WATERSHED ANALYSIS REPORT

for the

UPPER WILLIAMS RIVER

WATERSHED

Including all or portions of:

WOODROW OPPORTUNITY AREA #43.005
WILLIAMS RIVER EAST OPPORTUNITY AREA #43.006
WILLIAMS RIVER WEST OPPORTUNITY AREA #43.007
HIGHLAND SCENIC HIGHWAY OPPORTUNITY AREA #46.112
BLUE LICK RUN OPPORTUNITY AREA #46.113

on the

MARLINTON RANGER DISTRICT
MONONGAHELA NATIONAL FOREST

October 2000

UPPER WILLIAMS WATERSHED ANALYSIS
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UPPER WILLIAMS WATERSHED ANALYSIS

CHAPTER 1

INTRODUCTION

INTENT OF WATERSHED ANALYSIS

Watershed analysis is a procedure used to characterize the processes and interactions within a watershed. By analyzing the entire watershed the focus is on the interrelationships of the various resources based on the management prescriptions in the Monongahela National Forest Land Management Plan (MNFLMP). The intent is to develop a scientifically based document that identifies existing problems and management opportunities. Recommendations for the continued management and restoration of the specified watershed are included in Chapter 4.

This watershed analysis report is a stage-setting process, not a decision-making process. It is designed to allow for future changes (additions/deletions) based on new information and data that becomes available or as other issues develop which raise new key questions. Key terms are defined in the glossary (Appendix B). The report covers 6 basic steps:

- Characteristics of the watershed – identifies the dominant physical, biological, and human processes.
- Issue identification with key questions – identifies main resource concerns, conditions, and activities.
- Current condition description – describes the health of identified resources as they relate to the issues.
- Reference condition description – establishes the historic health of the identified resource concerns and serves as a comparison to the current condition.
- Interpretation of the changed conditions and probable causes – summarizes the main findings of the previous steps and explains the significance of any changes.
- Management activity recommendations – outlines potential projects and opportunities to maintain or restore the health of the identified resources. The objective is to move the area toward a Desired Future Condition (DFC). Standards and guidelines to achieve the DFC are described within the framework of the MNFLMP and management prescriptions.

Some of the sub-watersheds in this report contain areas in need of restoration or maintenance. These problem areas were usually caused by some historic pattern of human activity. The findings within this document represent a foundation to develop site specific project proposals and associated environmental reports with decision documents.

CHARACTERIZATION

The Upper Williams River Watershed (UWRW) is located in the headwaters of Williams River in Pocahontas County, West Virginia (Map 1-1). The Highland Scenic Highway and the ridge tops of Red Lick Mountain, Tea Creek Mountain, and Black Mountain border the north and west boundaries of this analysis area. The ridge tops of Black Mountain, Swago Mountain, and Day Mountain and the Monongahela National Forest Proclamation Boundary form the south and east boundaries. Elevations range from about 3,000′ on Williams River near the confluence with Sugar Creek to 4,703′ on Red Spruce Knob. The Handley Public Hunting and Fishing Area managed by the West Virginia Division of Natural Resources is located within this watershed.

Eight sub-watersheds comprise the Upper Williams River Watershed (Map 1-2) covering approximately 39 square miles (24,792 acres). The sub-watersheds are Beaverdam Run/Locust Knob, Swago Mountain/Downy Run, Mountain Lick Run, Black Mountain, Big & Little Spruce Knobs/Day Run, Little Laurel Creek, Big Laurel Creek, and Sugar Creek. Williams River is a tributary of Gauley River with the confluence near Donaldson, WV. Gauley River enters New River near Gauley Bridge, WV. New River turns into the Kanawha River and enters the Ohio River at Point Pleasant, WV.

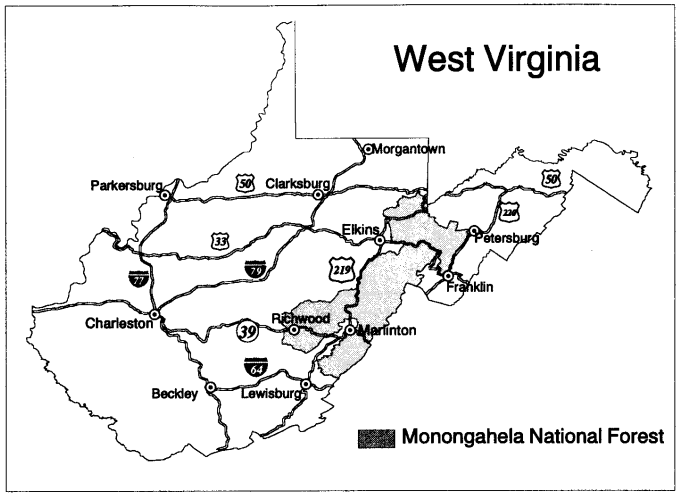
The climate is characterized by average precipitation (30″ – 60″ per year). The moister climates are generally found on the western side of the Forest (includes the UWRW) with the drier climates near the Virginia border on the east side of the Forest. Summer temperatures average around 80°F with occasional daytime highs in the 90s and night time lows reach down into the upper 30s. Winter temperatures average around 30°F. Normally there are several days in the winter with temperatures at sub-zero levels.

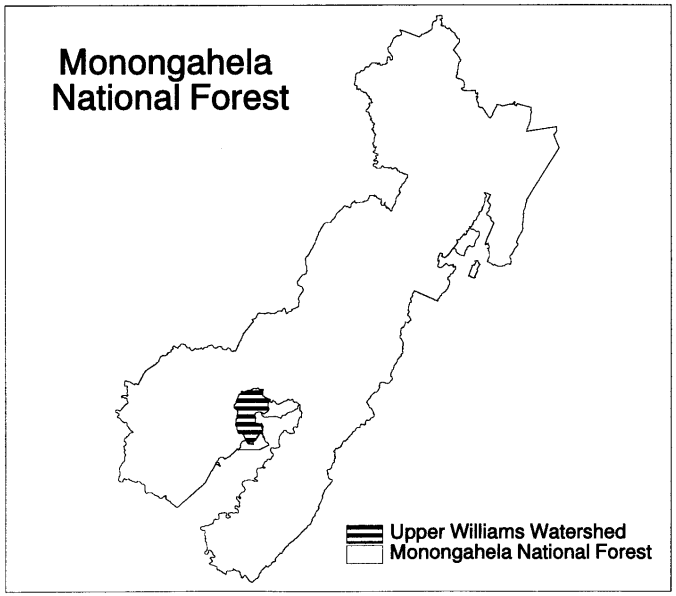
Red Spruce Knob, located in the northeast corner of this watershed, is the most dominant landform at 4,703′ elevation. Big Spruce Knob at 4673′ elevation is the second highest peak in the watershed and is located near the center of the watershed. Both landforms are located on national forest land. The watershed is underlain mostly by red, green, and medium gray shale, siltstone, coal, and sandstone with a few thin limestone beds. The landscape includes seeps and springs forming the numerous tributaries of the Upper Williams River. Several large grassy openings, mostly on private lands, provide visual diversity from viewpoints (and overlooks shown on Map 1-6) along the Highland Scenic Highway.

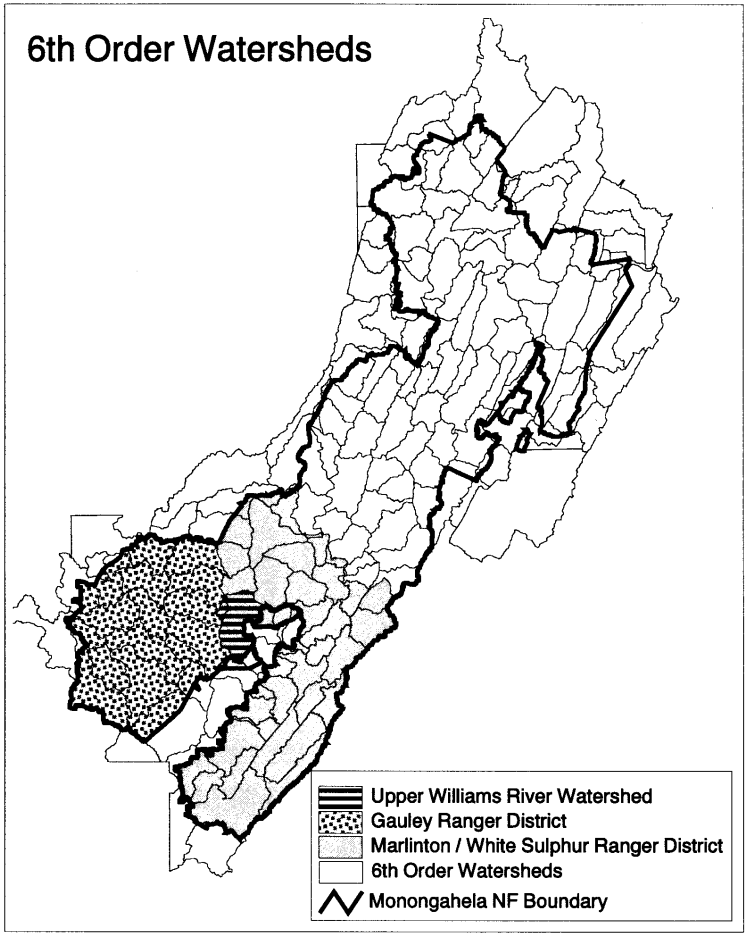
Approximately 66% of the watershed is national forest land, 3% state land, and 31% private lands. National forest land covers the north, west, and south boundaries. State public land is located in the northern portion of the watershed. Private lands are mainly in the eastern portion of the watershed. A major portion of the community of Woodrow is located in the northeast section in the Big Laurel Creek sub-watershed. Along the east and west boundaries of the Handley Public Hunting and Fishing Area are numerous hunting/fishing camps with mostly seasonal occupants. Several additional seasonal camps are located along Williams River near Day Run.

Monongahela NF
Upper Williams River
Composite; Above Sugar Creek Watershed
#05050005020010
Location Map

Chapter 1
Map 1-1







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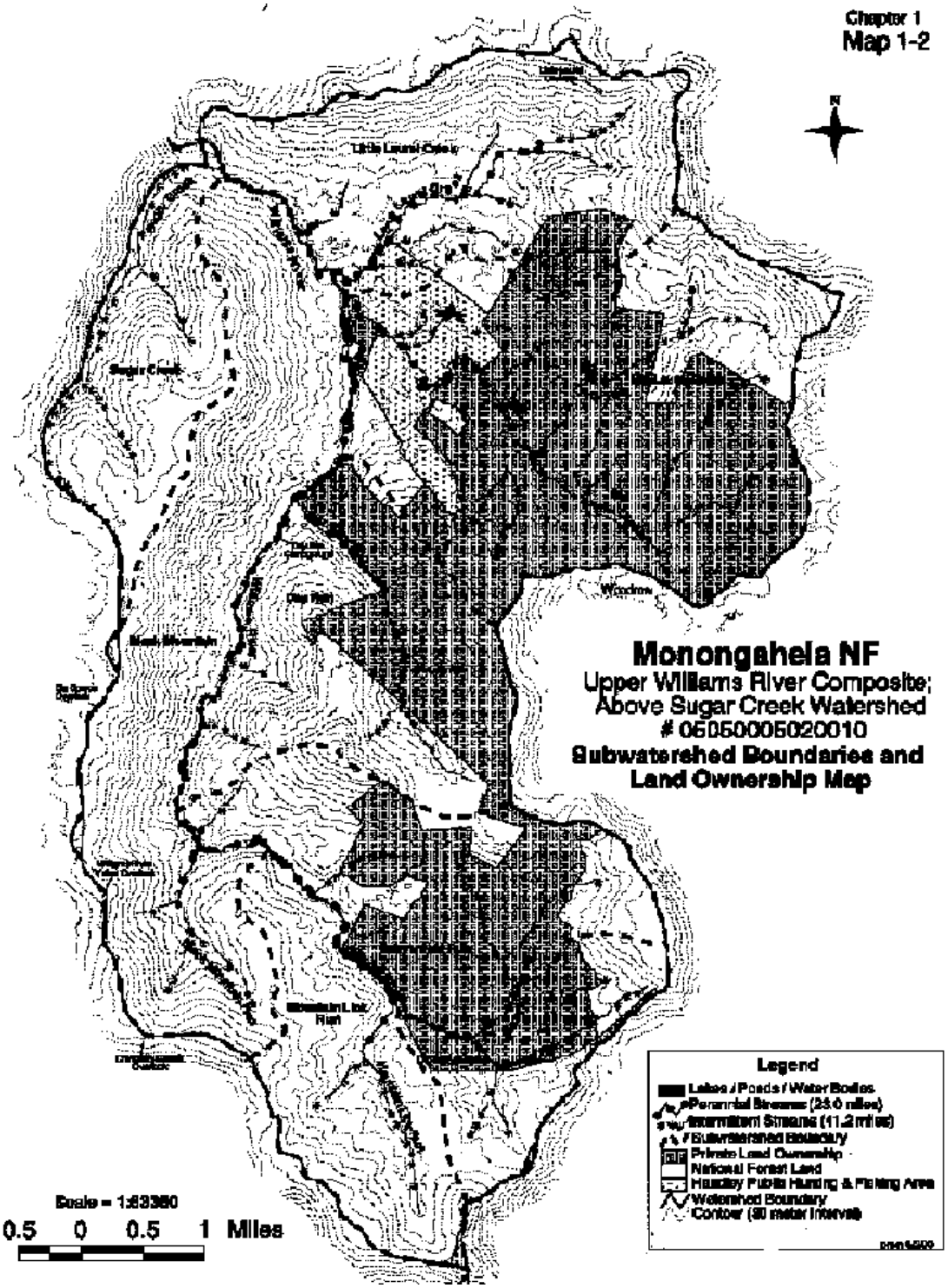

Chapter 1
Map 1-2
N
Monongahela NF
Upper Williams River Composite;
Above Sugar Creek Watershed
050500050020010
Subwatershed Boundaries and
Land Ownership Map
Legend
Lakes / Ponds / Water Bodies
Perennial Streams (23.6 miles)
Intermittent Streams (11.2 miles)
Subwatershed Boundary
Private Land Ownership
National Forest Land
Hunting Public Hunting & Fishing Area
Watershed Boundary
Contour (80 meter Interval)
Scale = 1:63360
0.5 0 0.5 1 Miles

The Upper Williams River Watershed contains two management prescriptions (see Maps 1-3 and 1-4) as described in the Monongahela National Forest Land Management Plan (MNFLMP). The 3.0 prescription, which covers the majority of national forest land in this area (over 15,000 acres), emphasizes:

- Large, high quality hardwood trees for lumber and veneer, hard mast production, and scenic attributes.
- A variety of Forest views.
- Wildlife species tolerant of disturbances, such as deer, grouse, squirrel.
- A primarily motorized recreation environment.

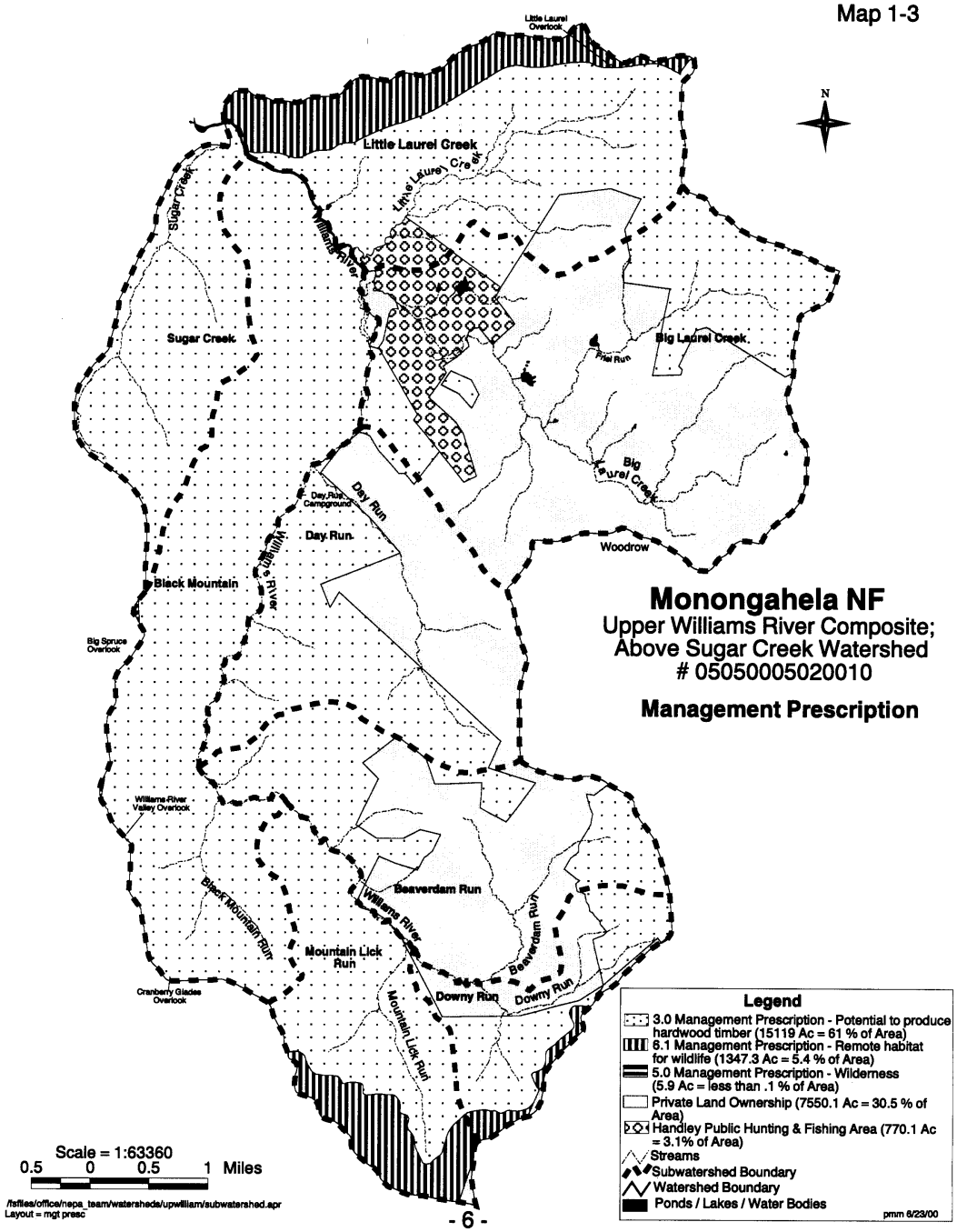
Approximately 1,300 acres are in the 6.1 management prescription located north of the Highland Scenic Highway and south of FR 437. The primary emphasis for this management prescription is remote habitat for wildlife intolerant of disturbance. Secondary emphasis includes:

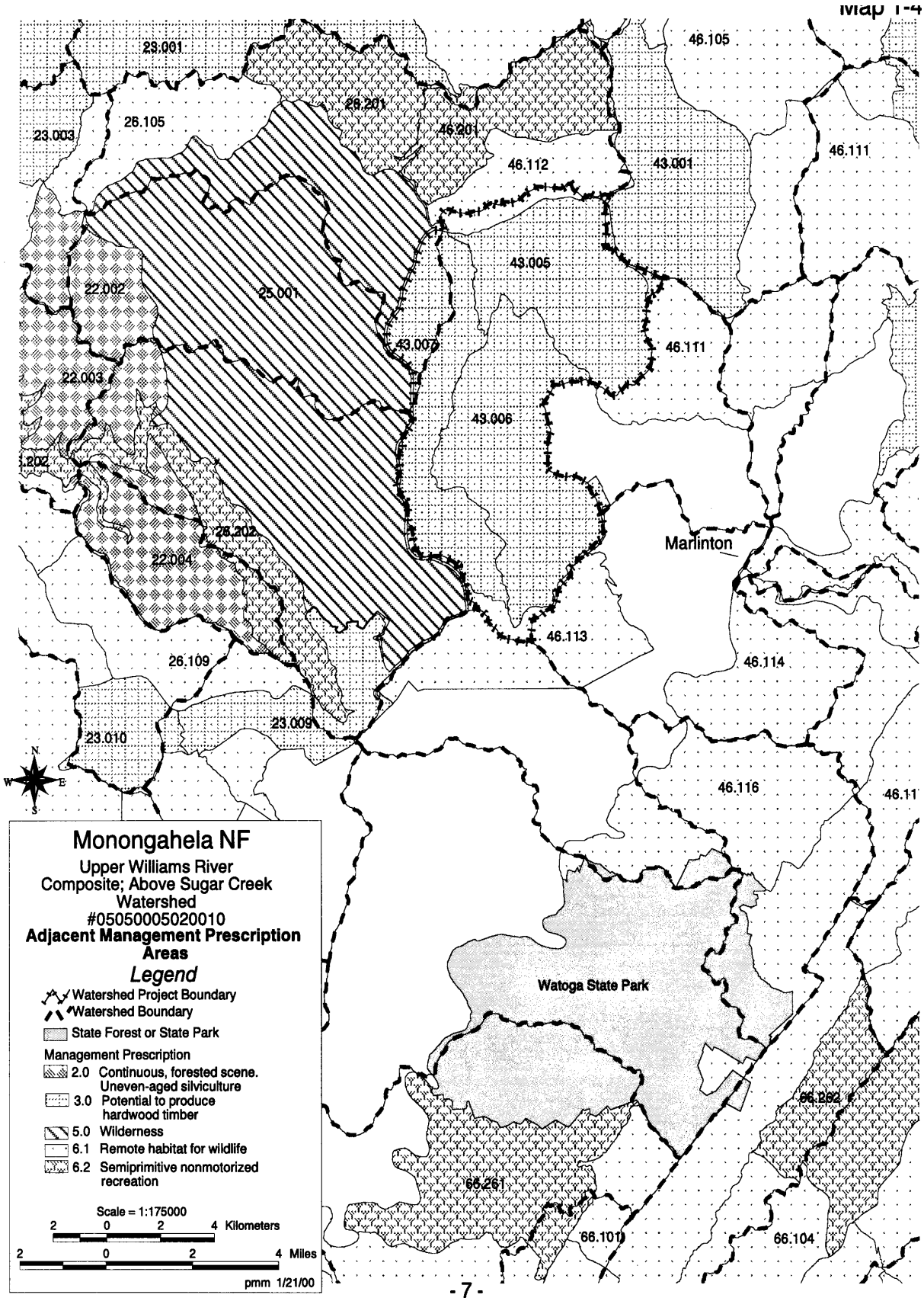
- A semiprimitive and nonmotorized type of recreational environment. When roads are open to motorized use, semiprimitive motorized experiences will be provided.
- A mix of forest products.
- A strategy for management of sites reverting from hardwood to conifer (pine and spruce) and the intermingled high site hardwood types.

Current conditions, reference conditions, desired conditions and objectives are described within each core topic. The core topics and sub-topics for this analysis are:

- Soils/Erosion Processes
- Hydrology/Stream Channels
  - Morphology
  - Flow Rates
  - Storm Flows
- Water Quality
  - Sediment
  - PH
  - Temperature
- Aquatic Resources
  - Fish
  - Riparian Habitat
- Vegetation
  - Threatened/Endangered/Sensitive Plants
  - Forest Type/Size Class/Density
  - Agriculture/Openings/Grazing
  - Wetlands
- Wildlife
  - Threatened/Endangered/Sensitive Animals
  - Management Indicator & Emphasized Species

Chapter 1
Map 1-3

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23.003
26.201
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43.001
43.005
22.002
25.001
43.007
46.111
22.003
43.006
28.202
22.004
Marlinton
46.113
26.109
46.114
23.009
23.010
46.116
46.11
Watoga State Park
66.262
66.261
66.101
66.104
N
W
E
S
Monongahela NF
Upper Williams River Composite; Above Sugar Creek Watershed
#05050005020010
Adjacent Management Prescription Areas
Legend
Watershed Project Boundary
Watershed Boundary
State Forest or State Park
Management Prescription
2.0 Continuous, forested scene. Uneven-aged silviculture
3.0 Potential to produce hardwood timber
5.0 Wilderness
6.1 Remote habitat for wildlife
6.2 Semiprimitive nonmotorized recreation
Scale = 1:175000
2 0 2 4 Kilometers
2 0 2 4 Miles
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- Human Uses
  - Recreation
  - Minerals - Gas/Oil/Coal
  - Special uses
  - Roads/Trails
  - Heritage Resources
  - Landlines
  - Other

SOILS/EROSION PROCESSES

The Upper Williams River watershed contains a wide variety of soils. The Mauch Chunk Group (red, green, and medium gray shale and sandstone with a few thin limestone beds) geology comprises 78% of the area. The New River Formation (predominantly sandstone, with some shale, siltstone and coal) cap Red Spruce Knob and Big Spruce Knob with the Kanawha Foundation (sandstone, siltstone, shale and coal of the Mandy-Snowdog-Gauley Soils Group), found on Black Mountain and in the high elevation portions of the Highland Scenic Highway, comprise approximately 17% of the watershed. The remaining 5% of the area is made up of the Berks-Weikert Soils Group.

The Mauch Chunk Group (Cateache-Shouns-Belmont Soils Group – see Map 1-5) contains some of the most productive and highly erosive soils found within the Monongahela National Forest boundaries. Present-day erosion processes are primarily streambank erosion, sheet erosion, and rill erosion. Minor mass wasting in the form of landslides (mainly evident on the cut and fill slopes of roads), soil humps (formed from the root walls of trees blown down), and soil creep can be found in the area.

