

**Damascus Study Area
Forest Protection and Enhancement
Recommendations
and
Forest Technical
Appendix**

April 2004

Executive Summary

The Damascus Environmental Study Area is located in the northernmost section of Montgomery County, Maryland. The boundaries are, approximately, the Patuxent River and Hipsley Mill Road to the northeast, Laytonsville Road to the east, Brink and Warfield Roads and Little Bennett Regional Park to the south, Ridge Road (MD 27) to the west, and the Frederick-Montgomery County line to the northwest. The study area encompasses 40,505 acres (63.3 square miles), which includes the entirety of the Damascus Master Plan Area (22,151 acres) and the subwatershed area of tributary streams that are part of the master plan area hydrology, although they fall outside the master plan boundary. This was done in order to compare resources within the logical framework of watershed or subwatershed boundaries. Accordingly, forests were ranked using a watershed and subwatershed approach. Forest stands falling within the master plan boundary were also analyzed as a subset to themselves in order that the results be more pertinent to the overall Damascus Master Plan recommendations.

For the forest study individual stands were ranked by their priority for preservation based upon an analysis of several stand and watershed characteristics. Opportunities for forest restoration were also identified and prioritized based upon their proximity to streams and existing forest.

Forests within the study area generally follow stream valleys, with several larger stands also including significant upland habitat. These large blocks of contiguous forest are important habitat for forest interior dwelling animal and plant species, and are relatively rare in Montgomery County due to land development and agriculture. Significant areas of woodland habitat occur along the mainstems of Bennett and Little Bennett Creeks and the Patuxent River (see Table 1). In other locales within the study area, development or agricultural practices have significantly reduced, or highly fragmented forested areas.

Several forest stands within each of the ranking categories were identified as high priority for preservation. Except for the Bennett Creek watershed, where there is only 13 acres of forested parkland, a portion of many of the larger forest stands have some existing protection by virtue of being located in parkland. The stand with the highest preservation rank for the master plan area is found in the Bennett Creek watershed, and that of the study area in the Upper Great Seneca Creek watershed. All top stands in the master plan and all but two in the study area are found on non-parkland. Since the Damascus vicinity is mostly zoned RDT and much of this area remains agricultural, very few of the forest stands, or portions thereof, are actually protected outside of parkland. Preserving these stands will depend upon the success of efforts to provide adequate incentives to landowners such as the opportunity to create and sell credits from forest banks and the purchase of conservation easements.

Table 1. Study Area Forest by Location and Significance

Watershed	Watershed Area	Total Forest Area		Forest in Parkland		Significant Forest ⁽²⁾				Forest Interior Habitat ^(1,3)	
	Acres	Acres	% of watershed area	Acres	% of total forest acreage	Acres	% of total forest acreage	Acres in parkland	% of significant forest in parkland	Acres	% of watershed area
Bennett Creek	7,081	2,196	31	13	<1	1,696	78	9	<1	344	5
Hawlings River ⁽⁴⁾	303	39	13	1	3	19	48	<1	1	0	0
Little Bennett Creek	8,165	3,804	47	2,761	73	3,354	88	2,619	78	1,315	16
Middle Great Seneca Creek ⁽⁴⁾	1,349	448	32	315	70	378	84	301	80	72	5
Upper Great Seneca Creek	16,791	4,824	29	1,416	29	3,715	77	1,326	36	633	4
Upper Patuxent River	6,807	2,344	34	741	32	2,090	89	1,029	49	430	6
TOTAL	40,496	13,655	34	5,480	40	11,252	83	5284	47	1,794	4

⁽¹⁾ Interior forest is defined as any forest that is found at least 300 feet from the outer periphery of the stand.

⁽²⁾ Significant Forest Area is defined as forest which may contain habitat suitable for interior dwelling birds or which provides migration corridors; consists of forest areas that are at least 100 acres in size and/or riparian corridors which, at a minimum, are 300 feet in width. Often will include interior forest.

⁽³⁾ Reflected in significant forest as well.

⁽⁴⁾ Only a small portion of these watersheds is located within the Damascus Study Area

Purpose

The purpose of this study is to identify and generally characterize the various forest stands found in both the Damascus Study Area and Master Plan Area, rank the stands with respect to their characteristics and the characteristics of the subwatersheds in which they occur, and choose stands which should be given consideration for preservation. This study is intended to be used in two ways: 1) to ensure that the existing high quality forest stands are given consideration as part of developing land use recommendations for the update to the master plan for the Damascus area and 2) to help guide future analysis of forest resources elsewhere in Montgomery County as part of the county's forest conservation program.

