

FIRE MANAGEMENT PLAN



Canaan Valley National Wildlife Refuge

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WILDLAND FIRE MANAGEMENT PLAN

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## I. INTRODUCTION

### A. Purpose

This document establishes a Fire Management Plan (FMP) for Canaan Valley National Wildlife Refuge (Canaan Valley NWR), a land unit of the National Wildlife Refuge System, which relies primarily on local fire departments to suppress wildland fires. The plan describes steps Canaan Valley NWR will take in the event of a wildland fire. It defines levels of protection needed to ensure safety and protect facilities and resources. The protection of life, property and natural resources from the harmful and unwanted effects of wildland fire remains the priority of this plan, however, this plan has been developed to provide direction and continuity in establishing operational procedures to guide all fire management activities, in addition to fire suppression.

This plan represents a revision of the existing FMP, approved in October 2002. A revision was necessary to incorporate new Refuge land acquisitions into the plan, and bring the existing plan into compliance with the current Service formatting guidelines.

The Refuge is slated to draft a Comprehensive Conservation Plan in 2006. Other planning documents, such as a Habitat Management Plan, will be initiated after the CCP is approved. At that time, the Fire Management Plan will be reviewed to insure it is compatible with the objectives identified in the pre CCP process. In the meantime, the Fire Management Plan will be reviewed annually to ensure that it is compatible with the goals of existing habitat management plans

### B. Regulatory Compliance

Wildland fire is an unplanned event and as such, involves no decision for public input on environmental effects. This plan qualifies for a Categorical Exclusion under the National Environmental Policy Act (NEPA). The plan is not anticipated to individually or cumulatively have significant adverse impacts on the environment. Activities above are included in the Service's actions designated as NEPA categorical exclusions in 516 DM 6 Appendix 1, 1.4 B.(5) and would not be exceptions to categorical exclusions (516 DM 2, Appendix 2). This plan also meets requirements of the National Historic Preservation Act and the Endangered Species Act.

However, this FMP is governed by several related statutory authorities. They include the Clean Air Act, the Clean Water Act, the National Environmental Policy Act and the Antiquities Act. Departmental Manual (620 DM 1.1) and the Fire Management Handbook (621 FW) contain other statutes cited authorizing and providing the means for prevention, pre-suppression, and suppression of wildfire on or threatening lands under the jurisdiction of the National Refuge System. For ease of reference, these Authorities are listed below.

### C. AUTHORITIES

1. Protection Act of September 20, 1992 (42 Stat. 857; 16 USC 594)
2. Economy Act of June 30, 1932 (47 Stat. 417; 31 USC 1535)
3. Federal Property and Administration Services Act of 1949.
4. Reciprocal Fire Protection Act of May 27, 1955 (69 Stat. 66; 42 USC 1856a)
5. National Wildlife Refuge System Administration Act of 1966, as amended.
6. Disaster Relief Act of May 22, 1974 (88 Stat. 1431; 42 USC 1521)

7. Federal Fire Prevention and Control Act of October 29, 1974 (88 Stat. 1535; 15 USC 2201)
8. Federal Grants and Cooperative Act of 1977.
9. Wildfire Suppression Assistance Act of 1989, (Pub. L. 100-428, as amended by Pub. L. 101-11, April 7, 1989)
10. Department of Interior Manual, Part 620 DM-1, Wildland Fire Management, April 1998
11. USFWS Refuge Manual, 621 FW 1-3, Fire Management, February 2000
12. USFWS Wildland Fire Management Handbook, ebook, last update September 2003

#### D. Collaborative Opportunities

To implement this Plan, the Refuge will utilize local fire departments (Canaan Valley and Davis), the West Virginia Forest Service and the United States Forest Service (Monongehela National Forest) to meet fire suppression initial attack goals and objectives.

## II. RELATIONSHIP TO LAND MANAGEMENT PLANNING/FIRE POLICY

### A. USFWS Policy

Refuge Manual direction (621 FW 2.3) and Departmental Manual (620 DM 1.4B) state every administrative unit with burnable vegetation shall have an approved Fire Management Plan. Canaan Valley NWR's FMP is an operational plan of action to implement fire management policies which provide for firefighter and public safety as the highest priority. Within the framework of management objective and plans, overall wildfire damage will be held to the minimum possible giving full consideration to: (1) an aggressive fire suppression program; (2) the least expenditure of public funds for effective suppression; (3) the methods of suppression least damaging to resources and the environment; and (4) the integration of cooperative suppression actions by agencies of the Department among themselves or with other qualified suppression organizations.

Wildfires, whether on lands administered by the Refuge or adjacent thereto, which threaten life, man-made structures, or are determined to be a threat to the natural resources or facilities under Refuge jurisdiction, will be considered emergencies and their suppression given priority over normal Refuge programs. The Refuge will give the highest priority to preventing the disaster fire, a situation where a wildfire causes damage of such magnitude as to impact management objectives and/or socio-economic conditions locally. However, no wildfire situation, with the possible exception of threat to human survival, requires the exposure of firefighters to life threatening situations.

### B. Refuge Description and Purpose

Canaan Valley NWR was established in 1994 under the authority of the Fish and Wildlife Act of 1956 and the Wetland Resources Act of 1986. Canaan Valley is of national significance due to its unique wetland and wildlife habitat resources, including diverse and unusual mix of habitats and boreal (northern) species. The Valley contains a system of plants and animals usually found much farther north in New England and Canada. Canaan Valley was characterized in its National Natural Landmark designation documentation as a "virtual living museum of Pleistocene Time in West Virginia" due to its diversity of relict habitats and species.

The Refuge was established to ensure the ecological integrity of the Valley and the continued availability of its wetland, botanical, and wildlife resources to the citizens of West Virginia and the United States. The Valley encompasses more than 9,000 acres of wetlands -- the largest such complex in both West Virginia and the central and southern Appalachians. It is listed as a priority for protection under the Emergency Wetlands Resources Act of 1986, as implemented by the

Service's Regional Wetlands Concept Plan, and is considered by the State of West Virginia as "the most important wetland in the State."

An acquisition in January 2002 added approximately 12,000 acres to the refuge. This addition increased the size of the Refuge to 15,245 acres. Due to the late addition of this property to the refuge, in relation to the development of the original FMP, only the south part of the refuge, consisting of 3,282 acres, was covered under the 2002 plan. This revised FMP will cover all recent land acquisitions.

A diversity of habitats are found on the refuge, including high elevation northern hardwood and spruce forests, grasslands, and palustrine wetlands and bogs. Land is currently managed for grassland nesting birds, American woodcock and common snipe as well as the protection of a variety of rare plant species and plant communities which occur in the Canaan Valley. The high elevation areas of the refuge provide habitat for the threatened Cheat Mountain salamander (*Plethodon nettingi*), and the endangered West Virginia northern flying squirrel (*Glaucomys sabrinus fuscus*). The threatened bald eagle (*Haliaeetus leucocephalus*) uses the Valley in winter months. The endangered Indiana bat (*Myotis sodalis*) has been documented using the south end of the refuge during fall months. This species abundance and distribution on the refuge is currently unknown.

The purposes of Canaan Valley NWR are:

1. The conservation of its wetlands in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions (Emergency Wetlands Resources Act of 1986).
2. The development, advancement, management, conservation, and protection of fish and wildlife resources (Fish and Wildlife Act of 1956).

Four goals that fulfill the purposes for which Canaan Valley NWR was designated:

1. To preserve and, where appropriate, enhance and restore the physical and biological components of refuge wetlands.
2. To preserve and, where appropriate, restore, relict boreal vegetation on the refuge.
3. To preserve and, where appropriate, enhance and restore populations and habitats of threatened and endangered plant and animal species on the refuge.
4. To perpetuate migratory birds by conserving their populations and by preserving and enhancing their habitats on the refuge.

In the Station Management Plan (USFWS, 1994b) developed for the Refuge, the Service identified the following management objectives:

1. Acquire and protect habitats (land);
2. Build a staff; administer the Refuge;
3. Develop and maintain up-to-date biological information base;
4. Preserve and protect endangered and threatened species;
5. Perpetuate the migratory bird resource and natural biodiversity;
6. Provide educational, interpretive, and recreational opportunities;

## 7. Identify existing water quality problems.

### C. Refuge Resources

#### 1. Location

Canaan Valley NWR is located in the Appalachian Mountains of north-eastern West Virginia. The refuge is located entirely within Tucker County, and is between 3 and 4 hours driving time from Washington D.C., Baltimore and Pittsburgh. It is approximately 31 miles from Elkins and 8 miles from Davis, WV. The refuge headquarters is located on Route 32 in the southern end of the Canaan Valley.

#### 2. Archaeological/Cultural/Historic Resources

There are several old barns and houses which are owned by the U.S. Fish and Wildlife Service that are not functional. These include the Beall and Cooper Tract barns and hay sheds (2 total), and numerous hunting camps on the Main Tract (13 total). These structures have been reviewed for their cultural significance by the Regional Cultural Resources Specialist. If these structures prove to be important in historical context, they must be considered a priority for protection in a fire situation. The State SHPO reviewed the Environmental Assessment and provided comments that were integrated into the document (Appendix A).

#### 3. Fish and Wildlife

Canaan Valley NWR supports a wide diversity of wildlife in forest, meadow, and wetland habitats. At least of 280 species of fishes, amphibians, reptiles, mammals and birds are known or expected to occur in the Canaan Valley. The land is managed and to protect biological diversity and for the protection and benefit of native, migratory and endangered species. There were few wildlife studies in the Canaan Valley prior to acquisitions by the Fish and Wildlife Service.

There are at least 28 species of fish in the rivers and streams, notably including naturally reproducing brook trout populations. Red-sided dace, a rare state species has also been found on the refuge. Water quality concerns on the Blackwater river center around its suitability as a naturally reproducing trout stream. Sedimentation from grazing in and around other tributaries such as Freeland Run also creates impaired conditions for trout and other sensitive aquatic species.

Nine species of reptiles are known to occur on the refuge including one turtle, 7 snakes and one lizard. Twenty-one species of amphibians are known or likely to occur on refuge lands. These include 15 salamanders, 5 frogs, and one toad. The most notable of these is the federally threatened Cheat Mountain salamander (*Plethodon nettingi*) which occurs on the refuge in high elevation spruce and hardwood forests.

There are at least 168 bird species which are known or likely to occur in the Canaan Valley. Migratory birds pass through the valley and have been well documented by long term banding

and monitoring along the Allegheny Front. The area is important for those species requiring wetland habitats for foraging and resting during migration such as waterfowl (esp. American black ducks), herons, shorebirds and American woodcock. The Canaan Valley has been documented as an important staging and nesting area for American woodcock and common snipe. Peregrine falcons and bald eagles are periodically seen in the valley and Northern goshawks have been documented nesting at the north end.

The mammals of the Refuge include 48 species and all are considered year-round residents with the exception of migratory bats. Perhaps the most conspicuous mammal is the white-tailed deer which has reached high densities in the southern portion of the valley including the refuge. Deer browse pressure is exceedingly high and generally recognized as a limiting factor to the regeneration of several plant species, most notably balsam fir. Wetland areas support populations of beaver, muskrat, mink and otter, while upland areas support species such as long-tailed weasels, bobcat, striped skunk, red and grey fox, black bear and fisher. Federally endangered Indiana bats are found on the Refuge. State species of concern include the northern water shrew and New England cottontail.

#### Threatened and Endangered Species

The fire management program will take appropriate action to identify and protect from adverse effects any rare, threatened, or endangered species, or other sensitive natural resources at CVNWR. Areas of sensitive natural resources include: (1) stands of balsam fir, a tree species of concern in the state; and (2) high elevation refuge lands which provide habitat for the threatened Cheat Mountain salamander (*Plethodon nettingi*) and the endangered West Virginia northern flying squirrel (*Glaucomys sabrinus fuscus*).

Balsam fir communities tend to occur in poorly drained wetland soils on the refuge. These areas are less likely to burn or carry a fire during most of the year as they remain quite wet. Stands of balsam fir occur on the Freeland Tract, Reichle Tract and Cortland Tract and the south end and scattered throughout the Main Tract. The use of heavy equipment in these areas (such as creating a disc or dozer line) would be highly disruptive to the wetland plant communities growing in and around the fir stands.

Habitat for the Cheat Mountain salamander and West Virginia northern flying squirrel occurs in the high elevation forests of the refuge on the Kelly-Elkins tract. Habitat for these species must be protected from burning in order to maintain suitable conditions for their continued use of the area. Both species require a red spruce and/or Eastern hemlock component to their habitat. Fires in these types of sub-alpine forests are not frequent, which allow considerable amounts of woody debris to develop on the forest floor. This debris is important for the salamander which uses downed woody debris for cover and for nesting. Rotting logs also provide substrate for lichens and fungus which may be an important component to the squirrel's diet.

The Kelly-Elkins tract is laced with old logging roads which will serve as fire breaks in the event of wildfire situations. These roads can also provide access for dozers and engines for suppression activities. Fire should be suppressed in these high elevation areas of the refuge in order to protect the conditions necessary to support the threatened Cheat Mountain salamander and endangered

West Virginia northern flying squirrel.

These areas are generally cool and wet, and ignition probabilities are usually low, except under extreme drought conditions. Furthermore, the Refuge does not currently plan to conduct any prescribed fire operations within northern flying squirrel habitats. Therefore, no impact from prescribed burning activities is anticipated. In the event that prescribed fire is considered in these areas, such actions will require careful planning and consultation with endangered species habitat specialists, to ensure that fire treatments are compatible with life cycle requirements of listed species. The Refuge Fire Management program will be implemented in cooperation with the Endangered Species Act of 1973, as amended, and will take appropriate action to identify and protect from adverse effects any rare, threatened, or endangered species.

Complete lists of vertebrate species which are known or are expected to occur in the Canaan Valley are listed in Appendix B.

#### 4. Vegetation

The Canaan Valley is known for its unique vegetation which developed after the severe ecological disturbances of the late 1800's and early 1900's. It is recognized as having over 40 different plant communities with at least 580 plant species. Many plants growing in the valley are remnant populations from the last glaciation, such as the balsam fir communities.

The refuge contains a wide cross-section of vegetation including high elevation spruce forest, typical northern hardwood forests, shrub dominated wetlands, old fields and pasture and peatland areas. As listed in Ron Fortney's dissertation (1975), major upland communities in Canaan Valley are grouped as "Northern Hardwoods forest, Hemlock-Hardwoods forest, and Solidago-Aster, Pteridium, and Danthonia old-field communities. The major bottom-land communities and general vegetation types are wet meadow, marsh, sphagnum bog, polytricum bog, Hypericum thicket, Spiraea thicket, Alnus thicket, Populus grove, Abies-Picea-Tsuga forest and Mixed Conifer-Hardwood forest."