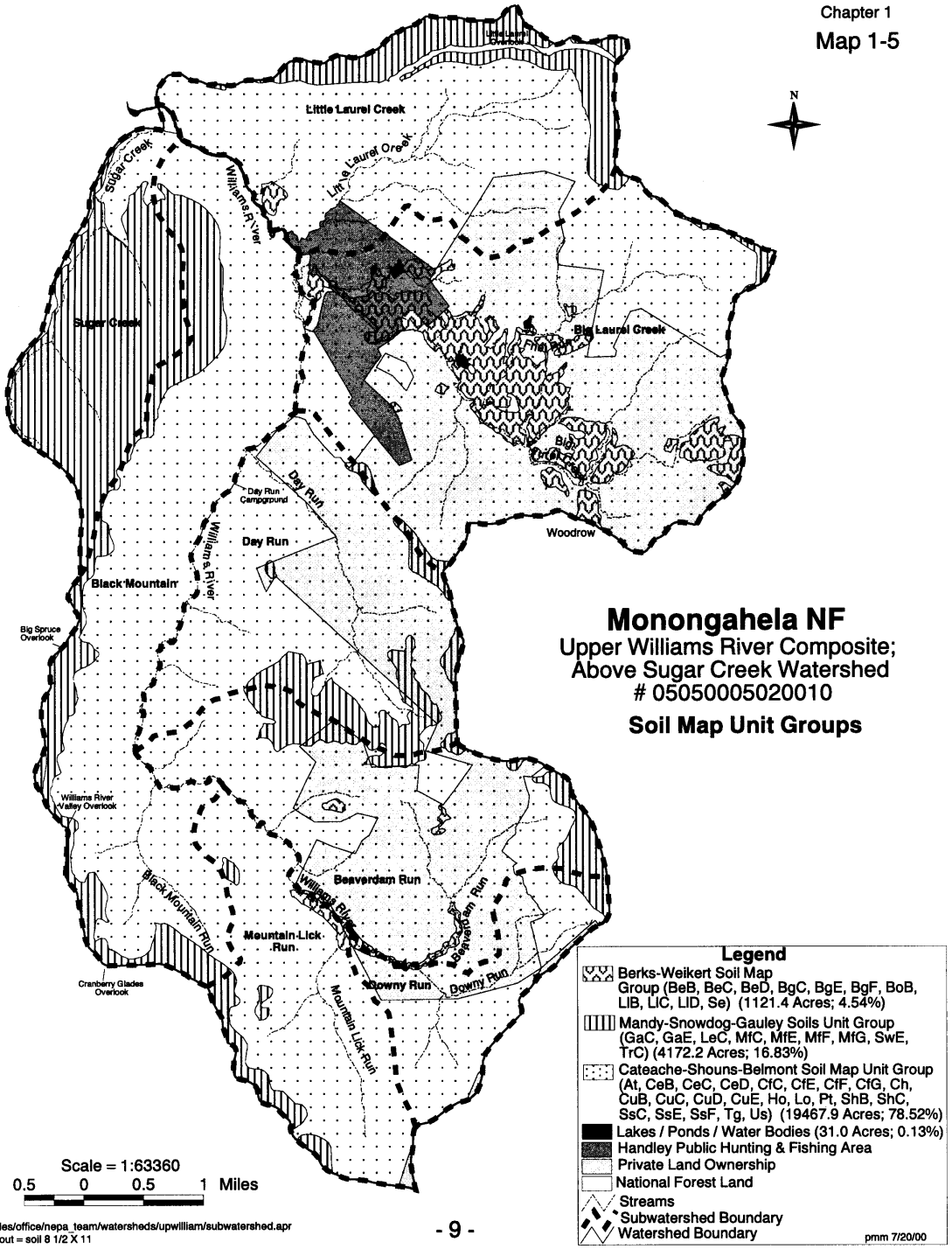
HYDROLOGY/STREAM CHANNELS

Morphology

Streams within the assessment area have evolved in soils formed from sedimentary rocks, predominantly sandstone, shales, and siltstones, within topography of relatively high relief. The elevation difference within the watershed is a maximum of approximately 1,700 feet. Slopes are moderately to very steep (up to 60% and more) within a large portion of the watershed, but some areas of more gentle slopes occur, particularly in the Big Laurel and Little Laurel Creek lower watersheds, and the mountain slopes in the southern portion of the assessment area. Also, the lower valley slopes along the Williams River are predominantly gentle, and the river has developed a narrow to moderate floodplain. Precipitation is high within the area, averaging about 55 inches annually, but streamflow is flashy due to the topography and soil/geologic characteristics. Also, intense summer storms and large frontal system storms are common, as are periodic drought conditions, adding to the wide range of flow conditions in these streams.

Chapter 1

Map 1-5



/fsfiles/office/nepa_team/watersheds/upwilliam/subwatershed.apr
Layout = soil 8 1/2 X 11

- 9 -

Channels have developed under these land and precipitation conditions, and have also been influenced by past and present land uses.

The smaller non-perennial channels within the assessment area are primarily "A" channel types (Rosgen Channel Types), which are entrenched streams with low sinuosity, low width to depth ratios, and steep to moderately steep gradient (Rosgen, 1996). The perennial tributaries to the Williams River are a mixture of stream types, mainly "B" channels (moderate entrenchment, sinuosity and width/depth ratios, and moderate gradient), and "G" channels (entrenched with moderate sinuosity, low width/depth ratio and moderate gradient. Some sections of "C" channels also occur, which tend to be stable channels with low entrenchment and gradient, and higher sinuosity, but this channel type is limited in the tributaries. Sugar Creek is primarily an A and B channel. The lower reaches of Big and Little Laurel Creeks are low gradient streams with low to moderate entrenchment, moderate to high sinuosity, and moderate to low width/depth, making them predominantly C and G channels.

The Williams River main stem covers approximately 11 miles within the assessment area, and includes several dominant stream channel types, mostly C and G channels. In its lower reaches near the Highland Scenic Highway, it may include some areas of "F" channel, a wide channel but entrenched, with moderate sinuosity. Also, a section of the Williams River near Big Laurel Creek contains multiple channels.

Flow Rates

Streamflow within the various sub-watersheds tends to be highly variable, dependent on season and precipitation patterns. There is no local or nearby streamflow gaging data with which to quantify flow characteristics. The nearest known stream gage is on the Williams River at Dyer, many miles downstream from the assessment area, and with a watershed area of 128 square miles (more than three times the watershed area of this assessment). Annual runoff at the Dyer gaging station over the past 70 years has averaged 2.61 cubic feet per second per square mile (2.61 cfsm). However, the difference between high and low flows is very great. For example, at Dyer the highest daily mean flow was 10,000 cubic feet per second (cfs), observed in July 1932, while an annual 7-day minimum flow of 0.5 cfs was observed in 1953. In 1999, a daily maximum flow of 3070 cfs was observed at Dyer, while the September minimum flow was 2.9 cfs. The Dyer gaging station data indicates that March is typically the month of highest average flow at 5.2 cfsm, and September is the month of lowest average flow at 0.7 cfsm.

These data, and what is known about the watersheds, indicates that streamflows are highly variable by season, and dependent on seasonal and precipitation characteristics. The evapotranspiration losses in the vegetative growing season contribute most to the lower streamflows. Also, snowmelt in the late winter and spring contributes substantially to the higher streamflows. As mentioned, streamflow tends to be not only variable, but flashy, responding quickly to the influence of topography and soils, soil moisture conditions at the time of precipitation, rainfall amounts and intensity, and land uses.

Storm Flows

Stormflow within the assessment area is characterized as intense and frequent. Streams are flashy in their response to larger storms, especially the more intense storms. Streamflow tends to rise rapidly under those conditions, and will fall rapidly as well, returning to baseflow conditions rather quickly. Major frontal weather systems and tropical storms from the south can carry very substantial quantities of rainfall. The largest 24-hour rainfall event for this area that occurs once each year (on average) is about 2.5 inches. However, periodic storms occur with much greater amounts and intensities of rainfall. For example, in 1989 a late summer storm occurred in the area of Red Lick Mountain which the National Weather Service estimated at up to 8 inches of rainfall in four hours. Other major storm events are fairly frequent, and generally occur during the dormant season of the year (November through mid-May), when evapotranspiration losses are minimal. This further adds to rapid storm runoff. Examples of recent dormant season precipitation events include the November 1985 flood, and the January and May 1996 floods.

Stormflows can be further influenced by land use activities and roads within the watersheds. Land uses that reduce the soil infiltration and water holding capacity, and reduce riparian vegetation, contribute to increased stormflow and stormflow effects on stream channels. Road development can act to extend the channel system within the watershed, concentrating flows and speeding runoff to downstream areas. Ground-based timber harvest activities can have some of these effects as well, through skid-road development. Extensive watershed harvesting of timber can sometimes alter the hydrology and stormflow characteristics of the watershed. Grazing and agriculture frequently has detrimental effects on streams through soil compaction and reduced infiltration, and loss of healthy riparian vegetation. Streamflow and stormflows can be affected by these and other land uses, but the magnitude of the effect depends on a number of variables.

There are a variety of land uses within the Upper Williams River watershed that can potentially influence rates of runoff and channel conditions. A relatively small amount of National Forest timber harvesting has occurred in various portions of the sub-watersheds, totaling about 2400 acres in the last 17 years, or 10% of the assessment area. Some roads and skid roads were developed for those activities. Old woods roads and trails also occur on National Forest lands. Forest Road 1797 and non-system roads traverse Black Mountain to access an abandoned underground coal mine, and several previously harvested National Forest clearcuts from the 1970's. These roads are concentrating flows and speeding runoff to downslope areas. The Williams River Road closely follows portions of the Williams River, and likely makes a small contribution to additional storm runoff. The Highland Scenic Highway is a major road corridor with extensive cut and fill disturbance, water interception, surface runoff, and flow concentration effects, and land slumps and slides have occurred along small portions of its length within this assessment area. Also, land uses for primarily grazing and timber harvest occur on the private lands within the watershed, having some of the same effects, reducing riparian vegetation cover

and health, and increasing sediment sources and channel bank erosion. Stormflow effects are also likely.

WATER QUALITY

Sediment

Fine sediment within the streams that form the sub-watersheds is generally high, as explained within the aquatic resource discussion. Sediment is delivered to these streams through channel bank erosion, and through sheet and rill erosion of upland slopes. Some gully erosion occurs below roads where flow concentration has altered drainage patterns, increasing substantially the sediment supply to channels. Examples include the road related drainage problems along portions of FR 115, FR 1797, the access roads to the old mine and timber harvest areas on Black Mountain, and some old woods roads. The Highland Scenic Highway has altered the surface and subsurface runoff characteristics along and below the highway, resulting in channel erosion, gully formation, and some mass wasting problems that all contribute to greater sediment in Sugar Creek and Little Laurel Creek. Riparian management practices, such as roads along streams, and grazing within the riparian area contribute to de-stabilized streambanks, accelerated channel bank erosion, and channel widening. Numerous sediment sources exist within the sub-watersheds.

Also, much of the existing channel and erosion conditions are features of the older land use that occurred in the early 1900's, when most of the watershed was timber harvested. Increased stormflows resulting from such drastic harvesting had substantial channel stability effects, further compounded by removal of most of the riparian vegetation, and the removal of large wood from the channels themselves. The aquatic and riparian resource condition that we see today has been and continues to be influenced by the nearly total forest removal that took place nearly a hundred years ago. Recovery from that impact is a very long-term process.

Despite these sediment related problems, and increased water temperatures in streams primarily within the private lands, most of these streams are considered by the State of West Virginia to be meeting water quality standards. Designated uses of the surface waters within the watershed include propagation and maintenance of fish and other aquatic life (Category B), and water contact recreation (Category C). In addition, the entire length of the Williams River within the assessment area is designated trout waters (Category B2). The only stream listed in the State's 1998 303(d) List of "water quality limited waters" is Sugar Creek (stream code KGW-21), and it is listed for reasons of being impaired by acid deposition.

Acidity (pH)

Water chemistry in the streams of the Upper Williams River watershed is moderately good to very good. Water samples taken in early May 2000 from most of the sub-watershed streams indicated moderate to good chemistry in terms of acidity conditions, with all but one stream having pH within the range of 6.74 to 7.41 pH units. Refer to Table 1-1 for water quality results in these streams. Alkalinity values were low to adequate, but indicating moderately buffered systems which would generally sustain the aquatic communities. Sugar Creek had the poorest water quality indicating its relative susceptibility to acid deposition impairment, with a pH of 6.37 and alkalinity of 1.32 mg per liter as CaCO3. As noted above, Sugar Creek is listed as being water quality limited due to acid deposition impairment. The State began treating Sugar Creek in May 2000 with limestone fines as a remedial measure to improve the pH and alkalinity.

Table 1-1. Water Quality Summary in Upper Williams River Watershed

Site (Water Source Name)	pH	Conductivity (uS/Cm)	Alkalinity (mg CaCO3/L)
Day Run	7.27	47.2	12.91
Mountain Lick Run	6.74	34.4	8.40
Sugar Creek	6.37	21.6	1.32
Black Mountain Run	6.96	38.4	9.74
Williams River (Upstream)	7.14	40.3	12.44
Williams River (Downstream)	7.02	44.0	12.85
Big Laurel Creek	7.12	44.1	12.25
Little Laurel Creek	7.41	38.5	8.58

All samples were collected on May 8, 2000.

Temperature

No temperature data was collected for this assessment, however, none of the streams within the assessment area have been listed as temperature impaired. Despite this, and the fact that most streams have trout, it is believed that some streams or stream reaches have reduced aquatic habitat quality in terms of increased water temperature. The reasons for this include riparian clearing for grazing on private lands, other riparian clearing activities, and some beaver impoundment effects on temperatures in certain headwater streams.

AQUATIC RESOURCES

The Upper Williams River Watershed includes approximately 11 miles of the Williams River main stem, from its head at the confluence of Beaverdam and Downy Runs, to the confluence of Sugar Creek. The Williams River flows primarily in a north to northwesterly direction within the assessment area before it gradually turns and flows

west to its confluence with the Gauley River. Major drainages within the assessment area include, from the headwaters progressing downstream, Beaverdam Run, Downy Run, Mountain Lick Run, Black Mountain Run, Day Run, Big Laurel Creek, Little Laurel Creek and Sugar Creek.

A number of native fish species, primarily non-game species, inhabit these waters. Fish collected at five sample sites in 1999 include blacknose dace (*Rhinichthys atratulus*), brook trout (*Salvelinus fontinalis*), creek chub (*Semotilus atromaculatus*), fantail darter (*Etheostoma flabellare*), mottled sculpin (*Cottus bairdi*) and mountain redbelly dace (*Phoxinus oreas*). In addition to the native species, brown trout (*Salmo trutta*), a nonnative species was collected at three sites in 1999. Other native and nonnative fishes are likely to occur in the assessment area, including Appalachian darter (*Percina gymnocephala*), New River shiner (*Notropis scabriceps*) and candy darter (*Etheostoma osburni*) which are considered sensitive species.

Fish habitat conditions within the Upper Williams River and its tributaries still reflect the impacts associated with logging activities from around the turn of the century and the influence of contemporary land use activities such as roads and recreation. Streams in the assessment area are generally lacking large woody debris (lwd), have limited pool habitat, limited cover and channel complexity, and high levels of fine sediment.

VEGETATION

Plant communities characteristic of this area include the following series or associations:

1) Sugar Maple
2) Sugar maple-Beech
3) Beech
4) Sugar Maple-Red Oak
5) Red Oak
6) Sugar Maple-Basswood (cove hardwoods)
7) Red Spruce
8) Red Spruce-Hemlock
9) Yellow Birch

At least 20 commercial tree species and more than 30 non-commercial trees and shrubs can be found in the Upper Williams Watershed. Approximately 2,200 species of vascular plants, growing without cultivation, are located within the State of West Virginia (Strausbaugh and Core 1964).

This watershed has been managed for over 100 years through commercial logging activities. Most of the logging completed at the turn of the century was done by railroad using the clearcut harvest method, resulting in the even age forest present today. Selection harvesting during the 1950s left stands of trees that were high graded (cutting the large, high quality trees while retaining the small and/or low quality trees). To correct the high grading, clearcutting was again used during the 1960s and early 70s on a

much smaller, more regulated scale. Only 8% of this watershed (1,325 acres) is less than 31 years old.

Red spruce continues to decline as fast growing hardwood species out compete this slower growing, shade tolerant tree. Concerns over the continuing decline of this species have been discussed in numerous research papers. To date there is no conclusive evidence of any single cause contributing to the decline. (DeHayes and Hawley 1992; Friedland, Hawley, and Gregory 1985)

WILDLIFE

This watershed contains a diversity of habitat types including forests, rivers, beaver ponds, and open/shrubby field areas. The elevation of this area from 3,000' to 4,703' would preclude the presence of some species that most commonly occur at lower elevations, i.e., cerulean warbler, bullfrog, and northern copperhead. The high elevation spruce forests, however, add to the variety of forest types, providing habitat for species such as red-breasted nuthatch, snowshoe hare, and saw-whet owl. (Stephenson 1993)

Threatened and endangered species that occur in the area include the West Virginia northern flying squirrel. There are records of Indiana bats hibernating in a cave on private land within five miles of the assessment area. There are no caves on national forest land in this area, and no Indiana bats were captured on mist netting surveys. Bald eagles nest within the state however, this watershed lacks streams and lakes of sufficient size to provide optimum foraging or nesting habitat. There are historical records of mountain lion and gray wolf, but these have been hunted to extinction within the entire Appalachian Mountain range.

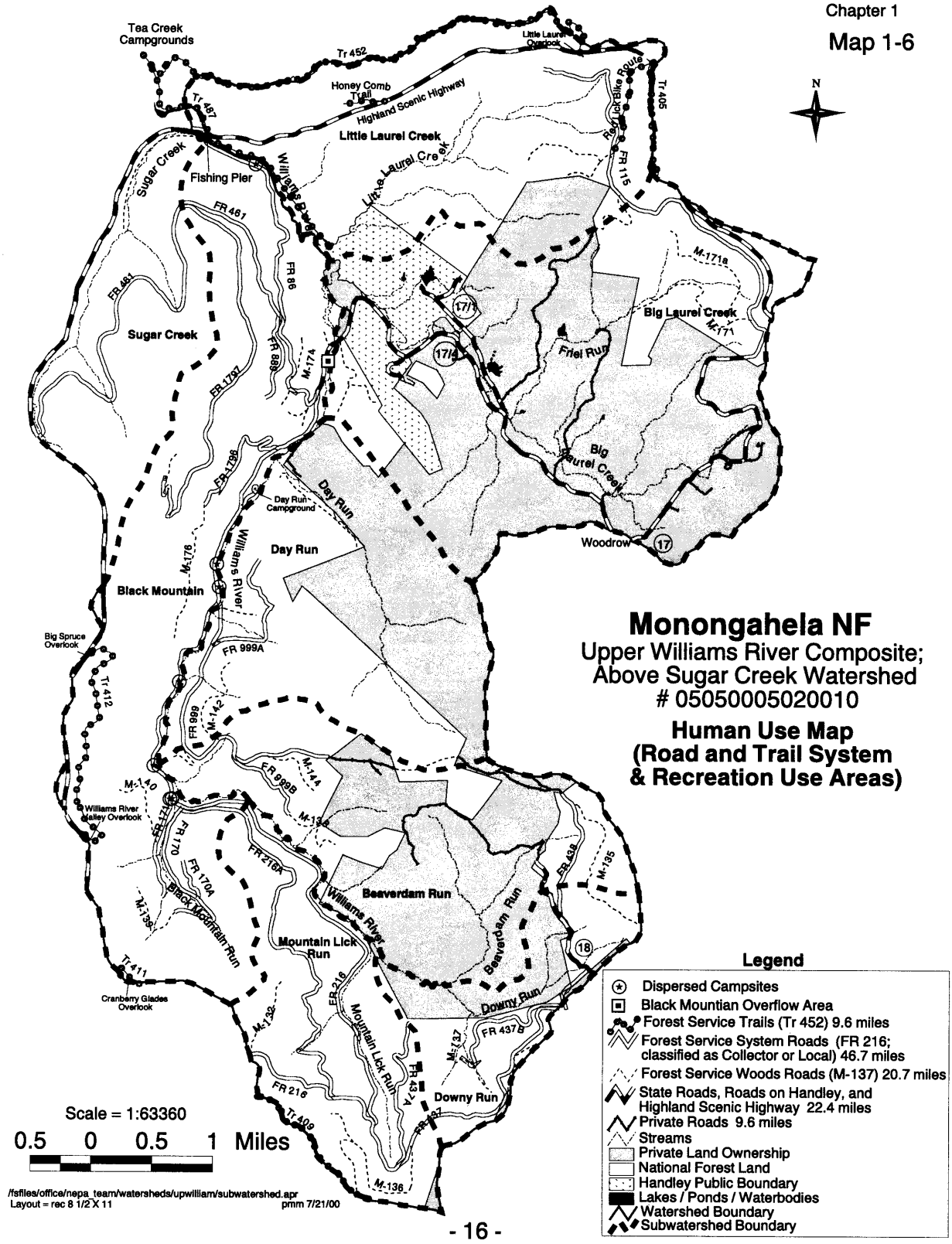
The majority of national forest land in this area is forested. Openings, consisting of meadows, grazing areas, and agricultural fields, are provided on adjoining state and private lands.

HUMAN USES

Many forms of recreation are available in the Upper Williams watershed (see Map 1-6). Hiking, camping, fishing, hunting, and viewing scenery are all popular activities.

Williams River is stocked with hatchery-raised rainbow and brown trout several times throughout the year and is a popular destination for mostly local anglers. In addition, several tributaries contain native brook trout for the more adventurous.

Hunting occurs mostly in the spring, fall, and early winter months. Game species include black bear, white-tailed deer, turkey, fox and gray squirrels, ruffed grouse, rabbit, and raccoon. A Black Bear Sanctuary within the Sugar Creek sub-watershed does not permit killing black bear within its boundaries.


Tea Creek Campgrounds
Tr 452
Honey Comb Trail
Highland Scenic Highway
Little Laurel Overlook
Tr 405
Tr 487
Little Laurel Creek
Sugar Creek
Fishing Pier
Williams River
FR 461
FR 86
FR 115
M-171a
Big Laurel Creek
M-171
Friel Run
Sugar Creek
FR 688
M-174
FR 1797
FR 1798
Day Run Campground
Day Run
Big Laurel Creek
Woodrow
Williams River
M-176
Black Mountain
Big Spruce Overlook
FR 999A
Tr 412
FR 999
M-142
FR 999B
M-144
M-140
Williams River Valley Overlook
FR 170
FR 216A
FR 170A
Beaverdam Run
Black Mountain Run
M-139
Mountain Lick Run
Tr 411
Cranberry Glades Overlook
FR 438
M-135
Downy Run
M-132
FR 216
FR 437
M-137
Tr 409
M-136
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N
Monongahela NF
Upper Williams River Composite;
Above Sugar Creek Watershed
05050005020010
Human Use Map
(Road and Trail System
& Recreation Use Areas)
Legend
Dispersed Campsites
Black Mountian Overflow Area
Forest Service Trails (Tr 452) 9.6 miles
Forest Service System Roads (FR 216; classified as Collector or Local) 46.7 miles
Forest Service Woods Roads (M-137) 20.7 miles
State Roads, Roads on Handley, and Highland Scenic Highway 22.4 miles
Private Roads 9.6 miles
Streams
Private Land Ownership
National Forest Land
Handley Public Boundary
Lakes / Ponds / Waterbodies
Watershed Boundary
Subwatershed Boundary

Day Run Campground, with 12 campsites and 4 vault toilets, is located within the watershed along with several dispersed camping no fee sites. Tea Creek Campground (a fee area similar to Day Run), located just down stream from the boundary of this watershed analysis, has vault toilets and 29 campsites.

There are several hiking trails in the Upper Williams watershed, including a short boardwalk interpretive trail, that are located to the south and to the east of the Highland Scenic Highway (HSH), a National Scenic Byway. Trails that are north of the HSH lead into the Tea Creek Mountain and Gauley Mountain areas while trails to the west of the HSH lead into the Cranberry Back Country and Wilderness. Several overlooks are also adjacent to the HSH and are located within the Upper Williams watershed.

Handley Public Hunting and Fishing Area contains a fee camping area with 13 camp sites and vault toilets, a stocked fishing pond, and provides hunting on several hundred acres of forested land interspersed with grassy openings. This area is managed by the West Virginia Division of Natural Resources.

UPPER WILLIAMS WATERSHED ANALYSIS

CHAPTER 2

ISSUES AND KEY QUESTIONS

The development of high priority issues is critical to focus the scope of a watershed analysis. Key questions that address the issues further refine the analytical task.

The following chapter lists current, high priority issues and key questions identified within the Upper Williams Watershed. The issues and questions are organized by the core topics listed in Chapter 1 to assist the reader/user in tracking the items through the document.

Soils/Erosion Processes

Issue: The Mauch Chunk Soils Group is the most highly erosive found on this Forest and comprises over ¾ of this watershed.

- What erosion processes are dominant within the watershed (surface erosion, mass wasting)?

- Where have they occurred or are they likely to occur?

Hydrology/Stream Channels

Morphology
Flow Rates
Storm Flows

Issue: Road construction and maintenance, timber harvesting, and grazing may have reduced channel complexity through the addition of sediment and reduction of large woody debris to the stream channel causing larger fluctuations in peak flows.

- What are the causes of current, unstable hydrologic processes within the watershed?

- What are the sources of accelerated erosion/deposition processes, and what aquatic resource effects are they having?

- How are current riparian conditions contributing to existing channel conditions?

- What is needed in terms of aquatic and riparian resource restoration within the watershed?

- What are the dominant hydrologic characteristics (total discharge, peak flows, minimum flows) and other notable hydrologic features and processes in the watershed (cold water seeps, ground-water recharge areas)?

- What are the basic morphological characteristics of stream valleys and segments and the general sediment transport and deposition processes in the watershed?

Water Quality

Sediment
PH
Temperature

Issue: The Upper Williams River provides important habitat to fish and aquatic invertebrates.

- What beneficial uses dependent on aquatic resources occur in the watershed?

- Which water quality parameters are critical?

Aquatic Resources

Fish
Riparian Habitat

Issue: Sedimentation – Most streams within the assessment areas have levels of fine sediment (sediment <4mm in size) that are detrimental to the native brook trout populations and aquatic communities.

- What activities will occur in the Upper Williams River watershed that may correct existing sediment sources and/or create additional ground disturbance and exacerbate the problem?

Issue: Loss of Large Woody Debris (lwd) – Timber harvest activities around the turn of the century affected riparian areas throughout the Upper Williams watershed and today most stream systems lack sufficient levels of lwd to provide quality fish habitat.

- What activities could occur to improve riparian habitat conditions and improve fish habitat conditions?

- What activities might occur that reduce riparian habitat conditions and reduce the potential for recruitment of lwd and fish habitat improvement?

- Native brook trout require cold clear water. Are current riparian habitat conditions affecting stream shading and water temperatures?

Vegetation

Threatened/Endangered/Sensitive Plants
Forest Type/Size Class/Density
Agriculture/Openings/Grazing
Wetlands

Issue: Management activities such as timber harvesting, road building, and grazing, along with the introduction of exotic insects and diseases and non-native invasive plants, may have changed species composition or altered the biological diversity.

- What is the array and landscape pattern of plant communities and seral stages in the watershed?

- What processes caused these patterns (fire, wind, mass wasting, insects, disease, timber harvesting, grazing)?

- How does the current condition compare with the historic range of variability?

- How does the current condition affect future land management objectives?

- Have botany surveys been completed to locate any threatened, endangered, or sensitive plants?

Wildlife

Threatened/Endangered/Sensitive Animals
Management Indicator & Emphasized Species

Issue: Fragmentation and lack of mature habitat may be limiting factors in the potential diversity of the Upper Williams River Watershed.

- What is the relative abundance and distribution of species of concern that are important in the watershed (TES, featured species, MIS)?

- What is the distribution and character of their habitats?