Benefits of Forest

The forests of the study area provide various environmental functions, including providing habitat for a range of plants and animals via the structural layers of the forest ecosystem, enhancing air quality by filtering particulates and absorbing nitrogen oxides, and contributing to the hydrologic cycle through evapotranspiration. Along streams and waterways, forests play a vital role in maintaining water quality by filtering, purifying, and reducing surface runoff, reducing stream bank degradation, helping to alleviate flooding, and moderating stream temperature fluctuations. The quality of life in anthropogenic communities is also improved by forests and trees through decreasing the need for cooling and heating, providing recreation, aesthetic enhancement, and perhaps most importantly providing a visible and psychological link with nature. Conserving forests and preserving these and other benefits is an essential part of the planning process.

Adverse Impacts to Forest Health

In Montgomery County urbanization and agriculture have caused a significant loss of historic forests. Today the county is approximately 25 percent forested (as opposed to the pre-European settlement level of 95 percent). Currently, both anthropogenic and non-anthropogenic forces still threaten remaining forest health. Anthropogenic threats to forest resources include both direct loss via land development and other land disturbing activities, and loss of forest benefits within the fragments of forest which remain after these activities. Existing regulations and guidelines prioritize protection of forest in stream valley corridors and on other environmentally sensitive land, which often results in the loss of large, mostly upland forest stands outside of these areas. These large forest blocks are areas that provide the best opportunities for maximizing forest benefits. Forest destruction, particularly as part of land development, results in what is known as fragmentation in these areas.

Fragmentation radically alters forest ecosystems. One of the most significant impacts of fragmentation is edge effect which may influence up to the first 100 meters of the periphery of a forest stand. In general, creation of a new forest edge by clearing causes a change in the light, temperature and wind regimes to which the trees are exposed. This change causes regression along the edge from the more mature, shade tolerant species of the interior forest to pioneer, shade intolerant, and now many times undesirable (i.e., non-native invasive) species. When forest is fragmented into long and/or narrow corridors and stands, as often occurs as part of land development, edge effect can result in the loss of all interior forest habitat. Forest interior dwelling species, particularly birds, require large tracts of unfragmented forest to sustain them. Therefore, not only is Montgomery County losing net forest acres but the remainder is being degraded with additional structural and species loss. If left unchecked this will lead to a shift in succession, with serious consequences for flora and fauna of the Damascus area.

Non-anthropogenic forces affecting forest stands include *Odocoileus virginianus* (white-tailed deer) and non-native invasive species. There is evidence that an inverse correlation exists between the quantity of interior habitat and *O. virginianus* populations. In addition, over browsing of forest understory layers by deer, including seedling trees, is seriously affecting the natural regenerative potential of existing forest stands. Along with the effects of *O. virginianus* the other major non-anthropogenic impediment to forest health is the threat of non-native invasive species. Non-native invasives are now found in almost every forest stand in the study area. In mature undisturbed forest, they usually remain in check and are simply additional species in the forest landscape. In areas of imbalance however, such as disturbed forest sites and along stand edges, non-native invasives develop into the most dominant and abundant species. The amount of damage from non-native invasive species competition varies from stand to stand, depending in part on the species involved and their growing characteristics (i.e. vine, groundcover, annual, perennial). They have a negative impact on natural succession and should be considered a major inhibitor to overall forest health and development. Individual non-native species include *Ailanthus altissima* (Tree-of-Heaven), *Alliaria petiolata* (garlic mustard), *Ampelopsis brevipedunculata* (porcelain berry), *Celastrus orbiculatus* (Asiatic bittersweet), *Hedera helix* (English ivy), *Lonicera japonica* (Japanese honeysuckle), *Microstegium vimineum* (Vietnamese stilt grass), *Polygonum perfoliatum* (Devil's tearthumb), and *Rosa multiflora* (multiflora rose) just to name a few.

It is of paramount importance therefore, to not only preserve forest, but preserve forest of adequate size and shape in order maintain biodiversity and minimize the impacts of the edge effect phenomenon.

Overview of Forest Resources

Using Geographic Information System (GIS) and aerial photographic technology, it has been determined that deciduous forest is the predominant forest type of the Damascus Study Area. Coniferous stands can be found within many of the larger deciduous forest areas in Little Bennett Regional Park, the Bennett Creek headwaters, along the Patuxent River, and along Great Seneca Creek. Mixed and successional stands are also found throughout the study area; successional stands especially along forest and field edges.