Wetland habitat on the refuge is considered to be sensitive. The Canaan Valley's wetlands hold regional and national significance due to their size and species composition. Many wetland plant species with typically northern ranges are found in Canaan Valley representing unique botanical communities. These areas also harbor plants listed as state Species of Concern due to their limited distribution in West Virginia.

Dominant plant communities on the Canaan Valley NWR can be summarized as: northern hardwood forest (~ 5,854 acres), mixed coniferous forest (~195 acres), grassland/wet meadow (~3,846 acres), and wetland shrub thicket (~3615 acres). Other vegetation types include aspen groves, moss and blueberry. See Appendix C for a list of the major plant communities found at CVNWR, by acreage. The following are fuel types (FBPS and NFDRS), for each of the major vegetation types on Canaan Valley NWR:

a. Northern Hardwood Forest (Fuel Model 9): This is characterized by a mixture of sugar maple,

American beech, black cherry and yellow birch. Also included in this category are varying amounts of American basswood, eastern hemlock, red maple, and white ash.

b. Mixed Coniferous Forest (Fuel Model 8): Dominant species include eastern hemlock and red spruce. There are some areas of balsam fir in the lower wetter refuge tracts. Additionally, yellow birch and red maple can make up a small component of this vegetation type.

c. Grassland/wetmeadow (Fuel Models 1 and 3): This vegetation category varies from drier upland grassland areas to transitional wetter meadows to true sedge and rush dominated sites consisting of wetland habitat. Common species can include mountain oat-grass, red top, deer tongue grass, goldenrods, several species of sedge and common rush.

d. Wetland Shrub Thicket (Fuel Model 5): Dominant species include meadowsweet (*Spiraea alba*) and glade St. John's wort.

## 5. Physical Resources

### Climate

The climatic conditions of a region influence evaporation rates, surface runoff, and the recharging of aquifers. Information presented in this subsection is based on NOAA/NCDC publication #84, *Climatology of the U.S. 1971 - 2000* (see Table 1.).

The general climate of Canaan Valley is best characterized as cold and humid. Summer temperatures are cool and winters are moderate to severe with an abundance of precipitation. The cool moist climate results from the geography and elevation of the valley. With an average elevation of 3,200 feet above sea level and mountains which ring the valley on all sides, a frost pocket situation has developed where the cold moist air is trapped in the valley. As a result frost can occur throughout the summer months creating a brief growing season more typical of areas farther north.

Annual precipitation in Canaan Valley averages 53.5 inches. Precipitation is rather evenly distributed during the year, with the driest months typically occurring in September and October. June tends to be the wettest month of the year typically averaging 5.4 inches of precipitation. On average 4.46 inches of precipitation fall each month. Out of the total precipitation, a significant portion falls as snow in Canaan Valley. Snow fall averages 120 inches per season.

Temperatures in Canaan Valley are lower than those recorded in the surrounding areas. During the winter, the temperatures are consistently below 38°F average and can reach below -20°F on occasion. Summer temperatures average between 75 and 80°F.

Typically, wildfires occur from October - December and March - May in West Virginia.. Fall is usually the driest time of year in Canaan Valley and coupled with increased leaf litter in October and dried grasses and ferns, fire potential increases in the surrounding slopes. Average rainfall for 1999 and 2000 is shown charted against the 20 year rainfall average (Figure 2 ).

## Topography/Soils/Water

The refuge is located in the Appalachian Mountains of north-eastern West Virginia. The average elevation of 3,200 feet above sea level coupled with a 35,000 acre watershed make this area the highest valley of its size east of the Rocky Mountains. The valley was formed through the erosion of the Blackwater Anticline creating a ridge of harder, less resistant rock in the center of the valley with depressions on either side. The Blackwater River originates in the southern portion of the Canaan Valley and winds its way north, eventually exiting the valley on the western edge. Numerous small streams and springs feed the Blackwater as it travels through the valley, adding to its size.

The refuge is characterized by the rough terrain of the high elevation Appalachian mountains and unique wetlands formed in the depressions on either side of the middle ridge in the valley. Refuge lands include high elevation spruce and northern hardwood forest on Cabin Mountain, open pasture and well drained hay fields as well as large shrub swamps and peat areas.

The soils of the valley were characterized by the USDA's 1967 Soil Survey report into four physiographic categories: uplands, lower slopes, flood plains and stream terraces and swamps. The upland sites are characterized as well-drained or excessively drained. The common soils are Dekalb, Calvin and Belmont making up the upper, middle and lower portions of sloping land and low hills. Meckesville soils are characterized as deep and well-drained tend to occur at the bases of the mountain slopes in the valley. Soils in the lower flood plain, stream and swamp areas are mostly poor to very poorly drained. The most common soil types in these areas are Blago and Atkins, with Muck and Peat soils occurring most extensively in the Canaan Valley.

## Air Quality

The area in and around Canaan Valley NWR is in attainment for all National Ambient Air Quality Standards (NAAQS). There is no heavy industry or significant urban activity in the vicinity to effect air quality. Visibility and clean air are valued resources at Canaan Valley NWR, and the protection of them will be given full consideration in fire management planning and operations. The refuge will comply with all applicable Federal, State, and local air pollution control requirements, as specified within Section 118 of the Clean Air Act, as amended (42 USC 7418). Further guidance is in the Service Fire Management Handbook.

## 6. Structures and Facilities

The refuge headquarters and maintenance building is located on Rt. 32 across from the Thompson Tract. Refuge has one storage building on the Shaffer Tract. These buildings are the primary structures and facilities owned by the U.S. Fish and Wildlife Service which should be considered in a fire situation. A refuge house is being considered for construction during 2005-06 at the beginning of Forest Road 80 on the Reichle Tract. This structure, if built, must also be considered in a fire situation.

Additionally there are three old barns which are owned by the U.S. Fish and Wildlife Service that are not functional. These structures are currently being reviewed for their cultural significance by the Regional Cultural Resources Specialist (see “Cultural Resources” section). If these structures prove to be important in historical context, they must be considered a priority for protection in a fire situation.

Aside from government owned structures, there are numerous private homes and facilities which are adjacent to refuge lands which must be given high priority during a fire situation. These include the homes within the Timberline, Black Bear Woods and Deerfield developments which border the Beall, Harper, Herz, Main and a portion of the Kelly -Elkins tracts of the refuge.

### **III. WILDLAND FIRE MANAGEMENT STRATEGIES**

Fire suppression will continue to be the primary objective of the fire management program. Overall, the FMP is designed to implement a safe, cost-effective program of fire protection, fuels management, and resource enhancement through management ignited prescribed fire strategies. The safety and property of private citizens and incident personnel are paramount concerns. With limited refuge staffing, local fire departments will provide initial attack response. Canaan Valley NWR is part of the Region 5 South Zone Fire Management grouping. Support resources and expertise for both fire suppression and prescribed fire will be provided by the South Zone Fire Management Officer, stationed at Great Dismal Swamp NWR. Support for Wildland-Urban Interface (WUI) issues will be provided by the Regional WUI coordinator.

#### **A. General Management Considerations**

The National Fire Plan 10-year Comprehensive Strategy (August 2001) identified three guiding principles for fire planning: Collaboration, Priority Setting and Accountability. This plan addresses these three principles in the following manner:

Collaboration – Facilitate a collaborative approach at the local, regional, and national levels. A cooperative agreement exists between Canaan Valley NWR and Forest Service for activities involving prescribed fire. An updated agreement is underway to incorporate wildland fire suppression. Upon its completion it will be added to Appendix D, which contains Memoranda of Understanding (MOU’s) with Canaan Valley and Davis Volunteer Fire Departments. These agreements have detail regarding payment among cooperators, list of response areas, and communication frequencies. These agreements will be reviewed and approved by a contract specialist and/or solicitor. Since Canaan Valley NWR falls in the Canaan Valley and Davis Volunteer Fire Departments jurisdiction they currently assume initial attack responsibilities on wildland fires. If necessary, additional resources can be pulled from the U.S. Forest Service. Fire crews at Great Dismal Swamp NWR are the closest Fish and Wildlife Service resource and may be called to aid in larger fires. Most of the local agencies communicate using local or county frequencies. These frequencies will be identified in the MOU for use by FWS.

Priority Setting – Emphasize the protection of communities, municipal, and other high-priority watersheds at risk. The refuge borders three private housing communities as well as many single family homes at the south end of the Valley. Some of the refuge borders the main economic development along route 32. Protecting these homes and businesses from wildfire or effects of prescribed fire (smoke drift) will be of utmost importance. Areas of the refuge bordering the Timberline development have been recently logged. Large amounts of “jackpot” fuels (piles of tree tops, logs) are present in varying densities which will be assessed for their risk of fire spread into the Timberline development. In addition, fire and smoke protection must be considered for three ski areas on the east side of the Valley. Businesses and the local community will be kept informed on refuge prescribed burn activities and potential wildfire events.

Accountability – Establish uniform and cost-effective measures, standards, reporting processes, and budget information in implementation plans that will fold into the Government Performance and Results Act (GPRA) process. Primary GPRA performance measure for Canaan Valley NWR is to control all initial attack wildfires at one acre or less within one 24-hour burning period. Prescribed fire criteria will be based on achieving acres treated, as identified in annual prescribed fire plans, and a reasonable cost per acre outcome, which will vary depending on the size, complexity and duration of any particular project.

#### B. Wildland Fire Management Goals

The goal of wildland fire management is to plan and make decisions that help accomplish the mission of the National Wildlife Refuge System. That mission is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans. Fire management objectives (standards) are used in the planning process to guide management to determine what fire management responses and activities are necessary to achieve land management goals and objectives. The fire management goals for Canaan Valley NWR include:

1. Ensure firefighter and public safety.
2. Maintain minimal human-caused wildland fires.
3. Maintain through agreement and fostering good relationships, adequate suppression response capabilities.
4. Identify the need for prescribed fire use to meet land management direction.

#### C. Refuge Specific Fire Management Objectives

There is currently no Comprehensive or Master Planning document for the Refuge, or any habitat direction established, other than the protection of the current vegetative structure present. Given the purpose of the Refuge, implied Interim resource Management Goals focus to:

1. Provide quality habitat for woodcock, through habitat enhancement and management.
2. Manage existing grasslands to obtain the greatest diversity of species.

3. Provide outdoor recreational and environmental educational opportunities found in the Refuge Improvement Act.
4. Manage and maintain wetland habitats to sustain viable populations of nesting and migratory waterfowl.
5. Preserve the northern forest ecosystem found on the refuge for nesting and migratory neotropical birds.
6. Identify important areas associated with the refuge for land acquisition.

The following strategies will be employed to meet refuge fire management objectives:

1. Conduct all fire management programs in a manner consistent with applicable laws, policies and regulations.
2. Promote training opportunities to develop the staff's fire skills to maintain a small initial attack group.
3. Maintain Memorandums of Understanding with the local Volunteer Fire Departments to promote cooperative prevention, suppression, and prescribed fire activities.
4. Minimum impact strategies and tactics will be used when possible.
5. Limit use of aerial retardants or foam near open water or waterways.
6. Prepare and implement an effective fire prevention plan to minimize fires.
7. Develop an annual prescribed fire plan to identify burn units and rotations.
8. Use prescribed fire as a management treatment for achieving hazard fuel and resource management objectives.
9. Initiate cost effective fire monitoring to ensure burn objectives are being met.
10. Use monitoring data to refine burn prescriptions to better achieve objectives.
11. Integrate fire ecology, management, and prevention themes into existing interpretive and education programs.

The safety and property of private citizens and incident personnel are paramount concerns. Suppression methods (direct vs. indirect attack) that impact fragile habitats should be weighed carefully against the need to protect property within and adjacent to the Refuge, provided there is minimal threat on human life.

Wildfire size-up should include an assessment of the threat to state and federally-listed endangered, threatened, and special concern species and their habitats from the fire and suppression measures. Similarly, wildfire size-up requires an assessment of the threat to cultural resources from the fire itself or suppression measures. Should either situation occur, advice will be sought from the Refuge Biologist.

Selected methods should cause minimum resource damage while accomplishing effective incident stabilization. The Incident Commander should not use heavy equipment (e.g., bulldozers) off designated roadways without specific authorization of the Refuge Manager (RM) or a designated representative.

Suppression strategies should be applied so that the equipment and tools used to meet the desired objectives are those that inflict the least impacts upon the natural and cultural resources. Minimum impact suppression strategies will be employed to protect all resources. Natural and artificial barriers will be used as much as possible for containment. Existing logging roads and wetland areas will serve as natural barriers in many areas. When necessary, fire line construction

will be conducted in such a way as to minimize long-term impacts to resources: (1) buffer strips of 30.5 m (100.0 ft) will be maintained between waterways and firelines; (2) when firelines must be placed within 30 m of waterways, they will be oriented perpendicular to the water way, if practicable.

Vehicle access to normally closed areas of the refuge will be made using existing farm and logging roads when possible. When off-road travel is determined to be necessary, vehicle access will be allowed with approval of the Refuge Project Leader or Delegate.

Heavy equipment such as crawlers, tractors, dozers, or graders will not be used within the refuge boundaries unless their use is necessary to prevent a fire from destroying privately-owned and/or government buildings and historic resources. The use of any heavy equipment requires approval from the Refuge Manager/ Project Leader.

Fire inhibiting chemicals (e.g., aerially applied retardants and Class A foam solutions) may be used with the concurrence of the Refuge Manager. Direct application of these chemicals into waterways such as stream channels, or drainage ditches must be avoided. Guidelines implemented in June 2000 require that application of retardants and class A foams be avoided within a 300 ft. buffer zone of waterways

#### D. Wildland Fire Management Options

All wildland fires on Canaan Valley NWR will be suppressed. Aggressive initial attack will generally be the suppression strategy for the entire Refuge, with the exception of Big Cove and Herz units, where difficult access and the absence of values at risk in some areas allow for a modified suppression strategy. Aggressive initial attack will be utilized on these units where possible, primarily along boundaries shared with other landowners. The use of natural or manmade barriers to contain the fire is also appropriate when increased safety or reduced cost over aggressive attack can be attained. Tactics will be unique to each incident dependent on safety consideration, weather conditions, cost of suppression, fuel conditions, the availability of resources and location of the fire in relation to structures, historical and cultural resource sites. Specific tactics will be determined by the Incident Commander on scene.