Human Uses

Recreation
Roads/Trails
Minerals - Gas/Oil/Coal
Special uses
Heritage Resources
Landlines
Other

Issue: Human uses such as mining, recreation, timber harvests, roads, and trails contribute to the economic health of local communities.

- What are the major human uses?

- Where do they generally occur in the watershed (map the location of important uses such as recreation developments, mining sites, and infrastructure)?

Issue: Management activities may impact pre-historic and historic sites within the Upper Williams River Watershed.

- Have heritage resource surveys been completed to locate pre-historic and historic sites?

UPPER WILLIAMS WATERSHED ANALYSIS

CHAPTER 3

PAST AND CURRENT CONDITIONS AND RANGE OF HISTORIC VARIABILITY

SOILS/EROSION PROCESSES

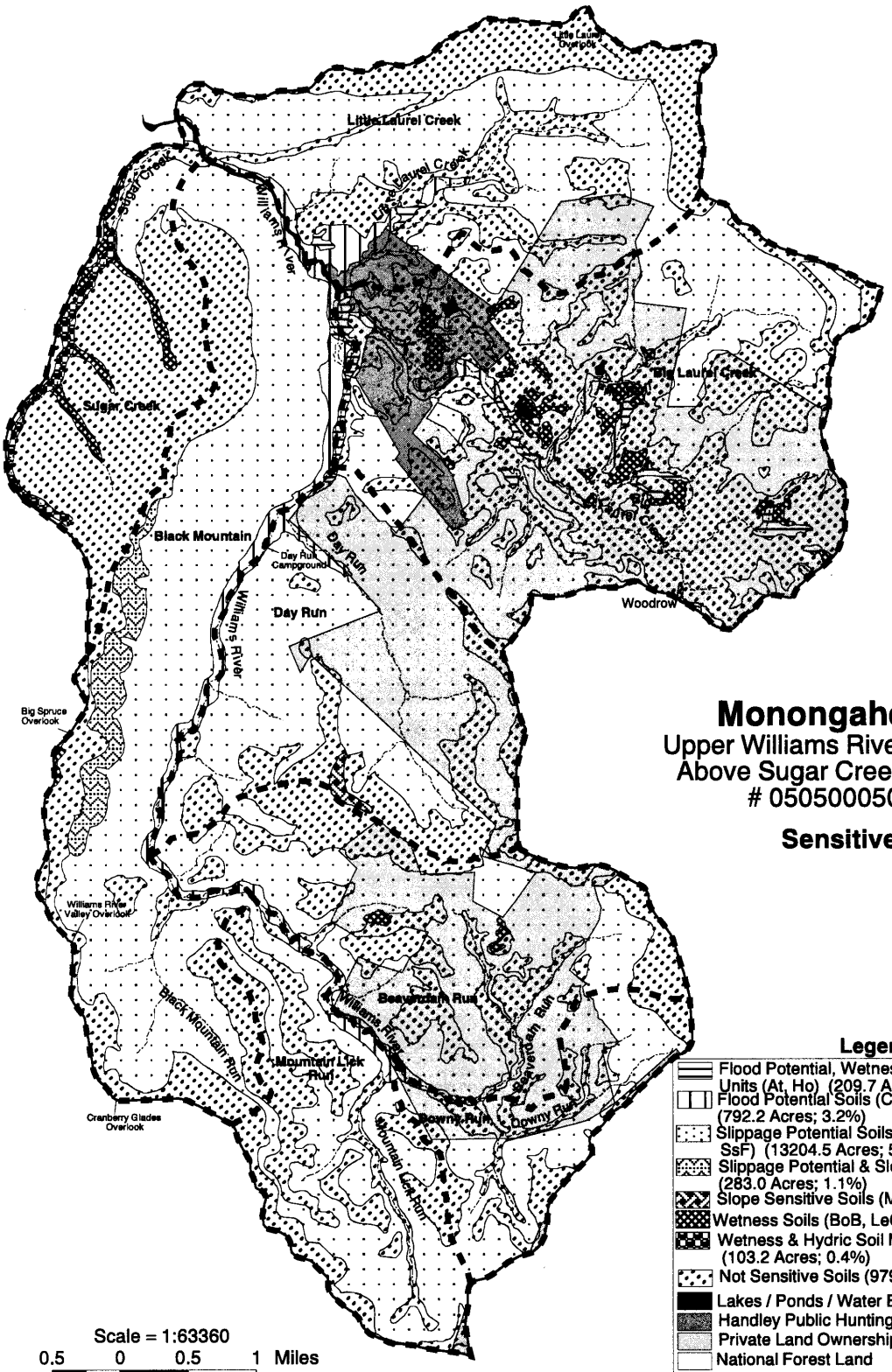
The erosion processes varied within the watershed due to geologic/soils relationships, landscape positions, and climate (including aspect). When the climate was wetter some geologic/soils relationships experienced more mass wasting than other areas under different geologic/soils relationships. Present-day erosion processes are primarily streambank erosion, sheet, rill, and some gully erosion in some areas. Minor mass wasting in the form of landslides (mainly evident on cut and fill slopes associated with roads), soil humps (formed from the root wads of tree blow down), and soil creeps within the watershed (see Map 3-1).

The Upper Williams River watershed contains a wide variety of soils existing over several geologic groups and formations. The Cateache-Shouns Soils Group (see Map 1-5) contains some of the most productive and highly erosive soils found within the Monongahela National Forest. This soil grouping is mapped over the lower portion of the Mauch Chunk Group (red and green shales of the Hinton and Bluefield formations) and comprises 78% of the area. The Mandy-Snowdog-Gauley Soils Group is at the higher elevation, consisting of colder soils, and mapped over the Bluestone and Princeton Formations of the upper portion of the Mauch Chunk Group). Over the Pottsville Group's New River Formation (predominantly sandstone, with some shale, siltstone, and coal) that cap Red Spruce Knob and Big Spruce Knob, and the Kanawha Formation (sandstone, siltstone, shale, and coal) found on Black Mountain and the higher portions of the Highland Scenic Highway. This soil group represents 17% of the area. The remaining 5% of the area is made up of the Berks-Weikert Soils Group mapped over several massive sandstone members of the middle portion of the Bluefield Formation of the Mauch Chunk Group.

HYDROLOGY/STREAM CHANNELS

Reference conditions within the Upper Williams can only be speculated upon, since all the sub-watersheds, and the streams that drain them, have been substantially impacted by past, and to a lesser extent present day land use. The dominant land use that has affected how streams and watersheds look today is the turn of the century logging and access development. Also, substantial clearing for livestock grazing, and some hay production, in some watersheds has substantially modified riparian and aquatic conditions in those streams, and downstream. Some of the present day transportation system, and older access roads and trails, also are having effects within these watersheds.

Map 3-1



Monongahela NF

Upper Williams River Composite; Above Sugar Creek Watershed # 05050005020010

Sensitive Soils

Legend

- Flood Potential, Wetness, & Hydric Soil Map Units (At, Ho) (209.7 Acres; 0.9%)
- Flood Potential Soils (Ch, Lo, Pt, Se, Tg) (792.2 Acres; 3.2%)
- Slippage Potential Soils (CeD, CfE, CfF, SsE, SsF) (13204.5 Acres; 53.3%)
- Slippage Potential & Slope Sensitive Soils (CfG) (283.0 Acres; 1.1%)
- Slope Sensitive Soils (MfG) (29.1 Acres; 0.1%)
- Wetness Soils (BoB, LeC, SwE) (341.9 Acres; 1.4%)
- Wetness & Hydric Soil Map Units (TrC) (103.2 Acres; 0.4%)
- Not Sensitive Soils (9797.7 Acres; 39.5%)
- Lakes / Ponds / Water Bodies (31.0 Acres; 0.13%)
- Handley Public Hunting & Fishing Area
- Private Land Ownership
- National Forest Land
- Streams
- Subwatershed Boundary
- Watershed Boundary

pmm 7/20/00

/fsfiles/office/nepa_team/watersheds/upwilliam/subwatershed.apr
Layout = sensitive_soil 8 1/2 X 11

- 2 -

Morphology

Streams have developed in response to the soils/geologic/topographic and vegetation conditions within the watershed, precipitation characteristics, and past and present land uses that occur. Streams exhibit a combination of stable and unstable forms, which reflects the influence of natural stream processes and the effects of certain land uses within the sub-watersheds. Some portions of channels exhibit channel bank erosion, and there are sections of channel deposition as well. Some of this is a natural process, and part of the "dynamic equilibrium" nature of streams. However, the effects of roads and other land uses, riparian clearing, and within channel modifications such as loss of large woody debris contributes to channel changes from more stable to less stable forms.

Stream channel morphology in the late 1800's, before the extensive timber harvesting occurred, could have been expected to be substantially different than the channel shape and condition of today. In general, channels would have exhibited more stable forms, with narrower width and more quality habitat features. There would have been considerably more large woody debris in the channels, contributing to long-term morphological stability and habitat quality and complexity. Channel profiles would have been more stable, with greater channel roughness to dissipate energy. Non-perennial headwater channels, and small perennial channels would have exhibited more of a step-pool profile. Less channel incision would exist, and floodplain function would have been improved. Channels would have been better "connected" to their floodplains, and floodplains would have performed their natural function of storing floodwaters more efficiently than in some present day locations. This would reduce flood energy within the channels, reducing the amount of bank erosion and instability. Overall, channels would tend to be narrower, and baseflows deeper.

The morphology of streams within the assessment area has been affected to some extent by the past and present land uses. Some channel bank erosion is likely to be the result of a combination of land use effects. Portions of Big Laurel Creek, Beaverdam, Downy and Day Runs, and Williams River all exhibit sections of accelerated channel bank erosion. Also, headwater tributaries to Williams River, Little Laurel Creek and Sugar Creek have eroded and unstable channel segments that are the result of increased runoff from old and present day transportation facilities. For example, non-perennial channels are being influenced by altered runoff from the Highland Scenic Highway, resulting in accelerated channel erosion or deposition, channel widening or deepening, increased bedload and deposition downstream, and an increased source of fine sediment to fish-bearing streams. Also, the old mine access road (FR 1797) on Black Mountain has some channelized sections with concentrated surface runoff, causing gullies and channel cutting below. The resulting accelerated runoff increases the fine and coarse sediment supply to the Williams River.

The morphological effects of these changed conditions is that in some cases stream channels may become more entrenched, reducing the ability of the floodplain to store water during times of flood. But in some other channel reaches sediment deposition occurs, and channel widening can result. Sometimes split channels can develop when

high bedload and channel widening is a problem. These processes are affecting portions of the channels within the assessment area.

Flow Rates

As discussed above, streamflow has been influenced by land uses in the Upper Williams watershed. Some increased runoff occurs in certain portions of the streams where private land clearing has taken place. This is predominantly in the Big Laurel and Beaverdam Run sub-watersheds. Also, clearing along the Highland Scenic Highway has had a similar effect of reducing evapotranspiration and creating modest increases in annual runoff to some extent.

Runoff rates are also affected by compaction within the watershed, such as in grazing areas, on roads and highways, and other uses that substantially disturb and compact soils. The Highland Scenic Highway is a major disturbance which modified and compacted soils, increasing runoff rates particularly during storm runoff. Also, roads and other facilities that intercept surface and shallow groundwater have the effect of concentrating and speeding flow away from the upper portions of the watershed. Less water is available for soil storage and floodplain recharge. This likely is having the effect of increasing flows during storm runoff and snowmelt situations, but also reducing baseflows and low flows as well. Thus, flows are re-distributed to a less even flow condition. The magnitude of this effect could be substantial in some localized areas, but its overall effect within the watershed is less clear.

These changes in flow conditions are likely having an effect on the morphology of the upper non-perennial streams, and to some extent the downstream perennial streams as well. Altered flows also increase the fine sediment supply to aquatic habitats, and during low flows the available aquatic habitat is reduced, putting an even greater stress on aquatic biota.

Reference conditions of streamflow would also be somewhat different than flows as they exist today. The primary factors that control those differences are the amount of present day roads, skid roads, old woods roads and railroad grades, compaction, and land clearing. Streamflow would have been somewhat less flashy in the reference condition, because there would have been less channel extension from the present and old transportation network, and less compaction from a variety of land uses. It is likely that baseflows and low flows would have been somewhat greater than the present day condition, because the effective drainage density (length of channel per unit area) would have been less, and soil infiltration would have been greater.

In the sub-watersheds affected by present day clearing and conversion to hay production and grazing, the reference condition would have been a nearly intact forest throughout nearly all of the sub-watershed area. Primarily small openings would have existed as part of the natural forest condition, caused by infrequent and small mass wasting events, fire, wind-throw and flood damage, and some other naturally occurring influences. These

mostly small forest openings would likely have had less effect on streamflow than the larger openings on some private lands, particularly for grazing. These areas where conversion to hay and grazing has occurred likely yield more water to streamflow in the growing season, because evapotranspiration losses are less in the cleared land condition. In the reference condition, an intact forest would have existed, and evapotranspiration losses would have been greater, so streamflow in those sub-watersheds would have been somewhat less during the growing season. The amount of this effect would have been relatively small. However, greater infiltration and soil storage would have existed in the reference condition, because roads and compaction from grazing would have been absent. So to some extent, there would have been offsetting factors in those localized areas where openings now exist.

Also, timber harvesting (as we know it today) would not have existed in the reference condition. Timber harvesting in the east has been found to increase the annual water yield from the harvested area, with the majority of those increases occurring in the growing season and mostly as increased baseflows and low flows. But those water yield increases are relatively small and short term, with streamflow returning to pre-harvest levels in about 10 years or less. In the reference condition, streamflow would have been unaffected by harvesting, so yield increases would not have occurred. However, the truck road and skid road transportation system and old railroad grades did not exist, so precipitation would have infiltrated and been detained more efficiently.

Overall, streamflow in the reference condition was very likely to have been somewhat more evenly distributed and not as flashy. Soil moisture storage was greater and release to the stream channels was slower. Baseflows were likely greater than the current condition, as well as low flows. But the magnitude of this difference is difficult to predict. Greater baseflows and especially low flows under the reference condition, combined with narrower channels and more large woody debris, would have maintained better quality habitat in the streams.

Storm Flows

The current condition within the sub-watersheds in terms of stormflows has been covered to some extent in the above discussion. Stormflows are likely being affected by some of the land uses within the area, by concentrating and speeding runoff. The magnitude of the stormflow effects depends on the type of land use, and its relative extent within the sub-watersheds. Normal forest management practices in the eastern United States generally have a small to modest effect on stormflow volume, but a less clear effect on storm peakflows (Reinhart et al, 1963; Kochenderfer et al, 1997; Edwards and Wood, 1994; Hornbeck, 1973; Hornbeck and others, 1997; Hewlett and Helvey, 1970.) Most studies documented stormflow increases for small mountain watersheds (less than 100 acres or so), where the entire small watershed area was harvested, and in some cases also included using herbicides after logging to keep the watershed from revegetating quickly. The documented effects are only for the treated watersheds, not for downstream areas, and stormflow increases are usually small. Stormflow increases are almost always of

relatively short duration, usually only 6 to 10 years or less, and most of the increase occurs during the growing season, not during the dormant season.

Other types of activities and land uses are likely to produce different stormflow effects. Activities that change the land use for a longer period of time would likely extend the duration of a stormflow effect, particularly if compaction occurred. Grazing impacts would likely produce longer term stormflow increases. Roads and highways that concentrate flows and reduce soil storage would speed stormflow runoff, increase stormflow volume, and increase peakflows as well under some situations. These effects would persist for the long term.

These types of stormflow effects are occurring within the Upper Williams River assessment area. It is not possible to quantify the effect because of the scattered nature of the roads and land uses. Stormflow effects related to normal, recent forest management practices within any given sub-watershed would not be great because most of the sub-watershed areas are primarily forested, and a relatively small amount of harvesting has taken place over the last 20 years.

Portions of the Big Laurel Creek watershed may be experiencing increased stormflow volume from the private land uses, and from the road system within that sub-watershed. The combination of old woods roads, the mine access road, and Forest Service system roads on Black Mountain is increasing rates of runoff and stormflow to the Williams River. In addition, the Highland Scenic Highway is likely having a substantial stormflow effect (increase) on Little Laurel Creek and Sugar Creek. These stormflow increases would tend to destabilize channels, increase channel bank erosion, increase deposition of sediment in some reaches of the channels, and increase fine sediment over the long-term. (Over the short-term, higher stormflows can flush fine sediment out of the smaller, higher gradient streams.)

Stormflows in the reference condition would have been unaffected by the land uses that came later, such as old roads and railroad grades, present day roads, the Highland Scenic Highway, timber harvesting, and land clearing for hay and grazing. Of these, the dominant influences are felt to be old roads with inadequate drainage, lands cleared for grazing, and the Highland Scenic Highway. In general, stormflows would have been slightly to moderately less (less volume) because of the undisturbed nature of the sub-watersheds. Storm runoff would have been less concentrated and slower, with a greater percentage of the precipitation being detained in the soil for slower release. The greatest difference between the current and reference conditions would likely have been for the smaller to moderate sized storm events. Also, floodplain function would have been improved in the reference condition, and a greater proportion of flood flows would have occupied the floodplain, reducing the erosive energy within the stream channels.

Storm peakflows in the reference condition may have been substantially different compared to current conditions for major flood-producing storms, particularly during the dormant season when most floods occur. The exceptions may be the sub-watersheds affected by extensive clearing and conversion to grazing, and the Highland Scenic

Highway. In those sub-watersheds, the reference condition would likely have been not only smaller stormflow volume, but somewhat lower peakflows as well.

Overall, smaller stormflows or longer stormflow duration, and greater floodplain storage in the reference condition would have meant less erosive energy within the stream channels. In general stream channels would have been more stable, with less channel bank erosion and sediment deposition within the channel. Aquatic habitat would have been higher quality because of the greater bank stability, less sediment deposition, lower fine sediment, and other habitat features. This condition of greater stability and less channel erosion would have existed in all of the sub-watersheds, but probably more so in the sub-watersheds now affected by land conversion to grazing, and the highway.

WATER QUALITY

Sediment

Streams within the sub-watersheds are impacted by sediment, as documented in the inventory of fine sediment conditions. Generally, fine sediment in these streams is high and would impair native trout reproduction. Refer to the Aquatic Resource section of this analysis, and fine sediment sampling results in Table 3-1. Also, the effects of various roads, highways, land uses on hydrologic processes, erosion sources, and channel conditions indicates that accelerated channel erosion is occurring in some reaches, leading to deposition in others. Indications are that the increased bedload primarily from channel bank erosion has led to widened channels in some sections of the Upper Williams. Impaired conditions of riparian vegetation, primarily on some private lands, has also led to increased channel bank erosion, and increased bedload and fine sediment impairment of aquatic habitats.

Sediment source areas are extensive throughout most of the sub-watersheds, some associated with system and woods road facilities. Also, sediment coming from the Black Mountain mine access road (FR 1797) is very substantial. This sediment also contributes to in-stream fine sediment levels, and aquatic habitats are generally impaired. As noted earlier, fine sediment and increased bedload has also originated from the Highland Scenic Highway, with sediment effects in Little Laurel Creek, Sugar Creek and Williams River.

Despite the current high sediment condition in these streams, none are listed on the State's 1998 303(d) List for reasons of sediment impairment. In terms of sediment, all streams within the Upper Williams River assessment area are considered to be meeting the designated uses assigned to them.

Reference conditions for water quality would have reflected the undisturbed condition of the sub-watersheds. Essentially none of the present day human-caused conditions that affect water quality in these sub-watersheds would have existed under reference conditions. Sediment conditions in streams would have been controlled by natural processes, and not been influenced by the variety of land clearing and disturbance

activities that exist today, such as roads and grazing. Natural processes would have included all of the types of erosion that occur today (sheet, rill, gulley, slides, streambank, etc), but in different proportions and amounts. Riparian areas would have remained intact, leading to improved channel stability in areas that are now cleared. Overall, bedload sediment and fine sediment would have been at moderately to substantially lower levels, and suspended sediment during stormflow conditions would have also been lower. Aquatic habitats throughout the Upper Williams watershed would have exhibited a higher quality because of the reduced sediment conditions. The aquatic community in general would benefit, and trout reproduction would have been maintained at a higher level.

Acidity (pH)

All streams within the assessment area are considered by the State to be meeting water quality standards for acidity, except for Sugar Creek. As noted earlier, the State listed Sugar Creek on the 303(d) List as being water quality limited due to acid deposition impairment. Sugar Creek was treated with approximately 66 tons of limestone fines, placed along two of its tributaries, in late April 2000.

Although there is an old mine on Black Mountain, acid mine drainage is not a problem with the site. No acid mine drainage impairment of the Williams River is occurring this far up in the headwaters (within the Upper Williams assessment area).

The following is a specific existing condition with information containing a reference to a road leading to an abandoned underground coal mine on Black Mountain. It is based on a review of the abandoned coal mine records (Mine site MF-1011) and field examination on 5/25/00 by Linda Tracy, Forest Geologist.

The Black Mountain underground (drift) coal mine last operated these privately owned minerals into the late 1960s. Based on 1958 aerial photographs, the mine existed at that time, but it is not known when operations began.

Examination of the approximately 1.1 miles of access road closest to the mine found:

- At least 2-3 significant fill slope washouts.
- High road cut banks with emerging water, small scale slumping, and mass movement into the road, both of which occur in the cove northeast of the 1st switchback.
- Sustained grades of 12-15%, except for several short sections that have grades up to 20% and down to 5-6%;.
- Uncontrolled drainage which is creating gully erosion within remnant ditches, the road surface and fill slopes.

The underground mine openings have fallen shut. There is no access to the underground workings by people or animals. However, there are 1-2 discharges emanating from the mine. Under low flow conditions, a single discharge was measured at 0.2 gallons per

minute, had a pH of 4.9 and total iron of .742 mg/l. Under high flow conditions, the same discharge identified above had an estimated flow of 3 gallons per minute, and pH of 5.42. A second discharge was estimated to contribute an additional 6-7 gallons per minute. Under the observed high flow conditions, as these discharges leave the mine bench onto the fill slope and access road, there is gully erosion.

Although most streams in the area are considered to be meeting water quality standards for acidity, acid deposition is likely having some effect on water chemistry in all these streams. Stream acidity under reference conditions would have been governed by the natural buffering capacity of the soils and bedrock, and by the natural acidity of precipitation and the influence of vegetation. In general, most streams probably had slightly higher average pH values. And during summer storms and snowmelt runoff, acid shock events were not a problem. The effect on the aquatic community in most of the sub-watershed streams may not be great, because most maintain some buffering capacity. In Sugar Creek, the reference condition was likely more distinctly different, as it appears to have been impaired by acid deposition in recent decades. Although Sugar Creek probably never was as productive a stream as the others in this assessment area (due to naturally acidic bedrock at the head of this sub-watershed), it likely maintained a higher average pH than current conditions and was able to support a native trout fishery.

Temperature

None of the streams are listed in the State 303(d) List as temperature impaired. However, some streams are believed to have impairment of habitat quality because of increased water temperature. Part of this effect is related to reduced quality of riparian habitats (riparian clearing for hay production, grazing and roads along stream channels), and it also is related to the increased sediment load in streams. As deposition occurs and aquatic habitats become simplified, and as channels widen and become shallower, they are more susceptible to temperature increases during the critical summer and early fall months when low streamflow occurs together with high daytime temperatures and intense solar radiation.

The streams most likely to be impaired are Big Laurel Creek, Beaverdam Run, and the lower reaches of the Williams River below Day Run. Portions of Day Run, Downy Run and Little Laurel Creek are also likely to have some temperature impairment in their lower reaches.

Stream temperatures under the reference condition would have remained lower during summer low flows. This would be due to the combined effect of a more intact riparian forest (particularly in the sub-watersheds of Big Laurel Creek and Beaverdam Run), generally narrower channel width in some stream reaches, and maintaining greater baseflows. Lower summer stream temperatures would have benefited the native aquatic community.

Summary of Hydrology/Stream Channel Conditions

The difference between the reference condition and the current condition in the sub-watersheds of the Upper Williams assessment area is fairly distinct. Watersheds have been impacted and impaired by a variety of facilities, land uses and conversion, and the more external influence of acid deposition. Much of the current condition in these sub-watersheds can be attributed to the early 1900's timber harvesting, which removed most of the timber from the entire assessment area, and developed a transportation system which severely impacted streams and riparian areas. Subsequently, a variety of land uses has continued to influence watershed condition, although to a much lesser extent for the most part. The existing and old road systems continue to effect patterns and rates of runoff from the land. In some cases this effect could be substantial, such as with the Highland Scenic Highway. Land clearing and conversion to permanently cleared condition, particularly for grazing, has a continuing effect on runoff and water yield, erosion, and channel stability.

Timber harvesting has been, and continues to be, a primary land use within the sub-watersheds, both on public and private lands. The transportation systems developed affect watershed condition as previously described. Removal of all trees in an area can temporarily increase water yield and stormflows, depending on the amount and type of harvesting. If the type of harvesting was limited to thinnings and no additional roads were constructed, then such flow effects would be short-lived.

Natural watershed processes are in an impaired state, and watershed condition is below its potential. Much of the stream channel system within the assessment area has been impaired through flow and sedimentation effects, channels are unstable, and aquatic habitat is impaired. The best examples of this are eroded streambanks, high fine sediment, widened channels, lack of large woody debris, and cleared riparian areas. Some stream channel reaches have degraded into less stable forms, indicating flow and sediment which are out of balance.

Watershed restoration measures are needed to improve watershed function and begin the process of moving watershed condition toward the reference condition. Watershed restoration is needed on both public and private lands. Restoration measures should consider erosion processes, hydrologic function, riparian and channel conditions, aquatic and riparian community needs, facility and land use needs and limitations, and other human uses. Restoration projects should focus on old and existing roads, riparian areas, possible channel restoration opportunities, and possible Highland Scenic Highway improvements. Priority should be given to road drainage improvements, road closure or obliteration, and riparian area restoration. Future projects, such as vegetation management, should consider the best methods for achieving management objectives and improving watershed and aquatic condition. In some cases, alternative timber harvest methods such as high lead cable yarding, skyline systems, or helicopter logging should be considered to reduce watershed effects.

AQUATIC RESOURCES

Fish

The current condition of aquatic habitats is characterized as simplified stream channels due to the loss of large woody debris, and elevated levels of fine sediment related to natural events and human activities on sensitive soils. No water temperature data were available for the assessment, but the predominance of non-game fishes in some stream systems are likely a reflection of increased water temperatures due to reduced stream shading.

