publications by authors such as May Theilgaard Watts, Henry Cowles, E. Lucy Braun, and Aldo Leopold. The purpose of field guides was to educate the general public so that the disciplines could be expanded by even amateurs. This ideology was in response to the gendering and devaluing of field work in comparison to the controlled environment of lab work in the horticulture field. Women were doing the majority of field work during this time because it was more accessible than a college education,

or the laboratories that were controlled by white men of the time (Martin, 2022). So, these types of books became the main tool for women and other amateur naturalists to gain and share knowledge about ecological systems. This history of gaining and sharing knowledge asynchronously can be paired with passing along lessons from experience to build comprehensive ecological literacy. The contextualization and visual imagery that field guides provide allow for a deeper understanding of the species and ecological processes discussed in these guides. This is a familiar way of accessing information for people nowadays, as field guides are found on bookshelves in homes across the world.

Forest Management and Changing the Landscape

The research on events of succession and disturbance in forests engages with the processes of recruitment, growth, and mortality. These processes have been researched independently as gap dynamics, wildfire disturbances, vegetation dynamics, as well as restoration paradigms and their effectiveness (Grubb, 1977; Halofsky et al., 2020; Stanturf et al., 2014; Yamamoto, 2000). These processes occur without human assistance; the forest exists without our management. However, as climate change affects the atmosphere's composition and disturbance rates, forests and their processes are degrading. Forests are changing; they are younger, more fragmented, and increasingly degraded by stressors like drought, pests, and temperature rise. Even trees' genetics are being altered by the changing climate (Whetten, 2021). Disturbance, increased CO2, rising temperatures, land-use changes, wildfires, and pests and diseases increase tree mortality rates with variable effects on recruitment and growth (McDowell et al., 2020). These increasing pressures mean that management strategies must change from the traditional strategies of the past. The consensus among forest scientists today is that increased diversity across all scales and elevations leads to a more robust and functional ecosystem (Benayas et al., 2009; Corbin & Holl, 2012; Grubb, 1977; Jactel et al., 2017; Löf et al., 2019; Schuler et al., 2017). This means that human interventions are most potent at disturbance and succession cycle points. Many human-assisted restoration strategies are currently used to address the climate-adapted ecosystem functions. Assisted succession, sustainable thinning, assisted migration, controlled burns, and climate-smart management to optimize carbon sequestration are some of the many strategies that have been tested to create the idealized natural forest (Stanturf et al., 2014). Through the effects of climate change, forests have continued to degrade in their functionality over time, and restoration has become something different than attempting to return to a specific time.

Forest restoration researchers argue that we should learn from the past by recognizing the existing conditions, but not use the historic conditions as the road map for restoration (Löf et al., 2019). Regeneration is a more substantive word, and these techniques and systems need to be advanced through the relationships between culture, human and natural disturbances, policy, and climate. Most of the research and current culture tells the story that any engagement with nature (which is seen as outside of us) is inherently bad. Nylander says that one of the most pervasive assumptions that landowners have is that staying out of their

Photo of reference site in Nelson County looking towards Sugarloaf Mountain

forests is the best way to manage them. They believe that changing a natural setting will inherently make it unnatural. However, stewarding a forest to be healthy most often means engaging in the management of disturbance and succession of the forest stand. Humans are not separate from nature, we influence these natural processes continuously. Regenerating the relationships means that there is new energy and life injected into the system, with the expressed purpose of creating a more sustainable and healthy system. The forest must be seen as a large-scale landscape system and restored towards that scale, which is different from how most restoration projects are carried out now (Löf et al., 2019). However, the local applications of these regeneration and repair practices are missing. Jenkins et al. state that the complex, scientifically researched practices are often tested and communicated at too large of a scale for humans to comprehend. Climate adaptation strategies are better understood through local, cultural contexts and with the additional visual translation of site-specific strategies (Jenkins et al., 2020).

The gaps found in the literature include site-specific and regionally

relevant Best Management Practices translated to the landowners, along with an entry point into the complex process of knowledge accumulation required for managing a forested landscape effectively. The following research process attempts to fill that gap, along with establishing relevance to the landscape architecture discipline through intentional management and maintenance practice, also known as design.

Methods

The following steps describe the method of identifying the ecological cues and the process of creating the Field Guide. The ecological cues are used as entry points in the Field Guide, leading the user through a dichotomous key that then translates researched BMPs from regional extension agencies into management strategies to be applied to the site. This process was determined through research on published field guides, comparison to existing BMPs, and testing with landowners on a reference site.

A reference site was chosen based on the identified research gap of medium sized lots (between 10 to 100 acres) without access to management resources, but with the intention of stewarding the forested parcel for the future. The site is in Nelson County, Virginia, a total of 76 acres. The majority of the acreage is forested and mountainous, with a former grazing pasture-turned lawn separating Davis Creek from the previously logged forest. As a professional soil conservationist and an amateur naturalist, the landowners of this reference site are the second generation to manage the forest and open spaces in the valley, and they already have a high level of ecological literacy. The landowners have started or completed several projects to benefit the ecological health of the site, including a wildlife corridor, reforestation within the monoculture portions, water quality measures, and invasive species eradication routines. Their constant care parallels their love for this site. This is one of the key takeaways of the literature review, proving that people take care of landscapes that they love and understand. This is also why the author chose this reference site, it is one that is walked often and the high level of care is obvious. To avoid the pitfall of limited time in proving this method works, this site was used as an in-progress scenario along with the experience of the landowners' in recognizing past cues that helped them decide on specific management strategies. This is explained further through the following project. The main goals of the landowners for management are for wildlife habitat and the aesthetics of an ecologically healthy landscape. This has been enacted through creating a wildlife corridor that connects the existing forest to Davis Creek, the stream at the base of the valley, and by maintaining the continuous installation of native species of trees, shrubs, and perennials throughout the property. The previous cue that the landowners identified was the separation between two forested areas and the lack of certain animals that are expected to be in this valley.

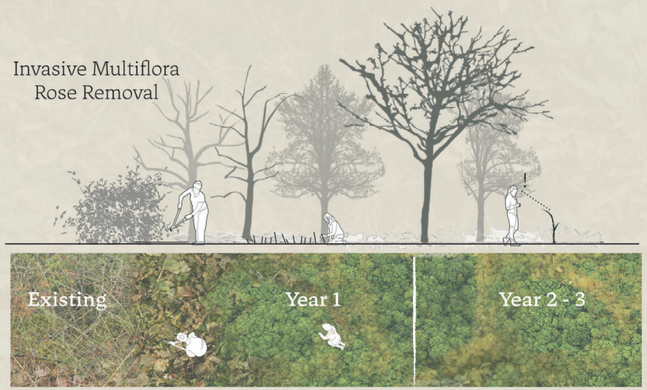
The ecological cues are meant to be the smallest unit within an ecosystem that humans can observe, and which also indicates a specific opportunity or problem. Other ecological cues include but are not limited to, species existence or non-existence, disturbance events paired with land characteristics, prior land use mechanisms, and condition pairings. The ecological cues were expanded through rigorous species and forestry unit sampling on multiple reference sites, interviews with experts in associated industries, and strategy testing through iteration. This possibly infinite array of ecological units was narrowed down to those identified on the reference site, which provided a viable way to confirm the relevance of each cue. Once the basis of ecological cues was created, they were compared to commonly referenced long-term goals and landowner values in state and county forester agencies. The multiple pathways between the ecological cues to the management strategies were created using personal professional experience, interviews with local conservationists, ecological research, and observations on the reference site. These BMP translations included multiple state and regional conservation agency recommendations. The dichotomous key became the bridge between the ecological cues, BMP recommendations, and the long-term goals of the landowners. This created process is based in the scientific method of psychology research along with the added benefit of design-thinking iteration that landscape architecture uses. This mixed-methods approach benefits both the author of the Field Guide and the users, as it provides multiple ways of understanding and engaging.

Photos of the wildlife corridor at installation (2020) and during an interview for this thesis (2025). The initial work was labor intensive and incredibly impactful, but the ongoing maintenance of the corridor is the most important to steward this space towards a more healthy ecology that hosts many wildlife species.

Suggested Best Management Practices by Extension Agencies and Conservation Groups are often not detailed or site-specific enough.

Dichotomous Keys beginning with the Ecological Cues allow landowners and designers to tune into the site specific needs.

Invasive Multiflora Rose Removal



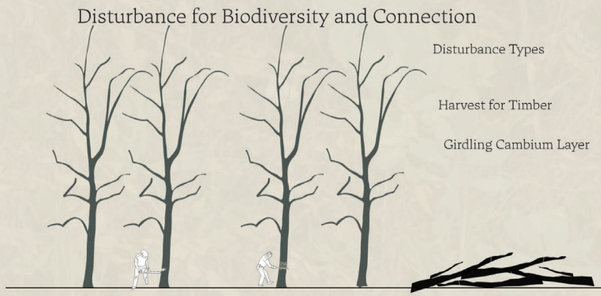
Invasive Multiflora Monoculture

Dormant Canes Cut & Painted

Further Removal And Alternate Planting

Suggested Best Management Practice: Remove Invasive Species. prevent the spread of invasive by avoid plaintng and reduce soil disturbance.
- Department of Conservation and Recreation

Disturbance for Biodiversity and Connection



Continued Disturbance to Allow for more Species to Access Sunlight

Diverse and Multi-aged Forest

Suggested Best Management Practice:
Plant material is to be bare root seedlings and containers no larger than a 2" caliper. Material can include trees or shrubs. Smallest or youngest plants reasonable are recommended for planting. Planting density shall be at least 300 trees per acre or 12-foot on-center. Diversity is encouraged for larger scale projects.
- Virginia Department Of Conservation and Recreation

Tulip Poplar Monoculture
Empty Forest Floor

Removal Through Disturbance

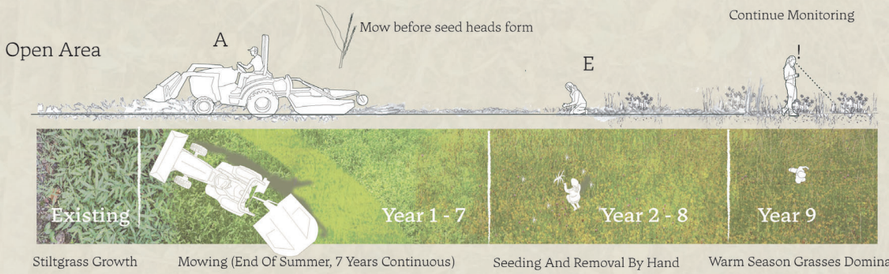
Invasive Japanese Stiltgrass Removal

1. Is the invasive population in a wooded area ..... go to 2
   in an open area ..... go to 3
2. Is the wooded area on a slope > 8% ..... go to C and D
   < 8% ..... go to 4
3. Is the open area on a slope > 8% ..... go to A or C
   < 8% ..... go to 4
4. Is the area within 100' of a water source ..... go to A or C
   outside of 100' of a water source ..... go to 5
5. Is the population area > 1000 sq ft ..... go to 6
   < 1000 sq ft ..... go to C
6. Separate areas into smaller sections and go to B

Suggested Best Management Practice:
Control Stilt Grass by removing by hand or mechanical means "late in the growing season before seed production". glyphosphate can be used at low dosage. Or Roundup at 1/2% solution
- Virginia Department Of Conservation and Recreation

A. Remove through continuous mowing, go to page 13
B. Can remove by spraying with glyphosphate, go to page 14
C. Remove by hand, go to page 16 [of Field Guide]
D. Plant native species to outcompete, go to page 17 shade
E. Plant native species to outcompete, go to page 17 sun

Open Area



Stiltgrass Growth

Mowing (End Of Summer, 7 Years Continuous)

Seeding And Removal By Hand

Warm Season Grasses Dominate

Forested Area

Stiltgrass Growth

Mowing (End Of Summer, 7 Years Continuous)

Planting Understory Species And Removal By Hand

1a.Surrounding land has areas of impervious surface or unvegetated ground or lawn runs directly to the stream ..... Go to 2b.

