Late-Successional and Old-Growth

Forest Conservation Strategies for Maine

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MAINE DEPARTMENT OF AGRICULTURE CONSERVATION & FORESTRY

Amanda E. Beal, Commissioner
Nancy McBrady, Deputy Commissioner
Jo D. Saffeir, Deputy Commissioner
18 Elkins Lane, Augusta, ME 04333
(207) 287-3200
maine.gov/dacf

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Executive Summary

Maine's late-successional and old-growth (LSOG) forests represent some of the state's most ecologically valuable landscapes. They support exceptional biodiversity, provide habitat for specialized species, store significant amounts of carbon, and serve as important reference systems for understanding natural forest development. At the same time, Maine's forests support one of the state's largest natural resource industries. Because most of Maine's forestland is privately owned, effective conservation depends on strategies that recognize both ecological values and the importance of working forests to landowners, rural communities, and the forest products sector.

Pursuant to LD 1529, *An Act to Enhance the Protection of High-value Natural Resources Statewide*, the Department of Agriculture, Conservation, and Forestry (DACF) prepared this report to evaluate statewide strategies for conserving old-growth forests, enhancing the conservation of late-successional forests, and supporting the development of transitioning LS forests. As required by the legislation, the report incorporates ecological, economic, and social considerations, drawing on input from forest landowners, industry representatives, logging contractors, procurement foresters for wood mills, conservation organizations, researchers, and the public.

The report maintains that LSOG conservation can be best achieved through a portfolio of voluntary, science-based strategies. Successful conservation relies on accurate field identification, consideration of landscape context, and collaboration among stakeholders. The strategies evaluated in this report include temporary and permanent conservation, ecological forest management, forest certification, carbon markets, emerging biodiversity markets, and other existing conservation mechanisms. These approaches are evaluated using four criteria: voluntary participation, conservation effectiveness, stakeholder impact, and financial support.

Collaborative, voluntary strategies offer the greatest opportunity to conserve Maine's oldest forests while supporting the people, communities, and industries that depend upon Maine’s forested landscape.

Introduction

Maine's late-successional (LS) and old-growth (OG) forests (LSOG forests) are among the state's most ecologically rich landscapes. These forests provide critical habitat for wildlife,[2-4] store vast amounts of carbon,[5] and support ecological characteristics and species that are less common or rare elsewhere[6-8]. Scientifically, they serve as key reference points for understanding how our forests are changing.[9-11] They also hold deep recreational, aesthetic, and legacy value for Maine communities and future generations.[12] At the same time, these high-volume forests are largely on privately owned lands and provide important wood supplies for the forest products industry.[13]

Public and scientific interest in LSOG forests in Maine is increasing. In response, Maine's 132nd Legislature passed LD 1529, which charged DACF with developing strategies to conserve LSOG forests. LD 1529 stipulated that the Department "develop a comprehensive report on statewide strategies to enhance the conservation of late-successional forests and old-growth forests, including the management of transitioning late-successional forests."[14]

It also stipulated that DACF "incorporate ecological values, carbon sequestration methods, and economic considerations from a broad range of perspectives, including forest landowners, forest industry representatives, logging contractors, conservation interests, and local economies." This report addresses the legislative requirements outlined in LD 1529.

Economic and Social Context

For thousands of years, people have managed the forests in what we now call Maine, and these forests have been central to cultures throughout that time.[15] They have provided food, shelter, economic opportunity, and habitat for a wide range of plants and animals.

For the Wabanaki, forests are central to both daily life and spiritual identity.[16] While OG forests are often assumed to be places without human interaction, Wabanaki forest relationships show that human interaction is part of the ecosystem of Maine forests and has been for thousands of years. Documentation of this use is extensive. Recently, a 700-year-old dugout canoe was excavated from a mud flat in Kennebunkport, carved without metal tools from a single yellow birch log. The tree for such a canoe would have likely been 30" in diameter. The use of the forest was intentional and widespread, and rooted in Wabanaki spirituality, cultural practices, and foodways. However, its lasting ecological impact on forest dynamics, in intensity and extent, is not well understood. In the period

after European colonization, timber, particularly in Maine, was among the most abundant and readily exported commodities, fueling a growing economy.[17] White pine, in particular, spurred rebellion by colonists long before the Revolutionary War. England, having depleted most of its own timber, depended on global acquisition and trade to supply its navy with masts. In what is now Maine, the Crown claimed the timber for its own, over the objection of colonists. Versions of the "pine tree flag" were first flown during the revolution, long before Maine became a state.[18]

Maine's most biologically diverse forests generally occur in southern Maine.[19] In these regions, early land surveyors recorded maple and beech forests as promising farmland, due to the land's rich soils.[20] These areas were among the first to be cleared and settled, and as a result, much of southern New England was once completely deforested. Lands that remained forests were generally not considered "good enough" for another purpose economically. The amount of land cleared for agriculture peaked in the mid-to-late 1800s, when industrialization and westward expansion led to farm abandonment and the return of forests. As a result, much of Maine's southern, central, and coastal regions are occupied by houses, towns, farms, and second-growth forests. Similar patterns of settlement, forest clearance, and re-growth occurred in some areas of northeastern Maine, which also had high-quality soils and access to early travel networks. In more remote areas, Maine's forests and waterways were primarily affected by timber harvesting during the river drive era, from the mid-17th to the mid-20th century.[21]

Much of the land now protected was likely harvested multiple times in centuries past.[22] The landscape has changed dramatically in the last 300 years, yet there are still some forests that have not seen human intervention.

According to the Maine Forest Service, Maine is 88% forested, and 92% of that forestland is privately owned. Most Maine communities are located in or near forests, and many depend on them to some degree for their livelihoods. Maine's forest products sector provides nearly 30,000 jobs and harvests approximately 2.4 million tons per year.[23] There is the biological capacity to increase this harvest significantly, as Maine's forests grow 1.55 tons of wood for every ton that is harvested.[24] Recent declines in demand for forest products, especially paper, have resulted in the loss of jobs and economic contributions, but the ability of the forests to provide future economic opportunities is significant.

Maine's forest products sector contributes $8.3 billion annually to the state's economy. It remains a primary source of employment in many Maine communities, many of which have struggled over the past two decades.[25] Harvesting, infrastructure, and energy costs have increased, outpacing the price and demand for finished wood products. Inflation is exacerbating price and demand issues. Most of the reductions in harvest volume in recent

years are the result of the loss of pulpwood and biomass markets.[26] The markets that remain matter more than ever. In the long term, LSOG stands may contain some of the most valuable wood Maine has to offer.

Maine's forest product sector is supplied by well-stocked forests ranging in maturity and ecological development from 60-year-old clear cuts to LSOG forests. Most of this wood may not come from LSOG forests because LSOG forests are a modest fraction of Maine's well-stocked forests. Many stands have been harvested multiple times over the last three centuries. Because of both abundant natural regeneration and forest management efforts, Maine's forests continue to provide a sustainable supply of wood products.

Despite the intensive land use history described, some LSOG forests remain.[27, 28] The relative rarity of these forests is accompanied by an incomplete ecological understanding of the full range of biodiversity, in terms of their species richness and ecological function, and the implications of their continued harvest. Loss of LSOG will reduce LSOG-dependent species. These population declines risk becoming irreversible and may continue for decades or even centuries, before eventually leading to their extirpation in Maine.[29, 30] This phenomenon has been primarily documented in Europe and the western U.S. In Maine. Intact, isolated LSOG stands may support LSOG-dependent or unique species over the long term, but it remains uncertain whether these natural communities can persist.

The area of forestland in conservation has steadily increased over the last several decades. While much of this conservation effort focuses on limiting development (keeping forests as forests), there have been steady efforts to limit harvesting in such areas as well. Conservation groups estimate there are 776,258 acres in Maine where logging is excluded in perpetuity through easement or fee ownership, often referred to as "forever wild".[31] Given the second-growth character of much of this land, very little of it is OG or has likely developed into LS in the few recent decades that have seen increased conservation efforts. In theory, these forested acres will, in time, develop some LS attributes. If conservation efforts continue, the number of acres subject to timber-harvesting restrictions will likely increase over time. Nonetheless, there are significant differences between second-growth forests that are growing toward a LS condition and those of functional and persistent OG forests. As these forests develop, second-growth forests will attain some ecological values that undisturbed LSOG stands currently provide, but not all of them.[32, 33] Most conservation biologists conclude that the ecological value held in intact OG forest is irreplaceable.[34]

Stakeholder Input

LD 1529 charged DACF with soliciting feedback from a "broad range of perspectives," including "forest landowners, forest industry representatives, logging contractors,

conservation interests, and local economies." In response, the Department undertook three approaches to ensure broad input, including convening a work group (Appendix A) to solicit feedback on potential LSOG conservation strategies. This group met monthly from March to October, including a field day to observe and discuss LSOG forest characteristics and conservation (described in the meeting notes in Appendix C). These meetings were also open to the public, who had the opportunity to provide comments at each meeting. In addition to this monthly engagement, the Department solicited feedback on draft conservation strategies through a public comment period. Although this report considers a diverse range of stakeholders and perspectives, the Department does not assert that it represents consensus among work group members or the public.

LSOG Ecology and Silviculture

Definitions

Defining OG, LS, and transitioning LS forests is a difficult task.[35] Biological systems are complex, and different forest type groups exhibit "OG" characteristics differently. The distinctions between LSOG categories occur on a gradient, often without clear thresholds.[36]

The characteristics used to evaluate these forests include **structure** (tree size, density, distribution, and condition), **composition** (tree species, lichens, beetles, etc.), **ecological processes** (forest patterns, natural disturbance regimes, and natural soil processes, and habitat), and **human legacy** (roads, farming, and logging).[37, 38] To properly apply LSOG conservation, a forest's ecological conditions and LSOG status need to be verified on the ground by qualified professionals.

Many different definitions and terms are used to describe OG, LS, and transitioning LS forests. The definitions listed here are informed by many reviewed sources as well as stakeholder input.

OG forests represent the most advanced stage of forest development and are best understood as a dynamic set of conditions rather than a specific age.[39-42] They are characterized by a high degree of structural complexity, ecological continuity, and natural processes that have developed over long periods of time with minimal stand-replacing disturbance or human intervention. Typical characteristics include large, centennial tree species, complex canopies, abundant standing dead trees and coarse woody material, irregular stand structure, and specialized plant, fungal, lichen, bryophyte, and invertebrate communities. Because Maine's forest types differ in their natural development, disturbance regimes, and longevity, the specific characteristics of OG forests vary among

northern hardwood, northern conifer, hemlock, cedar, and other forest types. OG forests are distinguished from LS and younger forests by the fact that OG forests have no or little history of human disturbance. No single set of measurements can universally define OG forest across all forest types.

LS forests are mature forests that have developed many, but not necessarily all, of the structural, compositional, and functional characteristics associated with OG forests.[43-45] These stands often contain large trees, developing canopy complexity, increasing quantities of deadwood, and ecological processes such as natural stand dynamics that more closely resemble OG forests than intensively managed stands. The ability of these forests to regain the unique values that OG forests provide is uncertain and depends, in part, on the intensity of past management and fragmentation. As with OG forests, the expression of LS characteristics varies among ecological forest types, reflecting differences in species composition, natural disturbance regimes, soils, and site productivity.

Transitioning LS forests are developing stands that are progressing from younger or previously managed conditions toward LS structure and function.[46] They are beginning to accumulate characteristics such as larger trees, increasing canopy stratification, greater structural diversity, and expanding amounts of standing and downed deadwood, while still retaining evidence of past management. However, as with LS forests, it is uncertain how many characteristics unique to OG forests can be achieved through the preservation or management of transitioning LS forests. As with OG and LS forests, the appearance and trajectory of transitioning LS forests vary among ecological forest types, and the pathways leading toward LS or OG conditions are not identical across Maine's diverse forest ecosystems. Transitioning LS forests have widely differing histories of human use. They include forests that were commercially clear-cut decades ago, which may take centuries of development to achieve OG conditions, as well as forests that have grown up on former cropland and pasture, which may never develop OG conditions.

LSOG Ecological Characteristics

The most noticeable characteristics of LSOG forests are structural.[47] Large centennial tree species, large cavity and snag trees, large, downed logs, and decomposing material make these forests stand out in comparison to their managed counterparts. Deadwood microhabitats provide food and shelter for wildlife, from bears to less common species such as black-backed woodpeckers. There are many other important characteristics for evaluation, however. Each characteristic is a piece of evidence and is a possible indicator of a stand's status.

LSOG characteristics differ by forest community. Table 2 offers a general rubric, and this report summarizes northern hardwood, northern conifer, hemlock, oak-pine, and cedar forests, with detailed tables in Appendix B. Although other forest types also warrant conservation, these types cover the largest areas. Landscape-specific ecosystems, such as floodplain and montane forests, are also priorities and support additional tree and woody plant species. While logging can affect these areas, climate change and other land uses often have greater impacts.

The rarity of these LSOG characteristics elevates their importance for conservation.[48] How these characteristics are arranged on the landscape also matters, as species loss is dependent on dispersal-limited organisms having insufficient or discontinued conditions for sustained populations.[49] The size of the area conserved, and its connectivity to other populations, dictate the rates of reproduction and whether the population can be sustained. Managing the surrounding forest also plays an important role in the microclimates of these stands and should therefore be considered. Protecting buffers around priority LSOG stands has been recommended to reduce direct and indirect effects from the surrounding managed landscape.[50] These buffers are often left unharvested, though ecological silvicultural practices described below may also protect the LSOG core.[51]

Table 1 LSOG forest characteristics, and what they indicate.[52-58]

LSOG forest Assessment Category	Key Characteristics	What It Indicates
Composition	Shade-tolerant centennial species, shade-tolerant regeneration, late-seral mosses, other bryophytes, lichens, fungi, and saproxylic insects	The biological community characteristic of mature, undisturbed forests.
Structure	Large, old trees, large cavity trees and snags, large downed coarse woody material, quantity and diversity of deadwood, multi-layered, multiple age and size classes, natural canopy gaps, irregular stand structure	The physical complexity and habitat diversity of the forest.
Ecological Processes	Natural disturbance and gap dynamics, ecological continuity, natural regeneration, soil development and decomposition, carbon accumulation and storage, hydrologic function (where applicable)	The extent to which natural ecosystem processes drive forest development.
Human Legacy	Evidence of harvesting or land use, influence of past management on species composition and stand structure, and recovery of ecological processes from disturbance	The degree to which historical human disturbance continues to shape the forest.

LSOG and Silviculture

Managing forests for LS and OG characteristics involves transitioning from standard industrial rotations toward methods that prioritize ecological continuity and structural complexity.[59, 60] These methods generally focus on retaining the stands' current LS values and tending the forest to produce more. While traditional management focuses on harvesting trees at their economic optimum (40–100 years),[61] managing for LSOG characteristics requires allowing stands to reach later stages of development (100–200+

years).[62] Silviculture can also be used to complement other strategies to mitigate impacts to stakeholders and fiber supply by increasing the productivity and value of non-LSOG stands. This concept is further discussed in the *Tools* section below.

Principles of LSOG Management

The core framework for these management practices is often summarized by the "four Rs":[63]

- **Structural Retention:** Deliberately maintaining "structural legacies", such as large live trees, snags, and downed logs during and after commercial harvests to mirror the outcomes of natural disturbances.
- **Restoration Forestry:** Using active silvicultural treatments, such as crown release, to accelerate the growth of individual trees into larger diameter classes and increase structural diversity faster than natural processes alone. It also includes the control of invasive species if they are detected.
- **Long-Rotation Forestry:** Intentionally increasing the time interval between a stand's initiation and its final harvest to allow stands to age and develop the complex multi-layered canopies characteristic of older forests.
- **Reserves:** Utilizing "passive" restoration by setting aside high-value patches from harvesting to preserve existing OG and allow younger stands to transition undisturbed.

Beyond these broad categories, practitioners use ecological silviculture, such as irregular shelterwood or group selection, to emulate natural gap dynamics. The goal is to shift focus away from what is being removed to what is being left behind. This involves specifically targeting a diameter distribution that reallocates growing space to foster a high density of very large, old "legacy" trees, and ideally never fully losing any of the multiple cohorts typically present in LSOG stands to harvesting.