Deciduous forests of Eastern North America, such as those in the study area, are comprised of various forest stands which differ in age, species, structure, and quality throughout their extent. Typical forest structure consists of super canopy, canopy, sub canopy, understory, shrub, and herbaceous layers. Dominant tree species in deciduous forests vary with topography. Mature upland stands are dominated by *Quercus alba* (white oak), *Q. rubra* (northern red oak), *Q. prinus* (chestnut oak), *Q. coccinea* (scarlet oak), *Carya tomentosa* (mockernut hickory), and *C. glabra* (pignut hickory). *Liriodendron tulipifera* (tulip poplar) is an important secondary component of upland areas. Slopes and lowland areas dominated by *L. tulipifera* in association with *Acer rubrum* (red maple) and *Platanus occidentalis* (American sycamore). *Prunus serotina* (black cherry) is an important associated species along with *Fraxinus pennsylvanica* (green ash), *Juglans nigra* (black walnut), *Nyssa sylvatica* (black gum), *Ulmus americana* (American elm), and *Fagus grandifolia* (American beech). Typical woody understory found in the deciduous forests of Montgomery County includes *Lindera benzoin* (spicebush), *Cornus florida* (flowering dogwood), *Kalmia latifolia* (mountain laurel), *Carpinus caroliniana* (musclewood), *Vaccinium spp.* (blueberries), and *Viburnum spp.* (viburnums) with occurrences of more unusual species such as *Ostrya virginiana* (ironwood) and *Hammamelis virginiana* (witchhazel).

The mixed deciduous/coniferous forests contain many of the same species of trees as the deciduous forest in association with *Pinus virginiana* (Virginia pine) and *Pinus strobus* (white pine). In scattered areas along the mainstem of the Patuxent River, *Tsuga canadensis* (eastern hemlock) is also present. In the younger mixed forest stands *Juniperus virginiana* (eastern red cedar) replace the pines as the dominant associated coniferous tree. Typical successional forest areas are dominated by *L. tulipifera*, *A. rubrum*, and *P. serotina* in association with *J. virginiana*. Successional forest areas and old fields offer great opportunities for expansion of existing forest resources in the watershed

Recommendations for Forest Preservation and Enhancement

Forest stands of Damascus and vicinity were given point scores based upon criteria for different categories. These scores were then tallied and ranked in order to come up with the priorities and recommendations which follow.

Preservation Priorities

Forest stands were grouped into one of five categories based off of the criteria in the following categories:

- | | |
|--------------------------|--|
| Preservation Category 1: | Large forests (greater than 100 acres) with 50 or more acres of interior forest (both upland and riparian forest resources and the stands have low edge to area ratios). |
| Preservation Category 2: | Riparian forest that has interior forest habitat of 10 to 49.99 acres, a corridor width more than 600 feet and a corridor length a minimum of 1000 feet. |
| Preservation Category 3: | Riparian forest that is between 300-600 feet in width, interior forest habitat between 0-10 acres, and a corridor length a minimum of 1000 feet. |
| Preservation Category 4: | Riparian forest that is less than 300 feet in width with no interior forest habitat. |
| Preservation Category 5: | Small upland forest. |

Table 2 shows the results of the preservation ranking analysis for all Category 1 stands and the highest scoring Category 2 and 3 stands for both the Damascus Master Plan Area and the Damascus Study Area. (The master plan area is simply a subset of the study area but is shown in order to better compare the forest resources with the rest of the master plan recommendations.) Please note that the forest stands are the same; the purpose of the two sets is to show relative intra-set ranking. Also, those stands that are only partially within the master plan area boundary were included in the master plan area analysis as entire stands. Refer to Map A for stand locations.

Each stand in the first three categories was ranked but only the highest scoring stands are included in the table. The rank of each stand is based on several characteristics as discussed in the methodology section, it is not just a reflection upon stand quality. Therefore, while some stands may be smaller with less interior forest, they contribute other important to the local ecology and may even be more immediately threatened than those stands of larger size and presumably higher quality. Table 2 summarizes the relative ranks and staff recommendations for protection of forest stands. Preservation Category 4 and 5 stands were not individually ranked in this study. This is because Category 4 forests are associated with stream buffers, which receive standardized protection along the stream channel, as described in the *Montgomery County Environmental Guidelines*. Category 5 stands were not ranked due to the limited availability of protection methods for small upland parcels, their large number, and the similarity between stands.

Master Plan Area

Please note that recommendations in this section cover forest stands which fall within the master plan area boundary, the remainder of the study area forest stands are discussed in a separate section below.

1. **High priority forest stands within parkland** – Many of the Category 1 stands are found in entirety or majority, within the current boundaries of MNCPPC or state of Maryland parkland. These forest stands are **PR-1**, **PR-2**, **UGSC-2**, and **UGSC-4**. These stands are generally the larger stands in the master plan area and have interior forest greater than 50 acres. Acquisition or dedication is recommended for those contiguous parcels that are currently forested but not parkland.

2. **High priority stands recommended for park acquisition** –The largest Category 1 stand in the master plan area is **BC-1** of the Bennett Creek watershed. It is currently not parkland. In fact, there is almost no parkland in the Bennett Creek watershed. **BC-1** is large enough to have a variety of habitats thereby supporting a high level of biodiversity. It also has many large areas of relatively undisturbed forest; a large population of *Castanea dentata* (American Chestnut), a state watchlist species, was also discovered in **BC-1**. Because of the high quality and variety of the forest found in this stand and because it envelops the headwaters of Bennett Creek, it is recommended that **BC-1** be acquired as parkland via Legacy Open Space or direct purchase in order to protect this valuable upland and lowland forest community as well as the water quality in the Monocacy and Potomac River Basins.

