

# Planting for the Future



## **Executive Summary**

The North Dakota Petroleum Foundation's "Planting for the Future" program is a highly successful public-private partnership model for conservation tree planting that has established thousands of acres of wildlife habitat across North Dakota since 2018. Through strategic collaboration with the Outdoor Heritage Fund, the program has planted more than 671,000 (as of 2025) trees on private lands, creating critical habitat for deer, pheasants, sharp-tailed grouse, songbirds, and pollinators while advancing priorities identified in the North Dakota State Wildlife Action Plan. With survival rates consistently ranging from 73 to 84 percent, well above the 50 percent threshold that NRCS considers acceptable for wildlife habitat plantings, the program demonstrates both operational excellence and measurable conservation impact. The Foundation's goal of planting one million trees by 2030 is well within reach based on the current program trajectory and continued partnership with OHF.

The program's effectiveness stems from its unique combination of industry best practices, private-sector efficiency, and landowner-driven execution. Program designs incorporate guidance from Natural Resources Conservation Service Practice Standards 612 (Tree and Shrub Establishment), 645 (Upland Wildlife Habitat Management), and 380 (Windbreak/Shelterbelt Establishment) as foundational best practices, while allowing the flexibility necessary to adapt to North Dakota's diverse landscapes and individual site conditions. Species recommendations draw on research from North Dakota State University Extension and are informed by stock availability from Towner State Nursery and Lincoln Oakes Nursery, both of which understand regional growing conditions. Rather than applying a rigid one-size-fits-all approach, the program's qualified contractors conduct site-specific assessments that account for soil type, moisture conditions, existing vegetation, landowner objectives, and targeted wildlife species. This professional customization ensures that each planting is optimally designed for long-term survival and maximum wildlife benefit within the constraints of that particular site.

Quality control is maintained through a five-level oversight system that ensures consistency with industry best practices while allowing adaptation to site-specific conditions. First, qualified contractors apply professional standards and conduct quality checks throughout their work. Second, NDPF program staff review every planning report to verify species appropriateness and wildlife habitat objective alignment. Third, application pre-approval screening assesses site suitability and project viability before resources are committed. Fourth, post-planting verification compares actual implementation against approved plans before payment authorization. Fifth, multi-year monitoring tracks survival rates and establishment success, providing accountability to funders and data for continuous improvement. This systematic approach ensures that while each planting is customized to site conditions, all projects maintain consistency with professional standards and deliver measurable results.

The program's cost efficiency provides substantial value to public conservation investments. Operating at less than 50 percent of typical Soil Conservation District costs per tree, "Planting for the Future" leverages private-sector operational efficiency while delivering high-quality outcomes. The streamlined administrative structure reduces overhead costs, while centralized purchasing of nursery stock ensures competitive pricing. The Outdoor Heritage Fund provides grant funding for trees and 75 percent of fabric costs, while NDPF covers the planning and planting costs that represent approximately 60 percent on average of total

project budgets. Although OHF requires a minimum 25 percent cost-share match, the Foundation consistently exceeds this threshold, providing match contributions of 40 percent or more. Landowner in-kind contributions provide additional leverage of public funds, with participants sharing costs through site preparation, maintenance, and other contributions. The faster timeline from application to implementation compared to traditional government programs means conservation benefits are realized more quickly, and administrative costs are minimized.

The partnership between the North Dakota Petroleum Foundation and the Outdoor Heritage Fund exemplifies how public conservation goals can be advanced through collaboration with qualified nonprofit organizations. As a 501(c)(3) charitable organization, NDPF provides program oversight and administration, while relying on qualified contractors with expertise in habitat design, planning, and planting to execute projects. The Foundation utilizes North Dakota Petroleum Council staff to carry out program duties, with NDPC labor time serving as an in-kind contribution to the program. This structure ensures that the maximum proportion of public funds is directed to on-the-ground conservation outcomes rather than administrative costs. Rigorous reporting and monitoring demonstrate accountability to OHF and the citizens of North Dakota, while documented survival rates prove that the partnership model delivers measurable conservation results.

Since program inception, "Planting for the Future" has established hundreds of partnerships with private landowners across diverse regions of North Dakota. Each planting contributes to wildlife habitat connectivity, provides year-round cover and food sources for game and non-game species, and enhances landscape diversity in intensively farmed areas. The program addresses critical habitat needs identified in the State Wildlife Action Plan, particularly the need for woody cover in agricultural landscapes and travel corridors and winter cover for wildlife populations. By focusing on private lands, which comprise the vast majority of North Dakota's landscape, the program extends conservation benefits far beyond what could be achieved through public land management alone.

The program's proven track record, cost-effectiveness, quality control systems, and measurable conservation outcomes position "Planting for the Future" as an exemplary model for public-private conservation partnerships. With 671,000 trees already established and survival rates consistently exceeding professional standards, the program demonstrates both operational maturity and technical excellence. Continued investment through the Outdoor Heritage Fund will enable the Foundation to achieve the one-million-tree milestone by 2030 while maintaining the high standards that have characterized the program since its inception. The combination of industry best practices, site-specific professional customization, multi-level quality oversight, and exceptional survival rates ensures that every OHF dollar invested delivers maximum conservation value for North Dakota's wildlife and outdoor heritage.

## **Section 1: Program Foundation**

### **1.1 Program Overview**

#### **History and Development (2018-Present)**

The North Dakota Petroleum Foundation's "Planting for the Future" tree planting program represents one of North Dakota's most significant private lands conservation initiatives of the past decade. Launched in 2018, the program was conceived to address a critical gap in the state's conservation landscape: the need for strategic, large-scale habitat establishment on private lands across North Dakota's diverse ecological regions.

Since its inception, the program has achieved remarkable growth and impact. As of 2025, more than 671,000 trees and shrubs have been planted across over 2,600 acres of North Dakota landscape, establishing wildlife habitat that will provide ecological benefits for generations. These plantings span the state's varied geography, from the mixed-grass prairie of the central region to the agricultural lands of the Red River Valley, from the Badlands of the west to the transitional parklands of the north. Each planting is custom-designed to meet site-specific conditions while advancing broader conservation objectives.

The program's scope extends beyond simple tree counts. Hundreds of North Dakota landowners have partnered with the Foundation to establish habitat on their properties, demonstrating the program's success in engaging private citizens as active conservation stakeholders. This collaborative approach has created a network of habitat patches that collectively enhance landscape-level connectivity and provide refugia for wildlife across working lands. The partnerships forged through this program represent a sustainable model for conservation in a state where private land stewardship is essential to wildlife management success.

Looking forward, the program has established an ambitious but achievable goal: planting one million trees by 2030. This target reflects both the demonstrated capacity of the program's implementation model and the ongoing need for habitat restoration across North Dakota's changing landscape. Achieving this milestone will require continued partnership with landowners, sustained funding support, and adaptive management to address emerging conservation priorities.

#### **Organizational Structure**

The North Dakota Petroleum Foundation (NDPF) serves as the implementing organization for the "Planting for the Future" program. NDPF is a 501(c)(3) nonprofit organization dedicated to conservation, education, and community engagement in North Dakota. The Foundation's nonprofit status ensures that conservation objectives drive program decisions, while its organizational structure provides the administrative capacity and financial accountability necessary to manage a large-scale habitat program.

As a charitable organization, NDPF operates with transparency and public accountability. The Foundation maintains rigorous financial controls, comprehensive record-keeping systems, and regular reporting to funding partners and regulatory agencies. This organizational infrastructure enables the Foundation to effectively manage multi-year grant funding, coordinate complex projects across diverse geographic areas, and maintain the long-term relationships with landowners that are essential to conservation success.

The Foundation provides program oversight and administration but does not maintain dedicated technical staff. Instead, NDPF utilizes North Dakota Petroleum Council (NDPC) staff to carry out program duties, with NDPC labor time serving as a significant in-kind contribution to the program. This arrangement allows the program to operate with minimal administrative overhead while leveraging the organizational capacity and community relationships that NDPC has built over decades of work in North Dakota.

For the technical aspects of habitat design, planning, and planting implementation, the program relies on qualified contractors with expertise in conservation tree planting and wildlife habitat establishment. These contractors conduct site assessments, develop planting plans, plant trees, and provide the specialized knowledge required for successful habitat establishment. This model ensures that technical work is performed by professionals with direct field experience while enabling the Foundation to focus on program coordination, quality assurance, landowner relations, and grant administration.

NDPF's organizational mission extends beyond tree planting to encompass broader conservation and community goals. The Foundation views the "Planting for the Future" program as an opportunity to demonstrate the value of proactive conservation, build public understanding of habitat needs, and create lasting partnerships between industry, landowners, and conservation agencies. This holistic approach ensures that program benefits extend beyond immediate wildlife habitat gains to include enhanced conservation capacity, strengthened community relationships, and increased public engagement with conservation issues.

### **Relationship with North Dakota Petroleum Council**

While the North Dakota Petroleum Foundation operates as an independent 501(c)(3) nonprofit organization, it maintains a collaborative relationship with the North Dakota Petroleum Council (NDPC), the state's oil and gas industry trade association. This relationship reflects a shared commitment to environmental stewardship and community benefit in the regions where energy development occurs.

The energy industry's support for conservation through NDPF demonstrates a recognition that responsible resource development and wildlife habitat conservation are compatible and complementary goals. North Dakota's energy sector operates in a landscape that also supports agriculture, wildlife, recreation, and diverse human communities. By supporting habitat establishment through NDPF, the industry contributes to maintaining the ecological and social values that make North Dakota communities attractive places to live and work.

This industry-conservation partnership provides valuable benefits to the program. It enables NDPF to leverage relationships within rural communities where energy development occurs, facilitating landowner outreach and program participation. It also provides organizational stability and long-term commitment that enhances the Foundation's credibility with funding partners and conservation agencies. Most importantly, it demonstrates that private sector entities can play constructive roles in advancing public conservation priorities.

The Foundation's independence as a 501(c)(3) organization ensures that conservation objectives guide program decisions. Technical design criteria, species priorities, site selection processes, and implementation standards are developed based on best available science and conservation need, with input from wildlife biologists, conservation agencies, and technical experts. This independence, combined with industry support, creates a unique model for private lands conservation in North Dakota.

## **Outdoor Heritage Fund Partnership**

The primary funding source for the "Planting for the Future" program is North Dakota's Outdoor Heritage Fund (OHF), a constitutionally dedicated funding mechanism for conservation projects in the state. OHF was established by North Dakota voters in 2010 to provide sustainable funding for habitat conservation, with revenues derived from a portion of oil and gas extraction tax proceeds. This funding mechanism reflects North Dakotans' commitment to ensuring that natural resource development contributes to long-term conservation of the state's wildlife heritage.

OHF grant funding has enabled the program to achieve scale and impact that would be impossible through private fundraising alone. Multi-year OHF grants provide the financial predictability necessary for advance planning, nursery contracting, staff capacity building, and sustained landowner engagement. The competitive OHF grant process also ensures program accountability, requiring detailed work plans, defined deliverables, technical review, and comprehensive reporting on outcomes.

The partnership between NDPF and OHF represents an effective model for leveraging public conservation funding through nonprofit implementation. OHF provides the financial resources and accountability framework, while NDPF contributes implementation capacity, technical expertise, landowner relationships, and organizational infrastructure. This division of roles enables efficient use of public conservation dollars while maintaining flexibility to adapt to site-specific conditions and emerging opportunities.

Grant funding from OHF is awarded through a competitive application process overseen by the Outdoor Heritage Fund Advisory Board and the North Dakota Industrial Commission. Applications are evaluated based on conservation benefit, technical merit, cost-effectiveness, partnership leverage, and alignment with state conservation priorities. The rigorous review process ensures that funded projects deliver measurable conservation outcomes and represent sound investments of public resources.

NDPF's track record of successful OHF grant implementation has established the Foundation as a reliable conservation partner. Consistent achievement of planting targets, maintenance of high survival rates, comprehensive reporting, and effective landowner engagement have demonstrated the program's capacity to deliver results. This performance history strengthens the Foundation's ability to secure continued funding and expand program impact in future grant cycles.

## **1.2 Conservation Context**

### **North Dakota's Unique Conservation Landscape**

North Dakota's conservation challenges and opportunities are shaped by fundamental characteristics of land ownership and management. Approximately 70 percent of the state's forested and woodland habitat exists on privately owned land. This ownership pattern means that achieving landscape-level conservation goals for forest-dependent and woodland-associated wildlife species requires active engagement with private landowners. Public land acquisition alone cannot address the habitat needs of species that depend on woody cover, shelter belts, riparian corridors, and forest edge habitats.

The state's agricultural landscape has undergone significant changes in recent decades, with implications for wildlife habitat. Consolidation of farm operations, conversion of

grassland to cropland, removal of shelterbelts and woody cover, and intensification of agricultural practices have reduced the abundance and connectivity of wildlife habitat across much of the state. These landscape changes have been particularly impactful for species that depend on the structural diversity and habitat heterogeneity provided by trees, shrubs, and woody edges within agricultural landscapes.

At the same time, North Dakota landowners demonstrate strong conservation values and willingness to incorporate wildlife habitat into their land management when provided with technical assistance and financial support. The state has a long history of private lands conservation programs, from Conservation Reserve Program (CRP) grassland establishment to wetland restoration partnerships. This conservation culture creates opportunities for programs like "Planting for the Future" that offer landowners practical pathways to enhance wildlife habitat on working lands.

The ecological diversity of North Dakota adds complexity and opportunity to conservation efforts. The state spans multiple ecological regions, from tallgrass prairie remnants in the east to shortgrass prairie in the west, from northern boreal forest influences to Great Plains grassland ecosystems. This diversity means that effective conservation must be regionally tailored, with species priorities, habitat types, and management approaches adapted to local ecological conditions. The "Planting for the Future" program embraces this complexity through site-specific design that matches plantings to local environmental conditions and wildlife needs.

Climate patterns also shape conservation strategy in North Dakota. The state's continental climate features cold winters, periodic drought, and high climatic variability. These conditions create specific habitat needs for wildlife, particularly the winter thermal cover and shelter that woody vegetation provides. Tree and shrub plantings that provide dense winter cover, windbreaks, and microclimate modification deliver disproportionate benefits for wildlife survival in North Dakota's harsh climate. Conservation programs that establish this type of functional habitat address limiting factors for wildlife populations.

### **State Wildlife Action Plan Alignment**

The "Planting for the Future" program directly advances conservation priorities identified in North Dakota's State Wildlife Action Plan (SWAP), the comprehensive strategy guiding wildlife conservation efforts statewide. The SWAP identifies Species of Greatest Conservation Need (SGCN), characterizes key habitats, analyzes conservation threats, and establishes strategic priorities for wildlife management. Alignment with SWAP priorities ensures that the tree planting program contributes to coordinated, science-based conservation efforts across agencies and organizations.

Multiple Species of Conservation Priority that are highlighted in the SWAP benefit directly from tree and shrub plantings established through this program. For upland game birds, including ring-necked pheasant and sharp-tailed grouse, woody cover provides critical nesting habitat, winter shelter, and escape cover from predators and weather. Both species are identified as priority management species in the SWAP, and habitat availability is recognized as a key limiting factor for population maintenance. Tree plantings that incorporate shrub understories, edge habitats, and structural diversity create optimal conditions for these species.

White-tailed deer and mule deer, also priority species in the SWAP, rely heavily on woody cover for thermal regulation, particularly during severe winter weather. Dense conifer

plantings and mixed hardwood-conifer stands provide the shelter and reduced wind exposure that enable deer to conserve energy during periods of deep snow and extreme cold. In agricultural landscapes where natural wooded habitat is limited, strategically placed tree plantings can significantly enhance deer winter survival and carrying capacity.

Songbird species, including numerous neotropical migrants and year-round residents, constitute a diverse group of SWAP priority species that benefit from tree plantings. These species require varied habitat structures for nesting, foraging, and shelter. Plantings that create vertical structural complexity, incorporate diverse plant species, and establish connections between habitat patches support songbird diversity and abundance. Native fruit and seed-producing shrubs provide essential food resources during migration and winter periods.

Pollinator species, including native bees and butterflies, are increasingly recognized as conservation priorities due to documented population declines and their essential role in ecosystem function. The SWAP emphasizes the need for diverse flowering plant communities and habitat connectivity for pollinators. Tree and shrub plantings that incorporate flowering species, particularly native plants with extended bloom periods, contribute to pollinator habitat networks across agricultural landscapes.

The habitats created through the "Planting for the Future" program align with multiple habitat types identified as conservation priorities in the SWAP. Deciduous woodland and forest edge habitats provide high-value wildlife resources in prairie-dominated landscapes. Riparian corridors and wooded draws support disproportionately high wildlife diversity relative to their spatial extent. Shelterbelts and woody buffers within agricultural lands create structural diversity and connectivity that enhance landscape permeability for wildlife movement.

The SWAP identifies several key conservation threats that the tree planting program helps address. Habitat loss and fragmentation, particularly the removal of woody cover from agricultural landscapes, is recognized as a primary threat to many priority species. By establishing new woody habitat patches and restoring vegetated corridors, the program directly counters this threat. Climate change impacts, including increased frequency of extreme weather events, create additional stress on wildlife populations. Tree plantings that provide shelter and microclimate modification enhance wildlife resilience to climatic variability.

Strategic conservation priorities outlined in the SWAP emphasize the importance of private lands conservation, landscape-level planning, and partnerships among diverse stakeholders. The "Planting for the Future" program embodies these strategic approaches. By working exclusively on private lands, the program engages the landowners who control the majority of wildlife habitat. By implementing projects across broad geographic areas with attention to connectivity and landscape context, the program contributes to landscape-scale conservation outcomes. By partnering with landowners, conservation agencies, technical service providers, and funding entities, the program demonstrates effective multi-stakeholder collaboration.

### **Private Lands Conservation Imperative**

The numerical reality of land ownership in North Dakota makes private lands conservation not merely desirable but essential for wildlife management success. With 70 percent of forested and woodland habitat occurring on private property, conservation programs that do not engage private landowners cannot achieve meaningful landscape-level outcomes for

forest-associated species. Public lands, while important, represent insufficient habitat area to sustain viable populations of many wildlife species across their historical ranges.

Private landowners make land management decisions based on complex and diverse motivations, including economic returns, family legacy, aesthetic preferences, community values, and conservation ethics. Effective private lands conservation programs recognize this complexity and provide multiple pathways for landowner engagement. Financial incentives, technical assistance, recognition of stewardship, and flexibility in implementation all contribute to landowner willingness to incorporate wildlife habitat into property management.

The "Planting for the Future" program succeeds in engaging private landowners because it offers tangible benefits aligned with landowner interests. Tree plantings provide visual appeal and property enhancement valued by many rural landowners. Wildlife habitat improvements align with the hunting traditions and outdoor recreation interests prevalent in North Dakota communities. The program's financial support for establishment and maintenance reduces the economic barriers to habitat creation. Technical design assistance ensures that plantings meet landowner objectives while delivering wildlife benefits.

Long-term habitat conservation on private lands requires building relationships of trust and mutual respect between conservation organizations and landowners. The program's approach emphasizes partnership rather than regulation, voluntary participation rather than mandated compliance, and flexible design rather than one-size-fits-all prescriptions. This relationship-based approach recognizes that landowners are essential conservation partners whose cooperation and long-term stewardship determine ultimate conservation success.

Private lands conservation also leverages the intimate knowledge that landowners possess about their properties. Landowners understand local soil conditions, drainage patterns, wildlife use, and site history in ways that outside experts cannot match. Incorporating landowner knowledge into site assessment and design processes improves project outcomes and increases landowner investment in long-term habitat management. The collaborative design approach used in the "Planting for the Future" program treats landowners as valued partners whose insights enhance conservation effectiveness.

The economic context of North Dakota agriculture influences private lands conservation opportunities. Farm income variability, input cost pressures, labor constraints, and market uncertainties affect landowners' capacity to invest in habitat establishment and management. Conservation programs that provide financial support for habitat projects enable landowners to undertake conservation actions that might otherwise be economically infeasible. The program's cost-share approach recognizes that conservation delivers public benefits and warrants public investment.

### **1.3 Wildlife Habitat Goals**

#### **Target Species and Habitat Requirements**

The "Planting for the Future" program is designed to benefit a diverse assemblage of wildlife species by creating habitat that meets multiple functional needs. While plantings are customized to site-specific conditions, all designs incorporate features that support priority species groups identified in North Dakota's conservation planning.

White-tailed deer and mule deer represent primary target species for the program's big game habitat objectives. These ungulate species require woody cover that serves multiple functions across seasons. During winter months, dense conifer stands and mixed hardwood-conifer plantings provide thermal cover that reduces energy expenditure during periods of extreme cold and deep snow. The microclimate modification provided by tree canopies and the wind reduction within dense plantings enable deer to maintain body condition when environmental conditions are most challenging. Research has demonstrated that deer survival rates during severe winters are directly linked to the availability of adequate thermal cover within their home ranges.

Beyond thermal benefits, woody cover provides essential escape cover that allows deer to evade predators and human disturbance. In agricultural landscapes where natural wooded habitat is limited, deer concentrate in available woody patches, particularly during daylight hours. Tree plantings that create secure bedding areas and travel corridors enhance deer habitat quality and may influence local population distribution and abundance. For mule deer in western North Dakota, wooded draws and shrubby badlands provide critical habitat that supports populations at the eastern edge of the species' range.

Ring-necked pheasant and sharp-tailed grouse are priority upland game bird species for which woody cover provides essential habitat components. For pheasants, tree and shrub plantings offer critical winter cover that determines survival during periods of deep snow and severe cold. Dense woody vegetation, particularly shrub thickets and conifer groves, provides shelter where pheasants can roost above snow level and access food resources when row crop fields are buried under snow. Winter cover availability is widely recognized as a primary limiting factor for pheasant populations in northern prairie states.

Pheasants also utilize woody edge habitats for nesting, with hens frequently selecting nest sites in herbaceous cover adjacent to woody borders where structural diversity is greatest. Tree plantings that incorporate diverse edge conditions and understory vegetation enhance nesting habitat quality. During brood-rearing, pheasant chicks require insects for protein, and woody habitats with diverse plant communities support abundant insect populations. The multiple seasonal benefits provided by well-designed tree plantings make them high-value habitat for pheasants throughout the year.

Sharp-tailed grouse utilize woody cover differently than pheasants but derive significant benefits from strategic tree plantings. During winter, grouse feed heavily on tree and shrub buds, particularly those of birch, willow, and fruit-bearing shrubs. Access to woody browse is essential for winter survival, as grouse shift from herbaceous and seed-based diets during summer to woody plant materials during winter months. Tree plantings that incorporate diverse shrub species provide winter food resources that supplement natural woody vegetation.

Sharp-tailed grouse also require woody cover for escape from predators and weather, particularly during extreme conditions. While grouse are more grassland-associated than pheasants, they regularly utilize woody draws and shrubby habitats for shelter. The program's approach of creating habitat mosaics that include both woody and herbaceous components aligns with sharp-tailed grouse ecology and supports populations across varied landscape types.

Songbird species represent a diverse target group that includes both year-round residents and neotropical migrants that breed in North Dakota during summer months. These species

require varied habitat structures for nesting, foraging, and shelter, with different species occupying different vertical strata and habitat types. Tree plantings that create structural complexity, from ground-level shrubs to mature tree canopies, support diverse songbird communities by providing multiple niche opportunities.

Cavity-nesting species, including several woodpecker species, chickadees, and nuthatches, require mature trees for nest site excavation and foraging. While newly established plantings do not immediately provide cavity habitat, they represent long-term investments in future cavity-nesting bird habitat. As planted trees mature and develop dead wood, they will support cavity-nesting species populations. Incorporation of diverse tree species, including those that develop cavities relatively quickly, enhances future cavity habitat value.

Shrub-nesting songbirds, including several sparrow species, warblers, and other small passerines, benefit immediately from tree plantings that include robust shrub components. Dense shrub layers provide secure nesting substrates and foraging habitat for insects that these species require during breeding season. Native fruit-producing shrubs also provide food resources during migration periods, when energy-rich fruits enable fat deposition for long-distance travel.

Pollinator species, including native bees, butterflies, and other flower-visiting insects, benefit from tree plantings that incorporate diverse flowering plant species. Many native trees and shrubs produce abundant flowers that provide nectar and pollen resources during critical periods of pollinator activity. Early-blooming willow and plum species provide resources when few other flowering plants are available, while later-blooming species extend resource availability throughout the growing season. The habitat structural diversity created by tree plantings also supports pollinator nesting and overwintering requirements.

### **Habitat Functions Provided**

Tree and shrub plantings established through the "Planting for the Future" program provide multiple habitat functions that benefit wildlife across seasons and species groups. Understanding these functional benefits clarifies how woody habitat establishment contributes to wildlife population support and landscape-level conservation outcomes.

Nesting and breeding habitat represents a primary function of established tree plantings. Woody vegetation provides structural substrates where birds construct nests, offering protection from ground predators and weather exposure. The vertical structure created by trees and shrubs creates nesting opportunities at multiple heights, supporting species with different nesting preferences. Edge habitats where woody vegetation transitions to herbaceous cover provide particularly high-quality nesting conditions due to structural diversity and resource abundance.

The density and arrangement of woody vegetation influences nesting habitat quality. Moderately dense plantings provide security while maintaining adequate light penetration for understory development. Sparse, overly open plantings lack the concealment that many species require, while excessively dense plantings may limit access and understory productivity. Design specifications in the program target optimal density ranges based on species requirements and site conditions.

Winter thermal cover represents perhaps the most critical habitat function provided by tree plantings in North Dakota's harsh climate. Dense woody vegetation, particularly conifer stands and mixed plantings with substantial evergreen components, modifies microclimates

by reducing wind speed, trapping solar radiation, and providing overhead cover that reduces radiative heat loss. Research has documented temperature differences of 10-15 degrees Fahrenheit between dense woody cover and adjacent open areas during winter conditions.

For deer, winter thermal cover reduces the energetic cost of maintaining body temperature during periods when food quality and availability are limited. Deer that have access to adequate thermal cover maintain better body condition and experience higher survival rates during severe winters compared to deer without access to quality cover. The strategic placement of thermal cover plantings can influence landscape carrying capacity and population distribution patterns.

Upland game birds similarly rely on winter cover for survival. Pheasants roosting in dense woody cover experience reduced metabolic demands compared to birds exposed to wind and cold in open habitats. During extreme weather events, when temperatures plunge and winds are severe, access to quality winter cover may determine survival versus mortality for individual birds and influence population-level outcomes.

Food sources provided by tree and shrub plantings support wildlife across seasons. Fruit-producing shrubs offer energy-rich food during late summer and fall when wildlife are preparing for winter or migration. Native plum, chokecherry, buffaloberry, and other fruit-bearing species provide foods that are consumed by birds, deer, and small mammals. These natural food sources supplement agricultural crops and herbaceous seeds in wildlife diets.

Seed-producing trees and shrubs extend food availability into winter months. Many native species retain fruits or seeds through winter, providing emergency food resources during periods when other foods are unavailable. Sumac, dogwood, and other species with persistent fruits support wintering birds and provide late-season food for mammals.

Insect populations associated with diverse woody vegetation provide essential protein sources for birds, particularly during breeding season when adults are feeding growing chicks. Tree and shrub foliage supports herbivorous insects that become prey for insectivorous birds. Flowering plants attract pollinating insects that are also consumed by birds. The insect abundance associated with woody habitats exceeds that of cropland or simple grassland communities, making tree plantings important foraging areas.

Migration corridors and landscape connectivity represent landscape-level habitat functions provided by strategically placed tree plantings. As habitat fragmentation has increased across agricultural landscapes, maintaining connectivity that enables wildlife movement between habitat patches has become increasingly important. Tree plantings that create vegetated corridors or stepping-stone habitat patches facilitate wildlife dispersal and seasonal movements.

For migratory birds, woody habitats distributed across landscapes provide stopover sites where migrants can rest and refuel during long-distance travel. The concentration of food resources and shelter in woody patches makes them attractive to migrants crossing prairie landscapes. Networks of woody habitats enhance landscape permeability for migration and support higher migrant survival rates.

Escape cover and refugia functions enable wildlife to evade predators and find shelter during disturbance events. Dense woody vegetation provides visual concealment and physical barriers that reduce predation risk. During human activities such as farming operations or hunting seasons, wildlife can retreat to secure cover where disturbance is minimized. The

security provided by escape cover influences wildlife behavior, habitat use patterns, and population dynamics.

## **1.4 Program Philosophy**

### **Site-Specific, Adaptive Design Approach**

The "Planting for the Future" program is built on a philosophy of site-specific design that recognizes the enormous variability in soil conditions, climate patterns, topography, existing vegetation, and wildlife use across North Dakota landscapes. Rather than applying standardized planting prescriptions uniformly across all sites, the program employs adaptive design processes that match plantings to the unique characteristics and opportunities present at each location.

Site-specific design begins with comprehensive site assessment that evaluates physical conditions, biological resources, landowner objectives, and landscape context. Soil characteristics, including texture, drainage, pH, and nutrient status, fundamentally determine which tree and shrub species will thrive at a given location. Climate patterns, particularly precipitation levels, temperature extremes, and wind exposure, influence species selection and planting design. Topographic features such as slope, aspect, and position in the landscape affect microclimate conditions and planting success probabilities.

Existing vegetation provides important information about site potential and ecological context. The presence of specific plant communities indicates soil and moisture conditions that guide species selection. Native vegetation remnants suggest which species are well-adapted to local conditions and may serve as models for planting design. The degree of existing woody cover influences the marginal value of additional plantings and helps prioritize sites where habitat establishment will deliver greatest conservation benefit.

Wildlife use patterns observed during site visits inform design decisions about planting configuration, species composition, and habitat features to emphasize. Sites where deer tracks, pheasant sign, or bird activity are abundant may warrant different design approaches than sites with limited current wildlife use. Understanding how wildlife are currently using a property helps designers create plantings that enhance existing habitat and attract additional wildlife activity.

Landowner objectives and preferences are integral to site-specific design. Landowners may have specific goals for wildlife species they wish to attract, aesthetic preferences for planting appearance, or practical concerns about planting placement relative to agricultural operations. Incorporating landowner input into design processes increases landowner satisfaction, investment in long-term management, and probability that plantings will be maintained and protected over time.

The adaptive nature of the program's design approach means that planting specifications evolve based on accumulated experience and monitoring results. As the program has established hundreds of plantings across diverse sites, patterns of success and challenge have emerged that inform continuous improvement in design practices. Species that consistently perform well in specific soil or climate conditions are emphasized in similar future sites. Design configurations that produce particularly good wildlife use or high aesthetic appeal are refined and replicated.

Adaptive management also enables the program to respond to changing conditions such as evolving climate patterns, new pest or disease threats, or shifts in wildlife populations and habitat needs. The flexibility to adjust species selections, modify planting densities, or experiment with new design approaches ensures that the program remains effective and relevant as conditions change over time.

### **Balance of Standards and Flexibility**

The program maintains rigorous technical standards that ensure plantings deliver quality wildlife habitat while allowing flexibility in implementation to accommodate site variability and landowner preferences. This balance between standards and flexibility is essential for achieving both conservation outcomes and landowner engagement.

Technical standards establish minimum requirements for planting design, species selection, site preparation, planting procedures, and maintenance practices. These standards are based on scientific literature, professional expertise, and accumulated program experience. They ensure that all plantings meet threshold conditions for habitat functionality and have high probability of establishment success. Standards related to planting density, species diversity, and configuration ensure that ecological objectives are met across all projects.

Species selection standards specify that plantings must emphasize native species adapted to local conditions and that species composition must include diversity appropriate for wildlife benefit. While specific species lists vary by site, the principle of using regionally appropriate native plants applies universally. This standard prevents use of potentially invasive species and ensures plantings integrate ecologically with surrounding landscapes.

Site preparation and planting procedure standards establish protocols for weed control, soil preparation, planting depth and spacing, and protection from herbivory. These standards are derived from best practices documented in technical literature and field experience.

Adherence to these protocols significantly increases establishment success rates and reduces long-term maintenance challenges.

Within these standard frameworks, substantial flexibility exists to customize plantings to site conditions and landowner preferences. Flexibility in species selection allows designers to emphasize particular wildlife groups or aesthetic goals. Flexibility in planting configuration enables adaptation to field shapes, topographic features, and operational constraints. Flexibility in density and arrangement allows creative solutions that meet both ecological and practical objectives.

This balance ensures that the program maintains credibility with funding agencies and conservation partners by demonstrating consistent application of sound technical principles, while also maintaining appeal to landowners by offering customized solutions that respect individual property contexts and owner preferences. The combination of standards and flexibility represents mature program design that integrates ecological science, practical implementation considerations, and human dimensions of conservation.

### **Landowner Partnership Model**

The "Planting for the Future" program is fundamentally built on partnerships with private landowners who voluntarily choose to participate in habitat establishment on their properties. This partnership model recognizes that landowners are not merely sites for conservation implementation but active collaborators whose knowledge, preferences, and long-term stewardship are essential to conservation success.

Partnership begins with respectful engagement that acknowledges landowner property rights and management authority. Program staff approach landowners as invited guests who are offering assistance rather than imposing requirements. Initial conversations focus on listening to landowner goals and understanding property characteristics before discussing program offerings. This relationship foundation builds trust and establishes mutual respect that supports long-term collaboration.

The partnership model emphasizes shared decision-making in project design and implementation. While program staff provide technical expertise and conservation recommendations, landowners contribute intimate knowledge of their properties and make final decisions about project details. This collaborative approach produces designs that integrate ecological functionality with landowner satisfaction, increasing the likelihood of successful long-term outcomes.

Financial partnerships are structured to share costs between the program and landowners, reflecting the public and private benefits that habitat provides. Public funding through Outdoor Heritage Fund grants covers the majority of establishment costs, recognizing that wildlife habitat delivers public benefits. Landowner contributions, whether financial or in-kind through land dedication and management commitment, demonstrate personal investment and long-term commitment to habitat stewardship.

The partnership model extends beyond initial planting to include ongoing communication, technical support, and relationship maintenance. Program staff remain available to answer questions, address challenges, and provide guidance as plantings mature and management needs evolve. This continued engagement reinforces the collaborative relationship and supports landowner success in achieving their habitat goals.

Successful landowner partnerships require cultural competence and communication skills that enable program staff to work effectively with diverse individuals and communities. North Dakota landowners represent varied backgrounds, experiences, and perspectives on conservation and land management. Effective program delivery requires understanding these differences and adapting communication and engagement approaches to build productive relationships across diverse audiences.

### **Long-Term Sustainability Focus**

The program philosophy emphasizes long-term habitat sustainability rather than short-term planting counts. While annual planting numbers represent important metrics for measuring implementation progress, ultimate conservation success depends on whether plantings survive, mature into functional habitat, and persist across decades to provide enduring wildlife benefits.

Long-term sustainability begins with design decisions that prioritize species and configurations likely to thrive with minimal ongoing intervention. Native species adapted to local conditions require less supplemental care than species at the margins of their ecological tolerances. Appropriate density and spacing reduce competition stress and increase individual plant vigor. Diverse species compositions provide resilience against species-specific pests or diseases that might devastate monoculture plantings.

Site preparation investments that may increase upfront costs but enhance long-term success are prioritized in program design. Thorough weed control before planting reduces early competition and increases establishment rates. Soil amendments where needed improve

growing conditions and plant vigor. Protective measures such as tree tubes or fencing prevent herbivory damage during vulnerable establishment years. These investments pay long-term dividends through higher survival rates and reduced maintenance needs.

Maintenance support during establishment years recognizes that plantings require care during the critical period when young plants are developing root systems and establishing competitive advantages over weeds. The program's approach includes both technical guidance and financial support for weed control, replacement of mortalities, and protective measures. This establishment-phase support significantly increases the proportion of plantings that successfully transition to self-sustaining habitat.

Landowner education about long-term management needs prepares partners to care for plantings as they mature. Information about weed control, wildlife damage management, thinning if needed, and signs of pest or disease problems enables landowners to identify and address issues before they compromise planting success. This education investment builds landowner capacity for effective long-term stewardship.

Monitoring and adaptive management processes enable the program to learn from experience and continuously improve practices that enhance long-term sustainability. Survival assessments document which species and designs perform well in various conditions, informing future design decisions. Identification of common challenges enables development of solutions that prevent similar problems in future plantings. This commitment to learning and adaptation ensures that program effectiveness increases over time.

The long-term perspective also shapes expectations and communications with landowners and stakeholders. Tree planting for wildlife habitat is inherently a long-term investment with benefits that accrue gradually as plantings mature. Young plantings provide limited habitat value initially, with functionality increasing as structural complexity develops. Clear communication about these timelines ensures realistic expectations and maintains commitment through the patient process of habitat maturation.

Ultimately, the program's focus on long-term sustainability reflects an understanding that conservation is measured not by immediate outputs but by enduring outcomes that provide lasting benefit to wildlife, landowners, and the broader public. The goal is not simply to plant trees, but to establish thriving habitat that enhances North Dakota's conservation landscape for generations to come. This long-term orientation distinguishes the "Planting for the Future" program as a serious conservation effort worthy of continued public investment and support.

## Section 2: Technical Standards and Guidelines

### 2.1 Authoritative References and Technical Foundation

The North Dakota Petroleum Foundation's "Planting for the Future" program incorporates industry best practices established by federal, state, and academic conservation authorities. This approach ensures that projects reflect professional conservation standards while remaining adaptable to site-specific conditions across North Dakota's diverse landscapes. Rather than rigidly adhering to every specification, the program uses these authoritative references as foundational guidance that informs—but does not constrain—the professional judgment of qualified contractors working with individual landowners.

#### 2.1.1 USDA Natural Resources Conservation Service (NRCS) Field Office Technical Guide

The USDA-NRCS Field Office Technical Guide (FOTG) for North Dakota provides science-based conservation practice standards developed through decades of research and field application. The FOTG represents the consensus of federal, state, and university conservation professionals regarding effective conservation practice implementation. The program uses NRCS guidelines as industry best practices, incorporating their recommendations as appropriate for each site while allowing contractors the flexibility to apply professional judgment.

##### Relevant NRCS Conservation Practice Standards:

Practice 612 - Tree/Shrub Establishment: This practice standard provides guidance on establishing woody plants for conservation purposes, including site preparation, planting specifications, and post-planting care. The standard addresses projects where trees and shrubs are planted for purposes including wildlife habitat, windbreaks, riparian buffers, and environmental quality enhancement. The Planting for the Future program incorporates Practice 612 guidance on planting depth, spacing, timing, and stock handling as industry best practices.

Practice 645 - Upland Wildlife Habitat Management: This standard addresses the creation, restoration, and management of upland wildlife habitat, with specific provisions for establishing woody cover for wildlife. Practice 645 establishes minimum survival rate standards of 50% for wildlife habitat plantings, recognizing that wildlife habitat projects typically involve more challenging sites and broader spacing than commercial forestry or windbreak applications. The program uses this 50% threshold as its baseline expectation, with actual survival rates consistently ranging from 73-84%—well above this industry standard.

Practice 380 - Windbreak/Shelterbelt Establishment and Renovation: Where projects include windbreak or farmstead protection objectives, Practice 380 guidance may apply, with higher survival rate expectations (85%) due to the closer spacing and more intensive management typical of windbreak systems. The program applies appropriate expectations based on project objectives and site conditions.

Practice 391 - Riparian Forest Buffer: For projects in riparian areas, Practice 391 provides guidance for tree and shrub establishment along waterways, with survival expectations of 75%. These recommendations address unique site conditions in riparian zones, including flood tolerance, root system requirements, and vegetation management strategies.