Williams River – The Williams River heads in an unconfined floodplain influenced by beaver activity and a valley slope of approximately 1%. Through most of its length it flows through a wide valley bottom with a gradient of approximately 2% and a channel reach morphology characterized as plane bed. Plane bed reaches are generally featureless reaches with limited habitat complexity. Towards the bottom of the assessment area, the valley becomes more confined, the gradient is approximately 1% and the habitat remains simplified. A large, long pool, called "the Deadwaters", is located in the lower reach. Fish sampling in 1999, midway between the confluences of Mountain Lick Run and Black Mountain Run, collected blacknose dace, creek chub, fantail darter, mottled sculpin, mountain and mountain redbelly dace. Brown trout were also captured at this site.

Beaverdam Run – Beaverdam Run heads in a high gradient cascade for a short distance before the gradient decreases and the valley widens to its confluence with Downy Run. No fish habitat data or fish sampling was conducted during the watershed assessment. Sediment samples were collected and fine sediment (<4mm in size) comprised 36%, by weight, of the potential spawning gravels sampled (Table 3-1). The Beaverdam sub-watershed is primarily in private ownership (58%) and approximately 60% is considered as having sensitive soils.

Downy Run – Similar to Beaverdam Run, Downy Run begins in a high gradient reach before the gradient decreases and the valley widens. Unlike Beaverdam Run, the lower reaches of Downy are highly influenced by beaver dams. No fish habitat or population data were conducted during the assessment. Spawning gravel samples measured 28% fine sediment levels. The Downy Run sub-watershed is approximately 66% National Forest System (NFS) lands and 66% of the area is considered to have sensitive soils.

Mountain Lick Run - Except for a short reach of high gradient cascades, the remainder of Mountain Lick Run is classified as plane bed. Pool development and pool quality are limited. The stream gradient decreases from approximately 15% in the headwaters, to approximately 4% in the middle reach and 2% in the lower reach. Fish sampling in 1999 collected native blacknose dace, brook trout, fantail darter and mottled sculpin. Nonnative brown trout were also collected. Total trout biomass was estimated at 55

pounds per acre with 35 lbs/ac of brook trout and 20 lbs/ac brown trout. Sediment samples had an average level of fine sediments of 21%. The sub-watershed is almost entirely in NFS ownership and 54% is considered to have sensitive soils.

Black Mountain Run –Black Mountain Run heads in a short, high gradient cascade reach before the gradient decreases and the channel morphology is characterized as plane bed. Riffles dominate the habitat types and pool area and quality are generally limited. Fish sampling in 1999 estimated a total trout biomass of 55 pounds per acre (29 lbs/ac brook trout and 26 lbs/ac brown trout). No non-game species were collected. Fine sediment levels averaged 25% in the spawning gravels that were sampled. Sensitive soils are found on approximately 69% of the sub-watershed, and the sub-watershed is entirely in NFS lands.

Day Run – Day Run is approximately two miles long and flows through a mixed ownership of NFS and private lands. It heads in a short, high gradient reach on Forest and then flows through private ownership for approximately one mile. The lower mile is back on Forest, but adjacent to private land and flows through an old agricultural field that is re-growing. No fish sampling was done in 1999-2000, but sampling in 1991 estimated an average brook trout biomass of 12 pounds per acre at the two sites sampled. In 1996, following floods that occurred that year, brook trout biomass was estimated at approximately 6 lbs./ac. Pool habitat and cover are limited due to a lack of Large Woody Debris (LWD). Sediment samples taken in 2000 had an average level of fine sediments of 19%. The sub-watershed is approximately 57% on NFS lands and 74% is considered to be sensitive soils.

Big Laurel – The Big Laurel sub-watershed is the largest of the eight sub-watersheds and comprises over 23% of the overall assessment area. Only 23% of the sub-watershed is on NFS lands with the remainder in private ownership or within the state owned Handley Public Fishing and Hunting Area. Friel Run, a major tributary to Big Laurel, is also within this sub-watershed. No habitat or fish population data were collected in the sub-watershed during this assessment. Sediment samples were going to be collected, but no potential spawning habitat was identified due to large substrate sizes and/or inappropriate stream depths. Most of the impoundments within the Upper Williams watershed are located in the Big Laurel sub-watershed. These impoundments may influence the hydrologic characteristics of Big Laurel. Approximately 43% of the sub-watershed is classified as having sensitive soils.

Little Laurel – Little Laurel is located to the north of the Big Laurel sub-watershed and 88% is on NFS lands. Channel characteristics range from high gradient cascades in the headwaters, to plane bed through the middle reaches and pool/riffle channel type in the lower reach. The pool-riffle channel type is in a low gradient reach (<1%) and has more defined pool development. Fish sampling in 1999 occurred in a plane bed reach and collected only native non-game species including blacknose dace, creek chub, fantail darter and mottled sculpin. Although no trout were collected, it contains suitable trout habitat and both brook and brown trout were collected in Little Laurel in 1991. Little Laurel had the lowest level of fine sediment (14%) for the eight sub-watersheds, with the

exception of Big Laurel where no collection was made. Approximately 53% of the sub-watershed is characterized as having sensitive soils.

Sugar Creek – The Sugar Creek sub-watershed is entirely on NFS lands and only 8% is characterized as having sensitive soils. Sugar Creek is considered to have some of the best habitat conditions within the assessment area. Channel types range from plane bed in the headwaters to cascade and step-pool in the middle reaches and plane bed in the lowest reach. The higher gradient middle reaches have good pool development and cover. Fish sampling in 1999 collected only brook trout and the total biomass was approximately 7.0 pounds/acre. Fish production was likely limited by acid runoff in Sugar Creek. In 2000, the West Virginia Division of Natural Resources began treating Sugar Creek with limestone fines to neutralize acid runoff and increase the pH. Prior to the treatment, pH values ranged from 4.7 to 5.7 in samples collected periodically from 1987-98. In the water sample collected in May 2000 the pH was 6.37. The limestone fines may also be elevating the overall level of fine sediment in the system. Sediment samples collected in 1999 had an average of 25% fine sediment and in 2000 the samples averaged 41% fine sediment.

Table 3-1. Data collected in 1999-2000 to assess the percentage of fine sediment (<4mm) in potential spawning gravels and estimated trout biomass (pounds/acre).

	Williams River	Beaverdam Run	Downy Run	Mtn. Lick Run	Black Mtn. Run	Day Run	Big Laurel	Little Laurel	Sugar Creek
% Fine Sediment	31	36	28	21	25	19	NA	14	25-41
% Sensitive Soils in Sub-watershed.	55	60	66	54	69	74	43	53	8
Trout Biomass (lbs/ac.)	NA	NA	NA	55	55	NA	NA	0	7

The existing aquatic habitat conditions within the Upper Williams Watershed Assessment area currently limits the productivity of native book trout. Native fish populations may also be limited by the presence of non-native species such as brown trout which compete for food and space and may prey directly upon native fish. As riparian and aquatic habitats recover, native brook trout populations should increase. Fishery management objectives can also be coordinated with the WVDNR to encourage the continued recovery of native brook trout and sensitive non-game species that may be affected by non-native species.

Riparian Habitat

No reference, or undisturbed, watershed conditions exist within the Williams River drainage in which to compare and contrast the existing conditions to. We can speculate that prior to disturbances associated with creating agricultural openings and the logging that occurred around the turn of the century, that streams primarily flowed through forested riparian areas. The LWD that would fall into the stream channels from these

riparian forests were probably more mature and larger diameter than the stands comprising the riparian areas today. Larger trees are generally more stable and last longer than smaller diameter trees. We can also speculate that spruce was a greater component of LWD than what we see today. With the natural recruitment of LWD, channels were more stable, had greater habitat complexity, pool development and cover. There was probably more reach types characterized as step pool and/or pool-riffle than the dominance of plane bed reaches under current conditions. With no roads to modify storm flows and increase erosion, stream channels would be more stable and have lower levels of fine sediment than what we find today

Stream shading was likely greater in the forested riparian areas resulting in cooler water temperatures. Native brook trout were probably in greater abundance and non-game species were likely reduced in range and abundance.

Fish habitat within the Upper Williams River assessment area is still greatly influenced by historic impacts associated with agricultural development and logging in the watershed. Simplified channel conditions and elevated levels of fine sediment are a legacy of past land use activities, and contemporary disturbances associated with roads, recreational sites and acid precipitation exacerbate the problems. Improved aquatic health is largely dependent upon the continued recovery and aging of riparian forests to restore the LWD that was an important component of these systems. Protecting riparian areas and timber stands along active channels will be an important element in restoring the components for a healthy watershed. Rehabilitation of existing sources of sediment will also help to reduce the amount of fine sediment influencing streams within the assessment area.

VEGETATION

Threatened/Endangered/Sensitive Plants

Botany surveys were conducted in the Upper Williams River Watershed in 1998 and 2000. No threatened or endangered plants were found. Field surveys revealed the presence of the following sensitive plant species:

- White monkshood (*Aconitum reclinatum)* – 22 sites were found, 2 of the sites are along road corridors and 2 sites are in young stands.
- Appalachian blue violet (*Viola appalachiensis*) – 5 sites were found, 3 of the sites are on road corridors.
- Rock Skullcap (*Scutellaria saxatilis)* – 2 sites were found, both sites are within ¼ mile of Williams River.

Forest Type/Size Class/Age Class

The following information is based on field reviews, inventory maps, silviculture exam data in the CDS database, GIS data, and other inventory data.

Landtype Association (LTA) and associated Ecological Landtype (ELT) Description:

The main LTA (see Map 3-2) within this watershed is the Allegheny Plateau (Bc01). This LTA has highly dissected topography, with primarily broad ridges. It is between 3000′ and 4000′ in elevation and has high density drainage patterns. The area has been further subdivided into many ELTs on the basis of soils, aspect and potential vegetation types. Although there are many ELTs, the main potential type is similar throughout this watershed. The potential vegetation types on the ridges and side slopes within the Bc01 area are the sugar maple/beech vegetation types. Mostly along the streamcourses in the lower elevations the potential vegetation type is Hemlock/Rhododendron. In rocky areas Yellow Birch/ Rhododendron is the potential vegetation type.

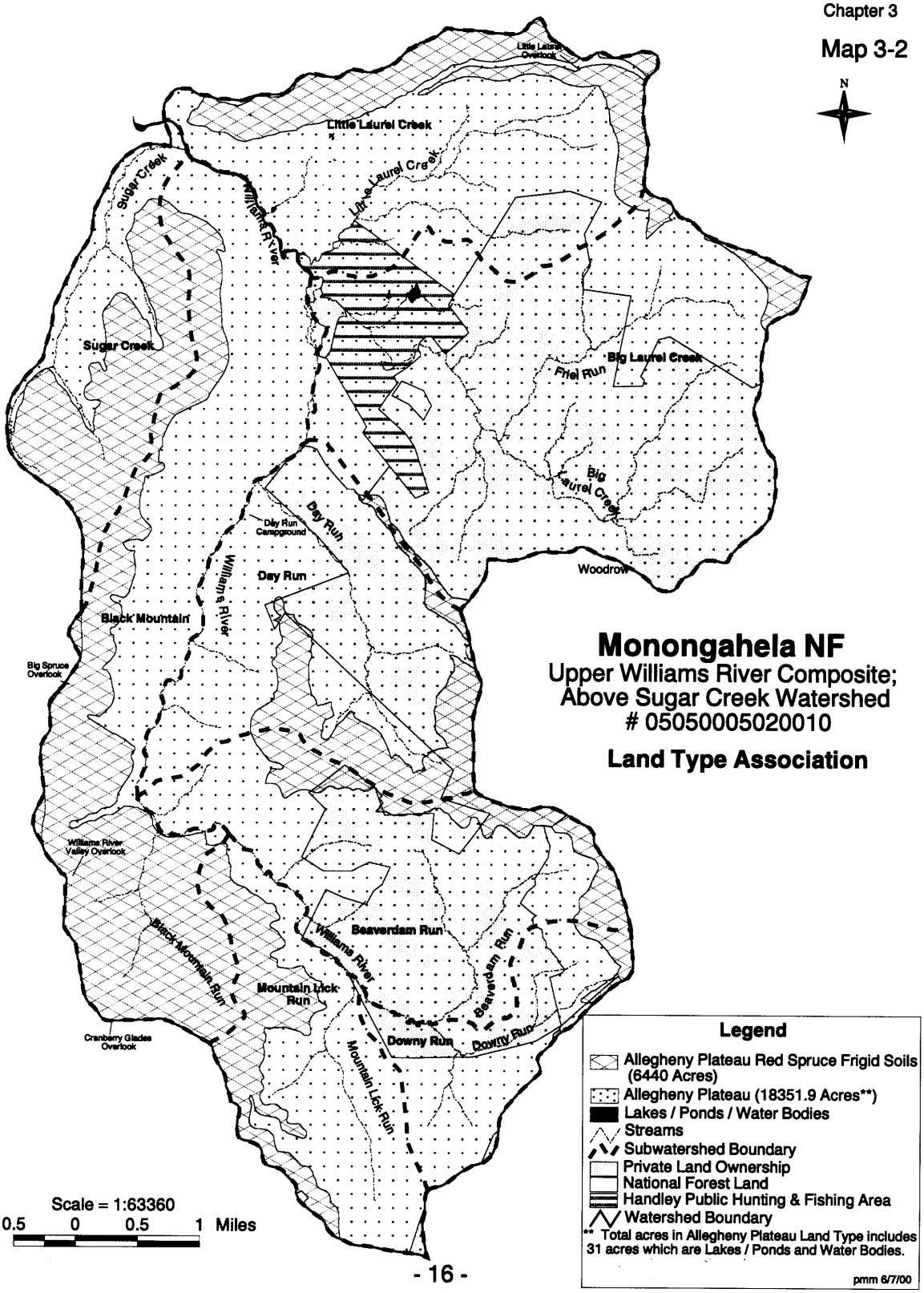
The other LTA in the Upper Williams River watershed is the Allegheny Plateau Red Spruce – Frigid Soils (Bc02). This LTA is in the area around Red Spruce, Big Spruce, Little Spruce, and Locust Knobs, and Tea Creek and Black Mountains. The Day Mountain area is also classified as Bc02 but field reviews indicate that at least the western side of the ridge may be Bc01. Potential vegetation for this LTA is primarily Red Spruce and Beech with some areas of Sugar Maple/Beech.

The uniformity of potential vegetation types are reflected in the relative uniformity of the existing vegetation types listed below as the Forest Types in Table 3-2. Nearly two-thirds of forested land in national forest ownership is classified as mixed hardwood forest types (89). Although the mixed hardwood type usually designates cove hardwoods, in this area it is used for stands with a variety of species such as sugar maple, black cherry, red oak, birch, beech, red maple, basswood, white ash, and yellow poplar along with other tree species. Striped maple is a common understory tree along with sugar maple and beech in both LTAs.

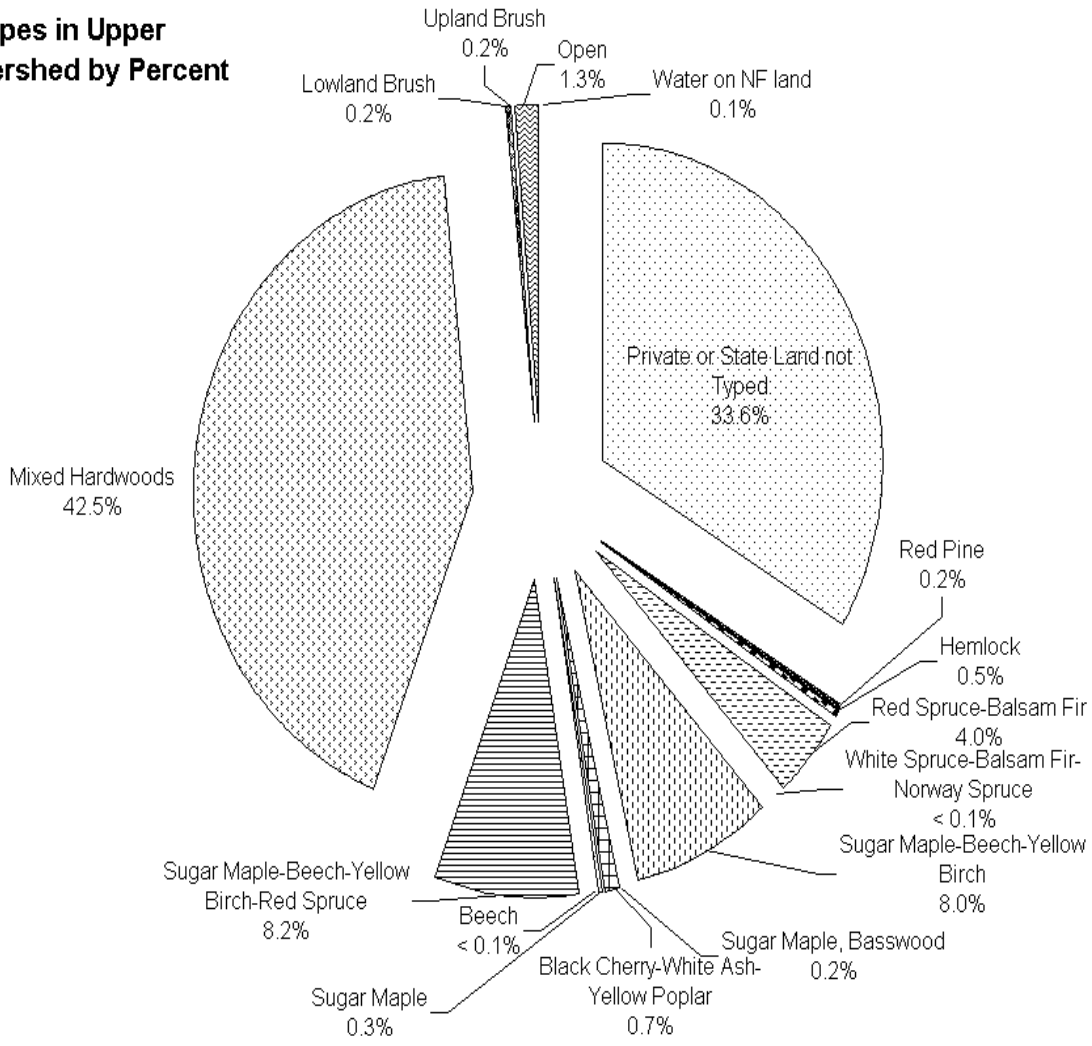
The conifer component, as a percent of stocking measured in square feet of basal area, is over 14%. The MNFLMP allows between 5% to 49% conifer stocking in 3.0 management areas. In 6.1 areas the MNFLMP recommends 5% to 25% conifer stocking.

More than 90% of the original Appalachian forest was dominated by hardwoods (Carvell 1986). The red spruce/fir forest was a major forest type, at higher elevations, prior to settlement by people of European origin. It is estimated over 1.5 million acres of spruce/fir forest covered the higher elevations of the Southern Appalachian Mountains in West Virginia, North Carolina, and Tennessee prior to European settlement. By 1860 this area was reduced by half. At the turn of the 20th century only 225,000 acres of the spruce/fir forest remained and by 1920 the number of acres had been reduced even further, to about 100,000 (USDA Forest Service 1975).

Map 3-2


N
Little Laurel Overlook
Little Laurel Creek
Little Laurel Creek
Sugar Creek
Williams River
Sugar Creek
Big Laurel Creek
Friel Run
Big Laurel Creek
Day Run Campground
Day Run
Day Run
Williams River
Woodrow
Black Mountain
Big Spruce Overlook
Williams River Valley Overlook
Beaverdam Run
Williams River
Black Mountain Run
Mountain Lick Run
Beaverdam Run
Cranberry Glades Overlook
Downy Run
Downy Run
Mountain Lick Run
Scale = 1:63360
0.5 0 0.5 1 Miles
Monongahela NF
Upper Williams River Composite;
Above Sugar Creek Watershed
05050005020010
Land Type Association
Legend
Allegheny Plateau Red Spruce Frigid Soils (6440 Acres)
Allegheny Plateau (18351.9 Acres**)
Lakes / Ponds / Water Bodies
Streams
Subwatershed Boundary
Private Land Ownership
National Forest Land
Handley Public Hunting & Fishing Area
Watershed Boundary
** Total acres in Allegheny Plateau Land Type includes 31 acres which are Lakes / Ponds and Water Bodies.
pmm 6/7/00

Forest Types in Upper Williams Watershed by Percent



Nearly 6% (993 acres) of national forest land in the Upper Williams watershed is in the spruce/fir forest types with over 7% (1,165 acres) in conifer forest types (see Table 3-2). In addition, many of the northern hardwood and mixed hardwood forest types contain some component of red spruce and hemlock (see Figure 3-1).

Table 3-2. Upper Williams River Forest Type Acres by Sub-watershed

Forest Type*	Little Laurel Creek	Big Laurel Creek	Sugar Creek	Day Run	Black Mtn.	Mtn. Lick Run	Beaver-dam Run	Downy Run	Total Acres
0#	413	4427		1324		20	1723	414	**8321**
2	45								**45**
5		5	28		78	10		6	**127**
13	261		522		200				**983**
16							9	1	**10**
81	180	211	493	84	723	180	102	10	**1983**
82			10		37				**47**
83	53				126				**179**
85	2	17		7	34	28			**88**
87	118	64	502	14	1126	162	20	16	**2022**
89	2261	975	142	1524	2136	1637	1109	748	**10532**
97	13			36	1		6		**56**
98				13	29		5		**47**
99	120	68	68	47	8		12	12	**335**
998	1		3		13				**17**
Total	**3467**	**5767**	**1768**	**3049**	**4511**	**2037**	**2986**	**1207**	**24792**

*See Appendix B for list of codes
#Private & State owned land includes forested land, openings, and water bodies

Table 3-3. Upper Williams River Size Class Acres by Sub-watershed (NF land only)

Size Class+	Little Laurel Creek	Big Laurel Creek	Sugar Creek	Day Run	Black Mtn.	Mtn. Lick Run	Beaver-dam Run	Downy Run	Total Acres
Open/Brush	134	68	67	96	22	0	22	12	**421**
Seedling/ Sapling	33	61	0	42	49	104	45	8	**342**
Poletimber	118	114	0	376	680	393	324	165	**2170**
Sawtimber	2769	1097	1698	1211	3747	1520	871	608	**13521**
Total	**3054**	**1340**	**1765**	**1725**	**4498**	**2017**	**1262**	**793**	**16454**

+ See Appendix B for definitions of size classes

Size and age class information is not available on private and state owned lands. Using aerial photographs, orthoquads, and GIS technology, it is estimated there are 2,471 acres of open/brush land and 5,850 acres of forest land. Less than 10% of the stocking on private land is conifer with approximately 1% in the spruce/fir forest type, including scattered plantings of Norway Spruce.

Table 3-4. Upper Williams River Age Class Acres by Sub-watershed (NF Land only)

Age Class	Little Laurel Creek	Big Laurel Creek	Sugar Creek	Day Run	Black Mtn.	Mtn. Lick Run	Beaver-dam Run	Downy Run	Total Acres
Open/Brush	134	68	67	96	21		22	12	**420**
0-15	30	61		42	48	105	45	8	**339**
16-30	53			211	396	16	261	49	**986**
31-59	429	136		194	278	382	123	148	**1690**
60-69	733	284	633	147	290	180	69	127	**2463**
70-100	1456	687	1064	1030	3166	1257	730	374	**9764**
101+	219	104		5	299	79	12	74	**792**
Total	**3054**	**1340**	**1764**	**1725**	**4498**	**2019**	**1262**	**792**	**16454**

Timber Resource Management Activities

Extensive timber harvesting occurred in this watershed prior to National Forest (NF) ownership. Construction of railroads in West Virginia doubled in the 1880s and doubled again in the 1890s allowing access to and transportation of the timber resource. By 1917 rail lines covered 3,705 miles in the state. The number of sawmills in West Virginia reached a peak in 1909 at 1,524. Production of lumber was highest in 1910 with mills employing 26,000 workers and producing 1,500 million board feet of lumber (Lewis 1998). Logging at the turn of the century clearcut the large majority of this portion of the State. For this reason the forest we have here today is mostly even-age (see Table 3-4). Over 74% of NF land is between 60 to 100 years old. Timber harvests for the purpose of multiple use management continues under NF ownership. Listed below are timber sales that have been completed within the Upper Williams River watershed since 1983.

Sale Name	Total Acres Harvested	Acres Clearcut	Year Completed
Upper Williams	221	40	1995
Black Mountain	800	0	1992
Swag-o	52	0	1989
Big Spruce II	224	84	1989
Little Spruce Products	31	0	1989
Big Spruce I	353	0	1988
Mountain Lick	620	100	1988
Friel Run	88	45	1988
Little Laurel	334	21	1986
Lower Williams	578	0	1983

Other small salvage, locust posts, and mine prop sales have occurred in the same time period.

Timber harvesting also continues on private land. Within the Upper Williams River watershed, approximately 1,069 acres have been harvested in 9 timber sales since 1994 by 5 separate landowners (Rossel 2000). These harvests have been mostly diameter limit cuts that remove most of the trees above a certain diameter measured at about 1 foot above ground level.

Recent timber harvests have not occurred within the Handley Public Hunting and Fishing Area. However, a small timber sale is planned in the near future. Approximately 82% of Handley land is forested, 10% is in maintained openings, and 3% is in shrub habitat. The remaining land is in ponds, streams, and roads.

In the early to mid-1960s clearcutting became a valuable silvicultural tool on National Forest land to correct individual tree harvests that were resulting in high-grading (the practice of cutting the best/largest trees and leaving lower quality and/or smaller trees). The use of clearcutting became highly controversial in the 1970s (mostly due to visual concerns of clearcutting large tracts of land) resulting in a temporary timber harvest moratorium and the creation of the National Forest Management Act and the National Environmental Policy Act. The clearcut harvest method continues to be a valuable silvicultural tool on the Monongahela National Forest, although at a much reduced level.

Most of the areas clearcut in the 1960s and 70s resulted in stands of overcrowded trees (too many trees trying to live in one area). Natural mortality can eventually reduce this overcrowding; however, through the utilization of timber stand improvement (TSI) techniques it is possible to select which trees will live and which trees will die. These TSI treatments are used to improve the health and increase the growth of the residual trees. One method of TSI is a non-commercial thinning in a crop tree release (CTR). Numerous young stands of trees received this type of treatment in the past 10 years in the Upper William River Watershed. Crop trees are selected based on species, mast capability, health, potential wood value, and form. The stands in this area that were treated with CTR are now, or within the next 5 years will be in the poletimber size class. There is the potential to further improve the health and growth of these stands through commercial and non-commercial thinnings utilizing other various TSI methods. See Appendix D, Silvicultural Treatments, for a list of potential stands.

Many stands that were clearcut in the Upper Williams River Watershed in the 1980s and early 90s are now overcrowded with young trees. These stands will be ready for a non-commercial thinning using the CTR method within the next 5 years. Most of these stands are presently in the sapling stage of growth. See Appendix D, Silvicultural Treatments, for a list of potential stands.

