Environmental Assessment

Assessment of Effect

for

FIRE MANAGEMENT PLAN EXCERPT

Moosehorn National Wildlife Refuge

2008

ALTERNATIVES CONSIDERED

Alternative I - No-Action (Aggressive Fire Suppression Only)

The Moosehorn National Wildlife Refuge currently has no *current* fire management plan (FMP). The Fire Management Plan that the refuge is utilizing operationally was written in 1998 and needs to be updated in order to meet current policy and refuge fire management needs. Since all USFWS refuges are mandated by Department of Interior Policy to prepare an FMP, a fire management plan needs to be prepared in order to incorporate preparedness actions, program requirements, and formats as outlined in the current USFWS Manual, Part 621 for Fire Management. The sole fire management strategy allowed under this alternative would be to continue to suppress all wildland fire ignitions using the most expeditious means necessary (aggressive fire suppression). Under the no action alternative, the fire management plan would not address any actions for the reduction of the accumulation of hazardous fuels, nor would it permit prescribed fire for wildlife and resource management benefit. Under the guidance of an already approved plan for management of invasive vegetation, chemical treatments would continue to be utilized in order to meet management objectives.

Alternative II – Appropriate Management Response and Integrated Fuels Management

(Preferred Alternative)

This alternative would allow for the preparation of a fire management plan that includes wildland fire management preparedness actions as well as detailed procedural actions during wildland fire events. In this alternative, the suppression of all wildland fire ignitions would utilize an appropriate management response (AMR). It would also provide a detailed action plan for preparedness and suppression of wildland fires including the mitigation of impacts, safety, and resource protection. The use of prescribed fire, either individually or as a part of an integrated management approach, would be utilized to accomplish the full range of natural resource management and hazardous fuel reduction goals. All prescribed fires would be planned and approved consistent with the method and format required by the Service Manual. *Wildland fire use would not be a permissible option under appropriate management response.* This alternative includes the use of prescribed fire for the purpose of hazardous fuel reduction. The use of prescribed fire would allow the reduction of hazardous fuels that have accumulated from a variety of causes, including the absence of naturally occurring fires and impacts from severe storms. Their implementation would decrease the likelihood of a catastrophic wildland fire that potentially presents a danger to human life as well as to refuge

resources. In many ecosystems in the eastern United States, normal precipitation patterns and low to normal fuel loadings preclude the potential for serious wildland fires. However, in those years when drought is present, the likelihood of a human – caused wildland fire is increased significantly. This increased potential for fire ignition and spread is intensified by the presence of fuel loadings outside of the normal range. Generally this means that fuel loading for deciduous and mixed pine/ deciduous forests is greater than ~16 tons/ acre but <25 tons/ acre, and considerably less for most shrub, brush and grass fuel models. Prescribed fire treatments may be applied on a rotational basis as a means of treatment to remove these excess fuels and at the same time enhance ecosystem variability for wildlife. Prescribed fires whose principal purpose is the reduction of hazardous fuels are generally implemented in such a manner that only ground fuels are consumed, ensuring that little or no ignition occurs in the crown structure of the forest. In those areas where fuel loading is heavier (>26 tons/acre for forest fuels, less for shrub, brush, and grasses), particularly near structures, non-fire manual or mechanical reduction methods will normally be utilized to reduce fuel loading. Where access is available, fuels will be removed and disposed of by removing them from the site. In those areas where access is limited, piles of cut debris may be constructed for burning at an opportune time. Generally this occurs during the winter months when the ground is snow-covered and/ or wet from winter precipitation, temperatures are low, and winds are minimal. Upland forests on the refuge may be found in various stages of succession. The diversity of these forests provides important habitat for many avian and mammal species, including the American woodcock (*Scolopax minor*). A healthy, genetically diverse upland forest also provides habitat for a wide variety of mammal, avian, and reptile life that are indigenous to the area. Prescribed fire may be used as a management tool to reduce fuel loading, thereby reducing overall risk from the effects of an unwanted wildland fire fueled by many years of fuel accumulation resulting from the effects of storms, insects and natural accumulation. It may also be used to assist in creating a more diverse forest ecosystem by engendering the growth of various age and size classes of many vegetative species. This in turn, provides suitable habitat for a variety of early and late successional species. Its use also helps promote the establishment and restoration of some herbaceous vegetation types, particularly native warm season grasses and other select species. One of the broad goals of the National Wildlife Refuge System has been the protection, enhancement and preservation of the natural resource systems that benefit wildlife. By using prescribed fire to enhance current eco-systems, other natural resource benefits would accrue. For example, wildlife habitat would be enhanced through the use of prescribed fire, increasing the number and palatability of various herbs and grasses upon which many species depend for food and forage. As a result, wildlife populations would benefit. Invasive species can also be treated effectively with combinations of prescribed fire and non-fire (hand-pulling and herbicide) techniques. Reductions in invasive species provide opportunities for native species to re-populate areas previously dominated by introduced species. Generally this leads to beneficial ecosystem changes since other plants and animals in the area are adapted to live within the context of their native ecosystems. In accordance with Service Directives, a monitoring plan would be developed and implemented for each project. The purpose of these plans would be to allow managers the ability to determine if project objectives were met or not, and, if not, how treatment(s) could be altered to meet stated objectives (adaptive management).