Challenges to Achievement

Managing LSOG characteristics poses challenges because it requires balancing ecological goals with standard economic and operational practices. Key challenges include:

- **Opportunity Costs:** LSOG conservation is an economic as well as an ecological challenge.[64] Allowing stands to reach 150+ years represents a significant loss of near-term income from high-volume timber, making voluntary protection unlikely without external financial incentives or markets for ecosystem services. While this is primarily a direct opportunity cost for landowners, other elements of the wood

supply chain, including mills, loggers, and truckers, also incur indirect costs associated with those choices.

- **Maintaining Key Ecological Conditions:** Standard harvesting openings are typically much larger than the small treefall gaps (<0.1 acre) that drive natural LSOG dynamics.[65] Additionally, when management disturbances are added to natural disturbances, the combined effect may diverge from the intended disturbance goals. Silviculture cannot easily reproduce the quantity, size, or advanced decay stages of deadwood found in true OG forests. Large snags and downed logs develop over centuries and cannot be created quickly through management.
- **Novel Biological Threats and Climate Change:** Older forests remain vulnerable to pests and pathogens, such as beech bark and beech leaf disease, hemlock woolly adelgid, and other invasive species, which can abruptly simplify complex structures and cause significant carbon loss.[66]
- **Landscape Connectivity:** While individual patches can be managed, maintaining regional biodiversity may be limited without efforts to maintain landscape connectivity between LSOG stands, across the landscape, and over time, despite the challenges of predicting future forest conditions.[67]

Table 2. General LSOG Forest Rubric

Characteristic	Old-growth	Late-successional	Transitioning late-successional
Composition	Dominated by long-lived, shade-tolerant species in both the canopy and regeneration. Well-developed communities of late-seral mosses, lichens, liverworts, fungi, saproxylic beetles, and other specialized organisms.	Dominated by shade-tolerant species. Many late-seral species are present, but their abundance and diversity are variable.	Shade-tolerant species are becoming established, but early- and mid-successional species remain common. Late-seral organisms are limited or absent.
Structure	Numerous large, old trees; abundant large snags and coarse woody material; complex, multi-layered canopy; multiple age and size classes; frequent natural canopy gaps; highly irregular stand structure; and pit and mound topography	Large trees are common. Structural complexity is developing, but deadwood, canopy layering, and multiple cohorts are less abundant than in OG. Natural canopy gaps may occur but are less common.	Some large trees may be present. Large snags and logs are limited; the canopy is relatively simple, there are few age classes, little deadwood, and few or no natural canopy gaps. Stand structure still reflects previous human disturbance.
Ecological Processes	Forest dynamics are driven almost entirely by natural disturbance and gap-phase succession. Ecological continuity is high, with natural processes shaping stand development over long periods.	Natural processes dominate stand development, but legacies of past human disturbance remain evident in species composition or stand structure. Ecological continuity is partially restored.	Stand development remains strongly influenced by past human disturbance. Forest succession and recovery processes are as influential as, or more influential than, natural disturbance in shaping stand conditions.
Human Legacy	Little or no evidence of past harvesting, land clearing, agriculture, drainage, or other intensive human disturbance. Human legacies are absent or ecologically insignificant.	Past human disturbance is clear but no longer dominates the stand condition. Historical legacies remain visible, but many LS characteristics have developed.	Evidence of past human disturbance is readily apparent and continues to shape stand composition, structure, and ecological processes. Recovery toward LS conditions is ongoing. The lack of pit-and-mound topography may hinder species recovery.

Strategies for Conservation

LSOG status in the landscape

Conservation strategies applied specifically to protect LSOG stands are predicated on the assumption that such stands are at least uncommon, and that harvesting or other human disturbance of such stands will further reduce their presence and future viability. Most studies indicate that OG forests are rare in Maine, and many conservation biologists recommend that they be protected because they are rare and have unique ecological qualities.[68, 69, 70] Estimates of LSOG abundance in Maine vary and are generally limited to the Unorganized Territories of Maine. It is widely accepted that LSOG forests also occur in organized towns. Further analysis and better data are needed in this regard. Available sources provide different assessments of LSOG presence in the Unorganized Territory, and are derived using different datasets and data types, methodologies, and analytical tools [71]. They also apply different criteria and metrics to distinguish between old growth, late successional, transitioning LS, and other forests. As a result, they have reached different conclusions about the proportion of the landscape covered by LSOG forests, though all agree that LSOG is a fraction of Maine's landscape. Data for Maine's organized towns require additional analysis due to data limitations and more complex forest types. Finally, these same differences in data sources and methodologies mean that estimates of the rate of change in LSOG acreage, both regionally and statewide, vary and require a better understanding.

There is general agreement that LSOG currently occupies a small percentage of the landscape. Estimates vary, and considerable ongoing work is underway to refine quantitative estimates and trends using new data sources and established definitions of LSOG. Understanding the prevalence of LSOG forest in Maine will better inform the scalability of specific conservation strategies required. It will also help advise where Maine’s investment in LSOG conservation would be most effectively directed.

In addition, Maine has an estimated 776,258 acres where harvesting is restricted by easement or other legal agreement, though protection of existing LSOG has typically not been the primary purpose of these efforts. Other forests are voluntarily being reserved from harvesting by landowners, including some that have been left unharvested for decades. Many, but not all, of these acres will develop valued older-forest characteristics over time. This process may take decades or even centuries before LSOG-associated species re-colonize these areas, and before we know whether LSOG restoration is successful. Hence, a strategy of waiting for future LSOG forests to develop may not succeed at conserving all

LSOG species. Evaluating these protected forest areas would help clarify their current and future contributions to conservation.

Conservation strategies need to be assessed at the landscape level but verified at the stand level. Mapping products can flag areas for potential conservation, and stand-level field verification can confirm rarity and conservation value. Future environmental and anthropogenic impacts to LSOG forest are difficult to predict. Hence, conservation efforts should prioritize ecological quality, stand size, and continuity. An assessment of the regional status of LSOG across all of Maine could also provide further guidance on the most effective use of the strategies described below.

Strategy Criteria

Using the available information, the Department has identified the following criteria to evaluate the likely impact and effectiveness of LSOG conservation strategies in achieving defined conservation objectives. **Not all LSOG conservation strategies meet the four criteria below, but those that do are likely to yield the best outcomes.** Different strategies could also be combined to achieve broad objectives.

Voluntary

A voluntary strategy is one in which LSOG conservation is adopted voluntarily, typically by a landowner. Voluntary measures strengthen the collaborative relationships between various stakeholders and increase the likelihood of broad-based support.

Effective

An effective strategy ensures that LSOG forest characteristics are conserved for a meaningful time period, either long-term or permanently. Credible confirmation of a forest's status as LSOG forest is a prerequisite for an effective strategy. This includes the assessment of each forest stand by a qualified professional. Strategies that fail to conserve LSOG forests, their unique characteristics, or over an ecologically meaningful time period, are not considered effective.

Impact Analysis & Collaboration

An analyzed strategy is one in which the socioeconomic impact of implementation is understood. These strategies engage the stakeholder(s) impacted by the LSOG conservation approach to identify specific outcomes if the strategies are pursued.

Financial Support

Financial support is often required to implement a conservation strategy, either to fund the identification, verification, and execution of legal mechanisms or to compensate affected parties for economic losses (e.g., loss of timber revenue). These considerations are

especially true for permanent conservation, as forests are resources that can naturally regenerate and perpetually produce commercial wood products, thereby generating financial value. A strategy involving compensation is designed to offset the financial impacts of LSOG conservation on landowners and possibly other affected parties. Successful strategies may require a thorough analysis of financial compensation needs and economic impacts, as well as the identification of a funding source.

Market-based strategies generate funds from private sources but may or may not merit additional funding. For example, forest certification is pursued by forest landowners and others in response to market factors, but it rarely provides a financial premium for landowners and is typically an added financial cost to landowners and loggers. LSOG-compatible ecosystem service strategies that provide market-based payments, on the other hand, have yet to materialize and may or may not afford their own capital. LSOG-specific carbon markets have been hypothesized, but they have yet to materialize.

Sources of funding for conservation strategies that other studies and experts have proposed include:[72-75]

- **Federal:** USDA Farm Service Agency and other USDA Grants (including those funneled through the State), Forest Legacy, Research Cooperatives.
- **Academic:** Research Cooperatives; National Science Foundation, and similar research funding sources.
- **State:** State Bond and other state funding mechanisms.
- **Philanthropy:** Private Fundraising, Foundations, NGOs.
- **Land Trades:** Exchange of assets among landowners

Conservation Mechanisms

Before articulating potential LSOG conservation strategies, it is important to note that strategies are typically comprised of mechanisms between parties to achieve a particular outcome, in this case, LSOG conservation. Common mechanisms for implementing strategies are listed in Table 3 below. Note as well that these mechanisms are already being employed to achieve conservation outcomes other than LSOG conservation.

Table 3: A list of conservation mechanisms for conserving LSOG forest.

Mechanism	Temporary	Permanent	Market-Based	Silviculture & Management
Market Demand (Certification, Carbon, Biodiversity Credits)	✓		✓	
Conservation Easements		✓		
Fee Purchase		✓		
Timber Deeds	✓	✓	✓	
Timber Contracts & Agreements (Harvest Deferrals, Rights Agreements)	✓			✓
Land Management (Reserves, Landscape Planning, Triad, Long Rotations)		✓		✓
Silviculture (Retention, Recruitment, Restoration, Structural Enhancement)				✓

Potential Strategies for LSOG Conservation

DACF has identified a variety of strategies that could be employed to achieve LSOG conservation. These are grouped by categories: Temporary Conservation, Permanent Conservation, Management, and Market-based Approaches. The strategies described are not original nor exhaustive, but they represent approaches that could satisfy the *Strategy Criteria described below.* Some of these strategies have already been applied in a variety of conservation projects over many years. Potential funding sources are identified for each strategy, though multiple sources may support any given strategy. The most appropriate strategy may depend on landowner size, type, and region, as well as the availability of willing landowning sellers.

For all strategies, conserving the ecological characteristics of LSOG forest is central to their design, and the system's long-term function is the goal.

Temporary Conservation

Voluntary Deferral

Voluntary deferral strategies pay for short-term no-harvesting agreements. These temporary agreements give conservation interests time to develop long-term solutions for permanent conservation.

Voluntary deferral strategies already exist in Maine, though not until very recently. This strategy uses USDA Forest Service funding for a termed agreement, while permanent solutions are being considered**.** It also takes into account the impact of harvest deferral on loggers by investing in silviculture treatments in managed forests, where loggers can be employed elsewhere. The concept addresses concerns about wood supply reductions.

Other examples of temporary strategies would include contracts or timber deeds. Loggers have historically used timber deeds to purchase standing timber for harvest. They are usually temporary, whereas conservation easements are usually permanent. A conservation group could purchase a timber deed without exercising its right to harvest the trees.

The farming sector has employed this strategy through the USDA Farm Service Agency (FSA) for temporary, or "termed," conservation. Although LSOG is likely ineligible for this

CASE STUDY

SUMMARY: **NEFF HARVEST DEFERRAL STRATEGY**

THE NEW ENGLAND FORESTRY FOUNDATION HARVEST DEFERRAL STRATEGY IS A **V**OLUNTARY, INCENTIVE-BASED EFFORT TO TEMPORARILY PROTECT MAINE'S REMAINING LATE-SUCCESSIONAL AND OLD-GROWTH (LSOG) FORESTS WHILE LONG-TERM SOLUTIONS ARE DEVELOPED. IT PAYS WILLING LANDOWNERS TO DELAY HARVESTS IN FORESTS AT LEAST 150 YEARS OLD THAT FACE NEAR-TERM HARVEST. DEFERRALS LAST 5–15 YEARS, WITH PAYMENTS BASED ON TIMBER VALUE, WITH FUNDING DIRECTED TO IMPROVEMENTS ON OTHER ACRES.

RESULTS

- DELAY HARVEST OF HIGH-VALUE LSOG FORESTS TO SUPPORT LONG-TERM PROTECTION.
- MAINTAIN WOOD SUPPLY BY IMPROVING YOUNGER FOREST PRODUCTIVITY THROUGH ACTIVITY INCENTIVES.
- MINIMIZE LEAKAGE BY AVOIDING HARVEST DISPLACEMENT TO OTHER REGIONS.
- IMPROVE PRODUCTIVITY ON MANAGED LAND THROUGH BETTER FOREST PRACTICES.
- COMPENSATE LOGGERS' LOST OPPORTUNITY COSTS.

CRITERIA ASSESSMENT

- ✓ VOLUNTARY: TWO OR MORE WILLING PARTICIPANTS.
- ✓ EFFECTIVE: IDENTIFIED LSOG CONSERVED.
- ✓ STAKEHOLDER IMPACTS STUDIED AND ADDRESSED.
- ✓ USFS FUNDED.

program as currently designed, it's conceivable that a comparable program could be designed for forest landowners.

For such federal Strategies, Adjusted Gross Income (AGI) caps on participating landowners may preclude large landowners from being eligible for federal funding, though, in some cases, cooperating conservation groups can be applicants on such disqualified lands. Also, some funding programs, such as the Forest Legacy Program, expect permanent protection.

Permanent Conservation

Precision Conservation Easements

Easements are transfers of one or more rights associated with property to a holder who paid for those rights. The most common form of conservation easement in Maine is the transfer of development rights, which are then not exercised. The rights to harvesting timber are sometimes sold as well.

Conservation easements for LSOG values have existed in Maine for a very long time. However, they are more often applied to younger forests to protect a wide array of values, including, in some instances, the aim of promoting the development of LSOG forest characteristics and LSOG recruitment.

HYPOTHETICAL CASE STUDIES
EXAMPLE: **PRECISION EASEMENTS**
AN NGO REGULARLY HOLDS EASEMENTS AND SEEKS TO CONSERVE LSOG FOREST ON NEIGHBORING COMMERCIAL LAND.

RESULTS

- NGO BUYS A PRECISION EASEMENT PROHIBITING HARVEST ON THE LSOG STAND AND BUFFER, MAKING THE LANDOWNER WHOLE.
- FUNDED BY PRIVATE PHILANTHROPY AND LANDS FOR MAINE'S FUTURE.

VARIATIONS

- A FULL-PROPERTY EASEMENT COULD INCLUDE SPECIFIC RESTRICTIONS ON DESIGNATED LSOG STANDS.

CRITERIA ASSESSMENT

- ✓ VOLUNTARY: TWO WILLING PARTICIPANTS.
- ✓ EFFECTIVE: IDENTIFIED LSOG CONSERVED.
- ✓ ADDRESSES LANDOWNER IMPACTS.
- ✓ FUNDED.

POSSIBLE IMPROVEMENTS AND SHORTCOMINGS

- SEEK A 10-31 OPPORTUNITIES EASEMENTS ARE 1031-COMPLIANT REAL PROPERTY, HELPING LANDOWNERS BUY MORE LAND AND OFFSET IMPACTS.
- NGOS OR FUNDERS COULD ADDRESS LOGGER AND PROCESSOR IMPACTS TO STRENGTHEN THE MODEL.

"Precision" easements that target existing LSOG stands are not widely used in Maine. These are likely to come with high costs relative to their size, including high monitoring costs, but could still be a viable conservation approach, and may arguably be a more valuable endeavor. Modern conservation easements have recognized the complex needs

of society and how they might change in the future. Such thinking can be applied to stakeholder consultation and accommodations for LSOG conservation.

Tradeable Rights

Tradeable rights are another approach that could be employed to conserve LSOG forest. In this approach, fee ownership would not change, but two or more parties would exchange timber deeds. This would be a form of harvest deferral if there were term limits, and permanent preservation if rights were permanently sold. Certain rights could be retained by each party to facilitate stewardship, access, or other matters that may arise with inholding issues. In this case, impacts on fiber supply would be mitigated by providing alternative harvesting opportunities for the fee owner of the LSOG forest.

The area subject to a rights exchange need not be 1:1 in terms of acres. When applied appropriately, it could result in a net increase in the acres of managed land if a conservation group not managing their property exchanged rights for LSOG forestland owned by a commercial forest landowner.

HYPOTHETICAL CASE STUDIES
EXAMPLE: **RIGHTS TRADE**
AN NGO OWNS WELL-STOCKED LAND WITH A STRONG HARVEST HISTORY AND SEEKS TO CONSERVE LSOG FOREST ON NEIGHBORING COMMERCIAL LAND.

