Criterion 7: Legal, Institutional, and Economic Framework for Forest Conservation and Sustainable Management

A society's laws and regulations often have profound effects on the long-term sustainability of a state's forest resources. Well-designed environmental laws, regulations, standards, and ordinances can help protect and conserve forest resources, while poorly conceived policies, or the lack of policies, can result in the continuing loss and fragmentation of forests. State and local governments need to recognize the importance of forests and their associated resources and take the necessary steps to maintain and enhance them for future generations. Therefore, it is important to ensure that a state has sufficient policies and laws, as well as standards and guidelines, to address the use and long-term sustainability of its forests while not overly burdening landowners and other forest users.

INDICATOR 17

Forest management standards/guidelines

Forest management guidelines are used to ensure sustainable management of forests on private and public lands and in urban areas. The Delaware Forest Service provides forest management assistance to landowners and communities to help them manage their forest resources. Delaware actively participates in the Forest Stewardship Program, American Tree Farm System, and Tree City USA. The DFS tracks the success of these efforts through multiple performance measures; these measures indicate a steady improvement in rural and urban forest management but further outreach and assistance is still needed.

Types of forest management standards/guidelines

The Delaware Forest Service (DFS) provides a variety of technical forestry assistance to landowners including standards for forest management. One very important standard is a plan that addresses all aspects of the forest resource, including wood production, wildlife habitat, recreational opportunities, and soil and water quality protection. Forest stewardship plans incorporate all of these benefits into a long-term management plan for the forest landowner based on his/her goals for the property. By following a plan, landowners help ensure that Delaware's forests are sustainably managed.

Table 19 details forest stewardship plan activity on private lands for the years 2007 through 2019. DFS foresters offer this service free-of-charge. More Delaware forestland owners should take advantage of this opportunity and become engaged in the active management of their forests. Currently, there are 245 active forest stewardship plans in Delaware totaling 20,302 acres.

Table 19. New forest stewardship plans, 2007–2019.

Year	Acres	Number of Plans
2007	1,835	20
2008	2,722	46
2009	2,046	35
2010	3,538	45
2011	3,753	52
2012	4,435	40
2013	1,233	27
2014	1,383	15
2015	2,432	23
2016	2,311	21
2017	1,889	18
2018	1,732	17
2019	1,904	20

Source: Delaware Forest Service

The American Tree Farm System, a program operated by the American Forest Foundation, recognizes landowners who are committed to the sustainable management of their forests. Landowners must follow a forest stewardship plan for their property that is written by a certified forester and they receive professional assistance when implementing forest management activities. Wood produced from Tree Farms is now recognized by many organizations as certified. There are over 230 participating Tree Farmers in Delaware that encompass 17,299 acres of forestland. Tree Farms are inspected by a certified tree farm inspector to monitor the property and assure plan compliance.

Voluntary and mandatory standards/guidelines

The DFS continues to provide educational opportunities and technical forestry assistance to landowners and attempts to reach these landowners through the media and other avenues (direct mail, internet, workshops, etc.). One DFS performance measure is to monitor the percentage of timber harvests (on an acreage basis) that follow a forest management plan. While having a forest management plan does not guarantee that a harvest is sustainably implemented and there are certainly excellent harvests on properties that do not have a plan, this is one of the best measures to gauge success in reaching forest landowners and helping them sustainably manage their forests. Table 20 summarizes this performance measure, by state fiscal year (July 1–June 30) over the past ten years. The data indicate that approximately one-third of timber harvests follow a professionally-prepared forest management plan. National estimates usually range from 10–20%, therefore Delaware's performance is above average, but much work remains.

The DFS developed best management practices (BMPs) for forest management activities in 1995, working with landowners, forest industry, nongovernmental organizations, and other public agencies. These BMPs are provided to landowners and forest operators (loggers, timber buyers, etc.) and they describe actions (buffers along waterways, proper water crossings, etc.) they must take, by law, to ensure timber harvests and other forestry activities do not degrade water quality.

Table 20. Percentage of timber harvests (acres) with a forest management plan (Non-Industrial Private Forestland). (Excludes timber harvests with land conversions.)