3. **High priority forest stands recommended for highest level of protection as part of development design** –One stand, **UGSC-26** can be protected through development design and rezoning. It is recommended that clustering be used to achieve maximum forest protection and preservation on those parcels which remain redevelopable or developable. Most of **UGSC-26** is on already built properties. Forest should be protected on already constructed lots through the creation of conservation easements or forest mitigation banks. On the remaining vacant properties, houses should be clustered and the non built parcels converted to conservation easements. Though only one of the high priority stands fall under this category, there is forest which will be affected by the recommendations of the master plan. Please see the section titled Forest on Properties Recommended for Development by the Master Plan for further information.

Three other forest stands, **LBC-12**, **UGSC-10** and **UGSC-29**, though not in the top priority echelon, are more imminently threatened with development and as such need a brief mention here. The **Kingstead Farm** is a large property which contains forests (including stand **LBC-12**), wetlands, and open fields. Housing development should be clustered in the currently farmed fields in order to protect the existing ecological communities. The forest stand on the west side of Kingstead Road (although a Preservation Category 4 stand due to its presence along a stream and its smaller size) is currently within the park take line because of the presence of natural resources along the mainstem of Little Bennett Creek. It is recommended that this stand indeed become parkland as well as **LBC-12**. This will ensure protection for these forest stands.

The **Warwick Farm** currently is unforested, save for the northeast corner, though the property abuts stands **UGSC-10** and **UGSC-29**. Because of this, it is recommended that development be clustered in such a manner that on-site forest is retained and the adjoining forest stands be protected from development. Additionally, there are two first order streams on the farm. At a minimum, these should be afforested out to the boundary of the stream buffer. Several properties have lower ranking forest (Category 4 and 5) which nevertheless, need mention because of the development threat recommended by this master plan. The **Burdett properties** contain a headwater stream which flows into the Patuxent River. It is currently

mostly in crop production, however, there are two forest stands (both Category 4) along the north central and northwestern boundaries of the property, one of which is quite old and though recently logged is regenerating extremely well and has a very low level of non-native invasive species. Development should be clustered in such a way that the forest is not directly impacted.

The **Miner property** contains a forested headwater wetland on its western boundary two swales draining to it. Ensuing development should be clustered in such a way that the forest is not directly impacted

The **Miller property** contains a headwater stream which flows into the Patuxent River. This stream is forested and splits the property down the middle. Most of the forest (Category 4) therefore is protected by virtue of being in the stream and wetland buffers. Cluster development to retain the remaining forest.

4. High priority forest stands which can be protected through application of development guidelines and FCL – For **LBC-7**, current houses are found around the periphery of the stand. Three remaining multi acre unbuilt parcels should be placed into conservation easements. The remaining properties should have a cluster pattern of development thereby retaining the greatest amount of forest which could then be placed into conservation easement. Prevention of forest fragmentation is vital. The remaining Top 10 stands, **PR-15, LBC-18, BC-9, BC-8, BC-10, BC-2, and BC-3** are located in the RDT zone. While RDT zoning limits the threat from development to an extent, these stands are still in danger of clearing any time for agricultural purposes. Attempts should be made to utilize incentive programs and obtain conservation easements to protect forest in this zone. For those properties which develop with residential uses, schemes for protection of the forest should be achieved through application of the Montgomery County Forest Conservation Law and the *Environmental Guidelines*. Essentially, priority will be given to all forest associated with stream valleys, existing wetlands, and highest quality individual trees.

Study Area

Please note that those forest stands which fall within the master plan area boundary are described in the abovementioned section and will not be repeated here.

1. High priority forest stands within parkland –A substantial amount of the Category 1 stands of the study area are found in entirety or majority, within the current boundaries of MNCPPC or state of Maryland parkland. These forest stands are **LBC-1, LBC-2, LBC-3, LBC-4, LBC-5, MGSC-1, UGSC-2, UGSC-3, UGSC-4, PR-1, PR-2, and PR-3**. These stands are generally the larger stands in the study area and have interior forest greater than 50 acres. Acquisition or dedication is recommended for those contiguous parcels that are currently forested but not parkland.

2. High priority stands recommended for park acquisition –None, except for **BC-1** (see Master Plan Area section)

3. High priority forest stands recommended for highest level of protection as part of development design –Most of stand **UGSC-13** is already built, but a portion remains undeveloped which should be protected as part of any future development. It is recommended that clustering be used to achieve maximum forest protection and preservation on the remaining developable parcel. Forest should be protected on already constructed lots through the creation of conservation easements or forest mitigation banks

4. High priority forest stands which can be protected through application of development guidelines and FCL –All but one of the study area forest stands outside of the

master plan area boundary are within the RDT zone. And all but three, **BC-12, BC-14, UGSC-1**, are parkland. While RDT zoning limits the threat from development to an extent, these stands are still in danger of clearing any time for agricultural purposes. Attempts should be made to utilize incentive programs and obtain conservation easements to protect forest in this zone. For those properties which develop with residential uses, schemes for protection of the forest should be achieved through application of the Montgomery County Forest Conservation Law and the *Environmental Guidelines*. Essentially, priority will be given to all forest associated with stream valleys, existing wetlands, and highest quality individual trees.