MNFLMP Standards and Guidelines for Management Prescription 3.0 indicate that forest diversity will be enhanced by the dispersal of different types and ages of vegetation. For high productive sites, which include most of the acreage in this watershed, there should be 10-20% of the area in seedling/sapling stands, 15-30% in pole stands, and 50-75% in sawtimber stands. The recommendation for low productive sites is to have 13-25% of the area in seedling/ sapling, 20-38% in poles, and 38-67% in sawtimber. These percentages were determined based on establishing an even distribution of age classes under even-aged management methods. Timber stands on medium to high productive sites grow out of the seedling/sapling stage within 20 to 30 years and may attain sawtimber size between 50 to 60 years of age. On low productive sites a timber stand may remain in the seedling/sapling stage for up to 40 years and not attain sawtimber size until 80 years of age. The normal rotation age for high site mixed hardwood stands is 200 years and 120 years for black cherry, when the age classes are in balance. Rotation ages for low sites are 150 years for mixed hardwood stands and 100 years for black cherry. However, until the age classes are balanced, stands must be at least 70 years old to be considered for a regeneration harvest. There is an opportunity in the next 5 years to continue to balance age classes by utilizing even-age regeneration harvests and to improve the structure, diversity, and health of many stands through commercial thinning.

Even-age regeneration methods may include two-age, clearcutting, and/or shelterwood harvests. A two-age harvest results in a residual basal area of 15 to 30 square feet of trees mostly in the poletimber and small sawtimber (12″ to 16″ dbh) size classes. The next entry for a regeneration harvest in stands receiving a two-age treatment would not occur for another 60 to 100 years. A clearcut harvest results in all trees over 1″ dbh being cut with the exception of about 5 trees per acre are left for wildlife purposes. Another regeneration harvest would not occur in a stand receiving a clearcut treatment for 120 to 200 years. A shelterwood harvest results in a residual basal area of 30 to 50 square feet of trees mostly in the small and medium sawtimber size classes (12″ to 22″dbh). Reentry in a shelterwood harvest would normally occur within 5 to 15 years after the initial harvest to remove the remaining sawtimber size trees if there is sufficient regeneration of desirable trees. With the exception of trees designated to remain, all other trees over 1″ dbh are cut in a regeneration harvest.

One type of commercial thinning is called an Overstory Removal (OSR). An OSR is usually done in a stand that has received a commercial thinning within the past 10 to 30 years. The first thinning may result in a substantial amount of regeneration, normally of tree species that are tolerant of shade such as sugar maple. The OSR harvest removes the overstory and releases the regeneration.

See Appendix D, Silvicultural Treatments, for a list of potential stands.

Insects, Disease, and Non-Native Invasive Plants

The role of non-native insects, diseases, and invasive plants as disturbance factors has increased in the past century due to the introduction of these pests from other countries. Some of the species known to influence the structure and pattern of vegetation are discussed below. The species listed here are not all inclusive of non-native insects, diseases, and invasive plants that may be present in the Upper Williams River Watershed.

Insects

Gypsy Moth (*Lymantria dispar L.*) was introduced, from France, to the United States in 1869. The first defoliation outbreak occurred in 1889 (McManus, Schneeberger, Reardon and Mason 1989).

A population crash of the gypsy moth, caused by the fungus *Entomophaga maimaiga*, kept the population under control for the past few years. High humidity, frequent periods of rain, and fairly constant temperatures between 14°C to 26° C are needed for the fungus to germinate and spread (Reardon and Hajek 1998). An increase in the number of gypsy moth egg masses on the Forest this past year is resulting in a population build-up causing defoliation in numerous "hot spots" in the eastern section of Pocahontas County. The population increase, due to dry spring weather for the past 2 years, should not cause significant tree mortality this year. However, a continued increase in the population with successive years of defoliation may cause extensive tree mortality. A return to a control program may be necessary to slow the spread of this insect and reduce tree mortality.

Oak trees (especially of the white oak group) are the preferred host for this insect pest. Less than 5% of the trees in the Upper Williams watershed are oak. Almost all of these are in the red oak group. This area is considered to be low risk for massive defoliation by gypsy moth caterpillars.

Hemlock Wooly Adelgid (HWA) (*Adelges tsugae)*: This sapsucking insect, introduced to the United States from Asia in 1924, was detected in Pocahontas County in 1993 (Hutchinson 1995). The insect feeds on twigs causing the foliage to discolor and drop prematurely. Defoliation and death usually occurs about 4 years after a tree is infested. Eastern and Carolina Hemlocks are highly susceptible to this insect and no resistant trees have been located to this date. However, several common predators (including the Japanese Ladybug) of the adelgid have been released and may prove to be an effective control (Kajawski 1998; Montgomery and Lyon 1996). Severe cold weather also seems to control HWA. In January, 1985 and the winter of 1993-1994 severe cold weather (-20° to -28° F) greatly reduced HWA populations (Souto, Luther, and Chianese 1995). Infestations of HWA are not apparent above the Hudson River corridor in New York. It appears cold weather may be a limiting factor in the spread of this insect. The cooler climate of the Upper Williams River Watershed may help to limit the impact of this exotic pest.

Disease

Beech Bark Disease (BBD): The beech scale insect (*Cryptococcus fasigua*), native to Europe, arrived in Nova Scotia around 1890. By 1932 trees in Maine were dying from BBD. The disease results when the bark is attacked by the beech scale, then invaded by fungi, primarily *Nectria coccinea* var.*faginata* and *N.galligena* which eventually kills or severely injures beech (Houston and O'Brien 1983). Beech trees over 8 inches diameter are more severely affected then smaller trees. Mortality occurs in about 30% of the trees that are infected. Up to 90% of the remaining beech trees in a stand become severely injured and do not produce quality wood (Leak and Smith 1995). It appears there are greater disease levels in stands containing hemlock (Gavin and Peart 1993). Hemlock provides high shade and moisture preferred by the fungi that attack the tree after infestation by the scale.

The advancing front of the scale is presently in the Williams River watershed. Cutting infected and high risk trees would provide an opportunity to salvage some of the material and improve the health and diversity of the stand (Ostrofsky and Houston 1988).

Chestnut Blight (*Cryphonectria parasitica*): This fungus (probably introduced through the importation of chestnut trees from Asia) was first reported in the United States in 1904. Within 50 years the fungus occupied the entire range and had killed 80% of the American chestnut (Kuhlman 1978). Nearly all the remaining live trees were infected with the fungus and dying. Prior to the infestation, the American chestnut was a major component of the eastern hardwood forest comprising 25% of all tree species on over 200 million acres from New England to Georgia (MacDonald, Cech, Luchok, and Smith 1978; and Schlarbaum 1989). This tree, which once grew up to 120′ tall and over 7′ in diameter, now rarely attains heights over 30′ with diameters up to 6″ before the fungus kills the stem and the process starts over when the tree resprouts. A few resistant trees have been found. There is hope that some time in the future the American chestnut will return, as a valuable timber and wildlife tree, to the eastern hardwood forest (Newhouse 1990). An opportunity exists to plant disease resistant chestnut in this area.

Non-native Invasive Plants

Multiflora Rose *(Rosa multiflora* Thunberg.): Also known as Japanese Rose, has been widely planted for erosion control and wildlife benefits. It was brought to the United States in the 1880s by horticulturists. This shrub forms dense thickets impenetrable by humans or large animals and is highly competitive for soil nutrients. It grows just about anywhere except in standing water or extremely dry areas. Control methods include mowing several times per year for 2 to 4 years, burning early in the growing season with follow-up burns for several years, digging up the plant with the entire root, or applying glyphosate, or other approved herbicides, to the cut stems or foliage.

Autumn Olive *(Elaeagnus umbellate* Thunberg.): Introduced from east Asia in the 1830s for revegetation of disturbed areas. This shrub has prolific fruiting ability. The fruit (and seed) is eaten and dispersed by birds. Autumn olive can thrive in poor soils and does not require much moisture to survive. When cut or burned it sprouts and grows rapidly forming a dense shade cover which make it difficult for sun-loving plants to compete with it. This plant does not grow well on wet sites or under forest shade conditions. Control methods include pulling up seedlings and sprouts when the ground is moist or applying glyphosate, or other approved herbicides, to cut stems or foliage.

Tartarian Honeysuckle *(Lonicera tatarica* L.): Most bush honeysuckles are natives of Europe or eastern Asia and have been cultivated in the United States since the mid-1800s. This plant was valued for its fragrant flowers and berries eaten by birds which then disperse the seeds into other areas. Honeysuckles can form dense shrub layers and interfere with the germination and growth of native plants. Control methods include digging up the plant and entire root and repeated burning or cutting during the growing season. Cutting should be done twice per year, once in the spring and once in the summer. Any cutting during the dormant winter months would increase resprouting. Applying glyphosate near the end of the growing season to the foliage or freshly cut stumps is an effective control method.

Purple Loosestrife *(Lythrum salicaria)*: This plant occurs exclusively in wetland habitats. Although it is not known if this plant occurs in the Upper Williams River Watershed, it is listed here because once established it becomes highly invasive and is extremely difficult to eradicate. Native to Eurasia, it was brought to Canada and the northeastern United States in the early 1800s. Pure, dense stands of up to 80,000 stems/acre choke out native plants and endanger not only other plants but amphibians as well. One stalk may produce up to 300,000 seeds which are spread by wind and water. In addition, purple loosestrife propogatates vegetatively by root or stem segments. Control in its native country is by herbivorous beetles that feed on its roots and leaves. Hand removal is possible in small populations except after flowering which would aid in scattering the seeds. Pulled plants should be bagged on site and removed since root or stem segments left behind would produce more plants. Once the plants are removed from the area they should be burned. Several treatments with herbicides registered for aquatic use may also aid in control. Care should be taken when using herbicides to avoid contact with non-target native plants since the native plants will be needed to recolonize the area.

Botanical Areas

Black Mountain - located off of FR 461. The area is designated botanical area #804, and is known for purple rhododendron, a species that does not usually occur naturally in this area.

Balsam and Fraser Fir Area - This unofficial botanical area was severely burned by a wildfire in the 1930s. Seeding in 1963 and 1964 resulted in the establishment of Balsam Fir and Fraser Fir. Both species appear to be regenerating naturally at this time. Records

show Norway Spruce and European Larch were also seeded but apparently did not become established in this stand.

Agriculture/Grazing/Openings

Grazing allotments, wildlife openings, and major roadside areas are presently maintained to remain open areas. While providing a diverse habitat, too many openings may fragment an area making it difficult for forest dwelling species to travel. Excessive fragmentation may cause isolation of a population, increase predation, and increase brood parasitism on neotropic migrant birds. Over 11% (2,890 acres – not including water bodies) of this watershed is presently in open/brushy fields. About 2,400 of these acres (over 30% of the total acres on private land) are concentrated in openings in the northeastern and southeastern sections of this watershed. Less than 3% of national forest land is in openings. A large portion of the acres in openings on national forest land in this watershed are concentrated in 2 grazing allotments that are adjacent to private land. Old fields are included in the opening category but are presently filling in with brush such as hawthorn and scattered young forest trees. Eventually the old fields will return to forested land if nothing is done to maintain them as openings. Less than 2% (359 acres) of forested area is temporarily fragmented by regeneration harvesting on national forest land in the past 25 years. (See Figures 3-2 and 3-3 and Map 3-3)

Grazing Allotments

Management of each range allotment depends on the specific Management Prescription (MP) the allotment occurs in. The emphasis varies for each management prescription. Direction for allotments in MP 3.0 areas directs "Management of open areas will be for livestock grazing and only secondary consideration will be giver to other uses. Intensive management for livestock grazing may occur" (MNFLMP pg. 130). The grazing season is usually May 15 through October 15.

Day Run - This area, located at the head of Day Run, has approximately 109 acres of pasture and woodland. It has been leased for grazing since 1959 every year except for 1972 and 1996. In 1999, a temporary 1 year grazing permit was issued through competitive bidding for $16/head/month for 14 cows and 1 bull for a total of 75 Animal Unit Months (AUM). In 2000, this allotment was advertised twice under competitive bidding. There were no bidders either time resulting in a vacant allotment in the year 2000. Up to 30 animals have been allowed to graze on this allotment. Forage is mainly native pasture with low soil fertility. Soil testing should be completed to determine amounts of lime and fertilizer to be applied.

Figure 3-2

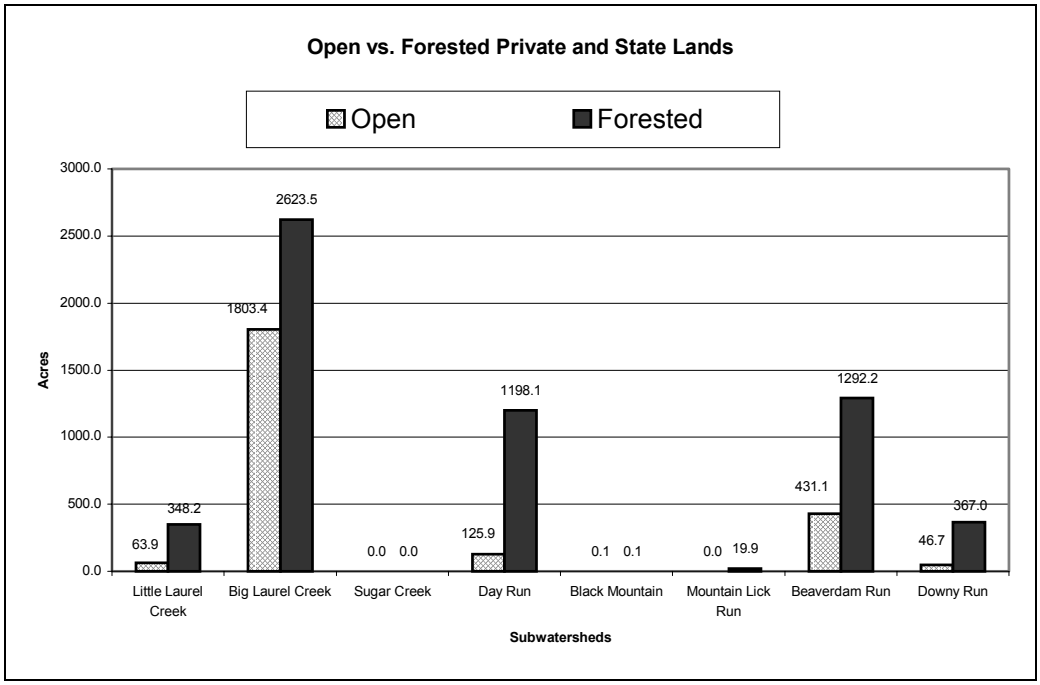
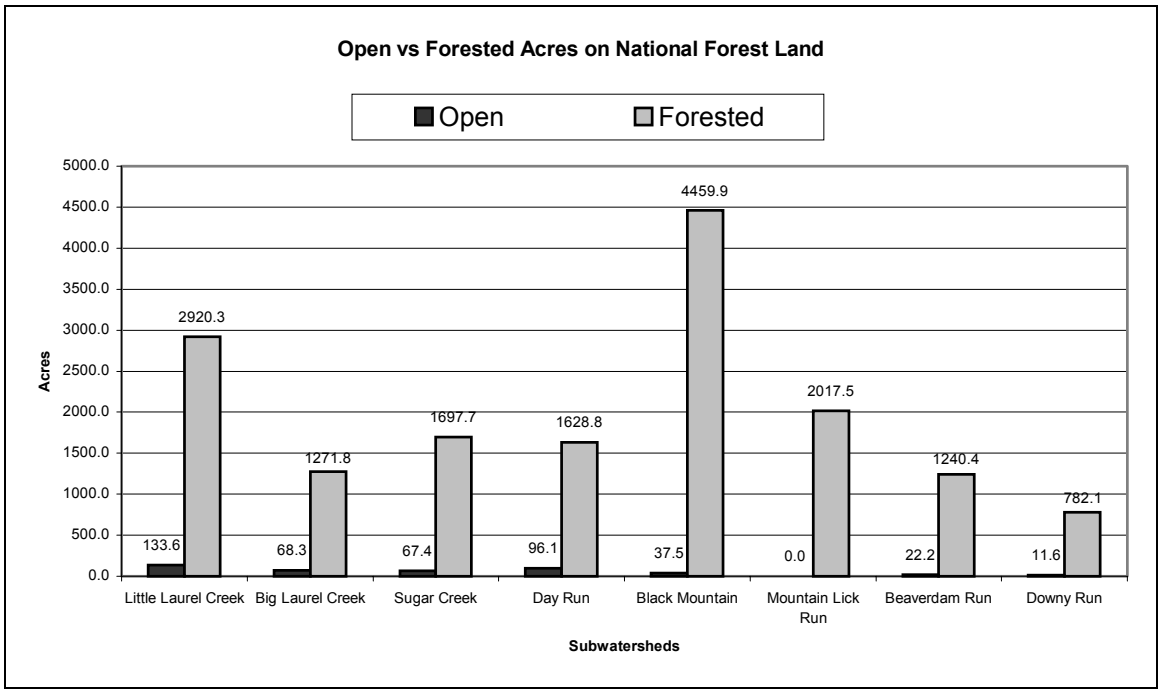
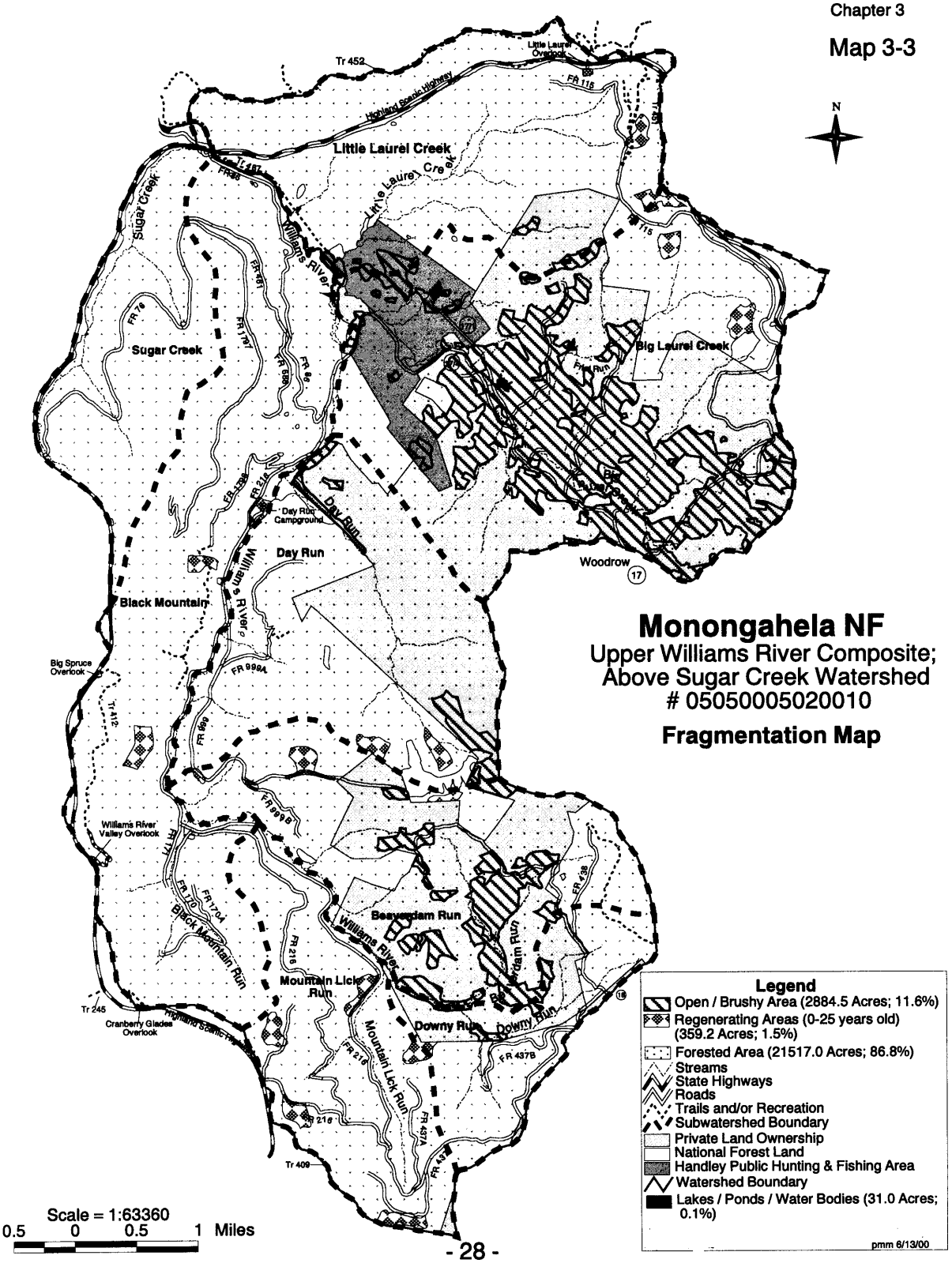

Open vs. Forested Private and State Lands
Open
Forested
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
Acres
63.9
348.2
1803.4
2623.5
0.0
0.0
125.9
1198.1
0.1
0.1
0.0
19.9
431.1
1292.2
46.7
367.0
Little Laurel Creek
Big Laurel Creek
Sugar Creek
Day Run
Black Mountain
Mountain Lick Run
Beaverdam Run
Downy Run
Subwatersheds

Figure 3-3


Open vs Forested Acres on National Forest Land
Open
Forested
Acres
5000.0
4500.0
4000.0
3500.0
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
133.6
2920.3
68.3
1271.8
67.4
1697.7
96.1
1628.8
37.5
4459.9
0.0
2017.5
22.2
1240.4
11.6
782.1
Little Laurel Creek
Big Laurel Creek
Sugar Creek
Day Run
Black Mountain
Mountain Lick Run
Beaverdam Run
Downy Run
Subwatersheds

Map 3-3



Monongahela NF

Upper Williams River Composite; Above Sugar Creek Watershed # 05050005020010

Fragmentation Map

The Range Allotment Management Plan (RAMP) for this allotment was prepared in April of 1972. In 1992 a draft revised RAMP was developed but never completely finished or officially approved. The district range files have copies of the original and draft RAMPs. The draft RAMP estimates the carrying capacity of this allotment at 21 cow/calf pairs.

The allotment is divided into two pasture units. A wooden gate between unit 1 and unit 2 is not operable, thereby preventing implementation of a rotational grazing system. The LTA is Bc002. This is a high elevation allotment.

Near the entrance gate is a wooden squeeze/v type livestock loading facility. Some boards are missing and need to be replaced. The wooden mineral feeder near the loading facility needs a new support post on the right side. A mineral feeder in unit 1 near an old building foundation needs replacement or removal. Future mineral feeders placed on the allotment should be mobile rather than stationary to more effectively manipulate the livestock. The fence is new 4 strand barbed wire. Posts are in good condition. In places, wire is broken from falling limbs and deer impacts but can be repaired during normal maintenance prior to grazing.

This allotment occurs within an area of expansive forest and serves as important non-forest habitat for wildlife. Within and adjacent to the allotment are fields of hawthorn that provide excellent brood habitat for wild turkeys and grouse as well as migration stopover habitat for woodcock and other migratory birds. Songbird nest boxes for grassland bird species could be erected on the allotment. The mature oak savannah within the allotment is an excellent hard mast feeding area for many species of wildlife. Some red spruce trees and other woody stems are beginning to invade the open areas indicating mowing or other vegetation control has not occurred recently. A small grassy area on adjacent private land adds to the open habitat in an area that is mostly forest.

A low standard road in the allotment extending from the end of FR 999 is eroding. Some areas are bare with gullies up to 2 feet deep. Since this area is relatively flat, the soil that has moved does not appear to be entering any stream channels. Water bars previously constructed on this sloping road are in need of repair. This same road had been used in the past to access timber harvest areas adjacent to the allotment. The road needs grading, liming, fertilizing, seeding and mulching. Additional water bars should be installed.

Three ponds are located on this allotment. One of the ponds is not holding water due to a hole at the bottom near the dam. Another pond should have its banks reseeded and waterway repaired.

Friel Run - This 25 acre allotment is located just south of FR 115 and north of the small community of Woodrow. It is in the very headwaters of the east branch of Friel Run which flows into Big Laurel Creek. It has been leased for grazing since 1978 every year except for 1996. The permittee rotates the cattle between this allotment and pasture on adjacent private land. Some portions of the fence are in need of repair. This allotment has been actively grazed under a term grazing permit which expired in December of

1999. In 2000, the standard grazing fee was $3.64/head/month on this allotment. The most recent (RAMP) for this allotment was completed in May of 1992. See the district range files (Friel Run allotment) for a copy of the RAMP. In 1999, 11 cows with calves and 1 bull were permitted for 60 animal unit months (AUM) of use. The LTA is Bc001. This is a high elevation allotment.

The road leading into this allotment was repaired in 2000. Numerous cattle crossings along two stream channels in the allotment are causing additional sediment in Friel Run from banks caving in. A pond used as the main water source is filling in with sediment and accumulating organic matter from cattle having free access from all sides including the dam area.

Soil fertility, based on observing the forages, appears to be low. Soil tests should be conducted to determine the need for liming and fertilizing. Some hawthorn occurs on the allotment, mostly along its perimeter, but is not a problem at this time.

Within the allotment there are several large brush piles. These should be left as hiding cover for wildlife. Songbird nest boxes for grassland bird species could be placed in the allotment.

Wetlands

The United States Department of the Interior completed a Wetlands Inventory in 1990. The only wetlands found in the Upper Williams River watershed are located along perennial and some intermittent streams.