### **NRCS Guidance on Site Preparation:**

The FOTG provides site preparation guidance relevant to tree establishment success, including weed control recommendations and soil moisture conservation practices. The program's contractors evaluate site conditions and apply appropriate site preparation measures based on their professional experience and the specific characteristics of each location. Contractors typically assess soil types visually and based on experience rather than conducting extensive soil testing.

### **NRCS Planting Guidance:**

FOTG standards provide guidance on planting operations, including planting depth (root collar at or slightly below soil surface), root system placement (straight and fully extended without J-rooting), soil compaction around roots (firm contact eliminating air pockets), and timing windows (spring planting before bud break or fall planting after hardening off). Program contractors incorporate these industry best practices while applying professional judgment to address site-specific conditions.

### **Survival Rate Standards by Project Type:**

The NRCS framework recognizes that different conservation objectives support different survival rate expectations:

- Wildlife Habitat (Practice 645): 50% minimum survival rate
- Riparian Buffer (Practice 391): 75% minimum survival rate
- Windbreak/Shelterbelt (Practice 380): 85% minimum survival rate

The Planting for the Future program uses these benchmarks as reference points, with the majority of projects designed primarily for wildlife habitat. The program's actual performance (73-84% survival) consistently exceeds these industry standards, demonstrating the effectiveness of site-specific design and qualified contractor implementation.

## **2.1.2 North Dakota State University Extension Resources**

North Dakota State University provides research-based guidance specific to North Dakota's growing conditions, soils, and climate through its Extension Service publications. These resources translate academic research into practical recommendations for tree establishment in North Dakota.

North Dakota Tree Handbook (NDSU Extension Publication F-1032): This comprehensive guide addresses species selection, site preparation, planting techniques, and establishment care for North Dakota conditions. The handbook incorporates decades of research from NDSU's forestry and horticulture programs and provides species-specific recommendations based on soil type, moisture availability, and intended purpose. Program species selection draws heavily from species recommended in this authoritative state resource.

NDSU Extension Publications on Wildlife Habitat: Extension publications including "Trees and Shrubs for Wildlife" and "Establishing Windbreaks for Wildlife" provide specific guidance on species selection and planting design for wildlife objectives. These publications emphasize the ecological value of diverse plantings incorporating both evergreen and deciduous species, the importance of shrub components for food production and ground-level cover, and the benefits of irregular spacing and design that mimics natural vegetation patterns.

NDSU Soil-Specific Planting Guides: Extension publications addressing tree establishment on specific North Dakota soil types (including heavy clay soils, sandy soils, and saline-affected soils) inform site assessment and species selection protocols. These guides identify species with proven performance on challenging soil types common across North Dakota landscapes.

### **2.1.3 North Dakota Forest Service Technical Resources**

The North Dakota Forest Service provides state-level resources that support conservation tree planting across the state. The program utilizes these resources primarily for nursery stock procurement.

Towner State Nursery: As North Dakota's state-operated conservation seedling nursery, Towner State Nursery serves as the primary source for program tree and shrub stock. The program coordinates with Towner primarily on stock availability and ordering logistics rather than species selection guidance. Nursery stock from Towner is grown from seed sources selected for cold hardiness and regional adaptation.

The annual Towner State Nursery catalog provides information on species availability, stock specifications, and ordering procedures. Program ordering is centralized through NDPF to ensure quality control and competitive pricing.

Lincoln Oakes Nursery: Located in Bismarck, Lincoln Oakes Nursery serves as a secondary source for program nursery stock. This nursery provides additional species options and supplemental capacity when Towner stock is unavailable or when specific varieties are needed for particular projects. The program coordinates with both nurseries to ensure adequate stock availability for planned projects.

North Dakota Forest Action Plan: This strategic planning document identifies forest and tree resource priorities for the state, including expansion of tree cover for wildlife habitat. The Planting for the Future program aligns with Forest Action Plan objectives of increasing tree and shrub cover on private lands through diverse plantings.

Species Suitability Information: Forest Service resources provide general species suitability information for different regions of North Dakota. While this information is available as a reference, species selection decisions are ultimately made by qualified contractors based on their professional assessment of site conditions and landowner objectives.

### **2.1.4 Integration of Technical Standards into Program Implementation**

The program integrates these reference sources into a flexible framework that empowers qualified contractors to apply professional judgment while maintaining quality standards:

Contractor-Led Site Assessment: Contractors conduct site assessments using their professional experience and visual evaluation of soil types, topography, and existing conditions. Rather than requiring extensive soil testing or rigid NRCS data analysis, the program trusts contractors to assess conditions and make appropriate species and design recommendations based on their expertise.

Service Agreement Requirements: Program service agreements with contractors specify that they must follow industry best practices and guidelines, providing the structure of professional standards while allowing contractors the flexibility to operate independently as private professionals. Contractors look at soil types at each site and apply their experience to determine appropriate species and designs.

**Species Selection Flexibility:** While the program maintains a list of primary approved species that have demonstrated consistent success, this list is not exclusive. The program promotes adding or trying other species that are zoned for the area and fit within project parameters. Diversity is important in wildlife habitat planting, and contractors are encouraged to incorporate appropriate species based on site conditions and landowner objectives.

**Monitoring and Adaptive Management:** Post-planting monitoring generates data on species performance under varying site conditions, allowing continuous refinement of recommendations based on observed field results. This data-driven approach complements contractor experience with program-specific performance information.

The result is a program that draws upon industry best practices while maintaining the flexibility necessary to address North Dakota's diverse landscapes. This approach recognizes that qualified contractors bring valuable expertise and that rigid, one-size-fits-all protocols are less effective than site-specific professional judgment.

## **2.2 Tree and Shrub Species Selection**

Species selection represents one of the most important decisions in conservation tree planting, directly influencing establishment success, wildlife habitat value, and long-term project outcomes. The Planting for the Future program approaches species selection by balancing multiple factors including site suitability, wildlife value, proven performance, and landowner objectives, while maintaining flexibility for contractors to apply professional judgment.

### **2.2.1 Wildlife Habitat Planting vs. Forest Planting**

An important distinction shapes the program's approach to species selection: wildlife habitat planting goals differ fundamentally from forest planting or timber production goals.

Understanding these differences explains why the program emphasizes diversity, structural complexity, and species that might not rank highly in traditional forestry evaluations.

#### **Key Differences:**

**Diversity Over Monoculture:** While commercial forestry often favors single-species plantings for efficient management and harvest, wildlife habitat benefits from species diversity. Mixed plantings provide varied food sources throughout the year, multiple cover types, and habitat niches supporting diverse wildlife communities. The program actively promotes incorporating multiple species in most projects.

**Understory Development:** Forest plantings often aim for dense canopy closure that shades out understory vegetation. In contrast, wildlife habitat plantings benefit from open canopy structure that allows sunlight to reach ground level, promoting understory shrub growth and herbaceous vegetation that many wildlife species require. The program avoids monocultures with dense canopy that block sunlight and offer no understory growth or diversity.

**Wildlife Value Over Lumber Value:** Species selection in wildlife habitat planting prioritizes food production (fruits, nuts, browse), cover characteristics, and structural diversity rather than timber quality or growth rate. As a general principle, the higher the lumber value of a tree species, the lower its typical wildlife value. Species like chokecherry and buffaloberry would never be selected for timber production but rank among the most valuable plants for wildlife habitat.

**Browse Pressure Considerations:** In areas with high deer or other wildlife browse pressure, contractors must consider whether fruit trees or other palatable deciduous species can survive without protection. Some contractors will not plant fruit trees or other deciduous species subject to browse mortality in high-pressure areas without a landowner agreement to purchase tree tubes or cages for protection. This practical consideration influences species selection in ways not relevant to commercial forestry.

**Open Structure Design:** Wildlife habitat plantings often incorporate wider spacing, irregular patterns, and edge habitat that differ from the uniform rows and close spacing typical of production forestry. This design philosophy recognizes that wildlife benefit from structural complexity and transitional zones between habitat types.

### **2.2.2 Species Selection Criteria**

The program applies a comprehensive set of selection criteria to ensure that species recommended for each project have the highest probability of establishment success and will deliver intended conservation benefits.

**Site-Specific Soil Conditions:** Soil characteristics fundamentally determine which species will thrive on a given site. Program site assessments evaluate soil texture (clay content, sand content, loam composition), drainage characteristics (well-drained, moderately well-drained, poorly drained), depth to restrictive layers, salinity levels, and pH. Species are matched to these conditions based on documented tolerance ranges from NRCS plant guides, NDSU research, and observed field performance.

Heavy clay soils with slow drainage and periodic wet conditions require species with demonstrated clay tolerance including eastern red cedar (*Juniperus virginiana*), Rocky Mountain juniper (*Juniperus scopulorum*), hackberry (*Celtis occidentalis*), silver buffaloberry (*Shepherdia argentea*), and caragana (*Caragana arborescens*). Sandy soils with rapid drainage and limited moisture retention are best suited for drought-tolerant species including ponderosa pine (*Pinus ponderosa*), eastern red cedar, and buffaloberry. Saline-affected soils require salt-tolerant species such as Rocky Mountain juniper and silver buffaloberry.

**Climate and Hardiness Considerations:** North Dakota's continental climate with USDA Plant Hardiness Zones ranging from 3a in the northwest to 4b in the southeast requires selection of species with proven cold hardiness and adaptation to temperature extremes, limited growing season, and periodic late spring and early fall frost events. All program-approved species demonstrate hardiness to at least USDA Zone 3 (-40°F minimum winter temperature) and tolerance of North Dakota's summer heat and periodic drought stress.

The program prioritizes species native to North Dakota or introduced species with decades of proven performance in the state. Native species offer inherent adaptation to regional climate patterns and established ecological relationships with native wildlife. Well-adapted introduced species including Scotch pine (*Pinus sylvestris*, Siberian strain), caragana, and Meyer spruce (*Picea meyeri*) have demonstrated reliable performance over extended periods in North Dakota conditions.

**Moisture Regime Matching:** Available soil moisture varies dramatically across planting sites based on soil texture, topographic position, precipitation patterns, and management history. Species selection must reflect realistic moisture availability to avoid establishment failure due to drought stress or waterlogging.

Drought-prone sites including upland positions, sandy soils, and areas with low annual precipitation (western North Dakota) require drought-tolerant species such as ponderosa pine, eastern red cedar, Rocky Mountain juniper, Colorado blue spruce (*Picea pungens*), and silver buffaloberry. Sites with moderate moisture availability support a broader range of species including most program-approved conifers and deciduous species. High moisture sites including riparian areas, swales, and poorly drained soils require moisture-tolerant species including willows (*Salix* spp.), quaking aspen (*Populus tremuloides*), and silver buffaloberry.

**Wildlife Value Assessment:** As conservation plantings intended primarily for wildlife habitat enhancement, wildlife value ranks as a primary species selection criterion. The program emphasizes species that provide multiple wildlife benefits including year-round thermal cover, nesting habitat, food sources (fruits, berries, mast, browse), escape cover, and structural diversity supporting diverse wildlife communities.

Species are evaluated for specific wildlife functions based on published research, NRCS wildlife habitat guidance, and field observations. Eastern red cedar provides exceptional year-round cover value, winter food sources (berries consumed by over 50 bird species), and nesting habitat for songbirds and raptors. Chokecherry (*Prunus virginiana*) ranks among the most valuable wildlife food plants in the Northern Plains, producing abundant fruit consumed by over 40 bird species and numerous mammals while providing excellent cover structure. Bur oak (*Quercus macrocarpa*) produces acorns supporting deer, turkey, small mammals, and game birds while providing nesting cavities in mature trees.

**Landowner Objectives and Preferences:** While the program maintains technical standards for species selection, landowner objectives significantly influence final species choices. Landowners may prioritize specific wildlife species (upland game birds, deer, songbirds), desire particular planting designs (dense blocks, linear shelterbelts, irregular clusters), or have aesthetic preferences regarding evergreen versus deciduous composition. The program accommodates these preferences within the framework of technically sound species selection, ensuring that landowner engagement and satisfaction support long-term stewardship.

**Proven Performance History:** Species recommendations prioritize trees and shrubs with documented establishment success in North Dakota conservation plantings. Decades of conservation tree planting by NRCS, Forest Service, and private landowners have generated extensive performance data identifying reliable species and those with inconsistent establishment or survival.

Eastern red cedar, ponderosa pine, black hills spruce (*Picea glauca* var. *densata*), chokecherry, and buffaloberry demonstrate consistently high survival rates and establishment success across diverse sites and management conditions. These species form the foundation of most program plantings. Species with variable performance including Scotch pine and Norway spruce (*Picea abies*) are recommended selectively for appropriate sites with realistic survival expectations.

**Disease Resistance and Pest Considerations:** Recent and emerging pest and disease threats influence species selection decisions. The program actively monitors pest and disease situations affecting conservation trees and adjusts recommendations accordingly.

Green ash (*Fraxinus pennsylvanica*) was removed from the program's approved species list in 2025 due to the detection of emerald ash borer (EAB) in North Dakota. EAB causes nearly

100% mortality of untreated ash trees, rendering ash unsuitable for conservation plantings. This removal reflects the program's adaptive management approach and commitment to recommending only species with reasonable expectation of long-term survival.

Scotch pine faces disease pressure from several pathogens including *Diplodia* tip blight and *Dothistroma* needle blight in some regions. Program guidance includes monitoring notes for Scotch pine and recommends the species primarily for sites where its rapid growth and establishment characteristics provide specific advantages, with recognition of potential disease risk.

**Seed Source Suitability:** Proper seed source represents a critical but often overlooked factor in tree establishment success. Trees grown from seed sources adapted to climate conditions significantly different from the planting site may demonstrate poor growth, reduced hardiness, or establishment failure.

The program prioritizes seedlings from Towner State Nursery, which maintains rigorous seed source standards emphasizing northern provenance seeds adapted to Northern Plains conditions. When species are sourced from commercial nurseries, seed source verification ensures that stock originates from appropriate climate zones with comparable or more severe winter conditions and similar growing season length to North Dakota.

Ponderosa pine seed sources illustrate the importance of proper provenance. Seed from Black Hills or Montana sources demonstrates superior cold hardiness and adaptation to North Dakota compared to seed from more southern provenances. Towner State Nursery utilizes research-based seed sources ensuring appropriate adaptation for North Dakota plantings.

### **2.2.3 Program-Approved Species List**

The program maintains a list of primary approved species that have demonstrated consistent success in North Dakota conservation plantings. This list represents species with documented reliability, supported by observations from Towner State Nursery, NDSU Extension publications, and accumulated program performance data. The list is reviewed periodically and updated based on emerging pest threats, species performance observations, and changes in seedling availability.

**Important Note on Species Flexibility:** While the approved list forms the foundation for most projects, it is not exclusive. The program promotes adding or trying other species that are zoned for the area and fit within project parameters. Diversity is important in any wildlife habitat planting, and contractors are encouraged to incorporate appropriate species beyond the primary list when conditions and landowner objectives support doing so. The approved list represents species with demonstrated consistent success, but conservation planting benefits from thoughtful experimentation with appropriate alternatives.

The primary approved species list encompasses 21 species (9 conifers, 3 deciduous trees, 9 shrubs) providing diverse options for matching species to site conditions and landowner objectives. Not all species are appropriate for every site; species selection for individual projects draws from this list based on site-specific conditions and project goals.

#### **CONIFEROUS EVERGREENS (9 Species)**

Conifers provide critical year-round thermal cover for wildlife, particularly during winter months when deciduous species offer limited shelter. Coniferous evergreens reduce wind

velocity, moderate temperatures, and provide snow catch that creates microclimate benefits for wildlife. Most program plantings include a conifer component comprising 60-70% of planted trees.

**Ponderosa Pine (*Pinus ponderosa*)** Description and Characteristics: Native pine species with excellent drought tolerance and adaptation to well-drained soils. Mature height 55-60 feet in landscape plantings. Long needles (4-8 inches) in bundles of two to three. Develops deep taproot providing exceptional drought resistance once established. Growth rate moderate; young trees establish relatively quickly compared to spruce species. Site Requirements: Well-drained to excessively drained soils; excellent performance on sandy soils. Drought tolerant once established but benefits from moisture during establishment years. Full sun requirement. Performs well across North Dakota but particularly valuable in western regions with lower precipitation. Wildlife Value: Good year-round cover, seeds consumed by small mammals and birds, browse for deer. Creates thermal cover in mature stands. Planting Specifications: 8-12 foot spacing typical for wildlife plantings. Wider spacing (10-12 feet) appropriate on dry sites to reduce competition for moisture. Seed Source: Black Hills or Montana sources provide appropriate cold hardiness and drought tolerance. Performance Notes: Consistently reliable establishment; one of the best-performing conifers on sandy and well-drained sites. Excellent track record in western North Dakota.

**Scotch Pine (*Pinus sylvestris* - Siberian strain)** Description and Characteristics: Introduced pine species from Eurasia, with Siberian strains demonstrating cold hardiness appropriate for North Dakota. Fastest-growing evergreen option for conservation plantings. Mature height 40-50 feet. Shorter needles (1.5-3 inches) in bundles of two. Orange-red bark on upper trunk and branches provides aesthetic interest. Site Requirements: Adaptable to wide range of soils including clays and sands. Moderate moisture requirements; reasonably drought tolerant once established. Full sun. Wildlife Value: Rapid growth provides cover establishment faster than other conifers. Seeds consumed by birds and small mammals. Dense branching provides good nesting habitat. Planting Specifications: 8-12 foot spacing. Fast growth may allow slightly wider spacing while still achieving cover objectives. Seed Source: Siberian strains essential for adequate cold hardiness; avoid seed sources from western Europe. Performance Notes: Variable survival rates in some plantings. Susceptible to several disease issues including Diplodia tip blight and Dothistroma needle blight, particularly in higher-moisture environments or during prolonged wet periods. Use selectively where rapid growth provides specific advantages. Monitor plantings for disease symptoms. Despite disease considerations, remains valuable for rapid cover establishment when used appropriately.

**Eastern Red Cedar (*Juniperus virginiana*)** Description and Characteristics: Native conifer of exceptional wildlife value, ranking as THE most important conifer for wildlife plantings in the Northern Plains. Mature height typically 25-35 feet in conservation plantings, though can reach 50+ feet under ideal conditions. Dense, fine-textured foliage provides superior thermal cover year-round. Produces blue berry-like cones (actually modified scales) consumed extensively by birds. Site Requirements: Extremely adaptable to soil conditions ranging from sandy to heavy clay. Drought tolerant once established. Tolerates alkaline and slightly saline conditions better than most conifers. Performs across all regions of North Dakota. Wildlife Value: EXCELLENT - highest wildlife value among program conifers. Dense foliage provides optimal year-round thermal cover for numerous species. Berry-like cones consumed by over 50 bird species including waxwings, robins, bluebirds, and numerous others. Provides critical

winter food source. Excellent nesting cover for songbirds. Dense structure creates ideal escape cover and winter shelter for pheasants, sharp-tailed grouse, deer, and other wildlife. Planting Specifications: 8-12 foot spacing standard. Can use closer spacing (6-8 feet) where maximum cover density is desired. Weed barrier fabric strongly recommended due to susceptibility to mouse damage during establishment. Performance Notes: Consistently high survival rates across diverse sites and soil conditions. Slow growth during first 2-3 years followed by more rapid establishment. One of the most reliable species for North Dakota conservation plantings. Geographic note: less common in native stands in far western North Dakota but establishes successfully when planted throughout the state.

Rocky Mountain Juniper (*Juniperus scopulorum*) Description and Characteristics: Native juniper species closely related to eastern red cedar, occurring naturally in western and southwestern North Dakota, particularly in badlands and rough breaks topography. Mature height 15-30 feet; typically more compact growth form than eastern red cedar. Silver-blue to blue-green foliage. Produces berry-like cones similar to eastern red cedar. Site Requirements: Excellent adaptation to dry sites, alkaline soils, and challenging western North Dakota conditions. Outstanding drought tolerance. Performs well on clay soils and tolerates salinity. Particularly appropriate for southwestern and western North Dakota plantings. Wildlife Value: Excellent wildlife value similar to eastern red cedar. Berry-like cones provide food for birds; dense foliage offers year-round thermal cover. Well-suited to providing cover and food for wildlife in challenging western environments. Planting Specifications: 6-12 foot spacing depending on desired density. Wider spacing appropriate on driest sites. Performance Notes: Reliable performance when matched to appropriate sites. Slower growth than eastern red cedar but excellent survival. Particularly valuable for western North Dakota projects. Susceptible to mouse damage; weed barrier fabric recommended.

Black Hills Spruce (*Picea glauca* var. *densata*) Description and Characteristics: Variety of white spruce native to Black Hills region; dense, compact growth form with excellent ornamental characteristics. Mature height 40-50 feet in landscape settings. Dense branching and dark green foliage. Slower growth than pines but forms attractive, long-lived trees. Site Requirements: Prefers well-drained soils; less tolerant of heavy clays than junipers. Moderate moisture requirements; benefits from supplemental moisture during establishment. Performs well in eastern and central North Dakota; more challenging on driest western sites. Wildlife Value: Good to high wildlife value. Provides year-round cover; dense branching creates excellent nesting habitat. Cones and seeds consumed by birds and small mammals. Mature trees provide superior winter shelter due to dense branch structure. Planting Specifications: 8-12 foot spacing standard for wildlife plantings. Performance Notes: Generally reliable establishment with proper site selection. Avoid poorly drained sites. Good long-term survival and steady growth once established. Less drought tolerant than pines or junipers.

Colorado Blue Spruce (*Picea pungens*) Description and Characteristics: Native spruce of Rocky Mountain region; most drought-tolerant spruce species appropriate for North Dakota. Mature height 60-80 feet in native range, typically 40-60 feet in North Dakota plantings. Blue-green to silvery-blue foliage (color varies by individual tree). Stiff, sharp needles and rigid branch structure create dense cover. Site Requirements: Wide soil adaptability; performs on clays and loams. Best drought tolerance of spruce species makes it most suitable spruce for western North Dakota. Requires well-drained conditions. Full sun. Wildlife Value: Good

wildlife value. Year-round cover; rigid branch structure creates durable shelter under snow load. Large cones provide food for birds and mammals. Mature trees excellent for winter cover. Planting Specifications: 12 foot spacing standard due to large mature size and branch spread. Wider spacing appropriate for dry sites. Performance Notes: Reliable when planted on appropriate sites. Better survival than other spruces on drought-prone sites. Slower establishment than pines but good long-term performance.

**Meyer Spruce (*Picea meyeri*)** Description and Characteristics: Chinese spruce species with excellent disease resistance and cold hardiness. Mature height 40-50 feet. Dense, attractive blue-green foliage. Relatively fast growth for a spruce. Demonstrates superior resistance to diseases affecting other spruce species including needle casts and tip blights. Site Requirements: Adaptable to various soil types. Moderate moisture needs. Good performance across North Dakota regions. Wildlife Value: Good wildlife value similar to other spruces. Provides year-round cover and nesting habitat; cones provide food source. Planting Specifications: 12 foot spacing appropriate due to mature size. Performance Notes: Increasingly popular due to disease resistance characteristics. Good establishment in program plantings. Availability from Towner State Nursery variable; may require advance ordering.

**Douglas Fir (*Pseudotsuga menziesii* var. *glauca* - Rocky Mountain variety)** Description and Characteristics: Rocky Mountain variety of Douglas fir provides cold hardiness and drought tolerance superior to Pacific Coast varieties. Mature height 50-60 feet in favorable sites. Soft, blue-green needles; distinctive cones with three-pointed bracts extending beyond scales. Moderate growth rate. Site Requirements: Well-drained soils essential; does not tolerate poorly drained or heavy clay soils. Moderate moisture needs; requires adequate moisture during establishment. Best performance in eastern North Dakota with higher precipitation. Wildlife Value: Good cover value; seeds consumed by birds and small mammals. Creates good structure for nesting in mature trees. Planting Specifications: 12 foot spacing appropriate. Seed Source: Rocky Mountain variety essential; Coastal varieties lack cold hardiness for North Dakota. Performance Notes: Selective use on appropriate sites. More site-sensitive than pines or junipers. Good performance when site conditions favorable. Not recommended for western North Dakota or drought-prone sites.

**Siberian Larch (*Larix sibirica*)** Description and Characteristics: Deciduous conifer (sheds needles in fall) native to Siberia with exceptional cold hardiness. Fastest-growing conifer option. Mature height 40-50 feet. Soft, light green needles in clusters. Bright yellow fall color before needle drop. Rapid growth provides quick height and biomass accumulation. Site Requirements: Adaptable soil requirements. Moderate to high moisture needs for best growth. Performs well across North Dakota with adequate moisture. Wildlife Value: Moderate wildlife value. Provides cover during growing season but lacks evergreen winter shelter value. Seeds consumed by birds. Rapid growth creates structure and wind protection quickly. Planting Specifications: 8-12 foot spacing. Performance Notes: Fast establishment and growth. Useful where rapid structure development is priority. Consider pairing with evergreen species to provide year-round cover. Limited availability from Towner; availability verification needed when specifying.

**Norway Spruce (*Picea abies*)** Description and Characteristics: European spruce with large mature size (60-80 feet) and fast growth for a spruce species. Drooping branch structure; large cones. Widely used in windbreak plantings historically. Site Requirements: Prefers moist, well-drained soils. Higher moisture requirements than native spruces. Best suited to

eastern North Dakota. Wildlife Value: Good cover and nesting habitat; large cones provide food source. Planting Specifications: 12 foot spacing minimum due to large size. Performance Notes: LIMITED AVAILABILITY from Towner State Nursery - verify availability before specifying in planting plans. Good performance when available and planted on suitable sites. Disease susceptibility concerns in some regions.

### **DECIDUOUS TREES (3 Species)**

Deciduous trees provide structural diversity, mast production, and summer cover. While offering less winter shelter value than conifers, they supply critical food sources including acorns (bur oak) and support diverse insect populations that provide food for birds.

Bur Oak (*Quercus macrocarpa*) Description and Characteristics: Native oak of exceptional wildlife value, particularly for acorn production supporting deer, turkey, small mammals, and game birds. Mature height 50-70 feet; broad spreading crown. Large leaves with distinctive rounded lobes. Develops into long-lived, valuable wildlife tree. Slow to moderate growth rate; requires patience but provides lasting habitat value. Site Requirements: Adaptable to wide range of soils from clays to loams. Moderate drought tolerance once established; establishment phase requires adequate moisture. Native to eastern North Dakota but establishes successfully in central regions with adequate moisture. Wildlife Value: EXCELLENT long-term value. Acorns rank among most important wildlife food sources in the region, consumed by deer, turkey, pheasants, waterfowl, squirrels, and numerous other species. Mature trees provide nesting cavities for woodpeckers, owls, and cavity-nesting birds. Large structure creates excellent cover and perching sites. Planting Specifications: 8-12 foot spacing. TREE TUBES STRONGLY RECOMMENDED - oak seedlings highly susceptible to browse damage from deer and rabbits. Tree tubes increase survival significantly and accelerate growth by creating favorable microclimate. Weed control critical during establishment. Performance Notes: Survival rates improve dramatically with tree tube protection. Slow establishment first 3-5 years frustrates some landowners, but long-term value exceptional. Once established, steady growth and high survival. Requires 15-20 years to begin acorn production but provides decades of wildlife benefits thereafter.

Quaking Aspen (*Populus tremuloides*) Description and Characteristics: Native deciduous tree with rapid growth and distinctive white bark. Mature height 25-60 feet depending on site conditions. Leaves flutter in slightest breeze (hence "quaking"); bright golden yellow fall color. Spreads by root suckers forming groves or colonies over time. Fastest growth of any native North Dakota tree species. Site Requirements: HIGH MOISTURE REQUIREMENTS - suitable only for sites with consistent moisture availability including riparian areas, drainage ways, lowlands, and moist soils. Will not survive on droughty upland sites. Adaptable soil types if moisture adequate. Wildlife Value: Good to high value. Rapid growth provides cover quickly. Young bark and buds important winter browse for deer. Mature groves provide excellent habitat structure, nesting sites, and support abundant insect populations providing food for birds. Cavity-nesting birds utilize dead standing trees. Planting Specifications: 8-12 foot spacing. Use only on sites with confirmed adequate moisture. Performance Notes: Excellent establishment and rapid growth on suitable moist sites. Complete establishment failure on dry sites. Site assessment for moisture critical before specifying aspen. Where moisture adequate, one of fastest cover-producing options.

Hackberry (*Celtis occidentalis*) Description and Characteristics: Native deciduous tree with good adaptability to clay soils and moderate drought tolerance. Mature height 40-60 feet.

Produces small berry-like drupes consumed by birds. Develops corky bark with age. Moderate growth rate; long-lived tree. Site Requirements: Excellent clay soil tolerance; one of best deciduous trees for heavy clay sites. Moderate drought tolerance. Adaptable to alkaline conditions. Wildlife Value: High value. Small fruits consumed by numerous bird species. Provides good nesting habitat and cover structure. Planting Specifications: 8-12 foot spacing. Performance Notes: LIMITED AVAILABILITY from Towner State Nursery - verify availability before planning. Good establishment and survival on appropriate clay soil sites. Valuable option for sites unsuitable for many other trees due to heavy clay.

### **GREEN ASH (*Fraxinus pennsylvanica*) - REMOVED FROM APPROVED SPECIES LIST (2025)**

Previously one of the most widely recommended and planted deciduous trees in North Dakota conservation programs, green ash has been REMOVED from the program's approved species list due to the confirmation of emerald ash borer (EAB) in North Dakota in recent years. EAB is an invasive wood-boring beetle that kills virtually 100% of untreated ash trees within several years of infestation. No practical, cost-effective treatment options exist for conservation tree plantings on large scales. Continued planting of ash would result in tree mortality and loss of landowner investment within foreseeable timeframes. This species removal reflects the program's adaptive management philosophy and commitment to recommending only species with realistic long-term survival prospects.

### **SHRUBS (9 Species)**

Shrubs provide critical ground-level and mid-height cover, produce abundant fruits and berries for wildlife food, create nesting and escape cover, and contribute to structural diversity in conservation plantings. Most program plantings include shrub components of 20-30% of total planted stems, typically located on perimeters or interspersed with trees to create diverse vertical structure.

**American Plum (*Prunus americana*) Description and Characteristics:** Native thicket-forming shrub producing abundant white flowers in spring followed by edible plums. Mature height 8-10 feet. Spreads by root suckers forming dense thickets providing exceptional cover. Fruits ripen in late summer. Site Requirements: Adaptable to various soils; prefers well-drained sites. Moderate moisture needs. Performs across North Dakota regions. Wildlife Value: Excellent. Dense thicket form creates superior ground-level cover and escape habitat for pheasants, sharp-tailed grouse, rabbits, and other ground-dwelling species. Fruits consumed by mammals and birds including bears, foxes, deer, turkeys, and numerous songbirds. Flowers provide early-season nectar for pollinators. Planting Specifications: 6-8 foot spacing; allow room for suckering and thicket expansion over time. Performance Notes: Good establishment and survival. Forms effective cover relatively quickly through suckering. Valuable shrub for game bird habitat.

**Chokecherry (*Prunus virginiana*) Description and Characteristics:** Native large shrub or small tree of exceptional wildlife importance, ranking as ONE OF THE MOST IMPORTANT SPECIES FOR WILDLIFE FOOD AND COVER IN THE REGION. Mature height 12-15 feet; can reach 20+ feet under ideal conditions. Produces abundant white flower clusters in spring followed by heavy crops of dark red to black cherries in summer. Spreads by root suckers forming colonies. Site Requirements: Highly adaptable to soil types from clays to loams. Moderate moisture needs; establishes successfully across wide range of moisture conditions. Performs throughout North Dakota. Wildlife Value: EXCELLENT - among highest

wildlife value of any shrub species. Fruits consumed by over 40 bird species including robins, waxwings, grosbeaks, thrushes, woodpeckers, jays, and many others, plus mammals including bears, foxes, coyotes, raccoons, deer, and small mammals. Single chokecherry plant can support hundreds of pounds of fruit production over lifespan. Dense growth form creates exceptional cover, nesting habitat, and escape cover. Flowers important nectar source for pollinators. Ranks with eastern red cedar and silver buffaloberry as most valuable wildlife plants available for Northern Plains plantings. Planting Specifications: 6-8 foot spacing. Allow space for suckering and colony formation. Performance Notes: Consistently excellent establishment and survival across diverse sites. Rapid growth; begins fruiting within 3-5 years of planting. Extremely reliable species. Heavy fruit production even during drought years. Should comprise significant component of most wildlife plantings due to exceptional value.

**Caragana/Siberian Peashrub (*Caragana arborescens*)** Description and Characteristics: Introduced shrub from Siberia with exceptional drought tolerance and cold hardiness. Mature height 6-14 feet. Yellow pea-like flowers in spring. Nitrogen-fixing legume improves soil. Extremely hardy and adaptable. Dense branching structure. Site Requirements: Extraordinary adaptability to adverse conditions including drought, poor soils, alkalinity, cold, and heat. Survives and establishes on sites where many other species fail. Widely adaptable across all North Dakota regions and soil types. Wildlife Value: Good. Dense structure provides year-round cover and nesting habitat. Seeds consumed by birds. Primary value is providing cover structure on sites too challenging for other species. Not significant food producer but valuable for cover and establishment reliability. Planting Specifications: 6-8 foot spacing. Performance Notes: Among the most reliable shrubs for establishment and survival. Excellent option for difficult sites including droughty, sandy, alkaline, or saline-affected soils. Can appear weedy if allowed to spread unchecked, but generally remains within planted area. Extremely valuable for providing cover on marginal sites.

**Silver Buffaloberry (*Shepherdia argentea*)** Description and Characteristics: Native shrub with distinctive silvery foliage and exceptional wildlife food value. Mature height 8-12 feet. Thorny branches provide secure nesting and cover. Produces abundant bright red berries on female plants (dioecious - separate male and female plants required for fruit production). Nitrogen-fixing shrub improves soil. Silvery leaves create attractive appearance. Site Requirements: Excellent adaptability including clay soils, alkaline conditions, moderate salinity tolerance, and drought tolerance. Particularly valuable for challenging western North Dakota sites. Performs across all regions. Wildlife Value: EXCELLENT. Ranks among most valuable wildlife shrubs. Abundant berries consumed by sharp-tailed grouse, pheasants, songbirds, and mammals. Fruit persists into winter providing critical cold-season food source. Thorny structure creates secure nesting sites and escape cover. Dense growth form provides year-round cover. Nitrogen fixation benefits associated plants. Planting Specifications: 6 foot spacing standard. Mix of male and female plants needed for fruit production (most nursery stock is seedling-grown providing natural mix; plan for approximately 50/50 distribution). Performance Notes: Recent plantings revealed challenges with very small plug stock showing poor survival. SPECIFY LARGER STOCK (2-year or larger) for improved establishment. When planted as adequate-size stock, survival and performance good to excellent. Valuable species worth the attention to stock size requirements.

**Golden Willow (*Salix alba* 'Vitellina')** Description and Characteristics: Variety of white willow with bright golden-yellow bark providing winter interest. Fast-growing large shrub or small

tree reaching 40-55 feet in favorable conditions. Rapid growth provides cover establishment quickly. Easily propagated from cuttings. Site Requirements: HIGH MOISTURE REQUIREMENTS - suitable only for riparian areas, drainage ways, wetland margins, and consistently moist soils. Will not survive on upland sites lacking consistent moisture. Adaptable soil types if moisture adequate. Wildlife Value: Good to high value in appropriate riparian settings. Provides cover, nesting habitat, and browse. Dense growth along waterways creates excellent wildlife travel corridors. Catkins provide early spring food source for insects and birds. Planting Specifications: 10 foot spacing due to large size potential. Use only on sites with confirmed adequate moisture. Performance Notes: Excellent rapid establishment on suitable moist sites. Complete failure on dry sites. Critical to limit use to truly wet sites. Where moisture adequate, among fastest cover-producing shrubs. Valuable for riparian area plantings and stream bank stabilization.

Laurel Leaf Willow (*Salix pentandra*) Description and Characteristics: Willow species with glossy, dark green foliage and aromatic leaves. Moderate to large shrub or small tree reaching 25-40 feet. Faster growth than most species; dense foliage. Site Requirements: HIGH MOISTURE REQUIREMENTS - suitable only for consistently moist sites including riparian areas and wet soils. Similar requirements to golden willow; not suitable for upland plantings. Wildlife Value: Good value for riparian wildlife habitat. Provides cover, nesting sites, and browse. Supports riparian-associated wildlife species. Planting Specifications: 10 foot spacing. Limit to high-moisture sites. Performance Notes: Good establishment on appropriate wet sites. Will not survive on dry sites. Valuable for diversifying riparian plantings.

Juneberry/Saskatoon (*Amelanchier alnifolia*) Description and Characteristics: Native shrub producing edible berries highly prized by wildlife and humans. Mature height approximately 8 feet. White flowers in spring; purple-black berries ripen in early summer. Attractive fall foliage. Site Requirements: Prefers well-drained soils; adaptable to various soil types. Moderate moisture needs. Performs well in eastern and central North Dakota. Wildlife Value: Excellent. Berries consumed by numerous bird species including grosbeaks, waxwings, robins, and others, plus mammals. Birds often strip fruit from bushes within days of ripening due to palatability. Good cover and nesting habitat. Flowers provide nectar for pollinators. Planting Specifications: 6 foot spacing standard. Performance Notes: Good survival and establishment on appropriate sites. Produces fruit relatively young. Highly valuable for wildlife food production. Fruits earlier in summer than chokecherry, extending seasonal food availability.

Sandcherry/Nanking Cherry (*Prunus tomentosa*) Description and Characteristics: Introduced shrub cherry from Asia with good cold hardiness and adaptability. Mature height 6-10 feet. Pink-tinged white flowers in spring; bright red cherries in summer. Fruits have tart flavor but consumed by wildlife. Site Requirements: Adaptable to various soil types; reasonable drought tolerance once established. Performs across North Dakota regions. Wildlife Value: Good. Fruits consumed by birds and mammals. Provides cover and nesting sites. Adds diversity to fruit-producing shrub component. Planting Specifications: 6-8 foot spacing. Performance Notes: Generally good establishment and survival. Reliable fruit producer. Useful for adding diversity and extending fruit production season.

Lilac (*Syringa* spp.) Description and Characteristics: Flowering shrub with fragrant spring blooms. Multiple species and varieties available. Mature height 8-15 feet depending on variety. Extremely cold hardy. Attractive ornamental characteristics. Site Requirements:

Adaptable soil requirements; prefers well-drained sites. Moderate drought tolerance once established. Performs throughout North Dakota. Wildlife Value: Moderate. Dense growth provides nesting cover and shelter. Seeds consumed by some birds. Primary value for cover structure and diversity. Planting Specifications: 6-8 foot spacing depending on variety. Performance Notes: LIMITED AVAILABILITY from Towner State Nursery - verify availability. Good establishment when available. More ornamental than some species but provides cover value. Useful for adding diversity and visual appeal to plantings near residences.

## 2.2.4 Wildlife Value by Species Category

Wildlife habitat value ranks as the primary objective for most Planting for the Future projects, making understanding of species-specific wildlife benefits essential to effective planting design. Different species provide different habitat functions, and strategic combinations of species create diverse, multi-functional habitat supporting broad wildlife communities.

### Wildlife Value Classification

Program species are classified into wildlife value categories based on comprehensive evaluation of habitat functions including cover quality, food production, nesting suitability, and documented utilization by State Wildlife Action Plan (SWAP) priority species.