Surrounding land is mostly vegetated with minimal runoff into the stream ..... Go to 4

2a. The stream rises significantly in storm events ..... Go to 3.
2b. The stream does not noticeably rise or runoff is contained locally ..... Go to A

3a. There is enough space to create a 20% grade from the stream to other features including structures or large, stable trees. ..... Go to B
3b. There is limited space to grade ..... Go to 5 or E

4a. The stream already has dense vegetation .. Go to C
4b. Vegetation is sparse, young, or recently cleared ..... Go to 5

5a. There is at least 10-15 feet between the stream and barriers (structures, property lines, etc.) .... Go to D or C
5b. Area is small or narrow ..... Go to E.

6b. Area is smaller than 1000 sq ft ..... Go to F.

A. Reduce runoff by replacing lawn or bare ground with vegetated buffers and/of adding rain gardens in higher elevations or alongside paved surfaces..

B. Grade the banks on either side to create a gentler slope and slow water velocity (minimum 20% slope)

C. Allow vegetation to grow and avoid mowing or cutting. Allow roots to stabilize the bank.

D. Install filter strips using native grasses, sedges, or shrubs parallel to the bank. Allow roots to stabilize the soil.

E. Reduce runoff using narrow filter strips of native plants or live staking directly into the eroding bank if possible.

Low Capability Strategies

Mown lawn above stream

Stream bank eroding
Roots exposed

Remove dead vegetation
Grade back slope

D
Plant riparian native spaceis

A
C

Wider filtration/riparian areas
Increased stabilization

Incised or Eroding Stream Restoration

Suggested Best Management Practice:
Per the Virginia Stormwater Management Handbook (V.1) Chapter 8, practice P-FIL-07, "Stormwater must enter the vegetated fi lter strip [...] as sheet fl ow. A typical configuration consists of the stormwater runoff from the paved area uniformly entering the practice along a linear edge (such as the edge of a road or parking lot) and draining across the length of the fi lter strip [...]. This confi guration would be accompanied by a gravel diaphragm or other pretreatment practice to establish a non-erosive transition between the pavement and the filter strip[...]. If the infl ow to the fi lter strip is from a pipe or channel, a level spreader must be designed in accordance with BMP C-ECM-14, Level Spreader, to convert the concentrated fl ow to sheet fl ow. A robust stand of vegetation should be established with a minimum cover density of 90%. Length is the measurement of distance perpendicular to the contour. Width is the measurement of distance across the slope, parallel to the contour. The minimum width for all slopes is 10 feet. Maximum slope is 8%.

- Virginia Extension Agency

Discussion

Through the site reading methods inspired by established field guide authors such as May Theilgaard Watts, Dr. Kristen Wickert, and David Allen Sibley, and researched psychological principles of perception, the Field Guide provides a methodological process that can be customized by landscape architects and used to ground land management plans in distinctive ecological communities. The most useful strategy to shift human perception toward the decision matrix form was determined to be a dichotomous key. Familiar through popular field guides, dichotomous keys typically help identify species through comparison and elimination. This guide adapts that format to create an entry point for management decisions; starting from a given ecological cue, the user navigates branching questions to arrive at one or more BMPs. This proposed process is customized and used to strengthen management plans, even with different ecological systems within a given landscape, by using these ecological cues from the site.

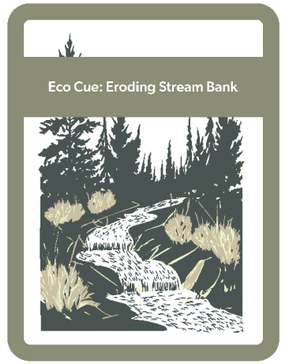
The ecological cues referenced throughout this study include multiple scales and layers of ecology as a science, and perception as a process. They are categorized into seasonal differences with the added layers of absence, presence, pattern, or anomaly. The Field Guide attempts to tease out these nuances that are often hidden behind these patterns observed in the forest and give the user choices without overwhelming them with possibilities. Ecopsychology supports this process through the multiple theories of perception and pattern and through the ongoing research of Joan Iverson Nassauer (Bell, 1999, pp. 46–57; Li & Nassauer, 2020). This Field Guide benefits from but builds onto these theories of perception by providing another way for humans to assess their surroundings. For example, the scenario of identifying Japanese stilt grass on the reference site is translated as an ecological cue based on the cards provided in the Field Guide. After referencing the ecological cue on the correct page, the user is led through the dichotomous key, which provides several contrasting descriptions to arrive at the most relevant BMP. If the invasive population is found in an open area or a wooded area, how far away is it from open water, how large is the population, are just a few of the descriptions. The BMPs listed are provided by extension agencies and conservationist groups for the state. Removal through mowing, planting native species to out-compete the invasive, removal by hand, or simply just monitoring are all BMP options. After consulting the BMPs, the Field Guide provides visual translations of the management strategies into the human scale, more readily available for the individual landowner. By consulting the Field Guide while on the site, the landowner improves their ecological literacy by identifying the species, recognizing the pattern and function within the surrounding ecological process, and translating this information into action that is completed through perception in their own body. The Field Guide engages with any existing management strategies by providing opportunities for meaningful perception by the landowner on their own land. The agencies mentioned

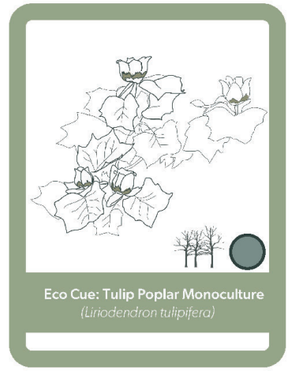
The ecological cue calendar, locating the general times of the year that these specific cues can be identified, and the times that action should or can be taken to support or alleviate these cues. Several cues are asynchronous from their identification and action, which should be noted in the Field Guide by users.

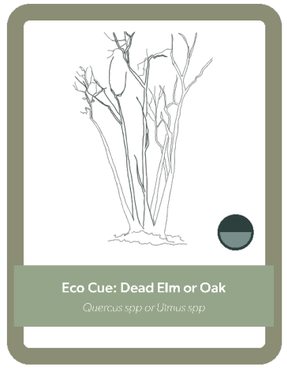
above could add to the Field Guide and provide extremely site-specific information for landowners without having to increase site visits. This is a process that also builds on landowners' previous knowledge and helps leverage lessons learned from past experiences. Repeating this process over seasons, years, and generations will help solidify the management values of the individual on the landscape, guided by the existing ecological processes. The previous visual process of only viewing a plant on their property becomes ecological perception because it now provides meaning.

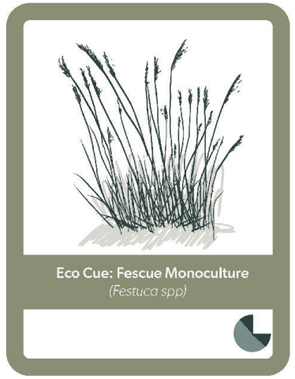
Increased fragmentation of forested lands and increased parcelization of forested properties are expected in the future. These trends have been researched at multiple spatial and temporal scales, posing a proven threat to the health of forested ecosystems (Stein et al., 2012; Thompson & Johnson, 1996). Adjacent parcels are often managed at differing scales and values, to the detriment of the entire forest. Landowners have the ability to manage their forested property, but there needs to be a connection between each of these properties. The provided ecological cues that each landowner identifies on their property will most likely overlap with neighboring lots. These ecological cues prompt the landowners to make similar strategy decisions for their forested lots, even with drastically different values.

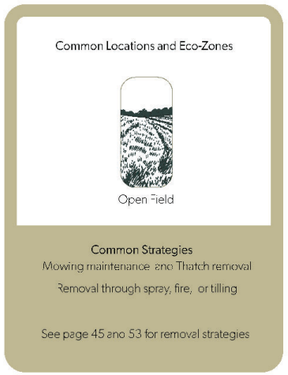
The described process is one opportunity for land management to be rooted in observed ecological patterns. Invasive species of plants, insects, and pathogens are a simple way to begin learning ecological cues. These species lead to different strategies with the same goal: to reduce the population and lessen the effects in surrounding parcels. Referencing what is not present is just as important as identifying a present cue. Patti Nylander describes a "healthy" forest as a condition in contrast to an "unhealthy" forest. The conditions she searches for while on site include Oak Wilt/decline, invasive vines, eroded hillsides, the presence of pests or disease, or a single-aged forest canopy (P. Nylander, interview, October 25, 2024). Noticing these small changes over time leads to an understanding of how the landscape is shaped or shapes the ecologies over time. Providing a tool for individual landowners to in crease their understanding benefits all parties. Luke Longanecker, Thomas Jefferson Soil and Water Conservation District Conservation Programs Manager and landowner, describes his experience visitng local landowners. " I always say ignorance is bliss when it comes to invasives. Because even the average rural American would not be able to tell you [if that plant is an invasive]... There's such a disconnect. They see nature, but they don't











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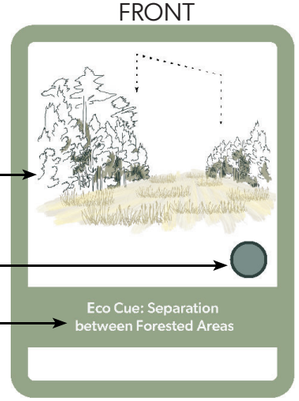