RESULTS

- TRADE TIMBER DEEDS AT 1:1 *VALUE*.
- INCREASE MANAGED-FOREST ACRES 3:1.
- INCREASE AND IMPROVE FIBER SUPPLY THROUGH MILL ACCESS AND LOWER EXTRACTION COSTS.
- NO EXTERNAL COSTS BEYOND CLOSING.
- NGO KEEPS OTHER LAND RIGHTS, PRESERVING ACCESS, RECREATION, AND SOCIAL VALUES.
- COMMERCIAL LANDOWNER MAY MAINTAIN ROADS AND LIMIT PUBLIC ACCESS TO AN LSOG AREA.

VARIATIONS

- LESS-STOCKED MANAGED LAND MAY REQUIRE MORE ACRES; LOWER-VALUE LSOG MAY REQUIRE FEWER.

CRITERIA ASSESSMENT

- ✓ VOLUNTARY: TWO WILLING PARTICIPANTS.
- ✓ EFFECTIVE: IDENTIFIED LSOG CONSERVED.
- ✓ MOST STAKEHOLDER IMPACTS NEUTRALIZED.
- ✓ SELF-FUNDED EXCEPT CLOSING AND BOUNDARY COSTS; RIGHTS TRADES MAY AVOID LAND-PURCHASE FUNDING LIMITS.

POSSIBLE IMPROVEMENTS AND SHORTCOMINGS

- TIMBER DEEDS MAY QUALIFY AS 1031-COMPLIANT REAL PROPERTY.
- CONSIDER PERMANENT VERSUS TEMPORARY PROTECTIONS.

Fee Ownership and Land Trading

Fee acquisitions of forestland occur every day in Maine, including for preservation purposes. A coordinated approach among interested parties could achieve greater LSOG conservation, clearer identification of LSOG locations, and meaningful stakeholder engagement. Land trading also currently takes place for a variety of reasons and could be

applied to LSOG conservation. No funding is required other than for the closing costs of these transactions, and the exchange can often be non-taxable (1031 exchanges, described in the *Tools* section below). Optimizing these outcomes could assist in these trades in the same way as fee acquisitions.

Providing an owner of LSOG forest with desirable timberland alternatives for trade addresses a few concerns and criteria. Stakeholder impacts may also be mitigated by selecting trade properties that were already unlikely to be harvested (e.g., by conservation NGOs) and that could now be. This reassigns conservation to the most valued spaces in Maine, rather than to what was most affordable at the time of acquisition.

HYPOTHETICAL CASE STUDIES
EXAMPLE: **FEE LAND TRADE**
IN THIS HYPOTHETICAL CASE, AN NGO SEEKS TO CONSERVE LSOG FOREST ON NEIGHBORING COMMERCIAL LAND. THE NGO DOES NOT PLAN TO HARVEST TIMBER BUT OWNS WELL-STOCKED LAND WITH A HARVEST HISTORY.

RESULTS

- TRADE FEE OWNERSHIP AT 1:1 *VALUE*.
- INCREASE MANAGED-FOREST ACRES 3:1.
- INCREASE AND IMPROVE FIBER SUPPLY THROUGH MILL ACCESS AND LOWER EXTRACTION COSTS.
- NO EXTERNAL COSTS BEYOND CLOSING.

VARIATIONS

- THE NGO COULD FUNDRAISE TO BUY A SUITABLE TRADE PARCEL.
- LESS-STOCKED MANAGED LAND MAY REQUIRE MORE ACRES; LOWER-VALUE LSOG MAY REQUIRE FEWER.

CRITERIA ASSESSMENT

- ✓ VOLUNTARY: TWO WILLING PARTICIPANTS.
- ✓ EFFECTIVE: IDENTIFIED LSOG CONSERVED.
- ✓ MOST STAKEHOLDER IMPACTS NEUTRALIZED.
- ✓ SELF-FUNDED EXCEPT FOR CLOSING AND BOUNDARY COSTS.

POSSIBLE IMPROVEMENTS AND SHORTCOMINGS

- THE STRATEGY MAY MITIGATE ECONOMIC IMPACTS, BUT THAT IS UNCERTAIN.
- CONSERVATION LAND MAY CARRY LEGAL RESTRICTIONS ASSOCIATED WITH ACQUISITION FUNDING, SO TRADABLE LAND MAY NEED TO BE PURCHASED.
- COULD USE A 1031 EXCHANGE TO AVOID CAPITAL GAINS TAX FOR THE COMMERCIAL LANDOWNER.

Silviculture & Management Practices

Restoration, Reserves, Retention, and [long] Rotation are the four R's of LSOG management practices to conserve or enhance LSOG characteristics. Because these practices are often not financially feasible on their own and carry high opportunity costs, they may require incentives. Their use on the landscape varies, depending on those costs and landowner objectives.

Restoration (Recruitment of Characteristics)

Forest management can enhance LS values in transitioning LS forests. Harvesting can add more structural complexity to a stand than would naturally occur. This often occurs by creating irregular conditions, removing shorter-lived trees, and establishing additional

cohorts. The key considerations for successful enhancements include retention of centennial species, emulating natural disturbance patterns (at an appropriate scale), and retaining snags and downed logs.

Non-commercial recruitment practices can also be implemented. By killing trees in place, snags will provide standing habitat, then eventually become downed habitat and natural seedbed conditions. Other non-commercial practices include enrichment-planting of underrepresented tree species compatible with the forest type.

An important consideration before implementing LS enhancement strategies is how these stands will be managed in the future. The first enhancement practice may be highly beneficial to LS development, but any secondary treatments in later years could detract from LS qualities or alter its developmental trajectory in undesirable ways. Rates of natural disturbance are often incorporated into the design of a harvesting strategy that is intended to mimic those disturbances. However, natural disturbances don't stop between harvest cycles, and it's important to appropriately adjust harvest rates to account for those additive losses.

Reserves

Land managers can and are refraining from harvest in LS stands in some managed landscapes. This occurs at different scales. This includes the retention of a collection of stands or a single stand. Scale will factor into which LS characteristics can be successfully maintained to aid continuity. Scale is also generally determined by economic considerations and an assessment of lost opportunity costs. Reserves at the stand level are somewhat common on working forest landscapes, for a variety of reasons, including LSOG conservation. As discussed elsewhere in this report, continuity and scale can be important factors for the persistence of some species. The protection of larger patches is always preferred over the protection of an equal acreage split among smaller patches, all other factors being equal.

Retention

Most commercial landowners have retention standards incorporated into their harvesting systems. Retention, in many ways, is similar to reserves, but on a smaller scale. Retention can be individual trees or groups of trees in or abutting harvest areas. Retention is applied to achieve many objectives, including conservation of LSOG characteristics. The promotion of these practices may be synergistic with other common retention values. While individual trees may retain some LS attributes, many LSOG attributes are better maintained when they are aggregated within an intact ecosystem. Most commercial landowners apply some form of retention. This is most effective when practiced in a landscape with the other “R”s. Retention, as applied in timber harvests, could include

increasing the number of retention trees and the percentage of trees that are vigorous, healthy, and of good genetic quality.

Rotation

Some LSOG characteristics can be maintained through long rotation forestry. Extending the harvest cycle toward biological maturity, rather than the economic optimum age, allows for greater continuity and the development of characteristics that often take over 150 years to emerge. The opportunity cost of this management strategy can be high for the timber industry, and that is why it's not commonly practiced. Furthermore, the term rotation implies full stand replacement where all merchantable trees removed and an even-aged condition (e.g., growing a cohort of the same age). When possible, a harvest of all merchantable trees should be avoided altogether.

Landscape Management Systems

LS characteristics can be further managed at a landscape level.

While not universal, LS retention and recruitment can be found throughout the working forest landscape. Most landowners manage for non-timber values to achieve complementary benefits. In the context of LSOG, this could mean reducing or refraining from harvesting in riparian areas or regulated and non-regulated zones (such as deer yards, significant wildlife habitat, and rare-species habitat). By their nature, riparian systems provide some aggregation and connectivity.

Adopting long-rotation forestry at the landscape level could provide sustained LS value. While individual stands can be fully re-established, if an entire landscape provides a balance of age classes in which long rotations are used, many LS characteristics may never be depleted. Such a system may fail to provide some of the most unique characteristics of OG forests, however.

Landscape management may also help address unintended "leakage." The landscape's ability to produce a forest product mix could be maintained by investing appropriately in silvicultural improvements that promote products otherwise lost when conserving LSOG.

A management system called the Triad system could also be employed to achieve LSOG conservation.[76] The Province of Nova Scotia has recently adopted this system on all Crown lands.[77] The Triad system divides a landscape into categories of forest use: preservation, intensive management, and ecological forest management. Intensive management can include highly productive practices like planted stands and precommercial thinning. At the opposite end, permanent reserves are also established. Ecological forestry is a middle ground in which many natural ecosystem functions are maintained alongside active forest

management. The intensively managed forest can then offset the wood production lost when timberland is set aside by establishing the preserves.

Market-Based Strategies

Market-based strategies are conservation approaches that utilize external economic demand and private financial markets to incentivize the protection of LSOG forests.

Forest Certification

Over the past thirty years, forest certification has been used to address many social pressures, such as deforestation and indigenous rights, with varying degrees of success. Maine has some of the highest rates of forest certification in the country, with approximately half of its forests certified to the Sustainable Forestry Initiative (SFI) and/or Forest Stewardship Council (FSC) standards.[78] Landowners currently have systems in place to address the terms outlined in these standards for protecting and conserving LSOG forests, as defined in each strategy.

SFI defines *old-growth forests* as "a forested ecosystem distinguished by old trees and related structural characteristics, such as tree size, down woody debris, canopy levels, and species composition."[79] Measure 4.2 of the SFI standard further states that "the certified organization shall protect threatened and endangered species, critically imperiled and imperiled species (Forests with Exceptional Conservation Values), natural communities, and old-growth forests."

HYPOTHETICAL CASE STUDIES
EXAMPLE: **LATE-SUCCESSIONAL EASEMENT**
A LAND TRUST OWNS FEE LAND AND IS CONSIDERING FOREST MANAGEMENT FOR THE FIRST TIME. THE FOREST IS NOT YET LATE-SUCCESSIONAL, BUT RESTORATION SILVICULTURE COULD HELP ACHIEVE THE TRUST'S GOALS.
RESULTS
- SELL A PRECISION LS CONSERVATION EASEMENT TO ANOTHER NGO.
- USE THE FOUR "RS" OF SILVICULTURE TO PROMOTE LS CHARACTERISTICS.
- MONITOR THE EASEMENT TO ENSURE LS OBJECTIVES ARE MET.
- FUND THROUGH PHILANTHROPY AND FEDERAL PROGRAMS.
- ADDRESS FOREST HEALTH THROUGH ACTIVE MANAGEMENT.

VARIATIONS
- PLACE THE EASEMENT TO BUFFER THE ADJACENT CONSERVED OLD-GROWTH FOREST.

CRITERIA ASSESSMENT
- ✓ VOLUNTARY: WILLING LANDOWNER AND CONSERVATION ORGANIZATION.
- ✓ EFFECTIVE: CONSERVES FOREST TRANSITIONING TOWARD OLDER CONDITIONS.
- ✓ PARTLY ADDRESSES IMPACTS: LANDOWNER COMPENSATED; TIMBER PRODUCTION CONTINUES ELSEWHERE.
- ✓ FUNDED THROUGH PHILANTHROPIC, STATE, AND FEDERAL CONSERVATION SOURCES.

POSSIBLE IMPROVEMENTS AND SHORTCOMINGS
- USE EASEMENT INCOME TO SUPPORT HIGHER-COST ACTIVE MANAGEMENT.
- USE COMMUNITY REPRESENTATION TO ADDRESS OR MITIGATE LOCAL ECONOMIC NEEDS.
- PARTNER WITH SPECIALTY MANUFACTURERS USING WOOD PRODUCTS FROM OLDER FORESTS.

The Forest Stewardship Council has its own definitions of OG, stating "*Type 1 Old-growth* 3 acres or more that have never been harvested and that display old-growth characteristics." And "*Type 2 Old-growth* 20 acres or more that have been harvested, but that have retained (through any harvesting activities) significant old-growth structure and functions."[80] No harvesting or road building is allowed in *Type 1 old-growth* stands, and harvesting that retains late successional characteristics is allowed in *Type 2 old-growth*.

These definitions are subject to interpretation by the certified organization and its 3rd-party independent auditor. Likewise, there is no single acceptable source for identifying OG forests in these strategies, and it's typically the certified organization's choice which sources to rely on. Some sources include contracted ecologists, state and national natural heritage strategies, and any other publicly available research analysis. These sources may not agree on how to define and therefore identify LSOG stands.

HYPOTHETICAL CASE STUDIES
EXAMPLE: **FOREST CERTIFICATION**
A COMMERCIAL LANDOWNER PURSUES FOREST CERTIFICATION IN RESPONSE TO CUSTOMER DEMAND, SHAREHOLDER REQUESTS, STAKEHOLDER PRESSURE, OR KNOWLEDGE SHARING.

RESULTS

- LANDOWNER CONTRACTS AN ECOLOGY OR CONSERVATION PARTNER TO INVENTORY LSOG STANDS FOR CERTIFICATION.
- NO EXTERNAL COSTS; LANDOWNER-FUNDED.

VARIATIONS

- MARKET DEMAND *MAY* CREATE CERTIFIED-WOOD PREMIUMS.
- LSOG CONSERVATION MAY RESULT FROM REQUIRED STAKEHOLDER INPUT

CRITERIA ASSESSMENT

- ✓ VOLUNTARY: LANDOWNER, CERTIFICATION ORGANIZATION, 3RD PARTY ASSESSOR, CONTRACTED EXPERT, STAKEHOLDERS
- ✓ EFFECTIVE: IDENTIFIED LSOG CONSERVED.
- ✓ SOME STAKEHOLDER IMPACTS NEUTRALIZED.

POSSIBLE IMPROVEMENTS AND SHORTCOMINGS

- *TEMPORARY: CERTIFICATION IS VOLUNTARY, AND CAN BE DISCONTINUED AT ANY TIME*
- *CERTIFICATION DEMAND MAY NOT TRANSLATE TO MARKET VALUE*
- *SOCIAL REQUIREMENTS FOR CERTIFICATION LIKELY WON'T ADEQUATELY ADDRESS IMPACTS TO LOGGERS.*

As discussed earlier in this report, definitions play an important role in the implementation of these standards. Broad definitions are established, in part, because these standards are set at the national level and must account for regional differences and nuances. However, this creates uncertainty about which sources are considered reliable and about what is and is not OG forest.

It is important to note that while forest certification systems were developed in response to consumer demands for assurances in forest management standards, mostly for paper products, there are often no financial advantages to being certified.[81, 82] **Because**

landowners can leave certification systems at any time, this strategy should be considered temporary.

Markets for Ecosystem Services (carbon markets, biodiversity credits)

Ecosystem service markets are economic systems that are typically voluntary and allow landowners (sellers) to sell or trade ecological benefits provided by nature to corporations or private investors (buyers). Some of these markets and investments could be used to further LSOG conservation.

Carbon markets have been in Maine for nearly 15 years but are still evolving rapidly. Carbon markets are intended to be measured, monitored, and verified according to a standardized methodology. While many methodologies currently exist, old methodologies are quickly becoming irrelevant. Many early projects focused on carbon storage, generating what are often referred to as "conservation credits," for which OG forests are most compatible. But more recently, attention has shifted to carbon sequestration (removal credits), which are more compatible with conserving younger forests (all else being equal).

While there are no conclusive findings to suggest that it's happening, by putting a higher value on sequestration and a lower value on storage, a landowner might be inclined to let younger forests grow and harvest older forests at higher rates. Carbon buyers are becoming increasingly sophisticated in sourcing these credits, asking about a project's impacts and benefits to local communities and economy, as well as conservation efforts and the treatment of Indigenous people. Furthermore, some interpretations of existing carbon standards may preclude landowners from participating in other incentive strategies for LSOG conservation due to perceived "double dipping."

Another challenge for carbon markets is the cost of establishment. These credits are purchased to offset corporate emissions, and they need public and shareholder confidence to purchase them. This is extraordinarily expensive. Some headway has been made by aggregating parcels and using remote sensing, but LSOG projects require an unprecedented level of precision and verification that currently doesn't exist. Developing a cost-effective protocol specifically for LSOG forests is likely possible.