Alternative III – Appropriate Management Response and Non-Fire Fuels Management

The fire management program under this alternative would, as in Alternative II, suppress all wildland fire ignitions using the appropriate management response. It would also allow for the use of non-fire fuel reduction techniques such as the use of mechanical hazardous reduction and the use of chemical herbicides, either individually or in combination, to achieve Refuge natural resource and fuels management objectives. Prescribed fire would not be used in this alternative.

Impact Analysis

2. AIR QUALITY

Affected Environment.

Good air quality values are important to Moosehorn NWR. As a result, the protection of these resources is given full consideration in fire management planning and associated operations. The refuge complies with all applicable Federal, State, interstate, and local air pollution control requirements, as specified in Section 118 of the Clean Air Act, as amended (42 USC 7418). The Clean Air Act also has established air quality class designations, where emissions of particulate matter and sulfur dioxide are restricted. Restrictions are most severe in areas possessing federally designated Wilderness. Wilderness areas exceeding 5000 acres in size are classified as mandatory Class I areas, those receiving the highest protection. Moosehorn National Wildlife Refuge is classified as a Class I Air Quality area on the basis of its 7,462 acre Wilderness Designation. A Class I designation indicates the maximum allowable increase in concentrations of pollutants over baseline concentrations of sulfur dioxide and particulate matter, as specified in the 1963 Clean Air Act (42 U.S.C. 7401 *et seq*.). Further, the Clean Air Act provides that federal land managers have an affirmative responsibility to protect air quality related values (including visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse pollution impacts. Fire management activities planned by the USFWS which result in the discharge of pollutants are subject to, and must comply with, all applicable federal, state, interstate, and local pollution control requirements. The USFWS submits project-specific prescribed burn plans for each planned application of prescribed fire to the appropriate state agency located in the area where the burn is scheduled for implementation: Maine (Maine Forest Service). These project specific plans include in-depth procedures for managing emissions, modeling results of predicted air quality impacts, and the identification of smoke mitigation techniques.

Moosehorn NWR is a partner in the Mid-Atlantic/ Northeast Visibility Union (MANE-VU), a consortium of agencies whose purpose is to encourage a coordinated approach towards meeting the requirements of the Environmental Protection Agency (EPA) regional haze rules and reducing the impairment of air quality in both federal areas (i.e. wildlife refuges, national parks and in Wilderness areas). For monitoring purposes, a 24-

hour visual camera (Hazecam, Fig 2) is located at Moosehorn NWR as a means to visually detect changes in area haze and associated visibility.

Figure 2- Hazecam and associated Air Quality at Mooesehorn National Wildlife Refuge.

Moosehorn National Wildlife Refuge is also part of a nation-wide interagency program to monitor and study the impacts of potential changes in air quality. An IMPROVE fine-particulate air quality sampler has been installed on the refuge. Scientific studies have been conducted to determine the impacts of acid deposition from the atmosphere on refuge water quality.