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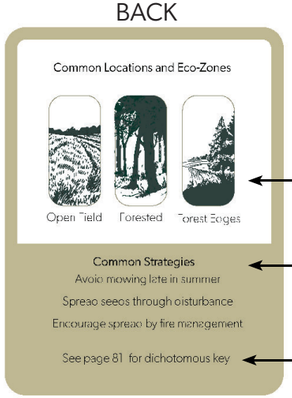


Sketch of Ecological Cue

Time of Identification and Action Task

Title of Cue

Common Locations Eco Cue is Found

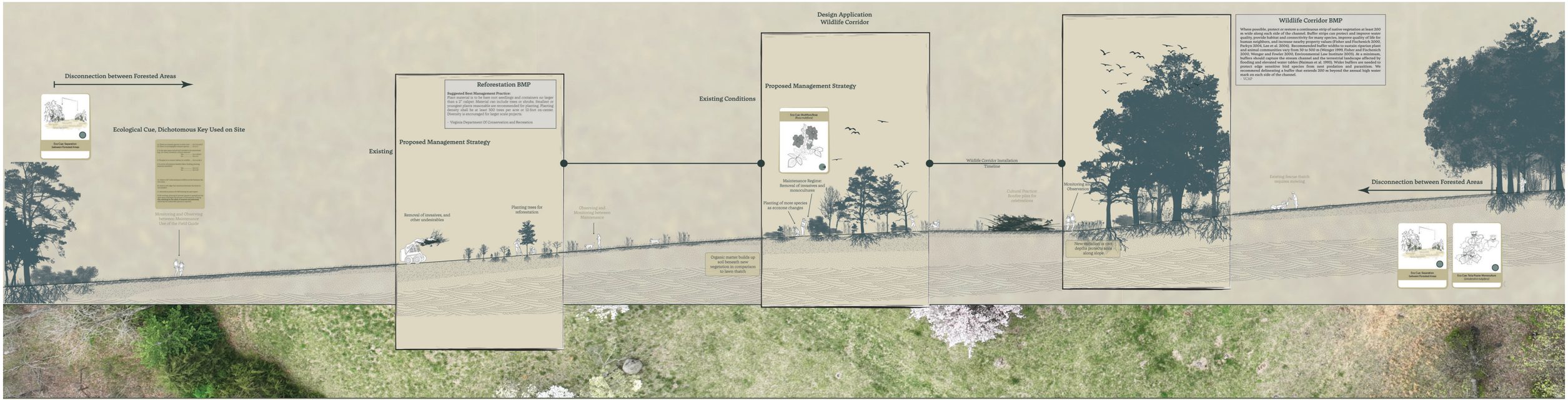
Common Strategies
Further explained in Dichotomous Key in Field Guide

Reference page in Field Guide

Ecological Cue cards are housed in the Field Guide book, but can be carried in a pocket for a reminder when out in the field. They explain the cue, common locations it can be found, the time of year for identification and action, and the page location in the Field Guide to find the dichotomous key.

understand it, even just outside their door" (E. L. Stowe & L. Longanecker, audio interview, March 2, 2025). People are shaping the land extremely fast and with significance. The gap between an expert in ecosystem management and an untrained user can be closed enough to effectively understand the landscape, especially when using the Field Guide. The landowners of the reference site, Luke and Erica understand the effect that collective effort of landowners can have on the ecosystem. This is another benefit of the Field Guide; it is easily shared and understood by neighbors and friends. Especially as a Field Guide user becomes more literate in their land's ecological processes, they can become leaders in their neighborhood, sharing their experience and ecological cues with interested neighbors. This process can be instigated and shaped by consrvation experts or landscpa architects, but the overall goal is to give landowners the agency to make these deicisions on their own. This will become even more important if our conservation resources are futher diminished by our federal government. Community is now and becomes even more so, the basis of sharing information.

Technology evolves to match the popularity of specific disciplines; without interest from someone willing to create the technology, the technology is not needed. Therefore, as the importance and interest in land management in reaction to multiple pressures on forested lands today, a more precise technology is needed to engage in this process. However, more tools and data may not be the solution. As climate scientists today no doubt agree, more data does not always equal more action. Creating a tool that landscape architects and landowners can use every day, but also to assist in long-term management decisions, is imperative to designing with the land. Landscape architecture benefits from this process by engaging with adjacent disciplines to sufficiently understand the focus site before, during, and after the design is installed. Landscape architects can guide these management decisions towards a more robust stewardship while engaging with the processes of creating a designed management plan over many generations, not just the single moment of a landscape planting plan after installation. The resulting management procedures not only engage with climate resilience based on carbon and biodiversity but also embed the formerly missing civic infrastructure and nature-based education.



One of the more detailed and complex ecological cue to BMP design translations is for the wildlife corridor which is already underway at Perry Lane. This began with the identification of a gap between two contiguous forested areas, and the decrease of wildlife over the years.

The first step was to begin removal of the invasives and thin the black locusts that dominated the stream bank, allowing for assisted succession plantings throughout.

This field guide leverages the ability of people to understand the landscape through patterns, comparison, and categories, as noted in my earlier literature review. By using these cues to ground the management strategies translated from BMPs, this process also allows a shift in strategies as landowners increase their landscape literacy.

Design Application
Wildlife Corridor

Existing

Reforestation BMP

Suggested Best Management Practice:
Plant material is to be bare root seedlings and containers no larger than a 2" caliper. Material can include trees or shrubs. Smallest or youngest plants reasonable are recommended for planting. Planting density shall be at least 300 trees per acre or 12-foot on-center. Diversity is encouraged for larger scale projects.

- Virginia Department Of Conservation and Recreation

Proposed Management Strategy

Removal of invasives, and other undesirables

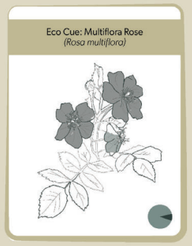
Planting trees for reforestation

Observing and Monitoring between Maintenance

Existing Conditions

Proposed Management Strategy

Eco Cue: Multiflora Rose
(Rosa multiflora)



Maintenance Regime: Removal of invasives and monocultures

Planting of more species as ecozone changes

Organic matter builds up soil beneath new vegetation in comparison to lawn thatch

Existing Conditions

Wildlife Corridor BMP

Where possible, protect or restore a continuous strip of native vegetation at least 200 m wide along each side of the channel. Buffer strips can protect and improve water quality, provide habitat and connectivity for many species, improve quality of life for human neighbors, and increase nearby property values (Fisher and Fischenich 2000, Parkyn 2004, Lee et al. 2004). Recommended buffer widths to sustain riparian plant and animal communities vary from 30 to 500 m (Wenger 1999, Fisher and Fischenich 2000, Wenger and Fowler 2000, Environmental Law Institute 2003). At a minimum, buffers should capture the stream channel and the terrestrial landscape affected by flooding and elevated water tables (Naiman et al. 1993). Wider buffers are needed to protect edge sensitive bird species from nest predation and parasitism. We recommend delineating a buffer that extends 200 m beyond the annual high water mark on each side of the channel.

- VCAP

Wildlife Corridor Installation Timeline

Cultural Practice: Bonfire piles for celebrations

Monitoring and Observation

New variation in root depths protects soils along slope

Existing fescue thatch requires mowing

Disconnection between Forested Areas

Eco Cue: Separation between Forested Areas

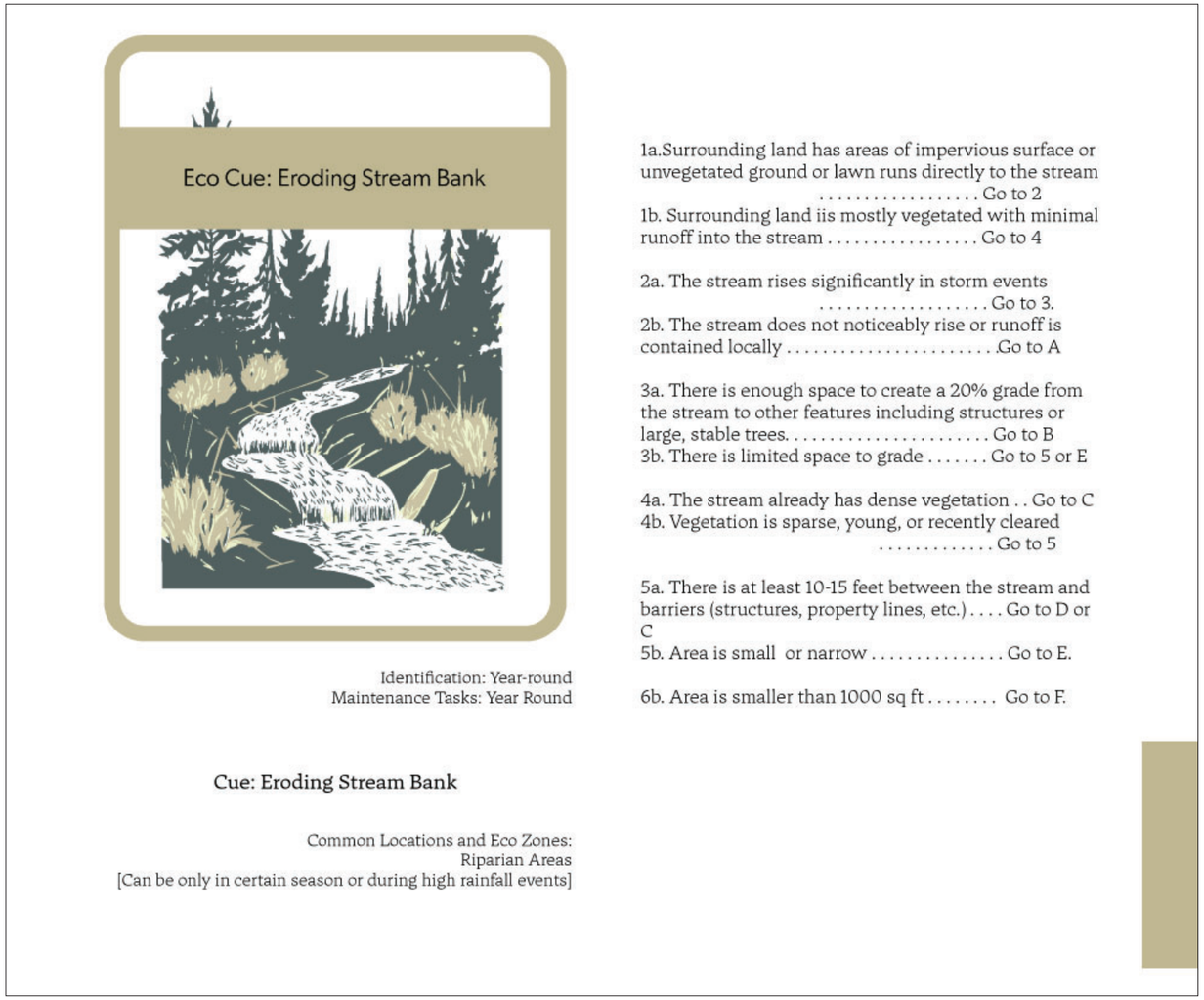
Eco Cue: Tulip Poplar Monoculture
(Liriodendron tulipifera)

Conclusion

In the current Anthropocene, humans have affected the ecosystem to such an extent that preserving a natural space means active management in the removal of human-introduced invasive species, in the treatment of human-spread fungus and plant diseases, and the mitigation of environmental stressors amplified by climate change. This active management is an ongoing task, and often, the main barrier to beginning is knowledge. There is no one correct answer to the questions these ecological changes ask us, but there are correct directions to steer the landscape towards. When an entire forest is disconnected through parcelization and fragmentation and then steered in different directions, the ecological systems are damaged. They are damaged on a scale of time that we might not be able to recognize until we look back at a century of change. Collective action will become necessary as forested lots continue to be parcelized and fragmented.