**Table 2 Summary of Forest Preservation Recommendations for the Study Area
Preservation Category 1 and Most Threatened Category 2 and 3 Forest Stands**

Preservation Category	Stand Number	Study Area Stand Rank	Master Plan Area Stand Rank	Point Score	Ownership of Properties Containing the Forest Stand			Staff Recommendations for Stand Protection ⁽¹⁾
					Parkland (Includes MNCPPC park, WSSC land and State park)	Vacant, Already Developed, or Committed but Not Built	Developable or Redevelopable	
1	UGSC-1	1		12.000		Roughly 2/3 of stand	Roughly 1/3 of stand	Apply FCL and protect riparian buffers; Explore FC easements/banks
	MGSC-1	2-tie		11.000	Majority of stand	Northern properties		Continue protection; Explore FC easements/banks
	PR-3	2-tie		11.000	Entirety of Stand			Continue protection
	BC-1	4	1	10.285		Majority of Stand	Several large properties	Park acquisition or dedication
	UGSC-3	5		10.023	Majority of stand	Northern properties		Continue protection; Apply FCL and protect riparian buffers; Explore FC easements/banks
	LBC-5	6		9.960	Almost Entire Stand	One property	Two properties	Continue protection; Apply FCL and protect riparian buffers; Explore FC easements/banks
	PR-1	7	2	9.543	Almost Entire Stand		One large property in central portion of stand	Continue protection; Park acquisition or dedication;
	LBC-1	8		9.447	Almost Entire Stand	Southern edge		Continue protection; Apply FCL and protect riparian buffers; Explore FC easements/banks
	LBC-4	9		9.219	Majority of stand	Southeastern edge		Continue protection; Park acquisition or dedication; Apply FCL and protect riparian buffers; Explore FC easements/banks
	LBC-2	10		9.194	Entirety of Stand			Continue protection
	UGSC-2	11-tie	3	9.000	Roughly 2/3	Roughly 1/3		Continue protection; Explore FC easements/banks

Preservation Category	Stand Number	Study Area Stand Rank	Master Plan Area Stand Rank	Point Score	Ownership of Properties Containing the Forest Stand			Staff Recommendations for Stand Protection ⁽¹⁾
					Parkland (Includes MNCPPC park, WSSC land and State park)	Vacant, Already Developed, or Committed but Not Built	Developable or Redevelopable	
1	UGSC-4	11-tie	4	9.000	Majority of stand	South-central property		Cluster or maximum protection development design; Apply FCL and protect riparian buffers; Explore FC easements/banks
	PR-2	13	5	8.867	Majority of stand		Western side	Continue protection; Park acquisition or dedication; Apply FCL and protect riparian buffers; Explore FC easements/banks
	LBC-3	14		7.287	Entirety of Stand			Continue protection
2	BC-3	15	6	11.850		Majority of stand	Northwestern portion	Apply FCL and protect riparian buffers; Explore FC easements/banks
	BC-2	16	7	11.354		Majority of stand	South central properties	Apply FCL and protect riparian buffers; Explore FC easements/banks
	LBC-7	17	8	11.000		Majority of stand	One property on eastern edge	Cluster or maximum protection development design; Explore FC easements/banks
3	UGSC-26	41	26	11.806		Entirety of stand		Cluster or maximum protection development design; Apply FCL and protect riparian buffers; Explore FC easements/banks
	BC-10	42-tie	27-tie	11.000		Majority of stand	Very small part of one property	Apply FCL and protect riparian buffers; Explore FC easements/banks
	BC-12	42-tie		11.000		Entirety of stand		Apply FCL and protect riparian buffers; Explore FC easements/banks
	BC-14	42-tie		11.000			Entirety of stand	Apply FCL and protect riparian buffers; Explore FC easements/banks
	BC-8	42-tie	27-tie	11.000		Majority of stand	Two properties on northern edge	Apply FCL and protect riparian buffers; Explore FC easements/banks
	BC-9	42-tie	27-tie	11.000		Roughly 2/3 of stand	Roughly 1/3 of stand	Apply FCL and protect riparian buffers; Explore FC easements/banks