A prescribed fire program was developed for the 2002 FMP, and a prescribed fire project completed during that year. This plan continues, and expands upon, the program set forth in the 2002 FMP. Fire is important in the cyclical maintenance of grassland habitats (Vogel 1974, Jordan et. al. 1995). Fire remineralizes litter (Anderson 1990); increases grass productivity (Anderson 1990, Knapp et al. 1998), retards woody plant invasion (Anderson 1997), and increases community diversity, by controlling the balance between early-flowering and late-flowering grasses and forbs (Howe 1995). The Refuge can appropriately adopt fire as a management technique, maintaining open meadow habitats. Fire can also be used to restore non-native grasslands to more diverse, native, warm-season grasslands if appropriate. Prescribed fire

may be applied to forested areas of the refuge to achieve fuel reduction goals, to further research (i.e. aspen regeneration), and in the interest of forest health.

Non-Fire Fuel applications, to include WUI projects, such as mechanical and manual cutting of vegetation, is permitted within this plan, providing the need has been identified as an approved prevention treatment. Treatments may include mechanical and/or chemical, and may be used to reduce hazard fuels accumulations, create firebreaks, restore or modify habitats, and facilitate other management work on the refuge.

Wildland Fire Use (fire for resource benefit) will not be considered as an option at this time.

#### E. Fire Management Unit (FMU) and Strategies

Canaan Valley NWR will be divided into seven functional fire management units. These units were developed based on fuel type, access and potential hazards. The units for the Canaan Valley NWR are as follows: Southern, Central, Northern, Timberline, A-Frame, Camp-70, and Big Cove units. A map of the Fire Management Units and the acreage of dominant plant species associated with each are found in Appendix E. Previously discussed goals, objectives, and general strategies as discussed in section IIIA-C apply to all FMUs, with the noted exceptions or additions mentioned below.

1. Freeland Road Unit (1464 acres or 592 hectares) contains the Kelly-Elkins Tract, Graham Tract, Reichle Tract and Freeland Tract. Boundaries are essentially all lands south of Timberline road. Refuge Tracts in the Southern Unit consist of northern hardwood forest and mixed spruce-hemlock-hardwood forest, open fields, wet meadow and boggy areas and several small groups of balsam fir-red spruce-eastern hemlock associated with low lying wet areas. The largest single tract, the Kelly-Elkins, consists of approximately 760 acres of hardwood forest stretching from the valley floor to the ridge line of Cabin Mountain. On the peaks of Cabin knob and bald knob as well as in the two main drainages (Idleman's Run and Freeland Run) mixed spruce and hemlock occur in sometimes dense stands. Fuel model 9 is pre-dominant, along with Fuel models 8 and 5. Fuel models 1 and 3 occur on the Freeland Tract. Access to this tract is primarily along Forest Road 80, a partially maintained dirt road. The area is laced with many logging roads which vary in their suitability for vehicular access, but do provide breaks in the vegetation type and access for heavy equipment.

Fire suppression for this unit should be aggressive. The unit borders the Timberline development to the north and a private cross-country ski center and the Canaan Valley State Park to the south. A few private homes occur adjacent to refuge boundaries in this Unit. In addition, the higher elevations contain the only known populations of the threatened Cheat Mountain salamander on the refuge and potential habitat for the endangered WV northern flying squirrel. Preventing fires in the higher elevations of the Kelly-Elkins Tract will preserve habitat for these federally protected species.

Other considerations on this Unit include the balsam fir stand on the Freeland Tract. This stand is bordered on the east side by fuel models 1, 3 and 8 which have the potential of creating a fire with a fast rate of spread and tall flame lengths. Use of fire retardant should be limited on this Unit due to the prevalence of wetlands and open water.

2. Timberline Road Unit (606 acres or 245 hectares) consists of the Herz and Thompson Tracts. Habitat on the Herz Tract consists of wetland plant communities surrounded by mixed grasses and forbs with some areas of shrub swamp and hawthorn-savannah habitat. Fuel models include 1,3 and 5. Fire suppression on this Unit will vary depending on the Tract. The refuge Headquarters is located on the Thompson Tract and several businesses are located adjacent to refuge boundaries. These sites will require an aggressive suppression strategy. Fires on the Herz tract will be treated aggressively on the western and northern boundaries where the refuge boundary joins the Timberline development.

Access through the Herz Tract is limited due to the dominance of wetland vegetation, primarily moss which is generally too wet to cross by vehicle. Old four-wheel drive roads on the north side of the Herz Tract can be accessed through the Timberline development. The Thompson Tract is split by Rt. 32. The east side is dominated by grassland/wet meadow habitat. It has vehicular access on the west, south and north sides from Rt. 32, Timberline road and a maintained gravel road respectively. These roads will serve as effective fire breaks. The area can also be typically be accessed through the field most of the year on the east side. The west side of the Thompson Tract contains the refuge headquarters and visitor center. Most of the vegetation falls into fuel models 1 and 3, however tall spruce and pine trees are located adjacent to the headquarters building. Fires on this site will be treated aggressively.

3. Cortland Road Unit (1432 acres or 580 hectares) consists of the Harper, Beall, Geary, Boot of Italy, Cooper, and Cortland Tracts. These areas consist primarily of grassland and northern hard wood forest, fuel models 1,3 and 9. Some shrub thicket (fuel model 5) exists in the lower drainages. The Harper Tract can be accessed by a gravel road from Cortland road and through farm roads on the Beall Tract. One grassland field on the Harper tract is located on the east side of the Blackwater River most easily accessed through the Timberline Development, but may also be accessed via a farm road which crosses the river and therefore should only be considered when water levels are low.

The Beall Tract is accessed from Old Timberline road and through two maintained gravel roads and two established farm roads. An important water source, an old farm pond, is located in the northern grassland unit of the Beall Tract. This tract is bordered on the west by several homes which will be a primary area for protection in the event of a wildfire. Fires on the north Beall Tract (Fuel model 9) can be treated less aggressively as there are no private homes or businesses bordering this area. One exception is a private in holding along the main north-south gravel road on the Beall Tract. This home will be a primary focus for protection given a fire situation on the Beall Tract. One barn occurs on the Beall Tract but is not considered historically significant and is not used by the refuge.

The Geary Tract ( is located on the eastern slope of a ridge between the Blackwater River and

Timberline Development. Fuel model 9 predominates on this property. This tract was logged as an agreement of acquisition and large slash piles are still located on the property which present potential fire hazards to the homes in the Timberline Development to the east. These homes will be the primary area of protection in the event of a wildfire. Access to this tract can be made through the Beall Tract on Old Timberline road across the Blackwater river during low water conditions or through the Timberline Development. A rough logging road provides vehicle and equipment access through the property.

The Cooper Tract and Boot of Italy are accessed from Rt. 32 on a maintained gravel road or from Cortland Road. A farm road provides access through grassland unit to the north. Fuel models 1 and 3 predominate this property, however lower areas near the river have shrub swamp habitat (fuel model 5) and northern hardwoods (fuel model 9) begin to fill in the upper elevations grading up slope to the private homes to the north-west. The strip of houses located on the ridge to the north and west of the Cooper Tract access road which will be an area of primary concern for protection in the event of wildfire. Several structures exist on the Cooper tract (two hay barns) but neither have historic significance and are not being used by the refuge. This tract has water access from the North Branch river located to the east of the access road.

The Cortland tract is accessed directly from the north end of Cortland road. Fuel model 9 and 1 are dominant on this property. Private homes border to the south of this tract however are separated by Cortland road which will serve as an effective fire break. Two old farm roads are located on this tract which provides equipment and vehicle access to the grassland portion of the tract. The forested portion of Cortland Tract is accessed by Rt. 32 on the west side, but no interior roads exist through this habitat. A small stand of balsam fir occurs on the south-western portion of this tract which should be a focus for resource protection, however vehicle access to this site is difficult.

4. Middle Ridge Road Unit (3767 acres or 1525 hectares) consists of the southern and mid portion of the Main Tract and can be accessed through the Timberline development via Timberline Road □ Spruce Island Lake Road □ Lakeview Road □ Middle Ridge Road (beyond Refuge gate). The eastern and northern boundaries are delineated by Glade Run, which runs North-South, the western boundary is delineated by the Blackwater River, and the southern boundary is delineated by the Refuge Boundary, which borders the Timberline development. The homes within this development will be the primary area of protection in the event of a wildfire. Middle Ridge road runs North-South through this unit providing access to a majority of the property. There are additional roads and trails throughout this property that adjoin Middle Ridge Road to facilitate further access. Additionally, this network of roads and trails will provide adequate fire breaks. The unit consists of northern hardwood forest (fuel model 9), timber - litter and understory (fuel model 10), shrub swamp habitat (fuel model 5), grasslands (fuel model 1), and wetland habitat (fuel model 3). This tract was logged prior to acquisition and large slash piles are on the property present potential fire hazards to the homes in the Timberline Development. These homes will be the primary area of protection in the event of a wildfire.

5. A-Frame Road Unit (4029 acres or 1630 hectares) consists of the eastern portion of the Main Tract and can be accessed by Route 93 north of the town of Davis. The western boundary of this

unit is delineated by Glade Run which runs North-South and the Little Blackwater River, northern/eastern/southern boundaries are delineated by the Refuge boundary. The unit consists of northern hardwood forest (fuel model 9), timber (litter and understory) (fuel model 10), shrub swamp habitat (fuel model 5), grasslands (fuel model 1), and wetland habitat (fuel model 3). The southern boundary of this unit borders the Timberline development. This tract was logged prior to acquisition and large slash piles are on the property present potential fire hazards to the homes in the Timberline Development. These homes will be the primary area of protection in the event of a wildfire. Protection of Timberline property is easiest accessed through Timberline property via Timberline Road.

6. Camp-70 Road Unit (3773 acres or 1527 hectares) consists of the western portion of the Main Tract and can be accessed by Camp 70 Road in the town of the Davis. The eastern and southern boundaries are delineated by the Little Blackwater and Blackwater Rivers, and the northern and western boundaries are delineated by the Refuge boundary. The unit consists of northern hardwood forest (fuel model 9), shrub swamp habitat (fuel model 5), grasslands (fuel model 1), and wetland habitat (fuel model 3). Hunting cabins do exist on this unit but are not considered historically significant and are not used by the refuge.

7. Big Cove Unit (450 acres or 182 hectares) consists of the northernmost tract of land and is nearest to the Main tract. This unit can be accessed by A-Frame Road off of Route 93. The unit consists of northern hardwood forest (fuel model 9), shrub swamp habitat (fuel model 5), grasslands (fuel model 1), and wetland habitat (fuel model 3). Because of access difficulty and lack of structures or resources needing protection, fires can be treated less aggressively. However, fire suppression activities should focus on using natural barriers and the unit's perimeter to prevent fire spread onto the land surrounding Big Cove, which is leased by Mountaintop Hunt Club from Allegheny Power. In the event of fire, the Refuge will coordinate with Mountaintop Hunting Club regarding suppression activities and fire status.

## F. Major Refuge Fuel Types

The Fire Management Units (FMUs) on Canaan NWR contain several fuel types. The following fuel types, fire behavior, and fire effects relate to all FMUs.

### 1) Fire Behavior Fuel Model 1 (NFDRS Model L)

Description: This model represents grassland fields. Fine perennial grass species predominate with some annual grasses and other herbaceous fuels present. Fuel loading is generally under two tons/acre. Most fields are periodically mowed, thus fuel bed depth is under two feet for much of the year. A small amount of encroaching woody vegetation, typically occupying less than 25% of the site, is present in most situations.

Fire Behavior: Fire spread is governed by the fine, very porous, and continuous herbaceous fuels that have cured or are nearly cured. Fires are surface fires that move rapidly through the cured grass and associated material. Fires occurring within this

fuel type are typically a problem in the spring and occasionally in late fall when perennial grasses are cured. High spread rates can be expected, but fire intensities remain low and are short in duration. Flame lengths may approach four feet with a rate of spread in excess of 50 chains/hour with an associated wind event. A fire in this fuel type usually will due little lasting resource damage.

## 2) Fire Behavior Fuel Model 3 (NFDRS Model N)

Description: This fuel model covers coarse marshland grasses in and around Refuge impoundments. This fuel type is typically in excess of three feet in height and the total fuel loading present is in excess of three tons/acre. Uncut upland fields may be represented, although rates of spread will be over predicted.

Fire Behavior: in this fuel are the most intense of the grass group and display high rates of spread under the influence of wind. Wind may drive fire into the upper heights of the vegetation and across standing water. Windy spring or fall days with warm temperatures and low humidity make this fuel type hazardous. Expect an extremely fast moving fire front in excess of 100 chains/hour with flame lengths over 12 feet. A fire in this fuel type will normally only be controlled at the change in fuel type near the edge of the marsh.

## 3) Fire Behavior Fuel Model 5 (NFDRS Model F or T) Scrub/Shrub

Description: This fuel type consists of under story grasses and forbs, and litter cast by shrubs. The shrubs are young with little dead material and the foliage contains little volatile material. Thus, fire intensity is generally low.

Fire Behavior: Slow-burning fires are expected with rates of spread less than 5 chain/hr and flame lengths under 0.6 m (2.0 ft). Fire is ordinarily carried in the surface fuel. Fire can display high rates of spread under the influence of wind. Wind may drive fire into the upper heights of the canopy. Stands are tall, averaging about 3' to 6', but considerable variation may occur. Approximately 1/3 or more of the stand is considered dead or cured and maintains the fire. Fuel loading is 3.0 tons/acre and consists of up to 1/4" - 1 and 10 hr) dead fuel component. Fire behavior is directly related to the fuel moisture and windspeed. Short-range spotting (up to 100') usually occurs and causes high to extreme control problems.

## 4) Fire Behavior Fuel Model 8 (NFDRS Model H and R)

Description: Closed to semi-closed canopy stands of hardwoods. Litter layer is compact, composed of leaves and twigs. Little undergrowth is present.

Fire Behavior: Slow-burning ground fires are generally the case. Fires will normally exhibit low rates of spread (under 5 chains/hour) with flame lengths less than 2 feet except when an occasional fuel concentration is encountered. Fires normally will

remain on the surface, except under dry conditions where fire may burn down through the duff layer and into underlying peat deposits. Only under severe weather conditions involving high temperatures, low relative humidities, and high winds, do the fuels pose fire hazards. Occasional flareups are possible when fire encounters heavier fuel concentrations.