Man-made ponds were also identified as wetlands in this inventory. Several active beaver ponds are located in the upper reaches of Williams River and in Downy Run. (See Map 3-4)

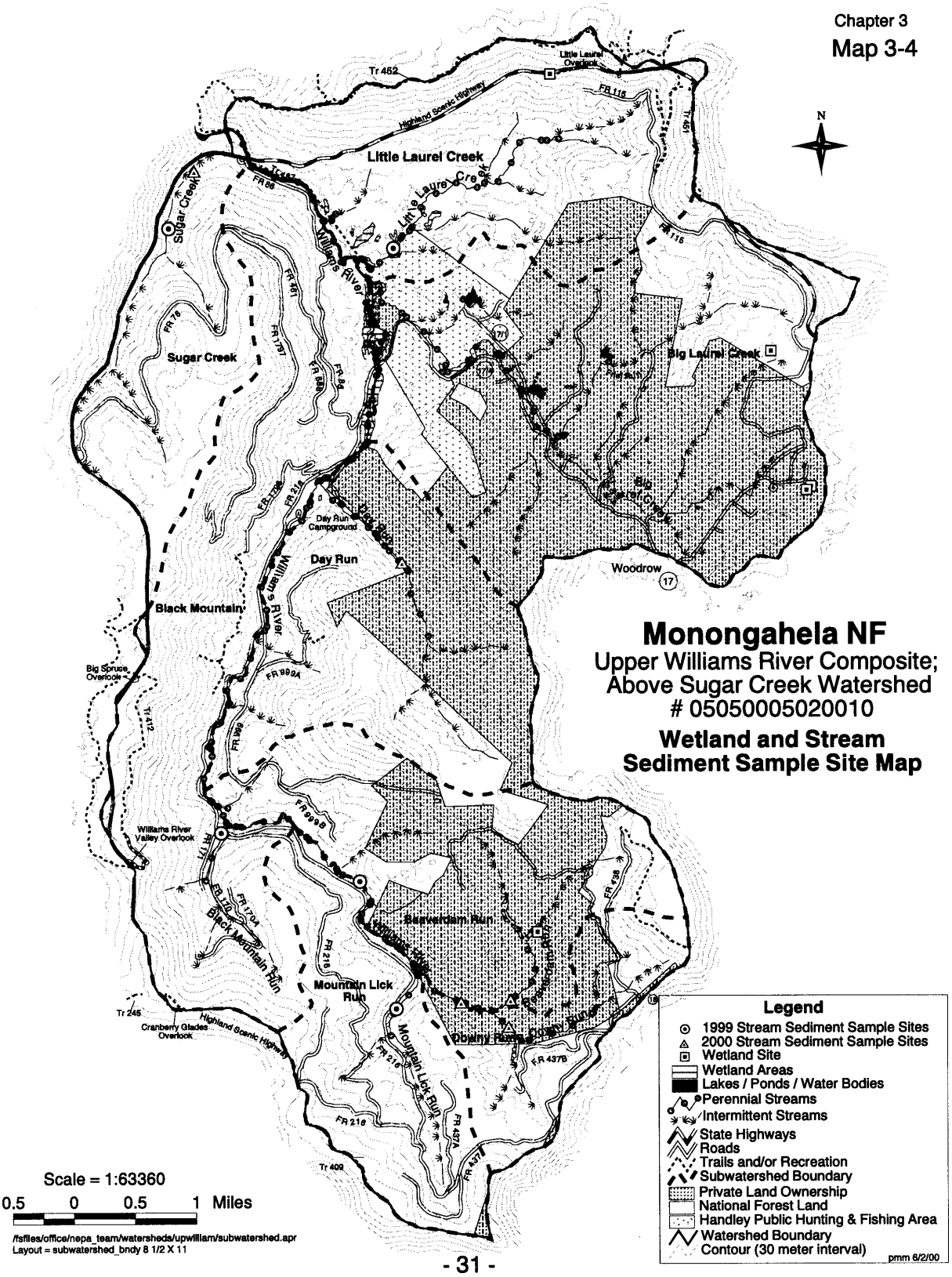
WILDLIFE

Water sources – Approximately 65% of the watershed is within ½ mile of a permanent water source: river, stream, pond or waterhole (see Map 3-5). Intermittent streams in the higher ridges on the northern, western and eastern boundaries of the watershed would provide water sources during wet seasons.

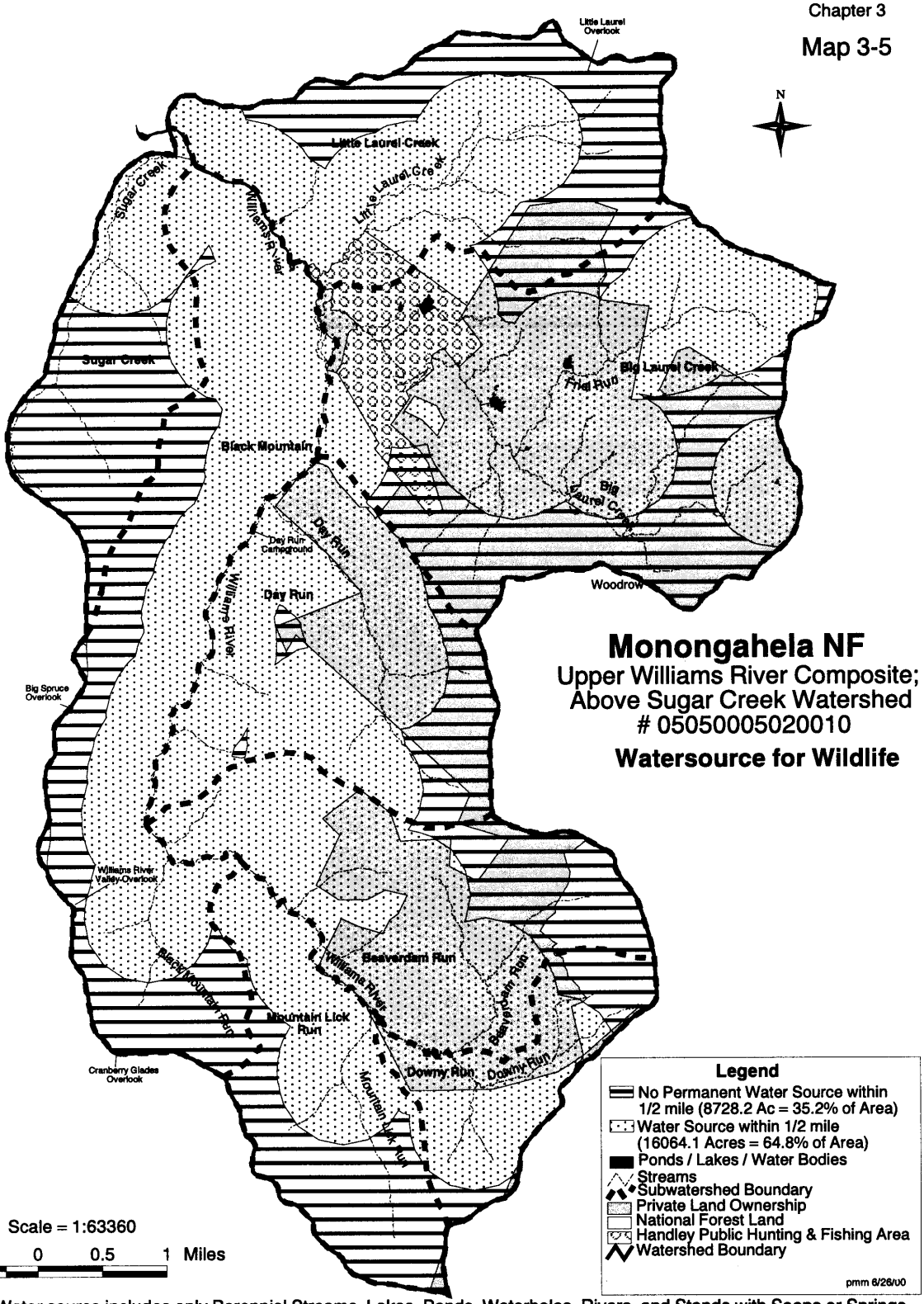
Permanent openings – About 2% of the national forest lands is open or brushy area – grazing allotments, wildlife openings, and beaver dam areas. Adjoining state and private

Chapter 3

Map 3-4



Map 3-5



Monongahela NF

Upper Williams River Composite;
Above Sugar Creek Watershed
05050005020010

Watersource for Wildlife

Note: Water source includes only Perennial Streams, Lakes, Ponds, Waterholes, Rivers, and Stands with Seeps or Springs.

land, however, contains meadows, grazing land, and agricultural fields. Combined national forest and private land openings total approximately 11.65% of the watershed.

Age structure of the forest landscape - The following percentages of various age classes are offered by national forest stands in this watershed.

Table 3-5. Habitat Types by Age Class

Stand Age	% of NF Acres	Species Type Supported by this age class
0-15	2	Early successional
16-30	6	Early/mid-successional
31-59	10	Mid-successional
60-69	15	Mid/late-successional
70-100	59	Late successional
101+	5%	Late successional/Mature habitat

Threatened/Endangered/Sensitive (TES) Animals

Threatened and endangered (T&E) wildlife species that are known to occur in this watershed include the West Virginia Northern Flying Squirrel (*Glaucomys sabrinus fuscus).* Other T&E species for which there is potential habitat include the Indiana bat (*Myotis sodalis)* and bald eagle (*Haliaeetus leucocephalis)*.

West Virginia Northern Flying Squirrel – Northern flying squirrels have been identified during nestbox checks in several areas of the watershed. The preferred habitat of the West Virginia Northern Flying Squirrel (WVNFS) in the southern Appalachians is conifer/northern hardwood ecotones or mosaics consisting of red spruce and fir associated with beech, yellow birch, sugar maple/red maple, hemlock and black cherry (NFS Recovery Plan, 1990). Until the late 19th century, spruce forests covered more than 200,000 hectares of the state, but these forests were almost completely eliminated by logging from 1880 to 1920 (Millspaugh 1891; Clarkson 1964). Currently spruce forests occupy about 24,000 hectares in the state (Stephenson and Clovis 1983). Recent studies indicate that red spruce has been declining since the 1960s. The exact cause is unknown, although acid deposition is being considered as a contributing factor (Stephenson 1993).

Mixed spruce/hemlock and northern hardwood forests cover approximately 32% of the Upper Williams River Watershed. Table 3-2 lists the acres by forest type in each sub-watershed containing conifer/northern hardwood forest. The majority of this area would be considered suitable WVNFS habitat. Some of this conifer habitat would be only marginally suitable at present but could have potential for future use.

To support the aims of the Northern Flying Squirrel Recovery Plan (NFSRP 1990), efforts should be made where possible in this watershed to manage marginally suitable habitat, i.e. conifer release, to enhance its conifer content. Because little research has

been done on the effects of silvicultural management on the WVNFS, opportunities exist in suitable habitat to study effects of management, i.e., releasing conifer, enhancing yellow birch, and thinning man-made pure spruce plantations.

Indiana Bat - The Indiana bat occupies 26 hibernacula in the state of West Virginia (Biological Assessment). There no caves in the UWRW. There is a cave on private land within a 5-mile radius of this area that was found to have Indiana bat occupancy from a survey in 1992. Indiana bats have been noted to use habitat as far as 5 miles from a hibernaculum as swarming areas before returning to the hibernaculum for winter. Some males can remain near the hibernacula in the summer (Stihler 1996). Because of this, felling trees for timber harvesting within 5 miles from a hibernaculum is not normally done from April 1 through November 15 on the Monongahela National Forest. See Map 3-6 for stands affected by this restriction.

Indiana bats are known to forage in upland areas. Maternity sites are in mature hardwood forests. At this time, no confirmed maternity colonies have been found on the MNF; however, potential habitat exists within this project area. Stands of mixed hardwoods greater than 70 years old (64% of national forest land) could provide maternity and foraging habitat.

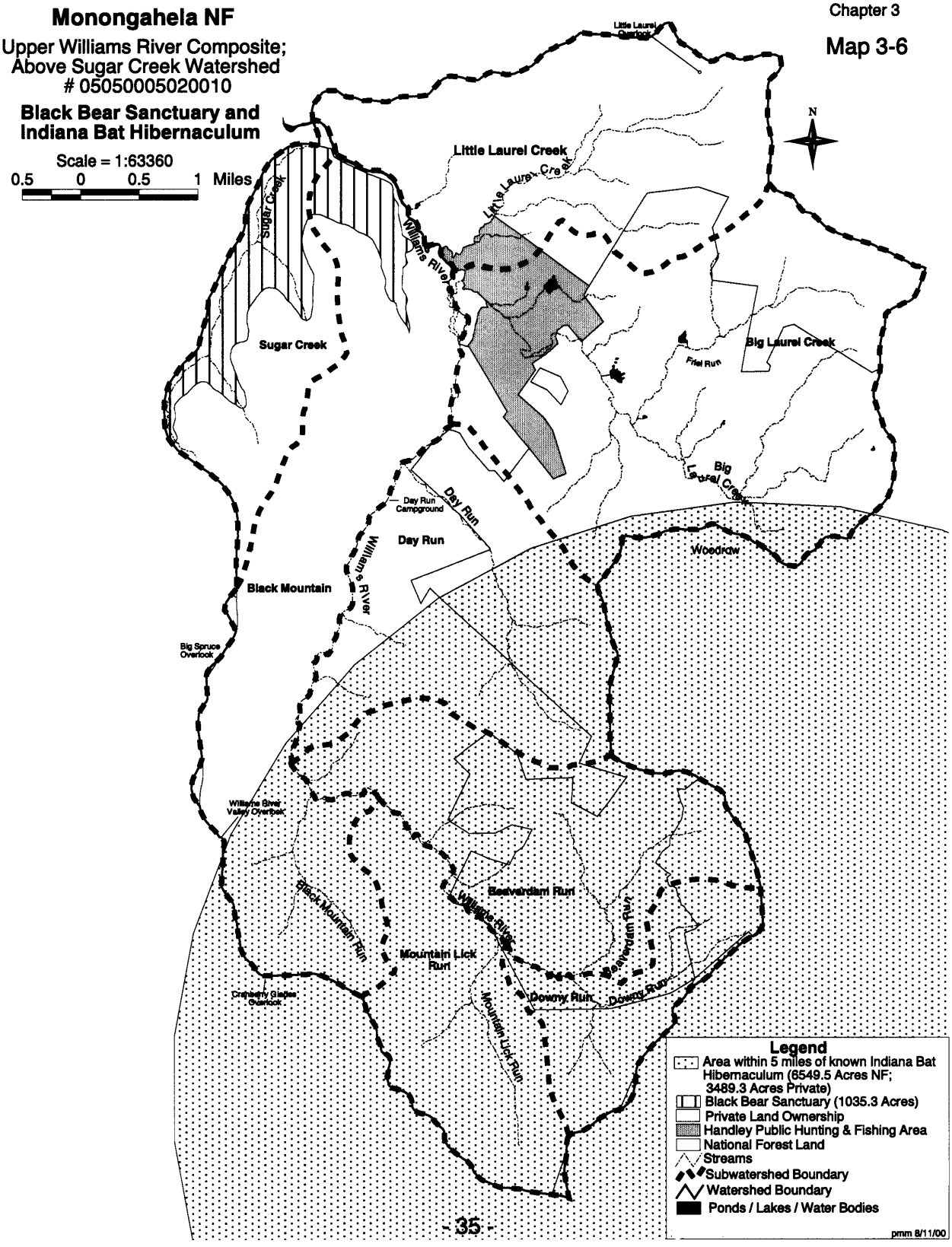
Opportunities exist in this watershed to enhance potential habitat by creating some small openings, or using harvest methods that would increase solar radiation to some trees. This could improve the potential for use as maternity roost trees, if Indiana bats were present.

Bald Eagle - There are known bald eagle nests within the state of West Virginia. Because this watershed does not contain any large lakes or rivers to provide sufficient foraging opportunities, this watershed would not provide optimum habitat for summer breeding use by bald eagles. Migratory routes, however, traverse areas of the MNF. The higher ridges of this watershed, especially along the Williams River, could provide stopping points for eagles as they migrate across this area. Maintaining snags and forested areas on the majority of the ridge tops would maintain the potential for use as migration stopping points.

Sensitive Species

Species on the Region 9 sensitive species list that have confirmed occurrence within the project area include the candy darter (*Etheostoma osburni*), Appalachian darter (*Percina gymnocephala*), New River shiner (*Notropis scabriceps*), eastern small-footed bat (*Myotis leibii*), southern water shrew (*Sorex palustris punctulatus)*, and Allegheny woodrat *(Neotoma magister*). Other sensitive species that may occur within this watershed include the southern rock vole (*Microtus chrotorrhinus carolinensis*), northern goshawk (*Accipiter gentilis*), migrant loggerhead shrike (*Lanius ludovicianus migrans*), timber rattlesnake *(Crotalus horridus*), green salamander (*Aenides aeneus*), and hellbender (*Cryptobranchus alleghaniensis*). Goshawk surveys using taped calls were

Map 3-6


Monongahela NF
Upper Williams River Composite;
Above Sugar Creek Watershed
05050005020010
Black Bear Sanctuary and
Indiana Bat Hibernaculum
Scale = 1:63360
0.5 0 0.5 1 Miles
N
Little Laurel Overlook
Little Laurel Creek
Sugar Creek
Williams River
Sugar Creek
Big Laurel Creek
Friel Run
Big Laurel Creek
Day Run Campground
Day Run
Day Run
Woodrow
Black Mountain
Williams River
Big Spruce Overlook
Williams River Valley Overlook
Beaverdam Run
Black Mountain Run
Williams River
Mountain Lick Run
Beaverdam Run
Cranberry Glades Overlook
Downy Run
Downy Run
Mountain Lick Run
Legend
Area within 5 miles of known Indiana Bat Hibernaculum (6549.5 Acres NF; 3489.3 Acres Private)
Black Bear Sanctuary (1035.3 Acres)
Private Land Ownership
Handley Public Hunting & Fishing Area
National Forest Land
Streams
Subwatershed Boundary
Watershed Boundary
Ponds / Lakes / Water Bodies
pmm 8/11/00

done in this watershed during May/June 2000. No goshawks were observed in response to these calls. No timber rattlesnakes have been seen or reported in this area (Dale 2000).

Management Indicator Species (MIS)

The MNFLMP lists Management Indicator Species (MIS) that were selected to represent important game species, T&E species, species of unique interest, and species to represent other habitats. The objectives were to maintain viable population levels (for TES species), or to reach desired population objectives for other species. (See Forest Plan, L-1)

MIS Species within the Upper Williams River Watershed:

Virginia Big-eared bat – is not known to be present within the UWRW. There are no caves within this project area or within a 5-mile radius that support summer or winter populations of this species.

Indiana bat - there are no summer records within the UWRW. There is one cave, on private land, within a 5-mile radius of the UWRW that has been noted to contain Indiana bats. See TES section for habitat information and management opportunities.

Cheat Mountain salamander – is not known to be present within the UWRW. Dr. Thomas Pauley has surveyed all areas on the Gauley and Marlinton Districts that he felt had potential habitat. No Cheat Mountain salamanders were found during these surveys.

Wild Trout – Brook trout were collected in most of the sub-watersheds in 1999, and are considered to occur in all eight of the sub-watersheds of the assessment area (Cain 2000).

Black bear – are present within the UWRW. Based on harvest information, and sighting information from Forest Service and WVDNR personnel, the black bear is present throughout this watershed. Good habitat is provided by vegetative diversity of some oak, abundance of beech, rhododendron and mountain laurel cover, and clearcuts on adjacent private land (Dale 2000). Part of the Sugar Creek sub-watershed is within the Cranberry Black Bear Sanctuary (see Map 3-6). Neither hunting for bear nor training dogs for bear hunting is allowed within the sanctuary boundaries.

Wild Turkey - present within the UWRW. They are limited to the mid and lower elevation oak, beech and cherry stands, and are common in these areas (Dale 2000).

White-tailed deer – are present throughout the UWRW, but larger numbers are concentrated around private land containing open areas with fruit trees. The higher elevations of this area have lower numbers, but the population is considered to be good throughout the area. Based on buck harvest figures in the Tea Creek Wildlife Management area over the past four years, it is estimated that the population in this area is approximately 10.85 to 21.7 deer/square mile (WVDNR 1999).

Gray squirrels - are present within the UWRW. *Gray Squirrels* (as well as fox squirrels) are most likely limited to the oak stands in the area, while red squirrels are present throughout. (Dale 2000)

Varying hare - there is potential habitat for the *Varying Hare* in the higher elevations. Tom Dale (WVDNR area manager) has not seen hare or tracks in the UWRW, but has seen tracks within 200 feet of the HSH adjacent to this area.

West Virginia Northern Flying Squirrel – is present within the UWRW. See notes under TES species for details of habitat availability and management opportunities.

MIS Associated Species

No specific surveys were done for general species within the wildlife associations of the MIS species (Forest Plan L-2). These associations were reviewed, and the following information is available on some of those species.

Although a specific bird inventory was not done on the Monongahela National Forest, during field observations in the area, the following species from the above associations (along with other species) were either seen or heard: blue jay, white-breasted nuthatch, wood thrush, woodpeckers (pileated, downy), black-capped chickadee, black-throated blue warbler, northern oriole, barred owl, ruffed grouse, black-throated green warbler, magnolia warbler, rufous-sided towhee, and tufted titmouse.

A bird survey completed on the Handley Public Hunting & Fishing Area in 1997 recorded the following species: American, American goldfinch, American robin, black-capped chickadee, brown-headed cowbird, blackburnian warbler, blue jay, brown thrasher, black-throated green warbler, Canada goose, cedar waxwing, chipping sparrow, common raven, common yellowthroat, chestnut-sided warbler, eastern wood peewee, field sparrow, great-crested flycatcher, golden-crowned kinglet, gray catbird, hairy woodpecker, hermit thrush, house wren, indigo bunting, least flycatcher, magnolia warbler, mourning warbler, ovenbird, red-eyed vireo, red-shouldered hawk, rufous-sided towhee, re-winged blackbird, sedge wren, song sparrow, tufted titmouse, veery, white-breasted nuthatch, white-eyed vireo, willow flycatcher, and wood thrush.

Tom Dale (2000), WVDNR area manager for Handley Public Hunting & Fishing Area, has extensive field knowledge of this watershed. The following are his observations on wildlife presence in the area:

Bobcat are common in this area. There is a good prey base enhanced by clearcuts on adjacent private land. There are good populations of both gray and red fox, with the red fox being more common in the open areas. Coyotes are common throughout the area. There is abundant beaver activity with dams present in almost all sections of river/streams with slow-moving water. These dams provide good habitat for other wildlife, including wood ducks. Rabbits are limited to clearcuts and open areas. They are common, but not abundant, due to predation by barred owls, hawks, foxes and

coyotes. It is probable that the Appalachian cottontail is present in higher elevations. Raccoon are common in lower elevations and along drainages. Opposum are common in open areas. Tracks of mink and fisher have been seen. Ruffed grouse are common, but not abundant. Woodcock are common in suitable habitat, but probably not abundant. Snakes such as garter, water, and black rat, are common in lower elevations.

Neotropical Migratory Birds

Partners in Flight (PIF) has developed priority bird species and habitats for physiographic areas across the U.S. The MNF lies in the Mid-Atlantic Ridge and Valley (Physiographic area 12). (Rosenberg 2000) The priority bird species and habitats for this region are:

Early succession shrub –
Bewick's wren, golden-winged warbler, prairie warbler and whippoorwill.
Mature deciduous forest –
Cerulean warbler, worm-eating warbler, Louisiana waterthrush, wood thrush.
Grasslands –
Henslow's sparrow.
Northern hardwood/spruce-fir forests –
Black-throated blue warbler, and blackburnian warbler

Recent information is beginning to note that mid-successional stands do not provide optimum conditions for many neotropical migratory birds. Because of past large scale clear-cutting, these stands are not providing the structural diversity to provide optimum nesting and foraging cover. Some experts in the avian research field are recommending forestry practices which can restore vegetation structural layers to stands which mid and understory cover is lacking. (Hunter, undated) The PIF physiographic area summaries include the conservation recommendations ensuring adequate tree-species composition and structural diversity where needed.

Opportunities exist in the UWRW for silvicultural management to restore vegetation structural diversity. In stands where there is open understory and midstory, small patch cuts and light thinning could be used to increase sunlight to lower canopies, increasing understory and midstory growth for nesting and forage cover.

Wildlife Habitat Enhancement Opportunities:

Other wildlife habitat enhancement opportunities in the watershed include, but are not limited to:

- Regenerating aging aspen in several stands, and planting aspen near beaver dams to maintain food source diversity for species such as grouse and beaver.
- Planting chestnut (7/8 American, 1/8 Chinese) seeds (in cooperation with the American Chestnut Foundation) in hopes of obtaining some which are resistant to the blight, and restoring some of this mast source for wildlife.

- Releasing hawthorn, hickory, mountain ash, persimmon, and other mast species.
- Developing waterholes in sections of the watershed which are more than ½ mile from any water source (see Map 3-5).
- Creating some small grassy or shrubby clearings, although there is minimal need for these clearings because of the open land which already exists on private land south and east of this watershed.
- Creating some small openings at high elevations for snowshoe hare habitat.

HUMAN USES

Recreation

The Williams River and its valley are valuable scenic assets when viewed from the overlooks along the Highland Scenic Highway (HSH). Broad mountains separated by narrow to wide valleys are covered with an even textured hardwood forest capped by stands of dark spruce at the highest elevations. Several openings, most on private land, provide visual variety.

The HSH is designated as a National Scenic Byway. Visitor use has been increasing due to national publicity. Visitors who come to the highway because of its byway status have a major concern for scenic quality. The views from the overlooks along this segment of the highway are important to visitors because they provide panoramic vistas that are not common along the highway corridor. The characteristic landscape seen within these panoramic vistas include a wide range of cultural features including pastures and other agricultural openings, timber harvest units, roads, impoundments, and farms. These cultural features blend with the landform and vegetation to create an exceptionally beautiful landscape with a high capacity to accept new alteration without diminishing its scenic quality.

Developed recreation sites include:

Fishing Pier and Vault Toilet - This area is located adjacent to the Williams River near the HSH along FR 86. Constructed in 1992, it is a popular site and provides an access point to the river.

Dispersed Camping - Ten dispersed campsites have been designated along FR 86 and 216 along the Williams River from the HSH to Black Mountain Run. A vault toilet located at campsites 20 - 23 needs to be replaced with an accessible facility.

Black Mountain Overflow Camping area - This area is located along the Williams River and provides additional camping opportunities when Day Run Campground is filled. It has one vault toilet that should be replaced with an accessible facility.

Day Run Campground - This campground with 12 camp sites is located in the upper reaches of the Williams River and has four vault toilets. These units should be replaced with two accessible toilet buildings.

Handley Public Hunting and Fishing Area

This area of 784 acres, established in 1959, is managed by the West Virginia Division of Natural Resources and provides hunting and fishing opportunities to the general public. A fee camping area with 13 campsites and a vault toilet is provided for public use. Vegetation is managed to promote wildlife species. Management includes timber harvesting and maintaining wildlife openings. Approximately 82 acres are maintained as grassy openings.