For carbon programs to have a meaningful role in LSOG conservation, a specific program must be specifically designed with those objectives in mind.

Biodiversity credits are like carbon offset strategies in that forestland owners are paid to maintain or enhance certain forest values to offset impacts on similar values elsewhere in the world. For example, if a housing development clears forestland and habitat, the developer could purchase biodiversity credits to mitigate that impact. This would theoretically be simpler than standard land mitigation practices currently implemented for things like filling in wetlands, powerline corridors, and wind turbine impacts on birds, where "replacement" land needs to be found, purchased, and held by a conservation group.

Biodiversity credit markets exist in Australia, England, and Colombia, but are not yet available in Maine. However, some landowners are exploring these options, and they may be part of forest management in the near future.

Tools

While strategies represent the overarching plans and mechanisms serve as the formal vehicles for conservation, tools are the practical, existing resources that provide the technical and fiscal means for implementation. These tools make broader conservation efforts feasible and accessible for landowners.

Education

The Maine Forest Service (MFS) currently provides free resources to forestland owners. This includes publications, advice, technical assistance, and referrals. Topics currently covered include timber harvesting, forest health, best management practices (BMPs), and carbon. Landowners can and do ask District Foresters to help them identify and address their own

HYPOTHETICAL CASE STUDIES
EXAMPLE: **BIODIVERSITY CREDITS**
SCENARIO: A COMMERCIAL TIMBERLAND OWNER HAS IDENTIFIED A HIGH-VALUE LS FOREST PATCH SCHEDULED FOR HARVEST AND SEEKS COMPENSATION TO FOREGO THE HARVEST.
RESULTS

- ENROLL THE FOREST IN A BIODIVERSITY BANK TO GENERATE CREDITS.
- QUANTIFY CREDITS USING VERIFIED STRUCTURE AND INDICATOR SPECIES.
- SELL CREDITS TO BUYERS OFFSETTING SAME-ECOREGION HABITAT IMPACTS.
- USE REVENUE TO COMPENSATE LANDOWNERS AND INVEST IN SILVICULTURE.

VARIATIONS

- USE A CARBON MARKETPLACE FOCUSED ON CARBON STORAGE.

CRITERIA ASSESSMENT

- ✓ VOLUNTARY: WILLING LANDOWNER AND MARKET BUYERS.
- ✓ EFFECTIVE: PROTECTS HIGH-VALUE LATE-SUCCESSIONAL FOREST FROM IMMINENT HARVEST.
- ✓ ADDRESSES IMPACTS: COMPENSATES LOST TIMBER RETURNS.
- ✓ FUNDED: USES PRIVATE, MARKET-BASED FINANCE.

POSSIBLE IMPROVEMENTS AND SHORTCOMINGS

- NO U.S. BIODIVERSITY OR CARBON MARKET CURRENTLY SPECIALIZES IN LSOG.

objectives and interests, which often include conservation of unique LSOG areas on their property. Providing on-site services to address the broadest spectrum of landowners' values is a cost-effective way to increase awareness throughout Maine. In addition to District Foresters' on-site services, MFS also refers landowners to ecologists, other agencies, or private foresters for specific expertise.

Current strategies could be enhanced by developing simple 1–2-page informational materials or augmenting existing resources for negligible cost. Financial incentives could help support landowners seeking specialized services, such as LSOG identification/verification, if funding sources (state or federal) would support them.

Current Use Property Taxation

Maine's Open Space program is the current-use property tax policy best positioned to conserve LSOG forests. It currently provides a property tax benefit to landowners who provide certain public benefits, including conservation or preservation.[83] The Open Space program "layers" public and ecological values, creating tiered reductions in tax value based on categories. Sixteen public benefit factors are assessed when enrolling land. One of these is *"The identification of the land or of outstanding natural resources on the land by a legislatively mandated strategy, on the state, local or federal level, as particular areas, parcels, land types or natural resources for protection"*.

LSOG that is permanently protected by a non-profit organization may be eligible to enroll in the Open Space program under the "Forever Wild" category, in combination with other categories, other than the "Managed Forest" category. However, lands not held or eased by non-profits are not eligible for the Forever Wild category. The Open Space program could be modified to allow for enrollment of verified LSOG acres to provide similar or augmented tax benefits.

There is no reimbursement to municipalities resulting from the reduction of taxes under the Open Space strategy, nor are stakeholder impacts (e.g., job losses or fiber supply disruptions) considered.

Tax Advantage/1031 Exchanges

A 1031 exchange is a provision of the tax code that allows entities to defer capital gains tax by exchanging one qualifying real property interest for another real property interest, rather than selling it outright. While 1031 exchanges require a 1:1 total value, the value could be distributed in a way that results in more managed land than would have occurred without the trade, with each acre of LSOG valued higher than each acre of exchanged land.

A hypothetical example of this in the context of LSOG: A landowner possesses an OG stand that they are willing to conserve but he or she depends on timber revenue. A conservation

organization acquires the LSOG property (or a conservation interest in it) while facilitating the landowner's acquisition of a more productive timber tract from a third party through a properly structured exchange. The landowner maintains their timber-producing asset, the conservation organization secures the LSOG forest, and the third-party seller receives market value for their property.

The IRS also specifically considers a conservation easement real property in the context of a 1031 exchange. This means the sale of a standard conservation easement could also be used in such a trade.

The savings from capital gains (up to 21%) could be further invested in stakeholder impacts.

Intensive Silviculture

Forest practices such as pre-commercial thinning and Timber Stand Improvement (TSI) serve as tools by providing biological means to increase wood growth on managed land, effectively offsetting the volume lost to LSOG conservation. These intensive management activities can function as part of the supporting infrastructure for the Triad landscape model or a custom strategy.

By implementing these specific silvicultural instruments, the landowners can maintain the long-term economic stability of the forest products industry and mitigate the indirect financial impacts on logging contractors, local mills, and product “leakage”.

Conclusion

Maine's remaining LS and OG forests are among the state's rarest and most ecologically important natural communities. Their value lies not simply in age, but in centuries' worth of accumulated structure, continuity, and ecological process. Because these forests may not persist in the current managed forest landscape, each verified LSOG stand is an important part of Maine's natural heritage, and their widespread loss could have lasting ecological consequences.

Protecting LSOG forests sustains ecological diversity, resilience, and scientific reference conditions across the landscape. Amid shifting markets, climate pressures, invasive species, and changing land use, these forests remain vital scientific benchmarks for natural forest development and long-term biodiversity. This is especially true in southern Maine, where LSOG is significantly rarer than elsewhere in Maine, and the threat of conversion is arguably greater.

No single LSOG conservation strategy can meet every goal or condition. Since most LSOG forests in Maine are privately owned, effective conservation will require balancing ecological priorities with landowner rights and socioeconomic realities. The most effective approach will likely be to employ a range of strategies that achieve ecological objectives while addressing socioeconomic impacts to the greatest extent possible. This will require collaboration between Maine landowners, conservation organizations, manufacturers, loggers, and rural communities.

Conserving Maine's LS and OG forests is a shared responsibility. Grounded in common goals, sound science, voluntary participation, and meaningful incentives, Maine can protect its rarest forests while sustaining the working landscape that shapes its economy, culture, and identity.

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Appendices

Appendix A: Work Group Rooster

These individuals attended monthly meetings from March to October 2026 and provided valuable feedback on LSOG conservation strategies.

Name (last name, first name)	Affiliation
Ary, Ray	Weyerhaeuser Company
Brusila, Barrie	Mid-Maine Forestry
Chaplin, Corey	Chaplin Logging
Cutko, Andy	ME DACF - Bureau of Parks and Lands
Egan, Amanda	Maine Woodland Owners
Haslam, Bill	American Forest Management
London, Molly	London Woodlot Management
Milakosky, Brian	New England Forestry Foundation
Prior, Ian	Seven-Islands Land Company
Romano, Jeff	Maine Coast Heritage Trust
Stockwell, Sally	Maine Audubon Society
Tabak, Nava	Baxter State Park Authority
Tatko, Steve	Appalachian Mountain Club

Appendix B: Forest Type Characteristics

Northern Hardwoods

- **Persistent, nearly continuous canopy** with small tree-fall gaps rather than large openings.
- **Gap-phase regeneration** as the dominant natural disturbance process.
- **Multiple cohorts present** rather than uniform age classes.
- **Large sugar maple, yellow birch, and American beech**, often accompanied by scattered eastern hemlock and red spruce.
- **Large cavity trees and deeply furrowed bark** supporting diverse bats, birds, epiphytic lichens, and invertebrates.
- **Abundant coarse woody debris and tip-up mounds**, creating microsites for regeneration and nutrient cycling.
- **Fire playing little ecological role**, with windthrow, senescence, and disease driving stand dynamics instead.
- **A significant conservation challenge posed by** beech bark and beech leaf disease, which may threaten the long-term persistence and ecological function of northern hardwood forests.

Northern Conifer

- **Red spruce as the principal long-lived structural species**, with eastern hemlock, white pine, northern white cedar, and scattered hardwoods contributing to diversity.
- **Greater natural structural variability** than northern hardwood forests, including both persistent canopies and patchy openings created by windthrow.
- **Multi-cohort stand development**, often maintained through repeated small and intermediate-scale disturbances. Sometimes in the form of multiple layers.
- **Abundant large snags and coarse woody material**, particularly following wind events.
- **Exceptional epiphytic lichen and bryophyte communities**, especially in cool, humid stands.
- **Large carbon stores** are supported by long-lived conifers and slow decomposition rates.
- **Fire variants** may exist in the presence of natural fire. This may allow pine to dominate and persist in the presence of its more shade-tolerant counterparts.

Hemlock

- **Eastern hemlock dominates both canopy and regeneration**, creating exceptional long-term stability.
- **Dense, persistent canopies** that produce cool, humid microclimates and moderate air, soil, and stream temperatures.
- **Exceptional shade tolerance**, allowing continuous regeneration beneath an intact canopy.

- **Very slow decomposition**, resulting in long-lasting snags, coarse woody material, and thick organic forest floors.
- **Gap-phase succession driven almost entirely by individual tree mortality**, with little natural stand-replacing disturbance.
- **Important habitat for shade-dependent plants, amphibians, bats, and cold-water aquatic ecosystems.**
- **Strong carbon storage capacity**, supported by long-lived trees, persistent organic matter, and slow decomposition.
- **A significant conservation threat posed by** Hemlock Woolly Adelgid, and Elongate Hemlock Scale which threatens the long-term persistence and ecological function of hemlock forests throughout much of their range.

Cedar

- **Exceptional longevity**, with northern white cedar often surviving longer than any other common tree species in Maine.
- **Tree diameter is a poor indicator of age**, as cedar grows slowly and older trees are frequently hollow.
- **Irregular, clumped stand structure**, rather than the more continuous canopy patterns typical of northern hardwood or hemlock forests.
- **Extremely persistent deadwood**, with decay-resistant cedar logs remaining on the forest floor for centuries.
- **Deep organic soils and peat accumulation**, creating some of the state's highest long-term carbon storage potential.
- **Rich bryophyte, sedge, and wetland plant communities**, along with abundant epiphytic lichens.
- **Critical wildlife habitat**, including winter shelter for White-tailed Deer, and summer habitat for American black bear, and important wetland functions.
- **Regeneration is highly vulnerable to deer browse**, making successful recruitment one of the greatest conservation challenges for cedar ecosystems.

Oak-pine

- **Red Oak and or Pine dominate the overstory** and are known to naturally alternate dominance in some cases.
- **Usually dry or perched site occupancy.** These stands usually occur in xeric soils like glacial outwashes, eskers, moraines and sometimes site shallow to ledge. Mesic variations also exist.
- **Often associated with wind and fire disturbances.** These sites are often within proximity to the coast, and the influences of storm systems contribute to their origins and development. Fire is more common on droughty sites.
- **Perpetuated by canopy openings** that are large enough to regenerate white and red pine, which are only mildly shade tolerant.

Other forest types

While the forest types above encompass a great deal of Maine's landscape, these are not the only forests or species that have important LSOG communities. Many of these areas have unique positions in the landscape (wetlands, high elevation, ledges, etc.)

Table 4 ***Northern Hardwoods***

Characteristic	Old-growth	Late-successional	Transitioning late-successional
Composition	Dominated by long-lived, shade-tolerant species such as sugar maple, yellow birch, American beech, eastern hemlock, and red spruce. Regeneration is primarily shade-tolerant. Rich communities of epiphytic lichens, bryophytes, fungi, and saproxylic insects are well developed.	Shade-tolerant species dominate most canopy and regeneration, although remnants of earlier successional species may remain. Many late-seral organisms are present but less abundant or diverse than in old-growth.	Mixtures of shade-tolerant and mid-successional species are common. Regeneration is becoming increasingly shade tolerant, but late-seral plants, fungi, lichens, and insects remain limited or patchy.
Structure	Numerous large, old hardwoods with scattered large conifers. Persistent, irregular multi-layered canopy with abundant large cavity trees, snags, coarse woody material, and tip-up mounds. Reverse-J to rotated-sigmoid diameter distribution with all age classes represented. Frequent small canopy gaps created by individual tree mortality.	Large trees are common and canopy layering is developing. Deadwood, cavity trees, and multiple age classes are increasing but remain less abundant than in old-growth. Diameter distribution is becoming more uneven, though remnants of past management are evident. Small natural canopy gaps may be present.	Moderate-sized trees dominate. Large snags, large down logs, and cavity trees are uncommon. Canopy layering is limited, diameter distributions are relatively even-aged, and stands generally lack natural gap dynamics. Structural complexity remains constrained by previous disturbance.
Ecological Processes	Stand development is driven almost entirely by gap-phase succession and individual tree mortality. Fire is rare, and ecological continuity has persisted over long periods. Nutrient cycling, decomposition, and regeneration occur under a persistent forest canopy.	Gap dynamics increasingly influence stand development, although stand structure and composition still reflect historical management. Natural ecological processes dominate much of the stand.	Forest succession following previous harvesting or disturbance remains a dominant driver of stand development. Natural gap dynamics are beginning to develop but have not yet become the primary ecological process.
Human Legacy	Little or no evidence of harvesting, agriculture, or other intensive human disturbance. Stand composition and structure primarily reflect natural processes accumulated over centuries.	Historical harvesting or other disturbance is evident but no longer dominates stand condition. Many LS characteristics have recovered, although ecological legacies remain visible.	Evidence of harvesting or other human disturbance is readily apparent in species composition, stand structure, and age distribution. Human legacies continue to influence forest development and ecological function.

Table 5 ***Oak Pine***

Characteristic	Old-growth	Late-successional	Transitioning late-successional
Composition	Dominated by oak and white pine, but beech, hemlock, red maple and spruce may be present. Red oak is most common, white and other oaks may occur.	Dominated by red and other oak species, and white pine, with mid-tolerant species like red maple. Large intolerant species like birch, big tooth aspen and red-pine may be present.	Dominated by oak and pine. Beech, intolerant hardwood and hickory, or red pine may also be present on dry sites, while maple, ash, basswood, hemlock, and other species are found on moist sites.
Structure	Exceptionally large trees. Canopy openings from individual and groups windthrow or fire that are large enough to allow mid-tolerant species to regenerate. Multiple age classes. Abundant amounts of large logs and tip-ups from windthrow. Individual dead standing trees common. Plant species typical of fire ecosystems like blueberry, sweet fern, and bearberry may exist.	Large trees are common. Canopy gaps are infrequent or absent. Stands may still look predominantly even-aged, with a single canopy layer, or a sparce understory of shade tolerant species (not oak and pine). Tip ups from wind thrown trees may start to appear.	Large trees are more commonplace than in a managed landscape. Few dead or downed trees present. Typically multi-cohort, with occasional patches of disturbance very few gaps. The overstory still shows strong signs of co-dominance.
Ecological Processes	Sites are frequented and important to mast dependent species like deer, bear, blue-jays, and rodents. Abundant amounts of organic material- sometimes reduced if fire is the predominant disturbance regime.	Trees may begin to die of competition, but not of old age. Deadwood is the result of intolerants falling out of the stand, is likely to be modest in abundance. As is organic material. Mast dependent animals are abundant.	The forest floor has few downed trees, and organic matter typical of managed stands. Mast dependent animals are abundant. Fire and wind are not the driving process for ecology.
Human Legacy	Little or no evidence of harvesting or other intensive human disturbance. Stand composition, structure, and deadwood accumulation primarily reflect centuries of natural processes. Pit and mound microtopography indicate a lack of farming or heavy equipment.	Natural process is beginning to overtake human legacy elements. Stumps may be present. If the site is in recovery from past management, pit and mound microtopography may not be present.	Stumps are common. Pit and mound topography is minimal due to past agriculture or heavy equipment.