#### 5) Fire Behavior Fuel Model 9 (NFDRS Model E)

Description: Open or closed hardwood stands and mixed stands with leaves off. Litter layer is fluffy, leaves subject to movement under windy conditions. Scattered concentrations of dead-down woody materials are greater than in Fuel Model 8 above.

Fire Behavior: Fires in this fuel type will have a higher rate of spread due to the deciduous leaf litter layer. Under windy conditions expect spotting problems from rolling and blowing leaves. Fires will generally remain on the surface and can be a problem in the spring before green-up. This fuel type can also be a problem in the fall if normal moisture is not received and an unwanted ignition source is present. Flame lengths can be expected to exceed 2 feet with a rate of spread of 5 to 10 chains/hour possibly causing containment problems under windy conditions.

#### 6) Fire Behavior Fuel Model 10 (NFDRS Model G)

Description: Model 10 consists of any forest type if heavy down materials are present. Much of the down woody material is over 3 inches (7.6 cm) in diameter.

Fire Behavior: Fire spreads through high loadings of dead, down woody fuels beneath overmature timber stands. Shrub understory or tree reproduction may be present. Torching of individual trees and spotting is more frequent, and fire intensity is higher in this model than model 8 or 9, thereby leading to potential fire control difficulties. More wind or drier conditions could lead to an escaped fire.

Potential fire behavior by fuel models found at Canaan NWR was previously discussed under the FMU Section. Past fire occurrence is low to non-existent for the refuge, and would be associated with warm, breezy spring days or late summer and fall drought periods. There is no record of a lightning-ignited fire, indicating that would be a rare event, however potential exists. Most wildland fire probably will start on the refuge or the boundary lines where public access is permitted.

Fire Behavior Fuel Model 9 has the greatest potential for control problems and Wildland and Urban Interface threats. Fires in this fuel type will have a higher rate of spread due to the deciduous leaf litter layer. Under windy conditions, expect spotting problems from rolling and blowing leaves. Fires will generally remain on the surface and can be problematic in spring before green-up. This fuel type can also be problematic in fall if precipitation is below normal and an unwanted ignition source is present. Flame lengths may exceed 0.6 m (2.0 ft) with a rate of spread of 5 to 10 chain/hr. Keeping fire out of this and more flammable fuel models that join

and run into the forest can reduce the wildland fire threat.

A wildland fire exhibiting extreme fire behavior should be a rare event at Canaan Valley. However, this does not remove the threat to human health and welfare. Wildland fire and prescribed fire remain a hazard and prescribed safety measures are to be followed.

Local weather information was obtained from the U.S. Forest Service automated weather station 90 miles to the south at Marlinton West Virginia. The local NOAA weather station will be used to obtain precise wind speed, relative humidity and temperature information for the refuge. FireFamily Plus was used to generate outputs. Three years of fire weather data were available. As the database grows, output values will be adjusted so that the refuge can keep informed on high fire danger days and the greatest fire behavior potential. Additional information generated through the FireFamily Plus program can be found in Appendix F.

#### **IV. WILDLAND FIRE MANAGEMENT PROGRAM COMPONENTS**

This section includes program direction for suppression actions taken on fires, use of management-ignited fires, and any non-fire applications which may help achieve refuge goals and objectives. Even though a full range of suppression responses is available and consistent with objectives, and constraints, an aggressive, quick initial attack with full control within the first burning period is the typical response. When firefighter safety dictates indirect attack, indirect and parallel tactics are appropriate as the safest and economical suppression strategies.

##### **A. WILDLAND FIRE SUPPRESSION**

###### **1. Historical Role of Fire**

Fire was an instrumental force in developing the existing vegetation present in Canaan Valley today. After a period of intense logging at the turn of the century, widespread fire (both intentionally set and accidental) repeatedly burned the Valley's humus soils and peat wetlands. Resulting vegetation has been slowly developing in stages creating important early successional habitat for a variety of wildlife and plant species. An example of pyric vegetation which grew up in response to periodic fires were aspen (*Populus tremuloides* and *P. grandidentata*) communities. These aspen-dominated communities persisted for several decades, but have been decreasing in abundance likely resulting from a lack of fire induced disturbances. In addition, open grassland and pastures occur in the southern portion of the Valley (and on the refuge) which had been maintained periodically in the past through the use of fire on agricultural lands. However, recent management of open grassland areas has been predominately mechanical (mowing/haying) for at least the past 20 years.

The earliest records of fire in the Canaan Valley are from 1865. As reported by Fortney (1975), "a huge forest fire started by hunters devastated parts of Canaan Valley and was followed by other fires also started by hunters". The next instance of fires in Canaan Valley are noted sometime later after the bulk of the logging had been completed at the turn of the century. As

noted again by Fortney (1975) “Canaan Valley and adjoining areas received their final destructive blow when fires swept over the lands, kindled by the logging slash, burning many of the last remaining trees of the great coniferous forest, and the deep organic soil which had taken thousands of years to develop.”

Since that time there is no good documentation of fire history for Canaan Valley. The area was cleared and farmed for cold weather crops such as potatoes and cauliflower and there were likely periodic fires set to help remove brush and slash piles. After the vegetable crop era, much of the open land was used for hay and grazing. There is no information concerning the used of prescribed fire to maintain these fields or of periodic wildfires in these areas.

### Pre-settlement Fires

Information on fires prior to settlement of Canaan Valley are scant. Vegetation types which existed in Canaan Valley included dense red spruce forest with laurel under story with interspersed palustrine wetland plant communities. Even though red spruce was dominant in the valley, the surrounding slopes contained mixed northern hardwoods such as sugar maple, American beech, yellow birch, black cherry and Eastern hemlock (Fortney, 1975). These vegetation types are not fire-dependant and would likely experience a relatively long, natural fire rotation interval. Studies in New Brunswick found that red spruce-hemlock-pine vegetation had a fire rotation of 230 years (Wein and Moore, 1977). Northern hardwood forests in northern New Hampshire and Maine are cited as having a fire rotation between 230 years and 5,200 years (Fahey and Reiners, 1981).

It is unlikely that intense and frequent fires were an important, natural component of the ecology of the vegetation in Canaan Valley. Information on fires in boreal forests studied in Newfoundland state that a fire rotation of 50 to 100 years was typical and that the fires killed most trees within the burn (Hunter, 1993). However, it is likely that although the Canaan Valley was dominated by red spruce and some smaller stands of balsam fir which are boreal tree species, fire rotations were longer than Hunter reported for true boreal forests. One reason is that the original forest was not a true boreal forest and had mixed species composition which included laurel and rhododendron and more typical northern hardwood tree species. In addition, large catastrophic fires as Hunter described on a 50-150 year rotation may not have occurred in Canaan Valley due to the expansive wetlands acreage. Northern hardwood forests, such as those found at CVNWR, have been dubbed “the asbestos forests” given the fact that fire is not common in this forest type (Lorimer, 2001).

### Post-settlement Fires

Fires appear to have been somewhat common in the Allegheny mountains when human inhabitants arrived in the area some 10,000 years ago. These scattered fires are typically described as being set by Native Americans for clearing forest for agriculture or to drive game. In Canaan Valley, fire history seems based on the development of the logging industry in the late 1800's and early 1900's. Logging operations in Canaan Valley left large accumulations of slash which was set on fire on purpose and by accident several times.

Notes of fires in Tucker County include statements by Hough (1882) that 20 square miles of forest burned in May 1880 as a result of land clearing activity, and by Egleston (1884) who noted that thousands of acres were destroyed by fires from hunting deer through the use of ring-fires. Reports of repeated fires at the turn of the century describe Tucker county with “scarcely a trace of vegetation” (Brooks, 1908). Generally fires described in Tucker County and Canaan Valley have all been described as destructive forces, as a result of wholesale logging practices, rather than prescribed for forest health or management.

Fire suppression activity in began in the 1920's and had greatly reduced the number of incidences in West Virginia (Stephenson, 1993). The Monongahela National Forest was established in 1920 in an effort to help prevent disastrous floods by reestablishing forest cover in the high mountain areas of the state. With this effort came the building of multiple fire towers to suppress forest fires and allow the regeneration of West Virginia’s forests.

## 2. Preparedness

Preparedness is considered the work accomplished prior to fire occurrence to ensure that the appropriate response, as directed by the Fire Management Plan, can be carried out. Preparedness efforts are usually accomplished outside the normal fire season dates, and then adjusted as necessary.

Prior to and during the fire season, the Refuge Manager, or designee, and South Zone FMO will take the following measures to ensure adequate fire preparedness:

Update and maintain accurate employee training and qualification records. Review Cooperative Agreements with surrounding fire management agencies. Prepare plans for any prescribed burn projects for hazard fuel reduction and resource management projects. Order fire supplies and replacement equipment as needed. Obtain necessary physical fitness evaluations. Provide updates or changes to cooperators for local and regional mobilization plans. Evaluate the need for basic firefighter training and conduct if necessary. Review and revise Fire Management Plan as needed.

The fire season in the Appalachian Mountains of northeastern West Virginia occurs in the fall (October -December) and spring (March-May). Fall fires generally pose the greater risk due to the drier conditions and unconsolidated leaf litter. Spring fires are less likely due to the typically high amounts of snow melt and rain that characterize Canaan Valley at that time of year.

While there is a great deal of historical information regarding fires in the area, the refuge itself has no documented fire history. For planning purposes, Canaan Valley NWRs fire season will mirror what is considered the typical fire season for the geographic area. The refuge can access the Beardon Knob or NOAA weather station located on the Refuge for up to date weather. Throughout the fire season, the FMO at Great Dismal Swamp will monitor the potential for critical

fire activity on the refuge, based on drought severity (KBDI), 1000 hour fuel moisture, and associated weather trends that may contribute to limits of acceptable control.

#### a. Prevention

The refuge will conduct a Fire Prevention Analysis that identifies the hazards, risks and values of the existing Refuge and those lands within the approved acquisition boundary. High hazard areas will receive treatment commensurate with values at risk. Proposed treatments can include public awareness, restricting access, and mechanical reduction projects. This may also include harvesting operations, and construction/maintenance of fuel breaks.

Most of the wildfire potential at CVNWR is related to human actions, and thus preventable. Human caused fires have the potential to be the most damaging because they can occur at a time of the year when fewer initial attack resources are available and fuels are drier. Active fire prevention programs will be conducted in conjunction with the local fire departments to protect human life and property, and prevent damage to natural and cultural resources or physical facilities. Public outreach using bulletin board materials, handouts and interpretive programs should be used to increase visitor and neighbor awareness of fire hazards. Trained employees need to relate to the public the beneficial effects of prescribed fires as opposed to unwanted human-caused fires, with emphasis on information, essential to understanding the potential severity of human-caused wildland fires and how to prevent them.

It is essential that employees be well informed about fire prevention and the objectives of the refuge's fire management program. Further, employees must be kept informed about changes in existing conditions throughout the fire season.

During periods of extreme or prolonged fire danger emergency restrictions regarding refuge operations or area closures may become necessary. Such restrictions, when imposed, will be consistent with those implemented by the U.S. Forest Service and state agencies. Closures will be authorized by the Refuge Manager.

#### b. Education

Educating the public on the value of fire as a natural process is important to increasing public understanding and support for fire program management. The Refuge will use the most appropriate and effective means to explain the overall program. When necessary, interpretive presentations deemed will address fire and explain its role in the environment. A program of internal and external education regarding potential fire danger will be implemented. Visitor contacts, bulletin board materials, handouts and interpretive programs can all be utilized to increase visitor and neighbor awareness of fire hazards. Consulting with the Zone FMO is the most effective method to determine the scope and best approach to further fire awareness.

Good public relations can engender public support and is prerequisite to a successful fire management program. Failure to provide good public information can be responsible for collapse of the program. Fires can spread very quickly and visibly, necessitating that timely, accurate information concerns both prescribed fire and wildfires be provided to refuge visitors

and adjacent landowners.

The Refuge will issue all press releases regarding fire danger levels, closures, special precautions, and prescribed fires to newspapers, radio and television stations. The Project Leader or designee, when necessary, will function as Information Officer, and provide for effective communication between personnel, the public, and the media. The fire management program will be incorporated into the refuge's overall interpretive program and explained when possible and appropriate. At higher staffing classes and/or during periods of high fire activity, an Information Officer will be ordered from outside the refuge.

Informing the public is an important part of fire suppression, fire prevention, prescribed fire, and the FWS mission. During Fire operations the IC / Burn Boss is responsible for providing fire information to the press and the public. The IC may delegate this task as needed.

Informing the public is a vital element of the prescribed fire program. Areas that have been burned will present an opportunity for the public to actually see the effects of fires, and offer staff members and excellent opportunity to explain the purpose of the burns to the public. These programs should demonstrate the refuge's capability to safely conduct prescribed fire operations, and increase the public's tolerance of the aesthetic effects.

The public information program will be developed as follows:

1. Concepts of the prescribed burn program will be incorporated, as appropriate, in publications, brochures, and handouts.
2. During periods when prescribed burns are ignited, handouts will be prepared and distributed to all visitors entering areas of fire activity.
3. The fire management program may be incorporated into visitor contacts. Particular attention will be given when fires are conspicuous from roads or visitor use areas.
4. News releases will be distributed to the media as appropriate.
5. The public information outlets of neighboring and cooperating agencies and the regional office will be provided with all fire management information.
6. The fire management program will be discussed in informal talks with all employees, volunteers, residents, and neighbors.

Prior to the lighting of any planned ignition, information will be made available to visitors, local residents, and/or the press about what is scheduled to happen and why. On-site information will be provided to alleviate visitor concern about the apparent destruction of resources by fire or the impairment of views due to temporary smoke. This information will include prescribed burn objectives and control techniques, current fire location and behavior, effects caused by the fire, impacts on private and public facilities and services, and restrictions and closures.

As outlined in the prevention section, emergency closures or restrictions may become necessary during periods of extreme or extended fire danger.

### c. Community Grant Assistance

The Department's Rural Fire Protection Program (RFA) has proven a great tool by which to properly train and equip local fire departments in the area. To date, Canaan Valley and Davis Fire Departments have received grant money for suppression equipment, and is the best alternative to supply suppression forces which the Refuge depends on. Providing the RFA program remains in effect, additional grant requests should consider fire training, and prevention awareness to further assist the Refuge fire program.