The major pollutant in the smoke produced by prescribed fire is manifested in the form of particulate matter (PM2.5 and PM 10). This material is composed chiefly of a mixture of tars, soot, and other volatile organics (Stanturf 2002). Particulates are not the only emissions produced by fire. Besides carbon dioxide and water vapor, gaseous hydrocarbons, carbon monoxide, and nitrous oxides are also released. However, only a small proportion (less than 3 percent) of the total emissions of particulates, carbon monoxide, and hydrocarbons can be attributed to prescribed burning. By conducting prescribed burning under atmospheric conditions that encourage rapid mixing, the problems associated with high levels of carbon monoxide can be eliminated (Stanturf 2002). Unsaturated hydrocarbons result from incomplete combustion of organic fuels. Because of their high affinity for oxygen, these compounds may form photochemical smog in the presence of sunlight and oxygen-donating compounds. Methane, ethylene, and literally hundreds of other gases are released during prescribed burning. Most of the hydrocarbons released during prescribed fires are quite different from those released in internal combustion engines (Stanturf 2002). Nitrogen oxides are not likely to be released in significant quantities during prescribed burning (Stanturf 2002). Nitrogen is volatized contingent upon the amount released into the atmosphere and depending upon such environmental factors as ambient air temperature and relative humidity. Sulfur dioxide emissions from prescribed fires are of minor importance since the sulfur concentrations of most forest fuels is less than 0.2 percent (Stanturf 2002).

Methodology.

Air pollution sources from proposed prescribed fire projects were compared with existing pollution sources found adjacent to the refuge in order to determine the potential for impacts.

Proposed project information relating to the number of acres annually to be treated by non-fire methods and prescribed fire was used to estimate impacts. Wildland fire acreage was estimated based upon the historical fire occurrence and fire return intervals. In addition, data from local agencies and organizations (Maine DEP, MANE-VU) was also utilized in making the analysis.

All available information on air quality was compiled and integrated into this assessment. Intensity of effects are defined in Table 1 on page 19. *Cumulative* – Impacts, though negligible, may add up through time becoming minor to major and may be irreversible

Regulations and Policies.

Current laws and policies require that the following conditions be achieved in the refuge:

Desired Conditions - Air quality related values would be protected from pollution sources emanating from within and outside refuge boundaries. Refuge management activities do not violate Federal and State air quality and conformity standards.

Sources – Clean Air Act; USFWS Service Manual, 561 FW2 and 563 FW2, Air Quality protection in Federally Designated Wilderness (Class I).

Impacts of Alternative I - No-Action

Impact Analysis

Under the no-action alternative, wildland fires would be aggressively suppressed with the primary goal of keeping them to the smallest acreage possible. Direct adverse impacts to air quality from wildland fire under this alternative would include the release of particulates and smoke into the airshed. Since these fires would most likely be the result of heavier than normal accumulations of dead and downed fuel, fire intensity and duration could provide considerable resistance to control for suppression resources, thus these events would last longer. This condition is somewhat mitigated by the fact that, even though areas of excessive hazardous fuel are located in the refuge, they are generally not continuous, but rather are composed of isolated cells of heavy fuel that are not always interconnected with one another. This fact may give suppression resources the opportunity to isolate heavy fuel accumulations and suppress fires in a more expeditious manner. This would lead to a reduction in overall smoke and particulate emissions. Generally, durations of smoke particulates would range from minor to moderate (1-5 days). In most cases, especially those in which drought is not a factor, fires would produce a short term impact. The fire suppression tactics used in this alternative would focus on extinguishing fires as quickly as possible. This would normally minimize smoke production because the total number of acres burned would be kept to a minimum.

Cumulative Effects

Due to the short term nature of most wildland fires, the cumulative effects on air quality would be localized and minor. This alternative would not contribute to cumulative effects on air quality in the long term. Air quality at the refuge would continue to be impacted from daily vehicle emissions on roads and other management activities that utilize power-driven machinery. In addition, some private timber companies and the public utilize prescribed burning as a tool in forest management and Silviculture, and to improve the production of blueberries and other local vegetation. The smoke resulting from these prescribed fires could have a cumulative impact on air quality when combined with smoke from wildland fires and / or prescribed burns taking place on the refuge. The continued use of prescribed burning in the general area is expected to continue. In areas located outside of the refuge, backyard trash burning, a common practice in rural and suburban communities, would present a small but consistent impact on air quality over time. The use of outdoor wood boilers has also proven to be a popular, if controversial, home heating application in areas surrounding the refuge. Impacts resulting from the use of these types of heating systems have been closely regulated in some areas of the country due to the amount of smoke and emissions produced over time. Their impact on