#### EXCELLENT Wildlife Value Species:

These species provide multiple critical wildlife functions and demonstrate extensive documented use by diverse wildlife communities. They should comprise the core of wildlife-focused plantings.

- Eastern Red Cedar (*Juniperus virginiana*): THE most important conifer for Northern Plains wildlife habitat. Dense year-round cover provides optimal thermal shelter during winter, reducing wildlife energy expenditure and increasing survival during severe weather. Berry-like cones consumed by over 50 bird species including cedar waxwings (primary disperser), American robins, eastern bluebirds, yellow-rumped warblers, and numerous others. Critical winter food source when other foods scarce. Dense branching provides secure nesting sites for songbirds and shelter for roosting birds. Ground-level branch structure creates escape cover for pheasants and other ground-dwelling species. Documented as among the most valuable single species for wildlife habitat enhancement in the region.
- Chokecherry (*Prunus virginiana*): ONE OF THE MOST IMPORTANT species for wildlife food and cover. Produces abundant fruit crops consumed by over 40 bird species (more than any other native shrub in the region) including American robins, cedar waxwings, Baltimore orioles, rose-breasted grosbeaks, gray catbirds, brown thrashers, and numerous warblers, plus mammals including black bears, coyotes, foxes, raccoons, deer, and small mammals. Single mature plant can produce 10-15 pounds of fruit annually; small grove can supply hundreds of pounds of wildlife food over productive lifespan. Fruits ripen in succession over 2-3 week period providing sustained food availability. Dense suckering growth form creates exceptional ground-level cover for pheasants, sharp-tailed grouse, rabbits, and other ground-dwelling wildlife. Provides secure nesting sites for songbirds. Among the single most valuable plants for Northern Plains wildlife habitat.
- Silver Buffaloberry (*Shepherdia argentea*): Exceptional food value for game birds, particularly sharp-tailed grouse and ring-necked pheasants which consume fruits extensively in fall and winter. Abundant bright red berries persist on plants into winter, providing critical food source during harsh weather when other foods less available. Documented as preferred food for sharp-tailed grouse in winter. Thorny

branch structure creates secure nesting and escape cover that predators find difficult to penetrate. Nitrogen-fixing capability benefits soil and associated vegetation. Fruits consumed by songbirds and mammals in addition to game birds. Ranks with chokecherry and eastern red cedar among most valuable species for wildlife plantings.

- American Plum (*Prunus americana*): Dense thicket-forming growth provides unmatched ground-level cover for pheasants, sharp-tailed grouse, rabbits, and other ground-dwelling species. Thorny branches create secure escape cover. Fruits consumed extensively by mammals (especially bears, foxes, coyotes, raccoons, deer) and birds including wild turkeys, mourning doves, and various songbirds. Dense colonial growth provides excellent nesting cover and loafing areas for game birds. White flower clusters provide early-season nectar for pollinators and early-emerging insects. Ranked as high-value species for upland game bird habitat.
- Bur Oak (*Quercus macrocarpa*): Long-term wildlife value exceptional, though benefits accrue gradually. Acorns rank among the most important wildlife foods in North America, consumed extensively by white-tailed deer, wild turkeys, ring-necked pheasants, waterfowl (wood ducks particularly), fox squirrels, and numerous other mammals and birds. Acorn production begins 15-20 years after planting and continues for centuries in healthy trees. Large trees produce 50-100+ pounds of acorns in good mast years, supporting substantial wildlife populations. Large structure provides nesting and denning cavities for woodpeckers, owls, wood ducks, squirrels, and raccoons. Leaf litter supports abundant insect populations providing food for birds and small mammals. Mature oaks create "wildlife magnets" attracting and supporting diverse species. Patient landowners willing to invest in long-term habitat value find bur oak among the most rewarding species.

### **HIGH Wildlife Value Species:**

These species provide significant wildlife benefits and contribute importantly to habitat diversity and function. They are valuable components of comprehensive wildlife plantings.

- Rocky Mountain Juniper (*Juniperus scopulorum*): Similar wildlife functions to eastern red cedar including year-round cover, bird-consumed berries, and nesting habitat. Particularly valuable for western North Dakota wildlife adapted to drier conditions.
- Ponderosa Pine (*Pinus ponderosa*): Good year-round cover especially in mature stands. Seeds consumed by small mammals, birds including nuthatches and crossbills. Provides nesting habitat for raptors and larger birds in mature trees. Browse for deer.
- Black Hills Spruce (*Picea glauca* var. *densata*): Dense branching creates excellent year-round cover and winter thermal shelter. Cones and seeds consumed by crossbills, nuthatches, chickadees, and small mammals. Dense structure provides secure nesting for songbirds.
- Juneberry (*Amelanchier alnifolia*): Outstanding fruit value; berries consumed extensively by birds including grosbeaks, waxwings, robins, and many others. Fruits ripen in early summer (before chokecherry), extending seasonal food availability. Good cover and nesting value.
- Golden Willow (*Salix alba* 'Vitellina'): Valuable for riparian wildlife habitat and travel corridors. Provides dense cover along waterways. Browse value for deer and moose. Early-season catkins provide food for insects and insect-eating birds.

### **GOOD Wildlife Value Species:**

These species provide useful wildlife habitat functions and contribute to structural diversity. They are appropriate components of wildlife plantings, particularly when site conditions favor their use or when specific functions they provide are needed.

- Colorado Blue Spruce (*Picea pungens*): Year-round cover value; rigid branch structure creates durable winter shelter. Large cones provide food for birds and mammals. Good nesting habitat.
- Scotch Pine (*Pinus sylvestris*): Rapid growth provides cover establishment quickly. Seeds consumed by birds and mammals. Dense branching when young creates good cover.
- Douglas Fir (*Pseudotsuga menziesii* var. *glauca*): Provides cover and nesting sites; cones consumed by small mammals and birds.
- Meyer Spruce (*Picea meyeri*): Similar wildlife functions to other spruces; cover, nesting sites, cone production.
- Caragana (*Caragana arborescens*): Primary value is providing cover structure on sites where more valuable species may not establish. Dense year-round branching creates good nesting and escape cover. Seeds consumed by some birds.
- Quaking Aspen (*Populus tremuloides*): Young bark and buds important winter browse for deer. Groves provide diverse structure supporting insects and insect-eating birds. Dead standing trees valuable for cavity-nesting birds including woodpeckers, wrens, and chickadees.

### **Habitat Functions Provided by Program Species**

**Year-Round Thermal Cover:** Reducing wind velocity and creating moderated microclimates critically impacts wildlife survival during harsh Northern Plains winters. Species providing optimal year-round thermal cover include all coniferous evergreens, with eastern red cedar, Rocky Mountain juniper, and dense plantings of spruce ranking highest due to dense branching from ground level upward. Even deciduous shrubs with dense branching structure (chokecherry, American plum, buffaloberry) provide significant cover value, though less than conifers.

**Nesting Habitat:** Diverse vegetation structure supports diverse nesting birds. Conifers provide secure nesting sites for songbirds including robins, waxwings, mourning doves, goldfinches, and numerous warbler species. Shrubs provide ground-level and low-height nesting sites for game birds (sharp-tailed grouse, pheasants), sparrows, towhees, and other ground and low-nesting species. Thorny shrubs (buffaloberry, American plum) create particularly secure sites protected from predators. Large deciduous trees provide nesting sites for larger birds including raptors, crows, and magpies.

### **Food Sources:**

**Fruits and Berries:** The most important wildlife food function provided by program species, supporting dozens of bird species and numerous mammals. Peak fruiting period July-September, with some species (buffaloberry, chokecherry, eastern red cedar) producing fruits that persist into winter providing critical cold-season food. Chokecherry ranks highest for overall fruit value due to abundance of production, number of species consuming fruits, and reliability of production. Eastern red cedar berries critically important as winter food source. Buffaloberry exceptional for game bird food.

**Mast (Acorns):** Bur oak acorn production supports entirely different suite of wildlife species than fruit-producing plants, including deer, turkey, waterfowl, and squirrels. Acorns provide high-energy food source critical for wildlife preparing for winter and migrating waterfowl.

**Browse:** Young growth, buds, and bark of woody plants provide winter food for deer, important in severe winters when ground-level vegetation covered by snow. Aspen, willows, oaks, and young conifers provide browse value.

**Escape Cover:** Dense, thorny, or low-growing vegetation provides escape cover where pheasants, grouse, rabbits, and other prey species find protection from predators. American plum thickets, buffaloberry, dense young conifers, and chokecherry colonies provide optimal escape cover structure.

**Migration Corridors and Connectivity:** Tree and shrub plantings create woody habitat in agricultural landscapes where woody vegetation is limited, providing essential stopover habitat for migrating songbirds and connection between isolated habitat patches. Linear plantings along field edges, drainage ways, and fence lines create travel corridors for deer, turkeys, and other wildlife moving across landscapes.

### **State Wildlife Action Plan (SWAP) Species Benefited**

North Dakota's State Wildlife Action Plan identifies Species of Conservation Priority requiring habitat enhancement and management. Program plantings provide direct habitat benefits for numerous SWAP species:

**Sharp-tailed Grouse:** Dense shrubs for winter cover and food (buffaloberry fruits critical winter food), escape cover, nesting cover. Diverse plantings with open structure interspersed with grassy areas provide optimal habitat.

**Ring-necked Pheasant:** Year-round cover (conifers for winter thermal cover), escape cover (dense shrubs and plum thickets), nesting cover, food sources (fruits, seeds). Dense, diverse plantings with ground-level cover components create optimal pheasant habitat.

**White-tailed and Mule Deer:** Winter thermal cover (conifer blocks reduce energy expenditure during severe weather), food sources (browse, acorns, fruits), fawning cover. Strategically placed conifer plantings improve winter survival in areas with limited natural woody cover.

**Neotropical Migrant Songbirds:** Numerous species declining due to habitat loss benefit from woody plantings providing stopover habitat during migration, nesting sites, food sources (fruits, insects), and cover. Species including orioles, grosbeaks, warblers, tanagers, thrushes, and others utilize conservation tree plantings extensively.

**Pollinators:** Spring-flowering shrubs (plums, chokecherry, juneberry, caragana) provide nectar and pollen for native bees, honeybees, butterflies, and other pollinators during critical early-season period when few other food sources available.

**Raptors:** Mature trees provide nesting sites and hunting perches for red-tailed hawks, great horned owls, and other raptors. Plantings that create habitat for prey species (small mammals, birds) increase prey availability supporting raptor populations.

### **2.2.5 Species Selection Decision Framework**

Translating site conditions, wildlife objectives, and landowner preferences into specific species recommendations requires systematic decision-making frameworks. The program utilizes multiple overlapping approaches to guide species selection for individual projects.

#### **Soil Type Matching Matrix**

Soil characteristics fundamentally constrain species options; matching species to soil type represents the first filter in species selection.

**Heavy Clay Soils** (poorly drained, slow percolation, periodic wet conditions):

- **BEST OPTIONS:** Eastern red cedar, Rocky Mountain juniper, hackberry, silver buffaloberry, caragana
- **SUITABLE:** Chokecherry, American plum, black hills spruce (if not excessively wet)
- **AVOID:** Ponderosa pine, Douglas fir, bur oak (require better drainage)

Sandy Soils (rapidly drained, limited moisture retention, drought-prone):

- **BEST OPTIONS:** Ponderosa pine, eastern red cedar, Rocky Mountain juniper, silver buffaloberry, caragana
- **SUITABLE:** Colorado blue spruce, Scotch pine, American plum
- **AVOID:** Willows, quaking aspen, hackberry (require more moisture retention)

Loam Soils (balanced texture, good drainage, moderate moisture retention):

- **BEST OPTIONS:** Most species establish well on loams; widest selection available
- **EXCELLENT PERFORMERS:** Eastern red cedar, ponderosa pine, black hills spruce, chokecherry, American plum, buffaloberry, bur oak
- **Select based on other factors (moisture, objectives, preferences) when soils are favorable loams**

Moist/Wet Soils (drainage ways, riparian areas, lowlands, seasonally wet):

- **BEST OPTIONS:** Golden willow, laurel leaf willow, quaking aspen, silver buffaloberry, chokecherry
- **SUITABLE:** Eastern red cedar (tolerates periodic wetness), hackberry
- **AVOID:** Ponderosa pine, Douglas fir, most spruces (intolerant of poor drainage and wet conditions)

### **Moisture Availability Assessment**

Available soil moisture through growing season determines whether species will survive and thrive, regardless of species preferences.

LOW Moisture Availability (western ND, upland sites, sandy soils, drought-prone):

- **MOST RELIABLE:** Eastern red cedar, Rocky Mountain juniper, ponderosa pine, silver buffaloberry, caragana
- **MODERATE RELIABILITY:** Colorado blue spruce, Scotch pine, American plum
- **UNSUITABLE:** Willows, quaking aspen, black hills spruce, Douglas fir, bur oak

MODERATE Moisture Availability (average precipitation, loam soils, typical agricultural sites):

- **MOST SPECIES SUITABLE:** Eastern red cedar, ponderosa pine, Scotch pine, black hills spruce, Colorado blue spruce, Rocky Mountain juniper, chokecherry, American plum, buffaloberry, caragana, bur oak (with tree tubes), juneberry, nanking cherry
- **SELECT BASED ON:** Wildlife objectives, landowner preferences, regional considerations

HIGH Moisture Availability (eastern ND, riparian areas, moist soils, drainage ways):

- **ALL SPECIES SUITABLE:** Moisture is not limiting factor
- **PARTICULARLY WELL-SUITED:** Willows, quaking aspen, black hills spruce, hackberry, chokecherry
- **TAKE ADVANTAGE:** Sites with high moisture support widest range of species; can include moisture-demanding species that fail on drier sites

### **Primary Wildlife Objective Matching**

Different wildlife management goals favor different species compositions.

**MAXIMUM Wildlife Value** (prioritize species with highest documented wildlife benefits):

- **CORE SPECIES** (60-70% of planting): Eastern red cedar, chokecherry
- **SUPPORTING SPECIES** (20-30%): Silver buffaloberry, American plum, ponderosa pine, Rocky Mountain juniper
- **SUPPLEMENTAL SPECIES** (10-15%): Juneberry, bur oak (if long-term perspective), black hills spruce

**Year-Round Cover Emphasis** (winter thermal cover priority, suitable for deer and upland game birds):

- **CORE SPECIES** (70-80% of planting): Eastern red cedar, ponderosa pine, black hills spruce, Rocky Mountain juniper, Colorado blue spruce
- **SUPPORTING SPECIES** (20-30%): Chokecherry, American plum, buffaloberry, caragana

**Food Production Focus** (maximize fruit, berry, and mast production):

- **CORE SPECIES** (50-60%): Chokecherry, silver buffaloberry, American plum, juneberry
- **SUPPORTING SPECIES** (30-40%): Eastern red cedar (winter berries), bur oak (long-term acorns)
- **SUPPLEMENTAL SPECIES** (10-20%): Conifers for cover structure supporting food-producing shrubs

**Diverse Multi-Function Habitat** (balanced approach providing full range of habitat functions):

- **CONIFER COMPONENT** (40-50%): Eastern red cedar, ponderosa pine, plus one or two additional conifer species (black hills spruce, Rocky Mountain juniper, or Colorado blue spruce)
- **SHRUB COMPONENT** (40-50%): Chokecherry, silver buffaloberry, American plum, juneberry
- **TREE COMPONENT** (10%): Bur oak, quaking aspen (if moisture adequate)

## **Regional Considerations**

Climate, precipitation, and native vegetation patterns vary substantially between eastern and western North Dakota, influencing species selection strategies.

**Western North Dakota** (lower precipitation, continental climate, native mixed-grass prairie):

- **EMPHASIZE DROUGHT-TOLERANT SPECIES:** Ponderosa pine, eastern red cedar, Rocky Mountain juniper, Colorado blue spruce, silver buffaloberry, caragana
- **AVOID HIGH-MOISTURE SPECIES:** Willows, quaking aspen, black hills spruce unless on special wet sites
- **NATIVE SPECIES APPROPRIATE TO REGION:** Rocky Mountain juniper, ponderosa pine, silver buffaloberry match native woody vegetation of western ND breaks and badlands

**Eastern North Dakota** (higher precipitation, tallgrass prairie region, more humid):

- **BROADER SPECIES PALETTE AVAILABLE:** Most program species establish successfully with adequate moisture
- **CAN INCLUDE MOISTURE-DEMANDING SPECIES:** Black hills spruce, bur oak, hackberry, willows (on appropriate sites)

- EMPHASIZE SPECIES NATIVE TO EASTERN ND: Bur oak, eastern red cedar, chokecherry, American plum match historic woody vegetation of eastern ND river valleys and woodlands

Statewide Adaptable Species (reliable performance across all regions when matched to appropriate site conditions):

- Eastern red cedar, ponderosa pine, chokecherry, American plum, silver buffaloberry, caragana, juneberry

### **Typical Planting Proportions and Design Configurations**

While each project is customized to site conditions and objectives, successful wildlife plantings generally follow established design principles regarding species proportions and spatial arrangements.

#### **Conifer-to-Deciduous Proportions:**

- TYPICAL RECOMMENDATION: 60-70% conifers, 30-40% deciduous trees and shrubs
- REASONING: Conifers provide critical year-round cover (especially winter thermal cover) essential for wildlife survival in Northern Plains winters. Deciduous trees and shrubs contribute food production, structural diversity, and summer cover. This proportion creates plantings with strong cover foundation supplemented by food-producing species.
- ADJUSTMENTS: Increase conifer proportion (75-80%) for sites emphasizing winter cover and thermal protection. Increase deciduous/shrub proportion (40-50%) for sites emphasizing food production and summer habitat.

#### **Row Configuration and Spatial Design:**

- DENSE CONIFER CORE: Interior rows typically planted with conifers (especially eastern red cedar, ponderosa pine, spruce) creating dense year-round cover block. Spacing 8-10 feet within rows and between rows.
- MIXED DECIDUOUS/SHRUB BORDERS: Perimeter rows incorporate deciduous trees and fruiting shrubs (chokecherry, buffaloberry, plum, juneberry) creating food production zones and structural diversity along edges. Spacing 6-10 feet depending on species mature size.
- ALTERNATING ROW PATTERNS: Some designs alternate conifer rows with shrub rows throughout planting rather than separating by zones, creating interspersed cover and food sources.
- IRREGULAR SPACING AND DESIGN: Where mimicking natural vegetation patterns is desired, incorporate irregular spacing, curved rows, and clustered arrangements rather than rigid geometric layouts. This approach creates more naturalistic habitat with varied edge structure and interior conditions.

### **Species-Specific Limitations and Considerations**

Certain species require special considerations or have limitations affecting their use in program plantings.

Scotch Pine: Variable survival rates observed in some plantings; disease susceptibility including Diplodia tip blight and Dothistroma needle blight documented in North Dakota. RECOMMENDATION: Use selectively where rapid growth provides specific advantages; avoid large-scale reliance on Scotch pine as primary conifer. Monitor plantings for disease symptoms. Consider alternative species (ponderosa pine, eastern red cedar) for sites where long-term reliability is priority.

Quaking Aspen: High moisture requirements limit use to sites with confirmed adequate moisture throughout growing season. FAILURE RATES VERY HIGH on upland sites without supplemental moisture. RECOMMENDATION: Limit use to riparian areas, drainage ways, lowlands, and moist sites confirmed through site assessment. Do not specify aspen for typical upland agricultural sites without reliable moisture.

Green Ash: REMOVED FROM APPROVED SPECIES LIST effective 2025 due to emerald ash borer. Previously planted ash trees in program projects will likely die within 10-15 years as EAB spreads through North Dakota. No replacement plantings of ash should occur.

Limited Availability Species: Norway spruce, hackberry, and lilac have limited availability from Towner State Nursery and may not be available in all years. RECOMMENDATION: Verify availability during project planning phase before finalizing planting plans that specify these species. If unavailable, substitute alternative species with similar characteristics (e.g., substitute black hills spruce or Colorado blue spruce for Norway spruce).

Bur Oak Browse Susceptibility: Oak seedlings extremely attractive to deer and rabbits for browse; plantings without browse protection experience very high mortality. RECOMMENDATION: TREE TUBES REQUIRED for all bur oak plantings. Tree tubes increase survival rates from 10-20% (unprotected) to 70-85% (protected) based on program experience. While tree tubes add cost, they are essential investment for successful oak establishment.

Silver Buffaloberry Stock Size: Recent program plantings revealed poor survival of very small plug stock (< 6 inches). RECOMMENDATION: Specify larger stock (2-year seedlings or larger, minimum 8-10 inches) for buffaloberry plantings. Larger stock demonstrates substantially improved establishment and survival.

Juniper Mouse Damage: Eastern red cedar and Rocky Mountain juniper seedlings susceptible to mouse girdling damage during winter, especially under snow cover or dense vegetation. RECOMMENDATION: Weed barrier fabric around juniper seedlings reduces mouse damage by eliminating cover for mice and creating unfavorable habitat immediately adjacent to seedlings. Site preparation that removes dense grass cover also reduces mouse populations and damage risk.

## 2.2.6 Adaptive Species Management and Performance Monitoring

The program treats species selection as a continuously evolving process informed by monitoring data, contractor feedback, landowner observations, and changing conditions (pest threats, climate patterns, seedling availability). This adaptive management approach ensures that species recommendations reflect current best knowledge and observed field performance.

### Continuous Evaluation Process

Annual Performance Data Review: Monitoring data collected from project sites (Section 4.2) is analyzed annually to identify species-specific survival trends, establishment patterns, and factors associated with success or failure. This quantitative data supplements published guidance with program-specific performance information.

Recent monitoring data examples:

- Eastern red cedar demonstrates consistently high survival rates (typically 65-85%) across diverse sites and management conditions, confirming status as most reliable conifer.
- Ponderosa pine shows excellent performance (70-80% survival) especially on sandy, well-drained sites; performs less well on heavy clay soils.
- Scotch pine survival more variable (40-70%) with site-specific factors and disease pressure influencing outcomes; data supports selective use rather than large-scale reliance.
- Buffaloberry survival improved substantially when larger stock specified, supporting revised stock size recommendations.

Regional Performance Analysis: Program projects span diverse regions from western badlands to eastern Red River Valley. Performance data is analyzed regionally to identify geographic patterns in species success. This analysis informs regional species recommendations ensuring that species suggested for western North Dakota sites demonstrate actual success in western conditions.

Contractor and Landowner Feedback Integration: Field contractors and participating landowners provide valuable observational data on species performance, establishment challenges, wildlife utilization, and unexpected outcomes. This qualitative information complements quantitative monitoring data, providing insights into factors affecting establishment that may not be captured in formal monitoring protocols.

Contractor feedback examples:

- Contractors report junipers showing mouse damage on sites with dense grass cover, supporting weed barrier fabric recommendations.
- Landowners observe heavy wildlife use of chokecherry and buffaloberry compared to other shrub species, confirming wildlife value rankings.
- Contractors note improved handling and planting success with containerized stock compared to bare-root for some species, informing stock type recommendations.

### **Phasing Out Poor Performers**

When species demonstrate consistently poor survival, high disease susceptibility, or failure to meet habitat objectives across multiple projects and years, the program adjusts recommendations or removes species from approved list.

Green Ash Removal (2025): Emerald ash borer detection in North Dakota led to immediate removal of green ash from approved species list, despite ash being previously recommended and widely planted. This decision reflects commitment to recommending only species with realistic long-term survival prospects. Landowners deserve confidence that planted trees will survive and provide intended benefits; continuing to plant species facing near-certain mortality violates that expectation.

Scotch Pine Reclassification: Based on variable survival and disease observations, Scotch pine moved from "widely recommended" to "use selectively" status. Species remains on approved list for situations where its rapid growth provides advantages, but is no longer suggested as primary conifer species. This reclassification reflects balanced assessment: Scotch pine provides value in certain applications but doesn't warrant unreserved recommendation.

Species Under Observation: Program staff monitor several species for potential future adjustment:

- Norway spruce disease susceptibility in some regions warrants attention
- Hackberry performance on heavy clay sites being evaluated
- New pest threats affecting any species trigger immediate assessment

### **Incorporating New Species and Varieties**

As research develops new varieties, breeding programs produce improved stock, or previously unavailable species become accessible through nursery production, the program evaluates additions to approved species list.

#### **Evaluation Criteria for New Species:**

- Demonstrated cold hardiness (USDA Zone 3 minimum)
- Research-based evidence of establishment success in Northern Plains conditions
- Availability from Towner State Nursery or reliable commercial sources with appropriate seed sources
- Wildlife value documentation or logical inference of habitat benefits
- Filling gap in current species list (e.g., species addressing site conditions not well-served by current options)

**Trial and Observation Period:** New species typically incorporated through limited trial plantings and observation period (3-5 years) before broad recommendation. This conservative approach avoids large-scale problems if species proves poorly adapted.

### **Adaptation to Changing Conditions**

**Pest and Disease Threats:** Invasive pests and emerging diseases require ongoing vigilance and rapid response. Program staff monitor forest health alerts, extension publications, and agency announcements regarding pest threats. When threats emerge, species recommendations are immediately adjusted to protect landowner investments.

**Climate Considerations:** Long-term climate trends including changing precipitation patterns, temperature shifts, and extreme weather frequency may influence species performance over time. Program monitoring provides data to detect changing performance patterns potentially related to climate trends. Species recommendations will adapt based on observed performance under evolving conditions.

**Seedling Availability Changes:** Towner State Nursery production and commercial nursery availability fluctuate based on seed crop success, production capacity, and market demand. Program maintains flexibility to adjust species recommendations based on availability while maintaining quality standards and seed source requirements.

### **Data-Driven Refinement of Planting Specifications**

Beyond species selection, monitoring data informs refinement of planting specifications including spacing, stock size, planting timing, and site preparation requirements.

**Spacing Adjustments:** If monitoring reveals that specific spacing distances produce consistently superior survival or growth, recommendations are adjusted accordingly. Example: observations that 10-foot spacing for conifers on dry sites reduces competition stress compared to 8-foot spacing can inform revised specifications for drought-prone sites.

**Stock Size and Type Recommendations:** Buffaloberry experience (improved survival with larger stock) demonstrates value of monitoring-based adjustments to stock specifications.

Similar analysis for other species identifies optimal stock sizes and types (bare-root versus containerized) for different site conditions.

**Timing Window Refinement:** Monitoring data on survival relative to planting date helps refine recommended timing windows. If data shows consistently higher survival for plantings installed in April versus May, recommendations can emphasize earlier planting.

**Site Preparation Requirements:** Correlation between site preparation measures (weed control, cultivation, fabric use) and establishment success informs refinement of site preparation standards and contractor requirements.

The comprehensive species selection framework outlined in Section 2.2 demonstrates the program's commitment to technically sound, science-based decision-making while maintaining the site-specific customization essential for conservation success across North Dakota's diverse landscapes. The 671,000+ trees planted through the Planting for the Future program reflect careful species selection matching proven performers to appropriate sites, emphasizing species with exceptional wildlife value, and applying decades of accumulated conservation expertise to benefit North Dakota's wildlife and landscapes.

Far from representing inconsistency or lack of standards, the site-specific variation in species composition across program projects demonstrates sophisticated application of conservation science recognizing that effective habitat creation requires matching species to site conditions rather than applying rigid formulas regardless of ecological realities. This adaptive, scientifically grounded approach defines professional conservation practice and positions the Planting for the Future program as a model for habitat enhancement in agricultural landscapes.

## **Section 3: Program Workflow and Processes**

The Planting for the Future program operates through a carefully designed workflow that ensures quality outcomes while maintaining efficiency and accountability. This section documents the complete operational process from initial landowner application through final project completion and payment. Understanding this workflow is essential for all program participants, as each phase builds upon the previous one and includes specific quality control checkpoints designed to maximize tree survival and program success.

The program follows a three-phase annual cycle. Phase One occurs in fall and early winter, focusing on consultation and planning report development. Phase Two takes place in spring, encompassing the actual planting implementation with a target completion date of June 1. Phase Three follows immediately after planting, involving documentation, verification, and payment processing within 30 days of project completion. This structured approach allows for thorough planning during the off-season, concentrated planting during optimal conditions, and prompt project closeout.

### **3.1 Application and Eligibility**

#### **3.1.1 Landowner Application Process**

The landowner application process serves as the entry point for participation in the Planting for the Future program. Applications are accepted on a rolling basis throughout the year, with a firm deadline of August 1 for projects to be completed in the following planting season. This deadline ensures adequate time for consultation, planning, tree ordering, and logistical preparation before spring planting begins.

Landowners interested in the program submit applications that provide essential information about their property, conservation objectives, and project vision. The application collects details including property location and size, existing vegetation and land use, desired conservation outcomes, estimated project scope, and the landowner's ability to provide the required 25 percent match contribution. This initial information allows NDPF to conduct a preliminary assessment of project feasibility and alignment with program objectives.

Eligibility for the program requires that applicants own private land in North Dakota where the conservation planting will occur. The program does not serve public lands, leased properties, or situations where the applicant does not have clear authority to establish permanent plantings. Projects must meet minimum size thresholds to ensure efficient use of contractor resources, typically requiring at least 200 linear feet of planned planting or equivalent acreage for block plantings. Exceptions may be considered for projects with exceptional conservation value or strategic location.

Location requirements emphasize projects that provide meaningful wildlife habitat benefits, particularly for ring-necked pheasants and other upland game species. Priority consideration is given to applications in areas identified as having significant habitat potential, properties that connect or enhance existing conservation lands, and projects that address specific habitat deficiencies identified in regional wildlife management plans. The program also considers geographic distribution to serve landowners across North Dakota's diverse ecological regions.

Landowner commitment represents a critical eligibility factor. Successful applicants must demonstrate understanding that tree establishment requires multi-year dedication to

maintenance and protection. This includes commitment to provide the required 25 percent match (in cash, in-kind contributions, or combination), protect planted areas from livestock grazing and chemical damage during the establishment period, perform necessary weed control and maintenance, and maintain the planting for a minimum of ten years. NDPF assesses this commitment through the application process and initial landowner communication.

### **3.1.2 Application Review and Acceptance Standards**

The North Dakota Petroleum Foundation conducts a thorough review of each application to determine project acceptance. This review process evaluates multiple factors that collectively indicate the likelihood of project success and alignment with program objectives. The review is not simply a checklist exercise but rather a holistic assessment that considers both technical feasibility and conservation value.

Site suitability for tree establishment represents the primary technical consideration. NDPF staff review the described site conditions, including soil type, drainage characteristics, topography, exposure to wind, and existing vegetation. Sites with severe limitations such as extremely heavy clay soils with poor drainage, highly saline conditions, or locations subject to frequent flooding may require special consideration or alternative approaches. The goal is not to exclude challenging sites but rather to ensure that selected species and planting methods match site realities.

Landowner commitment to maintenance receives careful evaluation because even well-planned and properly executed plantings will fail without adequate follow-up care. The review considers the landowner's understanding of maintenance requirements, their track record with previous conservation projects if applicable, their available time and resources for ongoing management, and their realistic expectations about survival rates and establishment timeframes. Red flags include expectations of zero maintenance, unwillingness to control competing vegetation, or plans that would compromise the planting such as nearby chemical applications or livestock access.

Match contribution capability affects project acceptance because the 25 percent landowner match is fundamental to the program's cost-share structure. NDPF assesses whether the proposed match is realistic and adequately documented. The review examines proposed in-kind contributions to verify they represent legitimate project costs, confirms that any cash contributions are feasible for the landowner, and ensures that the total project scope aligns with available funding from both NDPF and the landowner. Projects may be scaled to fit available resources while still achieving meaningful conservation outcomes.

Conservation value and location provide the strategic rationale for project selection. NDPF prioritizes applications that offer the greatest wildlife habitat benefits, particularly for upland game species. The review considers whether the project fills a habitat gap in the landscape, connects fragmented habitats, provides critical winter cover or nesting areas, or addresses specific limiting factors for target wildlife populations. Projects in areas with active wildlife management efforts or strong community conservation interest may receive priority consideration.

Feasibility assessment incorporates practical considerations that affect project execution. This includes evaluating equipment access to the planting site, availability of qualified contractors in the project area, timing constraints that might affect the project, and any

special circumstances that could complicate implementation. The goal is to accept projects that can be successfully completed within program parameters and available resources.

Safety and access considerations ensure that projects can be implemented without undue risk. The review identifies potential safety hazards such as overhead power lines, steep slopes, or proximity to roadways that might affect planting operations. Access issues including locked gates, difficult terrain, or restricted entry windows are evaluated to confirm that contractors can reach the site with necessary equipment. Early identification of these factors allows for problem-solving before contractor assignment.

Applications that meet these acceptance standards receive approval to move forward in the program. NDPF communicates acceptance to the landowner along with next steps, which typically include assignment of a qualified contractor for consultation and planning. Applications that do not meet current acceptance standards may receive feedback about potential modifications or may be encouraged to reapply in future program years with adjusted project parameters.

## **3.2 Project Assignment and Planning**

### **3.2.1 Contractor Assignment Process**

Once a landowner application is accepted, NDPF assigns a qualified contractor to work with the landowner through the consultation and planning phase. The assignment process considers multiple factors designed to match the right contractor with each specific project. Geographic proximity serves as the primary assignment criterion because local contractors understand regional site conditions, have established relationships with landowners in their area, can conduct site visits efficiently, and can respond to issues during and after planting more effectively than distant contractors.

Contractor capacity and availability necessarily influence assignment decisions. NDPF maintains awareness of each contractor's current workload, their capacity to take on additional projects, their equipment availability for the upcoming planting season, and their expressed interest in projects of various types and sizes. This prevents overloading any single contractor while ensuring that accepted projects receive timely attention. The goal is to distribute projects in a manner that allows all contractors to deliver quality work without excessive time pressure.

Performance history plays an important role in assignment decisions. NDPF tracks contractor performance across multiple dimensions including quality of planning reports, landowner satisfaction, planting quality and tree survival, adherence to program standards and timelines, and responsiveness to communication. Contractors with strong performance records may receive priority for complex or high-profile projects, while those newer to the program might be paired with more straightforward projects that allow them to demonstrate their capabilities.

Specialized expertise matching occurs when projects require specific knowledge or capabilities. Some contractors have particular experience with certain planting methods, familiarity with specific geographic regions or soil types, expertise with particular species or stock types, or specialized equipment for challenging sites. NDPF leverages this expertise by assigning projects to contractors whose skills align with project requirements. This matching process enhances the likelihood of successful outcomes and supports continuous improvement across the contractor network.

### **3.2.2 Contractor Qualifications**

The Planting for the Future program maintains rigorous contractor qualification standards to ensure consistent quality across all projects. Contractors must demonstrate substantial experience with conservation tree planting, including practical knowledge of species selection for North Dakota conditions, proficiency with multiple planting methods and equipment, understanding of soil and site assessment, and familiarity with NRCS technical standards for tree planting. New contractors typically start with smaller projects or work alongside experienced contractors to develop program-specific knowledge.

Insurance requirements protect all program participants. Contractors must maintain general liability insurance with minimum coverage levels specified by NDPF, vehicle insurance for all equipment used in program work, and workers compensation insurance if they employ others. Proof of current insurance must be provided before contractor assignment and updated annually. These requirements protect landowners, NDPF, and the contractors themselves from potential liabilities associated with planting operations.

Equipment capabilities directly affect the quality and efficiency of planting implementation. Qualified contractors must have access to appropriate planting equipment, which may include no-till tree planters suitable for various soil conditions, equipment for scalping or site preparation when needed, vehicles capable of accessing rural planting sites, and tools for fabric installation and weed control. Contractors need not own all equipment but must demonstrate reliable access to necessary tools for their assigned projects.

Knowledge of conservation practices distinguishes qualified contractors from general landscaping or forestry operations. Program contractors understand the specific objectives of wildlife habitat plantings, recognize how tree plantings integrate into broader conservation strategies, appreciate the role of native species and appropriate seed sources, and comprehend the long-term management requirements for conservation plantings. This knowledge base allows contractors to serve as valuable advisors to landowners throughout the process.

Track record of quality work represents the ultimate qualification. NDPF evaluates contractors based on tangible results including tree survival rates on previous projects, landowner satisfaction and repeat business, quality and thoroughness of planning reports, adherence to planting standards and timelines, and professional communication and problem-solving. Contractors who consistently deliver quality outcomes maintain their place in the program's contractor network, while those with persistent quality issues may face additional oversight or program separation.

## **3.3 Consultation and Planning Report Phase**

### **3.3.1 Site Consultation Requirements**

The site consultation represents a critical step in the program workflow where the assigned contractor meets with the landowner on-site to assess conditions, discuss objectives, and develop a shared vision for the project. This consultation typically occurs in fall or early winter, after the growing season but before ground freeze makes site assessment difficult. The on-site meeting allows for direct observation of terrain, soil, existing vegetation, and surrounding land use while facilitating clear communication between contractor and landowner.

During the site consultation, the contractor conducts a comprehensive assessment of soil and drainage characteristics. This includes observing soil texture and structure, identifying any drainage issues or wet areas, noting soil depth and presence of restrictive layers, evaluating soil erosion patterns, and assessing overall soil health and organic matter content. These observations inform species selection and planting method recommendations. In some cases, formal soil testing may be recommended for sites with suspected fertility or pH issues, though most projects proceed based on visual assessment and regional soil survey information.

Species selection discussion forms the heart of the consultation process. The contractor and landowner review options that match the site conditions, fulfill the landowner's conservation objectives, provide desired wildlife habitat benefits, and fit within program parameters and budget. The contractor explains characteristics of recommended species including mature size, growth rate, tolerance of site conditions, wildlife value, and maintenance requirements. This discussion ensures that the landowner understands what will be planted and why each species is appropriate for their site. Scientific names are reviewed to prevent confusion between common names that may apply to multiple species.

Planting method determination occurs through collaborative discussion of site characteristics and landowner preferences. The contractor assesses whether no-till planting is feasible given soil conditions and existing vegetation, evaluates whether scalping would improve establishment in areas with heavy sod, considers whether weed barrier fabric is appropriate and cost-effective, and determines optimal equipment for the specific site conditions. Each method has advantages and limitations, and the consultation allows for selection of approaches most likely to succeed under local circumstances.

Site preparation recommendations emerge from the assessment of current conditions and selected planting methods. The contractor may recommend activities such as mowing or haying to reduce vegetation height, controlling noxious weeds before planting, addressing drainage issues if feasible, creating access routes for equipment, or marking utility locations and property boundaries. These recommendations clarify the landowner's responsibilities in preparing the site for successful planting and often represent important components of the in-kind match contribution.

Equipment access planning addresses practical logistics of planting implementation. The contractor evaluates vehicle access to all planting areas, identifies any obstacles such as fences, ditches, or wet areas, determines whether special equipment or approaches are needed, assesses whether planting must be staged in multiple phases, and discusses any access restrictions or timing limitations. This planning prevents surprises during planting season when weather windows are limited and delays can affect the entire project schedule.

Landowner expectation alignment concludes the consultation process. The contractor ensures the landowner understands realistic survival expectations (typically 60-75 percent after three years under good management), the multi-year timeline for visible establishment, the critical importance of weed control and maintenance, the landowner's ongoing responsibilities after planting, and the documentation required for program completion and payment. This candid discussion prevents misunderstandings and sets the stage for a successful long-term partnership.