#### d. Training and Qualifications

Canaan Valley NWR will conform strictly to Service-specific guidelines as well as the National Wildfire Coordinating Group (NWCG) Publication 310-1, "Wildland and Prescribed Fire Qualification System Guide" (January 2000). Service employees participating in any wildland fire activities on Fish and Wildlife Service lands must meet these requirements as well as those for fitness, and personal protective equipment (PPE). The Refuge currently has 3 employees who meet these requirements and an additional 2 employees without current red-cards. A list of CVNWR fire management staff and current qualifications is in Appendix G. More information about training, fitness and PPE is provided in Chapter 1.5 of the FWS Fire Management Handbook, and the Fire Management Officer at Great Dismal Swamp NWR. Consult with the FMO on arranging fire training for Refuge staff.

Red Card qualification information, such as training records and fire assignments, are maintained through the Incident Qualifications and Certification System (IQCS). Refuge staff will submit information annually, and will be verified by the Zone FMO. The FMO maintains a file on refuge personnel; the refuge should document the training an individual receives in their personnel file. A copy of the course completion certificates should also be placed within the individual's file.

#### e. Readiness

Readiness activities include developing this plan and annually reviewing thereafter. First response for initial attack is made by local fire departments, followed by contacting the Zone FMO for additional resources needed. Equipment includes personal protective equipment, hand tools, hoses, fittings, firing devices. An NUS inventory of capital equipment is located in Appendix H. The Deputy Refuge Manager will be the cache manager. Refuge staff with fire qualifications must complete annual Refresher training and meet arduous fitness testing (pack test) prior to any initial attack action.

The Canaan Valley NWR has a central communications system. A base radio unit, mobile units on refuge vehicles and several hand held units are available. Emergency contact frequencies have been obtained through cooperative agreements. The refuge radio system will serve as the primary communication link. Cell phones can be used as a back-up to the radio system.

#### f. Detection

The Refuge depends upon staff, volunteers, visitors, neighbors, local fire departments, and sheriff offices to assist in detection and reporting of Refuge fires. If conditions develop which make wildfire incidence more likely, staff will monitor areas more closely. This is particularly important during the fall hunting seasons when more people are in the woods during the driest months of the year.

The Fire Management Plan does not discriminate between human-caused and lightning caused fire. All wildland fires will be suppressed. However, detection shall include a determination of fire cause. Moreover, human-caused fires will require an investigation and report by law enforcement personnel. For serious human-caused fires, including those involving loss of life, a qualified arson investigator will be requested through the Zone FMO.

The Dispatch plan (Appendix I) will be reviewed and updated annually. Copies will be maintained at the Zone Fire Management Office (Great Dismal Swamp NWR), the Refuge Headquarters, and with the Local Fire Agencies.

#### g. Aviation

Other than occasional detection flights conducted by state personnel, the use of aviation resources for fire suppression at Canaan Valley NWR is expected to be minimal. This is due not only to the relative lack of fire occurrence in this area, but also to the scarcity of aircraft resources which are certified to assist in fire suppression efforts. There has not been an agreement with any agency, state or federal, assistance via airplane or helicopter.

### 3. Initial Attack

All wildland fires will be suppressed with fire fighter and public safety as the highest priority. Fires will be suppressed in a prompt, safe, aggressive, and cost-effective manner to produce smallest resource/acreage adverse impacts. Generally direct attack is the most cost effective tactic, provided it can be done safely. Otherwise indirect tactics are necessary, as determined by the incident commander.

The Refuge will rely on local fire departments for initial attack response. The closest forces to respond will be fire department members from Davis and Canaan Valley. Not all of these department members may meet NWCG standards for wildland firefighting. Though not ideal, this will not be a limiting factor for the first burning period during initial attack. Should the fire extend into additional burning periods, then by policy, all suppression personnel will need to meet NWCG standards.

Contact numbers are listed in Appendix I. Additional resources can come from the Forest Service and Service fire fighters stationed at Great Dismal Swamp, keeping in mind the long arrival time.

#### a. Refuge response

All fires not classified as prescribed fires are wildland fires and will be appropriately suppressed. Initial attack on wildland fires on the refuge will be from the Canaan Valley Fire Department. If necessary, additional resources can be pulled from the U.S. Forest Service. The closest Fish and Wildlife Service fire crew is located at the Great Dismal Swamp NWR, approximately 6 hours driving distance.

Service employees participating in any wildland fire activities on Fish and Wildlife Service or cooperator's lands will meet fitness requirements established in PMS 310-1, except where Service-specific fitness requirements apply. Exceptions to fitness requirements on Initial attack activity are available from the Regional Fire Management Coordinator per guidelines in Chapter 1.5 of the Fire Management Handbook (USFWS 2000).

#### B. Incident Commander

Canaan Valley NWR will use the Incident Command System (ICS) as a guide for fireline organization. Qualified FWS firefighters will respond to all wildfires occurring on Refuge or threatening Refuge lands. In the event of no qualified FWS incident commanders the Refuge Manager will designate a resource advisor to advise the incident commander on the Refuge policies. The refuge manager will brief the incident commander on the location and status of the fire, as well as on pertinent details of this fire management plan (e.g., protection of special natural or cultural resources.) If initial attack is not successful, the manager will notify the Service's South Zone Fire Management Officer to prepare extended attack actions.

The incident commander will:

1. Locate, size-up, and coordinate suppression actions, including briefing subordinates, directing their actions and providing work tools. Depending on fire complexity, some positions may be filled by the same person. The incident commander will complete a pre-attack planning checklist.
2. Provide public and firefighter safety.
3. Considering current and predicted fire conditions assess need for additional suppression resources and estimate the final size of the fire. The potential for spread outside of the refuge should be predicted, as well as the total suppression force required to initiate effective containment action at the beginning of each burning period.
4. Assess the need for law enforcement personnel for traffic control, investigations, evacuations, etc., and make requests to the New England Fire Management Officer.
5. Document decisions and complete a fire report (Agency Wildland Fire Report).
6. Keep refuge manager informed
7. Notify refuge manager when initial attack is not successful, so WFSA can be developed for next operational period

Other duties of the incident commander are described in the National Wildfire Coordinating Group Fireline Handbook.

#### c. Public Safety

Canaan Valley is dedicated to ensuring the safety of each visitor and to all residents and property adjacent to the refuge's boundary. Because wildfires are dynamic and can be hazardous, they must be given very high priority during certain critical conditions. Employees responsible for and involved in any wildland fire management activity must always consider the safety of human life above all other values. Assuring visitor and firefighter safety takes priority over other activities at all times; being able to provide a consistent and accurate evaluation of fire behavior is the basis for contingency plans, contacts, and briefings that ensure public and personnel safety.

The following are Canaan Valley's NWR public and employee safety considerations:

- Limited opportunities to find safety zones for escaping from a fast moving wildfire on the Refuge trail and road system. Refuge visitors will likely not be able to recognize a safe area so emphasis will be to sweep potentially effected areas as quickly as possible.
- Certain areas will be closed to use when the risks to visitors is too high or there are not enough personnel to handle the situation any other way.
- Information concerning fire danger will be disseminated through the Visitor Center contacts, trail head and bulletin board signing. Any time human life may be endangered, all necessary means will be taken to warn or evacuate visitors and neighboring landowners and other users.
- Smoke on roadways may create a vehicle visibility hazard, from a fire burning nearby or at night under light wind conditions. It could also occur on roadways outside the refuge.

The Refuge Manager or Fire Management Officer will inform the staff of potentially hazardous conditions on the refuge. The Project Leader or appointee will coordinate public and interagency notifications and implement them if a fire should occur. Suppression actions will be taken to mitigate the fire's impact within and outside the refuge. The extent of public notice will depend on the specific fire situation. The following actions should be considered:

- When fire affects travel along any roads in Canaan Valley NWR, law enforcement or refuge staff will be dispatched to stop or control traffic. The State Patrol and Sheriffs office will be informed and assistance requested as needed.
- When evacuation of an area is recommended, the Project Leader, Refuge Manager, and Regional Fire Management Coordinator will be informed immediately.
- When heavy smoke impacts the Refuge, personnel will be sent to inform people of the situation, assess the area, and clear out if necessary.
- When fire is projected to rapidly spread and threaten sites or trails where visitors are known or strongly suspected to be, an employee will be dispatched to the area by best possible means to notify visitors of the danger. Such individuals will be knowledgeable of fire behavior and fire safety principles to be able to stay with visitors as long as needed to assist them to safety.
- As part of initial and continuing size-up, the Incident Commander will determine the proximity to the fire of any visitors or other land users, inform them of potential hazards, and aid in evacuation if needed. If life is threatened, and the parties do not cooperate, law enforcement assistance may be requested through dispatch.
- When needed, information on location, behavior, expected dangers, areas to avoid, and other precautions will be posted on refuge bulletin boards, and local post offices and businesses.
- When the risks from a wildland fire are high, precautionary signs will be posted on trails and bulletin boards. The Prescribed Fire Burn Boss will ensure that closure and/or informational signs on prescribed burns are properly posted.

A Status Summary (ICS 209) for all fires burning over 24 hours will be provided to the Eastern Area Coordination Center. The status summary will be distributed to all divisions on a daily basis. Smoke plume trajectories from large fires will be plotted using computer programs, weather information and onsite monitoring. Expected impacts on off-refuge communities and roadways will be evaluated and information shared with the respective agencies. If needed, vehicular or air patrols will be used to monitor smoke plumes. The Fire Information Officer will

notify and make media releases on local TV and newspapers, and through electronic mail if needed. The Fire Information Officer will be updated whenever new fire information is available. Additional notification will be made to cooperating agencies, as appropriate.

Ensuring and maintaining firefighter safety is of the utmost importance and takes precedence over rapid suppression targets or goals. The South Canyon Fire in Colorado in 1994 serves to reinforce the need to ensure and maintain firefighter safety. On all actions on wildland fires in Canaan Valley, the 10 Standard Firefighting Orders and 18 Situations That Shout Watch Out will represent Refuge Policy and will be strictly adhered to. Failure to maintain communications and to obtain fire behavior predictions and weather forecasts constitute grounds to suppression forces to withdraw from firelines and re-establish tactics. It will be the responsibility of the Fire Safety Officer to ensure that all safety measures are implemented and anyone failing to adhere to fireline safety will be removed from the fire.

The Incident Commander or Burn Boss will ensure that:

- All firefighters will wear proper personal protective equipment.
- All firefighters have completed basic wildland fire training S-130/190. All firefighters on wildfires must have successfully passed the Pack Test within the past year. All firefighters on prescribed burns must have successfully passed the Field Test within the past year.
- Communications is possible with all people involved with the fire.
- Fire weather will be taken at minimum every hour during on going fires.
- Any significant change in fire behavior or weather will be communicated immediately to everyone on the fireline.

#### 4. Extended Attack

The IC will notify the Refuge Manager whenever it appears that a fire will exceed initial attack efforts, threaten Service/private lands, or when fire complexity will exceed the capabilities of command or operations. The Refuge Manager will be responsible for coordinating with the IC all extended attack actions including:

Completion of Delegation of Authority if needed (Appendix J).

Completion of daily review of a Wildlife Fire Situation Analysis (WFSA; Appendix K).

#### 5. Air Quality

US Fish and Wildlife Service fire management activities which result in the discharge of air pollutants, (e.g., smoke, carbon monoxide, and other pollutants from fires) are subject to, and must comply with, all applicable federal, state, interstate, and local air pollution control requirements. These requirements are specified by Section 118 of the Clean Air Act, as amended (42 USC 7418). It is not the primary intent of the Clean Air Act to manage the impacts from natural sources of impairment (i.e., wildland fire use for resource objectives and wildfires). Smoke from these fires is an inevitable by-product. Fires are not considered point sources of emissions, but tend to be spatially distributed singular events, and temporary impacts to visibility and visitor enjoyment must be recognized, expected, and managed. This may include temporary closures or warnings during the progress of management approved prescribed fires. Pertinent

areas that will demand attention include any of the heavily traveled highway corridors within the acquisition boundary and any other populated areas adjacent to refuge lands. Canaan Valley NWR will comply with Air Quality-Smoke Management Guidelines listed in the Fire Management Handbook.

The effects of fire on air quality vary depending on time of year, fuel loading, and location of the unit. Air quality effects are normally minimal except with the most severe and intense wildfires. Intense wildfires often are accompanied by visual impairment and compromised air quality during the duration of the incident. Adverse air quality associated with prescribed burning usually is minimal since burn units are small and only ignited under conditions that yield adequate smoke dispersal and total consumption of fuels less than 2.5 cm (1.0 in) diameter. Larger fuels, such as stumps, snags, and logs are usually unavailable (higher moisture content) or easily extinguished during mop-up operations.

The goals of smoke management on the Refuge will follow goals enumerated by the National Wildfire Coordinating Group (1985): reduce fire emissions, enhance the dispersal of smoke plumes, steer smoke plumes away from smoke-sensitive areas, and coordinate the ignitions of prescribed burns. Smoke management practices will include maximizing combustion efficiency (to reduce particulate emissions).

The management of smoke will be incorporated into the planning of prescribed fires, and, to the extent possible, in the suppression of wildland fires. Sensitive areas will be identified and precautions will be taken to safeguard visitors and Refuge neighbors. When burning is done adjacent to roads and highways, close attention will be kept on wind conditions to prevent a driving hazard. There will be no hesitancy to postpone a burn when the wind conditions are questionable. A copy of the Fire Management Plan will be forwarded to the appropriate authorities, if necessary. Personnel from permitting agency will be allowed on-site during prescribed fires and wildland fires used for resource objectives for observational purposes if necessary for their agency needs.

Prescribed burning will be conducted only on days that are acceptable to the permitting agency. Any monitoring activities will be coordinated with the permitting agency and information collected will be made available to them as requested. All burn plans will have clear objectives and will monitor impacts of smoke on the human and natural environments. Current and predicted weather forecasts will be utilized along with test fires to determine smoke dispersal.

Prescribed burns ignited in proximity to structures will be ignited only after careful considerations are given to levels of visitation and impacts upon visitation and local residents and should be identified in the prescribed burn plans.

Considerations useful in managing smoke from longer duration fires include:

Develop contingency plans to limit smoke production if the need arises (may involve suppression on portions of the line).

Establish and maintain close communication with state and local air regulatory agencies regarding status of such fires.

The fire management program will be in compliance with interstate, state, and local air pollution control regulations, as required by the Clean Air Act. The Refuge Manager or Burn Boss will contact local and state authorities to ascertain all procedures prerequisite to compliance with regulations or permits, or ensure in writing that regulatory requirements will be met.