air quality at the refuge is likely to be minor, but long term. When certain environmental conditions persist, emissions from a large mill located relatively near to the refuge also impact air quality on refuge lands. Development outside of the refuge is not projected to increase in the future, so it is reasonable to assume that the uses of motor vehicles, power equipment and other machinery, though having a deleterious impact, and being largely unnoticeable, could still exert a relatively small, but stable, influence on air quality. Although visitation to Moosehorn NWR is expected to increase in the future, the cumulative impacts on air quality resulting from the increase in vehicle emissions would be localized and minor to moderate in intensity.

Conclusion
Since recent wildland fire occurrence is infrequent and fire size has been small, the direct and indirect adverse impacts of this alternative on air quality would be localized, short term, and minor. Wildland fire smoke impacts would be minimized in the case of smaller fires that result from the implementation of aggressive suppression tactics. It should be noted that there may be cases where fires, particularly those driven by excess hazardous fuel loadings, may exceed the capabilities of suppression resources to effectively and safely suppress, thus allowing fires to burn with increased intensity and resultant increased smoke production. Despite the potential for adverse impacts in the short term, the adoption of this alternative does not constitute impairment.

Mitigation

During aggressive fire suppression activities, the rapid suppression of fires and the extinguishment of residual smoke during the mop-up phase generally assist in reducing smoke impacts. This generally occurs during the smoldering phase of combustion often seen during the waning periods of a wildland fire's life cycle.

Impacts of Alternative II – Preferred Alternative

Impact Analysis
Wildland fire suppression, non-fire hazard fuel reduction and prescribed fire would result in minor to moderately adverse, but short term (1-4 days) impacts to air quality. Depending on the tactics of wildland fire suppression used, air quality impacts could be prolonged because tactics would be employed to minimize potential resource damage. As a result, wildland fires could burn longer and consume more total acres. This would lead to minor to moderate smoke impacts of longer duration (5-6 days). Indirect adverse impacts resulting from these emissions could be responsible for reduced visibility along roads, reductions in visitor use due to the presence of smoke, odors, and potential health effects to sensitive receptors, including nearby private residents located outside of the refuge. These adverse impacts would be short to long term (7+days), localized, and minor. Smoke from prescribed fires is only present during the time period when a prescribed burn is being implemented. This includes those time periods when mop-up activities are being conducted (residual smokes being suppressed). Since most prescribed burns at the refuge are projected to be small in acreage, a typical burn in the active stages would last approximately 4-12 hours. Prescribed fire is projected to be used to treat only approximately a maximum of 500 acres over a 5-10 year period; a very small percentage of the refuge land base. Smoke from prescribed fire can be minimized by altering ignition

patterns and burning during times of the day when smoke dispersal is maximized. In spite of these measures, minor to moderate, localized, short term impacts are likely to occur. Pollutants generated by non-fire fuel reduction projects would add a negligible amount of air pollution above those levels discussed in alternative I since additional acreage would be treated with manual fuel reduction techniques. Pollutants would be generated by the use of gasoline powered equipment in these operations, but the impacts upon air quality, given the small size of the projects and the infrequency of the activity, would be localized, short term, and negligible to minor. The indirect and longer-term adverse impacts would be negligible.

Cumulative Effects

Air quality at the refuge would continue to be impacted in the short term with minor impacts from such uses as daily vehicle emissions and other similar management and/ or public activities such as trash or backyard burning. Important local industries, such as timber and blueberry harvesting have close ties with prescribed burning and utilize it as a management tool, particularly in the spring of the year, as a tool to improve Silviculture and crop yields. On days when environmental conditions are such that emissions from these practitioners are directed towards the refuge, the combined smoke will likely create short term periods of visibility impairment. The Baring Division Wilderness Area on the refuge also can be directly impacted by emissions from a large Domtar-operated mill located in Woodland, a relatively short distance from the refuge. When combined with emissions from sources located within the refuge, impacts from smoke in the short term could be moderate in scope and duration. In the long term, adverse impacts would be lessened as accumulations of hazardous fuels were reduced through fuel reduction strategies (manual, mechanical, prescribed fire) both in and outside the refuge through cooperative efforts with neighbors and sister agencies.