Preservation Category	Stand Number	Study Area Stand Rank	Master Plan Area Stand Rank	Point Score	Ownership of Properties Containing the Forest Stand			Staff Recommendations for Stand Protection ⁽¹⁾
					Parkland (Includes MNCPPC park, WSSC land and State park)	Vacant, Already Developed, or Committed but Not Built	Developable or Redevelopable	
3	LBC-17	42-tie		11.000		Entirety of stand		Establish easements on existing lots. Cluster development on vacant property.
	LBC-18	42-tie	27-tie	11.000		Roughly 2/3 of stand	Roughly 1/3 of stand	Apply FCL and protect riparian buffers; Explore FC easements/banks
	LBC-22	42-tie		11.000		Entirety of stand		C Apply FCL and protect riparian buffers; Explore FC easements/banks
	PR-15	42-tie	27-tie	11.000		Majority of stand	One property on southeastern edge	Apply FCL and protect riparian buffers; Explore FC easements/banks
	UGSC-13	42-tie		11.000				Apply FCL and protect riparian buffers; Explore FC easements/banks

- (1) In general, staff recommendations for protection of forest stands in high priority preservation areas fall into one or more of the following categories:
- Continue protection** – Limit development and activities within the stand to those that allow maintaining the stand as a natural forest area. Avoid reduction in size or fragmentation of the stand.
- Park acquisition or dedication** – Add the forest on the property to MNCPPC parkland either by acquiring it, or zoning property so that the land can be dedicated for parkland as part of land development.
- Cluster or maximum protection development design** – Develop only the non-forested portion of developable property that contains part or all the forest stand. Forest stand may include both riparian buffer areas, as well as upland forest. Protect entirety of the forest stand through dedication of parkland or creation of conservation easements on private land, preferably common open space, as part of the development of the land. Development should be low density; sewer service that requires construction of new lines through the forest stand should not be permitted. Where entire forest stand cannot be reserved development should maximize forest preservation and meet at least “break-even” forest conservation requirements.
- Apply FCL and protect riparian buffers** – Protect forest through application of the Planning Board’s *Environmental Guidelines* and the county Forest Conservation Law when the property containing the stand is reviewed as part of a proposed land development project under the normal county regulatory review process.
- Explore FC easements/banks** – Use the county Forest Conservation Program and Legacy Open Space Program to provide incentives to landowners for protecting forest stands.

Restoration Priorities

Forest restoration is an important aspect of forest management. It seeks to increase forest in areas that have not been forested for some time (afforestation), in areas in which trees were recently destroyed, or improve areas that have only tree cover. There are two basic methods to get the trees in the ground, planting and natural regeneration. Restoration today consists almost exclusively of tree planting; the *O. virginianus* (white-tailed deer) population is simply too large for natural regeneration to successfully occur. Forest regeneration is a slow process and should not be thought of in terms of a simple one-for-one switch with existing forest. Young trees, though they may some day become a forest, when planted in no way equal the function, species habitat, species diversification of a mature forest.

Potential restoration (afforestation and reforestation) areas are shown on Map B. Based on the general ranking categories for restoration areas, the highest ranking restoration areas (Category 1) are within the stream buffers. When properties undergo some sort of development review, reforestation of stream buffers is required as part of the application of the forest conservation law and the *Montgomery County Environmental Guidelines*. On properties which will not be subject to these requirements as part of development, incentive programs need to be used in order to achieve reforestation along streams. In the study area, all watersheds include significant amounts of unforested streams located on properties which will probably not develop but need forest.

It should be noted that when restoration occurs in the Upper Patuxent River watershed special attention should be given to Scotts Branch. This stream length was recently designated a Tier 2 stream by the state of Maryland. A Tier 2 stream is one that protects water that is currently better than the minimum water quality from degrading to the minimum. Currently, the subwatersheds of the Scotts Branch are about 24 percent forested (a substantial amount of this adjoining the Patuxent River mainstem). In order to maintain, and ideally increase, water quality it is recommended that, when possible, afforestation and reforestation be completed first in the headwaters of each Scotts Branch tributary and within the *Environmental Guidelines* stream buffers. This should be encouraged through the use of forest mitigation banks, easements, and other incentive programs.

Another example of high priority restoration, though not necessarily Category 1, is along the state Green Infrastructure route. Green Infrastructure is a program whereby the Maryland Department of Natural Resources has designated hubs and the corridors necessary to link these hubs in order to better preserve species by providing large areas of habitat and the pathways to get there. Approximately 61 percent of the state green infrastructure goal for the study area is already in M-NCPPC and state parkland; 63 percent of the state goal is currently forested. Therefore, to increase the quantity of green infrastructure forest, thus improving the hubs corridors, afforestation and reforestation should be channeled to these areas whenever possible. This is especially true for the following three corridors: the north-south corridor linking the Little Bennett Creek and Bennett Creek headwaters, the east-west corridor linking the Bennett Creek headwaters with those of the Patuxent River, and the northeast-southwest corridor linking the Patuxent River with Upper Great Seneca Creek (marked with an asterisk on the corresponding map). Again, on properties outside the development process, the various incentive programs should be used to encourage restoration.