With 82% of Virginia's forests privately owned and the median parcel size only 11 acres, the landscape is becoming increasingly fragmented and undermanaged. Forest succession, exacerbated by climate change and species turnover, is accelerating in ways that traditional extension services cannot keep pace with, especially given the resource-intensive nature of forest management planning. Best management practices are scientifically researched but not translated onto the landscape in a comprehensible way. Many of these BMPs suggested by regional agencies are borrowed from other ecological zones or even a larger region that does not account for local specifics or differences. As the federal government continues to strategically dismantle these resources and protections, the responsibility becomes the individual landowners more than ever. The best way to move forward in a future of uncertainty is to look to the land for answers, and to think small. Begin with ecological cues and then take it step-by-step into a long-term management plan. The Field Guide offers a translational tool, bridging scientific knowledge with public applicability through familiar visual formats and providing strategies that can blend into the existing rural culture. Rather than delivering singular recommendations, the Guide scaffolds decision-making around ecological conditions, site goals, and personal values. As a locally specific and didactic tool, the Field Guide encourages landowners to translate opportunities or concerns on their land over seasons and generations, building up their landscape literacy as well. This book serves as a critical tool for bridging the gap between scientific research and practical land management. It serves as an invitation for landowners and designers to embark on a lifelong journey of stewardship, ultimately leading to a collaborative enhancement of landscape literacy within Virginia's forests.

Field Guide Pages



This site-specific ecological cue and suggested BMPs has been explored both in the Field Guide, in design application drawings, and in the first initial stages on the reference site. The following drawings are examples of how the meadow conversion BMP is being translated onto the site.

A. Reduce runoff by replacing lawn or bare ground with vegetated buffers and/of adding rain gardens in higher elevations or alongside paved surfaces..

B. Grade the banks on either side to create a gentler slope and slow water velocity (minimum 20% slope)

C. Allow vegetation to grow and avoid mowing or cutting. Allow roots to stabilize the bank.

D. Install filter strips using native grasses, sedges, or shrubs parallel to the bank. Allow roots to stabilize the soil.

E. Reduce runoff using narrow filter strips of native plants or live staking directly into the eroding bank if possible.

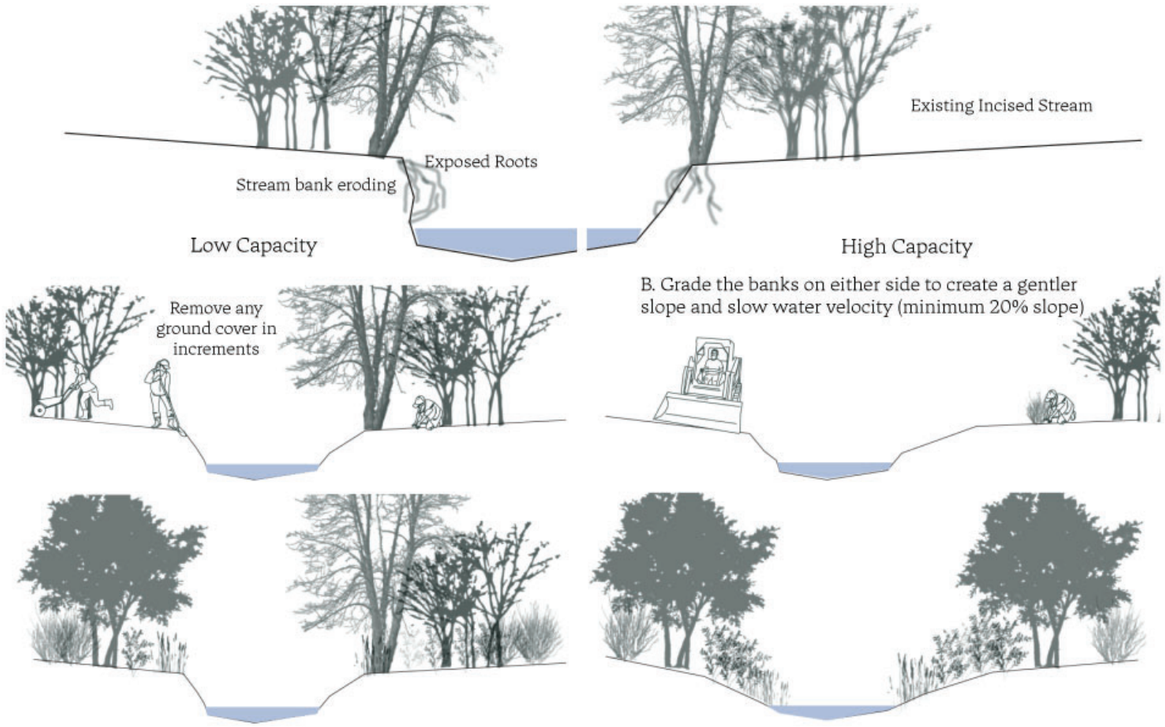
Common Locations and Eco-Zones: Riparian Edges, Open Fields, High Disturbance Areas

Existing BMPs

Per the Virginia Stormwater Management Handbook (V.1) Chapter 8, practice P-FIL-07, "Stormwater must enter the vegetated filter strip [...] as sheet flow. A typical configuration consists of the stormwater runoff from the paved area uniformly entering the practice along a linear edge (such as the edge of a road or parking lot) and draining across the length of the filter strip [...]. This configuration would be accompanied by a gravel diaphragm or other pretreatment practice to establish a non-erosive transition between the pavement and the filter strip[...]. If the inflow to the filter strip is from a pipe or channel, a level spreader must be designed in accordance with BMP C-ECM-14, Level Spreader, to convert the concentrated flow to sheet flow. A robust stand of vegetation should be established with a minimum cover density of 90%. Length is the measurement of distance perpendicular to the contour. Width is the measurement of distance across the slope, parallel to the contour. The minimum width for all slopes is 10 feet. Maximum slope is 8%.

"Basic Principles of Watershed Restoration and Stormwater Management in the Chesapeake Bay Region." Accessed April 29, 2025. https://pubs.ext.vt.edu/content/pubs_ext_vt_edu/en/SPES/SPES-195/SPES-195.html.

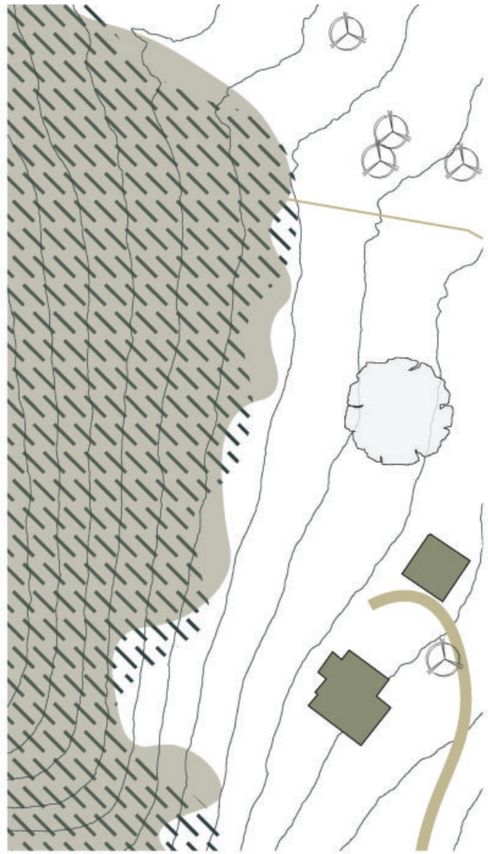
"Options for Backyard Stream Repair | NC State Extension Publications." Accessed April 29, 2025. https://content.ces.ncsu.edu/options-for-backyard-stream-repair.



C. Allow vegetation to grow and avoid mowing or cutting. Allow roots to stabilize the bank.

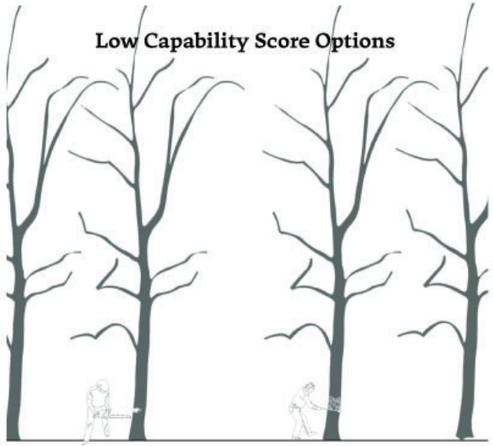
D. Install filter strips using native grasses, sedges, or shrubs parallel to the bank. Allow roots to stabilize the soil.

A. Reduce runoff by replacing lawn or bare ground with vegetated buffers and/of adding rain gardens in higher elevations or alongside paved surfaces..



Tulip Poplar monoculture on reference site

Low Capability Score Options



Removal by felling

Felling can create deadwood on the forest floor or could be used for timber products if the correct equipment is used.
A more predictable method of removal, but more costly and time consuming.

Removal by girdling

Girdling severs a ring of the bark and cambium layer encircling the tree. When this is cut, the tree can no longer transport water or nutrients and the roots begin to die. Eventually the tree will fall after wind or will become a snag for wildlife habitat.

Trees that grow naturally along rivers, or sprout easily should not be girdled, as it will be ineffective.