Table 6 ***Northern Conifer***

Characteristic	Old-growth	Late-successional	Transitioning late-successional
Composition	Dominated by long-lived, shade-tolerant conifers, particularly red spruce, with varying amounts of eastern hemlock, northern white cedar, white pine*, and scattered centennial hardwoods. Balsam fir is present but typically subordinate. Well-developed communities of coral lichens, bryophytes, fungi, and saproxylic insects are common.	Shade-tolerant conifers dominate, though balsam fir and mid-successional species may be more abundant than in old-growth. Many late-seral lichens, fungi, and bryophytes are present but variable in abundance.	Species composition reflects previous disturbance, often with abundant balsam fir and mixtures of mid-successional species. Long-lived conifers are becoming established, but late-seral organisms remain limited or patchy.
Structure	Numerous large, old conifers with abundant large snags and coarse woody material. Multi-layered canopies or irregular stand structure, and multiple age classes are common. Canopy openings vary from individual tree-fall gaps to small patch disturbances caused by windthrow. High basal area is typical but naturally variable.	Large conifers are common and structural complexity is developing. Large snags, downed wood, and multiple cohorts are increasing but remain less abundant than in old-growth. Small natural gaps and localized wind disturbance contribute to stand development.	Moderate-sized trees dominate. Large snags and coarse woody material are relatively limited. Canopies are simpler, age classes are less diverse, and stand structure continues to reflect previous management. Natural canopy gaps and patch dynamics are uncommon.
Ecological Processes	Stand development is driven by natural gap dynamics, windthrow, insect disturbance, and occasional partial stand replacement. Fire is infrequent but occurs more commonly than in northern hardwood forests. Ecological continuity has persisted over long periods with natural disturbance shaping forest structure.	Natural disturbance increasingly drives stand development, although historical harvesting remains evident in stand structure or composition. Wind disturbance and small canopy gaps contribute to increasing complexity.	Stand development is still strongly influenced by previous harvesting or other human disturbance. Successional recovery remains a major driver, with natural disturbance playing a secondary role.
Human Legacy	Little or no evidence of harvesting or other intensive human disturbance. Stand composition, structure, and deadwood accumulation primarily reflect centuries of natural processes.	Historical harvesting or disturbance is evident but no longer dominates stand condition. Many LS characteristics have recovered, although management legacies remain visible.	Evidence of harvesting or other human disturbance is readily apparent in stand composition, age structure, and deadwood abundance. Human legacies continue to shape ecological function and forest development.

Table 7 ***Hemlock***

Characteristic	Old-growth	Late-successional	Transitioning late-successional
Composition	Dominated by eastern hemlock, often with yellow birch, red spruce, white pine, northern white cedar, and scattered northern hardwoods. Hemlock dominates both the canopy and regeneration. Rich communities of mosses, liverworts, fungi, epiphytic lichens, and shade-adapted invertebrates are well developed.	Hemlock dominates or co-dominates the canopy, with abundant hemlock regeneration. Late-seral plants, fungi, bryophytes, and lichens are common but less developed than in old-growth.	Hemlock is increasing in the canopy and understory but often shares dominance with hardwoods or other conifers. Regeneration is becoming increasingly hemlock dominated, while late-seral organisms remain limited or patchy.
Structure	Numerous large, old hemlocks with deeply furrowed bark, abundant large snags and coarse woody material, and thick organic floors. Dense, persistent, multi-layered canopies create cool, humid conditions. Multiple age classes are present, with continuous hemlock regeneration beneath the canopy. Small canopy gaps created by individual tree mortality dominate stand dynamics.	Large hemlocks are common, with developing canopy stratification and increasing deadwood. Multiple age classes are present, although structural complexity and deadwood accumulation are less developed than in old-growth. Small natural canopy gaps are becoming more common.	Large hemlocks may be present but are generally less abundant. Canopies are simpler, deadwood is limited, and age classes are less diverse. Stand structure continues to reflect previous disturbance, although hemlock regeneration is increasing beneath the canopy.
Ecological Processes	Forest development is driven almost entirely by individual tree mortality and gap-phase succession. Dense canopy cover maintains cool, humid microclimates, moderates soil and stream temperatures, and supports slow decomposition and long-term ecological continuity. Fire is exceptionally rare.	Natural gap dynamics increasingly govern stand development, although historical disturbance remains evident. Hemlock continues to create cool, shaded conditions that promote LS development.	Forest succession following previous harvesting or disturbance remains a major influence. Hemlock is gradually reestablishing its ecological role, but natural gap dynamics and long-term ecological continuity are still developing.
Human Legacy	Little or no evidence of harvesting or other intensive human disturbance. Forest composition, structure, and ecological function primarily reflect centuries of uninterrupted natural development.	Historical harvesting or disturbance is evident but no longer dominates stand condition. Many LS characteristics have recovered, although ecological legacies remain visible.	Evidence of past harvesting or other human disturbance remains readily apparent. Stand structure, composition, and ecological processes continue to reflect those legacies, with recovery toward LS conditions underway.

Table 8 ***Cedar***

Characteristic	Old-growth	Late-successional	Transitioning late-successional
Composition	Dominated by northern white cedar, often with red spruce, eastern hemlock, balsam fir, black spruce, and scattered hardwoods depending on site conditions. Cedar dominates regeneration where browsing pressure is low. Rich communities of mosses, bryophytes, epiphytic lichens, fungi, and wetland-associated plants are well developed.	Cedar dominates or co-dominates the canopy with abundant shade-tolerant associates. Regeneration is present but may be limited by deer browsing. Late-seral mosses, lichens, fungi, and bryophytes are common but variable.	Cedar is present but often mixed with other conifers or hardwoods. Regeneration is patchy or sparse, particularly where deer browse is heavy. Late-seral organisms are limited or unevenly distributed.
Structure	Irregular, clumped stand structure with multiple age classes. Very old cedar trees are common, although tree diameter may underestimate stand age. Large standing dead cedar and exceptionally persistent coarse woody material accumulate over centuries. Thick organic soils, peat, and moss-covered logs are prominent features. Canopy layering is present but often less distinct because of cedar's relatively short stature.	Older cedar trees are common, with developing structural complexity and increasing deadwood. Multiple age classes are present, although coarse woody material and peat development are generally less extensive than in old-growth. Clumped stand structure is becoming more pronounced.	Moderate-sized cedar and associated species dominate. Large snags, persistent deadwood, and complex age structures are limited. Organic soils and coarse woody material are less developed, and stand structure continues to reflect previous disturbance.
Ecological Processes	Forest development is driven by small-scale mortality, hydrology, and slow ecological change. Peat accumulation, slow decomposition, and long-term ecological continuity dominate ecosystem function. Fire is rare, and wind disturbance is generally limited. Natural regeneration is episodic and strongly influenced by hydrology and deer browse.	Natural ecological processes increasingly shape stand development, although historical disturbance remains evident. Organic matter accumulation and slow decomposition are becoming more characteristic of the stand.	Previous harvesting or other human disturbances continues to influence stand development. Successional recovery is ongoing, while hydrologic processes and organic matter accumulation are gradually reestablishing LS conditions.
Human Legacy	Little or no evidence of harvesting, drainage, or other intensive human disturbance. Stand structure, peat development, and ecological function reflect centuries of natural processes.	Historical harvesting or disturbance is evident but no longer dominates stand condition. Many LS characteristics have developed, although ecological legacies remain visible.	Evidence of harvesting, drainage, altered hydrology, or other human disturbance remains readily apparent. Human legacies continue to influence regeneration, stand structure, hydrology, and ecological function.

Appendix C: Glossary

1031 Exchange: A tax code provision allowing a landowner to defer capital gains tax by exchanging one qualifying real property interest for another.

Bryophytes: A group of non-vascular plants that include hornworts, liverworts, and mosses including some species which are indicators of the biological community in mature, undisturbed forests.

Cavity Trees: Living or dead trees with hollowed-out sections that provide essential nesting and denning habitat for various wildlife species.

Centennial Tree Species: Long-lived trees that have reached advanced biological ages, typically 100 to 200+ years, and serve as a primary structural characteristic of old-growth and late-successional forests

Coarse Woody Material (CWM): Large pieces of dead wood on the forest floor, such as downed logs, which provide habitat, recycle nutrients, and store carbon.

Ecosystem Services: The natural benefits and functions provided by healthy forest ecosystems, such as carbon sequestration and storage, wildlife habitat, soil development, and hydrologic regulation.

Epiphytic Lichens: Lichens that grow on the surface of trees rather than on the ground; these are particularly diverse and abundant in cool, humid, old-growth stands.

Extinction Debt: An ecological concept where the negative consequences of habitat loss are not seen immediately but occur decades or centuries later, leading to delayed but irreversible species decline and/or loss.

Gap-Phase Succession: A natural forest process where small openings in the canopy, created by the death of individual trees rather than large-scale disasters.

Mesic: Refers to moderately moist soil conditions, or soils that are not excessively dry or wet.

Pit and Microtopography: A forest floor surface characterized by pits (from where a tree's roots were pulled up) and mounds (from the decaying root mass and fallen soil); its presence indicates that the land has not been leveled by farming or heavy equipment.

Saproxylic Insects: Specialized insects that are dependent on dead or decaying wood for at least part of their life cycle.

Snags: Standing dead trees that provide critical structural complexity and habitat for birds, bats, and invertebrates.

Structural Legacies: Biological remnants, such as large live trees, snags, and downed logs that are deliberately left behind during a harvest to mirror the outcomes of natural disturbances.

Triad System: A landscape-level management model that divides forests into three categories: permanent reserves (preservation), intensive management (high-yield timber), and ecological forestry (a middle ground maintaining natural functions).

Xeric: Refers to dry soil conditions, often found in specific forest types like oak-pine stands growing on glacial outwashes or shallow ledges.

Appendix D: Work Group Meeting Notes

Appendix C includes the agenda, planned outcomes, attendance, and meeting notes for each LSOG Work Group meeting.

Meeting #1 - April 17th, 2026

Agenda

What	When
Welcome – Chairs Jo D. Saffeir, Deputy Commissioner, DACF, and Kyle Burdick, Forest Geek LLC • Introductions and roles • Agenda Review • Working Agreements Review and Approval	10:00 – 10:30
Review L.D. 1529 - An Act to Enhance the Protection of High-value Natural Resources Statewide – Jo D. Saffeir	10:30 – 10:50
Review of Process and Timeline to Develop Late-Successional and Old-Growth (LSOG) Forest Conservation Strategies – Jo D. Saffeir and Andy Whitman, MFS	10:50 – 11:05
Break	11:05-11:15
Defining LSOG Forests – agreeing on a common definition for Work Group discussions - Kyle Burdick and Andy Whitman	11:15 – 12:10
Review and Feedback - LSOG Strategies Scientific Resources - Kyle Burdick and Andy Whitman	12:10 – 12:30
Public Comment	12:30 – 12:45
Next Steps and Communications - Jo D. Saffeir • Webpage and Interested Parties List • Next Meeting • Field Trip Details	12:45 – 1:00

Planned Outcomes

- reviewed the requirements of LD 1529

- reviewed the process timeline
- agreed on a working definition of LSOG forest for use in Work Group discussions
- identified additional technical resources to support Work Group discussions

Attendance

- Work group members (and affiliation) present: Ray Ary (Weyerhaeuser Co.), Barrie Brusila (Mid-Maine Forestry), Caleb Chaplin (Chaplin Logging), Andy Cutko (Maine Bureau of Parks and Lands), Bill Haslam (American Forest Management), Laura Kenefic (US Forest Service), Molly London (London Woodlot Management), Brian Milakovsky (New England Forestry Foundation), Ian Prior (Seven Islands Land Company), Jeff Romano (Maine Coast Heritage Trust), and Steve Tatko (Appalachian Mountain Club)
- Work group members (and affiliation) online: Amanda Egan (Maine Woodland Owners)
- Department of Agriculture, Conservation and Forestry (DACF) Staff: Jo D. Saffeir (work group co-chair), Morten Moesswilde, Andrew Whitman (technical assistance)
- DACF Consultant: Kyle Burdick (work group co-chair)
- Public (number) in person: 5
- Public (number) online: 6

Meeting Notes

1. *Welcome*: The work group co-chairs, Jo D. Saffeir and Kyle Burdick, welcomed the work group and public in attendance and online.
    - *Introductions and roles*: Jo D. described the role of the work group members. Jo D. and Kyle introduced themselves and their roles. Work group members, both in person and online, introduced themselves and their affiliations.
    - *Agenda Review*: Jo D. reviewed the planned agenda and scheduled feedback from the work group. No changes were requested.

2. *Working Agreements Review and Approval*: Jo D. reviewed a draft working agreement point by point and requested feedback. No changes to the working agreement were requested. Each group member agreed individually to abide by the working agreements. The work group was reminded that its role is to provide a broad range of perspectives to advise DACF on possible LSOG conservation strategies.

3. *Review L.D. 1529 - An Act to Enhance the Protection of High-value Natural Resources Statewide*: Jo D. Saffeir reviewed the language in the enabling legislation and DACF's responsibilities. Jo D. described how LD 1529 addressed two aspects of the work: (1) What needs to be done? It charged DACF with developing a comprehensive report on statewide strategies to enhance the conservation of late-successional forests and old-growth forests, including transitioning late-successional forests. It may incorporate ecological values, carbon sequestration methods, and economic considerations, involve the use of resources from other state agencies and outside sources, and submit the report by November 4, 2026, including any recommendations, to the joint standing committee of the Legislature. (2) Who needs to be engaged? LD 1529 suggested that a broad range of perspectives, including forest landowners, forest industry representatives, logging contractors, conservation interests, and local economies, be addressed, that other state agencies might be consulted, and the need for public feedback as well.

   It was noted that the work group meetings will not be an opportunity to litigate whether the LSOG forest conservation is a good idea. LD 1529 requires the Department, not a work group, to submit LSOG conservation strategies to the legislature. It will then be up to the legislature to decide whether or how to pursue any of the strategies outlined in the report. It was clarified that reporting on LSOG status in 2031 as specified in LD 1529, Sect. 2 will be accomplished as part of the MFS biennial State of the Forest reports, not in a separate report. The work group members were selected for their experience and knowledge of forest management and conservation as practiced in Maine, because practical strategies required an understanding of on-the-ground forest management and operations. DACF will seek other technical input as necessary.

4. *Review of Process and Timeline to Develop Late-Successional and Old-Growth (LSOG) Forest Conservation Strategies*: Jo D. Saffeir and Andy Whitman reviewed the process and timeline of the work group's meetings and activities. Andy noted that the process has four major steps using a sequence of meetings to achieve work group feedback: introduction; review of LSOG ecology and conservation strategies through invited speakers and field trips; discussion of strategies; and feedback on strategies and the final draft report. The two major opportunities for public feedback are: (1) public comment periods near the end of each meeting and (2) online through a public comment period in August.

5. *Defining LSOG Forests – establishing a common definition for Work Group discussions*: Kyle Burdick and Andy Whitman led this discussion on how to define old-growth (OG), late-successional (LS), and transitioning late-successional (TLS) forests for the purposes of all discussions about LSOG by the work group. Andy presented some framing concepts for defining LS, TLS, and OG forests, to ensure a consistent understanding as the work group provides feedback on strategies. It was noted that old forest attributes occur along a continuum, with attributes accumulating until a forest is considered an OG forest. Additional considerations were noted: degree of human disturbance (e.g., logging or land clearing) relative to natural disturbance levels and timing of canopy disturbance; level of ecological continuity with conditions existing before European settlement; and current conditions. A straw-person definition was offered for all three age groups.

   The group discussed defining old-growth forests and late-successional forests, acknowledging the complexity of creating precise definitions. Andy emphasized the need for a common understanding rather than a formal agreement, noting that Maine's forests don't follow a straightforward succession pattern. The discussion explored factors such as human disturbance, timber harvesting, and ecological continuity in defining these forest types. The group considered various aspects, including the effects of different types of human impacts and the concept of ecological continuity, recognizing the challenges in determining specific thresholds for defining old-growth forests. Distinguishing attributes from the discussion included: large, older trees, snags, and logs; multi-age characteristics; and dominance by late-serial tree species, with some indication of how transitioning LS moves to LS and eventually OG over time. Several members suggested using "framework" or "description" rather than "definition" to better capture the intended attributes. Kyle and Andy will revise the definitions based on feedback received and present updated versions at the next meeting.