Category 2 and 3 restoration areas respectively include forest interior and exterior gaps associated with forest stands. The purpose of planting in these areas is, with relatively little effort, to decrease the edge to interior ratio thereby increasing interior forest habitat and decreasing the negative aspects of edge effect. This is especially true for Category 2. Depending upon the irregularity of a particular stand, it is possible to have many Category 3 sites. Where these restoration areas occur on open space parcels, parkland, and larger developed lots, incentive programs need to be used to obtain planting wherever possible. On developable properties replanting of these areas should be secured as part of development review. Obviously, the value of Category 2 and 3 restoration areas is largely dependent upon the decisions which are made on preservation of the forest stands around them. Existing forest stands, which contain opportunities for restoration, are therefore higher priority for retention.

There are only a few examples of Category 2 restoration sites in the study area. This is generally because isolated interior gaps are not common; usually there is a break to the outside (and hence a Category 3 site). Nevertheless, they are found in all of the larger watersheds of the study area. These areas, if replanted would greatly increase the level of significant and interior forest with a low effort to result ratio.

Plentiful Category 3 examples can be found on much of the M-NCPPC parkland throughout the study area, especially on larger stands with a more irregular shape. Planting in

these locations would not only increase overall significant and interior forest but has the additional benefit of being on already protected land.

Category 4 restoration areas are those gaps between stands that are 500 feet or less. This category serves to unite forest stands, again increasing not only overall forest but also interior forest. It should be noted some utility easements have been identified; the likelihood of these ever being planted is slight.

An example of a locale with a high concentration of Category 4 sites is the Bennett Creek headwaters, forest which is currently proposed for park acquisition via Legacy Open Space. Another example would be the parkland along the Patuxent River. These areas should be targeted for restoration as part of any purchase since their infill would greatly increase the amount contiguous and interior forest in that area.

Appendix

This forest analysis has been conducted to identify areas that are suitable for forest preservation and restoration, and to assign each of them a level of relative priority. This information will then be used by planners to develop appropriate land use, regulatory, and public outreach strategies to ensure that forests in Damascus and vicinity are adequately conserved and enhanced.

Methodology

A. Compiling Forest Data

Forest data for this analysis was obtained from the Commission's GIS database. Stand boundaries for the entire Damascus Study Area were modified and updated using 2002 aerial photographs. These changes included the removal of stands, or portions thereof, which have since been destroyed, removal of anomalous lines causing stand divisions, and the combination of stands that were heretofore separated by a stream channel but had a closed canopy. The data cleanup was necessary as these extraneous separations would have caused significant error in some of the calculations that were run.

B. Defining Criteria and Prioritization for Analyzing Forest Stand Preservation Potential

Preservation Prioritization

Prioritizing forest preservation areas involved a two-step approach of assigning forest stands into general ranking categories and then ranking the stands within each of the top three general ranking categories.

Step 1. The updated stand coverage was used to separate the stands into general categories which aid in ranking the importance of each stand for preservation. The categories used (in descending order of their priority) are outlined below along with the rationale for their use (*See Map A for categorization*):

- | | |
|--------------------------|--|
| Preservation Category 1: | Large forests (greater than 100 acres) with 50 or more acres of interior forest (both upland and riparian forest resources and the stands have low edge to area ratios). |
| Preservation Category 2: | Riparian forest that has interior forest habitat of 10 to 49.99 acres, a corridor width more than 600 feet and a corridor length a minimum of 1000 feet. |
| Preservation Category 3: | Riparian forest that is between 300-600 feet in width, interior forest habitat between 0-10 acres, and a corridor length a minimum of 1000 feet. |
| Preservation Category 4: | Riparian forest that is less than 300 feet in width with no interior forest habitat. |
| Preservation Category 5: | Small upland forest. |

Rationale: Size was considered to be one of the most important forest characteristics for preservation prioritization because the larger forests are most likely to provide high levels of biodiversity and high quality habitat for species sensitive to fragmentation and edge effects. Conservation is a critical need in high quality areas because once the resource becomes fragmented, important and not easily replaced habitat is lost. Due to the high correlation between

forest and stream water quality, riparian forest areas are also prioritized with size being factored into their ranking. Although smaller upland forest areas received lower ranking because of the limited amount of habitat and water quality benefits they may have, these stands nevertheless may contain unique flora and fauna and may be a very important part of overall neighborhood character.

Step 2. Within each of the first three general ranking categories, individual stands were ranked using weighted scores that numerically represent the characteristics of the stands themselves and of the subwatersheds that the stands lie in. The parameters scored and rationale for their use are outlined below. This analysis placed emphasis on parameters which could be readily analyzed with the available data and GIS coverages. In future analyses, these parameters will likely be expanded and refined.