Property Values and Goals Worksheet

What is the vision for your property?

We want to heal the land, make it more diverse and better for wildlife. And to beautify this space that we get to live in.

What are your land stewardship values?

Create and nurture habitat for a large range of flora and fauna, support healthy ecosystems through soil and water quality protections, and enjoy the land through recreation such as walking, camping, playing.

What are you land stewardship near-term goals?

Extend the existing wildlife corridor further up the mountain. Convert the existing fescue field into a warm-season meadow. Soften the edges of the forest/meadow ecotone. Landscape the areas surrounding the new house for aesthetics. Maintain the view down the valley from the house. Reduce the amount of invasives coming onto the land

Do you plan to profit from this land, and if so, how?

Yes, through logging the monoculture areas in the near future.

How often do you spend time in the woods?

- [ ] *Every day*
- [x] *Every week*
- [ ] *Once a month*
- [ ] *A few times a year*

What activities do you like to do in the woods?

- [x] *Observing nature*
- [x] *Camping*
- [x] *Walking/Hiking*
- [x] *ATVs*
- [x] *Hunting/Fishing*
- [x] *Working/Harvesting*

How much time are you able to spend on maintenance?

- [ ] *0 - 1 day per month*
- [x] *4 - 8 days per month*
- [ ] *1 - 3 days per month*
- [ ] *Every weekend*

How important is community collaboration to you?

0 1 2 3 4 5 6 (7) 8 9 10
Not Very Important — *Extremely Important*

Rank by importance (1 as least and 10 as most)

- 7 *Enhancing the natural beauty*
- 8 *Having trails for recreating*
- 5 *Maintaining privacy and seclusion*
- 10 *Protecting the land from development*
- 1 *Earning money from the land*
- 9 *Providing wildlife habitat*
- 4 *Providing ecosystem services*
- 2 *Harvesting non-timber products for myself*
- 6 *Hunting/Fishing*
- 3 *Creating a legacy for my family*

Do you have a legacy or estate plan for your land if your current situation changes?

In progress

Do you have a budget for maintenance tools and equipment?

Yes, which is also shared with neighbors and family in the valley. Approximately $2500/year

(Summarized from the Woodland Owner Goals & Values Worksheet, extracted from Maine Forest Service, Oregon State University Extension Service, and Montana University Extension Service)
Werling, Rachel. "From Vision to Reality: Creating a Land Steward Property Management Plan." Extension Catalog publication. Extension Communications. Oregon State University Extension Service, October 26, 2021. Land Steward Program.
"Woodland Owner Goals & Values Worksheet." Maine Forest Service, n.d.

An aspect of the overarching framework of the Field Guide is the human relationship with the landscape. This is limited or supported by the time, labor, and values of each individual. Rather than disconnecting these parcels from each other as the current trend allows, the Field Guide leverages these differences to support the overarching goal of ecological health and protection through a shifting climate.

The 'Property Values and Goals' worksheet is used to narrow down and present the current situation, and help landowners identify their existing and future goals. The 'Capability Scale' worksheet (found on page 24 of this document) allows users to see where they stand in the scale of time, effort, budget, and labor capacity in order to enact the suggested BMPs. There are situations where higher capacity is needed, and therefore finding the correct machinery or expertise support is necessary. But there are also strategies that can be carried out using less labor or money and are indicated like in the above diagram.

Eco Cue: Warm Season Meadow Species

Andropogon virginicus & Solidago nemoralis

Identification: Summer through Autumn
Maintenance Tasks: Late Autumn or Early Spring

Cue: Presence of Warm Season Grasses or Piedmont Prairie remnant species

Common Locations and Eco Zones:
Open Field, Forested, Riparian Edges, Riparian Areas

1a. Warm-season meadow species (e.g., Andropogon virginicus, Solidago spp.) are present ..... Go to 2
1b. Meadow species not present or choked out by invasives ..... Go to A

2a. Unwanted species are present..... Go to A
2b. Unwanted species are not dominant ..... Go to 3

3a. Site is more than 100 feet from a wooded area and fire is permitted ..... Go to C

3b. Fire is not feasible due to proximity or regulation... Go to 4

4a. Site is within 100' of a water source ..... Go to 5 and E
4b. Site is more than 100' from water source..... Go to 6

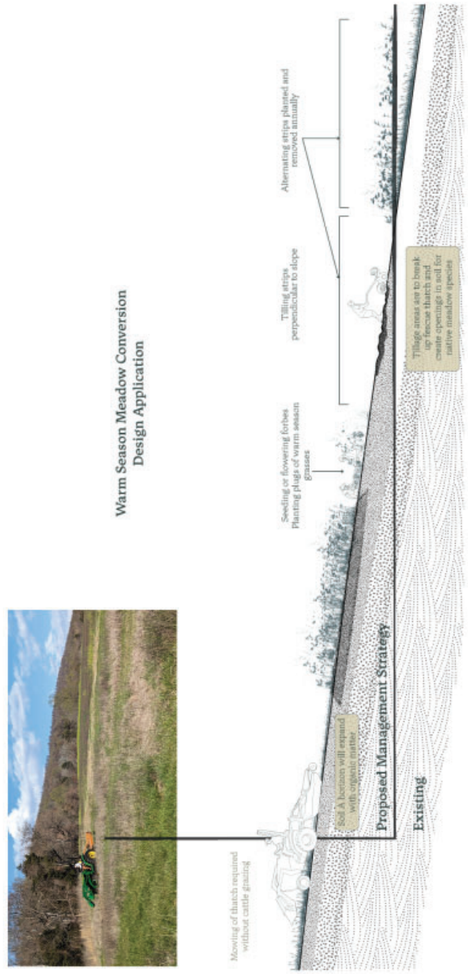
5a. Area is large (>1000 sq ft) ..... Go to B.
5b. Area is small (<1000 sq ft) or narrow ..... Go to F

6a. Area is larger than 1000 sq ft ..... Go to B.
6b. Area is smaller than 1000 sq ft ..... Go to F.

After any of the above preparation strategies, continue to D

Virginia Association of Soil and Water Conservation Districts, ed. "VCAP Implementation and Design Manual." Virginia Conservation Assistance Program, 2023. Section: Conservation Landscaping Guide. 8th Edition.

Virginia Working Landscapes. "Meadow Restoration: Where to Begin." Smithsonian Conservation Biology Institute, n.d.



Meadow conversion idealized future: a mix of warm and cool season species that bloom for pollinators and landowner preferred aesthetics. The mix of meadow species and shrub land should be balanced by 2 native grasses that will not require mowing; therefore reducing the maintenance tasks year-round.

Existing Best Management Practices (BMPs)

A meadow should include a seed mix with at least two (2) native grass species and nine (9) forbs/wildflower species.
A nurse crop of suitable annual groundcover such as cereal rye or oats may be used. Alternative Seed Mix ratio may be considered.
Competition controls must be included with the final plans. Competition controls should be described in greater detail in the site-specific plan submitted before installation. A temporary vegetative cover is necessary when there will be two (2) burn downs separated by a growing season.
Meadows shall be established by seed for areas over 1,000 square feet unless plugs are necessary for successful establishment of the planting area.
Tree canopy shall be maintained at less than 30%.

A. Remove unwanted species

B. Soil preparation through tilling. Prepare soil through strip tilling (parallel to water source)

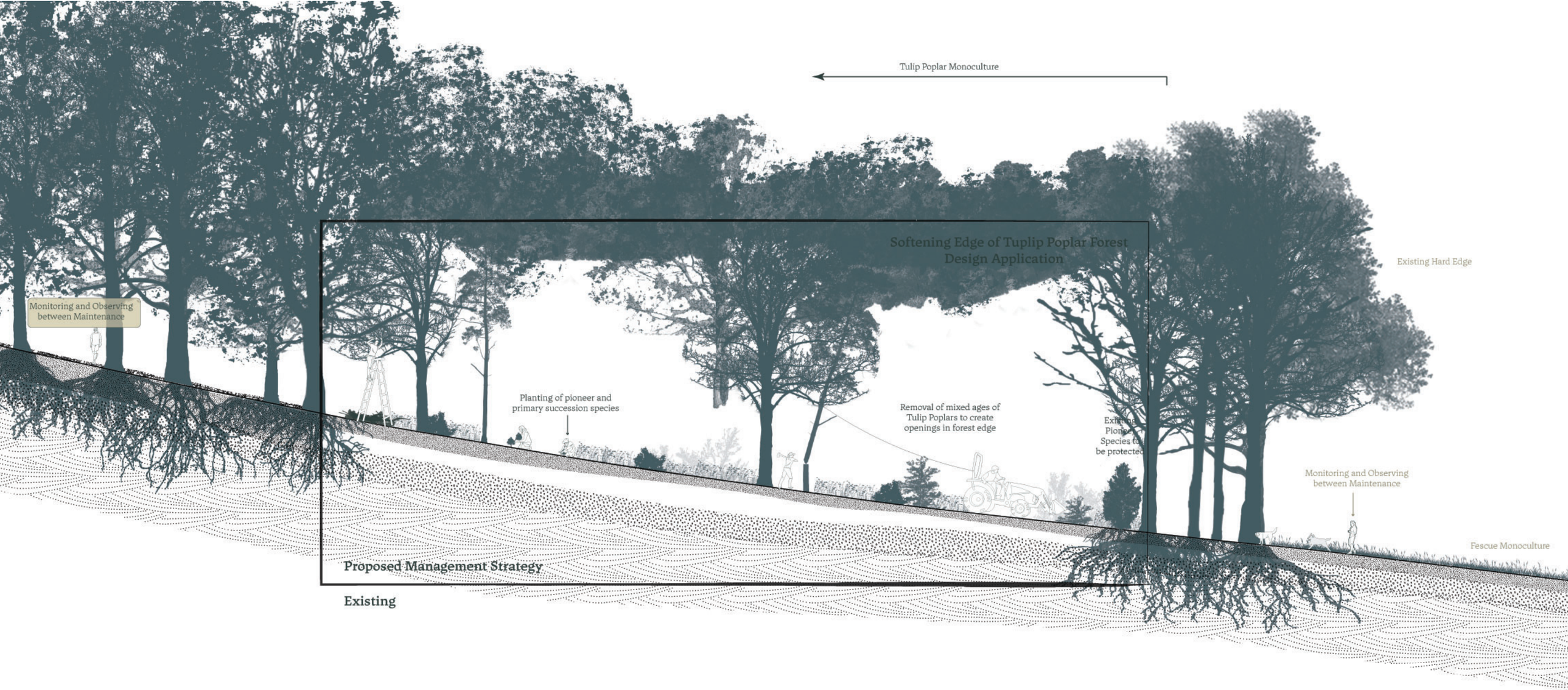
C. Area preparation and competition control by fire