6. *Review and Feedback - LSOG Strategies Scientific Resources and Speakers*: Kyle Burdick and Andy Whitman requested feedback regarding priority references from among a list of about 100 references generated by Andy, as well as preferences on speakers at subsequent meetings. Andy will develop an abbreviated list of highest priority references to share with the work group.

7. *Public Comment*: Public comments were offered by representatives from Maine Audubon, Maine Forest Products Council, Professional Logging Contractors of the Northeast, and the Natural Resources Council of Maine. Comments included

expressing gratitude for the formation of the work group and its charge; a suggestion that the Department's charge should be guided by the legislation's use of "may" rather than "shall; a counterpoint that the use of "may" in the legislation reflected how the Department's charge was contingent on the raising of sufficient outside funding; and a concern that defining LSOG could lead to legislation regulating private landowners. Finally, it was suggested that forest certification standards be added to the list of references.

8. *Next Steps and Communications*: Next steps were reviewed by Jo D. Saffeir with assistance from Andy Whitman.
    - *Webpage and Interested Parties List*: Andy Whitman announced that a webpage that contains background information, work group meeting schedule, Zoom registration links for virtual attendance, and meeting materials. The webpage can be found at: https://www.maine.gov/dacf/mfs/policy_management/lsog-workgroup.shtml. Interested parties may sign up via the webpage to receive meeting information.
    - *Next Meeting*: The schedule for Meeting #2 was discussed. Andy Whitman will poll the LSOG work group members to determine the date and time of the meeting.
    - *Field Trip Details*: The details of the field trip were described by Andy Whitman. The field trip will be in western Maine in the Eustis region. The morning will be spent visiting an LS forest, and possibly two managed LS forest sites that demonstrate conservation strategies. The afternoon will be spent indoors discussing what was seen in the field and LSOG conservation strategies. Lunch will be provided for work group members.

9. *Closing*: The meeting ended at about 12:45.

Meeting #2 – May 11th, 2026

Agenda

What	When
Welcome, agenda, Working Agreements, and role of Work Group review – Chairs Jo D. Saffeir, Deputy Commissioner, DACF, and Kyle Burdick, Forest Geek LLC	1:00 – 1:15
Ecology of LSOG Forest in Maine – Andy Whitman, MFS	1:15 – 1:50
Identification, conservation, and management of old forest in Maine – Justin Schlawin, IFW	1:50 – 2:25
Break	2:25 – 2:35
Baskahegan: LSOG History and Potential Conservation- Kyle Burdick	2:35 – 3:10
Discussion • Based on today's presentations, what key LSOG attributes should be considered when developing conservation strategies? • What do we already know of LSOG conservation strategies that are being employed in Maine (or elsewhere)? • What's already working with LSOG conservation in Maine's working lands, and are there ways to make it better?	3:10 – 3:45
Public Comment	3:45 – 3:55
Next Steps and Next Meeting - Jo D. Saffeir	3:55 – 4:00

Planned Outcomes

- Considered new information on the ecology, identification, conservation, and management of LSOG forests.
- Learned from one landowner's integration of LSOG conservation into its working forest.
- Discussed important aspects of LSOG conservation strategies.

Attendance

- Work group members (and affiliation) present: Barrie Brusila (Mid-Maine Forestry), Caleb Chaplin (Chaplin Logging), Andy Cutko (Maine Bureau of Parks and Lands), Amanda Egan (Maine Woodland Owners), Bill Haslam (American Forest Management), Brian Milakovsky (New England Forestry Foundation), Ian Prior (Seven Islands Land Company), and Steve Tatko (Appalachian Mountain Club)
- Work group members (and affiliation) online: Molly London (London Woodlot Management) (online), Department of Agriculture, Conservation and Forestry (DACF) Staff: Jo D. Saffeir (work group co-chair), Tom Gordon (AV and virtual connections), Morten Moesswilde, Andrew Whitman (technical assistance)
- DACF Consultant: Kyle Burdick (work group co-chair)
- Public (number) in person: 5
- Public (number) online: 6

Meeting Notes

1. *Welcome and review*: The work group co-chairs, Jo D. Saffeir and Kyle Burdick, welcomed the work group and public in attendance and online.
    - *Introductions and roles*: Work group members, both in person and online, introduced themselves and their affiliations.
    - *Agenda Review*: Jo D. reviewed the planned agenda and scheduled feedback from the work group.

2. *Working Agreements Review*: Jo D. reviewed the working agreement that was agreed to in Meeting #1. The work group was reminded that its role is to provide a broad range of perspectives to advise DACF on possible LSOG conservation strategies.

3. *Review L.D. 1529 - An Act to Enhance the Protection of High-value Natural Resources Statewide*: Jo D. Saffeir reviewed the language in enabling legislation and DACF's responsibilities. Jo D. described how LD 1529 addressed two aspects of the work: (1) What needs to be done? It charged DACF with developing a comprehensive report on statewide strategies to enhance the conservation of late-successional forests and old-growth forests, including transitioning late-successional forests (2) Who needs to be engaged? LD 1529 suggested that a broad range of perspectives, including forest landowners, forest industry representatives, logging contractors, conservation interests, and local economies, be addressed, that other state agencies might be consulted, and the need for public feedback as well.

Talks

4. *Talk 1: The Ecology of Late-Successional and Old-Growth Forest in Maine (Presenter: Andrew Whitman, Maine Forest Service)*: Late-successional and old-growth (LSOG) forests lack a single agreed-upon definition, but are broadly characterized by structural, compositional, and process-based attributes that distinguish them from managed forests. Structurally, LSOG forests feature large and very old trees, large snags and fallen logs, large volumes of deadwood in diverse states of decay, multi-layered vegetation, complex canopies, and spatially variable stand structure. Compositionally, they support specialized lichens, mosses, liverworts, saproxylic beetles, and wildlife dependent on abundant deadwood, with late-seral species dominating and rare species more frequently present. Process-based attributes include natural stand dynamics, disturbance regimes with infrequent disturbances, high carbon storage, and active nutrient cycling. Other studies suggest that LSOG forests in Maine are both rare and declining. A 2003 analysis of USDA FIA estimated they covered approximately 6.2% of the state's forest area and declined at an average rate of 2.7% per year between 1982 and 2003. A recent LiDAR-based study estimated that 3.9% of Maine's unorganized townships were covered by LSOG forest and that LSOG forest declined at an average rate of 1.4% per year from 2016 to 2024.

   Two concepts are important for conserving LSOG forest: ecological continuity and extinction debt. Ecological continuity is the uninterrupted persistence of critical LSOG habitat attributes across space and time. It is likely key to LSOG forest function and the species that depend on it. Even where habitat loss has slowed, LSOG-dependent species face lagged extinction risk, better labeled as extirpation debt. European research suggests LSOG species losses may occur from decades to centuries following initial major LSOG habitat loss. Maine's lichens, mosses, liverworts, and invertebrates may be particularly vulnerable. Given that Maine supports larger populations of many LSOG lichen species than other eastern states and potentially other LSOG species, its LSOG forests may have outsized regional conservation significance.

5. *Talk 2: Identification, Conservation, and Management of Old Forest in Maine (Presenter: Justin Schlawin, Program Coordinator, Beginning with Habitat, MDIFW)*: The concept of provenance — the chronological history of ownership, custody, and location — offers a valuable framework for understanding Maine's late-successional and old-growth (LSOG) forests. Each LSOG forest carries a unique ecological history that shapes its conservation significance. However, it is worth noting that some of Maine's highest-quality forests for their type are not LSOG forests. Maine has developed systematic tools for identifying and tracking old forests over several

decades. The Critical Areas Inventory (1980–1987) provided early statewide documentation and, in 1993, transitioned to the Maine Natural Areas Program (MNAP), which evaluates forests using three key metrics: forest condition, landscape context, and size. LiDAR-based analysis has recently enabled comprehensive landscape-scale mapping. Current forest age data from USDA FIA indicate that less than 1% of Maine's forest area contains stands older than 150 years, with approximately 50,000 acres of high-conservation-value old forest tracked by MNAP.

Old forests occur across Maine on public and private lands, and a range of complementary conservation and management approaches are being employed. On working forest lands, legacy tree retention and coarse woody debris management, partly driven by forest certification requirements, help maintain LSOG attributes. Approximately 10 million acres are enrolled in FSC or SFI certification programs that incorporate old forest conservation. Public lands management agencies use MNAP data to guide ecological reserve stewardship. In contrast, active management tools such as snag creation, selective harvesting, and hemlock pest management promote late-successional conditions on managed lands. Different conservation tools, used together, offer great potential for conserving LSOG characteristics across diverse forest landscapes.

6. *Talk 3: Baskahegan — A Case Study in LSOG Conservation (Presenter: Kyle Burdick, Baskahegan Company)*: Baskahegan Company's landscape history illustrates how industrial forestry can coexist with and create meaningful opportunities for late-successional and old-growth (LSOG) conservation. The property's history spans the Dead River harvesting era and the spruce budworm era, after which recovering age-class structures have produced a substantial volume of maturing timber. In response to this history and forest certification requirements, Baskahegan has self-identified 3,471 acres of mostly LS and transitioning LS forest as Representative Sample Areas, including one stand believed to qualify as old growth. An additional 1,200-acre LSOG cultivation area has been established at Sweet Cove Reserve. A 44-acre old-growth stand at Kossuth, ME — containing large maple, spruce, and hemlock, substantial downed logs, and no evidence of prior commercial harvest — further demonstrates the property's ecological significance.

   Baskahegan has also actively managed portions of the property to promote large-tree structure, with individual white pines now reaching 30–40" DBH. Notably, managed stands can yield high-value wood products for veneer and musical instruments, demonstrating that LSOG attributes and commercial timber goals need not be mutually exclusive. The company has operated under third-party forest

certification since 2004, transitioning from FSC to SFI in 2022. An emerging financial concern involves potential conflicts between carbon credit programs and participation in LSOG conservation, with a ruling pending from California's Air Resources Board. Additional questions were raised regarding whether carbon market incentives may inadvertently encourage high-grading, and about distinctions between MNAP exemplary forest criteria and LSOG classification standards.

7. *Work Group Discussion:* The Work Group discussion that followed centered on two questions: which key LSOG attributes should inform conservation strategies, and which conservation approaches are already being employed. On attributes, participants agreed that LSOG is far more than big trees — it requires old trees, large snags, coarse woody debris, multi-layered vegetation, canopy gaps, pit-and-mound topography (an indicator of ecological continuity), microclimate, and soil-level ecological processes (mycorrhizae, amphibians, insects). Ecological continuity, centuries of unbroken site occupancy, was highlighted as the attribute hardest to recreate. LiDAR mapping (Hagan's work) was highlighted as a useful tool, but participants agreed that ground-truthing is needed for public credibility. Other attributes raised included patch size, interior-to-edge ratio, landscape position, connectivity, and past chemical treatment history.

   In terms of strategies, the discussion touched on land trust acquisitions, conservation easements, and the need to build connectivity around existing LSOG cores, particularly in the state's fragmented southern part. It was noted that many land trusts were not favorable to forest management, even for LSOG restoration. They may need extensive education and awareness-building, and may be open to forest management due to income-generating opportunities. In southern Maine, one should also consider the impacts of parking lots, dogs, and trails on LSOG attributes, including species. Questions were raised about the LSOG value of existing lakeshores and riparian areas that receive lighter treatments. Still, it was also noted that landowners vary greatly in whether they retain LSOG attributes in these areas. Some landowners use the LS Index to identify potential high-value conservation forests, then use other sources to determine ecological value. FSC requires landowners to have representative areas to benchmark their management. SFI provides technical resources and training for landowners, which is very helpful. Some strategies may require training for consultant foresters in forest carbon opportunities and project development. A key issue remains the opportunity costs that can arise when harvesting is reduced through the application of LOSG conservation strategies. This cost may be passed on to mills and loggers. The group noted that extirpation debt should inform prioritization, though quantifying its

relationship to patch size or connectivity remains uncertain. The next meeting (originally scheduled for May 22nd, now June 9th) was designated as the dedicated session for conservation strategies.

8. *Public Comment:* The public comment segment focused on conservation strategies for LSOG in Maine's working landscape. Key themes included the use of managed riparian corridors as LSOG conservation areas, with both Baskahegan and AMC noting that areas managed lightly along waterways are now yielding both ecological and economic returns. Feedback suggested the need to look beyond big trees to a full suite of indicators. LiDAR mapping was recognized as a useful tool, but field verification may be required. Forest certification (FSC/SFI) and working forest conservation easements were seen by some as effective mechanisms, with larger land trusts increasingly incorporating ecological set-asides. A significant concern was ensuring landowners and loggers would be compensated for lost harvest value when LSOG is protected, with carbon-style payment models proposed as a framework. Logger representatives stressed that logging contractors bear disproportionate economic costs when the landscape shifts to smaller-diameter timber.
9. *Next Steps and Next Meeting*: Jo D. Saffeir described the date and nature of Meeting #3, a virtual meeting [Meeting #3 was postponed so that MFS and others could respond to the explosion at Robbins' Mill].

Meeting #3 – June 9th, 2026

Agenda

What	When
Welcome and agenda review – Chairs Jo D. Saffeir, Deputy Commissioner, DACF, and Kyle Burdick, Forest Geek LLC	9:00 – 9:05
Silviculture for managing LSOG Forest in Maine – Laura Kenefic, Ph.D., US Forest Service	9:05 – 9:35
Pathways to protect Maine's remaining late-successional and old-growth forests – Adam Dagneault, University of Maine, Orono, Maine	9:35 – 10:05
Incentive-based approaches to LSOG conservation – Brian Milakovsky, NEFF	10:05 – 10:35
Discussion • What are the key LSOG attributes to be considered when reviewing a full list of LSOG conservation strategies for application in Maine? • What strategies for conservation discussed are most compelling, and why? What other ideas regarding LSOG conservation strategies have not been uncovered in the work group meetings thus far? • When considering these strategies, what are the key challenges to aligning ecological, economic, and forest carbon considerations?	10:35 – 11:10
Public Comment	11:10 – 11:25
June 25th (26th rain date) Field Trip Details - Andy Whitman	11:25 – 11:30

Planned Outcomes

- Reviewed new information on the conservation and management of LSOG forests, silvicultural practices, and land conservation strategies relevant to LSOG conservation.
- Discussed the content presented on the conservation of LSOG attributes of greatest importance and the strategies to conserve them.

Attendance

- Work group members (and affiliation): Ray Ary (Weyerhaeuser Co.), Barrie Brusila (Mid-Maine Forestry), Caleb Chaplin (Chaplin Logging), Amanda Egan (Maine Woodland Owners), Bill Haslam (American Forest Management), Molly London (London Woodlot Management), Brian Milakovsky (New England Forestry Foundation), Ian Prior (Seven Islands Land Company), Jeff Romano (Maine Coastal Heritage Trust), and Sally Stockwell (Maine Audubon).
- Department of Agriculture, Conservation and Forestry (DACF) Project Staff: Jo D. Saffeir (work group co-chair), Tom Gordon (AV and virtual connections), Morten Moesswilde, Andrew Whitman (technical assistance)
- DACF observers: Jereme Frank (MFS), Bill Patterson (MBPL), and Mike Pounch (MBPL).
- DACF Consultant: Kyle Burdick (work group co-chair)
- Public (number) online: 22

Meeting Notes

1. *Welcome*: The work group co-chairs, Jo D. Saffeir and Kyle Burdick, welcomed the work group and the public online. Jo D. reviewed the planned agenda and scheduled feedback from the work group.

2. *Working Agreements Review*: Jo D. reviewed the working agreement that was agreed to in Meeting #1. The work group was reminded that its role is to provide a broad range of perspectives to advise DACF on possible LSOG conservation strategies.