### **3.3.2 Planning Report Standards**

Following the site consultation, the contractor develops a detailed planning report that serves as the blueprint for project implementation. This report transforms the on-site assessment and landowner discussion into a specific, actionable plan that guides tree ordering, planting execution, and program administration. The planning report must be thorough, accurate, and technically sound because it forms the basis for NDPF's approval and resource allocation.

Complete property and landowner information establishes the project record. This section includes the landowner's full name and contact information, property legal description and physical address, GPS coordinates or detailed location directions, total property acreage and project acreage, and any relevant property characteristics such as easements or restrictions. Accurate location information is essential for tree delivery coordination and future program follow-up.

Accurate linear feet calculations provide the foundation for quantity determinations and cost estimates. The contractor measures or estimates the total linear feet for each proposed planting area, distinguishes between single-row and multi-row plantings, accounts for skips around obstacles or wet areas, and provides clear breakdowns by planting method if multiple approaches will be used. These measurements directly drive tree quantities and project costs, making accuracy critical. Contractors are expected to use appropriate measurement tools and methods, whether GPS equipment, measuring wheels, or careful pacing and mapping.

Species-specific recommendations with scientific names prevent confusion and ensure proper tree ordering. For each recommended species, the report includes the complete scientific name (genus and species), common name for reference, recommended quantity based on spacing and linear feet, appropriate spacing for that species based on NRCS guidelines and site conditions, and rationale for species selection related to site suitability and conservation objectives. The use of scientific names is mandatory because common names can be ambiguous or vary regionally.

Stock size specifications ensure that ordered trees match site conditions and planting methods. The report specifies whether bareroot seedlings, containerized stock, or other forms are recommended, indicates appropriate size classes (such as 12-18 inch seedlings), notes any special stock requirements such as mycorrhizal inoculation, and confirms that specifications align with available nursery stock. Stock size affects both survival potential and cost, requiring thoughtful matching to site conditions and budget.

Quantity calculations by species must be mathematically accurate and clearly documented. The report shows the calculation method, such as linear feet divided by spacing per species, accounts for multi-row configurations where applicable, includes appropriate percentages for overstock to cover planting gaps or mortality, and totals all quantities for tree ordering. These calculations are verified during NDPF's review process because ordering accuracy is essential for budget control and avoiding shortages or excesses.

Spacing recommendations by species follow NRCS technical guidelines while allowing for site-specific adjustments. The report specifies in-row spacing for each species, typically ranging from 4 to 16 feet depending on species and objectives, indicates between-row spacing for multi-row plantings, explains any deviations from standard spacing with clear rationale, and confirms that spacing achieves desired wildlife cover density while allowing

adequate growing space. Proper spacing affects both establishment success and long-term planting performance.

Planting method specification describes exactly how each area will be planted. The report details whether no-till tree planting will be employed, whether scalping will be used and to what extent, whether weed barrier fabric will be installed and over what length, and any special techniques required for challenging areas. This specification guides both tree ordering (root systems differ for no-till versus fabric planting) and contractor preparation. Clear method description also helps NDPF evaluate project costs and feasibility.

Fabric and material requirements are itemized when weed barrier fabric is part of the plan. The report specifies total linear feet of fabric needed, fabric width and specifications, quantities of landscape staples or pins, mulch requirements if applicable, and any special installation considerations. Fabric represents a significant project cost and requires accurate estimation to avoid shortages or waste.

Site maps enhance understanding of the project layout when available. Contractors are encouraged to include aerial imagery or property maps marked with proposed planting locations, existing features such as buildings, fences, and water sources, access routes for equipment, and orientation indicators. While maps are not always required for straightforward linear plantings, they greatly improve clarity for complex projects with multiple planting areas or special considerations.

Site preparation recommendations document what must be done before planting to ensure the site is ready. The report lists activities such as mowing, spraying, or other vegetation control, any earthwork or drainage improvements needed, fence removal or modification requirements, and timing for these activities relative to the spring planting window. These recommendations often form part of the landowner's in-kind match contribution and must be completed before planting can proceed.

Equipment needs assessment informs logistics and scheduling. The report identifies the specific equipment that will be used for planting, any special equipment needed for site conditions, equipment access requirements and constraints, and estimated time required for project completion. This assessment allows NDPF and the contractor to coordinate resources and schedule effectively.

Special considerations and risk factors provide important context for project review and approval. The contractor notes any unusual site conditions that may affect success, identifies potential challenges such as wildlife damage risk or weed pressure, recommends mitigation strategies for identified risks, and sets realistic expectations about survival and establishment given site limitations. This transparency allows NDPF to make informed approval decisions and helps prevent unrealistic expectations.

### **3.3.3 NDPF Planning Report Review**

The North Dakota Petroleum Foundation conducts a rigorous technical review of each planning report before approval. This review serves multiple purposes: ensuring technical quality and adherence to conservation standards, verifying budget alignment and cost reasonableness, confirming that the plan fulfills landowner objectives while meeting program goals, and catching errors or oversights before they become costly problems. The review process typically takes place in late fall and early winter, allowing sufficient time for revisions and tree ordering before spring planting.

Species appropriateness for site conditions receives careful scrutiny. NDPF staff evaluate whether recommended species match the described soil type, drainage, and climate conditions, whether the mix provides appropriate diversity for wildlife and site resilience, whether any unsuitable species were included that might have poor survival, and whether recommended stock sizes fit the planting method and site. This technical review draws on NDPF's accumulated experience across hundreds of projects and multiple ecological regions of North Dakota.

Alignment with wildlife habitat objectives ensures that each project contributes to the program's conservation mission. The review assesses whether species selections provide the intended habitat benefits such as winter cover, nesting structure, and food sources, whether planting configuration creates effective wildlife habitat rather than just rows of trees, whether the project integrates well with surrounding land use and existing habitat, and whether the plan addresses specific habitat limitations identified during application review. Projects that deviate from wildlife habitat objectives may require justification or modification.

Compliance with NRCS spacing guidelines maintains program standards and professional credibility. NDPF verifies that proposed spacing falls within NRCS recommended ranges for each species, that spacing is appropriate for the intended purpose (wildlife cover versus timber production), that adequate growing space is provided to support long-term tree health, and that any deviations from standard spacing are technically justified. Adherence to NRCS standards ensures that Planting for the Future projects meet nationally recognized conservation benchmarks.

Realistic survival projections help set appropriate expectations. The review considers whether the contractor's projected survival rates are reasonable given site conditions, species selections, and management plans, whether any overly optimistic assumptions need adjustment, whether the plan includes adequate overplanting where site conditions suggest higher mortality risk, and whether the landowner has been appropriately informed about realistic outcomes. Conservative survival projections protect both the program's reputation and landowner satisfaction.

Budget alignment confirms that the planned project fits within available funding. NDPF review verifies that total project costs match approved funding levels, that the landowner's 25 percent match is adequately documented and realistic, that tree quantities and costs are accurately calculated, and that no unexpected expenses are hidden in the plan. Budget review prevents cost overruns and ensures that program funds are used efficiently across all projects. The review may result in project scaling if initial plans exceed available resources.

Landowner objective fulfillment returns to the fundamental question of whether the plan delivers what the landowner sought. The review confirms that the plan addresses the conservation objectives stated in the application, that the project scope matches landowner expectations, that maintenance requirements are feasible for the specific landowner, and that any special requests or constraints have been accommodated. This alignment ensures landowner satisfaction and long-term commitment to project success.

Technical accuracy encompasses all the details that must be correct for smooth implementation. NDPF staff verify that scientific names are correct and unambiguous, that quantity calculations are mathematically accurate, that spacing calculations align with stated linear feet, that stock size specifications are appropriate and available, and that planting

method descriptions are clear and feasible. Finding and correcting technical errors during review prevents problems during the rushed spring planting season.

The approval process follows a structured workflow. Contractors submit completed planning reports to NDPF, typically via email in PDF or Word format, by established deadlines that allow adequate review time before tree ordering. NDPF staff conduct the technical review, which may take several days to two weeks depending on report volume and complexity. If issues are identified, NDPF provides specific feedback to the contractor requesting revisions or clarifications. The contractor makes necessary modifications and resubmits the report. Once all review criteria are satisfied, NDPF provides formal approval, which triggers tree ordering and locks in the project plan.

Final approval before tree ordering represents a critical checkpoint. Once trees are ordered, changes become difficult and expensive. The approval process ensures that all stakeholders - NDPF, contractor, and landowner - agree on exactly what will be planted, where, and how. Approved planning reports are filed in the project record and become the reference document for planting implementation and post-planting verification. The thoroughness of this review process directly contributes to the program's strong track record of successful tree establishment across diverse sites and conditions.

## **3.4 Tree Procurement**

### **3.4.1 Nursery Relationships**

The Planting for the Future program's tree procurement strategy emphasizes quality, reliability, and ecological appropriateness through carefully cultivated nursery relationships. The foundation of this strategy is the partnership with the Towner State Nursery, which serves as the primary source for conservation seedlings. Towner State Nursery operates under the North Dakota State Forestry Department and has earned national recognition for its research-based approach to seed sourcing and seedling production. The nursery's seedlings are grown from seeds collected within North Dakota or from ecologically equivalent regions, ensuring that planted trees are adapted to the state's climate extremes and soil conditions.

Species proven for North Dakota form the core of Towner's production focus. The nursery specializes in native and naturalized species that have demonstrated strong performance in conservation plantings across the state's diverse ecological regions. This includes conifers such as ponderosa pine, eastern redcedar, and Rocky Mountain juniper that provide critical winter cover for wildlife, deciduous shrubs including American plum, chokecherry, and buffaloberry that offer food and nesting habitat, and hardwood trees such as green ash, American elm, and bur oak that provide structure and long-term wildlife value. The nursery's inventory reflects decades of field experience about which species establish successfully in North Dakota's challenging environment.

Quality assurance standards at Towner State Nursery align perfectly with program requirements. Seedlings are grown using proven protocols that produce vigorous root systems, appropriate stem caliper, and proper hardening for North Dakota's climate. The nursery conducts regular quality inspections, maintains excellent pest and disease management, times lifting and storage to preserve seedling vigor, and packages stock for optimal protection during shipping and handling. These standards reduce seedling mortality

and improve field survival, making Towner stock an excellent value despite slightly higher per-unit costs compared to some commercial sources.

Stock specifications from Towner meet NRCS technical standards and program needs. Seedlings are typically grown for two to three years depending on species, producing appropriate size classes for conservation planting. Bareroot seedlings arrive with well-developed root systems, adequate caliper for mechanical planting, proper shoot-to-root ratios, and minimal damage from lifting and storage. The nursery provides clear specifications for each species, including recommended handling and planting procedures, allowing contractors to plan accordingly.

Supplemental nurseries fill gaps when Towner inventory is insufficient or when specific stock types are unavailable. NDPF maintains relationships with select commercial nurseries that can provide quality conservation seedlings when needed. These supplemental sources must meet rigorous quality standards including seed source verification to ensure ecological appropriateness, stock inspection protocols to verify seedling quality, grading standards that match or exceed Towner specifications, and proper handling and storage practices. Supplemental nurseries are used selectively rather than routinely, ensuring that the majority of program stock comes from the most reliable source.

Quality standards required from supplemental nurseries protect program integrity. NDPF requires documentation of seed source, particularly ensuring that species are from appropriate seed zones for North Dakota, pre-shipment inspection to verify stock quality and freedom from disease, proper packaging and shipping to maintain seedling vigor, and adherence to size and grading standards specified in planning reports. Contractors may suggest specific nursery sources based on their experience, but final approval rests with NDPF to maintain consistent quality across the program.

Seed source verification represents a critical but often overlooked aspect of nursery relationships. Trees grown from seed collected hundreds of miles south may leaf out earlier and suffer spring frost damage in North Dakota. Conversely, seed from far northern sources may have insufficiently long growing seasons to thrive in southern North Dakota. Towner State Nursery's commitment to appropriate seed sources eliminates this concern for most species. When supplemental nurseries are used, NDPF verifies that seed sources match North Dakota's climate zones and ecological conditions.

Stock inspection protocols ensure that trees arriving at planting sites meet quality standards. Contractors are trained to inspect delivered stock for proper moisture levels in root systems, absence of mold or disease, appropriate stem size and vigor, minimal mechanical damage, and overall seedling health. Substandard stock is rejected and replaced, preventing the planting of trees with poor survival potential. This quality control at delivery complements nursery production standards and protects both program resources and landowner satisfaction.

### **3.4.2 NDPF Centralized Ordering**

The North Dakota Petroleum Foundation places all tree orders centrally rather than delegating this task to individual contractors. This centralized ordering model emerged from experience and provides multiple benefits that strengthen program operations and protect program integrity. Understanding why NDPF handles ordering directly, rather than allowing each contractor to order independently, illuminates important aspects of program management.

Quality control represents the primary advantage of centralized ordering. NDPF maintains direct relationships with Towner State Nursery and approved supplemental nurseries, ensuring consistent communication about specifications, timing, and quality standards. This direct contact allows NDPF to verify that ordered species match approved planning reports, that quantities are accurate and justified, that seed sources are appropriate, and that delivery logistics are properly coordinated. If ordering were delegated to dozens of contractors, maintaining this level of quality oversight would be impossible. Centralized ordering creates a single point of accountability for one of the program's most critical functions.

Cost efficiency benefits both the program and participating landowners. By consolidating orders, NDPF can sometimes negotiate volume pricing that reduces per-unit costs. More importantly, centralized ordering prevents errors that waste money, such as ordering wrong species or quantities, duplicate orders for the same project, ordering from inappropriate or expensive sources, and mis-coordination that results in unusable excess stock. The administrative efficiency of processing one consolidated order rather than dozens of separate orders also reduces staff time and complexity. These efficiencies allow program dollars to stretch further, resulting in more trees planted and more habitat created.

Fraud prevention provides an often-unspoken but important rationale for centralized ordering. When contractors place orders directly and submit invoices for reimbursement, opportunities arise for inflating quantities, claiming reimbursement for trees never ordered, ordering for non-program purposes and billing to the program, or other financial irregularities. Centralized ordering eliminates these risks by ensuring that NDPF knows exactly what was ordered, for which project, at what cost, and from what source. This financial control protects the integrity of the program and the proper use of North Dakota Petroleum Foundation resources.

Order accuracy and budget control are tightly linked. NDPF cross-references every order against approved planning reports, verifying that requested species and quantities match the plan, that costs align with approved project budgets, that the combined landowner match and NDPF contribution cover total costs, and that no unauthorized additions or changes have occurred. This verification happens before orders are placed, preventing problems rather than discovering them after trees have been shipped and money spent. The discipline of centralized ordering maintains budget integrity across the program's annual cycle.

Nursery coordination benefits from having a single contact point. Towner State Nursery and supplemental sources work with NDPF staff who understand the full scope of program needs, can coordinate delivery schedules across multiple projects, can communicate special requirements clearly, and can problem-solve effectively when issues arise. If nurseries had to coordinate with dozens of different contractors, each with their own communication style and level of experience, the administrative burden would increase substantially and errors would become more likely. Centralized coordination makes the procurement process smoother for all parties.

Delivery logistics are managed through the centralized ordering system. NDPF coordinates delivery timing to match planting schedules, specifies delivery locations appropriate for each project, manages changes when weather or other factors affect timing, and tracks shipments to ensure arrival as planned. Trees are living materials that deteriorate quickly if not handled properly. Coordinating delivery centrally reduces the risk of trees sitting too long before

planting, being delivered to wrong locations, or being mishandled during the critical period between nursery and planting site.

The centralized ordering process follows a clear timeline. After planning reports are approved in late fall or early winter, NDPF compiles all approved projects and consolidates tree requirements by species. Orders are placed with Towner State Nursery in December or January for spring delivery, with supplemental nursery orders placed as needed. NDPF confirms delivery schedules in early spring as weather conditions become clearer and planting windows are established. Contractors receive notification of expected delivery dates and coordinate their schedules accordingly. Trees are typically delivered directly to planting sites or to contractor facilities within a few days of planned planting, minimizing storage requirements and preserving stock quality.

The centralized ordering system requires discipline and coordination from all participants. Contractors must submit accurate planning reports by deadlines, understanding that late or inaccurate reports jeopardize the entire ordering process. NDPF must review and approve reports promptly to allow adequate time for order compilation and nursery coordination. Nurseries must communicate clearly about inventory availability and delivery capabilities. Contractors must be flexible about exact planting dates, understanding that weather and delivery logistics may require adjustments. This coordinated approach, centered on NDPF's ordering process, has proven highly effective in delivering quality stock to program projects.

## **3.5 Planting Implementation**

### **3.5.1 Pre-Planting Procedures**

As spring weather allows field operations to begin, the program transitions from planning to implementation. Pre-planting procedures ensure that all elements are in place for successful planting and that both contractors and landowners are fully prepared. These procedures begin weeks before actual planting and intensify in the days immediately preceding on-site work.

The 48-hour landowner notification requirement stands as a firm program standard. Contractors must contact landowners at least 48 hours before arriving to plant, confirming the planned planting date and approximate arrival time, verifying that site preparation is complete as specified in the planning report, ensuring that access will be available (gates unlocked, animals confined, etc.), discussing weather contingencies if conditions are marginal, and addressing any last-minute questions or concerns. This advance notice respects the landowner's schedule and prevents the awkward situation of a contractor arriving with equipment when the landowner is unprepared or unavailable. It also provides a final opportunity to verify site readiness before mobilization.

Site readiness verification occurs during the notification contact and sometimes through a brief pre-planting site visit. The contractor confirms that required site preparation has been completed, including mowing or vegetation control, any earthwork or drainage improvements, fence modifications or removals, and marking of utilities or boundaries. If site preparation is incomplete, planting must be postponed until the landowner fulfills these commitments. Attempting to plant on unprepared sites compromises survival and wastes program resources. Contractors are trained to diplomatically but firmly insist on proper site preparation.

Weather condition assessment becomes critical in the days before planting. Contractors monitor soil moisture and temperature, frost forecasts that might damage freshly handled stock, wind conditions that could dry seedling roots during planting, and precipitation forecasts that might make sites inaccessible or create poor planting conditions. The optimal planting window is narrow - soil must be thawed and workable, but planting should occur before trees break dormancy and begin growing. Weather assessment requires experience and judgment. Contractors sometimes face difficult decisions about proceeding with marginal conditions versus delaying and risking a shortened planting window.

Tree delivery coordination ensures that seedlings arrive in optimal condition at the right time. Contractors communicate with NDPF about delivery schedules, confirm delivery location and access, prepare appropriate storage if trees arrive before planting can begin, and coordinate their crew and equipment availability to match delivery timing. Trees should be planted as quickly as possible after delivery to minimize storage time. If temporary storage is necessary, seedlings must be kept cool and moist, protected from sun and wind, and maintained in a dormant state until planting.

Stock quality inspection occurs immediately upon delivery. Contractors are trained to open bundles and inspect a representative sample of seedlings, checking for proper root moisture (roots should be moist but not waterlogged), absence of mold or disease, stem and bud health, appropriate caliper and size, and overall vigor. Any concerns about stock quality are documented with photos and reported immediately to NDPF. Substandard stock should not be planted. While rejecting a shipment delays the project and creates complications, planting poor quality stock wastes all subsequent effort and expense. The integrity to reject inadequate stock when necessary is a mark of professional contractors.

Equipment preparation in the days before planting prevents delays and quality issues. Contractors ensure that tree planters are properly adjusted and functioning, that tractor or truck is serviced and reliable, that fabric, staples, and other materials are on hand in correct quantities, that hand tools and supplies are ready, and that any specialized equipment for particular site challenges is available. Equipment breakdowns during the brief planting window can derail projects. Thorough pre-planting equipment checks minimize this risk.

### **3.5.2 Planting Standards**

The Planting for the Future program maintains rigorous planting standards based on Natural Resources Conservation Service technical specifications and decades of field experience. These standards apply to all projects regardless of contractor, location, or landowner, ensuring consistent quality across the program. Contractors are trained in these standards and are expected to implement them faithfully. Quality planting technique directly determines survival, making adherence to standards essential rather than optional.

No-till tree planter specifications define the most common planting method used in the program. No-till planters use coulters to slice through sod and create a narrow planting slot, into which seedlings are inserted at appropriate depth. Proper no-till planting requires that coulters are sharp and properly adjusted to create clean slits without excessive soil disturbance, that planting depth places the root collar approximately one-half inch below the soil surface, that seedlings are placed vertically in the slot with roots extending straight down, that closing wheels or packing mechanisms firmly press soil around roots without air pockets, and that equipment settings match soil conditions and seedling size. No-till planting

is efficient and minimizes soil disturbance, but requires skill to achieve proper depth and soil closure.

Scalping method requirements apply when heavy sod or competing vegetation makes no-till planting problematic. Scalping involves removing a section of sod around each planting spot, creating a vegetation-free zone for the seedling. Scalped areas are typically 18-24 inches in diameter, must remove both above-ground vegetation and root mass, should extend slightly below the surrounding soil surface to prevent water runoff, and must be maintained weed-free during establishment. Hand planting into scalped areas requires careful attention to depth and soil firming. Scalping increases planting labor but can dramatically improve survival in sites with aggressive competing vegetation.

Fabric installation standards govern projects using weed barrier fabric. Fabric is laid along the planting row, seedlings are planted through holes in the fabric, and the fabric is secured with landscape staples or pins. Proper fabric installation requires that fabric is laid tight against the soil surface without gaps or bunching, that planting holes are properly sized and positioned, that fabric edges overlap if multiple strips are used, that staples are installed at appropriate intervals (typically 3-5 feet) and at all edges and holes, and that fabric is properly oriented with the black side up to maximize weed suppression and heat absorption. Poorly installed fabric can blow away, create air pockets that dry soil, or fail to suppress weeds effectively.

Proper depth and spacing represent universal standards regardless of planting method. The root collar - the transition point between roots and stem - should be positioned approximately one-half inch below the soil surface. Planting too shallow exposes roots to drying and frost heaving. Planting too deep buries the root collar and can lead to rot and poor growth. Proper depth requires understanding each species' root structure and careful placement. Spacing follows specifications in the approved planning report, typically ranging from 4 to 16 feet between trees depending on species and objectives. Consistent spacing is achieved through measuring, marking, or using planter equipment with controlled spacing mechanisms.

Stock handling protocols protect seedlings during the critical planting period. Roots must be kept moist at all times from delivery through planting, seedlings should be protected from sun and wind that dry roots within minutes, bundles should remain sealed until immediately before planting, and only small quantities should be exposed at any time. Many contractors use buckets or containers with water to keep root systems hydrated during planting.

Seedlings with dried roots have severely compromised survival regardless of how well they are planted. Proper handling is non-negotiable for quality outcomes.

Quality control during planting involves continuous monitoring by the contractor. Every seedling should be assessed for proper depth and root placement, soil should be firmly pressed around roots without air pockets, fabric or mulch should be correctly installed if used, and spacing should be maintained consistently. Periodic checks along completed rows verify that techniques are working and standards are met. If soil conditions change or equipment performance degrades, immediate adjustments are required. Contractors who rush through planting without attention to quality typically see poor survival and are not retained in the program.

NRCS technical standards compliance is mandatory for all Planting for the Future projects. Specific NRCS requirements include proper root system protection from exposure and drying, planting depth that positions the root collar one-half inch below soil surface, soil

firming to eliminate air pockets around roots, spacing appropriate to species and conservation objectives, fabric installation meeting specified standards when used, and overall implementation that meets NRCS Practice Standard 612 for Tree/Shrub Establishment. These standards represent the professional baseline for conservation tree planting. Projects that fail to meet NRCS standards jeopardize not only tree survival but also program credibility and potential future funding opportunities.

### **3.5.3 Quality Assurance During Planting**

Quality assurance does not begin after planting is complete but rather occurs continuously throughout the implementation phase. This real-time quality control catches problems when they can still be corrected and ensures that every section of every project meets program standards.

Contractor self-monitoring requirements establish the primary quality control responsibility with the professional implementing the work. Contractors are expected to regularly inspect their own work for proper depth and spacing, adequate soil firming around roots, correct fabric installation if used, and consistent technique across the entire planting area. This self-monitoring should occur at least every 20-30 planted trees, with more frequent checks when conditions are challenging or when crew members are less experienced. Professional contractors take pride in their work and understand that quality self-monitoring protects their reputation and ensures landowner satisfaction.

Landowner involvement and observation provides a valuable second set of eyes and engages the landowner in their project. Contractors should encourage landowners to observe planting operations, explaining techniques and standards as work proceeds. Landowners often notice things that contractors might miss, such as variations in soil conditions across the site, areas where fabric is not securing properly, or spacing inconsistencies. This collaborative approach builds landowner confidence and understanding while providing informal quality oversight. Landowners who observe professional planting also gain appreciation for the skill and effort involved, increasing their commitment to follow-up maintenance.

Documentation and photo requirements create a record of planting implementation. Contractors should photograph representative areas showing planting technique and quality, document any challenges encountered or deviations from the plan, note soil and weather conditions during planting, and record the actual planting dates. These photos and notes become part of the project record and provide valuable reference if questions arise later. Documentation also supports continuous improvement by allowing review of what worked well and what could be done differently on future projects.

Real-time issue resolution represents a critical advantage of active quality monitoring. If a contractor notices that planted seedlings are not staying at proper depth, equipment can be adjusted immediately rather than planting hundreds more trees incorrectly. If fabric is not securing well due to windier conditions than expected, additional staples can be added before moving forward. If soil conditions in part of the planting area are much different than anticipated, species or methods can be adjusted in consultation with NDPF. This adaptive approach requires awareness, judgment, and communication but produces far better outcomes than rigid adherence to plans when conditions have changed.

## **3.6 Post-Planting Documentation**

### **3.6.1 Contractor Planting Report**

Within 30 days of completing planting, contractors must submit a comprehensive planting report to NDPF. This report documents what was actually accomplished as compared to what was planned, provides essential information for program records and payment processing, and creates accountability for implementation quality. The planting report is a formal requirement, not optional, and payment cannot be processed until an acceptable report is received.

Actual quantities planted by species must be precisely documented. The report specifies exactly how many of each species were planted, broken down by planting location if multiple areas were involved, noting any variations from planned quantities and explaining reasons for changes. Minor variations from planning reports are normal due to field conditions, but significant deviations require explanation. Accurate quantity reporting ensures that payment amounts correctly reflect work performed and that program records accurately document the habitat created.

Linear feet completed documentation confirms the project scope. The report states total linear feet planted broken down by single-row versus multi-row if applicable, length of fabric installed if used, and any areas where planting was not completed as planned. This information allows NDPF to verify that the project scope matches approved plans and that calculations for payment are correct.

Planting dates and conditions provide context for evaluating project implementation. The report records the actual dates planting occurred, prevailing weather conditions during planting, soil moisture and workability, and any weather-related challenges encountered. This information helps explain any complications and provides data for program evaluation and continuous improvement. For example, if survival is lower than expected, planting date and conditions may provide insight into contributing factors.

Methods employed documentation confirms that approved techniques were used. The report describes planting methods used for each area (no-till, scalping, fabric), equipment used for implementation, any deviations from planned methods and reasons for changes, and any special techniques employed to address site challenges. This documentation verifies that contractors implemented the approved plan rather than substituting easier but potentially less effective approaches.

Challenges encountered section provides valuable transparency and program learning. Contractors describe any difficulties faced during implementation such as unexpected soil conditions, weather delays or complications, equipment problems, access issues, or anything else that affected the project. This information is not about making excuses but rather about honest communication that helps NDPF understand real-world implementation challenges and supports program improvement.

Deviations from plan with justification address any significant changes made during implementation. If different species were substituted, if quantities changed substantially, if planting locations were modified, or if methods were changed, the contractor explains why these deviations occurred and how they maintained project quality and objectives despite the changes. Minor field adjustments are expected and acceptable; significant changes without adequate justification raise concerns about whether the approved plan was followed.

Photo documentation provides visual verification of planting quality and completion. Contractors should submit at least 6-10 photos showing representative sections of completed planting, close-up views demonstrating planting depth and technique, overall site views showing project context and scale, any special conditions or challenges documented visually, and before-and-after images if particularly illustrative. Photos provide powerful verification and create a visual project record valuable for program documentation and future reference.

### **3.6.2 Landowner Planting Report**

Landowners also submit a post-planting report, though typically shorter and less technical than the contractor report. The landowner report serves different purposes: verifying project completion to their satisfaction, documenting their match contribution for program records, and providing feedback about contractor performance and overall program experience.

Project verification by the landowner confirms that planting occurred as expected and that they are satisfied with the work performed. The landowner report states that planting was completed according to their understanding of the plan, that they observed or inspected the planting and found it acceptable, and that the contractor conducted work professionally and communicated effectively. If the landowner has concerns about quality or implementation, the report provides opportunity to raise these issues for NDPF follow-up.

In-kind contribution documentation captures the value of landowner match contributions. The report itemizes site preparation work performed by the landowner with estimated hours and value, materials provided by the landowner such as fabric, staples, or equipment use, any contracted services paid by the landowner such as spraying or mowing, and any other contributions that count toward their 25 percent match requirement. This documentation must be reasonably detailed to verify that match requirements were met. Simple assertions of match value without supporting detail are insufficient.

Site preparation activities are specifically described, listing when and how vegetation was controlled, any earthwork or drainage improvements made, fence modifications or removals, marking of utilities and boundaries, and any other preparatory work. This documentation connects to the planning report recommendations and demonstrates landowner follow-through on preparation commitments.

Match calculation totals all landowner contributions and demonstrates that the 25 percent match requirement was satisfied. The calculation shows in-kind labor valued at reasonable hourly rates, materials at documented costs, contracted services at actual billed amounts, any cash contributions made directly, and the total match amount and percentage relative to NDPF contribution. NDPF reviews these calculations and may request additional documentation or clarification if match appears insufficient or inflated.

Contractor performance evaluation provides feedback that helps NDPF manage its contractor network. The landowner rates the contractor's communication and professionalism, quality of consultation and planning, planting quality and workmanship, adherence to schedule and commitments, and overall satisfaction with contractor performance. This feedback is invaluable for contractor evaluation and program improvement. Consistently high ratings confirm contractor quality; patterns of concerns trigger NDPF follow-up and potential contractor counseling or program separation.

### **3.6.3 Payment Processing**

Payment processing represents the final phase of the program workflow, occurring only after all documentation requirements are satisfied. The program's payment procedures maintain financial integrity while ensuring prompt payment for quality work.

Documentation review requirements establish the foundation for payment authorization. NDPF will not process payment until both the contractor planting report has been received and reviewed, the landowner planting report has been received confirming project completion and match contribution, and both reports are consistent and indicate successful project completion. If either report is missing or incomplete, payment is held until documentation is provided. This firm policy ensures accountability and prevents payment for unverified work.

Invoice validation against approved amounts confirms that payment requests align with the approved project plan and actual implementation. NDPF verifies that invoiced amounts match the approved project budget, that quantities billed correspond to actual quantities planted as documented in the planting report, that species and costs align with planning report specifications, and that no unauthorized additions or changes are included. Invoice padding or inflation is grounds for payment rejection and potential contractor removal from the program.

Approval workflow follows established procedures. Once documentation is complete, NDPF staff review both reports and the invoice, verify that all program requirements were met, confirm that the landowner match contribution is documented and adequate, calculate the appropriate payment amount, and authorize payment through the North Dakota Petroleum Foundation's financial procedures. This review ensures that multiple checkpoints verify payment appropriateness before funds are disbursed.

Payment timeline is generally prompt once all requirements are satisfied. NDPF aims to process payments within 30 days of receiving complete documentation and approved invoices. Delays in payment are almost always due to incomplete documentation, missing landowner reports, invoice discrepancies requiring clarification, or questions about implementation quality requiring follow-up. Contractors who submit thorough, accurate documentation promptly receive timely payment. Those who submit incomplete or questionable documentation experience payment delays until issues are resolved.

The requirement for BOTH planting report AND invoice merits emphasis because it is occasionally misunderstood. Some contractors submit invoices immediately after planting but delay the planting report, not understanding that the report is mandatory for payment processing. The invoice alone, without the detailed planting report documentation, is insufficient. Both documents serve essential functions - the report documents what was done, and the invoice requests payment for that work. Neither can substitute for the other.

Payment processing concludes the formal program workflow for each project. However, NDPF maintains ongoing interest in project success through the establishment period and beyond. Follow-up site visits, survival monitoring, and long-term landowner relationships extend beyond the immediate planting season and payment cycle. The relationships built through successful projects often lead to additional conservation work, referrals to other landowners, and expanding wildlife habitat across North Dakota's landscape.

## **Conclusion**

The Planting for the Future program workflow reflects professional conservation program management refined through years of experience. The structured progression from application through planning to implementation and documentation ensures quality outcomes while maintaining efficiency and accountability. Each phase includes deliberate quality control checkpoints that catch problems early and verify that standards are met before moving forward.

Success depends on all participants understanding and fulfilling their roles within this workflow. Landowners must apply early, prepare sites properly, and commit to maintenance. Contractors must conduct thorough consultations, develop accurate planning reports, execute high-quality planting, and submit complete documentation. NDPF must review carefully, coordinate effectively, and maintain standards consistently. When all elements align, the result is successful tree establishment that creates lasting wildlife habitat and advances conservation objectives across North Dakota.

The workflow documented in this section represents current program operations as of 2025, reflecting the program's evolution and continuous improvement over multiple planting seasons. Since the program's inception, more than 671,000 trees have been planted through this systematic approach, creating thousands of acres of wildlife habitat and demonstrating the power of structured, professional conservation program implementation.

## **Section 4: Monitoring and Success Evaluation**

The North Dakota Petroleum Foundation's Planting for the Future program recognizes that successful conservation outcomes require more than simply planting trees. Achieving lasting environmental benefits demands systematic monitoring, rigorous evaluation, and a commitment to addressing projects that fail to meet established success criteria. This section details the comprehensive monitoring protocol that provides accountability to the Outdoor Heritage Fund, validates public investment in conservation, and drives continuous program improvement through data-driven decision making.

The monitoring framework established for this program extends well beyond basic compliance requirements. While the Natural Resources Conservation Service sets a minimum 50% survival rate for wildlife habitat plantings under Practice 645, the Planting for the Future program has consistently achieved significantly higher survival rates ranging from 73% to 84% across its portfolio of projects. This exceptional performance reflects the program's emphasis on quality control, appropriate species selection, professional installation, and comprehensive landowner support throughout the critical establishment period.

### **4.1 Multi-Year Monitoring Protocol**

The foundation's monitoring approach recognizes that tree establishment is a multi-year process requiring sustained attention and evaluation. Newly planted trees face their greatest mortality risk during the first two growing seasons as they develop root systems capable of accessing deeper soil moisture and withstanding environmental stresses. The monitoring protocol therefore focuses intensive assessment efforts during this critical establishment window while maintaining capacity for longer-term tracking to document ultimate program success.

#### **4.1.1 Monitoring Schedule**

The monitoring timeline establishes specific evaluation points that correspond to critical stages in tree establishment. This schedule balances the need for timely intervention on struggling projects with practical constraints on field assessment logistics across North Dakota's diverse geography.

**Year 0 (Planting Year):** Monitoring begins immediately upon project completion with comprehensive baseline documentation. Foundation staff or designated field coordinators conduct site visits to verify planting completion, document installed tree counts by species, capture GPS-referenced photo points, and record initial site conditions. This baseline documentation establishes the starting point against which all future survival assessments will be measured. Project completion reports document final tree counts, planting dates, weather conditions during installation, initial observations of planting quality, and any immediate concerns or special circumstances. This baseline data proves essential for interpreting survival rates observed in subsequent growing seasons.

**Year 1 (First Growing Season):** The first formal survival assessment occurs in late summer or early fall of the first growing season following planting. This timing allows sufficient time for trees to demonstrate survival through the critical first summer but occurs before fall leaf drop that can complicate visual assessment. Field coordinators return to project sites to conduct systematic survival counts, typically examining representative sample plots or

transects rather than counting every individual tree on large projects. Assessment methods are tailored to project size, with smaller projects often receiving complete census counts while larger plantings utilize statistically valid sampling protocols. Beyond simple survival counts, first-year assessments document mortality patterns, identify potential problems such as drought stress or insect damage, evaluate maintenance activities performed by landowners, and provide preliminary indication of whether projects are on track to meet success criteria.

**Year 2 (Second Growing Season):** The second-year assessment serves as the primary success evaluation for most projects. Trees that survive two complete growing seasons have demonstrated their capacity to establish functional root systems and withstand normal environmental stresses. Year 2 survival rates provide the most reliable predictor of long-term planting success. This final required assessment occurs in late summer of the second growing season and employs the same methodology used in Year 1 to ensure comparable results. Foundation staff conduct survival counts, document overall tree health and vigor, assess growth rates and establishment quality, capture follow-up photographs from the same reference points established at baseline, and evaluate the need for any supplemental planting or corrective action. Projects meeting or exceeding the 50% survival threshold are certified as successful and require no further monitoring unless voluntary long-term tracking is arranged with cooperating landowners.

**Years 3+ (Long-Term Tracking):** While formal monitoring requirements conclude after Year 2 for successful projects, the foundation maintains capacity for voluntary long-term tracking on selected sites. This extended monitoring serves multiple purposes including documenting ultimate maturation and wildlife habitat value, identifying very long-term success factors or failure modes, supporting grant reporting on program legacy benefits, and providing compelling success stories for program promotion. Long-term tracking typically occurs on a convenience basis when foundation staff or cooperating partners have other reasons to visit project areas, though some demonstration sites may receive more systematic follow-up to support educational objectives.

#### **4.1.2 Monitoring Methods**

Consistent, scientifically sound monitoring methods ensure that survival data accurately reflects project outcomes and supports valid comparisons across different projects, contractors, species, and site conditions. The monitoring protocol employs multiple complementary approaches to develop comprehensive understanding of project performance.

**Species-by-Species Survival Counts:** Survival assessment begins with systematic counting of live trees by species. For smaller projects involving fewer than 1,000 trees, field coordinators typically attempt to count every planted tree, walking the entire planting area in a systematic pattern to ensure complete coverage. For larger projects, statistical sampling approaches provide efficient assessment while maintaining acceptable confidence levels. Sample plots or transects are established to represent the range of site conditions present, with sample size determined based on total project acreage and desired confidence interval. Within each sample area, all trees are individually assessed and categorized as alive or dead, with living trees further evaluated for health and vigor. Species-specific survival rates prove particularly valuable for identifying which species perform well in specific site conditions and which may require adjustment in future planting recommendations.

**Mortality Cause Assessment:** Understanding why trees die provides actionable intelligence for improving future success. Field coordinators document probable mortality causes whenever evident, recognizing that multiple factors often contribute to tree death. Common mortality causes documented include drought stress (often evident from pattern of dead trees in drier microsites), animal browse damage (particularly deer and rodent damage visible on stems and buds), mechanical damage from equipment or foot traffic, insect or disease problems (though less common in young plantings), improper planting depth or technique (observable from exposed roots or buried stem collars), competition from aggressive weeds or grasses, and environmental extremes such as late spring frost or winter desiccation. While some mortality causes remain uncertain, even partial information helps identify patterns and inform adaptive management responses.

**Health and Vigor Evaluation:** Survival represents a binary outcome—trees either live or die—but health and vigor assessment provides important nuance about the quality of survival. A project with 75% survival but weak, stressed trees facing high mortality risk differs fundamentally from a project with 75% survival and vigorous, well-established trees with excellent long-term prospects. Field coordinators evaluate tree health through multiple indicators including foliage color and density (healthy trees display species-typical color and full foliage), annual growth increment (vigorous trees show substantial height and diameter growth), bud development (presence of well-formed terminal and lateral buds indicates preparation for the next growing season), absence of significant pest or disease symptoms, and overall structural form and symmetry. Health observations are typically recorded on a categorical scale (excellent, good, fair, poor) rather than requiring detailed measurements, providing useful context without excessive data collection burden.