D. Plant sun-loving native species, go to page __ for list

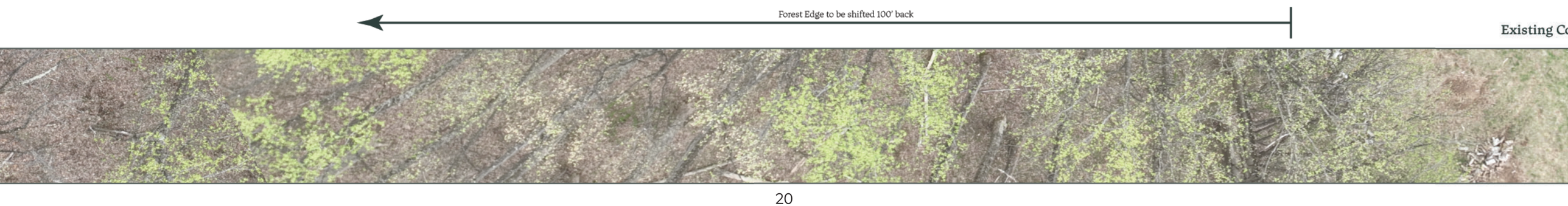
E. Plant filter strip including trees and shrubs, go to page __

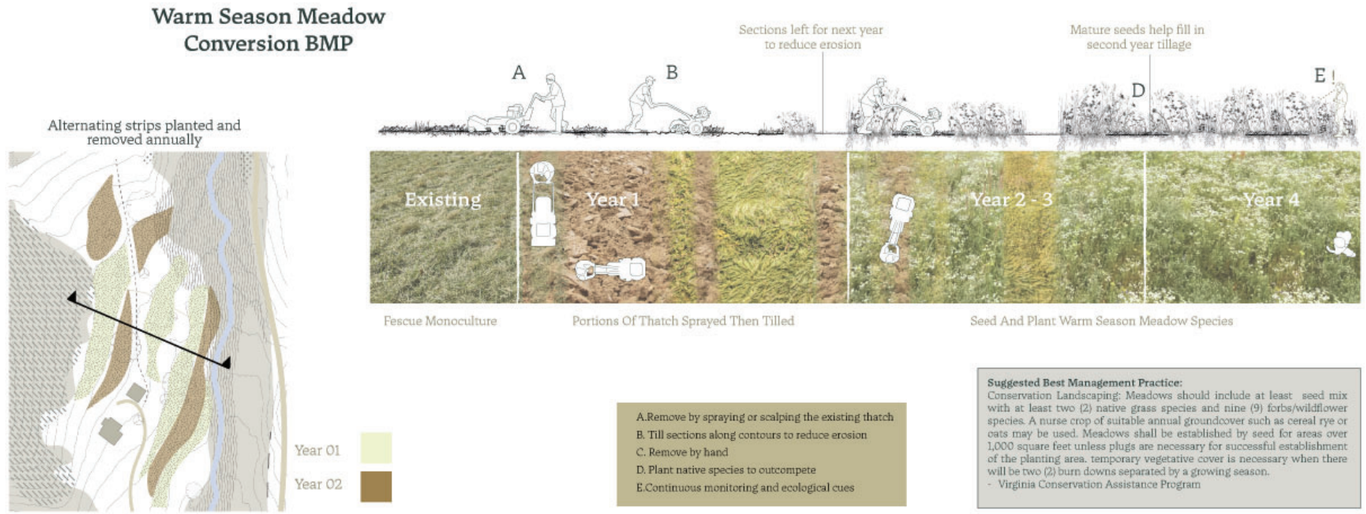
F. Competition control by mowing. (max 4x/year, never in fall) and continued monitoring

This site-specific ecological cue and suggested BMPs has been explored both in the Field Guide, in design application drawings, and in the first initial stages on the reference site. The following drawings are examples of how the meadow conversion BMP is being translated onto the site.

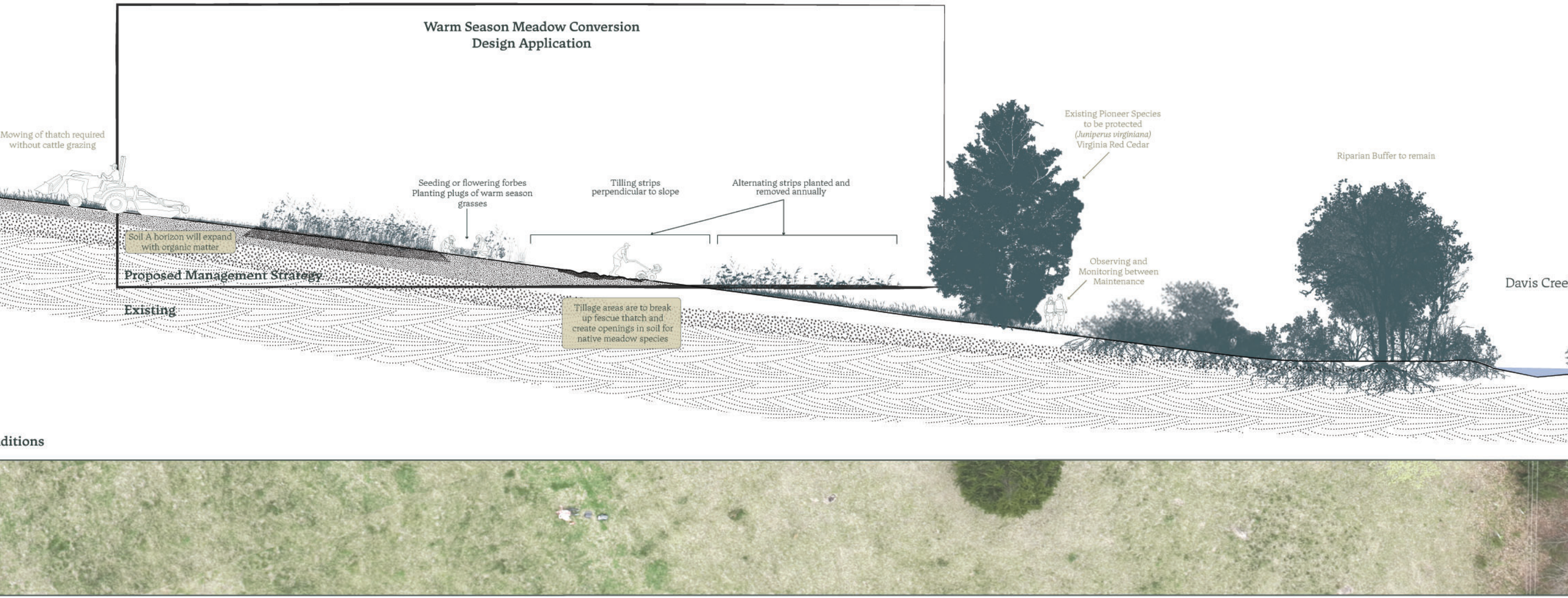


The meadow conversion was paired with moving the forested edge back approximately 100' to encourage shrubland. This was layered with the meadow conversion application because of the soil disturbance that would affect the meadow anyway, therefore reducing the overall area of open soils for a season. The shrubland edge is a strategy to soften the previous hard-edge of the tulip poplar monoculture, also encouraging browse for white-tailed deer and pollinators.





The suggested BMP strategy included several layered approaches. Including but not limited to removal of the monoculture fescue field using a multi-year step action and then tilling and seeding a custom mix of warm season and cool season grasses. The landowners also wanted the aesthetic appeal of late summer blooms which were included in the mix. The strips were determined based on topography, distance from the open water stream, and capability of human-time and machinery.



Glossary

Affordances: what the environment or object offers humans or animals, the value and usefulness.

Best Management Practices (BMPs): Actions that government-funded agencies recommend to landowners to carry out to reach a specific benchmark on their land. Such as reduction in erosion, removal of a species, or increase in forested area.

Dichotomous Key: The traditional dichotomous key is a tool used for identification of one species through a progression through contrasting descriptions until you arrive at the one answer, the identification of the species in question. Dichotomous keys are used in the Field Guide to identify multiple strategy options through a similar progression through contrasting descriptions, beginning at the ecological cue, which has already been identified. It works in the opposite direction but with a similar strategy.

Ecological Cue: Scenes or moments of interactions that could include the presence of [or lack] of plants, animals, insects, abiotic elements, historical remnants, or specific communities that tell us possible opportunities. They can be entrenched in the site such as the soil type being expressed in a certain way, or more temporary such as windfall and the successive tree seedlings filling in the gaps. These ecological cues have been listed by walking the reference site and referring to past maintenance strategies. The cues become the entry point for future landowners to begin the long journey of learning about managing their own sites.

Ecological Literacy: Learning to understand the natural systems that make up our environment and how we fit into the system as humans. Understanding these principles allows us to use them to create more sustainable communities that humans can be a part of.

Ecological Perception: pioneered by James J. Gibson, views perception as a direct and natural process where organisms perceive the environment and its affordances (opportunities for action) without needing complex cognitive interpretation.

Field Guide: The document/book that provides advice and direction towards a specific goal or value on the landowner's site. This field guide can become a translation device between scientifically researched strategies and the existing landscape. The field guide houses maps, dichotomous keys, ecological cue cards, a calendar of expectations, and maintenance schedules. It is a process of creating the field guide that helps create the thesis project, and then through use of the field guide, creates a management/maintenance plan with intention.

Forest: An ecosystem where the dominant species uses the growth strategy that matches a tree. It includes the species of plants, animals, and fungi, not only the trees.

Forested: Includes more than an acre of forest on the property and also is over half of the total property acreage.

Fragmentation: Division of large areas of forest into smaller areas of forest through the removal of trees or installation of a physical barrier.

Landscape Literacy: an understanding of the environment built through the connection between landscape and landscape-changer, identifying the opportunities and weaknesses that the ecological processes and individuals afford.

Parcelization: Division of property through visible or invisible boundaries.

Pattern: Repetition either through time or space

Perception: The process and interpretation of sensory information from the environment to create a meaningful experience

Regeneration: New inputs are needed to change the direction or cycle of the system. In terms of restoration ecology, regeneration is a more inclusive word, as it attempts to repair something lost but perhaps not to return to the original state of being. Regeneration includes new inputs that may not have existed in the previous system and has a more dynamic outcome.

Succession: The sequence of change in dominant organisms following a disturbance, driven by interactions among organisms, including competition, and is related to the degree of equilibrium in ecosystems.