All prescribed burns must comply with West Virginia Air Quality Regulations for Burning. A permit for prescribed burning is required. All burn projects are required to have a permit from West Virginia Dept. Of Forestry, Fairmont office (304-367-2793). Projects will be submitted to the local fire department for review in advance by submitting a copy of the Prescribed Fire Plan.

## 6. Other Management Considerations

### a. Step-Up Actions.

Fire Management involves prevention, detection, preparedness, and suppression activities. The scope of activities associated with each type of fire management action varies with changes in the risk of fires igniting and with the predicted fire behavior. This Plan uses the Burning Index (BI), derived from the National Fire Danger Rating System (NFDRS) (Deeming et al. 1977), and the Keetch-Byram Drought Index (KBDI) (Keetch and Byram 1988) as an important measure for basing determinations regarding the scope and extent of fire management activities. Depending on the BI and KBDI derived from the daily NFDRS/WIMS data, predicted fire danger is classified as low, moderate, high, very high, or extreme. A set of staffing classes, which have a corresponding set of actions that the refuge will initiate to meet potential fire danger, has been developed and is presented in Appendix L.

Burning indexes and Keetch-Byram Drought Index utilized in development of CVNWR staffing classes were taken from an historical analysis of fire weather observations archived for the US Forest Service Station in Marlinton West Virginia (Station number 464203). NFDRS fuel model E was used as the primary fuel model for fire danger calculation purposes. For these observations, the low fire danger rating equates with BI's ranging from 0 to .9; moderate equates with BI's ranging from 10 to 18; high ranging from 19 to 26; very high ranging from 27 to 35; and extreme with BI's of 36 and greater.

Actions taken under staffing classes I - III are funded through the normal refuge budget. Additional actions detailed under staffing classes IV - V can be supplemented by emergency preparedness funding requested through the Regional Fire Management Coordinator. Burning index, associated staffing classes, and designated prevention, detection, and preparedness actions to be taken with each level are discussed in Table 1 below. Using the Keetch-Byram Drought Index (KBDI), modify staffing as follows:

Table 1 - Staffing Adjustments in Response to KBDI Changes

<u>KBDI Range</u>	<u>Staffing Adjustment</u>
0 -150	Reduce 1 Class (Normal 12/15-2/15)
151-264	No Change (Normal 5/16-7/14 and 10/16-11/14)

265- 346  
>347

Increase 1 Class (Normal 7/15-10/15)  
Increase 2 Classes (Rare event)

Emergency preparedness describes actions to provide extra capability during times of extreme or unusual fire danger caused by meteorological influences on the refuge's fuel complexes. Unusual occurrences will be addressed by planned use of emergency preparedness funds linked to the national Fire Danger Rating System (NFDRS) burning index, and as described in the "Step-up Staffing Classes" of Appendix L. The Refuge's authority to expend emergency preparedness funds is detailed in FWS Fire Management Handbook. Appropriate actions for use of emergency preparedness funds include: hiring of temporary emergency firefighters; placing existing staff on extended tours of duty; increasing or initiating special detection operations; pre-positioning additional resources in the Refuge (engines, crews, etc.); and hiring fixed-wing or rotary aircraft to accomplish necessary preparation. These are planned to ensure the capability of prompt response with adequate forces to whatever specific fire situation develops. Authorization to expend emergency preparedness funds will be obtained from the Regional Fire Management coordinator who will evaluate the justification presented and reply to the refuge within 24 hours.

b. Regional and National Concerns. The regional preparedness level tends to follow the national preparedness level unless the eastern seaboard is experiencing very dry conditions and a high potential for wildfire. Expect normal refuge operations to occur through National Preparedness Level IV.

At National Preparedness Level V, when local fire conditions permit, and subject to supervisory approval, all individuals with fire training should be made available to meet regional and national needs. It is expected that all fire funded individuals are available at all times for national and regional resource needs.

c. Pre-attack Plan. Upon discovery of a fire, all subsequent actions will be based on:

1. The Incident Commander (IC) will locate, size-up, and coordinate suppression actions.
2. The IC and Refuge Manager provides for fire fighter and public safety.
3. Based on current and predicted conditions, the IC will assess the need for additional suppression resources and estimate the final size of the fire. The potential for spread outside of the refuge is predicted, as well as the total suppression force required to initiate effective containment action at the beginning of each burning period.
4. The IC will assess the need for law enforcement for traffic control, investigations, and evacuations. This becomes a resource request to the Zone FMO, through the Refuge Manager.
5. All decisions are documented and Wildland Fire Report completed by the IC.
6. An extended attack fire situation requires Delegation of Authority (Appendix J) and preparation of a Wildland Fire Situation Analysis (WFSA) beyond the first burning period. The Zone FMO will work with the Refuge Manager to meet these needs, and coordinate with the IC.

d. Minimum Impact Suppression Guidelines: Suppression efforts can sometimes cause more resource damage than the actual fire. Efforts to minimize resource damage must be a consideration with all suppression actions. As a general rule, the assigned IC will evaluate the suppression resource needs, seek alternatives to mechanized equipment that limit soil movement, maintain natural water courses and minimize land degradation, while at the same time minimizing the threat to human life and property. The IC shall seek Refuge Manager approval prior to any heavy equipment and retardant use within the Refuge Fire Management Units.

It is the responsibility of the Incident Commander to establish the minimum impact suppression tactics to protect natural and cultural resources. All personnel involved with Fire Management are expected to have an understanding of minimum impact suppression tactics such as indirect or parallel attack (instead of direct attack), utilization of existing barriers for control lines, and cold trailing. Further guidelines can be found in the Fire Management Handbook, FM 3.2.6.

A Resource Advisor will be used on any fire that has the potential for significant resource damage caused by suppression operations or whenever the Incident Commander requests the position. The Resource Advisor should be an employee with resource management knowledge to advise the Incident Management Team on issues related to mitigating the affects of suppression operations on cultural and natural resources.

e. Protection of Resources. Natural and cultural resources will be protected to the maximum extent feasible, but their protection will not be the highest priority. Appropriate suppression action will first and foremost ensure firefighter and public safety. When no threat to human life exists, protection of natural and cultural resources from fire or suppression damage will be the next highest priority. For example, suppression tactics should be applied so that equipment and tools avoid or minimize impacts to natural and cultural resources. Critical protection areas, such as the administrative buildings, will receive priority consideration in fire control efforts. No foam suppressants or retardants should be used on the refuge to protect various water resources. Heavy equipment such as crawlers, tractors, bulldozers, or graders will not be used within the refuge boundaries to suppress fire unless their use is necessary to prevent a fire from destroying privately-owned and/or government buildings and cultural resources. The use of heavy equipment requires approval from the refuge manager. If new natural or cultural resources of concern are discovered during fire suppression activities, the refuge manager will ensure their protection from damage related to fire activities to the extent appropriate and possible. The manager will consult with the regional historic preservation officer to avoid, minimize, or mitigate potential or actual damage to cultural resources.

i. Wildlife

The direct impacts of fire on wildlife include disturbance or infrequent mortality of individuals or groups of individuals, particularly slow moving and/or sedentary species. Most Eastern U.S. ecosystems that have developed since the last ice age evolved with fire as a natural disturbance, with various return frequencies according to site. Fire is therefore a natural, important ecological force in the development of most natural communities (Barbour et al. 1999). Most species have evolved responses and adaptations to fire; some cannot be maintained in a region without fire's periodic influence (DeBano et al. 1998).

One of the primary objectives of the Canaan Valley NWR is to provide a diversity of wildlife habitats. A variety of successional stages may be maintained with prescribed fires, contributing to overall habitat diversity across the Refuge landscape. Fire may also be used to assure that particular, fire-tolerant or fire-adapted species and communities are maintained, further contributing to species diversity. In general, catastrophic, stand-replacing fires cause significant, but often short-term adverse impacts on large areas of wildlife habitat. Such sites eventually revegetate and repopulate, through secondary successional processes.

It is important to consider the life cycles of plants and other species, and the fire regimes to which they are adapted, when assessing the effectiveness of fire in wildlife management. Prescriptions for management ignited fire should take into account the following factors: 1) fire frequency, 2) season of fire, and 3) severity, duration, and extent of burning (DeBano et al. 1998). Each of these aspects of fire behavior can have specific consequences for a plant or animal species. For example, a plant or insect species may be eliminated from a site if fire occurs too often, or during the wrong part of the organism's life cycle.

#### ii. Endangered Species/Sensitive Resources

The fire management program will take appropriate action to identify and protect from adverse effects any rare, threatened, or endangered species, or other sensitive natural resources at CVNWR. Areas of sensitive natural resources include: (1) stands of balsam fir, a tree species of concern in the state; and (2) high elevation refuge lands which provide habitat for the threatened Cheat Mountain salamander (*Plethodon nettingi*) and the endangered West Virginia northern flying squirrel (*Glaucomys sabrinus fuscus*).

Balsam fir communities tend to occur in poorly drained wetland soils on the refuge. These areas are less likely to burn or carry a fire during most of the year as they remain quite wet. Stands of balsam fir occur on the Freeland Tract, Reichle Tract and Cortland Tract. The use of heavy equipment in these areas (such as creating a disc or dozer line) would be highly disruptive to the wetland plant communities growing in and around the fir stands.

Habitat for the Cheat Mountain salamander and West Virginia northern flying squirrel occurs in the high elevation forests of the refuge on the Kelly-Elkins tract. Habitat for these species must be protected from burning in order to maintain suitable conditions for their continued use of the area. Both species are associated with a red spruce and/or Eastern hemlock component to their habitat. Fires in these types of sub-alpine forests are not frequent, which allow considerable amounts of woody debris to develop on the forest floor. This debris is important for the salamander which uses downed woody debris for cover and for nesting. Rotting logs also provide substrate for lichens and fungus which may be an important component to the squirrel's diet.

The Kelly-Elkins tract is laced with old logging roads which will serve as fire breaks in the event of wildfire situations. These roads can also provide access for dozers and pumper trucks for suppression activities. Fire should be suppressed in these high elevation areas of the refuge in order to protect the conditions necessary to support the threatened Cheat Mountain salamander

and endangered West Virginia northern flying squirrel.

These areas are generally cool and wet, and ignition probabilities are usually low, except under extreme drought conditions. Furthermore, the Refuge does not currently plan to conduct any prescribed fire operations within northern flying squirrel habitats. Therefore, there is not likely to be an impact from prescribed burning activities. In the event that prescribed fire is considered in these areas, such actions will require careful planning and consultation with endangered species habitat specialists, to ensure that fire treatments are compatible with life cycle requirements of listed species. The Refuge Fire Management program will be implemented in cooperation with the Endangered Species Act of 1973, as amended, and will take appropriate action to identify and protect from adverse effects any rare, threatened, or endangered species.

Wetland habitat on the refuge is also considered to be sensitive. The Canaan Valley's wetlands hold regional and national significance due to their size and species composition. Many wetland plant species with typically northern ranges are found in Canaan Valley representing unique botanical communities. These areas also harbor plants listed as state Species of Concern due to their limited distribution in West Virginia.

## B. WILDLAND FIRE USE

Wildland fire use (fires for resource benefit) is not authorized on the refuge at this time.

## C. PRESCRIBED FIRE

### 1. Long Term Prescribed Fire Program

Prescribed fires involve the use of fire as a tool to achieve management objectives. Research burning may also be conducted when determined to be necessary for accomplishment of research project objectives. The Refuge Manager, in consultation with the Refuge Biologist and/or Regional Biologist, Zone Fire Management Officer, and Regional Fire Staff will formulate the long term prescribed fire program. The results of this planning effort will be:

The designation of Burn Units

The preferred treatment interval

The recommended method of treatment (Fire, Fire/Mechanical/Chemical, etc)

The recommended treatment sequence (Rotation)

The annual target acreage scheduled for treatment.

The total target acreage treated annually

Measures to be taken to ensure the successful implementation of the prescribed fire program are:

1. Conduct a vigorous prescribed fire program with the highest professional and technological standards;
2. Identify the prescribed burn type most appropriate to specific situations and areas;
3. Efficiently accomplish resource management objectives through the application of prescribed fire;

4. Continually evaluate the prescribed fire program to better meet program goals by refining prescriptions treatments and monitoring methods, and by integrating applicable technical and scientific advancements;
5. Prepare prescribed burn plans with a review by a qualified Prescribed Fire Manager/Prescribed Burn Boss, and approval by the Fire Management Officer.
6. Conduct prescribed burns with an adequate number of qualified personnel to conduct the burn as well as to mop-up.

## 2. Refuge Prescribed Fire Program Objectives

Canaan Valley NWR has identified prescribed burning as a potential tool for managing refuge resources. The implementation of a prescribed fire and fuels treatment program at Canaan Valley NWR will result in an estimated 100-200 acres treated on an annual basis. Burns will be conducted in most habitats on a rotational basis, and are also subject to local weather patterns, availability of personnel, and approved funding, therefore it is likely there will be some years when no treatments take place on the refuge.

The refuge envisions using prescribed fire primarily on a rotational basis to set back succession in grassland and shrub land areas. In addition, prescribed fire may be used to remove hazardous fuel loads in hardwood forests, to protect quality habitat for target wildlife species, or potentially to remove slash in harvested areas that are subsequently acquired by FWS. The prescribed fire program goals are therefore resource/habitat management, and to a lesser degree, hazard fuel reduction:

Hazard fuel reduction (mechanical removal or prescribed fire) may occur within or near Refuge development zones, sensitive natural resources, and boundary areas. To reduce the risk from wildland fire and to the greatest extent possible, hazard fuel burns should compliment habitat/resource management objectives. Goals of hazard fuel reduction prescribed burning include:

- <maintain fuel loadings within the natural ranges (determined by fuel type)
- <protect habitat from wildfire trespass
- <establish defensible space around improvements and structures

Habitat/resource management prescribed fire is used to restore/create/maintain a diversity of plant communities in order to restore and perpetuate native wildlife species. The frequency of achieving many of the goals may require rotational, prescribed burns. Goals of resource management burns are likely to include:

- <stimulate native upland species production in grasslands, shrub lands, and in the future forests
- <aid in control of invasive species
- <set back successional processes (woody invasion, litter accumulation)
- <target regeneration of species in wetland communities
- <

### 3. Annual Planning Activities

Planning will start several months in advance of implementing the burn program. Actions include the selection and prioritization of prescribed burns to be carried out during the year, development of prescribed burn plans and burn prescriptions, and identifying time of year for burns will be scheduled. In general, units will be burned during the spring (March – April) growing season, or late fall/winter, for fuel reduction. Grasslands will be burned on a rotational basis, approximately every 3-5 years, to ensure a variety of successional habitats for grassland birds, and other wildlife. A longer rotation (approximately 6-8 years) may be used in the shrub-scrub and forest habitats, depending on vegetative response.