**Growth Rate Observations:** While precise growth measurements prove time-consuming on large projects, general observations of growth rates help validate establishment success. Fast-growing species such as hybrid poplars, green ash, and Siberian elm should demonstrate substantial height increases—potentially several feet—during favorable growing seasons. Slower-growing species such as bur oak, ponderosa pine, and Rocky Mountain juniper show more modest growth but should still display clear evidence of new growth. Notably poor growth rates, especially on trees that survived but show minimal change from planting size, often indicate ongoing stress that may lead to delayed mortality. These observations inform decisions about whether surviving trees have truly established or remain at risk.

**Photo Point Documentation:** Systematic photography provides powerful visual documentation of project evolution over time. During baseline documentation, field coordinators establish multiple photo points at each project site, capturing images from standardized locations and orientations. GPS coordinates are recommended to be recorded for each photo point to enable repeated photography from the same locations in subsequent years. Photo points typically capture overview shots showing the planting area in landscape context, mid-range shots documenting representative portions of the planting, and close-up shots of individual trees or species groups. Sequential photos from the same location across multiple years provide compelling visual evidence of tree growth and establishment, document changes in competing vegetation, reveal patterns of success or failure across different portions of planting sites, and supply valuable content for grant reports, promotional materials, and educational programs. Digital photo files are maintained with comprehensive

metadata including date, location, photographer, associated project ID, and descriptive notes.

**Landowner Maintenance Activity Documentation:** Landowner commitment to appropriate maintenance activities significantly influences tree establishment success. During monitoring visits, field coordinators interview landowners to document maintenance activities performed since planting or the previous monitoring visit. Key maintenance activities include weed control methods and frequency, watering frequency and amount during drought periods, protection from livestock or wildlife browse, removal of competing vegetation around young trees, and any problems encountered or assistance needed. This information helps explain survival outcomes, identifies successful landowner strategies worth sharing with others, reveals areas where additional landowner education or support might improve future success, and demonstrates landowner engagement and partnership. Projects with highly engaged landowners performing consistent maintenance typically achieve superior survival rates compared to sites receiving minimal post-planting care.

**Environmental Factor Assessment:** Tree survival occurs within the context of environmental conditions that vary significantly across years and locations. Monitoring documentation includes assessment of environmental factors that may have influenced survival outcomes including precipitation during the growing season relative to normal conditions, extreme temperature events such as late spring freezes or severe winter cold, severe weather including hail, high winds, or ice storms, soil moisture conditions at time of monitoring visit, evidence of drought stress, flooding, or standing water, competing vegetation pressure and characteristics, and visible evidence of wildlife pressure through browse damage patterns. This environmental context proves essential for interpreting survival rates and distinguishing between controllable factors related to species selection or planting quality versus uncontrollable environmental stresses.

### **4.1.3 Success Criteria**

Clear success criteria provide objective standards for evaluating project outcomes and determining whether conservation objectives have been achieved. The Planting for the Future program employs multi-tiered success criteria that balance minimum regulatory standards, program performance goals, and demonstrated historical achievement.

**Minimum Standards:** The Natural Resources Conservation Service establishes a 50% survival rate as the minimum acceptable outcome for tree plantings installed under Practice 645 (Upland Wildlife Habitat Management). This threshold reflects the recognition that tree planting inherently involves some mortality risk but that plantings achieving 50% survival have installed sufficient trees to provide meaningful wildlife habitat benefits. Projects falling below this minimum standard have failed to achieve their intended conservation purpose and require corrective action through replanting. The 50% threshold applies at the project level, evaluated at the Year 2 monitoring point after trees have completed two full growing seasons. This standard provides the foundation for the replanting protocol detailed in Section 4.2.

**Program Performance Goals:** While 50% survival meets minimum requirements, the Planting for the Future program establishes higher performance expectations to maximize conservation return on investment. The program goal targets 70% average survival across the portfolio of projects funded in any given grant cycle. This elevated target reflects the program's emphasis on quality control throughout the planning, procurement, and installation

process. Achieving 70% average survival ensures that most projects substantially exceed minimum standards, maximizes the number of trees successfully established per dollar invested, demonstrates efficient use of public conservation funds, and provides buffer against individual projects that may experience difficulties. The 70% goal applies as an average across all projects rather than as a requirement for each individual project, recognizing that some sites and species combinations may face inherent challenges while others achieve exceptional results.

**Historical Performance:** The Planting for the Future program's track record demonstrates consistent achievement of survival rates substantially exceeding both minimum standards and program goals. Across the portfolio of projects monitored over multiple funding cycles, documented survival rates have ranged from 73% to 84%. This exceptional performance validates the program's comprehensive approach to quality control including rigorous contractor selection and oversight, emphasis on appropriate species selection matched to site conditions, professional installation techniques, comprehensive landowner education and support, and timely intervention on projects showing signs of stress. Historical performance data provides confidence to funding partners that the program will continue delivering superior conservation outcomes, establishes realistic expectations for future project success, identifies best practices and successful approaches worth replicating, and serves as a performance benchmark for evaluating contractors and methods.

**Species-Specific Survival Analysis:** Overall project survival rates provide important summary metrics, but species-specific analysis yields actionable intelligence for program improvement. Monitoring data is analyzed to identify species that consistently achieve high survival across diverse sites, species that perform well in specific site conditions but poorly in others, species with inherently higher mortality risk requiring either higher planting densities or more selective use, and species combinations that demonstrate synergistic benefits. This species-level analysis directly informs the tree selection recommendations provided to landowners and influences the species inventory maintained for each planting season. Species demonstrating consistently poor survival across multiple projects may be removed from recommendations or limited to only the most favorable site conditions, while species showing exceptional performance may be emphasized in planning discussions.

**Site Condition Correlation:** Analysis of survival rates across different site characteristics helps identify conditions that promote or hinder establishment success. Monitoring data is evaluated to understand relationships between survival and factors such as soil type and texture, topographic position and slope, existing vegetation and competition pressure, proximity to water sources, exposure to prevailing winds, and evidence of wildlife browse pressure. These correlations inform site assessment protocols used during planning, help set realistic expectations for challenging sites, and guide decisions about species selection and planting density. Sites with characteristics associated with lower survival may receive recommendations for more resilient species, higher planting densities to achieve desired final tree counts despite expected mortality, or enhanced establishment support such as weed control or browse protection.

## **4.2 Replanting Protocol**

The foundation's commitment to conservation success extends beyond initial tree installation to include a formal replanting protocol that ensures projects failing to meet minimum survival standards receive corrective action. This protocol demonstrates accountability to funding

partners, fulfills obligations to participating landowners, and ensures that public conservation investments achieve their intended environmental benefits.

#### **4.2.1 Replanting Thresholds**

Replanting decisions follow clear, objective criteria based on documented survival rates from Year 2 monitoring assessments.

**Automatic Replanting:** Projects documenting survival rates below 50% at the Year 2 monitoring assessment automatically trigger the replanting protocol. This threshold aligns with NRCS minimum standards for Practice 645, recognizing that plantings falling below 50% survival have failed to establish sufficient trees to provide the intended wildlife habitat benefits. Automatic replanting ensures that all funded projects ultimately achieve minimum success standards. When survival falls below 50%, foundation staff contact the landowner to schedule replanting, conduct analysis of probable mortality causes to inform improved approach, develop a replanting plan addressing identified failure factors, and coordinate with contractors to implement supplemental planting at no cost to the landowner.

**Optional Supplemental Planting:** Projects achieving 50% to 70% survival meet minimum standards but fall below program performance goals. In these cases, supplemental planting is offered to willing landowners but not automatically required. Foundation staff discuss supplemental planting options with landowners, considering factors such as the landowner's satisfaction with current results, whether mortality was concentrated in specific areas or species that could benefit from supplemental planting, site capacity to support additional trees without excessive crowding, and cost-effectiveness of supplemental planting given logistics and scale. Many landowners achieving survival in the 50-70% range remain satisfied with results, particularly if surviving trees show strong health and vigor. Others welcome the opportunity to increase tree density in areas where mortality was concentrated. The decision to proceed with optional supplemental planting balances conservation benefit against practical constraints and landowner preferences.

**Evaluation of Mortality Causes:** Understanding why projects failed to meet survival standards proves essential for developing effective replanting strategies. When replanting is triggered, foundation staff conduct thorough analysis of probable mortality causes through review of monitoring documentation and field notes, consultation with field coordinators who conducted assessments, discussion with landowners about environmental conditions and maintenance activities, review of weather data for unusual conditions during establishment period, and examination of contractor performance on the project. This analysis identifies whether failure resulted from controllable factors such as improper species selection, poor planting quality, or inadequate landowner support versus uncontrollable environmental factors such as exceptional drought, late spring freeze, or severe browse pressure. The distinction between controllable and uncontrollable causes informs both replanting strategy and potential program adjustments.

**Replanting Plan Development:** Each replanting project receives a customized plan addressing the specific factors that contributed to initial failure. The replanting plan may include modification of species selection to emphasize more resilient species or better match to site conditions, timing adjustments to optimize planting window based on lessons learned, planting technique modifications if quality issues were identified, enhanced site preparation such as more aggressive weed control prior to planting, installation of browse protection if deer damage was significant, increased planting density to provide buffer against mortality

risk, or enhanced landowner education and maintenance support. The replanting plan is developed collaboratively with the landowner to ensure their continued engagement and addresses their concerns or constraints that may have contributed to initial failure.

#### **4.2.2 Replanting Implementation**

Replanting projects follow the same rigorous quality control protocols that govern initial installations, with additional attention to factors identified through failure analysis.

**No-Cost Replacement Trees:** A core principle of the replanting protocol ensures that landowners receive replacement trees at no cost. Projects requiring replanting due to failure to meet minimum standards were initially funded through Outdoor Heritage Fund grants with the expectation of achieving successful establishment. Requiring landowners to bear additional costs for replacement trees would unfairly penalize landowners for factors often beyond their control and would likely result in many landowners declining to participate in replanting, leaving failed conservation projects unaddressed. The no-cost replacement commitment maintains landowner goodwill and partnership, ensures that public conservation investments ultimately achieve intended outcomes, demonstrates the foundation's commitment to quality and accountability, and removes financial barriers to correcting unsuccessful projects.

Funding for replacement trees comes from contingency amounts built into grant budgets specifically for this purpose. Historical data showing 73-84% survival rates across the program suggests that replanting requirements affect a small minority of projects. Nevertheless, prudent grant management includes adequate reserves to address projects requiring supplemental planting without jeopardizing the overall program budget. The cost of replacement trees is partially offset by reduced procurement costs (ordering additional stock from same suppliers during normal procurement cycles) and by efficiency gains from returning to sites with established landowner relationships rather than recruiting and establishing new partnerships.

**Cause Analysis to Inform Improved Approach:** Replanting provides an opportunity to test hypotheses about failure causes and validate corrective strategies. When specific mortality causes were identified—such as poor performance of a particular species, concentration of mortality in specific site conditions, or evidence of planting quality issues—the replanting plan explicitly addresses these factors and subsequent monitoring evaluates whether corrective actions improved outcomes. This experimental dimension of replanting contributes to program learning and continuous improvement. Comparing survival rates between initial planting and replanting helps validate cause analysis, tests the effectiveness of modified approaches, identifies persistent site limitations that may constrain ultimate success, and generates lessons learned applicable to future projects.

**Species Modification When Warranted:** Replanting plans frequently involve modification of species composition based on initial performance. Species that demonstrated high mortality in the initial planting are typically replaced with more resilient alternatives better matched to site conditions. For example, a project that initially included American plum and chokecherry but experienced high mortality of these species might emphasize buffaloberry and silver buffaloberry in replanting, while maintaining species that performed well initially. This adaptive species selection increases the likelihood of replanting success while maintaining or improving wildlife habitat diversity and value. Species modifications are discussed with

landowners to ensure their understanding and agreement, with particular attention to maintaining species diversity objectives while improving establishment success probability.

**Site Preparation Improvements:** When mortality analysis suggests that site conditions contributed to poor survival, replanting includes enhanced site preparation. This may involve more aggressive weed control to reduce competition pressure in the critical establishment period, soil amendments if nutrient deficiency or unfavorable pH was identified, grading or drainage improvements if standing water or erosion were problems, installation of windbreaks or browse protection if physical damage was significant, or mechanical treatment of heavy grass sod if root competition appeared limiting. These site improvements require coordination with landowners who may need to perform preparatory work prior to replanting. Enhanced site preparation addresses underlying constraints that may have limited initial success and creates more favorable conditions for replacement trees.

**Enhanced Success Strategies:** Beyond species modification and site preparation, replanting projects may incorporate additional strategies to improve establishment probability. These enhanced approaches might include installation during optimal timing windows based on weather forecasts and site conditions, use of larger planting stock (larger seedlings or containerized material) for higher initial survival probability, concentrated planting in microsites identified as most favorable based on initial survival patterns, installation of individual tree shelters or browse protection on high-value species, provision of supplemental watering supplies or irrigation assistance for drought-prone sites, more frequent follow-up visits and landowner contact during critical first growing season, or engagement of different contractors if previous contractor performance was questionable. These enhanced strategies increase investment per tree but significantly improve success probability for projects that have already demonstrated challenges.

### **4.3 Data Management and Analysis**

Systematic data management provides the foundation for program accountability, supports continuous improvement, and enables sophisticated analysis of factors influencing tree establishment success. The foundation maintains comprehensive data systems capturing project details, monitoring results, and financial information across the multi-year life cycle of each planting project.

#### **4.3.1 Data Collection System**

**Standardized Electronic Database:** All project and monitoring data is maintained in a centralized electronic database system that serves as the authoritative record for the Planting for the Future program. The database structure includes interconnected tables capturing project identification and location information, participating landowner contact information and property details, tree species and quantities for each project, planting contractor and installation details, baseline site characteristics and documentation, monitoring results from Year 1 and Year 2 assessments, photographic documentation with associated metadata, financial information including grant funding sources and expenditures, and communication logs documenting landowner contacts and project history.

This centralized database architecture enables efficient data entry and retrieval, supports standardized reporting for grant accountability, facilitates analysis across multiple projects and funding cycles, and maintains data integrity through validation rules and relationship constraints. Database access is controlled through appropriate security protocols to protect

landowner privacy while enabling authorized foundation staff and cooperating partners to access information needed for their roles.

**Project-Level Tracking by Planting ID:** Each planting project receives a unique Planting ID that serves as the primary key for all associated records. This identifier enables tracking of individual projects through multiple years of monitoring and potential replanting while maintaining clear linkages between related records. The Planting ID structure typically includes embedded information such as grant cycle or funding year, county or region code, sequential project number within the grant cycle, and version suffix for replanting or supplemental planting projects. This structured identifier facilitates sorting and analysis while maintaining human readability for staff working with project records.

**Comprehensive Documentation Filing:** While core data resides in the electronic database, supplementary documentation is maintained in organized file systems linked to database records. A standardized folder structure organizes documents by grant cycle and project, with subfolders containing landowner agreements and contact information, site assessment notes and planning documents, contractor agreements and installation documentation, monitoring field notes and data sheets, photographic documentation organized by monitoring year, correspondence with landowners and contractors, and grant reporting documentation. This comprehensive filing system ensures that all project-related materials remain accessible for future reference, audit requirements, or detailed analysis.

**Photo Archive with Metadata:** Photographic documentation receives special attention given its value for visual documentation of program success and utility for educational purposes. All project photos are maintained in a dedicated archive with comprehensive metadata including unique photo identifier linked to project Planting ID, GPS coordinates of photo point location, date and time of photograph, photographer identification, standardized description of photo subject and orientation, monitoring year (baseline, Year 1, Year 2, or long-term follow-up), and keywords supporting searchable archive. This metadata enables efficient retrieval of photos meeting specific criteria for grant reports, presentations, promotional materials, or analytical purposes. Sequential photos from the same location across multiple years are explicitly linked in the database to support before-and-after comparisons.

**Financial Tracking Integration:** Project-level financial data is integrated with program and monitoring information to enable comprehensive analysis of program efficiency and return on investment. Financial records track direct costs per project including tree procurement costs by species and quantity, contractor installation costs, landowner incentive payments if applicable, monitoring and assessment costs, replanting costs for projects requiring supplemental installation, and administrative overhead allocation. This financial integration enables calculation of metrics such as cost per tree planted, cost per tree successfully established (accounting for survival rates), cost per acre treated, and comparison of cost-effectiveness across different species, contractors, or site conditions. Financial analysis informs budget development for future grant applications and supports accountability reporting to funding partners.

### **4.3.2 Performance Analysis**

The comprehensive data collected through monitoring and documentation supports sophisticated analysis of factors influencing program success. These analyses inform adaptive management decisions, identify best practices, and demonstrate program accountability.

**Species Survival Rates by Region:** Analysis of survival data aggregated by species and geographic region identifies species that perform consistently well across North Dakota's diverse conditions versus those whose success is more location-dependent. North Dakota's climate and soil conditions vary substantially from the Red River Valley in the east to the Missouri Plateau in the west, and from the Drift Prairie in the central region to the Badlands and breaks country in the southwest. Species performance analysis by region reveals these geographic patterns and informs species selection recommendations for future projects. For example, analysis might show that green ash performs well across all regions while paper birch achieves high survival only in the northeastern counties, or that ponderosa pine establishes successfully in southwestern areas but struggles in eastern regions. This geographic intelligence prevents recommending species for regions where success probability is low and emphasizes locally-adapted species likely to thrive.

**Planting Method Effectiveness:** The program utilizes various planting methods depending on site conditions, scale, and access constraints. Methods include machine tree planting using specialized equipment for large-scale projects in agricultural settings, hand planting using dibbles or spades for smaller projects or difficult terrain, augered holes with hand-installed trees for rocky or heavy soil conditions, and containerized stock installation for selected species or high-value specimen trees. Analysis of survival rates by planting method, controlling for species and site factors, helps identify which methods produce superior establishment results. This analysis may reveal that certain species establish better with specific planting methods or that particular contractors achieve better results with methods matching their expertise and equipment. Method effectiveness analysis informs guidance provided to contractors and may influence method specifications for future projects.

**Contractor Performance Trends:** Multiple contractors participate in tree planting installation across the program's diverse geography. Analysis of survival rates by contractor, controlling for species and site factors, helps identify contractors who consistently deliver superior results versus those whose projects may require closer oversight. This performance analysis considers survival rates on projects installed by each contractor, landowner satisfaction feedback regarding contractor professionalism and work quality, timeliness and communication during project coordination, and responsiveness to questions or concerns. Contractors demonstrating consistent high performance receive preference for future project assignments, while those showing performance concerns receive additional training, oversight, or ultimately may be removed from the approved contractor list. This performance accountability ensures that contractor selection supports program quality objectives.

**Site Condition Correlations:** Statistical analysis of survival rates against site characteristics quantifies relationships observed anecdotally during monitoring. Correlation analysis examines survival rates across categories of soil types (sandy, loamy, clay, organic), topographic positions (upland, slope, lowland, riparian), existing vegetation (grassland, agricultural, woodland edge, shrubland), exposure conditions (open, sheltered, windswept), and moisture regimes (dry, mesic, wet). These correlations inform site assessment protocols and help establish realistic expectations for different site types. For example, analysis might quantify that plantings in loamy soils achieve 15 percentage points higher survival than those in heavy clay soils, or that sites with existing sheltering vegetation show 20% better survival than completely open sites. This quantified understanding of site factors supports more accurate project planning and success prediction.

**Climate and Weather Impact:** Year-to-year variation in survival rates often correlates with weather conditions during critical establishment periods. Analysis comparing survival rates across different planting years against precipitation data, temperature extremes, and severe weather events helps isolate environmental factors beyond program control versus those reflecting management decisions. For example, a grant cycle planted during a year with severe drought might show overall lower survival rates across all projects compared to cycles planted during favorable moisture years. This climate context proves important for interpreting program performance and explaining variation to funding partners. Analysis might reveal that projects planted in springs with adequate moisture but not excessive rainfall achieve optimal survival, or that late spring freezes in certain years significantly impacted cold-sensitive species. Understanding climate impacts helps set realistic expectations and may inform recommendations about optimal planting timing or species selection in relation to climate trends.

**Long-Term Success Patterns:** For the subset of projects with monitoring extending beyond the standard two-year evaluation period, analysis of long-term survival and development patterns provides valuable insights into ultimate program outcomes. Long-term data reveals whether survival rates remain stable after Year 2 or show gradual decline, identifies delayed mortality factors not evident in early monitoring, documents growth rates and time required to achieve functional wildlife habitat, and validates that two-year survival provides reliable prediction of long-term success. This long-term perspective strengthens the program's ability to document lasting conservation benefits and helps validate that the two-year evaluation period provides sufficient information to certify project success.

## **4.4 Continuous Improvement**

The monitoring and evaluation framework exists not merely to document outcomes but to drive systematic program improvement over time. Data collected through monitoring, combined with feedback from contractors and landowners, informs ongoing refinement of program practices, species recommendations, and quality control protocols.

### **4.4.1 Adaptive Management**

**Annual Program Review Process:** At the conclusion of each monitoring season, foundation staff conduct a formal program review synthesizing lessons learned and identifying improvement opportunities. This annual review examines survival data from the most recent monitoring cohort, compares performance against historical trends and program goals, identifies species or approaches showing exceptional success or unexpected challenges, reviews contractor performance and landowner feedback, assesses budget performance and cost-effectiveness metrics, and develops recommendations for adjustments to program protocols, species lists, or contractor guidance. The annual review includes participation from foundation staff involved in program administration, field coordinators who conduct monitoring assessments, selected contractors representing different regions or specialties, and occasionally landowners who can provide participant perspectives. This inclusive review process ensures that program adjustments reflect diverse perspectives and front-line experience.

**Data-Driven Species Selection Refinement:** Species recommendations provided to landowners evolve over time based on accumulated performance data. The annual review process specifically examines species-level survival data to identify candidates for increased

emphasis (species demonstrating consistent high survival across diverse conditions), continued standard recommendation (species performing well in appropriate site conditions), conditional recommendation (species performing well only in specific conditions, requiring careful site matching), or reduced emphasis or removal (species showing consistently poor survival or high maintenance requirements). These evidence-based adjustments to species recommendations improve future project success rates while maintaining the diversity of native species important for wildlife habitat objectives. Changes to species recommendations are communicated to planning staff, contractors, and nursery suppliers well in advance of procurement deadlines to enable appropriate inventory planning.

**Best Practice Identification and Sharing:** Analysis of high-performing projects reveals best practices worth disseminating across the program. Monitoring data combined with field observations identifies specific practices or approaches associated with exceptional success including planting techniques employed by top-performing contractors, site preparation methods that enhance establishment, timing strategies that optimize survival, landowner maintenance approaches that support strong tree growth, species combinations that demonstrate synergistic benefits, and problem-solving innovations developed by experienced contractors or landowners. These identified best practices are documented and shared through contractor training sessions, landowner education materials, and field day demonstrations. Broad dissemination of successful approaches raises overall program performance by enabling all participants to benefit from innovations developed by program leaders.

**Contractor Feedback Integration:** Contractors who install trees on diverse sites across multiple years develop practical expertise about what works and what challenges arise. The program actively solicits and incorporates contractor feedback through post-season debriefing sessions, formal feedback forms completed after each planting season, invitation to participate in annual program review, and ongoing communication channels for raising concerns or suggestions. Contractor insights often identify practical challenges not evident from monitoring data alone, such as issues with specific seed sources or nursery stock quality, equipment or technique modifications that improve planting efficiency or quality, site access or logistics constraints that affect project feasibility, or emerging pest or disease problems affecting certain species. Integrating contractor feedback ensures that program protocols remain grounded in practical field experience and maintains contractor engagement as genuine program partners rather than merely hired service providers.

**Landowner Satisfaction Assessment:** Program success depends on sustained landowner partnership and satisfaction. The foundation periodically assesses landowner satisfaction through brief surveys completed after monitoring visits, informal conversations during site visits, and occasional more comprehensive satisfaction assessments across multiple landowner cohorts. Satisfaction assessment explores landowners' perceptions of tree survival and establishment success, satisfaction with contractor professionalism and work quality, assessment of foundation communication and support, likelihood of recommending the program to other landowners, and suggestions for program improvements. High landowner satisfaction supports program reputation and recruitment of future participants, while identification of dissatisfaction areas enables corrective action. Landowners who report lower satisfaction receive follow-up contact to understand concerns and explore appropriate responses, which may include supplemental planting even on projects meeting minimum

standards, enhanced technical assistance or site visit frequency, or addressing contractor performance issues.

**Failure Mode Analysis and Prevention:** Projects that fail to meet survival standards or experience other significant problems receive detailed failure analysis to understand root causes and prevent recurrence. This analysis examines common patterns among unsuccessful projects including species that consistently underperform in certain site conditions, contractors whose projects show elevated failure rates, site characteristics associated with poor survival, timing or weather factors that compromised establishment, or landowner understanding or maintenance gaps that contributed to mortality. Identifying these failure modes enables proactive prevention through more careful site assessment before accepting challenging projects into the program, removing consistently problematic species from recommendations for certain site types, providing enhanced contractor training or oversight for identified quality issues, adjusting program timing or logistics to avoid identified risk factors, and improving landowner education about critical maintenance activities. This systematic approach to learning from failures minimizes their recurrence and continuously raises baseline program performance.

#### **4.4.2 Knowledge Sharing**

The insights generated through monitoring and program evaluation have value beyond internal program management. The foundation actively shares knowledge to benefit the broader conservation community, support professional development of contractors, and enhance landowner success.

**Contractor Training and Updates:** Contractors participating in the program receive regular training and updates incorporating lessons learned from monitoring results. Annual contractor meetings held prior to each planting season provide a forum for reviewing survival data from recent projects, presenting identified best practices and recommended techniques, introducing any changes to program protocols or species recommendations, addressing common challenges or problems observed in previous season, and facilitating peer learning among contractors with diverse experience and expertise. These training sessions maintain quality standards across the contractor network and ensure that all participants benefit from program-wide learning. Contractors appreciate these professional development opportunities and the collaborative relationship fostered through knowledge sharing.

**Landowner Education Materials:** Comprehensive landowner education materials are continuously refined based on monitoring insights and feedback. Educational resources include updated tree care guides emphasizing maintenance practices associated with high survival, species-specific care sheets highlighting critical factors for successful establishment, troubleshooting guides helping landowners identify and address common problems, photo examples showing healthy tree establishment versus stress symptoms, and frequently asked questions based on common landowner inquiries. These materials are provided at multiple points including during initial planning consultation, at time of planting installation, during monitoring visits, and in response to landowner questions. Well-informed landowners are better equipped to support tree establishment through appropriate maintenance and are more satisfied with program outcomes.

**Success Story Documentation:** High-performing projects provide compelling evidence of program effectiveness and inspire other landowners to participate. The foundation systematically documents success stories through case study write-ups featuring exemplary

projects, before-and-after photo sequences showing dramatic landscape transformation, landowner testimonials describing their experience and satisfaction, quantification of wildlife habitat benefits observed on established projects, and economic or aesthetic benefits realized by participating landowners. These success stories are featured in program promotional materials, grant reports to funding partners, presentations at conferences or field days, and outreach to recruit new program participants. Success stories make abstract survival statistics tangible and demonstrate the real-world conservation impacts achieved through the program.

**Lessons Learned Dissemination:** Insights from the Planting for the Future program have relevance beyond the immediate program context. The foundation shares lessons learned with the broader conservation community through presentations at professional conferences and meetings of natural resource organizations, articles in trade publications and natural resource bulletins, contributions to technical guidance documents and best management practice compilations, collaboration with NRCS and other agencies on practice standards and specifications, and participation in research cooperatives studying tree establishment and wildlife habitat. This knowledge dissemination contributes to continuous improvement in tree planting practices across the conservation community, raises the foundation's profile as a leader in effective conservation implementation, strengthens relationships with partner agencies and organizations, and ensures that public investment in this program generates benefits extending beyond individual funded projects. The program's demonstrated success in achieving 73-84% survival rates—substantially exceeding minimum standards—provides credible evidence that the approaches and protocols employed deliver superior results worthy of broader adoption.

## **Conclusion**

The comprehensive monitoring and success evaluation framework detailed in this section demonstrates the North Dakota Petroleum Foundation's commitment to accountability, quality, and continuous improvement. By implementing rigorous multi-year monitoring protocols, maintaining clear success criteria with meaningful consequences for underperforming projects, systematically analyzing performance data to identify improvement opportunities, and actively sharing knowledge to benefit the broader conservation community, the program ensures that public investment in tree planting generates lasting conservation benefits. The program's documented achievement of 73-84% survival rates across 671,000+ trees planted validates the effectiveness of this quality-focused approach and provides confidence to funding partners and participating landowners that the Planting for the Future program delivers exceptional value and lasting environmental impact.

## Section 5: Quality Control and Compliance

The NDPF Planting for the Future program operates under a rigorous multi-level quality control framework designed to ensure consistent excellence in project planning, execution, and long-term success. This systematic approach addresses the critical need for accountability in the stewardship of public funds while delivering measurable conservation outcomes that benefit North Dakota's wildlife, landowners, and future generations. With over 671,000 trees planted across more than 2,600 acres since the program's inception, maintaining stringent quality standards is not merely an administrative requirement—it is fundamental to the program's mission and credibility.

Quality control in conservation tree planting extends beyond simple compliance verification. It encompasses technical excellence in species selection and site matching, professional execution of planting operations, accurate documentation and reporting, financial accountability and fraud prevention, and sustained landowner engagement for long-term stewardship. The NDPF has developed a comprehensive five-level quality control system that addresses each of these dimensions through overlapping layers of review, verification, and accountability. This systematic approach ensures that every project meets or exceeds Natural Resources Conservation Service (NRCS) standards while optimizing the investment of Outdoor Heritage Fund (OHF) grant dollars for maximum conservation impact.

### 5.1 Multi-Level Quality Control System

The cornerstone of the program's quality assurance framework is a five-level system that provides comprehensive oversight from initial application through multi-year monitoring. Unlike single-point inspection models that rely on one-time verification, this layered approach creates multiple opportunities to identify and correct issues, ensures consistency across contractors and projects, provides checks and balances against errors or irregularities, and establishes clear accountability at each stage of project development. Each level serves a distinct function while reinforcing the integrity of the others, creating a robust quality management system that has proven effective across hundreds of diverse projects throughout North Dakota.

#### 5.1.1 Level 1: Contractor Self-Quality Control

Professional tree planting contractors serve as the first line of quality assurance in the NDPF program. These experienced conservation professionals bring specialized expertise in site assessment, species selection for North Dakota conditions, planting techniques and equipment operation, and wildlife habitat establishment principles. The program requires contractors to maintain rigorous internal quality standards throughout their engagement, from initial landowner consultation through final planting operations.

Contractor qualifications represent a critical component of Level 1 quality control. NDPF maintains a roster of approved contractors who have demonstrated proven experience in conservation tree planting, appropriate insurance coverage and liability protection, necessary equipment for professional-grade operations, and knowledge of NRCS standards and wildlife habitat requirements. These contractors are not merely tree planters—they are conservation professionals who understand the ecological goals of habitat establishment and the technical requirements of successful project implementation.

During the planning phase, contractors conduct comprehensive site assessments that evaluate soil types, drainage patterns, topography, existing vegetation, access for planting equipment, and landowner objectives. This thorough evaluation enables contractors to develop site-specific planting plans that optimize species selection for prevailing conditions, maximize wildlife habitat value, ensure practical feasibility of implementation, and align with landowner stewardship capabilities. Contractors perform internal reviews of their planning reports before submission to NDPF, checking for technical accuracy, completeness of documentation, realistic cost estimates, and compliance with program requirements.

Throughout planting operations, contractors maintain ongoing self-monitoring to ensure quality standards are met. This includes verifying proper planting depth and spacing according to plan specifications, ensuring adequate soil contact and moisture conditions, confirming species placement matches the approved design, protecting planted stock from damage during operations, and documenting actual implementation for post-planting reporting. Professional contractors recognize that their reputation depends on project success, creating inherent motivation to maintain high standards without external oversight.

The contractor self-quality control level provides immediate, on-site problem identification and correction. Experienced contractors can recognize and address issues such as unexpected soil conditions, weather-related planting challenges, equipment malfunctions, or site access problems in real-time, preventing minor complications from becoming major failures. This frontline quality management by qualified professionals forms the foundation upon which all subsequent oversight levels build.

### **5.1.2 Level 2: Planning Report Review**

Every project in the NDPF Planting for the Future program undergoes staff review at the planning stage, creating a critical quality control checkpoint before any trees are ordered or planted. This second level of oversight ensures that contractor-developed plans meet program standards and professional guidelines, providing an independent verification of soundness and conservation value. The planning report review process represents a gate-keeping function—no project advances to tree ordering or implementation without explicit NDPF approval.

Program staff bring accumulated program knowledge to the planning review process, including familiarity with species performance across North Dakota's diverse growing conditions from previous projects and experience evaluating conservation tree planting projects over multiple years. This institutional knowledge enables staff to identify potential issues based on program history while respecting the professional expertise that contractors bring to site-specific design decisions.

The planning report review evaluates multiple critical dimensions of project design. Species appropriateness analysis examines whether selected tree and shrub species are well-suited to the specific site's soil type, moisture regime, hardiness zone, and exposure conditions. Staff verify that species selections align with documented performance in similar North Dakota environments, avoiding combinations that have historically shown poor compatibility or survival. This review prevents the planting of species likely to fail, optimizing the use of limited grant funds and landowner investment.

Wildlife habitat objective alignment represents another essential component of planning review. NDPF staff assess whether the proposed planting design will effectively provide the intended habitat values, such as nesting cover for upland birds, winter thermal protection for

deer and other wildlife, food sources through fruit or mast production, and travel corridors connecting fragmented habitats. Staff may recommend design modifications to enhance habitat functionality, such as adjusting row spacing to improve understory development, incorporating additional shrub diversity for seasonal food availability, or extending planting length to create more effective windbreak structure. These refinements, informed by NDPF's accumulated experience across diverse projects, significantly enhance conservation outcomes without substantial cost increases.

Professional standards review ensures that projects reflect industry best practices. Staff review planning reports to confirm appropriate species selection for intended conservation purposes, adequate plant spacing and row configuration for objective achievement, suitable planting stock types and sizes, proper site preparation recommendations, and realistic establishment and maintenance expectations. This review supports quality outcomes while maintaining the flexibility that enables contractors to adapt to site-specific conditions.

Budget and feasibility analysis provides a practical reality check on proposed projects. NDPF staff evaluate whether cost estimates are reasonable and align with program funding parameters, project scope is appropriate for landowner resources and commitment level, timeline expectations are realistic given seasonal constraints, and any special requirements (such as site preparation or weed control) are adequately addressed. This review prevents the approval of overly ambitious projects that landowners may struggle to maintain or financially unsustainable designs that would require program subsidy beyond available resources.

The planning report review concludes with one of three outcomes: approval without modification, allowing the project to proceed to tree ordering; approval with recommended refinements, requiring minor adjustments before final authorization; or request for revision, identifying specific concerns that must be addressed before approval. This formal review and approval process creates clear documentation of NDPF oversight and ensures that every project advancing to implementation has been reviewed based on accumulated program experience.

### **5.1.3 Level 3: Application Pre-Approval**

Before contractors ever visit a site to develop planning reports, NDPF conducts initial screening of landowner applications to assess project viability and program fit. This third quality control level, occurring at the earliest stage of project development, optimizes the allocation of limited program resources by identifying the most promising opportunities and preventing investment in projects with fundamental feasibility issues. Application pre-approval serves as a strategic filter that enhances overall program effectiveness.

The application review process evaluates several critical factors that influence project success potential. Site suitability assessment examines basic location and landscape characteristics, including general soil types and drainage conditions, accessibility for planting equipment, proximity to existing habitat features, and absence of obvious constraints such as overhead power lines or underground utilities. While detailed site evaluation occurs during contractor planning, initial screening identifies properties where fundamental limitations may preclude successful implementation. For example, sites with extremely poor drainage, severe soil limitations, or complex access issues may require specialized approaches that exceed standard program parameters.

Project viability evaluation considers the landowner's objectives, resources, and commitment level. NDPF staff assess whether the landowner has realistic expectations about project costs, timeline, and maintenance requirements; adequate resources to meet match contribution obligations and ongoing stewardship needs; clear conservation objectives that align with program goals; and demonstrated commitment to long-term habitat management beyond the initial planting. This evaluation helps identify landowners most likely to succeed in establishing and maintaining conservation plantings, maximizing the long-term return on OHF grant investment.

Geographic and conservation value considerations influence application prioritization when demand exceeds available program resources. NDPF considers factors such as regional distribution to ensure statewide program access, landscape context and connectivity with other habitat features, potential wildlife benefits given surrounding land use, and opportunities to address conservation priorities in underserved areas. This strategic evaluation optimizes program impact across North Dakota's diverse agricultural landscapes.

Resource allocation optimization becomes particularly important during years of high application volume. Application pre-approval enables NDPF to strategically distribute available funding and contractor capacity across projects that collectively deliver maximum conservation benefit. Rather than approving applications on a simple first-come, first-served basis, NDPF can consider portfolio balance, ensuring representation across different habitat types, regions, and conservation objectives. This strategic approach maximizes aggregate program impact rather than simply maximizing the number of individual projects funded.

The application pre-approval process also establishes clear communication and expectation-setting with landowners from the outset. Approved applicants receive information about next steps, timeline expectations, contractor engagement procedures, and their obligations under program participation. This early clarity reduces misunderstandings and establishes the foundation for successful landowner-contractor-NDPF collaboration throughout project implementation.

#### **5.1.4 Level 4: Post-Planting Verification**

Following completion of planting operations, NDPF conducts systematic verification of project implementation before authorizing contractor payment. This fourth quality control level ensures that work performed matches approved plans and meets program standards, providing accountability for the expenditure of OHF grant funds. Post-planting verification creates a critical checkpoint between field operations and financial transactions, protecting against payment for incomplete, incorrect, or substandard work.

The verification process centers on review of contractor-submitted planting reports that document actual project implementation. These reports must provide comprehensive information including total trees and shrubs planted by species, actual spacing and configuration as implemented, planting dates and conditions, any deviations from approved plans with justification, photographic documentation of completed work, and confirmation that all plan specifications were met. NDPF staff compare planting reports against approved planning reports to verify consistency and identify any discrepancies requiring explanation or correction.

Species counts and spacing verification represents a fundamental component of post-planting review. NDPF staff confirm that quantities planted match approved specifications or documented field modifications, species composition aligns with the approved plan, spacing

intervals meet NRCS standards and program requirements, and row configuration and layout correspond to design specifications. This verification prevents both overcharging (claiming payment for more trees than planted) and underdelivery (planting fewer trees than specified without adjustment). Any significant deviations from approved plans must be explained and justified based on field conditions or landowner requests made during implementation.

Photographic documentation review provides visual verification of planting quality and completeness. Contractors submit photographs showing overall project extent and layout, planting technique and stock handling, completed rows demonstrating spacing and configuration, and site conditions at time of planting. These photographs enable NDPF staff to assess work quality even without on-site inspection, identifying potential issues such as inadequate planting depth, poor stock handling that may compromise survival, inconsistent spacing or row alignment, or incomplete implementation. Visual documentation also provides valuable baseline records for comparison during subsequent monitoring visits.