Fiscal Year	*% of Harvested Acres with a Stewardship Plan*
2010	54
2011	37
2012	30
2013	43
2014	40
2015	10
2016	39
2017	17
2018	47
2019	41

Source: Delaware Forest Service

Delaware also partners with the State of Maryland in the Maryland/Delaware Master Logger Program. The Master Logger Program is a voluntary, education and (third party) certification program for loggers. Its goal is to provide loggers with comprehensive training and education in the laws, regulations, and practices that are important to the industry. Loggers must complete a set of core courses to become certified and then complete continuing education courses to maintain current status. Core courses include sustainable forest management, timber harvesting, wildlife management, and safety techniques. Harvesters who are master loggers have a skill set that allows them to operate at the highest level of professionalism and safety. The Master Logger Program also allows landowners to select operators who are committed to professionalism and high quality, sound timber harvesting. Currently there are nine Master Loggers in Delaware and 32 on the Eastern Shore of Maryland. This is a decrease over the last ten years of one in Delaware and 12 on the Eastern Shore.

There is the potential to harvest low quality timber, primarily hardwood species, for energy production in Delaware. This could provide new markets for Delaware's forest landowners. Currently, Delaware does not have guidelines for biomass harvests. Because biomass harvests could use not only low value timber but also portions of trees that are not removed during a conventional harvest (limbs, stumps, etc.), guidelines should be developed for these harvests to ensure they do not reduce site productivity or otherwise detrimentally affect the forest.

Delaware's three State Forests are managed with the assistance of forest management plans prepared by staff foresters. All State Forest management plans were completely updated in 2006 and subsequently amended as new forested parcels were added to the inventory (31 parcels totaling 3,692 acres). The plans address not only timber production, but the entire other suite of forest resources as well (e.g., wildlife habitat, recreational opportunities, threatened and endangered species, etc.). State Parks and State Wildlife Areas are also managed with the assistance of forest management plans prepared by professional foresters. Although some of these lands are not managed for timber production, issues such as invasive species control, threatened and endangered species protection, and forest health are best approached with the help of a long-term forest management plan.

Urban forestry assistance and guidelines are provided to Delaware's communities and homeowners. Delaware participates in the Tree City USA program that recognizes communities that meet four criteria (tree board or commission, tree ordinance, spend at least $2/capita on tree planting and management, and recognize Arbor Day). Communities achieving this status are actively managing their urban forest resources. The DFS uses the percentage of Delaware communities that have achieved Tree City USA status as a performance measure to gauge its success in helping cities and towns incorporate urban forest management into their long-term plans and thus sustainably manage their urban forests. Currently, 17 of Delaware's 57 incorporated cities and towns (30%) have achieved Tree City USA status. By comparison, in 2000 only four communities were recognized. Delaware's current Tree City USA communities are:

New Castle County	Kent County	Sussex County
Delaware City	Dover	Bethany Beach
Middletown	Dover Air Force Base	Bridgeville
Newark	Milford	Dagsboro
Odessa	Smyrna	Dewey Beach
Wilmington		Fenwick Island
		Lewes
		Ocean View
		Rehoboth Beach

In 2011, Delaware State University became the first (and still the only) Delaware Tree Campus USA recipient and has achieved this status for the last eight consecutive years. Efforts have been made to recruit other institutions of higher learning, but little progress has been made to date in this effort. Like Tree City USA, Tree Campus USA is sponsored by the Arbor Day Foundation.

Management of urban forest resources along public utility rights-of-way is also important to not only protect these resources but also provide for public safety. The Tree Line USA program, also administered by the National Arbor Day Foundation, recognizes utility companies that meet three criteria for proper management of trees along utility lines. Currently one Delaware company (Delmarva Power) is recognized as a Tree Line USA utility.

The three criteria for Tree Line USA are:

Quality Tree Care – The utility follows industry standards for pruning, planting, removals, and trenching and tunneling near trees.

Annual Worker Training – The utility ensures that its employees and contract workers are trained in best practices.

Tree Planting and Public Education – The utility sponsors and participates in a tree planting and public education program designed to expand canopy and educate customers about proper tree planting, placement, and pruning, including participation in community Arbor Day celebrations.

The DFS also encourages communities and homeowners to utilize International Society of Arboriculture (ISA) certified arborists for any tree care assistance. The DFS has partnered with the ISA to provide training to tree care professionals to help them better manage our urban forests. Currently there are 43 certified arborists in Delaware.

The Tree-Friendly Community program recognizes communities and homeowner associations committed to protecting and enhancing the state's urban forest resources. This program is specific to Delaware and was developed in an effort to recognize communities for tree management, especially those located outside of municipal boundaries or homeowner groups. A community qualifies for the honor by accomplishing three of the following: 1) perform an annual ceremony to promote community forests, 2) develop a community forestry management plan, 3) complete a tree project that enhances existing urban forests, 4) adopt a community tree ordinance that protects trees, 5) form a tree commission or tree board that serves as the guiding body for tree-related decisions, and 6) have a tree budget of $1/residential household.