The Zone Fire Management Officer or designated Burn Boss, along with refuge staff, will write individual prescribed fire plans for the units to be treated. Per Service policy, all burn plans must be reviewed and signed by the designated Burn Boss, the Regional Fire Management Coordinator, and Refuge Supervisor. The Refuge Manager will have final approval for implementation of the plan.

The Zone Fire Management Officer shall assign the burn boss of the appropriate level to implement the burn. The burn boss will follow all the guidelines and procedures that are contained in the Prescribed Fire Plan. Prescribed burning qualifications will be reviewed annually, with personnel directed toward appropriate training courses, depending on interest and availability. Training requests are submitted to the Zone FMO for further consideration and scheduling. At the Refuge level, most of the burning is of low complexity, requiring a minimum qualification of Firefighter Type 2 rating. At least one individual, who meets the qualifications for Prescribed Fire Burn Boss (RXB3), is required as the Burn Boss on low complexity burns. Assistance can be provided by the South Zone Fire Management Officer and fire crew stationed at Great Dismal Swamp NWR.

### 4. Preparation and Implementation

Mowing and other site preparation will be accomplished for necessary firebreaks. Baseline vegetation and fuel information will be collected and compiled. An annual Prescribed Burn Plan will be prepared and submitted 60 days in advance of proposed burn window for necessary approvals. The Annual Prescribed Burn Program will be implemented as approved by the RFMC.

Follow-up vegetation and wildlife monitoring, evaluation, and reporting requirements will be accomplished following completion of all prescribed burning activities.

Responsibility for the preparation of the individual burn blocks will be assigned or contracted to a qualified equipment operator. It may be necessary to mechanically or chemically treat areas prior to conducting prescribed burns. The need for this aspect will be identified in the prescribed fire plan.

Due to the limited number of optimum burn days, the District Fire Management Officer or Burn

Boss must monitor the weather, fuel conditions, and other environmental factors closely to take advantage of favorable conditions. This information will be communicated to the Refuge Manager and the Cooperators to implement the burn.

## 5. Seasons

Due to the relatively short growing season, and high precipitation levels, the most likely times of year to successfully accomplish prescribed fires in north-eastern West Virginia are in the fall and spring, generally from September through December and March through May. Canaan Valley experiences snow cover during most winter months. The risk of an escaped fire will be greater during the fall-winter burn season due to the drier conditions and unconsolidated leaf litter. Spring burn windows are likely to be short due to the usually high amounts of snow melt and rain that characterize Canaan Valley at that time of year. Growing season burns, although occasionally appropriate for ecological reasons, will be difficult to accomplish.

## 6. Monitoring and Evaluation

a. Background Monitoring and evaluation are part of the prescribed fire process. Monitoring may be long term or on-going due to the habitat management goals of the prescribed burns. Monitoring is conducted pre-burn, burn day, and post-burn. Pre-burn and post-burn evaluations are accomplished with transects or plots depending on the habitat type and fire unit.

b. Types of Monitoring All of the burning done at the Refuge will be well documented. Basic site conditions will be recorded during prescribed burns, to ensure that prescribed burning activity is within prescription, as required by Refuge Annual Prescribed Burn Plans. Site conditions monitored generally include temperature, relative humidity, mid-flame wind speed and direction, cloud cover, 1 hr. fuel moisture, and 10 hr. fuel moisture. Additional, optional site conditions include fuel loading, soil moisture, and soil temperature. Measuring these additional parameters may yield important information for research-related prescribed fire.

In addition, basic fire behavior will be recorded. This will aid in post-burn evaluation, to determine if 1) the fire behaved as predicted; and 2) specific fire behavior can be linked to specific vegetation/habitat effects. Fire behavior to be monitored includes: type of fire (backing, heading, flanking), rate of spread, and intensity (inferred from flame length). Other possible parameters include: percent surface fuels burned, fuel consumption, burning duration, maximum temperatures, and soil heating. Measuring these additional parameters may yield important information for research-related prescribed fire. No special equipment is necessary for monitoring fire behavior. Most burns will be low to moderate in intensity and easily measured through rate of spread and flame length observations. Should more comprehensive fire behavior and effects information be necessary, it will be outlined in the Annual Prescribed Burn Plan.

Basic monitoring to determine habitat response will generally use photo-points, which will be revisited and photographed during subsequent seasons. It is vital that the Refuge devote time to post-burn monitoring of burn plots. Comparisons over time will aid in determining if burn objectives and resource objectives are being met. More complex monitoring efforts may be

undertaken for research-related prescribed burns, or to answer question about the effects of prescribed fire on specific wildlife or other habitat parameters. Such monitoring can require vegetation transects, breeding bird point counts, presence/absence of target species, etc.

#### c. Habitat Response Monitoring Requirements

Hazard Fuel Reduction Operations (sub activity 9263) funds may be used to facilitate adaptive management when evaluating fuels management program and project effectiveness, and to ensure that refuge resource management goals and objectives are not compromised by the fuels management projects. The use of 9263 funds will be limited to monitoring the first and second order effects of fuel management projects (prescribed fires, mechanical or chemical fuel treatments, etc.) on fuel and wildlife habitat composition and structure, as recognized and well-described as measurable objectives in an approved refuge habitat management plan. Monitoring will be limited to before and after treatment and at 1, 2, 5, 10, and 20 year after treatment intervals.

Although funding wildlife population inventories or fire effects research or management studies on wildlife is not an appropriate use of 9263 funds, evaluating fuel management treatment effects on wildlife habitat composition and structure is intended to complement these inventories, management studies and research projects. Because fuels management effectiveness monitoring is not an emergency, Base 8 personnel costs or costs associated with back filling personnel or personnel overtime costs will not be funded.

Fuels management effectiveness monitoring will require the preparation and approval of a monitoring plan. This plan can be a separate Fuels Treatment Monitoring Plan or part of a holistic adaptive management program that integrates all refuge resource monitoring activities. Whether separate or integrated the plan should contain:

- A full description of the fuel and wildlife habitat monitoring attributes, monitoring objectives, approved monitoring protocol description in sufficient detail that a successor can continue the monitoring, and the approved refuge Fire Management Plan and/or habitat management plan reference identifying the monitoring need.
- Description of management actions to be taken when monitored habitat attributes reach established threshold levels.
- The refuge's commitment to implementing and completing the monitoring and management actions.

The Regional Fire Management Coordinator and/or Regional Fire Ecologist will assure that before any fuel treatment monitoring (beyond the first order fire effects monitoring in the Prescribed Fire Plan) is approved for funding:

- The fuel and wildlife habitat monitoring activities are adequately described in the approved refuge Fire Management Plan and/or an approved refuge habitat management plan.
- The monitoring protocols conform to regionally established fuel and wildlife habitat monitoring protocols established under Fulfilling the Promise WH-10(1) action item or the Service's Fuel and Fire Effects Monitoring Guide.
- The plan is independently reviewed by the regional fire ecologist and/or wildlife biologist to determine if the proposed protocols are the most cost effective and statistically defensible means of addressing monitoring objectives.

- All stakeholders are aware of management changes that may result from the monitoring results.

## 7. Complexity

A Complexity Analysis, using eight complexity elements, is required as an input into FIREBASE, the Service's fire management project and budgeting database, to determine funding and staffing needs for an individual project. This analysis will be done by the Zone FMO in conjunction with the refuge. A second, more detailed, complexity analysis is also required for individual burn plans. The development of this analysis is accomplished using the NWCG Fire Complexity Rating System Guide, and is intended to identify risks, potential consequences, and technical difficulty associated with implementing the plan. Results of the complexity analysis will determine overall complexity of a project (1, 2 or 3) and will dictate the qualifications required to execute the project. Most of the burns at Canaan Valley NWR are expected to be of Low Complexity. However, due to air quality considerations or proximity to housing developments, some burns may be of Moderate to High Complexity.

## 8. Potential Impacts

The area in and around Canaan Valley NWR is a popular tourist location year round, and receives moderate visitation. The area itself remains largely rural. Census figures for 2000 show Tucker County as a whole with a population of 7321 people, but the seasonal influx to the resorts and vacation homes in the valley will make the number of people in and around the refuge at any given time fluctuate.

The challenge for managers is to develop a strategy that effectively mitigates the potential impacts/issues associated with prescribed burns. Issues that have been identified include:

- A small staff with limited qualifications and experience.
- A narrow burn window with a limited number of days when the unit(s) are in prescription due to transport wind requirements, the proper soil moisture, etc.).
- Air Quality and public safety concerns resulting from smoke generated by prescribed firing operation.
- Restrictions that reduce the opportunity to burn a given area using a variety of fire intensities necessary to stress or kill woody species and create a mosaic.
- Close proximity to developments (the wildland-urban interface) and traffic on area roads.
- The need to protect sensitive habitat(s) (such as protect high-quality aquatic habitats from erosion and ash effects)
- The need to protect breeding animals, such as endangered species and migratory birds

## 9. Reporting And Documentation

Individual prescribed burn plans will be the primary document used to record prescribed fire information. Burn plans document air quality requirements, personnel, costs, fire behavior, weather, fire summary, and burn critique information. Prescribed burns will also be documented on DI-1202 forms and entered into the Fire Management Information System.

#### 10. Prescribed Fire Critiques and Plan Review

Individual prescribed burn plans will be reviewed by a prescribed fire burn boss, South Zone Fire Management Officer, Regional Fire Management Coordinator, and Refuge Supervisor, prior to implementation. Prescribed fires will be critiqued by the burn boss and documented in the appropriate section of the burn plan. Regional Fire Management Coordinator, Refuge Manager, Incident Commander, and FMO will conduct a formal critique if:

- there is a significant injury/accident
- There is an escaped prescribed fire
- significant safety concerns arise
- there are smoke management problems

#### D. Non-Fire Fuel Applications

Non-Fire Fuel applications, to include WUI projects, such as mechanical and manual cutting of vegetation is permitted within this Plan, provided the need has been identified as an approved prevention treatment. This activity also is permitted when considering adjacent communities at risk for hazard fuel abatement. Non-fire fuels projects may be initiated when needed. Mechanical treatment of natural fuels may be developed for hazard fuel reduction where identified. Projects may be addressed in several ways- as a fire fuels project, as a WUI project, or as a normal refuge operational project. A fuels project should be coordinated with the South Zone Fire Management Officer. A WUI project should be coordinated with the Regional WUI Coordinator. Work planned and accomplished as part of normal refuge operations will follow established refuge policy and procedures.

#### E. Emergency Rehabilitation and Restoration

Once a fire is out, efforts will be made to return the fire site to as natural a state as possible if needed. Generally most initial attack fires will not have rehabilitation needs. However, each incident shall be evaluated following policies set forth in Departmental Manual, 620 DM 3. Also refer to the Interagency Burned Area Emergency Stabilization and Rehabilitation Handbook.

In the event of a large fire, a Resource Advisor will be designated and a Rehabilitation Plan developed, approved by the Refuge Manager and implemented by the Incident Commander prior to the release of those people from the incident. This Rehabilitation Plan will establish counter measures, and outline methods to minimize or restore damage. Mechanically constructed fire lines should be built with water bars and effectively blocked to limit vehicular access. Consideration will be given to reseeded and moving woody debris back into fire lines to simulate natural processes and accelerate healing of the disturbed site. Any disturbed natural water channel will be reestablished. Reduce visual impacts by cutting stumps to ground level.

Rehabilitation is any action taken to restore an area to the pre-burn or natural condition. Incident Commanders are responsible for short-term (less than six months) actions to mitigate the effects of

fire suppression activities. Immediate rehabilitation actions will be outlined in the Incident Action Plans. Post-incident rehabilitation actions will be documented in a rehabilitation plan and approved by the RFMC.

Rehabilitation will occur on all fires according to the following standards and techniques:

1. Remove all trash and debris from firelines, staging areas, helispots, ICP's and other incident locations. Attempt to return such areas back to their original condition.
2. Flush cut all stumps that were disturbed or created on the incident.
3. Scatter brush and debris from suppression activities over constructed firelines. Break up machine-made slash piles.
4. Remove pumper chances (water drafting sources) and constructed dams in water courses.
5. Fill in firelines with leaf litter and brush material. Construct water bars to prevent erosion when necessary.
6. Reseed, with native grass seed, firelines outside of the Refuge if significant impact was caused. Firelines inside the Refuge may be seeded only if determined to be an erosion hazard and a plan is completed and approved by the RFMC.

## **V. ORGANIZATION AND BUDGET**

The organizational structure for meeting fire program needs within this Plan is based on a Service Zone or District concept. Line authority stems from management and administrative support at Canaan Valley NWR. To meet most fire needs within this Plan, resources from Great Dismal Swamp with the addition of fire qualified personnel at Canaan Valley NWR can be assigned. The Zone FMO at Great Dismal Swamp NWR (Service's Region 5 South Zone) is the principal contact for technical support and assistance in fire management.

### **A. Fire Management Team Responsibilities**

Wildland fires on the Refuge, or on lands threatening the Refuge, constitute an emergency situation, and activities associated with suppressing or otherwise managing these fires will take priority over all other activities, except the activities involved with safeguarding of human life. All Refuge employees will be available to assist with emergency suppression needs on the Refuge.

Actual fire duty assignments will include only those duties for which each employee is personally qualified under the National Interagency Fire Qualification System. Individuals must meet training and physical fitness requirements to serve in fire line positions. Support duties will be filled as needed. Qualified individuals will be made available for off-Refuge assignments if the National fire situation warrants, or to further career development, subject to staffing needs. A listing of CVNWR fire management staff and current qualifications is found in Appendix G.

### **B. Refuge Fire Management Team**

Refuge Manager (RM): The Refuge Manager will have final responsibility for the development and implementation of the fire management program, and will annually review the fire management program. The Refuge Manager will have final approval of cooperative and interagency agreements, and approval of all management ignited prescribed fire plans. The Refuge Manager will serve as the Incident Commander on any wildland fires or will delegate that role to the appropriate individual.