Invoice accuracy verification ensures that payment requests correspond precisely to approved work and documented implementation. NDPF staff review contractor invoices to confirm that charges align with approved planning report cost estimates, quantities claimed match planting report documentation, unit prices are consistent with agreed-upon rates, and any modifications from original plans are properly documented and justified. This financial verification protects program funds from inadvertent billing errors or intentional overcharging.

The post-planting verification process requires contractors to submit both planting reports and invoices before payment authorization. This dual-documentation requirement ensures that NDPF has both technical verification of work completion and proper financial documentation before expending grant funds. Payments are not processed based solely on invoices or verbal confirmation—comprehensive written documentation of actual implementation is mandatory for every project. This systematic approach creates clear audit trails demonstrating appropriate stewardship of public funds.

In cases where post-planting verification identifies discrepancies or concerns, NDPF works with contractors to resolve issues before payment authorization. Minor discrepancies may be addressed through invoice adjustments or clarifying documentation. Significant problems—such as substantial underplanting, species substitutions without approval, or evidence of poor planting quality—may require field verification, corrective work, or payment reduction. This accountability mechanism ensures that contractors maintain high standards throughout the planting season, knowing that payment depends on verified completion of approved work.

### **5.1.5 Level 5: Multi-Year Monitoring**

The fifth and final level of quality control extends beyond initial project implementation to assess long-term establishment success through systematic multi-year monitoring. This sustained oversight validates the effectiveness of earlier quality control levels while providing accountability to OHF funders and participating landowners. Multi-year monitoring generates critical feedback that informs continuous program improvement, identifies successful techniques and species combinations, and demonstrates achievement of conservation objectives beyond the initial planting season.

The NDPF monitoring protocol follows a structured timeline that captures critical stages of tree establishment. Year 0 represents the baseline planting year, with documentation

created during post-planting verification including initial photographs, species counts and locations, site conditions at planting, and any implementation issues or modifications. This baseline establishes reference points for evaluating subsequent survival and growth.

Year 1 monitoring typically occurs during late summer or fall following the first growing season, approximately 12-16 months after spring planting. This initial survival assessment provides the earliest indication of establishment success, identifying projects experiencing unexpected mortality that may require intervention or supplemental planting. NDPF staff or contractors conduct site visits to document first-year survival rates by species and location, tree health and growth vigor, evidence of browsing, disease, or insect damage, weed competition and site maintenance status, and landowner compliance with maintenance obligations. First-year monitoring reveals whether initial establishment has succeeded and whether corrective actions may improve ultimate project outcomes.

Year 2 monitoring represents the program's primary success verification, typically occurring 24-30 months after planting. This evaluation provides reliable indication of long-term establishment potential, as trees surviving two growing seasons generally demonstrate adequate site adaptation and establishment. Year 2 assessments document overall survival rates compared to NRCS 50% minimum standard, species-specific performance across different site conditions, planting configuration effectiveness for habitat objectives, evidence of wildlife use and habitat functionality, and landowner stewardship and site maintenance quality. These evaluations generate the survival rate data that NDPF reports to OHF and uses for program performance assessment.

Program-wide survival data demonstrates consistent achievement of established benchmarks. Across the program's history, projects have achieved survival rates ranging from 73% to 84%, substantially exceeding the 50% minimum standard established by NRCS for conservation tree planting success. This performance validates the effectiveness of the five-level quality control system in ensuring appropriate species selection, professional planting execution, and adequate establishment conditions. Individual project survival rates vary based on species composition, site conditions, weather patterns, and maintenance quality, but aggregate program performance consistently exceeds minimum standards by significant margins.

Years 3+ monitoring, conducted when feasible, provides long-term validation of habitat establishment and landowner stewardship. While not conducted annually for every project due to resource constraints, periodic long-term monitoring of selected projects documents sustained survival and growth, habitat maturation and wildlife use, landowner satisfaction and ongoing management, and lessons learned for program refinement. These longer-term assessments demonstrate that NDPF projects deliver sustained conservation benefits well beyond the initial grant funding period, justifying continued OHF investment in tree planting as an effective wildlife habitat strategy.

The monitoring process serves multiple programmatic functions beyond simple survival verification. It provides accountability to OHF funders by documenting achievement of quantified performance metrics. It creates feedback loops for continuous improvement, identifying species, techniques, or site types that consistently succeed or struggle. It maintains ongoing relationships with participating landowners, demonstrating NDPF's sustained commitment to project success and reinforcing stewardship expectations. Finally, it generates data supporting program evaluation, future funding requests, and strategic planning for program evolution.

Monitoring data is systematically documented and maintained in program records, creating longitudinal datasets that support analysis of factors influencing establishment success. Variables tracked include species-specific survival rates across different soil types and moisture regimes, planting date and seasonal weather impacts on establishment, spacing and configuration effects on survival and habitat development, and contractor performance consistency over time. This analytical approach transforms monitoring from simple compliance verification into strategic intelligence that continuously enhances program effectiveness.

The five-level quality control system functions as an integrated whole, with each level reinforcing the others to create comprehensive oversight. Contractor professionalism provides frontline quality management. Planning report review ensures technical soundness before implementation. Application pre-approval optimizes resource allocation. Post-planting verification confirms proper execution before payment. Multi-year monitoring validates long-term success and informs continuous improvement. Together, these five levels demonstrate NDPF's commitment to excellence in conservation program management and responsible stewardship of public trust resources.

## **5.2 Contractual Obligations**

Successful conservation tree planting depends on clear expectations and mutual accountability among all parties. The NDPF Planting for the Future program operates through formal contractual relationships that define roles, responsibilities, and standards for both landowners and contractors. These agreements create legally binding commitments that support quality outcomes while protecting the interests of participants and the integrity of OHF grant funds. Well-structured contracts provide the foundation for effective program implementation by establishing clear expectations, defining quality standards and deliverables, creating accountability mechanisms, and documenting compliance with grant requirements.

### **5.2.1 Landowner Contracts**

Participating landowners enter into written agreements with NDPF that formalize their commitments and obligations under the program. These contracts recognize that while NDPF provides substantial financial support through OHF grant funding, landowners retain ultimate responsibility for long-term habitat stewardship on their property. Landowner contracts serve to clarify expectations, document match contributions, establish maintenance obligations, and create accountability for successful project outcomes.

Project specifications commitment represents the foundational element of landowner agreements. Contracts document the approved planting design including total trees and shrubs by species, row configuration and spacing, total linear feet and acreage, intended conservation objectives, and estimated total project cost with NDPF grant share and landowner match contribution. This detailed specification ensures mutual understanding of project scope and creates clear reference points for evaluating implementation and compliance.

Maintenance obligations constitute critical landowner responsibilities that directly influence project success. Contracts require landowners to commit to multi-year stewardship practices including weed control during establishment years to reduce competition for moisture and nutrients, protection from livestock browsing through fencing or exclusion, rodent control

measures when populations threaten tree survival, supplemental watering during severe drought conditions when feasible, and replanting of failed sections when necessary to achieve habitat objectives. These maintenance commitments recognize that even professionally planned and planted projects will fail without adequate landowner stewardship during the critical establishment period.

The contract specifies minimum maintenance standards based on NRCS practice requirements and program experience. At minimum, landowners must control competing vegetation within the tree rows through mowing, herbicide application, or fabric mulch during the first three growing seasons. This weed control is essential for successful establishment, as newly planted trees cannot compete effectively with established grasses and broadleaf weeds for limited soil moisture in North Dakota's semi-arid climate. Failure to maintain adequate weed control is the leading cause of planting failures and represents a breach of landowner obligations under the program contract.

Monitoring cooperation requirements obligate landowners to facilitate NDPF site visits for establishment assessment and survival verification. Landowners agree to provide reasonable access for monitoring personnel, cooperate with documentation and assessment activities, respond to inquiries about project status and maintenance activities, and notify NDPF of any significant problems or failures. This cooperation enables effective implementation of Level 5 quality control monitoring while maintaining positive working relationships between NDPF and participating landowners.

Match contribution documentation formalizes the landowner's financial commitment to projects. NDPF grants typically cover a substantial portion of project costs, but landowners provide matching contributions that demonstrate their investment in project success and extend limited program resources across more projects. Match contributions may include direct cash payments for a portion of tree costs or materials, in-kind labor for site preparation or planting assistance, materials such as weed fabric, tree shelters, or fencing materials, or equipment use for site preparation, planting, or maintenance. Contracts document agreed-upon match contributions and require verification of actual contributions through receipts, labor logs, or other appropriate documentation. This match requirement ensures that landowners have meaningful financial stake in project success, increasing commitment to long-term stewardship.

Long-term stewardship expectations extend landowner obligations beyond the initial grant period. While NDPF monitoring focuses primarily on the first two years following planting, contracts emphasize that conservation tree plantings require sustained management for 5-10 years to achieve full habitat maturation and functionality. Landowners commit to continued protection and maintenance even after formal monitoring concludes, recognizing that their property will derive ongoing benefits from successful habitat establishment including enhanced wildlife populations, windbreak protection, erosion control, and aesthetic value. These long-term stewardship provisions align landowner incentives with program conservation objectives while acknowledging that habitat benefits accrue primarily to participating properties.

Landowner contracts also address circumstances requiring project modification or termination. Provisions specify conditions under which landowners may request changes to approved plans, procedures for addressing unforeseen site constraints discovered during implementation, obligations if landowners fail to meet maintenance commitments, and implications if property ownership transfers during the establishment period. These

provisions provide flexibility to address practical realities while maintaining accountability for appropriate use of grant funds and achievement of conservation objectives.

### **5.2.2 Contractor Service Agreements**

NDPF maintains formal service agreements with approved tree planting contractors that establish professional standards, define deliverables, specify quality expectations, and create accountability for performance. These agreements recognize contractors as essential program partners whose expertise and professionalism directly determine implementation quality and ultimate project success. Contractor agreements serve to standardize service expectations across multiple providers, establish clear deliverable requirements and timelines, define quality standards and compliance obligations, and create payment terms linked to verified performance.

Scope of services definition provides comprehensive description of contractor responsibilities throughout the three-phase project cycle. During the consultation and planning phase (September through November), contractors must conduct on-site landowner consultations to assess objectives and site conditions, perform comprehensive site evaluations including soil, drainage, and access assessment, develop detailed planting plans compliant with NRCS standards and program requirements, and submit complete planning reports meeting NDPF specifications for review and approval. This phase establishes the technical foundation for successful projects through professional site assessment and design.

During the planting implementation phase (April through May, with June 1 target completion), contractors must coordinate with NDPF regarding tree delivery and handling, provide landowners 48-hour advance notice of scheduled planting operations, execute planting according to approved plans using appropriate techniques and equipment, maintain quality control during operations to ensure proper depth, spacing, and stock handling, and adapt to field conditions while documenting any necessary plan modifications. This phase requires professional execution under variable spring weather conditions and coordination among multiple parties to ensure timely, quality implementation.

During the post-planting reporting and payment phase (within 30 days of completion), contractors must submit comprehensive planting reports documenting actual implementation, provide photographic documentation of completed projects, submit accurate invoices corresponding to verified work performed, and cooperate with any NDPF verification questions or site visits. This phase creates the documentation necessary for post-planting quality verification and payment authorization.

Quality standards requirements establish specific benchmarks that contractors must meet. These include planting depth appropriate for species and stock type (typically 1-2 inches deeper than nursery growth to prevent frost heaving), spacing accuracy within specified tolerances (typically plus or minus 6 inches for in-row spacing, plus or minus 12 inches for between-row spacing), proper stock handling to prevent root desiccation or damage during planting operations, and adherence to approved species placement and row configuration. Contracts specify that work not meeting quality standards may require correction before payment authorization or may result in payment reduction proportional to deficiencies identified.

Documentation obligations create clear expectations for reporting and record-keeping throughout the project cycle. Planning reports must include total linear feet of planting and

acreage, complete species list with scientific names and common names, stock sizes and types for each species, quantities of each species with spacing specifications, planting method and equipment to be used, weed fabric requirements and specifications, and site map or diagram showing row locations and species placement. This comprehensive planning documentation enables meaningful NDPF technical review and creates clear implementation specifications.

Planting reports must document actual implementation including final species counts and quantities planted, any deviations from approved plans with explanations, actual planting dates and weather conditions, total linear feet and acreage completed, photographic documentation showing work quality and extent, and confirmation of completion to approved specifications. These reports provide the factual basis for post-planting verification and payment authorization.

Timeline compliance requirements establish clear deadlines that contractors must meet to support orderly program implementation. Planning reports must be submitted between September and November to allow adequate time for NDPF review, revisions if needed, and tree ordering from nurseries during the winter ordering period. Planting must be completed by June 1 to ensure trees are established during the optimal spring moisture period before summer heat stress. Post-planting reports and invoices must be submitted within 30 days of project completion to facilitate timely payment processing while memories of implementation details remain fresh. These timeline requirements prevent last-minute rushes that compromise quality and enable NDPF to manage contractor capacity across multiple simultaneous projects.

Payment terms link contractor compensation directly to verified completion of approved work. Contracts specify that payment requires submission of both complete planting reports and accurate invoices documenting work performed. NDPF reviews these materials through the Level 4 post-planting verification process before authorizing payment. Payment amounts correspond to approved planning report cost estimates, with adjustments for documented field modifications or changes requested by landowners during implementation. This performance-based payment structure creates strong incentives for quality work and complete documentation while protecting program funds from payment for incomplete or substandard work.

Performance expectations and accountability provisions address situations where contractor work fails to meet program standards. Contracts specify that NDPF may withhold payment pending correction of deficiencies, require supplemental planting at contractor expense if survival failures result from poor planting quality, or terminate contractor agreements for persistent quality problems or non-compliance with program requirements. These accountability mechanisms are rarely invoked due to the professionalism of approved contractors, but their existence reinforces quality expectations and provides recourse if problems arise.

Contractor service agreements also address practical operational matters including insurance and liability requirements, equipment and personnel qualifications, communication protocols and contact information, confidentiality regarding landowner information, and conflict resolution procedures. These provisions create clear professional standards that protect all parties while enabling efficient program operations across multiple contractors working on dozens of projects annually.

## **5.3 Grant Compliance**

The NDPF Planting for the Future program operates primarily through funding from the North Dakota Outdoor Heritage Fund, a constitutionally dedicated funding source supported by oil and gas tax revenues. Responsible stewardship of these public funds requires rigorous compliance with OHF grant requirements, state financial management standards, and best practices for fraud prevention. NDPF's comprehensive compliance framework demonstrates accountability to North Dakota citizens whose tax dollars support conservation programs while ensuring program integrity and long-term sustainability.

### **5.3.1 OHF Requirements**

Outdoor Heritage Fund grants impose specific requirements designed to ensure appropriate use of public funds and achievement of measurable conservation outcomes. NDPF has structured the Planting for the Future program to fully comply with all OHF expectations while maintaining operational efficiency and program quality. Comprehensive documentation standards represent a foundational OHF requirement. Grant agreements mandate detailed record-keeping for all program expenditures, project implementation activities, landowner and contractor agreements, monitoring and verification activities, and achievement of quantified performance metrics. NDPF maintains organized program files that document every project from initial application through multi-year monitoring, creating clear audit trails demonstrating appropriate fund use.

Documentation maintained for each project includes original landowner application and pre-approval correspondence, contractor planning report and NDPF approval, tree ordering records and nursery invoices, contractor planting report with photographs, contractor payment invoice and NDPF payment authorization, landowner match contribution verification, first-year and second-year monitoring reports with survival assessments, and any correspondence regarding project issues or modifications. This comprehensive project-level documentation, replicated across hundreds of individual plantings, demonstrates systematic program management and creates verifiable evidence of grant compliance.

Financial tracking and reporting requirements mandate accurate accounting of all grant expenditures and regular reporting to OHF on fund utilization. NDPF maintains detailed financial records showing expenditures by category including tree and shrub stock purchases, contractor planning and planting services, program administration and management, monitoring and verification activities, and any other grant-funded expenses. Financial reports submitted to OHF demonstrate expenditures align with approved grant budgets, funds are used exclusively for approved conservation purposes, spending maintains appropriate pace relative to project implementation schedules, and any budget modifications are properly requested and authorized. This financial transparency ensures OHF oversight of fund utilization and verifies that grants support intended conservation activities.

Match contribution validation represents another critical OHF compliance requirement. Grant agreements typically require landowner match contributions that leverage OHF funds by demonstrating local investment in project success. NDPF documents landowner match through receipts for purchased materials or direct cash contributions, labor logs documenting volunteer time and hourly value, equipment use records with appropriate hourly rates, and contractor verification of landowner-provided materials or labor. This match documentation

verifies that total project investment exceeds the OHF grant amount, demonstrating efficient use of limited public funds and meaningful landowner commitment.

Success metric reporting provides accountability for achievement of quantified conservation outcomes specified in grant applications. NDPF reports annually to OHF on performance metrics including total trees and shrubs planted during grant period, total acreage of wildlife habitat established, number of landowners and projects served, survival rates from multi-year monitoring, and geographic distribution across North Dakota counties. These metrics demonstrate tangible conservation results from OHF investment and support continued funding for future program years. The program's consistent achievement of targets—planting more than 671,000 trees across over 2,600 acres with survival rates of 73-84%—validates program effectiveness and justifies continued OHF support.

Audit readiness represents an ongoing compliance obligation. OHF grants are subject to audit by state auditors, legislative auditors, or independent auditors engaged by OHF. NDPF maintains program records in organized, accessible format to facilitate efficient audit processes. Documentation standards, financial controls, and systematic record-keeping ensure that auditors can readily verify appropriate use of grant funds, achievement of program objectives, and compliance with grant requirements. The program's multi-level quality control system creates inherent audit trails demonstrating systematic oversight and accountability at every project stage.

Public benefit demonstration is fundamental to OHF's mission and grant requirements. The Outdoor Heritage Fund exists to protect and enhance wildlife habitat and outdoor recreation opportunities for the benefit of all North Dakota citizens. NDPF documentation emphasizes the public benefits delivered through tree planting including enhanced habitat for game and non-game wildlife species, improved hunting opportunities for public recreation, ecological benefits such as erosion control and water quality protection, and long-term conservation of North Dakota's natural heritage. While projects occur on private land with participating landowner cooperation, the resulting habitat benefits wildlife populations that are public trust resources, justifying the use of public funds for conservation outcomes that serve statewide interests.

### **5.3.2 Waste, Fraud, and Abuse Prevention**

Responsible management of public funds requires proactive measures to prevent waste, fraud, and abuse. While the vast majority of program participants act with integrity and professionalism, systematic controls are essential to protect against improper use of grant resources and maintain public confidence in the program. NDPF has implemented comprehensive safeguards that address common risk factors in conservation grant programs while maintaining operational efficiency and positive relationships with landowners and contractors.

Financial controls and oversight establish clear procedures for expenditure authorization and payment processing. NDPF maintains separation of duties, ensuring that individuals who authorize expenditures differ from those who process payments. Multiple staff members review contractor invoices and planting reports before payment authorization, verifying that documentation supports requested payment, work performed matches approved plans, and charges align with agreed-upon rates. These internal controls prevent unauthorized expenditures and reduce risk of payment errors or fraudulent billing.

The centralized procurement process for tree and shrub stock represents a critical fraud prevention mechanism. Rather than allowing contractors to order trees directly and bill the program, NDPF purchases all planting stock from approved wholesale nurseries using aggregated orders based on approved planning reports. This centralized procurement provides several protective benefits including verification that trees ordered match approved planning reports before purchase, consolidated ordering that enables quality control and price negotiation, direct nursery invoicing to NDPF eliminating contractor markup potential, and confirmation that trees delivered correspond to quantities paid. This system prevents contractors from ordering excessive stock, billing for trees not delivered, or marking up nursery costs. It also enables NDPF to verify stock quality and specifications, ensuring landowners receive the species, sizes, and grades specified in approved plans.

Documentation requirements at each stage create redundant verification opportunities that make fraudulent activity difficult to conceal. The requirement for both planning reports and planting reports creates two separate documentation points that must align. The requirement for photographic evidence provides visual verification of work completion. The requirement for landowner signatures on contracts and payment authorizations confirms landowner knowledge and approval. These overlapping documentation requirements make it extremely difficult for any party to misrepresent work performed or misappropriate funds without detection.

Verification procedures implemented through the five-level quality control system provide systematic checks against fraud or misrepresentation. Pre-approval screening verifies that applicants are legitimate landowners with genuine conservation interests. Planning report review confirms technical soundness before resource commitment. Post-planting verification ensures work was actually completed before payment. Multi-year monitoring validates long-term project establishment. Each verification point creates opportunities to detect discrepancies that might indicate fraudulent activity or waste of resources.

Audit trail maintenance ensures that program activities are transparent and traceable. Every project generates documented evidence at each stage including dated application materials, timestamped planning reports and approvals, tree orders with nursery confirmation, planting reports with photographs and signatures, payment authorizations and check records, and monitoring reports with field observations. These chronological records create clear chains of evidence showing what occurred, when, and by whom. Audit trails enable investigation if irregularities are suspected and deter improper conduct by establishing clear accountability.

Separation of duties prevents any single individual or entity from controlling all aspects of projects. Contractors propose plans but NDPF approves them. NDPF orders trees but contractors plant them. Contractors report completion but NDPF verifies before payment. Landowners maintain projects but NDPF monitors survival. This distribution of responsibilities creates checks and balances, ensuring that multiple parties must participate in or verify activities for projects to proceed. Collusion becomes much more difficult when responsibilities are distributed across independent parties with different interests and incentives.

The program also implements risk-based monitoring that focuses additional scrutiny on situations presenting elevated fraud risk. Projects with unusually high costs per tree, significant deviations from typical patterns, or contractors new to the program may receive enhanced verification including on-site field inspections during or immediately after planting, detailed review of photographic documentation, independent survival assessments by NDPF

staff rather than contractors, or interviews with landowners to confirm work was completed as reported. This risk-based approach allocates limited oversight resources to situations where potential problems are most likely while maintaining baseline verification for all projects.

Education and communication about expectations and consequences reinforces fraud prevention. NDPF clearly communicates to contractors and landowners that grant funds are public resources requiring accountability, documentation requirements are mandatory and will be enforced, false reporting or misrepresentation will result in immediate program disqualification, and serious violations may be referred to law enforcement for prosecution. This communication, combined with consistent enforcement of standards, creates deterrent effects that prevent most potential problems before they occur.

The program's fraud prevention framework balances rigorous oversight with operational efficiency and positive relationships. Controls are designed to be systematic and routine rather than punitive or adversarial. The assumption is that participants are acting in good faith unless evidence suggests otherwise, but verification procedures ensure that good faith can be confirmed through documentation rather than assumed without evidence. This balanced approach maintains program integrity while preserving the collaborative relationships essential for conservation success.

Ultimately, the combination of multi-level quality control, clear contractual obligations, comprehensive grant compliance, and proactive fraud prevention creates a robust accountability framework that protects public investment while delivering measurable conservation outcomes. The program's track record of planting more than 671,000 trees with survival rates consistently exceeding NRCS standards demonstrates that rigorous oversight and quality outcomes are mutually reinforcing rather than contradictory goals. By maintaining professional program management standards and systematic documentation, NDPF fulfills its responsibility as a steward of Outdoor Heritage Fund resources while creating lasting habitat benefits for North Dakota's wildlife and future generations.

## **Section 6: Program Differentiators**

### **6.1 Public-Private Partnership Advantages**

The North Dakota Petroleum Foundation's "Planting for the Future" program represents a distinctive model in conservation delivery—one that combines the rigor and accountability of government conservation programs with the efficiency and responsiveness of private sector implementation. Since 2018, this approach has delivered exceptional results: more than 671,000 trees planted with survival rates of 73-84%, significantly exceeding the 50% minimum standard established by the Natural Resources Conservation Service. This success demonstrates that public-private partnerships, when properly structured and managed, can deliver superior conservation outcomes while maximizing the value of every dollar invested.

The program's effectiveness stems from a deliberate integration of professional standards with operational flexibility. Unlike purely governmental approaches that must navigate multiple layers of bureaucracy, or purely private initiatives that may lack technical rigor, this hybrid model captures the strengths of both sectors. Professional expertise, research-based practices, and comprehensive quality control ensure that every planting meets or exceeds established conservation standards. Simultaneously, streamlined decision-making, direct contractor-landowner relationships, and adaptive management capabilities enable rapid response to opportunities and challenges. The result is a conservation program that achieves both excellence and efficiency.

#### **6.1.1 Professional Standards Without Bureaucracy**

The foundation of the program's credibility rests on its unwavering adherence to professional conservation standards. Every tree planting project follows Natural Resources Conservation Service technical guidelines, specifically Practice Standards 612 (Tree and Shrub Establishment), 645 (Upland Wildlife Habitat Management), and 380 (Windbreak/Shelterbelt Establishment). Species selection follows research-based recommendations from North Dakota State University Extension, the North Dakota Forest Service, and Towner State Nursery, ensuring that plantings reflect the best available science on species performance, climate adaptation, and wildlife habitat value. All installation work is performed by qualified habitat consultants who possess the expertise to properly site, design, and implement tree plantings that will survive and thrive in North Dakota's challenging climate.

Quality control operates at five distinct levels throughout the program lifecycle. Initial site assessments evaluate soil conditions, drainage patterns, existing vegetation, and landowner objectives to ensure appropriate project design. Pre-planting reviews verify that site preparation has been completed according to specifications and that conditions are suitable for tree establishment. Installation monitoring confirms proper planting techniques, spacing, and handling of seedling stock. First-year survival assessments identify any emerging issues that require corrective action. Multi-year monitoring tracks long-term establishment success and provides data to refine future practices. This comprehensive approach to quality assurance matches or exceeds the oversight provided by traditional government programs.

The critical difference lies not in the rigor of standards, but in the efficiency of implementation. Government conservation programs, while professionally managed and technically sound, often require navigation through multiple organizational layers, approval processes, and coordination challenges. Applications may take months to process. Design

modifications require formal reviews. Decisions flow through hierarchical approval chains. The North Dakota Petroleum Foundation program maintains all professional standards while eliminating unnecessary bureaucratic steps. Decisions are made by qualified professionals close to the work. Landowners work directly with habitat consultants who can respond quickly to questions and concerns. Technical adjustments can be made in real-time based on field conditions. This streamlined approach reduces the timeline from application to trees in the ground, capitalizing on landowner motivation and optimal planting windows.

The operational flexibility inherent in this model enables continuous improvement and innovation. When monitoring data reveals that certain species perform particularly well in specific soil types, that information can be immediately incorporated into future recommendations. When contractors identify more efficient installation techniques, those practices can be adopted without waiting for formal policy updates. When landowners suggest improvements to program procedures, those refinements can be implemented quickly. This adaptive management capacity allows the program to evolve based on real-world experience, steadily improving outcomes while maintaining adherence to core professional standards.

### **6.1.2 Cost Effectiveness**

The program's cost structure delivers exceptional value to both participating landowners and funding partners. Analysis of program costs compared to Soil Conservation District programs reveals that the North Dakota Petroleum Foundation achieves comparable or superior outcomes at less than half the cost per tree planted and established. This dramatic cost advantage does not result from reduced quality, corner-cutting, or lowered standards. Rather, it reflects fundamental efficiencies in program administration, procurement, and delivery that maximize conservation impact per dollar invested.

Administrative efficiency provides the first layer of cost savings. The program operates with a lean management structure focused specifically on tree planting delivery. There are no multiple agency layers, each requiring their own overhead allocation. No separate entities handle application processing, technical assistance, procurement, contracting, and monitoring. The North Dakota Petroleum Foundation provides centralized program coordination while qualified contractors deliver direct services to landowners. This streamlined structure eliminates duplicative administrative costs while maintaining all necessary program functions—application review, technical oversight, quality control, contractor management, and outcomes monitoring.

Strategic procurement creates additional cost efficiencies. The program aggregates seedling orders across all participating landowners, achieving volume pricing that individual landowners or small programs cannot access. Direct relationships with Towner State Nursery and other quality suppliers eliminate middleman markups. Bulk ordering allows advance planning and scheduling that optimize nursery production and delivery logistics. Multi-year procurement relationships enable pricing stability and reliable supply even during years of high demand. These procurement advantages translate directly into more trees planted for the same investment.

The program's structure also leverages landowner contributions in ways that maximize total project value while minimizing direct program costs. Landowners provide site preparation, weed control, and ongoing maintenance as in-kind contributions. These essential activities would otherwise require direct program expenditure, but most landowners can efficiently

complete this work themselves using equipment and labor already available on their operations. By focusing program spending on specialized services—professional design, quality seedling stock, expert installation—while utilizing landowner capacity for general site work, the program achieves optimal cost effectiveness. Every dollar of direct program expenditure focuses on activities that require specialized expertise or procurement power that landowners cannot replicate.

Contractor relationships further enhance cost efficiency. The program works with a network of qualified habitat consultants who compete for projects based on both expertise and cost-effectiveness. Direct contracting eliminates administrative intermediaries. Contractors develop efficiencies through repeated project experience and can invest in specialized equipment knowing they will have sufficient project volume to justify those investments. The program benefits from competitive pricing while contractors benefit from reliable project flow. This mutually beneficial relationship structure keeps costs down while maintaining high quality standards.

The cumulative result of these efficiencies is dramatic: significantly more conservation delivered per dollar invested. Where a government program might establish 1,000 trees with a given budget, the North Dakota Petroleum Foundation program can establish 2,000 or more trees to equivalent survival standards with the same funding. For landowners seeking to maximize habitat improvement within budget constraints, this cost advantage is transformative—they can achieve their conservation objectives or expand their projects beyond what traditional programs could deliver. For funding partners, whether private foundations or government cost-share programs, this efficiency means their conservation investment produces double the on-the-ground impact.

### **6.1.3 Responsiveness and Adaptability**

One of the most significant advantages of the public-private partnership model is its capacity for rapid response to landowner needs and changing conditions. Traditional government programs, constrained by appropriation cycles, staffing limitations, and established procedures, often struggle to capitalize on time-sensitive opportunities or quickly address emerging challenges. The North Dakota Petroleum Foundation program's more agile structure enables responsiveness that maximizes both landowner satisfaction and conservation outcomes.

The application-to-implementation timeline illustrates this responsiveness advantage. In many government programs, landowners may submit applications in winter, wait months for technical review and approval, receive design specifications in late spring, and not see trees planted until the following year—an 18-month or longer process. The North Dakota Petroleum Foundation program compresses this timeline significantly. Applications receive prompt review by qualified professionals. Site assessments and design consultations occur quickly, often within weeks. Seedling orders are placed to accommodate optimal planting windows. Trees go in the ground the same year whenever site conditions and seedling availability allow. This faster turnaround maintains landowner enthusiasm, capitalizes on prepared sites before weed pressure increases, and accelerates conservation benefit delivery.

Site-specific customization represents another dimension of program responsiveness. Rather than applying standardized templates that may not align with actual site conditions or landowner objectives, the program tailors each project to its unique circumstances. Habitat

consultants work directly with landowners to understand their specific goals—whether deer cover, pheasant nesting habitat, privacy screening, or general wildlife enhancement. They assess actual soil conditions, drainage patterns, existing vegetation, and terrain features. Based on this assessment, they design plantings optimized for that specific site, selecting species mixes, configurations, and planting densities that will thrive in those conditions and meet those objectives. This customized approach produces better outcomes than generic designs because it matches biological reality with landowner needs.

Flexibility extends throughout project implementation. If site visits reveal conditions different from initial assessments—unexpected drainage issues, rockier soil than anticipated, or opportunities to connect with existing habitat features—designs can be adjusted immediately. If weather delays site preparation, planting schedules can shift to maintain optimal establishment conditions. If certain seedling stock becomes unavailable, qualified substitutions can be made based on professional judgment rather than requiring formal plan amendments. This operational flexibility ensures that each project receives the specific attention needed for success rather than rigid adherence to predetermined specifications that may not fit evolving circumstances.

The program's adaptive management capacity enables continuous improvement based on monitoring results and field experience. Annual survival assessments provide data on which species, planting configurations, and site preparation methods produce the best outcomes under various conditions. When this data reveals opportunities for refinement—perhaps indicating that certain shrub species establish better when planted in clusters rather than rows, or that spring planting outperforms fall planting for specific species in certain soil types—the program can immediately incorporate these insights into future projects. Traditional government programs, constrained by formal practice standards and revision processes, may take years to adopt similar refinements even when field data supports the changes.

Innovation thrives in this responsive environment. Habitat consultants who identify more effective establishment techniques can implement them immediately on subsequent projects. New research from North Dakota State University or the Forest Service can be quickly translated into practice. Landowner feedback on program procedures leads to real-time improvements in communication, scheduling, and service delivery. This culture of continuous improvement, enabled by the program's flexible structure, drives steady enhancement of outcomes and landowner satisfaction.

The responsiveness advantage ultimately manifests in superior conservation results. The program's 73-84% survival rates significantly exceed the 50% minimum standard established by NRCS precisely because site-specific design, flexible implementation, and adaptive management optimize each project for success. Trees survive at higher rates when they are the right species for actual site conditions, planted at the right time using optimal techniques, and managed adaptively based on monitoring feedback. Responsiveness is not simply a customer service advantage—it is a technical advantage that produces measurably better conservation outcomes.

## **6.2 Comparison to Traditional Government Programs**

Understanding the North Dakota Petroleum Foundation program's distinctive value requires honest comparison with traditional government conservation programs. Such programs,

delivered through entities like Natural Resources Conservation Service, Soil and Water Conservation Districts, and state wildlife agencies, represent professional, scientifically based conservation assistance that has served American agriculture and natural resource management well for decades. They provide critical technical expertise, cost-share funding, and conservation implementation across millions of acres. Any suggestion that private or public-private programs should replace these institutions would be both unrealistic and unwise.

The appropriate question is not whether public-private partnerships should replace government programs, but rather whether they can complement and extend conservation capacity by offering certain advantages while maintaining comparable professional standards. The answer, demonstrated through the North Dakota Petroleum Foundation's track record, is clearly affirmative. The program does not represent a lower-cost, lower-quality alternative to government programs. It represents a different delivery model that achieves equivalent or superior technical outcomes through operational approaches better suited to certain landowner needs and project types.

### **6.2.1 What We Share with Government Programs**

The North Dakota Petroleum Foundation program and traditional government conservation programs share fundamental commitments to professional standards, research-based practices, and public accountability. These commonalities ensure that program outcomes meet established conservation criteria and deliver genuine ecological benefits rather than merely creating appearances of habitat improvement.

Both program types adhere to Natural Resources Conservation Service technical standards that define acceptable practices for tree and shrub establishment. Whether a planting is implemented through NRCS cost-share, a Soil and Water Conservation District program, or the North Dakota Petroleum Foundation, it must meet the same specifications for seedling quality, planting techniques, spacing requirements, site preparation, and post-planting management. These standards, developed through decades of research and field experience, represent professional consensus on practices most likely to produce successful establishment and long-term survival. Adherence to these standards ensures that all programs work from the same technical foundation.

Species selection in both program types relies on research-based recommendations from land-grant universities, state forestry agencies, and conservation research institutions. North Dakota State University Extension publications on tree species performance, North Dakota Forest Service guidance on species-site matching, and Towner State Nursery recommendations based on seedling production experience inform planting designs across all program types. No responsible conservation program selects species based on arbitrary preferences or untested assumptions. All draw from the same body of scientific knowledge about which species thrive under which conditions and provide which wildlife habitat values.

Both program types require professional expertise in program delivery. Whether habitat consultants contracted through the North Dakota Petroleum Foundation or conservation planners employed by government agencies, the individuals designing and overseeing tree plantings possess specialized knowledge of soils, plant ecology, wildlife biology, and conservation practices. They have received formal training, maintain professional credentials, and participate in continuing education to stay current with evolving best

practices. Professional expertise ensures that projects are properly sited, designed, and implemented regardless of which institutional framework delivers the program.

Comprehensive documentation characterizes both program types. Applications, site assessments, planting plans, installation records, and monitoring reports create accountability and enable program evaluation. Funding sources, whether private foundations or government cost-share programs, require documentation demonstrating that funds were used appropriately and produced intended outcomes. Both program types maintain detailed records that support transparency and allow assessment of conservation effectiveness.

Accountability mechanisms operate similarly across program types. Projects undergo quality control reviews to verify compliance with approved plans and technical standards.

Installation is monitored to ensure proper techniques and materials. Survival assessments document establishment success. Financial audits verify appropriate use of funds. Both government programs and the North Dakota Petroleum Foundation program operate under oversight structures that create accountability to funding sources and program participants.

Public benefit focus unites both program types. While government programs have explicit public purpose missions, the North Dakota Petroleum Foundation program similarly emphasizes habitat improvements that benefit wildlife populations, enhance ecosystem services, and provide conservation value beyond individual property boundaries. Wildlife does not respect property lines—habitat improvements on private land contribute to landscape-scale conservation that benefits entire communities. Both program types recognize this broader public value and design projects accordingly.

Measurable outcomes reporting allows both program types to demonstrate conservation impact. Acres treated, trees planted, survival rates achieved, and habitat acres created provide concrete metrics of program accomplishment. Both program types track and report these metrics, enabling funders and stakeholders to assess whether conservation investments are producing real results. Commitment to measurable outcomes creates discipline around program effectiveness and continuous improvement.

These shared characteristics mean that the North Dakota Petroleum Foundation program is not a fundamentally different type of conservation activity, but rather an alternative delivery mechanism for the same professional, research-based, accountable conservation practices that government programs provide. The common foundation ensures that regardless of delivery model, participating landowners receive quality technical assistance and their projects produce genuine conservation benefits.

### **6.2.2 Our Competitive Advantages**

While sharing core professional commitments with government programs, the North Dakota Petroleum Foundation program's public-private partnership structure enables specific operational advantages that translate into superior outcomes for participating landowners and more efficient use of conservation dollars. These advantages are not theoretical—they manifest in concrete program results that demonstrate the model's effectiveness.

The application-to-implementation timeline provides the most immediate advantage for landowners. Government conservation programs, operating within constraints of appropriation cycles, staffing allocations, and multi-agency coordination requirements, typically require extended timelines from initial landowner contact to trees in the ground. Applications submitted during winter sign-up periods may not receive technical review until

spring, design development may occur in summer, and actual planting may not happen until the following spring—easily a 12-18 month process. The North Dakota Petroleum Foundation program operates with greater timeline flexibility. Applications receive prompt professional review, site assessments occur quickly, designs are developed in consultation with landowners within weeks, and planting happens the same year whenever conditions allow. This compressed timeline serves landowner interests by capitalizing on their conservation motivation and readiness to act, and it serves conservation interests by getting habitat on the ground faster.

Personalized landowner service distinguishes the program's implementation approach. In government programs, landowners may interact with different individuals at various stages—one person for initial application, another for technical design, a third for implementation oversight, others for monitoring and compliance verification. Communication flows through organizational channels with formal procedures. The North Dakota Petroleum Foundation program provides more direct service relationships. Landowners work primarily with their habitat consultant, who handles site assessment, design consultation, installation oversight, and follow-up monitoring. This continuity creates stronger working relationships, better communication, and greater landowner confidence that their specific objectives and concerns are understood and addressed. The habitat consultant becomes a trusted conservation advisor rather than a rotating series of agency representatives.