List originated from Plant Virginia Natives guide to Piedmont Natives. Extracted species for Eastern portion of Nelson County, Piedmont area.

Warm season meadow species options SUN

Perennials

Andropogon virginicus	*Broomsedge*
Asclepias tuberosa	*Butterfly Weed*
Coreopsis lanceolata	*Lanceleaf Tickseed*
Echinacea purpurea	*Purple Coneflower*
Liatris spicata	*Blazing Star*
Monarda fistulosa	*Wild Bergamot*
Rudbeckia hirta	*Black-eyed Susan*
Solidago speciosa	*Showy Goldenrod*
Symphyotrichum novae-angliae	*New England Aster*

Shrubs

Ceanothus americanus	*New Jersey Tea*
Hypericum prolificum	*Shrub St. John's Wort*
Rosa carolina	*Carolina Rose*
Rhus aromatica	*Fragrant Sumac*
Viburnum dentatum	*Southern Arrowwood*
**Sambucus canadensis*	*Elderberry*
Vaccinium pallidum	*Hillside Blueberry*

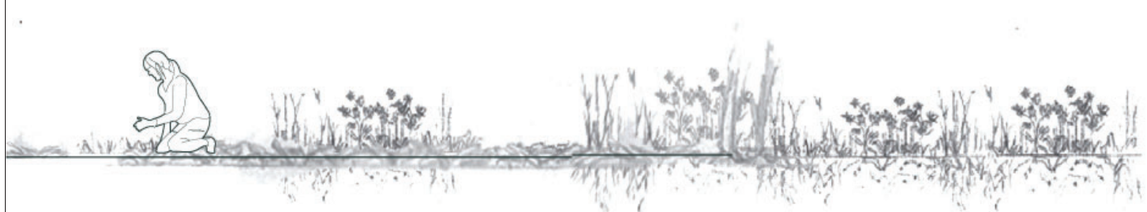
Meadow species options PART SUN

Perennials

Adiantum pedatum	North Maidenhair Fern
Aquilegia canadensis	Wild Columbine
Tiarella cordifolia	Foamflower
Phlox divaricata	Woodland Phlox
Polystichum acrostichoides	Christmas Fern
Viola sororia	Common Blue Violet
Ageratina altissima	White Snakeroot
Carex flaccosperma	Thinfruit Sedge
Chrysogonum virginianum	Green and Gold
Eurybia divaricata	White Wood Aster
Geranium maculatum	Wild Geranium
Iris cristata	Dwarf Crested Iris
Phlox divaricata	Woodland Phlox
Polystichum acrostichoides	Christmas Fern
Solidago caesia	Bluestem Goldenrod

Shrubs

Lindera benzoin	Spicebush
Hydrangea arborescens	Wild Hydrangea
Ilex verticillata	Winterberry
Viburnum acerifolium	Mapleleaf Viburnum
Rhododendron maximum	Great Laurel



Woody species options understory

Shrubs

Lindera benzoin	Spicebush
Hydrangea arborescens	Wild Hydrangea
Ilex verticillata	Winterberry
Viburnum acerifolium	Mapleleaf Viburnum
Rhododendron maximum	Great Laurel
Viburnum dentatum	Arrowwood Viburnum
Rhododendron periclymenoides	Pinxterbloom Azalea
**Cephalanthus occidentalis*	Common Buttonbush
**Castanea pumila*	Allegheny Chinkapin

Trees

**Asimina triloba*	Pawpaw
Carpinus caroliniana	American Hornbeam
**Cornus florida*	Flowering Dogwood
Nyssa sylvatica	Black Gum
Ostrya virginiana	Hop Hornbeam
Ilex opaca	American Holly
**Magnolia virginiana*	Sweetbay Magnolia

Woodland Species options SUN

Trees

Quercus alba	White Oak
Quercus coccinea	Scarlet Oak
**Liriodendron tulipifera*	Tulip Poplar
**Pinus taeda*	Loblolly Pine
** Betula nigra*	River Birch
**Acer rubrum*	Red Maple
**Acer saccharinum*	Silver Maple
**Quercus velutina*	Black Oak
**Quercus rubra*	Red Oak

* available through VDOF tree nursery

A limited list of species that have been suggested for the reference site. This is based on previous horticultural knowledge and 'lessons learned' from the author and reference site landowners. These lists would be different but similar between each Field Guide. The free and publicly available list would be referenced from the Plant Piedmont Natives list, another free and publicly available resource for landowners.

Capability Scale

Choose the option that most closely reflects your current situation. Total your score at the end and use the rating scale to determine the capability level for management and maintenance activities.

1. Do you currently own or have access to tools/ equipment for the land management activities (e.g. pruning tools, chainsaw, tractor)?

None at all . . . . . 0 points

Basic hand tools only . . . . . 1 point

A few power tools or shared equipment . .2 points

I own or have access to large equipment . 3 points

2. How often do you walk your land to observe changes in vegetation, wildlife, or signs of erosion/disturbance?

Rarely or ever . . . . . 0 points

Once or twice a year . . . . . 1 point

Several times a season . . . . . 2 points

Monthly or more . . . . . 3 points

3. What is your level of comfort with performing basic ecological management tasks (e.g., thinning saplings, cutting vines, removing trees, planting seedlings)?

Not at all comfortable . . . . . 0 points

Inexperienced, but ready to learn. . . . . 1 point

Somewhat comfortable . . . . . 2 points

Seasoned pro . . . . . 3 points

4. How connected are you with support networks (e.g., Cooperative Extension, forestry professionals, conservation groups, neighbor landowners)?

None at all . . . . . 0 points

I have attanded an event . . . . . 1 point

I have talked with an agent for advice . . . 2 points

I consult this network regularly . . . . . 3 points

5. How ready are you to plant or replant areas with native vegetation, in terms of knowledge, budget, and timing?

Not ready or unsure how. . . . . 0 points

I am interested and have started plans . . 1 point

I have a few of those things ready . . . . . 2 points

I have the species, location, and time. . . . 3 points

Total possible score = 15 points

0 to 3 = New Seedling

You're just getting started. Consider connecting with local experts or beginning with one small project.

4 to 7 = Learning Sprout

You've got some ideas and tools in place. A written plan or seasonal goals could boost your progress.

8 to 11 = Growing Sapling

You're managing land with intention. Keep building your network and refining your strategies.

12 to 15 = Seasoned Steward

You're well-equipped and informed. Consider mentoring others or contributing to community land efforts.

Every forested site is different, and every landowner has different skills, times, and capacity to enact these suggested practices. The capability scale helps users understand where they fall in the spectrum, and lets them know when its time to call an expert, or reference an additional resource.

There is also space to understand the crossovers from agriculture experience and traditions. This aspect has many opportunities for building the BMP strategy actions.

Eco Cue: Japanese Stilt Grass
(Microstegium vimineum)

Identification: Spring through Autumn
Maintenance Tasks: Late Summer

Cue: Presence of japanese stiltgrass
(*Microstegium vimineum*)

Common Locations and Eco Zones:
Open Field, Forested, Riparian Edges, Riparian Areas

1a. Is the invasive population in a wooded area . . Go to 2
1b. Is the invasive population in an open area . . Go to 3

2a. Is the wooded area on a slope > 8% . . . Go to C and D
2b. Is the wooded area on a slope < 8% . . . . . .Go to 4

3a. Is the open area on a slope > 8% . . . . . Go to A or C
< 8% . . . . . Go to 4

4a. Is the area within 100' of a water source
. . . . . Go to A or C
outside of 100' of a water source . . . Go to 5

5a. Is the population area > 1000 sq ft . . . . . Go to 6
< 1000 sq ft . . . . . Go to C

6. Separate areas into smaller sections and Go to B

Possible Management Strategies_ Go to page 47 and 48

A. Remove through continuous mowing

B. Can remove by spraying with glyphosphate

C. Remove by hand

D. Plant native species to outcompete, go to page __ shade

E. Plant native species to outcompete, go to page __ sun

Virginia Association of Soil and Water Conservation Districts, ed. "VCAP Implementation and Design Manual." Virginia Conservation Assistance Program, 2023. Section: Conservation Landscaping Guide. 8th Edition

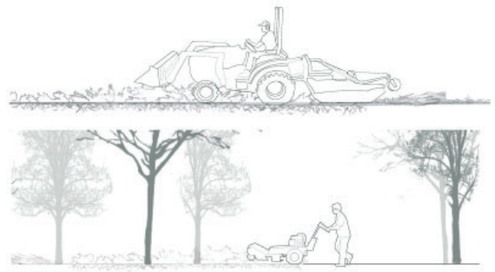
Existing Best Management Practices (BMPs)

Control Stilt Grass by removing by hand or mechanical means "late in the growing season before seed production". glyphosphate can be used at low dosage. Or Roundup at 1/2% solution.
- Department of Conservation and Recreation, Virginia

"Remove invasive species."
- Department of Conservation and Recreation, Federal

Strategy Explanations

A. Remove through continuous mowing



B. Can remove by spraying with glyphosphate

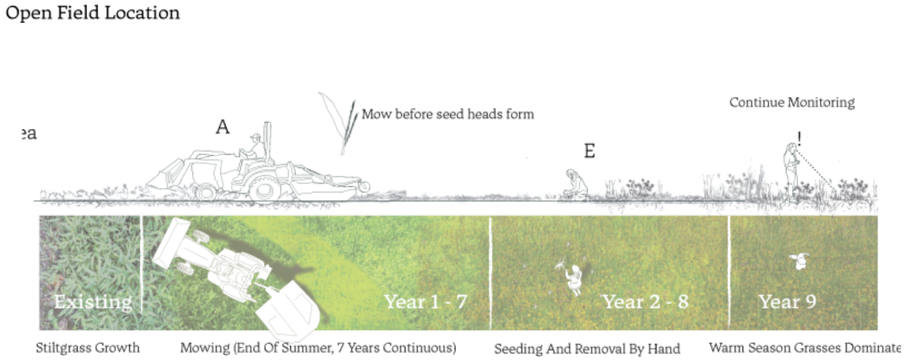
C. Remove by hand

D. Plant native species to out compete, shade

E. Plant native species to out compete, sun

Individually, these ecological cues can be managed with in their respective BMPs and the overall ecological health of the site will be increased incrementally. This is the long term goal of the Field Guide. However, the invitation to layer and combine these ecological cues to maximize time and efforts in management strategies will help increase the health that much more. Enhanced by the knowledge of local experts and experienced neighbors, Field Guide users can exponenitally support the health of their site's ecology even in a rapidly shifting climate.