Roads/Trails

The MNFLMP provides standards and guidelines for the density of designated trails and system roads on national forest land by Opportunity Area depending on the management prescription. For Management Prescriptions 3.0 the standards are: 0 to 1 mile/square mile for designated trails, an average of 1 mile/square mile for collector system roads, and an average of 1 to 3 additional miles/square mile for local forest system roads. For Management Prescriptions 6.1 the trail and road density standards are: 0 to 1 mile/square mile for designated trails, an average of 1 mile/square mile for collector system roads, and an average of 1.5 miles/square mile for local system roads. The following tables indicate the road and trail density in the Upper Williams River Watershed by sub-watershed and Opportunity Area:

Table 3-6. Upper Williams River Trail Density by Sub-watershed

Sub-watershed Name	Trail Miles	Trail Density (miles/square mile)
Little Laurel Creek	7.1	1.49
Big Laurel Creek	0	0
Sugar Creek	0	0
Day Run	0	0
Black Mountain	2.5	.35
Mountain Lick Run	0.9	.29
Beaverdam Run	0	0
Downy Run	0	0

Table 3-7. Upper Williams River Trail Density by Opportunity Area

Opportunity Area Number	Trail Miles	Trail Density (miles/square mile)
43.001	0	0
43.005	2.9	0.50
43.006	0	0
43.007	2.5	0.23
46.112	4.2	0.68
46.113	0.9	0.24

Table 3-8. Upper Williams River Road Density by Sub-watershed

Sub-watershed Name	Road Class	Miles	Road Density (miles/square mile)
Little Laurel Creek	Local	1.8	0.38
Big Laurel Creek	Local	2.3	1.1
Sugar Creek	Collector Local	0.1 3.7	0.04 1.34
Day Run	Collector Local	1.2 0.8	0.44 0.30
Black Mountain	Collector Local	7.7 10.9	1.09 1.55
Mountain Lick Run	Collector Local	5.7 4.8	1.81 1.52
Beaverdam Run	Collector Local	1.4 1.7	0.71 0.86
Downy Run	Collector Local	2.2 1.7	1.77 1.37

Table 3-9. Upper Williams River Road Density by Opportunity Area

Opportunity Area Number	Road Class	Miles	Road Density (miles/square mile)
43.001	None	0	0
43.005	Collector Local	1.45 4.1	.25 .71
43.006	Collector Local	8.25 5.9	1.13 .81
43.007	Collector Local	6.1 17.7	.57 1.64
46.112	None	0	0
46.113	Collector	2.2	.58

Trails and Trailheads

Tea Creek Mountain Trail (Tr 452) and Trailhead – This 4.7 mile (2.5 miles within Upper Williams Watershed) trail begins at Tea Creek Campground. This trail traverses the ridge on the northern-most end of the Little Laurel Creek sub-watershed. It then comes down to the Highland Scenic Highway (HSH) where it begins as a trailhead and parking area near the Little Laurel Overlook.

Red Spruce Knob Trail and Trailhead (Tr 405) - This 1.2 mile trail (0.6 miles within the watershed) is used to access Red Spruce Knob from the HSH. An existing "woods" road on the west side of Red Spruce Knob (at the end of FR 115) is used by cross-country skiers. There is an opportunity to construct a viewing platform at the top of this trail.

Honey Comb Rock Interpretative Trail - A decision has been made to construct an interpretive trail (1.3 miles in length) to unique honeycomb rock features located above the HSH.

Williams River Trail (Tr 487) and Trailhead - Trailhead access is located off the HSH. This is an old railroad grade converted into a trail and parallels the Williams River. This 2.3 mile (1.8 miles within the watershed) trail travels in a southeasterly direction down to the Handley Public Hunting and Fishing Area. There is an opportunity to make this a loop trail. Care must be taken to avoid sensitive plants in the proposed loop trail area.

Parking Area (North of Big Spruce Overlook) - This area is located on the western edge of the Upper Williams watershed along the HSH. It provides access to Black Mountain Trail (TR 412) and access to trails located in Cranberry Wilderness.

Black Mountain Trail (Tr 412) - Part of this 2.2 mile trail is an old railroad grade which occurs in the Black Mountain sub-watershed. It goes south from the parking area at Big Spruce Overlook and ends at the Williams River Valley Overlook. Interpretive signing may be added to this trail in 2001.

High Rocks Trail (Tr 409) - This 1.3 mile trail begins at a trailhead parking area on the HSH and forms the southern boundary of the Upper Williams Watershed. It leads to a scenic overlook of the Greenbrier River Valley and the historic town of Hillsboro.

Red Lick Mountain Bike Route - This 0.9 mile designated bike route includes FR 115 behind the gate, and a railroad grade/woods road, which ends near the HSH. The grade was originally part of the Gauley Mountain Trail, prior to construction of the HSH.

Overlooks along the Highland Scenic Highway

All of the overlooks described below have accessible sheltered picnic tables and modern vault toilets.

Red Lick Scenic Overlook - This overlook has vistas down into Big Laurel Creek sub-watershed. Views are primarily onto private land, mostly to the east of the Williams River watershed.

Little Laurel Scenic Overlook - This overlook looks down into Little Laurel Creek drainage. Some minor vegetation treatment is needed in this area to maintain landscape views. Concentrated water flow during high intensity or long duration storm events is causing excessive channel cutting below the overlook and FR 115A.

Big Spruce Scenic Overlook - This overlook has a boardwalk, observation deck, and an interpretative trail. It occurs in the Black Mountain sub-watershed overlooking Williams River and Big Spruce Knob areas. The balsam/fraser fir area is located along the boardwalk.

Williams River Valley Overlook - This overlook provides scenic vistas of the upper tributaries of Williams River. The Black Mountain Trail (TR 412) connects this overlook to the Big Spruce Overlook and boardwalk.

Cranberry Glades Overlook & Tr 411 - A short 0.3 mile trail from the HSH leads to this overlook and provides scenic vistas into the Cranberry Backcountry and Wilderness.

Table 3-10. Trails & Primary Use

Trail Name	Trail No.	Total Miles	Miles in Watershed	Primary Use
Tea Creek Mountain Trail	Tr 452	4.7	2.5	Hiker/Mtn Bikes
Red Spruce Knob	Tr 405	1.2	0.6	Hiker
Honey Comb Rock Interpretative Trail		* 1.3	* 1.3	Hiker
Williams River Trail	Tr 487	2.3	1.8	Hiker
Black Mountain Trail	Tr 412	2.2	2.2	Hiker
High Rocks Trail	Tr 409	1.3	0.9	Hiker
Red Lick Mountain Bike Route		0.9	0.9	Mtn. Bikes
Cranberry Glades Overlook Trail	Tr 411	0.3	0.3	Hiker

* Estimated mileage of trail to be constructed. The section from the Highland Scenic Highway to the honeycomb rock location is approximately 0.4 miles. The trail will continue and connect to Tr 452.

Public Access Roads (See Map 3-7)

Highland Scenic Highway, State Route (SR) 55/150 - This road provides major improved highway access to the Upper Williams Watershed. Two slumps have occurred on the HSH. One slump has been repaired. An access road has been developed for the second slide. This repair should be completed in 2001, if funds become available.

The HSH is a standard two lane paved highway. Normal design standards for this type of road require fewer, large culverts to drain the area. This design, when combined with the sensitive soils found in this area, results in concentrated water flow during high intensity or long duration storm events causing excessive channel cutting below the highway.

SR 17 - One lane paved road from Woodrow to FR 115. Provides access for local residents.

SR 17/1 - This road begins at the junction with SR 17 at Woodrow. It is a paved one lane road up to the junction with SR 17/4. At this junction it becomes a gravel surface and leads to Handley Public Hunting & Fishing Area.

SR 17/4 - This road is a one lane paved road from the junction with SR 17/1 to FR 86.

SR 18/4 – A gravel road connecting to FR 437 and FR 438.

There are numerous private roads accessing residences, camps, and grazing areas in this watershed. Most of these roads are not surfaced and poorly maintained.

Forest Roads (FR) open to motor vehicle traffic

FR 86 - open to motor vehicle traffic year round. This road has been identified as a mountain bike route on a forest-wide map.

FR 115 - open year round from the HSH to SR 17 at Woodrow. The section of FR 115 behind the gate near the HSH is closed year round.

FR 216 - open year round from the junction with FR 86 to the HSH.

FR 437 - open year round from State Route (SR) 18/4 to the junction with FR 216.

FR 438 - open year round, from SR 18, and is in extremely poor condition. This road has steep pitches (up to 17 percent), insufficient culverts and cross drains, and an eroded surface.

FR 461 - open only during deer gun season and Purple Rhododendron blooming season (June 1 thru July 15). This road has also been identified on a forest-wide map as a mountain bike route.

FR 999 - open from the Williams River low water bridge up to the gate (about 2.7 miles) near private land during deer hunting season through the end of bear season.

FR 1101 - is open year round for Day Run Campground.

Roads Closed to Public Motor Vehicles

FR 115 & 115A - located behind a gate near the HSH. These roads are grass covered and are mowed every few years to improve wildlife habitat. FR 115 is part of a designated bike route.

FR 170, 170A, & 171 - located behind gates on either side of Black Mountain Run above FR 216. These roads are spot surfaced with gravel and grass covered.

FR 216A - joins with FR 170 at the lower end and FR 216 at the upper end near the HSH. This grass-covered road is bunkered at both ends. Blown out culverts need to be replaced.

FR 437A - located above Mountain Lick Run and joins with FR 437. This road is bunkered and grass- covered. Culverts on upper section of road are plugged from sediment running through the culverts of FR 437. Need to maintain culverts every 2 to 3 years or put in larger culverts.

FR 889 - joins with FR 461 just above the lower gate. This road is bunkered.

FR 999A & 999B - joins with FR 999. Both roads are bunkered and grass-covered. Culverts need to be replaced prior to use by motorized vehicles.

FR 1796 - located above Day Run Campground and joins with FR 216. This road is gated and has gravel surface in spots.

FR 1797 - joins with FR 461 and parallels the upper section of FR 1796. This road is not bunkered or gated but is located behind the gates of FR 461. Some motorized vehicle traffic occurs on this road for about the first 0.7 miles when the gates on FR 461 are unlocked for deer gun season and rhododendron viewing season. The remaining section is not accessible due to trees growing in the road. Old wooden culverts need to be replaced with metal culverts. Several hundred feet of this road have eroded due to a wooden culvert being blocked by a rock.

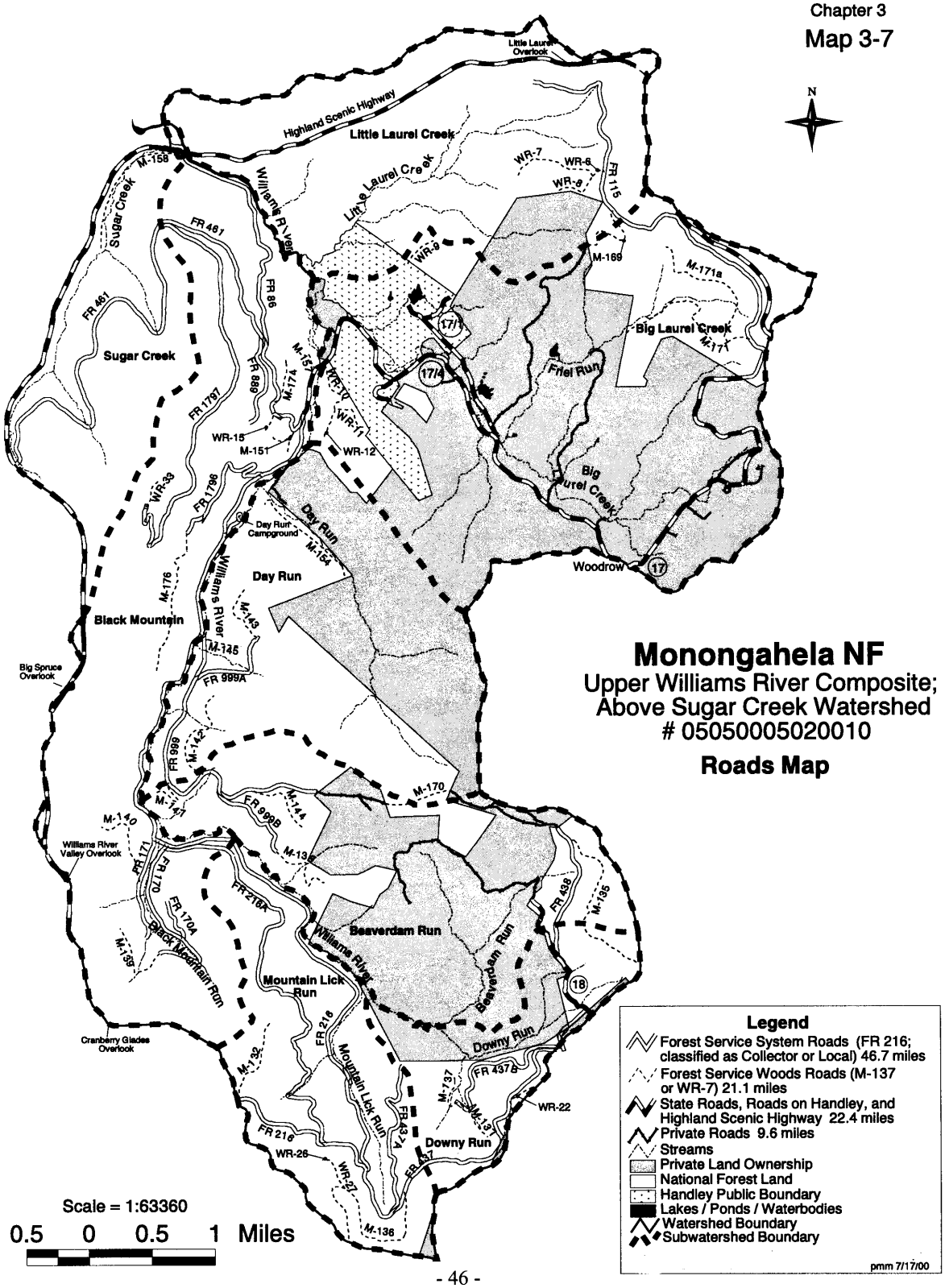

N
Little Laurel Overlook
Highland Scenic Highway
Little Laurel Creek
Little Laurel Creek
Williams River
Sugar Creek
M-158
FR 461
FR 461
Sugar Creek
FR 86
FR 889
FR 1797
FR 1798
M-157
M-174
WR-14
WR-11
WR-12
WR-15
M-151
WR-33
WR-7
WR-6
WR-8
WR-9
FR 115
M-169
M-171a
17/1
17/4
Big Laurel Creek
M-171
Friel Run
Big Laurel Creek
Woodrow
17
Day Run
Day Run Campground
M-154
Day Run
M-176
Black Mountain
Williams River
M-143
M-135
Big Spruce Overlook
FR 999A
FR 999
M-142
M-170
M-141
M-140
M-144
FR 999B
M-136
Williams River Valley Overlook
FR 171
FR 170
FR 170A
FR 216A
Black Mountain Run
M-139
Beaverdam Run
Williams River
Beaverdam Run
FR 838
M-135
18
Mountain Lick Run
Cranberry Glades Overlook
FR 216
Mountain Lick Run
Downy Run
FR 437B
M-137
M-138
FR 437A
WR-22
FR 216
WR-26
WR-27
Downy Run
M-136
Monongahela NF
Upper Williams River Composite;
Above Sugar Creek Watershed
05050005020010
Roads Map
Legend
Forest Service System Roads (FR 216; classified as Collector or Local) 46.7 miles
Forest Service Woods Roads (M-137 or WR-7) 21.1 miles
State Roads, Roads on Handley, and Highland Scenic Highway 22.4 miles
Private Roads 9.6 miles
Streams
Private Land Ownership
National Forest Land
Handley Public Boundary
Lakes / Ponds / Waterbodies
Watershed Boundary
Subwatershed Boundary
pmm 7/17/00
Scale = 1:63360
0.5 0 0.5 1 Miles

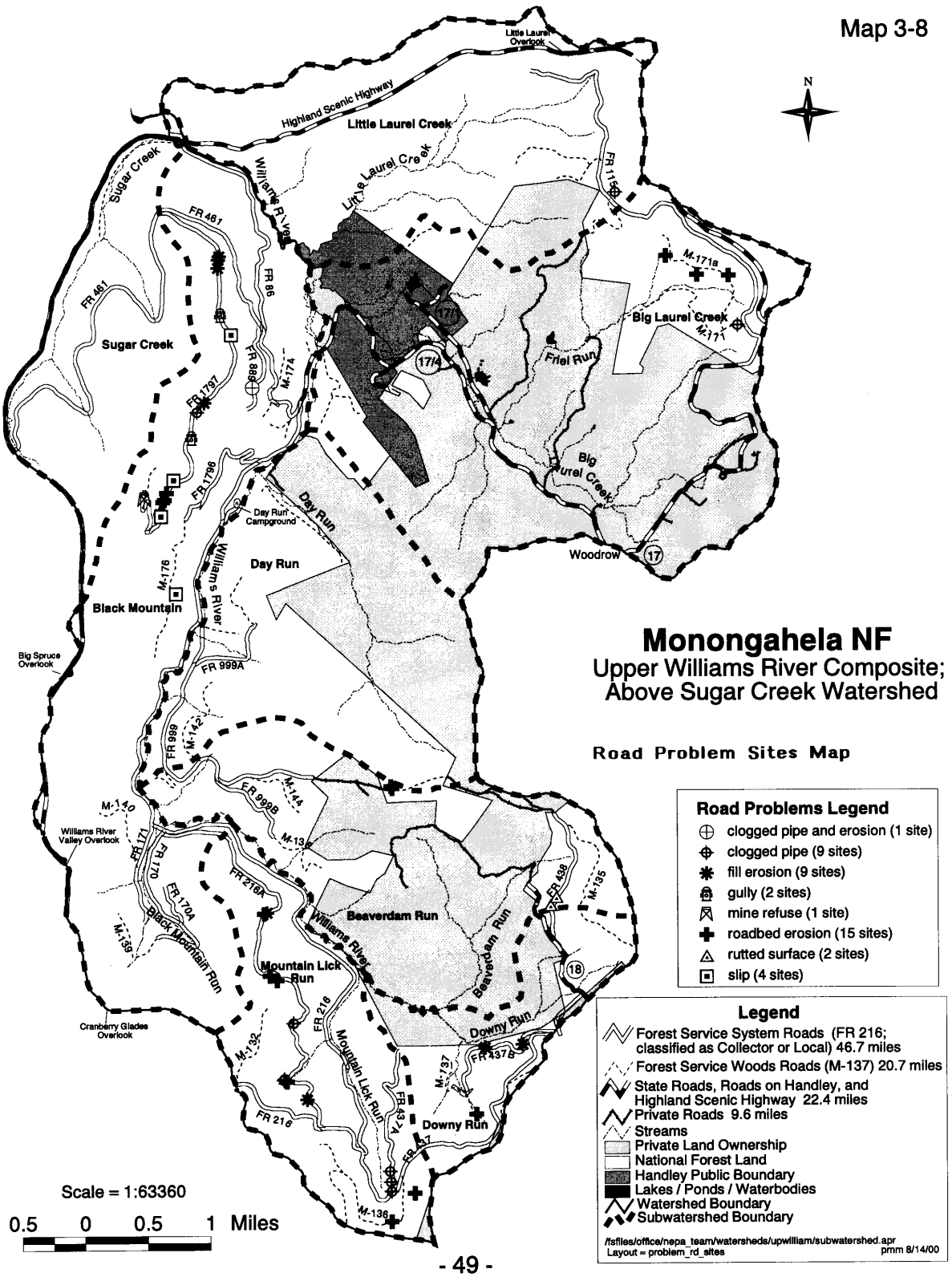
Table 3-11. State Routes (SR) and Specified Forest Roads (FR)

Road Number	Length (Miles)	Collector Or Local	Closed, Open, or Open Seasonally	Sub-Watershed	Road Condition
SR 55/150	3.9	NA	Open	Little Laurel Creek	Paved
SR 55/150	1.3	NA	Open	Big Laurel Creek	Paved
SR 55/150	4.5	NA	Open	Sugar Creek	Paved
SR 55/150	1.9	NA	Open	Black Mountain	Paved
SR 55/150	0.1	NA	Open	Mountain Lick Run	Paved
SR 17	1.3	NA	Open	Big Laurel Creek	Paved
SR 17/1	2.7	NA	Open	Big Laurel Creek	Paved/Gravel
SR 17/4	2.3	NA	Open	Big Laurel Creek	Paved
SR 17/4	0.5	NA	Open	Black Mountain	Paved
SR 18/4	0.5	NA	Open	Downy Run	Gravel/Dirt
SR 18/4	0.2	NA	Open	Beaverdam Run	Dirt
FR 86	2.9	Collector	Open	Black Mountain	Gravel
FR 86	0.1	Collector	Open	Sugar Creek	Gravel
FR 115	2.3	Local	Open to Gate	Big Laurel Creek	Gravel
FR 115		Local	Closed/Gate	Big Laurel Creek	Gravel/Dirt
FR 115	1.8	Local	Closed/Gate	Little Laurel Creek	Gravel/Dirt
FR 115A	1.5	Local	Closed/Gate	Little Laurel Creek	Dirt
FR 170	1.5	Local	Closed/Gate	Black Mountain	Dirt/Gravel
FR 170A	0.4	Local	Closed/Gate	Black Mountain	Dirt
FR 171	0.9	Local	Closed/Gate	Black Mountain	Dirt/Gravel
FR 216	4.8	Collector	Open	Black Mountain	Gravel
FR 216	4.7	Collector	Open	Mountain Lick Run	Gravel
FR 216A	0.5	Local	Closed/Bunker	Black Mountain	Gravel/Dirt
FR 216A	3.4	Local	Closed/Bunker	Mountain Lick Run	Dirt/Gravel
FR 437	1.0	Collector	Open	Mountain Lick Run	Gravel
FR 437	2.2	Collector	Open	Downy Run	Gravel
FR 437A	1.4	Local	Closed/Bunker	Mountain Lick Run	Dirt
FR 437B	1.4	Local	Closed/Bunker	Downy Run	Dirt
FR 438	0.3	Local	Open	Downy Run	Dirt/Poor
FR 438	0.9	Local	Open	Beaverdam Run	Dirt/Poor
FR 461	1.6	Local	Open 6/1-7/15	Black Mountain	Dirt/Gravel
FR 461	3.7	Local	Open 6/1-7/15	Sugar Creek	Dirt/Gravel
FR 889	0.8	Local	Closed/Bunker	Black Mountain	Dirt
FR 999	1.2	Collector	Open Deer-Bear	Day Run	Gravel
FR 999	1.4	Collector	Open Deer-Bear	Beaverdam Run	Gravel
FR 999A	0.8	Local	Closed/Bunker	Day Run	Dirt
FR 999B	0.8	Local	Closed/Bunker	Beaverdam Run	Dirt
FR 1101	0.3	Local	Open	Black Mountain	Gravel
FR 1796	1.2	Local	Closed/Gate	Black Mountain	Gravel/Dirt
FR 1797	3.7	Local	Closed/Gate	Black Mountain	Dirt

Table 3-12. Woods Roads

Road Number	Length (Miles)	Sub-Watershed	Road Condition	Remarks
M132	0.7	Mountain Lick Run	Dirt	Spur off FR 216
M135	1.4	Beaverdam Run	Dirt/Poor	Spur off FR 438
M136	1.7	Mountain Lick Run	Dirt	Spur off FR 437
M137	0.7	Downy Run	Dirt	Extension of FR 437B
M138	0.7	Beaverdam Run	Dirt	Extension of FR 999B
M139	0.7	Black Mountain	Dirt	Extension of FR 170
M140	0.7	Black Mountain	Dirt	Spur off FR 171
M142	0.1	Beaverdam Run	Dirt	Spur off FR 999
M142	0.8	Day Run	Dirt	Spur off FR 999
M143	0.5	Day Run	Dirt	Extension of FR 999A
M144	0.6	Beaverdam Run	Dirt	Spur off FR 999
M145	0.3	Day Run	Dirt	Spur off FR 999
M147	0.4	Beaverdam Run	Dirt	Spur off FR 999
M151	0.4	Black Mountain	Dirt	Spurs off FR 86
M154	1.0	Day Run	Gravel	
M157	0.1	Black Mountain	Dirt	Spur off SR 17/4
M158	1.1	Sugar Creek	Dirt	In riparian area
M169	0.7	Little Laurel Creek	Dirt	Spur off FR 115
M170	0.5	Day Run	Dirt	Grazing Allotment
M171	1.3	Big Laurel Creek	Dirt/Poor	Grazing Allotment
M171A	1.2	Big Laurel Creek	Dirt/Poor	Spur off FR 115
M174	0.3	Black Mountain	Dirt	Spur off FR 86
M176	1.2	Black Mountain	Dirt	Extension of FR 1796
WR6	0.1	Little Laurel Creek	Dirt	Spur off FR 115
WR7	0.7	Little Laurel Creek	Dirt	Spur off WR6
WR8	0.4	Little Laurel Creek	Dirt	Spur off WR6
WR9	0.3	Big Laurel Creek	Dirt	Leads to W/L Opening
WR10	0.5	Big Laurel Creek	Dirt	Spur off SR 17/4
WR11	0.3	Big Laurel Creek	Dirt	Extension of WR10
WR12	0.2	Big Laurel Creek	Dirt	Extension of WR10
WR15	0.2	Black Mountain	Dirt	Spur of FR 86
WR22	0.5	Downy Run	Dirt	Spurs off FR 437
WR26	0.1	Mountain Lick	Dirt	Extension of WR27
WR27	0.3	Mountain Lick	Dirt	Spur of M136
WR33	0.3	Black Mountain	Dirt	Extension of FR 1797

Map 3-8


Little Laurel Overlook
Highland Scenic Highway
Little Laurel Creek
Sugar Creek
Williams River
FR 461
FR 86
FR 888
M-174
FR 1797
FR 1796
Sugar Creek
Day Run Campground
Day Run
Williams River
M-176
Black Mountain
Big Spruce Overlook
FR 999A
FR 999
M-142
M-140
Williams River Valley Overlook
FR 171
FR 170
FR 170A
FR 218A
M-139
Black Mountain Run
Mountain Lick Run
Cranberry Glades Overlook
M-132
FR 216
Mountain Lick Run
FR 437A
M-137
Downy Run
M-136
FR 437
Beaverdam Run
Williams River
FR 998B
M-144
M-138
FR 498
M-135
18
Downy Run
FR 115
M-171a
Big Laurel Creek
M-171
Friel Run
Big Laurel Creek
Woodrow
17
17A
17A
N
Monongahela NF
Upper Williams River Composite;
Above Sugar Creek Watershed
Road Problem Sites Map
Road Problems Legend
clogged pipe and erosion (1 site)
clogged pipe (9 sites)
fill erosion (9 sites)
gully (2 sites)
mine refuse (1 site)
roadbed erosion (15 sites)
rutted surface (2 sites)
slip (4 sites)
Legend
Forest Service System Roads (FR 216; classified as Collector or Local) 46.7 miles
Forest Service Woods Roads (M-137) 20.7 miles
State Roads, Roads on Handley, and Highland Scenic Highway 22.4 miles
Private Roads 9.6 miles
Streams
Private Land Ownership
National Forest Land
Handley Public Boundary
Lakes / Ponds / Waterbodies
Watershed Boundary
Subwatershed Boundary
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0.5 0 0.5 1 Miles

Table 3-13. Road Problem Sites by Sub-watersheds and Roads

Sub-watershed	Road	Clogged pipe & Erosion	Clogged Pipe	Fill Erosion	Gully	Mine Refuse	Roadbed Erosion	Rutted Surface	Slip	Total Problems
Little Laurel Creek	M-169	0	1	0	0	0	0	0	0	1
										1
Big Laurel Creek	M-171	0	1	0	0	0	0	0	0	1
	M-171a	0	0	0	0	0	3	0	0	3
										4
Sugar Creek		0	0	0	0	0	0	0	0	0
										0
Day Run		0	0	0	0	0	0	0	0	0
										0
Black Mountain	FR889	1	0	0	0	0	0	0	0	1
	FR1797	0	1	5	2	1	3	0	3	15
	M-176	0	0	0	0	0	0	0	1	1
										17
Mountain Lick Run	FR 216a	0	3	2	0	0	4	0	0	9
	FR 437a	0	3	0	0	0	0	0	0	3
	M-136	0	0	0	0	0	2	0	0	2
										14
Beaverdam Run	FR 438	0	0	0	0	0	0	2	0	2
	M-170	0	0	0	0	0	2	0	0	2
										4
Downy Run	FR437b	0	0	2	0	0	1	0	0	3
										3
Total Problems*		1	9	9	2	1	15	2	4	43

*This list is not all-inclusive and represents only those roads that were field checked with Global Positioning System (GPS) equipment. See Map 3-8.