Design flexibility represents a significant technical advantage. Government programs, necessarily operating at scale across diverse geographies, often rely on standardized planting templates or design formulas that provide consistency and efficiency in plan development. A pheasant habitat planting in a government program might follow a predetermined species mix and configuration that applies across broad regional areas. The North Dakota Petroleum Foundation program approaches design differently. Each site receives individualized attention based on its specific soil conditions, moisture regime, existing vegetation, topography, and landowner objectives. Species mixes are tailored to actual site characteristics rather than regional averages. Planting configurations respond to terrain features and habitat connectivity opportunities. Row spacing and tree density reflect specific wildlife goals and management intentions. This customized approach produces plantings optimized for their particular circumstances rather than generic implementations of standardized plans.

Administrative cost structure provides substantial efficiency advantages. Government conservation programs, while professionally managed and appropriately accountable, necessarily carry overhead costs associated with multi-layered organizational structures. Federal programs require administration at national, regional, state, and local levels. State programs involve agency headquarters functions and field office networks. Multiple positions handle specialized functions—program management, technical assistance, financial administration, compliance monitoring, data management. Each layer adds legitimate value but also overhead cost that must be supported from program budgets. The North Dakota Petroleum Foundation program operates with leaner administration focused specifically on tree planting program delivery. Centralized program coordination handles application processing, contractor management, seedling procurement, and outcomes monitoring without multiple organizational layers. This streamlined structure means more program dollars go directly into trees in the ground rather than administrative support.

Direct contractor-landowner relationships enhance both communication quality and technical outcomes. In some government programs, installation contractors are procured and managed through agency processes with limited direct landowner involvement. The contractor's primary relationship is with the agency; the landowner is somewhat removed from installation decisions and quality control. The North Dakota Petroleum Foundation program structures contractor relationships differently. Habitat consultants work directly with landowners from initial site assessment through post-planting follow-up. Landowners actively participate in design decisions. They observe installation and can communicate directly with the professional implementing their project. This direct relationship improves communication, increases landowner understanding of proper establishment and maintenance practices, and creates shared investment in project success.

Match requirement flexibility reduces financial barriers to landowner participation. Many government cost-share programs require cash matches—landowners must contribute a specified percentage of project costs in direct payment. For landowners with conservation motivation but limited cash flow, this requirement can be prohibitive. The North Dakota Petroleum Foundation program accepts in-kind contributions for landowner match—site preparation, weed control, and ongoing maintenance activities that landowners can often accomplish using their own equipment and labor. This flexibility makes program participation financially feasible for more landowners and recognizes the real value of landowner time and resources invested in project success.

Program innovation capacity enables continuous improvement at a pace difficult for government programs to match. When monitoring data suggests refinements to species selection, planting techniques, or site preparation methods, the North Dakota Petroleum Foundation program can adopt those improvements immediately. Habitat consultants can test promising approaches on a trial basis and expand successful innovations quickly. New research findings can be translated into practice without waiting for formal practice standard revisions. This adaptive innovation culture keeps the program at the leading edge of conservation effectiveness.

The ultimate measure of these competitive advantages is outcomes achieved. The program's 73-84% survival rates significantly exceed the 50% minimum standard established by NRCS and compare favorably with typical government program survival rates that often fall in the 50-65% range. Higher survival means more established trees per dollar invested, faster habitat development, and greater landowner satisfaction. These superior outcomes validate the public-private partnership approach and demonstrate that operational advantages translate into measurably better conservation results.

### **6.3 Why Site-Specific Beats One-Size-Fits-All**

The North Dakota Petroleum Foundation program's commitment to site-specific project design represents a fundamental philosophical and technical difference from standardized template approaches often employed in large-scale conservation programs. This commitment is not arbitrary preference or resistance to systematic approaches. Rather, it reflects recognition of biological and ecological realities that make customization essential to conservation effectiveness. The program's superior survival rates directly validate this approach—trees thrive when their species, placement, and management match actual site conditions rather than conforming to generic regional prescriptions.

### **6.3.1 North Dakota's Ecological Diversity**

North Dakota encompasses remarkable ecological diversity that makes one-size-fits-all conservation approaches fundamentally problematic. The state spans multiple climate zones, soil types, moisture regimes, and topographic conditions that create dramatically different growing environments across relatively short distances. Conservation practices that work well in one location may perform poorly just miles away. Effective tree planting requires acknowledging and responding to this diversity rather than pretending uniform approaches can succeed across such varied conditions.

Climate gradients create the foundational layer of ecological variation. Eastern North Dakota experiences relatively humid continental climate with annual precipitation often exceeding 20 inches and more moderate temperature extremes. Western North Dakota transitions to semi-arid conditions with precipitation frequently below 15 inches and greater temperature variability between summer heat and winter cold. Central regions fall between these extremes with intermediate moisture availability and temperature patterns. These climate differences profoundly affect which tree and shrub species will successfully establish and survive. Species well-adapted to eastern moisture levels may suffer drought stress in western locations. Species tolerant of western aridity may grow poorly in heavier eastern soils with different moisture dynamics. Effective species selection must account for these climate realities rather than applying statewide species lists regardless of location.

Soil diversity compounds climate variation with complex patterns of soil texture, drainage, pH, and fertility that affect tree establishment and growth. The Red River Valley features heavy clay soils with high fertility but challenging drainage and difficult planting conditions. Glacial till soils across central regions vary from clay loams to sandy loams with diverse drainage characteristics. Western areas include everything from heavy clay in valley bottoms to sandy soils on uplands and slopes. Some locations have shallow soils over bedrock or hardpan layers that restrict root development. Others have deep soils that support vigorous tree growth when moisture is adequate. Soil pH ranges from slightly acidic in some eastern areas to alkaline in western regions, affecting nutrient availability and species performance. Conservation planners cannot responsibly ignore these soil variations when selecting species and designing plantings.

Moisture regimes vary not only with regional precipitation patterns but also with local topography, drainage, and water table characteristics. Bottomland sites may have high water tables and seasonal flooding that only certain species tolerate. Upland sites experience drier conditions where drought-tolerant species are essential. Some locations have perched water tables or seep areas that create localized wet conditions in otherwise dry landscapes. Others have rapid drainage that makes moisture stress severe even in moderately humid climate zones. Draws and sheltered valleys may retain moisture more effectively than exposed ridgetops and slopes. These microclimatic moisture variations within individual properties mean that different portions of a single planting site may require different species selections for optimal establishment.

Wildlife population differences across regions create varying habitat needs that plantings should address. Pheasant populations concentrate in certain agricultural regions where their habitat requirements of nesting cover, winter cover, and food sources align with land use patterns. Deer populations vary in density and seasonal distribution based on available habitat and agricultural practices. Waterfowl utilize different regions based on wetland availability and migration patterns. Songbird communities vary with existing habitat types

and regional ecology. A planting designed for pheasant habitat in southeastern North Dakota serves different conservation purposes than a planting focused on mule deer cover in western badlands country. Site-specific design allows plantings to target the wildlife species most relevant to each location.

Topographic variation creates exposure differences, wind patterns, snow accumulation dynamics, and erosion potential that affect both tree survival and habitat value. Sheltered valley sites provide fundamentally different growing conditions than exposed ridge tops. North-facing slopes retain more moisture and experience less temperature stress than south-facing slopes. Areas with significant topographic relief require different erosion control considerations than flat terrain. Wind exposure patterns affect winter survival, moisture stress, and structural stability of plantings. Effective design accounts for these topographic realities rather than applying flat-site templates to rolling or hilly terrain.

This ecological diversity means that truly effective tree planting in North Dakota requires location-specific knowledge and customized design. A standardized "pheasant habitat planting" template developed for average conditions will inevitably be suboptimal for many actual sites—wrong species for the local climate, inappropriate for actual soil conditions, poorly matched to real moisture availability, or ineffective for local wildlife populations. Site-specific design acknowledges ecological reality and optimizes each project for its actual circumstances.

### **6.3.2 Individual Property Considerations**

Beyond regional ecological diversity, individual properties present unique characteristics that demand customized conservation approaches. Even properties located in close geographic proximity may differ substantially in site conditions, operational constraints, existing habitat features, and landowner objectives. Standardized planting templates cannot accommodate this property-level variation, while site-specific design optimizes each project for its particular circumstances.

Site characteristics vary significantly from property to property even within ecologically similar regions. Two farms in the same county may have markedly different soil types based on glacial history and depositional patterns. One property may have well-drained loam soils throughout while its neighbor has heavy clay in some areas and sandy soils in others. Drainage patterns reflect subtle topographic differences—one property may have natural surface drainage while another has internal drainage problems requiring careful species selection. Aspect and slope orientation create microclimate differences that affect temperature extremes and moisture availability. Previous land use influences soil fertility, weed pressure, and remnant vegetation. These site-specific physical characteristics mean that the same species mix and planting configuration will not perform equally well on different properties.

Landowner operational needs introduce additional considerations that generic conservation templates cannot address. Working farms and ranches must integrate tree plantings with ongoing agricultural operations. Equipment access requirements vary based on machinery size and operational patterns—plantings cannot block critical access routes or interfere with efficient field operations. Grazing management considerations affect where plantings can be located, what fencing will be needed, and how plantings integrate with pasture rotations. Some landowners need visual screening from roads or neighbors, affecting optimal planting locations and species selection. Others prioritize wildlife attraction near their homes for

viewing and hunting access. Irrigation availability on some properties enables species selection impossible under dryland conditions. These operational realities require collaborative design that accommodates how landowners actually use and manage their properties.

Existing habitat features provide both opportunities and constraints that site-specific design can leverage for enhanced conservation value. Properties with remnant tree plantings, shelterbelts, or woody draws can benefit from connectivity-focused new plantings that expand and link existing habitat. Locations near wetlands, streams, or natural areas can maximize value through strategic placement that creates wildlife travel corridors or enhanced cover adjacent to other habitat types. Properties dominated by monoculture cropland require different design approaches than those with diverse habitat mosaics. Previous conservation practices—grassland enrollments, wetland restorations, existing wildlife plantings—affect how new tree projects can best complement established features. Cookie-cutter planting templates ignore these site-specific habitat opportunities.

Budget constraints and priorities vary among landowners in ways that require flexible, customized approaches. Some landowners prioritize maximum wildlife benefit within modest budgets, suggesting higher-density plantings with less expensive species. Others prefer fewer trees of premium species that provide specific habitat values they prioritize. Some are willing to invest in infrastructure like fencing and weed barrier to maximize establishment success. Others need lower-cost approaches that rely more on basic site preparation and maintenance. Landowners may want to start with smaller pilot projects to test approaches before larger investments, or they may want to implement comprehensive habitat plans in phases as budgets allow. Standardized programs with fixed designs and cost structures cannot accommodate this legitimate diversity in landowner financial capacity and priorities.

Management capability and commitment influence what types of plantings will succeed on each property. Some landowners have time, equipment, and expertise to provide intensive establishment care—regular weed control, supplemental watering during drought, protection from wildlife browsing, precise maintenance. They can successfully establish more challenging species that require careful management. Other landowners have limited time and capacity for intensive management, requiring more forgiving designs with hardy species that will succeed with basic care. Some properties have severe weed pressure from adjacent agricultural fields or invasive species infestations, requiring design modifications and species selections that account for intense competition. Others have relatively clean sites where establishment will be easier. Matching planting complexity to realistic management capacity increases success probability.

Specific wildlife objectives vary among participating landowners in ways that should inform design decisions. Some landowners focus on white-tailed deer hunting and want plantings optimized for deer cover, bedding, and browse. Others prioritize pheasant habitat with appropriate nesting cover, winter protection, and food sources. Some emphasize general wildlife diversity, wanting plantings that benefit multiple species. Others have specific interests in songbirds, waterfowl, pollinators, or other wildlife groups. These varying objectives should influence species selection, planting configuration, and management approaches. A planting designed for dense pheasant cover looks substantially different from one intended to provide deer bedding or songbird nesting habitat. Site-specific design allows each project to target its landowner's actual conservation priorities.

These property-level considerations demonstrate why customization is not a luxury but a necessity for effective conservation. Ignoring individual site characteristics, operational needs, existing features, budget realities, management capacity, and landowner objectives produces plantings that may technically meet generic specifications but fail to optimize outcomes for their specific circumstances. Site-specific design ensures that each project represents the best possible conservation investment for its particular property.

### **6.3.3 Optimization Through Customization**

The North Dakota Petroleum Foundation program's site-specific approach is not ad hoc or arbitrary. Rather, it represents systematic optimization of each project through professional assessment of actual conditions and collaborative design focused on realistic success. This customization process follows established technical frameworks—NRCS practice standards, research-based species recommendations, professional design principles—while applying them to real-world circumstances. The result is plantings that achieve superior outcomes precisely because they match biological requirements with site realities.

Species mix optimization begins with professional site assessment that characterizes actual soil type, drainage, moisture regime, and exposure conditions. Rather than selecting species from regional lists developed for average conditions, habitat consultants match species to documented site characteristics. Heavy clay soils receive species tolerant of wet conditions and difficult planting—American plum, chokecherry, buffaloberry. Well-drained sandy soils get drought-tolerant species adapted to rapid drainage—ponderosa pine, Rocky Mountain juniper, skunkbush sumac. Intermediate loam soils support the widest species range with selections based on specific moisture and exposure conditions. Alkaline soils in western regions require species tested for pH tolerance. Poorly drained sites get wet-soil specialists rather than upland species that will fail. This species-site matching, fundamental to professional forestry and habitat management, dramatically improves establishment probability compared to generic regional species lists that may include inappropriate choices for specific locations.

Beyond soil and moisture matching, species selection accounts for wildlife objectives, maintenance capabilities, and landowner preferences. Deer-focused plantings emphasize browse-tolerant shrubs and trees that provide winter cover—willows, dogwoods, buffaloberry, evergreen conifers. Pheasant-oriented designs include dense shrubs for winter cover and nesting habitat—wild rose, snowberry, buffaloberry in multi-row configurations. General wildlife plantings feature diverse species assemblages that provide varied structure, food sources, and cover types. Landowners with limited weed control capability receive hardy, competitive species that establish successfully despite weed pressure. Those committed to intensive management can include more desirable but challenging species. Integration of biological requirements with practical considerations produces species mixes optimized for success under real-world conditions.

Planting configuration customization accounts for terrain, existing features, operational needs, and habitat objectives rather than applying standardized layouts. Linear shelterbelts suit flat terrain and provide wind protection, visual screening, and wildlife travel corridors. Block plantings maximize habitat area and work well for dedicated wildlife cover areas. Curved or irregular layouts follow topographic contours, integrate with existing features, and create more natural habitat patterns. Row spacing reflects species growth characteristics and habitat objectives—tight spacing for dense cover, wider spacing where mature tree

canopies are desired. Multi-row designs provide structural diversity and enhanced wildlife value compared to single-row configurations. Equipment access lanes accommodate landowner operational needs. Designs that respond to actual site conditions and objectives outperform rigid template layouts.

Timing optimization recognizes that planting success depends heavily on seasonal weather patterns and site readiness. While spring planting serves as the default season for most species and locations, site-specific conditions may suggest alternatives. Fall planting works well for certain species on appropriate sites when spring weather creates challenging mud conditions. Containerized stock extends planting seasons beyond bare-root limitations. Irrigation availability enables summer planting impossible under dryland conditions. Site preparation timing affects weed control effectiveness and planting window availability. Flexible scheduling based on weather, site conditions, and seedling availability optimizes establishment probability rather than forcing all projects into standardized seasonal windows.

Success rate maximization through customized approaches manifests in the program's documented 73-84% survival rates. This performance substantially exceeds the 50% minimum standard NRCS considers acceptable and compares favorably with typical government program outcomes that often fall between 50-65% survival. The difference is not random variation or luck—it reflects systematic optimization of species selection, site preparation, planting technique, and post-planting management based on actual site conditions and professional assessment. Trees survive when they are right for their location, planted correctly at appropriate times, and maintained according to their establishment needs. Customization enables this optimization; standardization compromises it.

Landowner satisfaction and engagement represent additional benefits of customized design that contribute indirectly to long-term conservation success. When landowners participate actively in design decisions, understand why specific species and configurations were chosen for their property, and see that recommendations reflect their unique circumstances and objectives, they develop stronger investment in project success. They are more likely to provide quality establishment care, protect plantings from damage, and maintain them properly over time. They understand the conservation rationale for their planting and can explain it to others, becoming conservation advocates. Conversely, landowners who receive standardized designs developed without their input often view tree plantings as generic conservation obligations rather than customized habitat improvements tailored to their property. This psychological dimension of site-specific design—treating each landowner and property as unique rather than interchangeable—enhances program effectiveness through stronger landowner commitment.

The philosophical foundation of site-specific design reflects professional conservation practice. Experienced foresters do not apply identical prescriptions to every stand—they assess each forest's condition and develop customized management recommendations. Wildlife biologists do not recommend identical habitat improvements for every property—they evaluate existing conditions and design enhancements optimized for that location. Range conservationists do not prescribe standardized grazing systems—they develop plans appropriate to specific range conditions and operation characteristics. This professional approach, based on systematic assessment and customized prescription, represents best practice across all natural resource disciplines. The North Dakota Petroleum Foundation program applies this same professional methodology to tree planting conservation.

Critics might suggest that standardization provides efficiency and consistency advantages that justify accepting somewhat reduced outcomes. This argument fails on both practical and philosophical grounds. Practically, the program's customized approach has demonstrated superior outcomes while maintaining cost efficiency—higher survival rates at lower cost per tree than standardized programs. There is no efficiency-effectiveness tradeoff when customization is implemented systematically through professional protocols. Philosophically, conservation effectiveness should be the primary criterion for program design. If standardization produces inferior results—lower survival, poor species-site matching, reduced wildlife value—then efficiency gains from template approaches represent false economy. Conservation programs exist to achieve conservation outcomes, not administrative convenience.

The empirical validation is conclusive: 671,000 trees planted since 2018 with 73-84% survival rates, positioning the program to reach its goal of 1 million trees by 2030. This track record demonstrates that site-specific customization, grounded in professional standards and research-based practices, delivers superior conservation outcomes. One-size-fits-all approaches may be easier to administer, but they cannot match the biological effectiveness of designs optimized for actual site conditions. In conservation as in medicine, effective treatment requires accurate diagnosis and customized prescription. The North Dakota Petroleum Foundation program's commitment to site-specific design reflects this fundamental principle and produces measurably superior results.

Section 6 Summary: The North Dakota Petroleum Foundation's "Planting for the Future" program demonstrates that public-private partnership models can deliver superior conservation outcomes through strategic combination of professional standards and operational flexibility. With 671,000 trees planted since 2018 achieving 73-84% survival rates at less than half the cost of comparable government programs, the model has validated its effectiveness. Site-specific customization, far from representing quality compromise, enables biological optimization that produces higher survival and greater wildlife value. The program exemplifies how thoughtful integration of public accountability and private efficiency can extend conservation capacity and maximize return on investment for all stakeholders.

## **Section 7: Roles and Responsibilities**

The success of the Planting for the Future program depends on the coordinated efforts of multiple partners, each bringing essential expertise and resources. This section outlines the specific roles and responsibilities of all program participants, establishing clear expectations for accountability, quality, and effective collaboration.

### **7.1 North Dakota Petroleum Foundation**

The North Dakota Petroleum Foundation serves as the central administrator and coordinating entity for the Planting for the Future program. This comprehensive management role encompasses financial administration, technical oversight, stakeholder coordination, and quality assurance across all program activities.

#### **Program Management and Oversight**

The Foundation provides overall strategic direction and operational management for the program. This includes developing annual program goals aligned with conservation priorities, establishing program policies and procedures, managing timelines and deliverables, and ensuring compliance with all grant requirements. The Foundation serves as the primary point of contact for all stakeholders and maintains responsibility for program outcomes and accountability.

#### **Grant Administration and Compliance**

As the recipient of funding from the North Dakota Outdoor Heritage Fund, the Foundation manages all aspects of grant compliance and reporting. This responsibility includes preparing comprehensive grant applications and supporting documentation, ensuring adherence to all OHF policies and requirements, maintaining detailed financial records and documentation, submitting timely progress reports and final reports, coordinating site visits and inspections with OHF staff, and managing all grant-related correspondence and communications. The Foundation's rigorous approach to grant administration has enabled successful multi-year funding commitments and maintained excellent standing with OHF.

#### **Landowner Application Processing**

The Foundation manages the complete landowner application process from initial inquiry through final approval. This includes responding to landowner inquiries and providing program information, reviewing applications for completeness and eligibility, evaluating projects based on established criteria and priorities, communicating approval decisions and next steps, and maintaining organized records of all applications and correspondence. The application review process considers factors including property size and suitability, landowner commitment and capability, project alignment with program goals, geographic distribution to maximize impact, and available program funding and capacity.

#### **Contractor Coordination and Assignment**

The Foundation maintains relationships with qualified habitat consultants and contractors across North Dakota, strategically assigning projects based on geographic location, contractor availability and capacity, project complexity and requirements, and contractor expertise and track record. This coordination ensures efficient project execution and maintains high quality standards throughout the state.

### **Planning Report Review and Approval**

Before any trees are ordered or planted, the Foundation carefully reviews planning reports prepared by contractors. This review process ensures that species selection is appropriate for site conditions and program goals, planting designs meet technical standards and best practices, quantities and spacing are accurate and suitable, and recommendations align with landowner objectives and capabilities. The Foundation provides feedback and requests revisions when necessary, ensuring that every project receives thorough technical evaluation before implementation proceeds.

### **Tree Procurement and Ordering**

The Foundation centralizes all tree and shrub procurement through the Towner State Nursery and other qualified suppliers. This centralized approach provides significant advantages including bulk ordering for cost efficiency, coordination of seed sources and species selection, quality control and consistency across projects, simplified logistics and delivery coordination, and professional relationships with nursery staff. The Foundation places orders well in advance of planting season based on approved planning reports, manages delivery schedules to ensure optimal planting conditions, coordinates pickup or delivery logistics with contractors, and verifies order accuracy and stock quality upon receipt.

### **Contract Preparation and Execution**

The Foundation prepares formal contracts with both landowners and contractors, establishing clear expectations and protecting all parties. Landowner contracts specify planting details and requirements, maintenance and monitoring obligations, match contribution requirements, timeline expectations, and program compliance responsibilities. Contractor agreements establish scope of work and deliverables, payment terms and conditions, quality standards and expectations, reporting requirements, and liability and insurance provisions.

### **Payment Processing**

The Foundation manages all financial transactions related to program implementation. This includes processing contractor invoices upon satisfactory completion of work, issuing landowner payments for approved match contributions, maintaining detailed financial records for all expenditures, ensuring compliance with grant budget requirements and limitations, and preparing financial reports for OHF and internal tracking. The Foundation's careful financial management ensures accountability and maximizes conservation impact from every dollar invested.

### **Monitoring Coordination**

Working with contractors and landowners, the Foundation coordinates systematic monitoring of completed projects. This includes scheduling post-planting assessments, tracking survival rates and project performance, identifying challenges or issues requiring attention, documenting outcomes and lessons learned, and maintaining comprehensive records of monitoring data. This monitoring function provides essential feedback for continuous program improvement and demonstrates accountability to funders and stakeholders.

### **Data Management and Reporting**

The Foundation maintains comprehensive databases tracking all program activities and outcomes. This systematic data management supports transparent reporting to OHF and

other stakeholders, performance analysis and program evaluation, strategic planning and goal setting, and documentation of conservation impact and return on investment. The Foundation's commitment to rigorous data management enables evidence-based decision making and continuous program refinement.

### **Quality Assurance**

Throughout all program activities, the Foundation maintains quality standards through clear policies and procedures, contractor qualification requirements, planning report review and approval, monitoring of implementation practices, follow-up on issues or concerns, and regular evaluation of program effectiveness. This comprehensive approach to quality assurance has contributed significantly to the program's impressive survival rates and landowner satisfaction.

### **Technical Coordination**

The Foundation facilitates access to technical resources and supports communication among program participants. While qualified contractors provide the primary technical expertise for site assessment and design, the Foundation maintains relationships with partner organizations, coordinates contractor knowledge-sharing, and compiles lessons learned from program monitoring data. This coordination ensures that program projects benefit from accumulated experience across multiple contractors and sites.

## **7.2 Qualified Habitat Consultants and Contractors**

Qualified habitat consultants and contractors serve as the professional technical experts who translate program goals into successful on-the-ground conservation outcomes. These professionals bring specialized knowledge of plant ecology, habitat design, site assessment, and implementation techniques that ensure each project achieves its conservation potential.

### **Current Approved Contractors and Qualifications**

The Foundation maintains a network of approved contractors who have demonstrated the expertise and professionalism required for program success. Contractors must meet rigorous qualification criteria including relevant education or experience in natural resources management, wildlife habitat, forestry, or related fields, demonstrated knowledge of North Dakota plant communities and wildlife habitat requirements, proven ability to assess sites and develop appropriate planting plans, technical competency in planting design and implementation, strong communication skills and professional demeanor, reliable equipment and operational capacity, appropriate insurance and business credentials, and commitment to quality workmanship and customer service. The current roster of approved contractors provides geographic coverage across the state, ensuring that landowners in all regions can access qualified professional assistance.

### **Site Consultation and Assessment**

Contractors conduct thorough on-site consultations with landowners to evaluate property conditions and conservation opportunities. This consultation process includes meeting with landowners to understand their objectives and preferences, evaluating soil conditions, topography, hydrology, and existing vegetation, assessing wildlife use and habitat connectivity, identifying opportunities and constraints for planting, discussing maintenance capabilities and long-term commitment, and educating landowners about conservation

benefits and management practices. These site visits establish the foundation for effective project planning and build strong working relationships between contractors and landowners.

### **Planning Report Preparation**

Following site assessment, contractors prepare detailed planning reports that serve as blueprints for project implementation. These comprehensive reports document site conditions and assessment findings, specify recommended species and quantities with scientific and common names, provide detailed planting design including spacing and arrangement, include scaled maps or diagrams showing planting locations, explain rationale for species selection and design choices, estimate project costs and timelines, and outline maintenance recommendations and requirements. Planning reports must meet the Foundation's technical standards and provide sufficient detail for accurate tree ordering and efficient implementation.

### **Species Selection Recommendations**

Drawing on their professional expertise and knowledge of site-specific conditions, contractors recommend species mixes that will thrive in local conditions and provide desired wildlife benefits. These recommendations consider soil moisture regimes and drainage, climate and hardiness zone, existing vegetation and ecological context, wildlife habitat objectives and target species, growth characteristics and mature sizes, maintenance requirements and landowner capabilities, and diversity to provide multiple seasons of value and resilience to pests and diseases. Contractors must justify their selections and ensure alignment with program goals and best management practices.

### **Planting Implementation**

Contractors are responsible for professional execution of approved planting plans. This includes procuring trees from designated sources as coordinated by the Foundation, transporting and storing stock properly to maintain viability, using appropriate equipment and techniques for planting, following design specifications for spacing and arrangement, ensuring proper planting depth and technique, handling seedlings carefully to minimize stress and damage, completing projects within agreed timelines, and managing work sites to minimize disturbance and maintain safety. The quality of implementation work directly determines project success, making contractor expertise and diligence essential to program outcomes.

### **Quality Workmanship**

The program's exceptional survival rates reflect contractors' commitment to quality workmanship throughout all phases of implementation. This includes using proven planting techniques that maximize seedling survival, attention to detail in every aspect of installation, problem-solving and adaptability when field conditions require adjustments, efficient use of time and resources, and professionalism in all interactions with landowners and Foundation staff. Contractors take pride in their work and understand that their reputation depends on delivering results that meet or exceed expectations.

### **Professional Landowner Communication**

Contractors serve as ambassadors for the program, representing the Foundation through their interactions with participating landowners. Professional communication includes explaining technical concepts in accessible language, responding promptly to questions and

concerns, setting realistic expectations for outcomes and timelines, providing clear maintenance instructions and recommendations, demonstrating respect for landowners' property and time, and building trust through competence and reliability. Many landowners have limited experience with conservation projects, making contractors' educational role especially important.

### **Comprehensive Documentation**

Contractors document all aspects of their work to support program accountability and learning. Documentation requirements include photographs of sites before, during, and after planting, detailed records of species planted and quantities by location, notes on site conditions and implementation challenges, completion reports summarizing work performed, invoices with clear itemization of services and expenses, and follow-up observations from monitoring visits. This documentation creates a valuable record of program activities and outcomes.

### **Post-Planting Reporting**

Following project completion, contractors submit comprehensive reports to the Foundation detailing all work performed and outcomes observed. These reports confirm that work was completed according to approved plans, document any deviations or modifications and reasons, provide initial assessment of establishment success, identify any concerns or recommendations for landowner follow-up, and include all required documentation and supporting materials. Timely and thorough reporting enables the Foundation to process payments, update records, and ensure quality standards are consistently met.

## **7.3 Landowners**

Private landowners are essential partners whose voluntary participation makes conservation possible on the thousands of acres that comprise North Dakota's diverse landscapes. Landowner commitment to long-term stewardship determines whether planted trees become thriving habitat that benefits wildlife for generations.

### **Application Submission**

Landowners initiate participation by submitting applications that provide essential information for program planning and decision-making. Applications include property location and size, ownership documentation, description of existing conditions and conservation opportunities, landowner objectives and interests, commitment to program requirements including match contribution and long-term maintenance, and any relevant history of conservation programs or practices. Complete and accurate applications enable efficient review and appropriate project planning.

### **Property Access and Cooperation**

Landowners grant contractors and Foundation representatives reasonable access to their property for site assessment, project planning, implementation, and monitoring activities. This cooperation includes allowing site visits at scheduled times, providing information about property features and conditions, identifying any restrictions or special considerations, being available for consultation and decision-making, and maintaining communication throughout the project lifecycle. Landowner engagement and accessibility contribute significantly to project success.

### **Site Preparation**

As part of their in-kind contribution to projects, landowners are typically responsible for site preparation activities that create optimal conditions for planting and establishment.

Depending on site conditions and project design, preparation may include controlling competing vegetation through mowing, herbicide application, or tillage, removing debris or obstacles from planting areas, addressing drainage issues if needed, marking boundaries or specific planting zones, and completing preparation work according to agreed timelines to ensure readiness for planting. Quality site preparation significantly improves seedling survival and reduces long-term maintenance requirements.

### **Contractor Coordination**

Landowners work directly with assigned contractors throughout the planning and implementation process. This coordination includes participating in site consultations and planning discussions, reviewing and approving proposed planting plans, scheduling implementation work at mutually convenient times, providing access and support during planting operations, addressing questions or concerns promptly, and communicating effectively about expectations and timelines. Strong working relationships between landowners and contractors contribute to smooth project execution and satisfactory outcomes.

### **Match Contribution Provision**

The program's cost-share structure requires landowners to provide a financial match representing approximately thirty percent of total project costs. This contribution demonstrates commitment and shared investment in conservation outcomes. Landowner match can be provided through cash contributions toward project costs, in-kind contributions of site preparation labor and materials, maintenance activities and inputs, or combinations of cash and in-kind contributions as agreed with the Foundation. The match requirement ensures that landowners have meaningful stake in project success while keeping conservation affordable and accessible.

### **Long-Term Maintenance Commitment**

Perhaps the most critical landowner responsibility is providing ongoing maintenance and stewardship to ensure that planted trees survive and thrive. Maintenance commitments include controlling competing vegetation around seedlings through mowing, cultivation, or herbicide application, protecting plantings from livestock grazing during establishment, monitoring for pest or disease problems and taking appropriate action, replacing mortality when practical to maintain intended habitat value, and continuing stewardship for multiple years until plantings are well established. Contractors provide specific maintenance recommendations tailored to site conditions and species planted, but landowner diligence in following through determines ultimate success.

### **Monitoring Cooperation**

Landowners cooperate with contractors and Foundation staff who conduct monitoring visits to assess project outcomes. This cooperation includes allowing access for monitoring visits at scheduled times, providing observations about seedling performance and wildlife use, reporting any problems or concerns that arise, participating in survival assessments and counts, and sharing feedback about satisfaction with program services and outcomes.

Monitoring data collected from landowner properties enables program evaluation and continuous improvement.

### **Stewardship Responsibility**

Beyond specific maintenance tasks, landowners embrace a broader stewardship ethic that honors the public investment in conservation on their property. This stewardship includes maintaining plantings for the long term rather than removing them prematurely, managing surrounding land uses compatibly with conservation objectives, appreciating and promoting wildlife benefits to neighbors and community, potentially expanding conservation efforts on additional property areas, and serving as conservation ambassadors who encourage others to participate. Many program participants report that their conservation projects have deepened their connection to the land and enhanced their quality of life, motivating continued stewardship.

## **7.4 Towner State Nursery and Suppliers**

The Towner State Nursery, operated by the North Dakota Forest Service, and other qualified suppliers provide the high-quality plant materials that are essential to program success. These specialized nurseries produce seedlings specifically adapted to North Dakota's challenging climate and suited to conservation objectives.

### **Research-Based Seed Source Selection**

Nursery professionals carefully select seed sources based on decades of research and experience with plant performance in North Dakota conditions. Seed source decisions consider genetic adaptation to regional climate and soils, proven performance in similar planting sites, disease resistance and vigor, wildlife value and preferred characteristics, availability and sustainable collection practices, and alignment with current scientific recommendations. The nursery's expertise in seed source selection contributes directly to the high survival rates achieved in program plantings.

### **Quality Stock Production**

Towner State Nursery employs proven production practices that result in vigorous seedlings capable of withstanding transplant stress and establishing successfully in diverse field conditions. Production practices include optimal growing media and fertilization regimes, appropriate irrigation and hardening-off procedures, integrated pest management to maintain health, grading to ensure uniform quality, careful handling and storage to maintain viability, and quality control inspections throughout the production cycle. Nursery-grown seedlings offer significant advantages over wild-collected stock, including uniform size and quality, strong root systems developed in controlled conditions, freedom from diseases and pests, and consistency that enables efficient planting operations.

### **NDPF Order Fulfillment**

The nursery prioritizes fulfillment of the Foundation's substantial annual orders, recognizing the program's importance to North Dakota conservation. This priority treatment includes reserving adequate inventory of key species, coordinating production schedules with program timelines, accommodating specific requests for species or quantities, communicating proactively about availability and alternatives, and maintaining flexibility to

address changing needs. The strong partnership between the Foundation and Towner State Nursery ensures reliable access to quality stock year after year.

### **Delivery Coordination**

Nursery staff work closely with the Foundation and contractors to coordinate delivery timing and logistics that optimize seedling viability and planting success. This coordination includes scheduling lifting and shipping during optimal windows, monitoring weather conditions and soil conditions for planting, communicating clearly about delivery dates and logistics, packaging stock appropriately for transport and storage, providing handling and storage instructions to maintain quality, and being responsive to questions or issues that arise. Proper timing and handling of seedling delivery significantly influences establishment success.

### **Stock Quality Assurance**

The nursery stands behind the quality of its products and works to address any concerns that arise. Quality assurance includes inspecting stock before shipping to verify health and vigor, replacing stock that fails to meet quality standards, investigating and responding to any quality complaints, providing technical advice about storage and handling, and continuously improving production practices based on feedback and outcomes. The nursery's commitment to quality gives the Foundation and contractors confidence in the plant materials they work with.

### **Technical Recommendations**

Nursery professionals share their extensive knowledge to support program success. Technical support includes advising on species selection for specific site conditions, providing information about seedling characteristics and requirements, recommending planting techniques and timing, sharing research findings and new developments, troubleshooting establishment problems or poor performance, and contributing to professional development of contractors. This technical expertise enhances the program's collective knowledge and capacity.

The Planting for the Future program succeeds because each partner fulfills their responsibilities with professionalism and commitment to conservation outcomes. Clear expectations and strong relationships among all participants create the foundation for continued success as the program works toward its ambitious goal of planting one million trees by 2030.

## Section 8: Program Results and Impact

Since its inception in 2018, the Planting for the Future program has achieved remarkable conservation outcomes that demonstrate the power of strategic partnership and sustained commitment. The program's results extend far beyond simple tree counts, encompassing measurable habitat gains, documented wildlife benefits, engaged landowner stewardship, and a proven model for leveraging public-private collaboration to achieve landscape-scale conservation impact.

### 8.1 Quantitative Outcomes

The program's quantitative achievements provide compelling evidence of its effectiveness and value to North Dakota's conservation community.

#### **Trees Planted: Steady Progress Toward One Million**

Through seven years of operation from 2018 through 2024, the Planting for the Future program has established more than 671,000 trees and shrubs on private lands across North Dakota. This substantial achievement represents consistent annual production that has varied based on funding availability, weather conditions, and landowner demand, but has maintained steady momentum toward the program's ambitious goal of one million trees by 2030.

Annual planting totals have ranged from approximately 70,000 to over 120,000 seedlings, with cumulative totals growing steadily. The 2018 inaugural year established approximately 78,000 seedlings as the program developed its processes and partnerships. Subsequent years saw increasing capacity and demand, with 2019 and 2020 each delivering approximately 95,000 seedlings. The program hit its stride in 2021 and 2022 with annual totals exceeding 110,000 seedlings in each year, reflecting strong landowner interest and efficient operations. Recent years have continued strong production, with 2023 and 2024 maintaining pace toward the million-tree milestone.

With more than 671,000 trees already established and nearly six years remaining to reach 2030, the program is well positioned to achieve and potentially exceed its signature goal, requiring an average of approximately 55,000 trees annually for the remaining period.

#### **Properties and Landowners Served**

The program has worked with hundreds of individual landowners across North Dakota, transforming properties ranging from small acreages to large agricultural operations. Projects have included small habitat parcels of just a few acres, farmstead shelterbelts and windbreaks, field borders and wildlife travel corridors, grassland-woodland interface plantings, riparian area restorations, and comprehensive habitat complexes spanning dozens of acres.

This diversity of property types and project scales demonstrates the program's flexibility and broad applicability across North Dakota's varied landscapes. Many landowners have completed multiple projects over the years, expanding their conservation commitment as they observe the benefits of initial plantings.

## **Geographic Distribution and Counties Reached**

Program projects have been completed in counties across North Dakota, creating a network of habitat that spans the state's diverse ecological regions. The western mixed-grass prairie region has seen substantial planting activity, particularly in counties including McKenzie, Mountrail, Williams, Billings, Dunn, and Stark. The central prairie pothole region, critically important for waterfowl and grassland birds, has benefited from projects in counties including McHenry, Pierce, Benson, Wells, Foster, and Stutsman. The eastern tallgrass prairie and transition zone has received plantings in counties including Cass, Richland, Sargent, Ransom, and Barnes. The Missouri River corridor and associated breaks have been enhanced through projects in counties including Morton, Burleigh, Oliver, and McLean. Northern forest-prairie transition areas have gained habitat through work in counties including Bottineau, Rolette, Cavalier, and Pembina.

This geographic distribution ensures that the program's conservation benefits reach wildlife populations across the state and address habitat needs in diverse ecological contexts.

## **Acreage Converted to Habitat**

Collectively, program plantings have established woody habitat on more than 2,600 acres of North Dakota private lands that previously offered limited wildlife value. This acreage represents a significant addition to the state's habitat base, particularly considering that these acres have been converted from generally non-habitat conditions such as idle crop fields, degraded grasslands, bare ground around farmsteads, or sparse vegetation along field edges.

The habitat value per acre varies with planting density, species composition, and site context, but all planted acres represent meaningful improvement over baseline conditions. As plantings mature over the coming years and decades, habitat quality and wildlife carrying capacity will continue to increase, multiplying the conservation return on investment.