Stand Preservation Parameters

Forest Characteristics

1) Stand Contains Potential Restoration Areas

- a. Stand contains two or more restoration areas = 2
- b. Stand contains one restoration area = 1

Rationale: Loss of a forest stand with a potential restoration area also results in loss of the restoration area.

2) Stand Contains Steep Slopes

- a. More than 50% of the forest stand contains greater than 15% slopes and the majority of these slopes are greater than 25% = 1
- b. Less than 50% of the forest stand contains slopes greater than 15% = 0

Rationale: Forest on steep slopes protect against erosion and subsequent sediment deposition into stream systems. Presence of slopes also increases habitat diversity due to the variation in aspects and hydrologic conditions. Topographical diversity contributes to regional biodiversity.

Watershed Characteristics

3) Percent of the Subwatershed¹ which is Forested

- a. Less than 50% existing forest within the subwatershed = 1
- b. Greater than or equal to 50% existing forest within the subwatershed = 0

Rationale: The benefits to water quality of having forest within a watershed are well documented. Fifty percent cover is used as the break point in this analysis because it represents the majority of the subwatershed. Fifty percent cover is also a recommended level of cover recommended in a recent analysis of tree and forest cover and runoff attenuation completed by American Forests (*Chesapeake Bay Regional Ecosystem Analysis*, American Forests, 1999).

¹ For this analysis, subwatersheds correspond to those defined in the Update to the Montgomery County, Countywide Stream Protection Strategy (CSPS), 2003.

4) Percent of the Total Subwatershed Forest which is Made Up by the Forest Stand

- a. Stand is greater than or equal to 2/3 of the total subwatershed forest = 3
- b. Stand is between 1/3 and 2/3 of the total subwatershed forest = 2
- c. Stand is less than 1/3 of the total subwatershed forest = 1

Rationale: The loss of forest stands which make up the majority of the existing total forest within a given subwatershed should be avoided. That is, such a stand most likely provides the majority of current forest-associated water quality benefits for the subwatershed.

5) Potential for Loss of the Forest Stand

- a. Entire forest stand is developable = 4
- b. Portion of stand is developable or developed but not in an easement = 3
- b. Entire stand on park land = 1

Rationale: Prioritizes the forest stands, or portions of stands, in the most potential danger of being lost.

6) Subwatershed CSPS Ranking

- a. Poor = 4
- b. Fair = 3
- c. Good = 2
- d. Excellent = 1

Rationale: Presence of forest within the subwatershed contributes to the level of water quality by filtering groundwater, reducing surface runoff, alleviating flooding and modifying temperatures of the stream environment. Forest within subwatersheds which have lower water quality is especially important to preserve because it may be the last major defense against further stream degradation. The weight of this category was averaged for stands that crossed subwatershed boundaries.

Individual riparian forest stands of less than 300' in width (Category 4) and small upland forest areas (Category 5) were not ranked against each other. The narrow riparian areas are all high priority for retention and will likely be protected by application of existing guidelines and regulations as part of the County's normal development and regulatory review process. As previously mentioned, small upland forests may be important from individual neighborhood standpoints but are less important for forest conservation benefits.

C. Defining Criteria and Prioritization for Analyzing Forest Restoration Opportunities

Potential restoration areas were grouped into four general ranking categories. The categories used (in descending order of their priority) are outlined below along with the rationale for their use (*See Map B for categorization*). Ranking of the restoration areas within each of the general categories will be done after land use recommendations have been made and forest preservation areas are identified. The types of ranking criteria which will be used to formulate a future reforestation/restoration approach are included for information.

- | | |
|-------------------------|---|
| Restoration Category 1: | Unforested riparian buffer areas up to 150' from the stream bank. |
| Restoration Category 2: | Interior forest gaps. |

Restoration Category 3: Exterior forest gaps.
Restoration Category 4: Gaps of 500' or less between two forest stands.

Rationale: Riparian forests provide a number of valuable functions to a stream's overall health and the water quality of a subwatershed/watershed. Additionally, riparian forests are important to aquatic habitats, as stream organisms use energy from organic material produced outside the stream, usually in the form of coarse particulate leaf litter. Interior forest gaps are unforested areas which are completely surrounded by existing forest. Exterior forest gaps are unforested areas adjacent to forest stands which are surrounded by existing forest except for gaps of less than 500 feet. Filling interior and exterior forest gaps increases the overall amount of forest and provides additional potential interior forest habitat for plants and animals.

The following are restoration area parameters which will be used to formulate future reforestation priorities. These parameters may be revised based upon results and recommendations of the environmental modeling being completed for the Subregion.

- Stream length unforested
- Location within headwaters
- Amount of total forest within a subwatershed
- CSPS Watershed Management Category of a subwatershed
- Presence of existing old field habitat
- Association with potential RT&E habitat
- Potential for creation of interior forest habitat
- Development status of parcel
- Ownership of already developed land containing restoration areas