Refuge Biologist (RB): The Refuge Biologist will be responsible for the overall management of the fire program, and will assure that all fire management activities are consistent with and meet resource objectives. The Refuge Biologist will assist in developing cooperative agreements with adjacent agencies and landowners, developing all management ignited fire plans to assure they meet resource objectives, serve as resource advisor on wildfires, and oversee fire behavior, effects, and ecological studies.

Fire Management Officer (FMO) located at Great Dismal Swamp

- Maintains liaison with Regional Fire Management Coordinator and Cooperators.
- Manages district prescribed fire activities including:
  - Coordinates annual prescribed fire program to meet management objectives
  - Prepares or approves individual prescribed fire plans
  - Serves as or designates Prescribed Fire Burn Boss
  - Provides daily validation that prescribed fires are under prescription and meet all other Service policy requirements

Assists Refuge Biologists with fire research and fire effects monitoring.

Assists in the operation of the fire public relations program:

- Responsible, with the Public Use Staff, for planning programs to educate the public regarding the role of fire in the Refuge and fire prevention
- Prepares and presents slide programs, video presentations and displays about the Fire Management Program

Coordinates and supervises the fire management program.

Prepares and manages the fire budget.

Administers the payroll, purchasing and travel for the fire staff.

Supervises the fire staff.

Plans, coordinates, and directs all Preparedness activities including:

- Fire training
- Physical fitness testing and Interagency Fire Qualification System and data entry.
- Fire weather station operation and data entry.
- Fire cache and equipment inventory accountability, maintenance and operation.
- Coordinates with cooperative agencies. Revises agreements as necessary.
- National Fire Danger Rating System (NFDRS) use.
- Insures the step-up Preparedness plan is followed.
- Prepares annual Fire Base budget request, tracks use of funding.
- Informs staff of fire situation and potential for wildfire

Coordinates and directs all suppression activities including:

- Dispatching

- Fire Command
  - Insures fire management and safety policies are observed
  - Advising Refuge Manager of the status of fire suppression operations
- Prepares a fire prevention plan, and coordinates fire prevention duties with other employees.
- Coordinates refuge fire training needs.
  - Annually updates the Fire Management Operations Plan, maintains fire records, and reviews completed DI-1202's for accuracy.
  - Administers the suppression evaluation process on wildland fires.

Regional Fire Management Coordinator (RFMC) - The Regional Fire Management Coordinator is responsible for oversight of the fire program and coordinates budget preparation and fire activities. RFMC also reviews Fire Management Plans and annual prescribed burn plans.

Deputy Refuge Manager: The Deputy Refuge Manager will be designated Refuge Fire Coordinator. This position may be delegated to one of the above listed positions, or another staff member. If designated to a position already listed, the following duties will be in addition to those listed for that position (i.e. Refuge Biologist). The Deputy Refuge Manager will:

- be responsible for oversight and coordination of the Refuge fire management program, and the implementation of the fire management plan.
- serve as advisor to the Refuge Manager and other staff on matters related to fire management and the Refuge fire program
- serve as the manager of all wildland and prescribed fire activities on the Refuge, if available, to include serving as incident commander on wildland incidents, and burn boss on prescribed fires, within limits of current qualifications.
- maintain training and qualification records for refuge personnel, coordinates refuge fire training, through Southern Zone Fire Management Officer (FMO) or Regional Fire Management Coordinator, maintains fire records and systems, and oversees equipment readiness.
- advise and assist outreach team leader in development of outreach and educational activities

Outdoor Recreation Planner (ORP): The Outdoor Recreation Planner will serve as the Public Information Officer for the Refuge, addressing public and media inquiries regarding the fire program, and coordinating outreach and educational activities related to fire program.

Office Assistant (OA): The Office Assistant serves as the communications link for on-going wildfires and prescribed fires. Maintains a unit log during a wildfire. Responsible for posting of firefighter time and meeting procurement needs at the local level during and on-going incident.

### C. Budget

No fire funds are specifically earmarked to conduct fire management activities at Canaan Valley NWR. However, funds can be requested to meet hazard fuel treatment needs, habitat management objectives, other prevention needs, NUS, and PPE through the Zone FMO on an annual basis. Other funds from regional fire program sources are available to cover training, travel associated with, and physical exams.

### D. Agreements

The refuge currently has three qualified individuals and a minimum base of equipment for suppression activities, depending heavily on other agencies for suppression resources. The following cooperators will be used in the refuge response to wildfires:

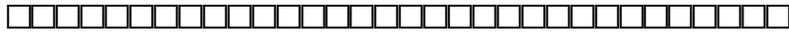
Canaan Valley Volunteer Fire Department(CVVFD) - Cooperative agreement for suppression of wildfire on refuge lands.

Davis Volunteer Fire Department (DVFD) - Cooperative agreement for suppression of wildfire on refuge lands.

3. U.S. Forest Service - Cooperative agreement for suppression of wildfires on refuge lands.

Cooperative agreements with the Canaan Valley VFD, Davis VFD, and the U.S. Forest Service (Appendix D) provide that resources of each agency are available to assist in initial attack efforts. These agreements detail payment among cooperators, list of response areas and communications frequencies, and have been reviewed by a contract specialist and/or solicitor.

Dispatch Plans will be developed to provide the most efficient level of fire operations. The Dispatch Plan (Appendix I) contains the guidelines for a reported fire and the proper dispatching to effect a quick and orderly initial attack by the closest local resource. The contact name, location, telephone numbers, are listed in descending order of contact priority in the Dispatch Plan



## VI. Monitoring and Evaluation

### A. Fire Investigation

After a wildland fire has been detected, refuge personnel should be wary of suspicious individuals or vehicles. Refuge personnel should not disturb a fire location in case an investigation is needed. Fire management personnel from the responding fire department will attempt to locate and protect the probable point of fire origin and record pertinent information required to determine fire cause. They will be alert for possible evidence, protect the scene, and report findings to the fireline supervisor. All suspicious fires will be promptly and efficiently investigated. Fire management personnel other refuge staff should not question suspects or pursue the fire investigation unless they are currently law enforcement commission qualified.

Personnel from other agencies may investigate wildland fire arson or fire incidents involving structures. All fire investigations should follow guidelines in section 4.1-2 of the Service=s Fire Management Handbook. If this is necessary, the Zone Fire Management Officer should be contacted.

### B. Required Reporting

The refuge manager must report all wildland fires to the South Zone Fire Management Officer, who will add the fire to the Fire Management Information System. The incident commander will be responsible for documenting decisions and completing a fire report (e.g., ICS-214, Agency Wildland Fire Report). Fire reviews will be documented and filed with the final fire report. The South Zone Fire Management Officer will retain a copy and will be responsible for additional required reports such as an annual regional fire summary report and meeting national fire performance measures. This report will document fires by type, acres burned by fuel type, cost summary, personnel utilized, and fire effects.

### C. Annual Fire Management Plan Review

The refuge manager will review the Fire Management Plan annually and ensure necessary updates or changes are accomplished before the next fire season. The manager will determine if additions, deletions, or changes warrant re-approval of the plan.

## Glossary of Fire Terminology

**Anchor Point** - An advantageous location, generally a fire barrier, from which to start constructing a fireline; used to minimize the chance of being outflanked by the fire while the line is being constructed.

**Appropriate Management Response** - Specific actions taken in response to a wildland fire to implement protection and fire use objectives.

**Backfire** - A predetermined strategy where a fire is set along the inner edge of a fireline to consume fuel in the path of a wildfire and/or change the direction of force of the fire's convection column.

**BEHAVE** - A system of interactive computer programs for modeling fuel and fire behavior, comprised of two subsystems; BURN and FUEL.

**Blackline** - Preburning of fuels adjacent to a control line, where there is no unburned material between the fireline and edge. A fireline reinforcement tactic.

**Burning Index** - An estimate of the potential difficulty of fire containment as it relates to the flame length at the head of the fire. In general, BI divided by a factor of 10 indicates approximate flame length, it traces seasonal trends reasonably well and is used by the agency for determining initial action resource needs (Step-Up Planning) based on fire potential only.

**Burning Period** - A 24-hour period ending at 10 a.m. The first burning period of a fire would be from the time of ignition until 10 a.m. the following day.

**Burning Out** - Setting fire inside a control line to consume fuel between the edge of the fire and the control line. Used to widen control lines during line construction or to eliminate unburned fuels inside the control lines after containment.

**Chain (ch)** - A unit of measure equal to 66 feet. 80 ch equals 1 mile; 10 ch<sup>2</sup> equals 1 acre. Commonly used to report fire perimeters and calculating fire size.

**Confine/Contain/Control** - These terms, when used in the context of suppression strategies, are confusing since they also have tactical meanings. Containment and control are assumed to maintain their definition for fire reporting purposes, where "containment" implies the completion of a fireline around a fire and any associated spot fires which can reasonably be expected to stop the fire's spread. "Control" is a point in time where fire suppression actions have removed any threat of fire escape, and at which time hazard pay stops.

**Energy Release Component (ERC)** - A NFDRS value related to the 24-hr potential worst case, total energy released per unit area within the flaming front at the head of a fire. It is directly related to the available energy (BTUs) per unit area (ft<sup>2</sup>) within the flaming front. The importance of this component is that the day-to-day variability is minimal as the value is not affected by wind

speed. This is the best component for indicating the effects of intermediate to long-term drying on fire behavior.

Firebreak (Fuel Break) - A natural or constructed barrier used to stop or slow the spread of a fire, or, to provide control line from which to work.

Fire Hazard - A fuel complex, defined by volume, type condition, arrangement, and location, that determines the degree and ease of ignition and/or resistance to control.

Fire line - The removal or alteration of fuel from a narrow area of a control line by the use of hand tools, power equipment, etc. to control a fire. It implies mineral soil exposure.

Fire Management Plan (FMP) - A strategic plan that defines a program to manage wildland and prescribed fires and documents the Fire Management Program in the approved land use plan. the plan is supplemented by operational procedures such as preparedness plan, preplanned dispatch plan, prescribed fire plans and prevention plans.

Fire Management Unit - Area within the refuge where there are common fire management goals, objectives, fuels, and resource use have been defined. the size of the unit is not important, however an FMU should relate well to overall suppression and prescribed fire strategies defined within a Fire Management Plan.

Fire Risk - The chance of fire starting, as affected by the nature and incidence of causative agents; an element of the fire danger in any area; any causative agent.

Hazard Reduction - The manipulation or removal of fuels to reduce the likelihood of ignition and lessen potential damage from wildfire. Normally hazard reduction is done to reduce the chance of major fire but can also be done to protect the resource or facility.

Ignition Component (IC) - A NFDRS value rating the probability that a fire brand will cause a fire requiring suppression action. Theoretically, on a day which registers an IC of 60, 60% of all firebrands which contact wildland fuels will start fires.

Incident Command System (ICS) - A combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure with responsibility for management of assigned resources to effectively accomplish stated objectives pertaining to an incident.

Indirect Attack - Method of fire suppression in which the control line is located a considerable distance from the fire's active edge; generally used in the case of a fire with rapid rate of spread or high intensity to utilize natural or constructed fire breaks or fuel breaks and favorable breaks in topography. Intervening fuel is usually burned out, but occasionally the main fire is allowed to burn to the control, depending on conditions.

Initial Attack - An aggressive suppression action consistent with firefighter and public safety and values to be protected.

Mixing Height - Height a column of smoke will rise in the atmosphere.

Mutual Aid - Any form of free direct assistance from one fire agency to another during an emergency, based upon a prearrangement between agencies involved and generally made upon the request of the receiving agency.

National Wildfire Coordinating Group (NWCG) - A national interagency operational group authorized by the Secretaries of Agriculture and the Interior designed to coordinate fire management programs of the participating agencies providing a means of constructively working together. The group provides a platform to agree upon policy, standards of training, equipment, aircraft, suppression priorities, and other operational considerations.

Normal Fire Year - The year with the third greatest number of fires in the past ten.

Normal Unit Strength - The amount of non capitalized fire fighting equipment needed by a refuge to meet 70 percent of suppression needs.

Preparedness - Activities that lead to a safe, efficient and cost effective fire management program in support of land and resource management objectives through appropriate planning and coordination. Replaced the term "presuppression".

Prescribed Fire - Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition. the terms, "Prescribed Natural Fire and Management Ignited Prescribed Fire," are no longer valid.

Prescription - Measurable criteria which guide selection of appropriate management response and actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social or legal considerations.

Resource Advisor - Resource specialist responsible to the Refuge Manager for gathering and analyzing information concerning natural resources and their uses that may be impacted by the fire or fire suppression activities.

Smoke Sensitive Area - Area in which smoke from outside sources is intolerable, for reason such as heavy population, existing air pollution, intensive recreation or tourist use, including designated wilderness areas of the refuge.

Spread Component (SC) - An NFDRS rating term related to the potential 24-hr worst case forward rate of spread of a head fire. A value numerically equivalent to the predicted forward rate of spread of a head fire in feet/minute.

Strategy - Overall plan of attack for fighting a fire which gives regard to the most cost-efficient use of personnel and equipment in consideration of values threatened, fire behavior, legal constraints, and objectives established for management of natural resources. Actual decisions on tactical use of personnel and equipment are left to the assigned Incident Commander of an incident.

Tactics - Planned operational actions that determine specific fire suppression measures are used to extinguish a fire. They must be consistent with the strategy established for suppressing the fire.

Urban/Wildland Interface - Area or zone where structures and other human development meets or intermingles with underdeveloped wildland or vegetative fuels capable of sustaining wildfire.

Wilderness - An area established by the Federal Government and administered by various agencies in order to conserve its primeval character and influence for public enjoyment, under primitive conditions, in perpetuity.

Wildfire - An unwanted wildland fire.

Wildland Fire - Any non-structure fire, other than prescribed fire, that occurs in the wildland.

Wildland Fire Management Program - The full range of activities and functions necessary for planning, preparedness, emergency suppression operations, emergency rehabilitation and prescribed fire operations, including non-activity fires management to reduce risks to public safety and to restore and sustain ecosystem health.

Wildland Fire Situation Analysis (WFSA) - A decision-making process that evaluates alternative management strategies against selected safety, environmental, social, economical, political, and resource management objectives as selection criteria. Replaces the term, "Escaped Fire Situation Analysis".

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## Supporting References

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Fire Management Handbook, 1993, 1997 releases.

National Interagency Mobilization Guide

U.S. Fish & Wildlife Service Region 5 Mobilization Guide

Fire Effects Guide, National Wildfire Coordinating Group

APPENDICES