3. *Review L.D. 1529 - An Act to Enhance the Protection of High-value Natural Resources Statewide*: Jo D. Saffeir reviewed the language in enabling legislation and DACF's responsibilities. Jo D. described how LD 1529 addressed two aspects of the work: (1) What needs to be done? It charged DACF with developing a comprehensive report on statewide strategies to enhance the conservation of late-successional forests and old-growth forests, including transitioning late-successional forests (2) Who needs to be engaged? LD 1529 suggested that a broad range of perspectives, including forest landowners, forest industry representatives, logging contractors, conservation interests, and local economies, be addressed, that other state agencies might be consulted, and the need for public feedback as well. It was also noted that this group could not re-legislate the in-statute mandate from the legislature.

Talks

4. *Talk #1: Silviculture: Considerations for Late Successional Old Growth (LSOG) Management (Presenter: Laura Kenefic, Ph.D., Research Forester and Team Leader, U.S. Forest Service Northern Research Station)*: Dr. Kenefic's presentation reviewed silvicultural principles and challenges for managing forests toward Late Successional Old Growth (LSOG) conditions in Maine. She reviewed silvicultural principles and challenges for managing forests under LSOG conditions in Maine. Maine's LSOG forests may be characterized by five attributes, including advanced tree ages, high volumes of decayed deadwood, canopy disturbance rates at or below 1% annually, multi-aged stand structure, and sub-canopy seedling recruitment. Managed stands are primarily driven by forest successional dynamics, while LSOG forests are primarily driven by natural stand dynamics. Shade- and mid-tolerant tree species capable of persisting without stand-replacing disturbance dominate these systems. Silvicultural systems emphasizing multi- and uneven-aged structures can be most compatible with LSOG objectives, though silviculture inherently produces less deadwood and higher rates of canopy disturbance than unmanaged forests. Ecological forestry, distinguished from production, restoration, and climate-adaptive frameworks, may provide the most appropriate conceptual basis for LSOG management. It has four principles: structural continuity, complexity, disturbance timing, and landscape context. Some candidate LSOG stands may require prior restoration before ecological forestry practices can be applied to maintain LSOG conditions. Early applications of ecological forestry have also revealed a tendency to retain degraded growing stock while removing vigorous individuals, undermining long-term stand quality. Furthermore, the elevated harvesting and hauling costs associated with ecological forestry may pose significant economic feasibility challenges, limiting the use of LSOG-oriented silviculture on working timberlands.

5. *Talk 2: Pathways for Protecting Maine's Remaining Late-Successional and Old-Growth Forests (Presenter: Dr. Adam Daigneault, University of Maine)*: Dr. Daigneault cited the Hagan study, which suggests Maine's late-successional and old-growth (LSOG) forests are more limited and fragmented than previously recognized, with only ~161,881 hectares classified as late-successional or old-growth, most of which is unprotected and owned by private landowners. Dr. Daigneault's team found that patch-size distributions were highly skewed, with old-growth patches exhibiting greater fragmentation than late-successional stands. They developed a framework for prioritizing LSOG conservation based on scores for four criteria: patch size, carbon stock density, landscape connectedness, and near-

term harvest threat. High-scoring patches were mostly in northern and western Maine but varied by criterion, underscoring the need for clear conservation objectives. Cost modeling indicates that land acquisition expenses increase nonlinearly with the size of protected-acre targets. Carbon offset revenues, particularly from regulatory markets, might be used to partially offset costs. Policy instrument analysis by Dr. Daigneault's team across 15 actions found trade-offs among cost-effectiveness, permanence, and landowner acceptability. His team proposed a five-tier conservation strategy, ranging from ecological reserve designation on public lands to voluntary incentive programs and real-time remote-sensing monitoring on private timberlands, prioritizing actions based on ownership type, patch size, and threat urgency.

Q&A: Work group members had comments and questions. A landowner representative suggested that the current private landowners have already done much to conserve the forest's ecological continuity by keeping intact forest cover. Another landowner representative suggested that LSOG conservation will have cascading impacts, reducing wood supply and affecting the financial viability of mills; the more forest that is preserved, the more it would negatively affect companies down the wood supply chain. One member suggested that the strategies presented by Dr. Daigneault were predicated on a willing selling landowner and a willing buyer. A logger expressed concern that conservation efforts today do not fully consider the economic impact of conservation and the conservation benefits of future LSOG and non-LSOG forests, or of transitioning LSOG that will become LSOG or even OG in decades and centuries.

6. *Talk 3: Can We Conserve LSOG with an Incentive-Based Approach? (presenter: Brian Milakovsky, Senior Forester, New England Forestry Foundation)*: Mr. Milakovsky opened by framing LSOG conservation as a complex problem because the forests most valuable ecologically are often among the most commercially valuable as well, and nearly all are privately owned. He described how LSOG forests provide critical habitat for deadwood-dependent species, exceptional carbon storage capacity, and significant biodiversity value, while also representing high-value timber assets essential to regional mill supply chains and logging contractors' livelihoods. His organization, the New England Forestry Foundation (NEFF), is piloting a $4.3 million U.S. Forest Service-funded program testing timber harvest deferral payments as a bridge mechanism to facilitate permanent LSOG conservation. It pairs each deferred LSOG acre with subsidized timber stand improvement on three additional acres, offsetting landowner opportunity costs and helping maintain long-term wood production levels. The program also pilots

contractor adjustment payments to compensate logger contractors for increased operational costs resulting from the removal of large-diameter timber from the available harvest base. Early findings indicate that emergency deferral payments are economically inefficient and that deferrals represent a stopgap rather than a permanent conservation strategy. The NEFF team proposed a framework for integrating science-based prioritization, multi-stakeholder consensus-building, diversified funding streams, and paired silvicultural investments to sustain LSOG conservation across Maine's working forest landscape without disproportionate economic burden on rural forest-dependent communities. NEFF is piloting this approach with several landowners across Maine, hoping to reduce opportunity costs for landowners, loggers, mills, and rural communities that economically depend on the forest, including the LSOG forest.

Q&A: Two landowner representatives had questions about using the Hagan Rapid Assessment Tool to verify field LSOG status and payments to mills. Mr. Milakovsky indicated that the NEFF project has used the Hagan Rapid Assessment Tool to verify the conservation suitability of the candidate LSOG because it has been field-verified. He also reported that the NEFF project is exploring a method for calculating the opportunity costs of LSOG conservation for mill operators, to determine the size of possible payments to wood mills to compensate for LSOG conservation.

7. *Work Group Discussion*: Jo D. Saffeir and Kyle Burdick co-moderated a work group discussion focused on this question: which of the conservation strategies discussed are most compelling, and why? A landowner representative stressed the importance of keeping forest management economically viable. He cautioned that many of the strategies discussed leaned toward preservation rather than active management, and that reducing harvest volumes could affect companies that form wood-product supply chains, raise loggers' costs, force mills to source wood farther away, and squeeze the broader regional forest economy. He argued that incentivizing landowners to continue managing stands for LSOG conditions or attributes was essential. A logger raised a concern about ecological forestry, creating a dilemma: forests where silvicultural practices were used to increase LSOG characteristics might eventually be deemed necessary for conservation and removed from production, undermining the very management strategy that conserved them.

   Two members expressed support for the NEFF's proposed deferral model, which combines timber stand improvement (to increase wood production) with harvest

deferrals to conserve LSOG and allow trees to grow larger, as this could create more valuable wood for loggers and a favorable economic environment for them in the future. One member suggested that the NEFF model might serve as a financial-bridge strategy to increase the short-term financial sustainability of loggers, create a future forest with more, larger trees and forest conditions that are financially better for logger contractors. They both acknowledge the need for diversified, tiered financial mechanisms to fund transitions.

A conservationist underscored how no single LSOG conservation strategy will suffice, and called for both immediate protective actions, given how rapidly LSOG can be lost, to conserve some LSOG forests, and long-term transition support for landowners, loggers, and mills to help them create more structurally diverse forests that will ultimately yield higher timber value and support more LSOG forest.

There was some discussion about the role of forest certification. A conservationist suggested that certification could support voluntary education efforts aimed at landowners and loggers. A landowner representative indicated that certification may, under very limited conditions, require that a landowner manage the OG forest differently and that OG of a minimum stand size probably should not be harvested if the landowner is certified. A conservationist suggested that OG also occurs on fewer acres and so its conservation may have less economic impact than conserving LS and transitioning LS. LSOG forests that can be maintained with harvesting should remain available for harvesting.

Another conservationist suggested that incentive-based tools could be used to expand the use of ecological silviculture on more acres, higher retention, and gap-based harvesting when conservation is not feasible. He noted that forest certification alone is insufficient without financial backing in the current context of difficult wood markets.

8. *Public Comments*: Jo D. Saffeir moderated public comments. A representative of industry and landowners raised concern about the absence of mill operator voices in the discussion, warning that targeting high-value timber for conservation set-asides near mills would harm mills, loggers, and landowners. For example, she referenced a carbon forest project in New Hampshire that is purportedly affecting the wood supply of two nearby major mills. A conservationist echoed the ecological importance of LSOG forests, called for broad stakeholder consensus, expressed support for mitigation models like the New England Forestry Foundation's, and noted a strong public support for protecting LSOG forests while also supporting the forest products industry. A logger representative stressed that mill operators and

manufacturers should participate in any discussion before LSOG conservation strategies are proposed. He also suggested that additional data be collected and more research be conducted before any LSOG conservation strategies are proposed. A conservationist highlighted that existing voluntary conservation agreements and long-term conservation projects are already addressing LSOG goals, and that current maps represent only a snapshot. It may take decades before current conservation projects yield benefits for LSOG conservation. Jo D. Saffeir closed by clarifying the department's legislative charge and previewing an upcoming field tour with planned mill representation.

9. *Next Steps and Next Meeting*: Andy Whitman identified the date and nature of the next meeting, a field day, near Wyman, Maine, running from 9:00 am to 3:00 pm. The morning will include a stop at an unmanaged LSOG forest, and the afternoon will involve a virtual meeting.

Field Day – June 25th, 2026

Planned Outcomes

- Visited two field sites representing an unmanaged LSOG forest and a forest managed for LSOG.
- Discussed field sites' LSOG attributes and management
- Discussed the economic concerns of mill operators and how this might inform LSOG conservation strategies

Agenda

What	When
Welcome and agenda review – Kyle Burdick, Work group co-Chair, Forest Geek LLC.	9:00 – 9:10
Stop # 1: Unmanaged LSOG forest and its LSOG attributes – Kyle Burdick & Andy Whitman, MFS.	9:10 – 10:10
Travel to Stop #2	10:10 – 10:30
Stop #2: LSOG Management Site, Bigelow Reserve, Mike Pounch, Chief Forester, ME BPL.	10:30 – 11:30
Travel to the lunch location	11:30 - 12:00
Lunch – location: Stratton Community Room, 88 Main Street, Stratton, ME.	12:00 – 12:45
Panel of mill operators – discussion questions: • What is the role of LSOG forest in the timber supply for mills in Maine? • What do the panel members recommend LSOG strategies include to avoid having LSOG conservation strategy impacts to the wood supply?	12:45 – 1:35
Work Group discussion • What role does timber harvesting have in the conservation of LSOG forests and their LSOG attributes?	1:35 – 2:40

• What are the ways that strategies for conservation discussed are most compelling, and why? What other ideas regarding LSOG conservation strategies have not been uncovered in the work group meetings thus far? • When considering these strategies, what are the key challenges to aligning ecological, economic, and forest carbon considerations?	
Public Comment	2:40 – 2:55
LSOG Work Group Meeting #4 (July 9th) and subsequent meetings – Kyle Burdick.	2:55 – 3:00

Attendance

- Work group members (and affiliation) present: Ray Ary (Weyerhaeuser Co.), Barrie Brusila (Mid-Maine Forestry), Caleb Chaplin (Chaplin Logging), Andy Cutko (Maine Bureau of Parks and Lands), Amanda Egan (Maine Woodland Owners), Molly London (W.W. London Woodlot Management Co.), Ian Prior (Seven Islands Land Company), Jeff Romano (Maine Coastal Heritage Trust), Sally Stockwell (Maine Audubon), and Nava Tabak (Baxter State Park Authority).
- Work group members absent: Bill Haslam (American Forest Management), Brian Milakovsky (New England Forestry Foundation), Steve Tatko (Appalachian Mountain Club).
- Department of Agriculture, Conservation and Forestry (DACF) Staff: Patty Cormier (MFS), Morten Moesswilde (MFS), Bill Paterson (BPL), Mike Pounch (BPL), Andrew Whitman (MFS, technical assistance).
- DACF Consultant: Kyle Burdick (work group co-chair)
- Sawmill operators: 2
- Public (number) in person (affiliations when known): 3 (plus 1 for the indoor session only; American Forest Management, Maine Forest Products Council, Natural Resources Council of Maine, and Professional Loggers Contractors).

Meeting Notes

1. *Welcome*: The work group co-chair, Kyle Burdick, welcomed the work group and public in attendance and online.

- *Introductions and roles*: Work group members and public guests introduced themselves and their affiliations.
- *Agenda Review*: Kyle Burdick reviewed the planned agenda and scheduled feedback from the work group.

2. *Working Agreements Review*: Kyle Burdick reviewed the working agreements that were agreed to in Meeting #1. The work group was reminded that its role is to provide a broad range of perspectives to advise DACF on possible LSOG conservation strategies.

Morning Outdoor Field Session: *Two stops to (1) review LSOG attributes and (2) LSOG management practices on public timberlands*.

3. *Stop 1: LSOG Attributes in an LSOG Northern hardwood stand (Stony Brook LSOG) (presenters: Kyle Burdick, ForestGeek LLC & Andy Whitman, MFS)*: Work group members were asked to identify LSOG attributes in the stand. Structurally, this northern hardwood LSOG stand featured large, very old trees; large snags and fallen logs; large volumes of deadwood in diverse states of decay; multi-layered vegetation; complex canopies; and spatially variable stand structure. Compositionally, it supported long-lived tree species (eastern hemlock, sugar maple, red spruce, yellow birch). It likely hosts specialized lichens, mosses, liverworts, and potentially saproxylic beetles, and other wildlife dependent on abundant deadwood, with late-seral species dominating and rare species more frequently present. Process-based attributes included mostly natural stand dynamics, disturbance regimes with infrequent small-scale disturbances, and high carbon storage. The lack of stumps suggested little or no harvest history, though patches of white ash (a mid-successional species) and patches of older and younger forest could indicate a light-to-modest harvest operation more than 40 years ago. From a forestry perspective, the stand was composed of low-grade eastern hemlock and sugar maple, some yellow birch and red spruce, and white ash. Work group members discussed the timber values of the stand and how viable a harvest operation would be in the context of poor markets and low-quality stocking in the forest, though some quality sawlog trees are present. The proximity of the nearby (chip-using) biomass power plant in Stratton was noted as potentially making a logging operation financially viable.
4. *Stop 2: LSOG management practices on public timberlands at a spruce-fir-hemlock site (presenter: Mike Pounch, Chief Forester, ME DACF Bureau of Parks and Lands)*: Mike described the harvest prescription as an irregular shelterwood with expanding

gaps. Trails and gaps were laid out by foresters to take advantage of stand variability, ensuring that gaps would be adjacent to areas with abundant regeneration and that the main skid road could be reused in future harvest operations. The logging equipment included two dangle-head processors and a forwarder. The harvest operation has been profitable for the logger, but this was in part because the trucking distance for chip wood was short (the nearby Stratton biomass plant), which made it possible to turn a profit on chipping wood. The conversation focused on whether this long-term silvicultural system could maintain LSOG structural attributes and be financially viable now and in future logging operations.

Afternoon Indoor Work Session

5. *Panel Session: Mill Operators' Perspective on LSOG Conservation (moderator: Kyle Burdick, ForestGeek LLC; Panel members: Scott Dumont, log buyer, Bourgeois Guitars, and Walker Day, log buyer, Columbia Forest Products):*

   Panel discussion questions:

   Q1: What is the role of LSOG forest in the timber supply for mills in Maine?

   Up until the 2000s, quality logs came from LSOG stands, but now most logs come from mature stands that have been historically managed. LSOG may be a significant source of logs, but most of the wood comes from historically managed forests. Logs down to a 10" butt are purchased, but preference is given to logs in the 14" to 20" range. Larger than 22", it is hard to evaluate log quality, so larger logs have quality issues more often. The Columbia Mill in Presque Isle is a major producer of birch plywood for the U.S., with products used in cabinets, doors, furniture, and aircraft interiors. Maine forests have a greater proportion of pulpwood to sawlogs than those in Vermont, which may reflect management history and soil quality (site productivity). It was unclear whether the loss of sawlogs from LSOG conservation could be replaced through better management of the remaining commercial forestland.