Education, while not a specific forest management standard or guideline, is also an important function of the DFS. Increasing the public's knowledge of the forest resource and its many natural benefits is vital to the long-term sustainability of our forests. Informed citizens, both children and adults, will help make wise decisions concerning forest policy. The DFS supports the internationally recognized Project Learning Tree (PLT) curriculum administered by the Sustainable Forestry Initiative, Inc. The DFS has an educator on staff who provides PLT training to teachers and other educators as well as a PLT Advisory Committee to help monitor and improve the program. Additionally, the DFS provides wildfire prevention (Smokey Bear) programs to first grade students and Arbor Day programs to elementary students to improve student understanding of forestry issues. There are also education centers and trails at Blackbird and Redden State Forests to further the public's forestry knowledge. One of the DFS performance measures is to track the percentage (public) and number (private) of elementary schools that participate in at least one DFS educational program. For the last ten years, on average, 61% of Delaware's 173 elementary schools participated in a DFS educational program. Table 21 has a summary of the Smokey Bear and Arbor Day programs in Delaware since 2010.

Table 21. Elementary schools and students participating in DFS educational programs, including Smokey Bear and Arbor Day programs.

Fiscal Year	*% of Schools Participating*	*Number of Students*
2010	69	12,725
2011	68	14,290
2012	68	12,543
2013	61	10,670
2014	67	11,072
2015	65	13,110
2016	57	10,662
2017	62	10,679
2018	40	7,013
2019	52	9,066

Source: Delaware Forest Service

About 30% of Delaware's communities include urban forest management in their planning process—an increase from ten years ago.

Conclusions

Delaware, through partnerships with other natural resource organizations, provides sustainable forest management standards to landowners. Tracking the percentage of timber harvests that follow a forest management plan shows that an increasing number of landowners utilize professional forestry assistance, although many landowners have yet to receive assistance. The DFS also partners with other natural resource organizations to provide urban forestry assistance and guidelines to communities, utilities, and tree care professionals. Approximately 30% of Delaware's communities include urban forest management in their planning process—an increase from ten years ago. The DFS also provides educational information and recommendations to homeowners to help them better manage their urban trees. Lastly, Delaware provides educational programs to students and adults to increase their knowledge of the importance of forest resources.

INDICATOR 18

Forest-related planning, assessment, policy, and law

Laws addressing forest management set boundaries on permissible activities to protect soil and water quality as well as the forest itself. Forest-related planning and assessment are tools through which policy recommendations are made. Solid legal and planning frameworks are necessary to ensure sustainable forest management. In addition, site-specific planning is necessary to promote proper management at the stand and parcel levels.

Forest planning and assessment

The Delaware Forest Service (DFS) has completed various forest planning documents in the last 20+ years. The *Vision for the Future of Delaware's Forests* published in 1998 provided an overview of Delaware's forest resources as well as current (at the time) and future efforts to sustain these forests. A comprehensive forest health report published in 2006 provided a status of Delaware's forests based on the seven criteria and 18 indicators for sustainable forest management used for this state assessment. Additionally, a Forest Legacy Assessment of Need (AON) was completed and accepted by the USDA Secretary in December 1998 that presented a plan and guidelines for Delaware's Forest Legacy Program including the state's four Forest Legacy Areas (see Figure 43). An updated AON can be found in Appendix 3 of this document. The DFS completed a comprehensive five-year strategic plan in 2008 with input from a variety of stakeholders including landowners, communities, nongovernmental organizations, and other public agencies. Then in 2010, a detailed forest action plan was submitted to and approved by the U.S. Forest Service. This plan consisted of two components: the *Delaware Forest Resource Assessment* and the *Delaware Statewide Forest Resource Strategy*. The progress of this 2010 plan was reviewed in 2015 and an additional update (2020) is included in Section II of this revised assessment document.

Delaware also participates in the U.S. Forest Service's Forest Inventory and Analysis (FIA) program. FIA utilizes a series of permanent plots located throughout the state to analyze the forest resources (but not urban forests) including acreage, forest types, forest volume, growth, mortality, and removals. This information is valuable not only to the DFS but also to many other parties as well including forest industry and other government agencies. In fact, much of the forest resource information in this assessment was generated through FIA data. Until 2004, the U.S. Forest Service measured the FIA plots periodically—Delaware's forests were measured in 1957, 1972, 1986, and 1999. Beginning in 2004, however, the U.S. Forest Service began measuring FIA plots on a continuous basis. Federal funding was available to measure one-seventh of the plots annually. Thus, after the first seven years, Delaware's entire data set would be available. Delaware elected to provide state funding to reduce the measurement cycle to five years because land-use changes were rapidly impacting our forestland. Additionally, due to Delaware's small size, the estimates from the FIA plots are often based on relatively few observations and thus the values have large confidence intervals. Therefore, Delaware also invested funds to double the number of permanent plots to help produce more precise estimates. 2008 was the final year of the initial five-year measurement cycle and since then, FIA has continued to visit one-fifth of Delaware's plots on an annual basis. Much of the most recent FIA data for Delaware is available through the following web site: **https://www.fia.fs.fed.us/tools-data/.**