Conclusion

This alternative would have a temporary minor to moderate adverse impact on air quality in those areas where hazardous fuels are being removed, either by non-fire fuel reduction or through prescribed fire. Wildland fire smoke impacts may be increased in the short term through the use of the appropriate management response to fire suppression tactics. In the long term, this same approach allows more fuels to be consumed and may actually reduce the potential for both smoke production and duration. Smoke impacts from prescribed burns are short term, usually from between 4-12 hours, and may be planned for periods of the day when environmental conditions are maximized for smoke dispersion and direction, a major change from most wildland fires resulting from human causes. These types of fires typically result from human activities such as refuse burning, unintentional ignitions resulting from improper use of fire, and even arson, that typically occur during periods of the day/ night when environmental conditions are such that smoke production is increased (higher relative humidity/ greater fuel moistures) and dispersion is reduced (stable atmospheric conditions). The adoption of this alternative does not constitute impairment.

Mitigation

The extinguishment of residual fires produced by burning fuels (mop-up) during wildland fire incidents would lead to reduction of residual smoke resulting from prescribed burns.

Coordination with adjacent regulatory agencies before prescribed fire operations would lead to a more efficient extinguishment of smoke produced by pre-identified heavy fuel accumulations. In addition, the public could be notified of the potential impacts of smoke and their anticipated duration.

During prescribed fire operations, a variety of techniques may be utilized to reduce the production of smoke emissions and/ or plan for their dispersion:

- Ignitions only implemented when relative humidity is optimized for fuel consumption (less smoke production in a "clean" burn)
- Fuel moistures are relatively low
- Ignition patterns utilized that minimize smoke production (backing fires).
- Mixing heights at least 500 meters or more
- Transport winds greater than 12 mph
- Wind direction away from critical identified targets
- Prescribed burn projects compartmentalized into smaller units, resulting in smaller sections burned with less smoke production.
- Burning during periods of atmospheric instability (daylight hours)

Impacts of Alternative III – Appropriate Management Response and Non-Fire Fuels

Management

Impact Analysis
Under this alternative, the impacts would be similar to those described under the referred alternative (alternative II), *except* that there would be no impacts attributable to rescribed fire.

Wildland fire suppression (appropriate management response) and non-fire hazard fuel reduction would cause minor to moderate adverse, but short term impacts to air quality. Depending upon the wildland fire suppression tactics utilized, air quality impacts could be prolonged because techniques would be employed to minimize potential resource damage. These would be manifested primarily through the use of indirect attack strategies and tactics as well as confinement strategies that allow the fire to burn unimpeded until natural fuel breaks are encountered. As a result, wildland fires could burn longer and consume more total acres, leading to minor to moderate smoke impacts over longer periods of time. This alternative would eliminate smoke from prescribed fires and would rely upon non-fire (manual, mechanical, chemical) methods to reduce hazardous fuel accumulations. Those impacts would be of short term consequence and negligible in their impact.

Cumulative Effects
There would be no short term smoke produced from prescribed fires in this alternative. Because of the short duration of most hazard fuel reduction activities, this alternative would not contribute to the cumulative impacts of air quality over the long term in the strict sense of the activity. But, because prescribed fire is not available as a fuel reduction tool in this alternative, potential for increased fuel loading to occur over time may lead to increased wildland fire activity and smoke production in the future. Air quality in the

refuge would always be impacted in the short term from daily vehicle emissions, local industry (i.e. paper mills) and other management activities requiring motorized equipment.

Conclusion

The implementation of this alternative could have a short term minor to moderate adverse impact on air quality in those areas of the refuge where non-fire reduction of hazardous fuels is undertaken. Although these methods are an effective means of removing hazardous fuels, they are at the same time a costly, labor intensive treatment that depends upon significant funding for implementation. Funding for these projects may or may not be available. As a consequence, significant amounts of fuel may continue to build-up unabated, which increases the potential for smoke impacts, both in terms of intensity and duration, when wildland fires do occur in untreated areas. The adoption of this alternative does not constitute impairment.

Mitigation

Extinguishment of residual smoke from burning and smoldering fuels during wildland fire incidents would occur.