   Q2: What are your concerns about possible strategies to conserve LSOG forests?

   Log buyers are always concerned when land is protected and thus no longer available for timber harvesting, so they don't favor a ban on harvesting in LSOG forests. Logs don't have to come from LSOG stands to meet log buyers' quality standards for mills. One buyer prefers logs with narrow tree-ring widths from slow growth, as often found in LSOG stands; tree-ring width was not a concern for the other log buyer, except for oak logs, where large rings can reduce log quality for

"peeling." Both log buyers purchase most (>80%) of their logs from Maine, though logs may be purchased as far west as New York state, from all New England, and as far north and east as nearby Canadian provinces. Maine logs are sold on a global market. Consumer preferences have not changed, but Asian markets pose a threat to compete with domestic log buyers on log pricing. Alternative tree species like black cherry and black walnut are entirely bought up by the Asian market.

6. Work Group Discussion

Talk 1: LSOG Conservation Strategies Primer (presenter: Kyle Burdick): Kyle presented a framework of LSOG conservation strategies that focused on voluntary measures: education, forest certification, precision conservation easements, fee purchase of land, land-and-rights trades, different harvesting, management for LSOG forests, biodiversity and carbon credits, and the USDA FSA's Conservation Reserve Program as it might be applied to LSOG forest conservation.

Key Discussion Questions

Q1: What role does timber harvesting have in the conservation of LSOG forests and their LSOG attributes?

Q2: What are the ways that strategies for conservation discussed are most compelling, and why? What other ideas regarding LSOG conservation strategies have not been uncovered in the work group meetings thus far?

Q3: When considering these strategies, what are the key challenges to align ecological, economic, and forest carbon considerations?

Discussion

The responses from the work group were varied. A logger expressed concern that many of these strategies may pay landowners but not loggers for their opportunity costs when land is taken out of production. A land conservation organization representative described how over 600,000 acres are conserved and will eventually be designated as LSOG. A state agency representative indicated that only 5% of Maine is off-limits to logging, and 40% of that is wetlands and high-elevation areas (total forest conserved is about 500,000 acres). A forester indicated a preference for concrete numbers of LSOG acres in Maine before providing feedback on this report.

A commercial landowner representative proposed managing LSOG so that it can be moved around the landscape, allowing periodic harvesting and canopy removal. A landowner representative suggested that the report could include a suite of LSOG strategies without recommending any of them in the legislative report. It was

suggested to have MNAP confirm the OG sites for potential conservation. A conservation organization representative stated that it takes a very long time to create OG, so that it can't be moved around the landscape, and needs to be considered separately from LS.

A work group member asked whether the report could include possible funding sources for different strategies. There is also interest in obtaining cost estimates for different strategies, though some doubt whether this would be possible.

One member pointed out that forest certification may not address the LSOG issue because landowners don't know where their LSOG is (can't manage what you don't know you have). Therefore, auditors aren't able to address LSOG-related requirements. Moreover, the certification standards do not require landowners to create data layers for their LSOG. Some certified landowners may have once had LSOG parcels that were sold to conservation groups because they do not want to manage LSOG forest. Some certified landowners have claimed credit for conserving LSOG by selling LSOG forest land to land conservation organizations rather than continuing to own and manage LSOG forests for LSOG attributes. It was noted that sales of small parcels of LSOG might fragment ownerships and create obstacles to forest management.

There was a short discussion about paying landowners to conserve LSOG privately. It was noted that the USDA FSA's Conservation Reserve Program, which applies to farmland, could serve as a model for this. The conservation term is 10 to 15 years and could serve as a model for paying for deferred harvesting.

7. *Public Comment:* Public comments were made by representatives of American Forest Management, Maine Forest Products Council, Natural Resources Council of Maine, and Professional Loggers Contractors. A commercial landowner representative discussed how they meet certification requirements to address LSOG conservation on their lands by establishing verifiable policies and procedures for mapping and managing LSOG stands, and consistently and appropriately applying them. An economic interest stated that there is insufficient data about the status of LSOG forests and how the significant decline in harvesting has likely created even more LSOG forest in Maine than before. Based on a private conversation with the logger for Stop 2, he suggested that timber harvesting as an LSOG forest conservation strategy could not be profitable. Another economic interest representative suggested that the Hagan map was flawed and that making strategy recommendations without identifying the current status of LSOG forest and setting targets for LSOG did not make sense. He suggested that existing

conservation lands were sufficient for conserving LSOG, and though some LSOG gets harvested, Maine's forests are growing more LSOG. A state agency person clarified that the legislature directed DACF to prepare a report that focused on LSOG conservation strategies and did not direct DACF to determine LSOG forest status. An environmental organization representative indicated that efforts should be made to verify LSOG on the ground, OG should be preserved as it is irreplaceable, but LSOG might be conserved and managed for timber.

8. *Next Steps and Next Meeting:* Andy Whitman described the date and nature of Meeting #4, July 9th, 9-11:00 am, a virtual meeting that requires online registration to receive the Zoom link.

Meeting #4 – July 9th, 2026

Planned Outcomes

- Reviewed and discussed broad LSOG characteristics (common to different forest types) based on the field trip and past presentations
- Reviewed and discussed general criteria for considering LSOG conservation strategies
- Reviewed and discussed specific possible strategies and primary considerations (positive and negative) based on general criteria.

Agenda

What	When
Welcome and agenda review – Chairs Jo D. Saffeir, Deputy Commissioner, DACF, and Kyle Burdick, Forest Geek LLC	9:00 – 9:05
LSOG characteristics - Kyle Burdick and Andy Whitman • Are the described LSOG characteristics a complete list? • What would you add to or take away from the list? • Are some characteristics more important than others? How important is no harvest history? • In the context of conservation strategies, who is qualified to identify these characteristics?	9:05 - 9:25
Criteria for selecting LSOG conservation strategies - Kyle Burdick • What would you add or take away from this proposed list of criteria for selecting LSOG conservation strategies?	9:25 - 9:50
LSOG Tools and Strategies - Jo D. Saffeir and Kyle Burdick • How "tools" differ from "strategies." Do other tools exist? • What details would add to understanding the identified LSOG conservation strategies? • Which LSOG conservation strategies would you consider to be feasible and workable from your perspective? • What action items need to be completed before a strategy is designed and implemented?	9:50 - 10:40
Public Comment	10:40 – 10:55

Next Steps – review timeline - Work Group feedback on Draft LSOG strategies report - Public comments on Draft LSOG Strategies report - Summary of public comments to LSOG work group Next Work Group meeting - September 11, Deering Bldg. - To review public comments on draft strategies	10:55 – 11:00

Attendance

- Work group members (and affiliation) present: Ray Ary (Weyerhaeuser Co.), Barrie Brusila (Mid-Maine Forestry), Caleb Chaplin (Chaplin Logging), Andy Cutko (Maine Bureau of Parks and Lands), Amanda Egan (Maine Woodland Owners), Bill Haslam (American Forest Management), Brian Milakovsky (New England Forestry Foundation), Jeff Romano (Maine Coastal Heritage Trust), Sally Stockwell (Maine Audubon), Nava Tabak (Baxter State Park Authority), and Steve Tatko (Appalachian Mountain Club).
- Work group members absent: Molly London (W.W. London Woodlot Management Co.), Ian Prior (Seven Islands Land Company),
- Department of Agriculture, Conservation and Forestry (DACF) Staff: Jo D. Saffier, Deputy Commissioner, Patty Cormier (MFS), Morten Moesswilde (MFS), Bill Paterson (BPL), Mike Pounch (BPL), Andrew Whitman (MFS, technical assistance).
- DACF Consultant: Kyle Burdick (work group co-chair)
- Public (number) in person (and list of affiliations when known): 18 people, including staff members of the American Forest Management, Maine Audubon, Maine Department of Inland Fisheries and Wildlife, Maine Forest Products Council, Manulife, Natural Resources Council of Maine, Northeast Wilderness Trust, Northern Hardwoods Research Institute Inc., Old-Growth Forest Network, Prentiss and Carlisle, Professional Loggers Contractors, The Nature Conservancy, and Woodland Pulp LLC.

Meeting Notes

1. *Welcome*: The work group co-chairs, Jo D. Saffeir and Kyle Burdick, welcomed the work group and public in attendance and online.
   - *Introductions and roles*: Work group members and public guests introduced themselves and their affiliations.

- *Agenda Review*: Jo D. Saffeir reviewed the planned agenda and scheduled feedback from the work group.

2. *Working Agreements Review*: Jo D. Saffeir briefly reviewed the working agreements that were agreed to in Meeting #1. The work group was reminded that its role is to provide a broad range of perspectives to advise DACF on possible LSOG conservation strategies.

Work Group Discussion

3. *Discussion and Feedback on LSOG Characteristics*

   Presentation Summary: Kyle Burdick described LSOG characteristics as falling into four categories: composition, structure, ecological process, and human legacy, and how they are organized along a development spectrum from transitional LS forest to old growth. Key characteristics include shade-tolerant/centennial tree species, multi-layered canopy and age classes, epiphytes/lichens/fungi, and unique ecological processes not easily replicated in managed forests. He also identified forest-type variations (northern hardwood, northern conifer, hemlock, cedar, etc.), noting that cedar is difficult to age and that fire-dependent northern conifer forest types are rare. He raised an open question: should harvest history matter, or just the current number of LSOG characteristics? He leaned toward the latter. Five discussion questions were provided: Are the described LSOG characteristics a complete list? What characteristics would you add to or take away from the list? Are some characteristics more important than others? How important is no harvest history? In the context of conservation strategies, who is qualified to identify these characteristics?

   Work Group Discussion and Feedback: Work group members responded to these questions and suggested several improvements to the LSOG framework. Two members urged adding oak-pine as a forest type, noting that current categories skew toward the north/rural and overlook southern Maine areas like the Camden Hills. Two members also requested that two LSOG characteristics be added to the list: (1) deadwood decay, size, and volume as the clearest indicators of ecological continuity, and (2) complex canopies and canopy gaps. One forester strongly recommended that conditions, rather than harvest history, should be used to determine ecological value. Two members urged that existing resources (e.g., prior packets, field-trip notes, and John Hagan's Climate Commons definitions) be used to develop a list of key LSOG characteristics, rather than new resources. A biologist appealed for more emphasis on the ecological function of LSOG, not just LSOG structure. Three members highlighted the need for trained field verification when selecting LSOG stands for conservation. The Maine

Natural Areas Program (MNAP) was proposed as the logical provider for this service because its funding is consistent, though its staff capacity is limited.

4. LSOG Criteria

   Presentation summary: Kyle Burdick proposed four pillars as criteria for assessing strategies: voluntary (strengthens collaboration among landowners, loggers, NGOs, and researchers); effective (truly conserves LSOG and uses qualified, forest professionals to identify LSOG stands); impact-analyzed (understands consequences); and compensated/funded (the forest-products community and landowners are paid). He described how the New England Forestry Foundation's program was the only real-world example that addressed all four pillars so far. Two discussion questions were provided for reviewing these four criteria: What would you add or take away from this proposed list of criteria for selecting LSOG conservation strategies? Should professional identification of LSOG forests be a criterion?

   Work Group Feedback: Several participants urged that permanence be explicitly built into the "effective" pillar, distinguishing fee acquisition and permanent easements from temporary deferrals. Two members emphasized that harvesting deferrals were framed as a stopgap rather than a perpetual tool, with permanent protection remaining just one option alongside strict easements and incentivized adaptive management on harvested stands. Several members cautioned against treating the four pillars as criteria for a rigid pass/fail test. They favored using them as a flexible toolkit that also accounts for scalability and durability as they relate to stand size. One member proposed a simple scoring system for the pillars (i.e., high/medium/low) to facilitate comparisons across strategies. Two members also recommended that MNAP's participation in the process of documenting LSOG sites be a LSOG project funding requirement. One member noted that LSOG eligibility standards will likely vary by strategy and funder.

5. LSOG Strategies

   Presentation Summary: Kyle distinguished mechanisms/strategies (timber contracts/deferrals, fee purchases, timber deeds, conservation easements, land management, market-demand/certification, and emerging carbon/ESG/biodiversity credits) from tools that support them but aren't standalone strategies (education, current-use programs, 1031 exchanges). He walked through voluntary deferrals, precision conservation easements, tradable timber rights, active management, and market-based approaches (noting ~10 million acres of Maine forest are already certified), using NEFF's program as the case study that meets all four pillars. Four discussion questions were provided for reviewing these four criteria: (1) "Tools" are

different from “strategies”. Do other tools exist? (2) What details would add to understanding the identified LSOG conservation strategies? (3) Which LSOG conservation strategies would you consider to be feasible and workable from your perspective? (4) What action items need to be completed before a strategy is designed and implemented?

Work Group Feedback: Work group members proposed three additions for the report. Mapping should be added as a tool: while the report itself won't contain an LSOG map, conservation strategies will need one from a reliable source, potentially using LiDAR, to identify candidate LSOG stands for projects. One member strongly recommended including a case study for each type of strategy to make the report more accessible to legislators with varying levels of expertise, even if the case study is hypothetical. Finally, it was noted that LSOG conservation efforts must consider the long-term pipeline, since much of the forest land currently conserved is young or cutover and will mature into LSOG over 50 to 150 years.

6. *Feasibility of Strategies / Data and Action Items Needed*: Further discussion was facilitated by Jo Saffeir and consisted of a direct group round robin for additional feedback. Two members identified fee purchases and easements as the most effective LSOG conservation strategies, if money is available. However, funding has come in waves, and future philanthropic support may be uncertain. Members from different groups recommended that spatially explicit LSOG mapping be improved before assessing feasibility and raised concerns about the accuracy of Hagan’s analysis. A staff member at an environmental organization also urged prioritizing LSOG areas and using buffer zones around them to reduce edge effects. One staff member of a land conservation organization proposed a “core + adaptively managed buffer” model, which has been widely used internationally, paired with a 5- to 10-year funding and project development runway. A staff member at a land conservation organization noted that Maine’s conserved acreage has nearly quadrupled over 30 years and is expected to continue growing regardless of the group’s recommendations. One member stressed prioritizing LSOG across geography and forest types, including the oak-pine gap, and researching adequate retention thresholds. Another member also urged acknowledging the north/south regional differences in the amount and forest types of LSOG conserved. A staff member of a commercial landowner recommended incorporating other assessments, including Aaron Weiskittel’s LSOG report, in addition to Hagan’s report.

Public Comment and Next Steps

7. *Public Comment:* Public comments were made by staff of the Natural Resources Council of Maine, Northeast Wilderness Trust, Professional Loggers Contractors, and

The Nature Conservancy. Four people spoke. A staff member from an environmental organization stressed that LSOG exists on a spectrum and is not a single forest category. She underscored that fieldwork must evaluate the level of LSOG conditions before an LSOG stand is included in a conservation program. She advocated for the strong protection of old-growth forests in Maine. She suggested that ecological forestry practices could be applied in LS, in tandem with financial incentives for landowners, loggers, and mill operators. A representative of the logging industry called for comprehensive statewide LSOG data before strategies move forward. He cautioned against treating harvesting deferral solely as a step toward permanent protection and recommended applying an analysis to document the opportunity costs for landowners and logging contractors.

Staff from two land conservation organizations spoke next. One promoted the view of old growth as an ecological condition rather than a stand age and endorsed flexibility around the permanence of protection. She noted that the Northeast Wilderness Trust will be releasing an upcoming study on ecoregion representation in conserved wildlands. The other staff member at a land conservation organization suggested treating the "pillars" (LSOG strategy criteria) as evaluative metrics rather than universal requirements, and urged caution when defining terms like "permanence," citing lessons from carbon markets on the concept of permanence.

8. *Next Steps and Next Meeting:* Jo D. Saffeir reviewed the LSOG Forest Strategies Document Timeline and described the date and nature of Meeting #5, September 9th, 9-12:00 am, a hybrid meeting that requires online attendees to use the online registration link to receive the Zoom link.

Meeting #5 – September 11th, 2026

Agenda

Planned Outcomes

Attendance

Meeting Notes

Meeting #6 – October 16th, 2026

Agenda

Planned Outcomes

Attendance

Meeting Notes