All of these processes and supporting documents have helped inform the public about Delaware's forests and provide guidance for future activities. These efforts have helped garner support for the allocation of state and federal funds to protect strategic working forestlands and to initiate the state's Forestland Preservation Program. They have also contributed information for this statewide forest resource assessment.

Forest laws and policies

The *Delaware Seed Tree Law* (Title 3, Chapter 10, Subchapter V), enacted in 1989, applies to timber harvests of 10 acres or more where 25% of the canopy consists of pine and/or yellow-poplar, unless the forest will be converted to another land use (agriculture, development, etc.). The law requires landowners to make provisions ensuring 400 healthy pine and/or yellow-poplar seedlings/acre are established following harvest. Reforestation may be attained by planting or, where conditions permit, through natural regeneration. This law was passed due to the significant drop in loblolly pine acreage in the late 20th century and a similar, albeit smaller, decline in yellow-poplar acreage. Since 2010, an average of 24 harvest operations (down from 35 the previous ten years) averaging 1,848 total acres (1,955 acres the previous ten years) annually triggered *Seed Tree Law* reforestation requirements (Table 22). An interesting aspect of this data summary is the number of acres planted versus natural regeneration. From 2000 to 2009 an average of 939 (48%) acres were planted and 1,016 regenerated naturally. But between 2010 and 2019 only an average of 171 (9%) acres were planted while the number of naturally regenerated acres grew to 1,677. Landowners are relying more and more on the plentiful natural seed sources for reforestation.

Table 22. Number of timber harvest operations affected by the Delaware Seed Tree Law, 2010–2019.

Year	Operations	Acres	Acres Regenerated	
			Planted	Natural
2010	28	2,853	59	2,794
2011	15	529	163	366
2012	16	847	106	741
2013	20	1,637	158	1,479
2014	41	2,868	61	2,807
2015	33	1,997	242	1,755
2016	35	2,944	40	2,904
2017	10	1,155	0	1,155
2018	15	1,860	110	1,750
2019	27	1,939	0	1,787

Source: Delaware Forest Service

Erosion and Sedimentation (E&S) Law

The *Erosion and Sedimentation (E&S) Law* (Title 3, Chapter 10, Subchapter VI), passed in 1994, requires that forest management activities, including timber harvests, protect water quality by eliminating sedimentation and erosion. Operators satisfy the law by using silvicultural best management practices (BMPs) during timber harvests and other silvicultural activities. The DFS developed and published Delaware's BMPs in 1995 through a collaborative process with forest industry, forest landowners, NGOs, and other government agencies. BMPs are designed to reduce the delivery of sediment to surface waters during harvest. Examples of timber harvest BMPs include proper placement of roads and landings, as well as retention of some trees in sensitive riparian zones. The DFS enforces the E&S Law. Enforcement options, though seldom required, include cease-and-desist orders and fines of up to $5,000/offense.

To monitor forest harvest operations, the *E&S Law* also requires that landowners and forest operators notify the DFS of all timber harvests totaling one acre or more. The application includes a summary and map of the harvest area, including any BMPs planned, and the intended future use of the property (remaining forest, development, agriculture, etc.). The DFS reviews the application to ensure that proposed harvests comply with the *Seed Tree Law* and E&S requirements and makes any necessary revisions to the planned BMPs before approving the permit. Foresters perform site inspections to ensure that the provisions of the harvest permits are met. Details on E&S permitting for the years 2010 through 2019 are contained in Table 23. On an annual average basis over the last ten years, 98 permits were issued by DFS foresters on 4,657 acres that had a corresponding 152 inspections. For the prior time period (2000 to 2009), annual averages were 128 permits, 5,032 acres, and 266 inspections.

Table 23. E&S (timber harvest) permits, 2010–2019.

Year	Permits	Acres	Inspections
2010	115	6,735	174
2011	101	3,541	191
2012	107	4,925	211
2013	99	4,653	201
2014	126	6,230	170
2015	116	4,818	179
2016	102	4,850	141
2017	92	4,103	74
2018	61	3,277	123
2019	87	4,345	76

Source: Delaware Forest Service

In 2014, the Maryland Forest Service initiated a study funded by the U.S. Forest Service entitled *Harvesting BMPs for Working Forests in Maryland and Delaware*. The goal was to evaluate the rates at which BMPs were applied to forest harvesting operations and their effectiveness in preventing sediment from entering waterways (a goal of the Clean Water Act). Results showed that Delaware timber harvests achieved a 93% rate of compliance with BMPs designed to protect water quality and limit soil erosion.