Minerals (Gas/Oil/Coal)

An abandoned underground coal mine with four horizontal shafts penetrating the hillside is located at the end of FR 1797 on the east side of Black Mountain. This mine has not been active since the late 1960s. Several of the openings are blocked by fallen rock making them inaccessible to the public. Acidic water is being discharged at the rate of 1 gallon per minute from at least one of the openings. Several piles of coal spoils and a collapsed wooden tipple on a concrete foundation are still present on the site.

Special Uses

Powerline right-of-way - along the Williams River. Consideration has been given to moving this powerline to the road corridor, to prevent periodic flood damage to the power poles, and to eliminate the need to control riparian vegetation in the right-of-way.

Outfitter Guides - Several outfitter guides are authorized to use the Tea Creek Mountain and Williams River Trails for hiking and biking trips, and the Williams River for fishing trips.

Heritage Resources

Numerous Heritage Resource Surveys have been completed over the past 17 years mainly due to land exchanges and proposed projects such as timber sales and trail construction. The following surveys have been completed in this watershed:

Project Name	Acres		Sites Found
Little Laurel Timber Sale	290		0
Big Spruce Timber Sale	625		2
Mountain Lick Timber Sale	553		3
Big Spruce II Timber Sale	223		1
Swago Mountain Mine Prop Sale	10		0
Big Spruce Land Exchange	735		6
Log Landing on FR 437	1		0
Black Mountain Timber Sale	778		0
William River West OA	5,745		6
Friel Run Timber Sale	82		2
Woodrow OA	2,633		6
Black Mountain Run Trail Construction	20		1
Highland Scenic Highway OA	3,448		5
Woodrow OA West	323		11
Williams River East OA	3,156		1
Tea Creek Trails	75		9
Red Spruce Trail	1		0
Total Acres Surveyed	18,698	Total sites	52

Walkovers of 2 other areas within this watershed were recently completed. The first area in the Highland Scenic Highway OA just north of the HSH is primarily steep slopes. The eastern end is a flat grassy area composed of massive fill produced by construction of the highway. A railroad grade that more or less parallels Williams River contains a site of scattered debris that may be associated with early logging activity. This area has been subjected to flooding and has suffered considerable disturbance. The site is not eligible for the National Register of Historic Place.

The second area in the northern portion of the Blue Lick Run OA is primarily steep slopes. Several saddles along the crest of Black Mountain were determined to have a medium to high probability for prehistoric sites. A few somewhat level areas near the junction of FR 216 and 437 were identified as medium probability. Shovel probes in these areas did not reveal any sites. A determination has been made that these 2 areas, with a total of approximately 400 acres, do not contain any historically significant remains.

Three other areas in this watershed have not been surveyed. All of the areas are located adjacent to Williams River and are likely to contain potentially significant remains. There are no projects proposed in these areas since most of it is considered to be a floodplain and/or riparian area. Normally, projects are not proposed in floodplains and recent policy discourages projects in riparian areas, therefore any potential sites should not be impacted. If this policy should change and projects are proposed for these areas, then additional surveys would be required.

Prehistoric and Historic Uses

Pre-European

Humans have been in Pocahontas County for approximately 12,000 years beginning in the Paleo-Indian period (10,000 to 8000 B.C.) (Yarnell 1998). In the Late Archaic period (4000-1000 B.C.) all of the major river valleys, within what is now known as the Monongahela National Forest, were inhabited. By this time, the inhabitants had developed some of the preconditions of residential stability by establishing a pattern of seasonal resource scheduling. In the Woodland period (1000 B.C. – 1250 A.D.), pottery making and horticulture of squash, beans, and corn was evident in the Ohio River Valley. By the Late Prehistoric period (1250 A.D. – contact) intensive agricultural fields of maize existed in the middle Mississippi River valley (Davis 1978). A recent discovery of maize in a pre-historic site in the South Branch of the Potomac River is evidence of Native Americans utilizing some flood plains in West Virginia for agriculture.

The myth of a large unbroken virgin forest extending across eastern North American has been refuted by the journals of numerous sixteenth, seventeenth, and eighteenth century explorers (DeVivo 1990). Native Americans used fire on a regular basis to clear the understory for cultivation of crops, improve forage, and to drive game. In addition the cleared area around villages, resulting from fires and cutting trees for fuel wood, increased visibility, which made surprise attacks from enemy tribes less likely and reduced the risk of a catastrophic fire destroying the village. Numerous studies suggest the aboriginal population prior to contact with Europeans, in what is now the southeastern United States, was much higher than previously suspected. Historians estimate the pre-settlement population in the Americas could have been as low as almost 4 million to over 100 million (Denevan 1976). There is general agreement that the original inhabitants were advanced enough to significantly alter the vegetation of this region. Diseases brought by the first explorers drastically reduced the numbers of Native Americans. Populations were reduced by roughly 90% through the 1500s (Hamel and Buckner 1998). By the time the first European settlers crossed the Appalachian mountains, the forests had returned to a less human altered condition.

European Settlement

The earliest recorded European explorer to Pocahontas County may have been Lieutenant-Governor Alexander Spotswood in 1716. Jacob Marlin and Stephen Sewell were the first settlers to arrive in Pocahontas County in 1750. By the 1780s several forts (Greenbrier, Drinnon, Dunmore, Warwick, and Clover Lick) had been constructed (Davis 1978). From 1750 to 1870 the population of Pocahontas County increased from 2 to 4,069. By 1920 the population was over 15,000 (Lewis 1998). For the past 10 years the population of Pocahontas County has remained near the 9,000 level.

The following information was collected by the USDA Census and the West Virginia Department of Agriculture:

Table 3-14. Pocahontas County Agriculture Statitics: 1870-1920-1997

	1870	1920	1997
Number of Farms	604	1,283	357
Total Acres	336,954	266,346	128,965
Average Acres	558	208	361
Number of Cattle	7,916	13,272	15,330
Number of Sheep	10,824	35,110	4,401

Landlines

An office and partial field review of the landlines between National Forest System Land and private land was completed for this analysis. This review indicated the following:

Compartments 17, 18, and 24 - starting in the eastern portion of Woodrow OA and going west to Handley Public Hunting and Fishing Area the landlines are up to standard. These lines were surveyed between 1983 and 1989 with the 1983 line maintained (repainted) in 1990. The line adjacent to Handley along the compartment 17 boundary to Williams River has not been surveyed by the FS but may have a recent survey by WVDNR. Signs have been posted (although, in places, the signs are sparse and the line is not visible) by WVDNR designating the boundary between Handley and national forest land. The last portion of boundary line, adjacent to compartment 24, follows Williams River across from Handley and continues upstream to State Route 17/4 across from private land. For this section the river is the boundary and does not need maintenance.

Compartments 23, 25, and 27 – there is no private land adjacent to these compartments.

Compartments 26 and 70 –The landline in compartment 70, from corner 1 to corner 20 of Tract 506 continuing from corner 1 to corner 2 of Tract 597 in Compartment 26 (near Locust Knob) is in need of survey. This includes the camps and homes along the

Williams River down stream from Day Run Campground. Corners 2, 3, 4, and 5 of Tract 506 are adjacent to Handley and have signs posted by WVDNR. Surveying was completed in 1984 and 1985 for Tract 597 between corners 2, 3, 4, 5 and 6; in 1985 for Tract 811-a between corners 4, 5, 6 and back to Tract 597; and in 1988 for Tract 506 between corners 33 and 43.

All boundary lines in Tract 506-a, compartment 70, adjacent to private land need to be surveyed. The line from corner 6 to corner 1 is adjacent to Handley and is posted with WVDNR signs.

Corners have been found for 2, 3 and 4 of Tract 811-a, in compartment 26, but the lines have not been surveyed. Corners 4, 5, 6, and 7 were also found in Tract 636 but the line was not surveyed. All other property lines within compartment 26 have not been surveyed.

Compartment 28 – the line between corners 33 to 43 in Tract 506 was surveyed to standard in 1988. In this same tract the line from corners 43 to 46 were surveyed in 1984 and maintained in 1995. The boundary lines adjacent to private land in Tract 853 were surveyed in 1967 but need to be resurveyed to be brought up to standard.

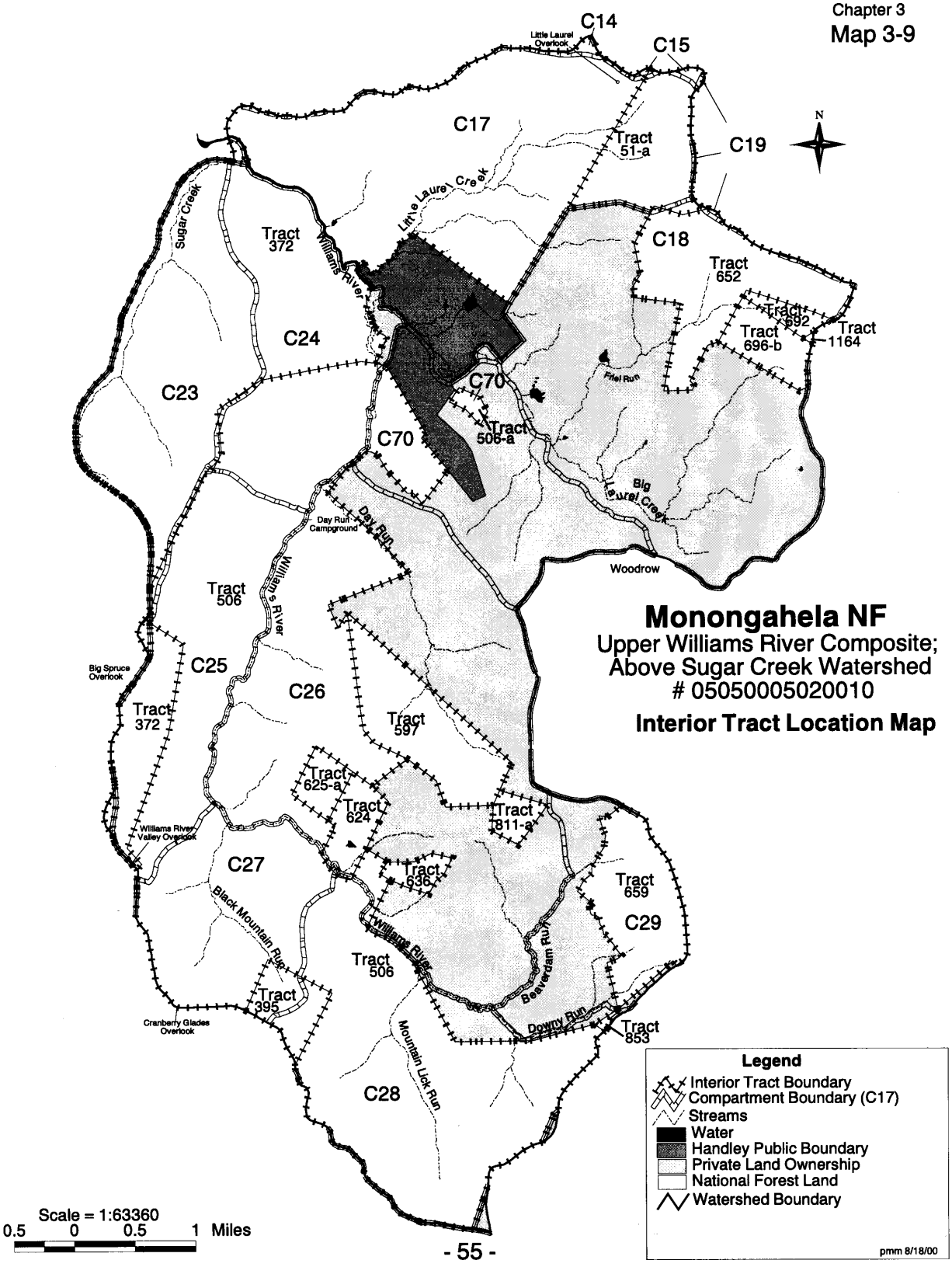
Compartment 29 – landlines need to be surveyed if any projects are scheduled within and near the boundary.

See Map 3-9 for U. S. Tracts within the Upper Williams watershed and Table 3-15 for a list of the tract numbers by compartment.

Table 3-15. US Tracts acquired for the Monongahela National Forest by Compartment

Interior Tract Number	Compartment Number
1164	18
372	14,15,17,23,24,25
395	27,28
506	23,24,25,26,27,28,70
506-a	70
51-a	15,17,18,19
597	26
624	26,27,28
625-a	26
636	26
652	17,18,19
659	29
692	18
696-b	18
811-a	26
853	28

Chapter 3
Map 3-9



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Other

Vandalism – Several of the overlook sites are vandalized every year. The most frequent vandalism at the overlooks is broken windows and graffiti.

Locks and pins on the gates of closed roads are often broken. Most of this vandalism occurs during bear hunting season.

Off-Road Vehicle Use – At this time there are no authorized areas for the use of off-road vehicles. Several areas of national forest land, adjacent to private property, show evidence of recent and frequent off-road vehicle use. Most of this use is limited to all-terrain vehicles (ATVs).

Some snowmobile use occurs on the HSH. Although not designated as a snowmobile trail, use is not discouraged since the road is not plowed in the winter months.

Timber Theft – Recently timber theft has become a problem throughout the MNF including the Upper Williams Watershed. Large, high quality hardwood trees near roads have been cut and removed by the thieves.

Fire History – Fire has been nearly excluded from the Upper Williams River Watershed in the past 60 years. Numerous, large fires occurred after the extensive logging in the 1920s and 30s. An extremely intense fire in logging slash on Black Mountain in the 1930s caused considerable damage. Damaged soils from the intensity of the fire and erosion from the rains have resulted in vast areas of exposed rock with little soil cover. Vegetation is still in the pole, sapling, and shrub stages nearly 70 years after the fire.

Natural Disturbances – Most natural disturbances in the Upper Williams River Watershed are limited to damage from rain, wind, and snow. Snow damage is limited mostly to conifers although it may occasionally occur on hardwoods during an early fall snow (before the hardwoods drop their leaves). Historically most damage has been in small, scattered patches (usually less than 5 acres). Damage from rain occurs mostly in the form of landslides or slumps and localized flooding, as in the case of the torrential rains from the remnants of Hurricane Hugo in 1989 and localized heavy rains in 1985 and 1996. The flooding in January, 1996 was a combination of a deep recent snowfall, warming temperatures triggering thawing of the snow, and heavy rains.

UPPER WILLIAMS WATERSHED ANALYSIS

CHAPTER 4

SIGNIFICANT FINDINGS AND RECOMMENDATIONS

Table 4-1 contains the summary, by core topic, of significant findings and recommendations documented within this watershed analysis report. Detailed information to support these recommendations can be found in Chapter 3. The action required to implement these findings is included in the table. Any deviation from the standards and guides listed in the Monongahela National Forest Land Management Plan (MNFLMP) must be documented in an EA or EIS with a corresponding decision document.

Table 4-1. Significant Findings/Recommendations/Actions Required

SIGNIFICANT FINDING	RECOMMENDATION	ACTION REQUIRED
SOILS/EROSION PROCESSES		
The majority of the soils in this watershed (78%) are from the highly erosive Mauch Chunk Group.	Field verify the erosion potential of soils on a project level basis, incorporate information in project design, and adopt site specific mitigation measures.	INFORMATION FOR FUTURE PLANNING
HYDROLOGY/STREAM CHANNELS		
Riparian areas are degraded.	Restore riparian areas by planting trees along streams to provide shade and future LWD. Fence riparian areas in grazing allotments to keep livestock out of stream channels.	NEPA DOCUMENT/ MONITORING
Stream channels are degraded.	Restore stream channels through methods of natural stream channel restoration design, soil bioengineering techniques, and Rosgen structures.	NEPA DOCUMENT/ MONITORING
WATER QUALITY		
Underground mine openings are discharging acidic water (pH 4.9-5.42) onto the fill slope of the road and causing gully erosion.	Provide armored drainage channels from the mine site discharges across the disturbed area to disperse the water on naturally armored, undisturbed forest floor down slope from the mines.	NEPA DOCUMENT/ MONITORING

SIGNIFICANT FINDING	RECOMMENDATION	ACTION REQUIRED
The last 1.1 miles of FR 1797 leading to the coal mine site has 2-3 fill slope washouts, high cut banks with emerging water, small scale slumping, sustained grades of 12-15% with short sections up to 20%, and uncontrolled drainage causing gully erosion.	Obliterate and restore the entire 1.1 mile section of FR 1797 nearest to the mine site.	NEPA DOCUMENT/ MONITORING
AQUATIC RESOURCES		
Simplified stream channels and loss of large woody debris (LWD).	Identify opportunities to restore channel complexity. Passively recruit LWD into stream channels by protecting the source of wood through riparian buffers.	NEPA DOCUMENT/ MONITORING
Elevated levels of fine sediment.	Continue sediment sampling efforts on national forest land. Locate and correct sediment sources on national forest land caused by roads, grazing, mining, and other human uses.	MONITORING/ COORDINATE WITH USDA S&PF.
Lack of tree cover along streams results in increased water temperatures and stream bank instability.	Encourage landowners to plant trees along streams for riparian area protection/recovery and bank stability.	COORDINATE WITH STATE AGENCIES AND USDA S&PF.
Water temperatures in sections of some streams are too high to support native trout.	Maintain canopy cover over all intermittent and perennial streams.	COORDINATE WITH USDA S&PF. MONITORING
Non-native species in streams.	Emphasize and encourage the recovery of native aquatic species in the watershed.	COORDINATE WITH WVDNR.
VEGETATION		
Presence of sensitive plant species.	Maintain or increase the populations of sensitive plant species through management, propagation, and protection.	CONSULT WITH FOREST BOTANIST
Red Spruce forest type has been substantially reduced from reference condition.	Encourage release of red spruce seedlings and saplings in mixed hardwood stands through intermediate cuttings (thinnings). Retain all spruce and hemlock trees in stands regenerated this entry.	NEPA DOCUMENT/ MONITORING

SIGNIFICANT FINDING	RECOMMENDATION	ACTION REQUIRED
Non-commercial thinning potential exists in young stands clearcut in the 1980s and early 90s.	Use the crop tree release method to select and release healthy, valuable, and well-formed trees.	NEPA DOCUMENT/ MONITORING
Over 74% of NF land is between 60 to 100 years old.	Utilize even-age management techniques to diversify habitat by providing temporary early seral plant communities while striving to meet size class guidelines in the MNFLMP.	NEPA DOCUMENT/ MONITORING
Commercial thinning potential exists to improve health, growth, structure, and diversity.	Utilize TSI commercial thinning methods in younger stands clearcut in the 1960s and 70s. Utilize other TSI thinning methods including Overstory Removal for older stands.	NEPA DOCUMENT/ MONITORING
Non-native insects, diseases, and invasive plants are changing forest and grassy opening vegetation structure and pattern.	Monitor insects/diseases. Remove susceptible/diseased trees through individual tree selection harvest or salvage dead/dying trees. Eradicate invasive plants with herbicide, prescribed burning, or mechanical treatments. Recolonize areas by planting native trees and shrubs.	NEPA DOCUMENT/ MONITORING
Soils in the grazing allotments appear to be low in fertility.	Lime and fertilize grazing allotments to improve forage capacity.	GRAZING ALLOTMENT PLAN
Roads leading into and through grazing allotments are rutted, causing erosion.	Grade the road, add stone, and replace the culvert(s).	MAINTENANCE
Pond in Friel Run grazing allotment is filling in with sediment and accumulated organic matter. Dam banks are eroding.	Clean out and fence the pond to allow only one access lane and keep the livestock off the dam.	GRAZING ALLOTMENT PLAN
Livestock are crossing stream channels in the grazing allotments causing excessive sediment down stream.	Fence out the stream channels and allow livestock crossing at specified location(s) only.	GRAZING ALLOTMENT PLAN
A pond in the Day Run Grazing Allotment is not holding water due to a hole in the bottom near the dam.	Plug the hole.	MAINTENANCE
Grazing allotments could supply habitat for NTMB.	Construct and place nest boxes in the grazing allotments.	CONTACT W/L BIOLOGIST

SIGNIFICANT FINDING	RECOMMENDATION	ACTION REQUIRED
Fences, loading docks, and feeders in allotments are in need of repair	Make the needed repairs.	MAINTENANCE
WILDLIFE		
Research opportunities exist in areas that may have suitable or marginal WVNFS habitat to determine effects of vegetative management that may assist in the recovery of this sub-species.	Enhance areas determined to be marginal habitat (with USFWS consultation) for WVNFS by releasing yellow birch and conifer trees. Conduct research to study effects of vegetative management in areas determined to be suitable habitat for WVNFS.	CONSULT WITH USFWS. NEPA DOCUMENT/ MONITORING
Stands containing aspen are ageing.	Regenerate older stands containing aspen. Plant aspen near beaver dams to increase diversity of food supply.	NEPA DOCUMENT/ MONITORING
Maintain diversity of mast trees and shrubs.	Release or plant mast producing trees and shrubs such as hickory, American chestnut, hawthorn, persimmon, mountain ash, etc.	NEPA DOCUMENT/ MONITORING
Permanent water sources are lacking in some areas in the watershed.	Construct ponds to increase water source availability.	NEPA DOCUMENT/ MONITORING
Some stands lack adequate structural diversity for NTMB nesting habitat.	Where appropriate, create small patch cuts to encourage regeneration growth and thin stands to increase under-story and mid-story growth.	NEPA DOCUMENT/ MONITORING
Species such as snowshoe hare, could benefit from additional small, scattered openings on national forest land.	Create ½ to 1 acre grassy openings and hardwood forest patch clearcuts to increase habitat availability for snowshoe hare.	NEPA DOCUMENT/ MONITORING
HUMAN USES		
Unique geological formations along the HSH are difficult to access.	Construct a 1.3 mile interpretive trail to allow visitors easier access and explain the rock formations.	NEPA DOCUMENT/ MONITORING
A loop trail on Williams River is desired. Mountain biking through Handley Public Hunting and Fishing Area is discouraged.	Explore potential to construct a loop trail for mountain bikers from the parking lot adjacent to HSH to the boundary with Handley and then returning to the HSH.	NEPA DOCUMENT
There are limited vistas on the Red Spruce Knob Trail.	Explore possibility of constructing a viewing platform on Red Spruce Knob Trail.	CONSULT WITH USFWS. NEPA DOCUMENT

SIGNIFICANT FINDING	RECOMMENDATION	ACTION REQUIRED
Human waste at dispersed camping sites is a potential health hazard.	Improve visitor information regarding the location of existing vault toilets or proper disposal of human waste.	MAINTENANCE
Vault toilets in dispersed and overflow camping areas and Day Run Campground were not constructed for accessible use.	Replace vault toilets with accessible facilities.	NEPA DOCUMENT
Vandalism at the overlooks continues.	Increase patrols of the area through cooperative agreements and funding with local law enforcement agencies.	COORDINATE WITH LE&I
Vista at Little Laurel Overlook is becoming blocked by vegetation.	Cut trees below the vista to maintain the view.	MAINTENANCE
Repairs of a landslide along the HSH have not been completed.	Secure additional funding to complete the repairs.	REQUEST ADDITIONAL FUNDING
HSH has too few culverts, considering downstream effects, causing excessive water flow during rain events especially at Little Laurel Overlook.	Place additional culverts where needed and provide additional drainage to disperse water flow at Little Laurel Overlook.	SECURE FEDERAL HIGHWAY COOP FUNDS
FR 115 & 115A (behind the gate) have insufficient culverts (both size and number) causing excessive channel cutting below the culverts.	Place additional culverts where needed and replace existing culverts with larger ones where needed. Add stone to the entire length of road behind the gate.	MAINTENANCE
FR 171 may not be necessary for transportation purposes considering the location and length of FR 170.	There may be an opportunity to obliterate FR 171 if a determination is made that is not necessary for the long term transportation plan on the MNF.	CONSULT WITH TRANSPORTATION PLANNER. NEPA DOCUMENT.
Culverts on FR 216A have been blown out.	Replace with larger culverts or remove blown out culverts and allow free flow of water.	MAINTENANCE
FR 437A has plugged culverts.	Replace with larger culverts and maintain every 2 – 3 years.	MAINTENANCE
FR 438 has steep grades up to 17%, insufficient cross drains or culverts and is rutted, causing erosion.	Reduce steep grades to acceptable levels, add culverts or cross drains, grade the road and add stone.	MAINTENANCE

SIGNIFICANT FINDING	RECOMMENDATION	ACTION REQUIRED
FR 999A has washed out culvert with gully at stream channel and ruts in road bed.	Replace culvert with larger one, grade road, and add stone if road is to be used this entry. Restore stream channel banks below washed out culvert using soil bioengineering techniques.	MAINTENANCE
FR 999B has washed out culvert in stream channel and ruts in road.	Replace culvert with larger one, grade road, and add stone if road is to be used this entry.	MAINTENANCE
Some areas in this water-shed lack an adequate road system.	Review transportation plan to determine if the existing road system meets resource management objectives.	CONSULT WITH TRANSPORTATION PLANNER. NEPA DOCUMENT
There is a backlog of maintenance on open roads and lack of maintenance on closed roads.	Develop a more comprehensive and frequent maintenance schedule for all specified system roads.	MAINTENANCE PLAN
Land adjustment opportunities are limited.	Pursue exchange with small parcel of national forest land south of Handley with private land in the southern portion of this watershed.	NEPA DOCUMENT