This field guide and proposed process of using the ecological cues creates not a strict, regimented way to view the landscape but rather an entry point into a greater ecological literacy. This resource would not replace the hardworking conservation agents in our state, but help their clients gain a higher level of understanding and capability to meet them when their precious time and expertise is warranted. These moments of community collaboration are already happening, led by agencies such as VDOF but resources for these types of connections are in danger. The Field Guide can be a perfect gift for a neighbor, or received when you pay your property taxes, or distributed to forestry walk attendees , who can then go out and help increase landscape literacy in their own neighborhoods.



Eco Cue: Tulip Poplar Monoculture
(Liriodendron tulipifera)

Identification: Year round
Maintenance Tasks: year round

Cue: Monoculture of mature Tulip Poplars
(Liriodendron tulipifera)

Common Locations and Eco-Zones: Forested Areas

1. Is large-scale removal of tulip poplars a viable option (economic/logging value, access to equipment, terrain suitable)?
- Yes . . . . . Go to 2
- No . . . . . Go to 3

2a. The slope is generally less than 8% and not adjacent to sensitive boundaries . . . . . Go to A

2b. The slope is generally greater than 8% or adjacent to sensitive boundaries. . . . . Go to B and D

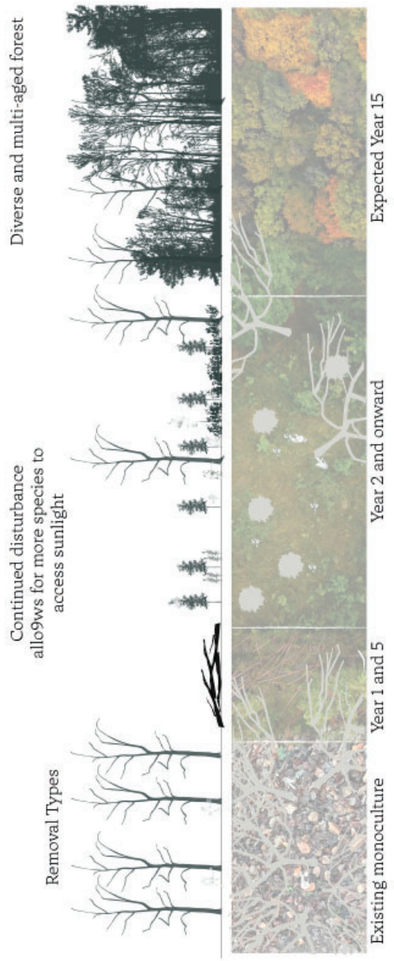
3. Is labor and funding available for replanting across the site after tree removal?
- Yes . . . . . Go to C
- No . . . . . Go to D

A. Remove large portion of poplars through logging
- Selective logging if there's economic value.
- Clear cut if no value and slope <8%, leaving buffers at forest edges.

B. Remove selection of poplars through small labor strategies

C. Plant new species using tree guide on page 69 & 70

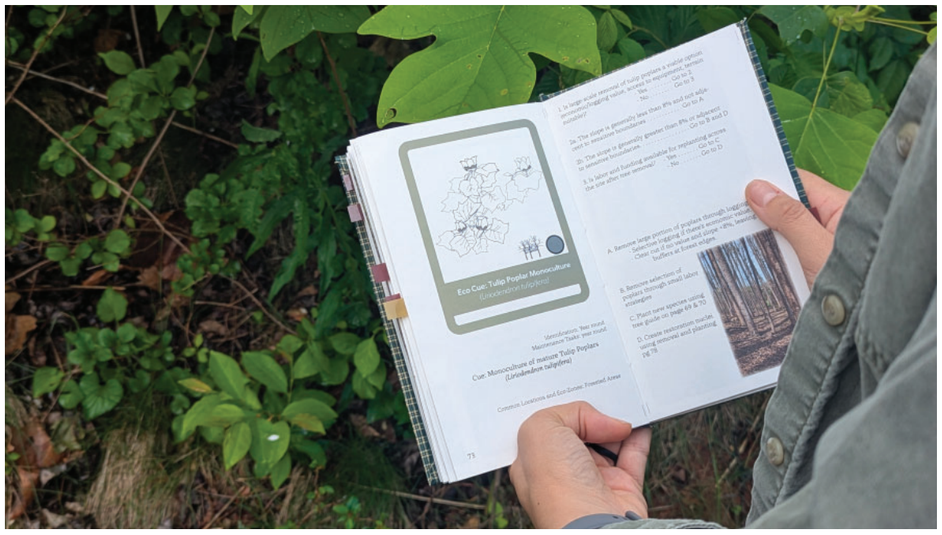
D. Create restoration nuclei using removal and planting pg 78



Understanding a landscape before intervening in it requires more than just technical knowledge—it demands ecological literacy grounded in perceptual and cultural awareness.

Garret Eckbo once observed that rural landscape patterns, developed across generations, are "perhaps our most direct and continuous expression of the joint operations of man and nature." This deep interweaving of human culture and ecological process suggests that rural communities already possess a form of landscape intelligence—though it may not always be recognized or fully activated in the face of modern change. Yet, as Joan Iverson Nassauer points out in Messy Ecosystems, Orderly Frames, "people do not know how to see ecological quality directly."

Our ability to perceive ecological function is filtered through cultural lenses—what looks like "nature" may, in fact, obscure crucial ecological processes. We often live in and move through landscapes, unaware of the functions that sustain them. In rural regions, these functions have been shaped and reshaped by centuries of management decisions—some beneficial, others suppressive. Diverse woody canopy undergrowth around fallen deadwood or warm season meadows with desiccating grasses may be seen as untidy or in need of correction when, in fact, they represent essential ecological structures.



On larger properties (greater than 20 acres), a combination of strategies for the same overall goal is preferable for saving time and labor. Combining the diversification of a monoculture forested area with the change in forest edge location allowed the site reference owners to double their efforts towards the overall goal of increasing and protecting wildlife habitat on their property.

Eco Cue: Multiflora Rose
(Rosa multiflora)

Identification: Summer through Autumn,: leaves, flowers, and rosehips
Maintenance Tasks: Early Spring removal to reduce amount of vegetation to remove and limit canes to paint herbicide

Cue: Presence of Multiflora Rose
(Rosa multiiflora)

Common Locations and Eco-Zones: Riparian Edges, Open Fields, High Disturbance Areas

1a. Patch is within 100 feet of a water source .... Go to 2
1b. Patch is more than 100' from a water source. Go to 3

2a. Area is smaller than 500 square feet..... Go to A
2b. Area is larger than 500 square feet ..... Go to 3

3a. Site is open and accessible to equipment .....Go to B
3b. Site is not accessible for equipment .....Go to A then C

A. Remove by hand (minimize disturbance near water)

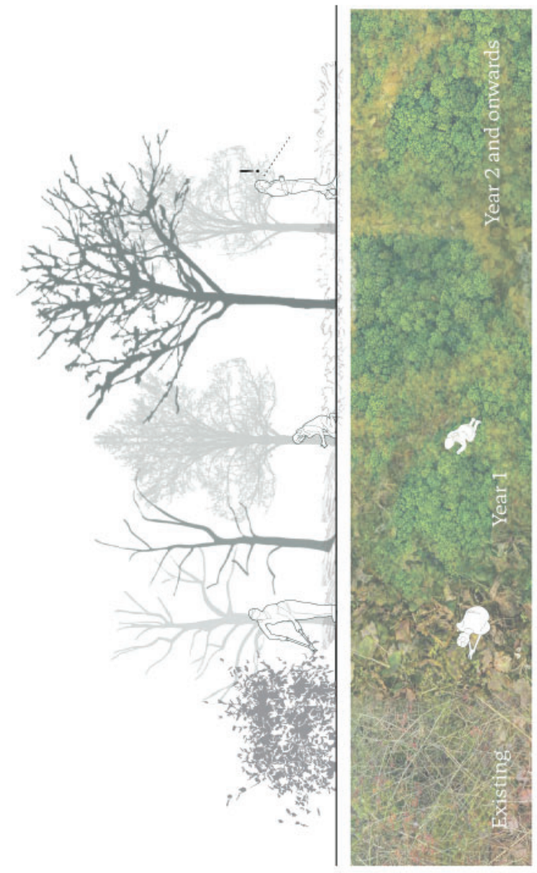
B. Remove by bush hogging (followed by monitoring and regrowth control)

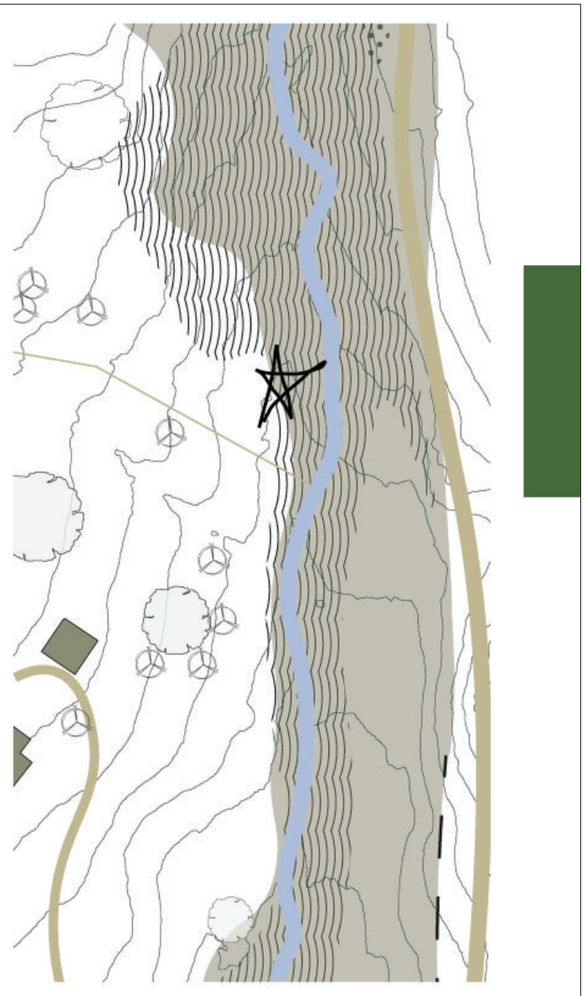
C. After removal apply herbicide by painting cut ends of canes.

Notes

Canes to be cut and continuously removed along stream embankment

Extra protection required because of proximity to stream. Erosion control to be administered while roses are removed.





Some ecological cues lead towarrds one goal, invasive removal and reduction. This goal can vary in intensity based on the ecological cue identification rate, size, and intensity. If this cue is observed in multiple places and continuously, the intensity of removal should be increased. If observed less, then the intensity will be lower. However, the surrounding ecological context will help users of the Field Guide to explore and understand how to reduce these cues over time.

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