A recent study on timber harvests in Maryland and Delaware concluded that proper use of BMPs was very successful at protecting water quality during operations.

The study concluded that average sediment delivery across all locations was just 0.3 cubic feet/site—indicating that proper use of BMPs was very successful at protecting water quality during harvest operations. Non-compliance issues were minor (e.g., one instance of an oil drip <10 square feet) and can easily be corrected by operators paying closer attention to their equipment. The study results were very encouraging, especially because between 2014 and 2016 rainfall increased 20% above the 30-year average. An increased amount of precipitation during harvesting has the potential to exacerbate sediment movement if BMPs are not followed properly.

The *Seed Tree* and *E&S Laws* are Delaware's only two laws specific to forest management operations. Other than the Seed Tree Law—which only addresses pine and yellow-poplar—there are no regulations that address how landowners manage their hardwood forests for silvicultural purposes. This could partly explain the increase in low-quality hardwood species, namely gum and maple, although other events/issues have certainly contributed as well, namely extensive gypsy moth infestations, the 1994 ice storm, and the lack of markets for low quality hardwoods.

Delaware law also contains code for urban and community forestry (Title 3, Chapter 10, Subchapter III). This legislation, passed in 1998, formally established an Urban and Community Forestry Program and designated this authority to the DFS. In addition to establishing an advisory council, it also outlines actions for the DFS to expand urban forests and urban forest management, including the authority to develop guidelines for comprehensive community forestry plans, voluntary accreditation programs for tree care, and a community forestry grant program. The law does not, however, contain any specific requirements for communities to manage their urban forest resource.

Delaware law has established two advisory councils to guide the DFS: the Governor's Council on Forestry and the Delaware Community Forestry Council.

Delaware law also establishes two advisory councils to help direct and advise the DFS. Title 29 §8107A of the Delaware Code established the Governor's Council on Forestry. This seven-member board, appointed by the Governor, advises the DFS on important issues including forest health, fire prevention, forestry education, and forest management. A parallel group, the Delaware Community Forestry Council established in Title 3 §1034, performs a similar function for the DFS Urban and Community Forestry Program.

Delaware also has legislation that addresses illegal timber harvests. The *Timber Trespass Law* (Title 25, Chapter 14) establishes the penalties for the illegal removal (theft) of timber from private landowners. The court determines whether the trespass was intentional or accidental. Intentional trespass entitles the landowner to three times the value of the trees taken, or "triple stumpage." In cases of accidental trespass, the violator must pay the owner for the value of the trees removed plus court costs.

Conclusions

The DFS works to protect forest resources and water quality by enforcing existing laws and regulations. The *Seed Tree Law* was passed in 1989 to stop the loss of loblolly pine and yellow-poplar, both extremely important timber species. The *Erosion and Sedimentation Law* ensures that water quality is protected during forest management operations by utilizing best management practices. Landowners and operators file a permit for all harvests of one acre or more and the DFS monitors these harvests to ensure compliance. Additionally, two advisory councils guide the DFS on forestry issues and there is a law to protect landowners from illegal timber harvests.

Summary – Criterion 7

Forest management standards and guidelines as well as forest policies and laws are important tools used to maintain and enhance a state's forest resources. The DFS works with a variety of organizations, including the U.S. Forest Service, American Forest Foundation, and the National Arbor Day Foundation, to provide both forest management standards for rural and urban forest management and technical assistance to help landowners and communities achieve these standards. Tracking the percentage of timber harvests that follow a forest management plan and communities that have active urban forest management programs shows that an increasing amount of Delaware's rural and urban forestlands are managed with professional forestry guidance, but many have yet to receive assistance. Delaware also has various laws to help ensure the wise use and perpetuation of forest resources, including the *Seed Tree Law*, *Erosion and Sedimentation Law*, and *Timber Trespass Law*. The DFS monitors all timber harvests using a permit system to ensure these laws are followed. Two advisory councils also help guide and review forest policies. Many Delawareans, both adult and student, are exposed to forests and forestry issues through the DFS educational programs and State Forest education centers. These programs must continue and grow if future Delawareans are to make wise forest-use policy decisions. All of these efforts help address the three S&PF national priorities—*Conserve and manage working forest landscapes for multiple values and uses, Protect forests from threats,* and *Enhance public benefits from trees and forests.*