## **Species Distribution and Diversity**

Program plantings have incorporated dozens of native and adapted tree and shrub species selected to provide diverse habitat structure and seasonal resources for wildlife. The species palette has been carefully tailored to North Dakota conditions and conservation objectives, with particular emphasis on species that offer food value through fruits, nuts, or seeds consumed by wildlife, cover value through dense branching structure or retained foliage, nesting substrate for birds and small mammals, pollinator value through flowers and flowering timing, adaptation to North Dakota's climate extremes and soil conditions, and disease resistance and long-term survival potential.

Commonly planted species have included conifers such as Rocky Mountain juniper, eastern red cedar, ponderosa pine, and various spruce species that provide critical winter cover and thermal protection. Tall deciduous trees including bur oak, hackberry, and cottonwood create canopy structure and mast production. Mid-story trees such as American plum, chokecherry, and various crabapples provide abundant fruit resources. Shrubs including buffaloberry, juneberry, and various willows offer dense cover and diverse food sources.

The typical project includes eight to fifteen species arranged in multi-row configurations that mimic natural woodland edge structure and maximize wildlife value through diversity of form, phenology, and resource provision. This diversity also provides resilience against species-

specific pests, diseases, and climate stresses that could otherwise compromise planting success.

### **Survival Rates: Exceptional Performance**

One of the program's most impressive achievements has been consistently high seedling survival rates that substantially exceed industry standards and demonstrate the effectiveness of the program's quality-focused approach. Monitoring conducted by contractors at one-year and two-year intervals following planting has documented survival rates ranging from 73% to 84% across the program's project portfolio.

These rates compare extremely favorably to the 50% minimum survival standard established by the Natural Resources Conservation Service for its conservation programs and far exceed the typical outcomes of less intensively managed tree planting efforts.

Multiple factors contribute to these exceptional results, including high-quality nursery stock specifically adapted to North Dakota conditions, professional site assessment and species selection by qualified contractors, proper planting techniques executed by experienced crews, landowner commitment to site preparation and ongoing maintenance, favorable growing conditions in many project areas during establishment years, and careful attention to timing of planting operations.

The survival rates achieved represent not only conservation effectiveness but also efficient use of public and private resources, as high survival means that a much greater percentage of planted seedlings become established habitat rather than requiring replacement. These outcomes validate the program's investment in professional services, quality plant materials, and landowner support rather than pursuing a high-volume, lower-quality approach.

### **Match Contributions Leveraged**

The program's cost-share structure has successfully leveraged substantial private investment in conservation through landowner match contributions. With landowners providing approximately thirty percent of project costs through cash and in-kind contributions, every dollar of Outdoor Heritage Fund investment has generated additional private conservation investment.

Over the program's history, cumulative landowner match contributions have totaled hundreds of thousands of dollars in combined cash payments and in-kind services including site preparation, maintenance, and materials. This leveraging of public funding with private resources multiplies conservation impact and demonstrates landowner commitment to stewardship.

## **8.2 Conservation Impact**

The program's quantitative outputs translate into meaningful conservation benefits for North Dakota's wildlife, landscapes, and communities.

### **Wildlife Species Benefited**

Program plantings provide habitat for a diverse array of wildlife species that depend on woody vegetation in North Dakota's predominantly grassland and agricultural landscapes.

White-tailed deer utilize plantings extensively for thermal cover during harsh winters, bedding security throughout the year, fawning cover in spring, browse during all seasons,

and travel corridors connecting larger habitat patches. The program's contribution to deer habitat is particularly valuable in agricultural regions where woody cover is limited.

Ring-necked pheasants benefit from critical winter cover that reduces mortality during severe weather, nesting habitat in taller vegetation within and adjacent to plantings, brood-rearing cover providing insect resources and protective structure, roosting sites offering security from predators and weather, and food resources including fruits and seeds from shrub species. Enhanced pheasant habitat supports both wildlife watching opportunities and hunting recreation that drives significant economic activity.

Sharp-tailed grouse use woodland edges for winter thermal cover and food resources, with younger plantings providing particularly valuable shrub habitat. Songbirds including American goldfinch, cedar waxwing, American robin, gray catbird, brown thrasher, and numerous other species find nesting substrate, food resources, and cover in program plantings. Multi-species plantings with diverse structure and fruiting times support particularly rich bird communities.

Numerous warbler species and other neotropical migrants utilize woodland edge habitat during spring and fall migration, with program plantings serving as important stopover sites. Small mammals including cottontail rabbits, fox squirrels, white-footed mice, and voles inhabit program plantings, contributing to prey base for raptors and mammalian predators. Pollinating insects benefit from flowering shrubs and trees included in many plantings, supporting broader ecosystem function and agricultural productivity.

### **Habitat Connectivity Achieved**

In North Dakota's increasingly fragmented agricultural landscapes, program plantings make vital contributions to habitat connectivity that enables wildlife movement and population persistence. Individual projects have created stepping stones of habitat between larger conservation areas, established travel corridors across otherwise open agricultural landscapes, connected riparian corridors with upland habitat, enhanced habitat networks in priority conservation areas identified in state planning efforts, and improved structural diversity in landscapes dominated by grassland or cropland.

These connectivity benefits are particularly important for species sensitive to crossing open areas and for maintaining genetic exchange among wildlife populations. As the program continues to add new projects strategically distributed across the state, the cumulative connectivity value increases, contributing to landscape-scale conservation function that no single project could achieve in isolation.

### **State Wildlife Action Plan Priorities Advanced**

The Planting for the Future program directly supports multiple priorities identified in North Dakota's State Wildlife Action Plan, the state's comprehensive conservation strategy. The program addresses SWAP habitat conservation priorities by enhancing woodland edge and shrubland habitats identified as conservation priorities, improving habitat quality on private lands where most wildlife populations exist, contributing to landscape-level habitat connectivity and resilience, and supporting multiple Species of Greatest Conservation Need that utilize woody vegetation.

By aligning closely with SWAP priorities, the program ensures that its investments contribute to North Dakota's strategic conservation framework and complement other conservation initiatives.

### **Private Land Conservation Partnership Success**

The program exemplifies successful private land conservation partnership that respects property rights while achieving public conservation benefits. The voluntary, incentive-based approach has proven highly effective at engaging landowners who might not participate in more restrictive programs.

The program has built trust with agricultural landowners through professional service delivery, reasonable cost-share requirements that acknowledge private investment, flexibility to accommodate individual property circumstances and objectives, respect for landowner knowledge and preferences, and demonstrated commitment to long-term support and partnership. This positive reputation has generated word-of-mouth referrals and repeat participation, creating a self-sustaining cycle of expanding conservation impact.

### **Landowner Satisfaction**

Participating landowners consistently express high satisfaction with program services and enthusiasm about conservation outcomes on their properties. Landowners regularly report appreciation for professional expertise and guidance provided by contractors, satisfaction with quality of planting work and survival outcomes, enjoyment of observing increased wildlife use of their properties, pride in contributing to conservation and environmental stewardship, positive experiences with Foundation staff and program administration, and intention to pursue additional projects or encourage neighbors to participate.

Many landowners describe their program participation as among the most satisfying aspects of land ownership, combining practical benefits such as wind protection and privacy with intrinsic values of wildlife stewardship and landscape enhancement.

## **8.3 Program Sustainability and Future Outlook**

The Planting for the Future program has established a strong foundation for continued success and expanding impact in the years ahead.

### **Multi-Year Grant Success**

The program's track record of delivering results has earned sustained support from the North Dakota Outdoor Heritage Fund through multiple grant cycles. This consistent funding enables multi-year planning, contractor capacity development, nursery stock planning and production, strategic geographic expansion, and program refinement based on lessons learned.

The Foundation's rigorous grant administration and compelling outcomes have established credibility that positions the program favorably for continued OHF support as long as landowner demand and conservation benefits continue. The relationship with OHF has evolved into a true partnership characterized by mutual respect and shared commitment to maximizing conservation return on public investment.

### **Growing Landowner Demand**

Interest in program participation continues to exceed available funding, indicating strong potential for program expansion if additional resources can be secured. Current application backlogs and waiting lists demonstrate robust demand across the state. This sustained interest reflects word-of-mouth reputation among landowners, growing awareness of program availability and benefits, increasing appreciation for wildlife habitat among

agricultural landowners, desire for cost-share assistance with habitat projects landowners would like to pursue, and positive experiences of past participants who encourage others.

### **Contractor Network Development**

The program has fostered development of a professional contractor network with the expertise and capacity to deliver quality habitat projects. Several contractors have grown their businesses substantially based on program work, developing specialized expertise in wildlife habitat design and installation, investing in equipment and training to improve efficiency and quality, building reputations as trusted conservation professionals, expanding geographic service areas to reach more landowners, and developing complementary service offerings that support long-term habitat management.

This contractor capacity development represents important infrastructure for conservation that will support program success and potentially enable expansion.

### **Continuous Improvement Trajectory**

The program has demonstrated commitment to learning and adaptation that improves outcomes over time. Continuous improvement efforts have included refining species recommendations based on survival data and performance observations, improving contractor guidance and technical standards, streamlining administrative processes to reduce burden and increase efficiency, enhancing monitoring protocols to capture better data on outcomes, incorporating new research and technical innovations, adjusting policies and procedures based on stakeholder feedback, and strengthening quality assurance practices.

This learning orientation ensures that the program's final projects will be even more effective than its early successes, multiplying conservation return on investment as the program matures.

### **Progress Toward One Million Trees by 2030**

With more than 671,000 trees already established and the program operating at sustainable annual capacity, the ambitious goal of one million trees by 2030 is readily achievable with continued funding and landowner participation. Reaching this milestone will require maintaining average annual production of approximately 55,000 trees through 2030, which is well within demonstrated program capacity.

Achieving one million trees will represent a significant conservation legacy and a testament to what can be accomplished through sustained partnership among private landowners, industry leadership, and public conservation funding. The milestone will generate positive recognition for the North Dakota Petroleum Foundation and its member companies, demonstrating long-term commitment to conservation and environmental stewardship in the state.

### **Conservation Legacy**

The Planting for the Future program is creating a lasting conservation legacy across North Dakota that will benefit wildlife and communities for generations. Trees planted today will continue providing habitat value for fifty to one hundred years or more, long after program funding has been spent and forgotten. These enduring benefits represent exceptional return on investment and demonstrate the power of visionary conservation leadership.

The program also establishes important precedents and examples including industry environmental stewardship beyond regulatory compliance, effective public-private partnership for conservation, voluntary landowner engagement achieving landscape-scale outcomes, and strategic use of dedicated conservation funding to leverage additional private investment. These broader contributions to North Dakota's conservation culture and infrastructure may ultimately prove as valuable as the direct habitat outcomes, influencing future conservation efforts and inspiring continued private sector leadership.

The Planting for the Future program has achieved remarkable results over its first seven years of operation, establishing more than 671,000 trees on 2,600+ acres of private land, documenting survival rates of 73-84% that far exceed industry standards, engaging hundreds of landowners in voluntary conservation stewardship, and creating habitat that benefits deer, pheasants, grouse, songbirds, pollinators, and numerous other wildlife species across North Dakota. These quantitative outcomes translate into meaningful conservation impact that supports wildlife populations, enhances landscape connectivity, advances state conservation priorities, and engages communities in environmental stewardship.

The program's strong performance, sustained funding, growing demand, and commitment to continuous improvement position it for continued success as it works toward the goal of one million trees by 2030 and builds a lasting conservation legacy for North Dakota.

## **Section 9: Supporting Resources**

*North Dakota Petroleum Foundation*

Program Manual



## 9.1 Reference Documents

The Planting for the Future program is built on established conservation practices and technical standards developed by state and federal agencies. This section identifies key reference materials that inform program design, implementation, and quality standards.

### NRCS Technical Standards

The Natural Resources Conservation Service (NRCS) Field Office Technical Guide provides the foundation for tree planting practices in North Dakota. Three practice standards are particularly relevant to this program:

**Practice Standard 612 - Tree/Shrub Establishment.** This standard covers the establishment of woody plants by planting seedlings or cuttings, direct seeding, or natural regeneration. It addresses site preparation, species selection, planting methods, and post-planting care. The standard emphasizes matching species to site conditions and establishes minimum survival rates for successful establishment. All Planting for the Future projects follow Practice Standard 612 specifications for seedling quality, planting depth, spacing, and timing.

**Practice Standard 645 - Upland Wildlife Habitat Management.** This standard applies to creating, improving, or maintaining upland habitat for wildlife. It includes provisions for wildlife food and cover plantings, nesting structures, and habitat corridors. Planting for the Future conservation plantings designed primarily for wildlife benefit reference Practice Standard 645 for species selection, configuration, and management recommendations.

**Practice Standard 380 - Windbreak/Shelterbelt Establishment and Renovation.** This standard covers the establishment and renovation of windbreaks and shelterbelts for multiple purposes including wind erosion reduction, livestock protection, and wildlife habitat enhancement. Many Planting for the Future field windbreak projects are designed and implemented according to Practice Standard 380 specifications.

Complete NRCS practice standards and supporting technical notes are available through local NRCS field offices or online at the NRCS Conservation Practice Standard Library.

### NDSU Extension Resources

North Dakota State University Extension provides essential technical guidance for tree planting in North Dakota through the following publications:

**The North Dakota Tree Handbook.** This comprehensive reference covers tree and shrub species suitable for North Dakota, planting and care instructions, and management recommendations for various planting types. The handbook includes detailed species profiles with characteristics, adaptation zones, and suggested uses. It serves as the primary reference for species selection in the Planting for the Future program.

**Windbreak Renovation and Improvement.** This publication addresses the renovation of aging or damaged windbreak systems, including species replacement strategies and gap planting techniques. It is particularly relevant to Planting for the Future projects that involve renovating existing farmstead or field windbreaks.

Establishing Trees and Shrubs in North Dakota. This guide covers site preparation, planting methods, mulching, watering, and early care of newly planted trees. It provides practical recommendations for landowners and contractors implementing tree planting projects.

NDSU Extension publications are available online at [www.ag.ndsu.edu/publications](http://www.ag.ndsu.edu/publications) or through county extension offices.

## **North Dakota Forest Service Materials**

The North Dakota Forest Service provides technical assistance and educational materials for forestry and conservation tree planting throughout the state. Key resources include:

Conservation Trees and Shrubs for North Dakota. This publication provides detailed profiles of tree and shrub species available from Towner State Nursery, including botanical and common names, growth characteristics, landscape adaptation, and conservation uses. It is the primary reference for species available through the Planting for the Future program.

Tree Planting Guide for North Dakota. This practical guide covers all aspects of successful tree establishment, from site selection through long-term maintenance. It includes recommendations specific to North Dakota's climate and soils.

Windbreak Management Guidelines. These guidelines address the long-term management of windbreak systems, including thinning, pruning, weed control, and renovation strategies.

North Dakota Forest Service publications are available at [www.ndsu.edu/forests](http://www.ndsu.edu/forests) or by contacting the Forest Service office in Bottineau.

## **State Wildlife Action Plan**

The North Dakota State Wildlife Action Plan identifies Species of Conservation Priority and their habitat needs. The plan guides conservation efforts across the state and informs habitat restoration priorities. Planting for the Future projects that include wildlife habitat objectives reference the State Wildlife Action Plan to ensure plantings benefit priority species and address identified habitat deficits. The plan is available from the North Dakota Game and Fish Department.

## **Program Forms and Templates**

Standard forms and templates ensure consistent documentation and reporting across all Planting for the Future projects. These include landowner applications, contractor planning and planting reports, monitoring forms, and invoice templates. Forms are referenced in detail in Appendix A and are available from NDPF program staff.

## 9.2 Contact Information

### North Dakota Petroleum Foundation Program Staff

#### Program Director

Eric Delzer, North Dakota Petroleum Foundation, 100 West Broadway, STE. 200, Bismarck, ND 58501 Phone: 701-204-7348 Email: [edelzer@ndoil.org](mailto:edelzer@ndoil.org)

#### Program Coordinator

Micaela Rud, North Dakota Petroleum Foundation, 100 West Broadway, STE. 200, Bismarck, ND 58501 Phone: 701-557-7742 Email: [mrud@ndoil.org](mailto:mrud@ndoil.org)

Program staff can answer questions about eligibility, application procedures, funding availability, project approval, and general program requirements.

### Towner State Nursery

Towner State Nursery North Dakota Forest Service P.O. Box 188 Towner, ND 58788 Phone: 701-537-5636 Email: [towner.nursery@ndsu.edu](mailto:towner.nursery@ndsu.edu) Website: [www.ndsu.edu/forests/nursery](http://www.ndsu.edu/forests/nursery)

The nursery can provide information about seedling availability, species characteristics, ordering procedures, pricing, and pickup arrangements. Annual seedling catalogs with species descriptions and current pricing are available each fall.

### NRCS State Office

USDA Natural Resources Conservation Service North Dakota State Office 220 East Rosser Avenue, Room 270 Bismarck, ND 58501 Phone: 701-530-2000 Website: [www.nrcs.usda.gov/northdakota](http://www.nrcs.usda.gov/northdakota)

The NRCS State Office can provide information about conservation practice standards, technical resources, and contact information for local field offices.

### Local NRCS Field Offices

NRCS maintains field offices in most North Dakota counties, staffed by soil conservationists and other technical specialists. Local NRCS offices can provide site-specific technical assistance, soil surveys, conservation planning support, and information about other conservation programs. Contact information for local offices is available through the NRCS State Office or at [www.nrcs.usda.gov/northdakota](http://www.nrcs.usda.gov/northdakota).

### North Dakota Forest Service

North Dakota Forest Service 307 First Street East Bottineau, ND 58318 Phone: 701-228-5422 Email: [ndsu.forest.service@ndsu.edu](mailto:ndsu.forest.service@ndsu.edu) Website: [www.ndsu.edu/forests](http://www.ndsu.edu/forests)

The Forest Service provides technical assistance for tree planting, windbreak design, forest management, and conservation tree programs. Staff can answer questions about species selection, planting techniques, and long-term tree care.

## **North Dakota Association of Soil Conservation Districts**

North Dakota Association of Soil Conservation Districts 4023 State Street, Suite 2 Bismarck, ND 58503 Phone: 701-223-8518 Website: [www.ndascd.org](http://www.ndascd.org)

The Association can provide contact information for local Soil Conservation Districts, which may offer technical assistance, cost-share programs, or equipment rental for conservation projects.

## **NDSU Extension Service**

NDSU Extension Service Dept. 7070, PO Box 6050 Fargo, ND 58108-6050 Phone: 701-231-8944 Website: [www.ag.ndsu.edu/extension](http://www.ag.ndsu.edu/extension)

NDSU Extension provides educational programs and technical publications on tree planting, forestry, horticulture, and natural resources management. County extension offices are located throughout North Dakota.

## 9.3 Frequently Asked Questions

### Eligibility and Application

#### **Who is eligible for the Planting for the Future program?**

North Dakota landowners who own property in areas impacted by oil and gas development are eligible. This includes individual landowners, families, tribal members, and organizations with land ownership. Both agricultural and non-agricultural properties may qualify. Priority is given to projects in counties with significant oil and gas activity and to projects that provide multiple conservation benefits.

#### **What types of tree planting projects does the program support?**

The program supports farmstead windbreaks, field windbreaks, living snow fences, riparian buffer strips, wildlife habitat plantings, conservation reserve plantings, and other conservation tree projects that provide environmental benefits. Projects incorporate industry best practices and use species appropriate for North Dakota conditions.

#### **Is there a cost to participate in the program?**

No. The program provides free trees and planting services to eligible landowners. Landowners are responsible for maintaining planted trees, including weed control, watering during establishment if needed, and protection from livestock and equipment damage.

#### **How do I apply?**

Complete a Landowner Application form, available from NDFP program staff or on the NDFP website. Submit the completed application along with a site map showing the proposed planting area. Applications are reviewed for eligibility and conservation benefit. If approved, a qualified contractor will contact you to complete a site visit and develop a planting plan.

#### **When should I apply?**

Applications are accepted year-round. However, applying by November ensures consideration for spring planting the following year. Tree orders must be placed with Towner State Nursery by early December for delivery the next spring.

#### **How long does the application process take?**

Most applications are reviewed within two to three weeks. Once approved, a contractor will schedule a site visit within one to two months, depending on weather and contractor availability. The complete process from application to planting plan approval typically takes two to four months.

### Project Planning and Planting

#### **What tree species can I get through the program?**

The program uses species available from Towner State Nursery and Lincoln Oakes Nursery that are adapted to North Dakota growing conditions. Available species include conifers (eastern red cedar, Rocky Mountain juniper, ponderosa pine, Black Hills spruce, Colorado blue spruce), deciduous trees (hackberry, bur oak, cottonwood), and shrubs (buffaloberry, chokecherry, American plum, lilac, caragana). Note: Green ash was removed from the

approved species list in 2025 due to emerald ash borer concerns. Your contractor will recommend species based on your site conditions, soil type, and planting objectives.

### **Can I choose what species are planted?**

Your contractor will develop a planting plan that matches species to your site conditions and objectives. You will have the opportunity to review and discuss the plan before planting. Landowner preferences are considered, and final species selection is made collaboratively between you and your contractor based on what will work best at your specific site.

### **How many trees will I get?**

The number of trees depends on your project type, available space, and conservation objectives. A typical farmstead windbreak might include 200 to 500 trees. Field windbreaks vary widely based on length and configuration. Wildlife habitat plantings depend on area and design. Your contractor will determine appropriate tree numbers based on standard spacing guidelines.

### **When are trees planted?**

Trees are planted in spring, typically from late April through May depending on weather and soil conditions. Fall planting is not generally used in North Dakota due to short establishment periods before winter.

### **Who does the planting?**

For projects using qualified contractors, the contractor is responsible for site preparation, planting, and post-planting care according to program specifications. For landowner-installed projects, the landowner receives trees and planting instructions and completes the installation themselves.

### **What site preparation is required?**

Sites should be free of existing vegetation in the planting area. This typically involves tillage, herbicide application, or mechanical vegetation removal the season before planting. Your contractor will assess the site and recommend appropriate preparation methods. Adequate site preparation is critical to planting success.

## **Maintenance and Survival**

### **What maintenance is required after planting?**

Weed control is the most important post-planting maintenance activity. Competing vegetation must be controlled for at least three to five years to allow trees to establish. Methods include cultivation, mulching, or herbicide application. Occasional watering during severe drought may be beneficial. Trees must be protected from livestock, mowing, and other mechanical damage.

### **Do I need to water the trees?**

In most years, natural rainfall is sufficient for tree survival if weed control is adequate. During severe drought, supplemental watering can improve survival and growth, particularly during the first two years. Focus watering on young trees, providing deep soakings rather than frequent light watering.

### **What if some trees don't survive?**

Some mortality is expected in any tree planting project. Survival rates of 70 to 80 percent after three years are considered acceptable. If survival falls below acceptable levels due to factors beyond the landowner's control, replanting may be considered. Factors within landowner control, such as inadequate weed control or livestock damage, do not qualify for replanting.

### **How long does it take for trees to become established?**

Trees are considered established when root systems are developed sufficiently to support growth without intensive care. This typically takes three to five years. During this period, weed control and protection from damage are critical. After establishment, trees require minimal maintenance other than occasional monitoring for disease, insect damage, or severe drought stress.

### **When will the trees provide the intended benefits?**

Benefits develop over time as trees grow. Farmstead windbreaks begin providing noticeable wind protection within five to seven years and reach full effectiveness in 15 to 20 years. Wildlife habitat benefits develop more quickly, with shrubs providing food and cover within three to five years. Snow management benefits appear within five years for field windbreaks and living snow fences.

## **Monitoring and Reporting**

### **How does monitoring work?**

All projects are monitored to assess survival and growth. Contractors monitor contractor-installed projects in year one and year three after planting and submit monitoring reports to NDPF. Landowners with self-installed projects submit monitoring reports at the same intervals. Monitoring involves counting surviving trees, assessing overall condition, noting problems, and documenting maintenance activities.

### **What if I have problems with my trees?**

Contact NDPF program staff if you observe unusual mortality, disease symptoms, insect damage, or other problems. Staff can provide guidance or arrange for technical assistance from appropriate agencies. Early identification of problems often allows for corrective action.

### **Am I required to keep the trees forever?**

Landowners are expected to maintain planted trees and protect them from damage. There is no formal conservation easement or minimum retention period. However, the program is designed to establish long-term conservation plantings that provide lasting environmental benefits. Removing established trees defeats the program's purpose and represents poor stewardship of conservation resources.

### **Can I remove trees if my land use changes?**

While there is no legal prohibition on removing trees, landowners are strongly encouraged to maintain conservation plantings. If circumstances require removal of some trees, contact NDPF program staff to discuss alternatives. In some cases, portions of plantings may be removed while maintaining conservation benefits from remaining trees.

## **Program Operations**

### **How many trees has the program planted?**

Since its inception in 2018, the Planting for the Future program has provided more than 671,000 trees to North Dakota landowners. These trees have been planted across counties impacted by oil and gas development, creating wildlife habitat and other conservation plantings that provide lasting environmental benefits.

### **How is the program funded?**

The program is funded by the North Dakota Petroleum Foundation through voluntary contributions from oil and gas companies operating in North Dakota. This funding demonstrates industry commitment to environmental stewardship and community investment in areas impacted by energy development.

### **Will the program continue in the future?**

The program operates on an annual basis subject to available funding. While no program can guarantee indefinite continuation, the Planting for the Future program has operated successfully since 2018 and remains a priority initiative of the North Dakota Petroleum Foundation. Landowners interested in participating are encouraged to apply.

### **Where can I get more information?**

Contact NDPF program staff using the contact information provided in Section 9.2. Staff can answer specific questions about eligibility, project planning, application procedures, and program requirements.

# **Appendices**

*North Dakota Petroleum Foundation*

Program Manual



## Appendix A: Program Forms and Templates

The Planting for the Future program uses standardized forms and templates to ensure consistent documentation and reporting across all projects. This appendix provides brief descriptions of available program forms. Complete forms are available from NDPF program staff.

### Landowner Application

The Landowner Application collects basic information needed to determine project eligibility and conservation potential. The form requests landowner contact information, property location and description, intended planting type and objectives, site characteristics, and any special considerations. A simple sketch or aerial photo showing the proposed planting area must accompany the application. The application is typically two pages and can be completed in 15 to 20 minutes.

### Contractor Planning Report Template

The Contractor Planning Report documents the site visit, site assessment findings, and proposed planting plan. The template guides contractors through a systematic evaluation of soil conditions, topography, existing vegetation, exposure, and other site factors. It includes sections for recording landowner objectives, identifying constraints, selecting appropriate species, specifying planting design and layout, and estimating tree quantities. Maps or diagrams showing the proposed planting configuration are attached. The planning report provides the technical foundation for project approval and seedling ordering.

### Contractor Planting Report Template

The Contractor Planting Report documents actual planting activities completed by contractors. The template records planting dates, species and quantities planted, planting methods used, site preparation activities, weather conditions, any deviations from the approved plan, and post-planting care provided. Photographs documenting site conditions, planting operations, and completed installations are included. The planting report provides verification that work was completed according to program standards and enables accurate tracking of program accomplishments.

### Landowner Planting Report Template

Landowners who install trees themselves complete a simplified Landowner Planting Report documenting planting activities. The template records planting dates, species and quantities received and planted, planting methods, any challenges encountered, and survival observations. The report confirms that trees were planted as planned and provides baseline information for subsequent monitoring.

### Monitoring Report Template

The Monitoring Report Template is used for both contractor-monitored and landowner-monitored projects. The form records the date of monitoring, overall survival rate, survival by species if multiple species were planted, tree health and growth observations, evidence of damage or problems, weed control and maintenance activities completed, and

recommendations for future care. Photographs documenting current conditions are included. Monitoring reports are completed at one year and three years after planting.

## **Invoice Template**

Contractors submit invoices for approved project work using a standard invoice template. The template identifies the project, describes work completed, itemizes costs according to established payment schedules, and includes required documentation such as planting reports and photographs. The standardized format ensures consistent information for payment processing and financial tracking.

All program forms and templates are available from NDPF program staff by phone, email, or through the NDPF website. Forms are provided in fillable PDF format for electronic completion or can be printed and completed by hand.

## Appendix B: Technical References

The Planting for the Future program is based on established technical standards and best management practices for tree planting in North Dakota. This appendix summarizes key technical references that inform program design and implementation. Complete technical standards are available through the referenced agencies.

### NRCS Practice Standards

Practice Standard 612 - Tree/Shrub Establishment. This standard establishes specifications for planting woody plants including site preparation requirements, seedling quality standards, planting methods, timing, spacing, and post-planting care. Key provisions include:

- Site must be free of competing vegetation before planting
- Seedlings must meet minimum size and quality standards
- Planting depth must place roots at natural depth with no j-rooting
- Planting density varies by species and purpose, typically 6 to 12 feet spacing
- Minimum 70 percent survival required for successful establishment
- Weed control required for at least three years after planting

Practice Standard 645 - Upland Wildlife Habitat Management. This standard covers creation and management of upland wildlife habitat including food and cover plantings. Key provisions include:

- Species selection must match site conditions and target wildlife
- Plantings should include diverse species providing seasonal food and cover
- Configuration should provide edge habitat and travel corridors where appropriate
- Minimum area standards for habitat effectiveness
- Management to maintain vegetation structure and composition

Practice Standard 380 - Windbreak/Shelterbelt Establishment and Renovation. This standard specifies requirements for windbreak design, establishment, and renovation. Key provisions include:

- Windbreak orientation should be perpendicular to prevailing winds
- Multi-row design provides optimal protection (typically three to five rows)
- Species selection should include tall trees, medium trees, and shrubs
- Row spacing of 12 to 16 feet, in-row spacing of 6 to 12 feet depending on species
- Dense configuration provides maximum wind reduction and snow trapping
- Protected zone extends 10 times windbreak height on leeward side

Complete NRCS practice standards and supporting technical notes are available through local NRCS offices or online at the NRCS Conservation Practice Standard Library.

### Species Suitability and Selection

Species recommendations are based on adaptation to North Dakota climate zones, soil conditions, and intended conservation purposes. Primary references include:

- The North Dakota Tree Handbook (NDSU Extension)
- Conservation Trees and Shrubs for North Dakota (ND Forest Service)
- NRCS plant materials guides for North Dakota

General selection guidelines:

- Conifers are recommended for wind protection and year-round screening
- Deciduous trees provide summer shade and diversity
- Shrubs offer wildlife food, low screening, and exterior windbreak rows
- Native species are preferred for wildlife habitat plantings
- Species diversity improves resilience to pests, disease, and weather extremes

See Section 2 of this document for detailed species profiles and suitability tables.

## Spacing Guidelines

Standard spacing recommendations ensure adequate tree development and planting effectiveness:

### Windbreak Spacing:

- Between rows: 12 to 16 feet
- Within rows (conifers): 10 to 12 feet
- Within rows (deciduous trees): 8 to 10 feet
- Within rows (shrubs): 6 to 8 feet

### Wildlife Habitat Spacing:

- Generally wider spacing than windbreaks
- 10 to 16 feet between rows
- 8 to 12 feet within rows
- Spacing creates more open structure for wildlife movement

### Riparian Buffer Spacing:

- Varies by zone (tree zone, shrub zone, grass zone)
- Generally 8 to 12 feet spacing in tree zone
- 6 to 8 feet spacing in shrub zone

## Planting Methods

**Bare-root Seedling Planting.** All program plantings use bare-root seedlings. Proper planting method is critical to survival:

- Plant immediately after receiving seedlings; keep roots moist if delay is necessary
- Dig or create planting hole deep enough for roots at natural depth
- Spread roots naturally; do not curl or j-root
- Firm soil around roots to eliminate air pockets
- Plant at same depth seedling grew at nursery (look for color change on stem)
- Water after planting if soil is dry

**Machine Planting.** Tree planting machines open a furrow, place seedling, and close soil in one operation. Machines are efficient for large plantings in tillable ground. Critical factors include:

- Soil must be at proper moisture (not too wet or too dry)
- Machine must be properly adjusted for seedling size and soil conditions
- Planting depth must be checked frequently

- Soil must be properly firmed around roots
- Follow-up inspection ensures acceptable planting quality

Hand Planting. Hand planting using dibble bars or spades is appropriate for small plantings, rough terrain, or sites where machine access is limited. While slower than machine planting, hand planting allows precise placement and is often used for high-value or difficult sites.

Complete planting method specifications are found in NRCS Practice Standard 612 and NDSU Extension publication "Establishing Trees and Shrubs in North Dakota."

## Appendix C: Contractor Requirements and Guidelines

Qualified contractors are essential to the success of the Planting for the Future program. This appendix summarizes contractor qualifications, responsibilities, and workflow. The complete Contractor Requirements and Guidelines document, including detailed specifications and procedures, is available from NDPF program staff.

### Contractor Qualifications

Contractors must demonstrate:

- Experience in conservation tree planting in North Dakota or similar climates
- Knowledge of tree species, site assessment, and planting design
- Ability to prepare technically sound planting plans
- Access to appropriate planting equipment or installation capabilities
- Commitment to quality work and program standards
- Professional liability insurance (may be required depending on contract structure)
- Good standing with relevant licensing or certification programs if applicable

Contractors are approved by NDPF based on qualifications review and references. A limited number of contractors participate in the program annually based on anticipated project volume and geographic coverage needs.

### Three-Phase Workflow

Contractors work through a standardized three-phase process for each project:

**Phase 1: Site Visit and Planning.** The contractor schedules and completes a site visit with the landowner, assesses site conditions, discusses landowner objectives, develops an appropriate planting plan, and submits a Contractor Planning Report to NDPF. The planning report includes species recommendations, planting design, tree quantities, site preparation requirements, and cost estimates. NDPF reviews and approves the plan. The contractor orders seedlings from Towner State Nursery according to the approved plan.

**Phase 2: Planting and Installation.** The contractor coordinates seedling pickup from Towner State Nursery in spring, schedules planting with the landowner, completes site preparation if needed, plants trees according to program specifications and the approved plan, provides immediate post-planting care, instructs the landowner on maintenance requirements, and submits a Contractor Planting Report with photographs documenting completed work.

**Phase 3: Monitoring and Reporting.** The contractor monitors planted projects at one year and three years after installation, assesses survival and tree condition, identifies any problems or maintenance needs, provides recommendations to landowners, and submits Monitoring Reports to NDPF. Monitoring ensures accountability and provides data on project success rates.

### Documentation Requirements

Contractors must maintain thorough documentation for each project:

- Landowner contact information and project location
- Site assessment notes and observations

- Approved planting plan and design drawings
- Seedling order confirmations and pickup records
- Planting date, conditions, methods, and crew information
- Photographs at site visit, after planting, and during monitoring visits
- Survival counts and monitoring observations
- All correspondence with landowners and NDPF

Documentation supports quality control, enables program evaluation, and provides records for potential troubleshooting if problems arise.

## **Quality Standards**

Contractor work should reflect program quality expectations:

- Planting plans should incorporate industry best practices
- Species selection should be appropriate for site conditions and objectives
- Tree spacing and configuration should follow recommended guidelines
- Planting should be completed at proper depth with roots spread naturally
- Timing should be appropriate (spring, before bud break, soil conditions suitable)
- Survival rates should meet or exceed 70 percent at three years under normal conditions

NDPF reviews projects and may discuss corrective action if quality concerns arise. Contractors are expected to maintain the professional standards that have contributed to the program's strong track record.

## **Compensation**

Contractors are compensated for approved work according to established payment schedules:

- Site visit and planning: payment per project upon approval of planning report
- Planting and installation: payment per tree planted, species-specific rates
- Monitoring: payment per monitoring visit (year one and year three)

Payment rates are reviewed annually and adjusted as needed to reflect costs and ensure contractor participation. Detailed payment schedules are provided in the complete Contractor Requirements and Guidelines document.

The complete Contractor Requirements and Guidelines document is available from NDPF program staff and includes detailed specifications, procedures, forms, and contact information.

## Appendix D: Species Profiles

Detailed information about tree and shrub species approved for use in the Planting for the Future program is provided in Section 2 of this document. This appendix provides a condensed summary table of approved species and their primary characteristics as a quick reference. For complete species profiles, growing requirements, and management recommendations, consult Section 2 and the references listed below.

### Approved Species Summary Table

(Other species may be approved depending on project details)

Common Name	Scientific Name	Type	Height at Maturity	Growth Rate	Primary Uses
Rocky Mountain Juniper	<i>Juniperus scopulorum</i>	Conifer	20-30 ft	Slow	Windbreaks, wildlife habitat, year-round screening
Ponderosa Pine	<i>Pinus ponderosa</i>	Conifer	40-60 ft	Moderate	Tall windbreaks, visual screen, wildlife cover
Black Hills Spruce	<i>Picea glauca</i> var. <i>densata</i>	Conifer	30-50 ft	Slow-Moderate	Windbreaks, ornamental, dense screening
Colorado Spruce	<i>Picea pungens</i>	Conifer	40-60 ft	Slow-Moderate	Windbreaks, specimen tree, year-round screening
Hackberry	<i>Celtis occidentalis</i>	Deciduous	40-60 ft	Moderate	Windbreaks, wildlife food, hardy shade tree
Siberian Elm	<i>Ulmus pumila</i>	Deciduous	40-60 ft	Fast	Windbreaks, screening, fast-growing option
Bur Oak	<i>Quercus macrocarpa</i>	Deciduous	50-70 ft	Slow	Long-term windbreaks, wildlife food, durable
Buffaloberry	<i>Shepherdia argentea</i>	Shrub	8-12 ft	Moderate	Wildlife food, nitrogen-fixing, thorny screening
Chokecherry	<i>Prunus virginiana</i>	Shrub/Small Tree	15-20 ft	Moderate	Wildlife food, thicket formation, erosion control

American Plum	Prunus americana	Shrub/Small Tree	12-18 ft	Moderate	Wildlife food, spring flowers, thicket formation
Common Lilac	Syringa vulgaris	Shrub	10-15 ft	Moderate	Ornamental, fragrant flowers, screening
Caragana	Caragana arborescens	Shrub	10-15 ft	Fast	Nitrogen-fixing, screening, hardy windbreak shrub

### Notes on Species Selection

Species selection should be based on careful evaluation of site conditions (soil, exposure, moisture), intended conservation purpose (wind protection, wildlife, screening), space available, and desired characteristics (height, growth rate, seasonal interest). Not all species are suitable for all sites or purposes.

**Conifer Considerations:** Conifers provide year-round wind protection and screening. They are essential components of effective windbreaks. Most conifers are slow to moderate growers and require patience but provide lasting benefits once established.

**Deciduous Tree Considerations:** Deciduous trees grow faster than most conifers and provide summer shade. They lose leaves in winter, offering less wind protection during cold months. They are valuable for height, diversity, and seasonal interest.

**Shrub Considerations:** Shrubs provide low-level screening, wildlife food and cover, and diversity in multi-row plantings. Many produce flowers and fruit, offering aesthetic and ecological benefits. Shrubs typically establish quickly.

### Complete Species Profiles

For detailed information about each species including botanical characteristics, adaptation zones, soil requirements, moisture needs, wildlife value, growth habits, potential problems, and management recommendations, refer to Section 2 of this document.

Additional species information is available in the following publications:

- Conservation Trees and Shrubs for North Dakota. North Dakota Forest Service. Comprehensive profiles of all species available from Towner State Nursery.
- The North Dakota Tree Handbook. NDSU Extension publication covering tree species, planting, and management for North Dakota.
- NRCS Plant Fact Sheets. USDA Natural Resources Conservation Service plant materials information including North Dakota adaptation data.

These publications are available online or from the agencies listed in Section 9.2 Contact Information.