

ENVIRONMENTAL ASSESSMENT

FIRE MANAGEMENT PLAN



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EXECUTIVE SUMMARY

The National Park Service (NPS) is considering changes in the way fire is managed at the St. Croix National Scenic Riverway (Riverway). Fire is currently being managed according to guidance provided in a Fire Management Plan dated February 1992. Under that plan, the NPS suppresses all wildland fires at the Riverway, whether lightning or human-caused, as quickly as possible. Prescribed fire is not currently used as a resource management tool.

This EA provides an analysis of the alternatives now under consideration for fire management. Each of the four alternatives assumes that all unplanned wildland fires at the Riverway, whether lightning or human-caused, would continue to be suppressed as soon as possible. They include Alternative 1: No Action (no change), Alternative 2: Prescribed Fire, Alternative 3: Mechanical Treatment, and Alternative 4: Integrated Program using both Prescribed Fire and Mechanical Treatment. The management plans for the Riverway state that one of its significant resource values is the convergence of three biological communities: prairie, hardwood forest and coniferous forest. Prairies, coniferous forests and some hardwood forests are fire-adapted communities, which depend on periodic fire for their survival. Without fire, these communities are disappearing from the Riverway. In addition, exotic plants have degraded the quality of native plant communities at the Riverway. Fire can be useful in controlling some exotic plants, especially when used in conjunction with mechanical means. Therefore, the NPS preferred alternative is Alternative 4: Integrated Program. Alternative 4 provides maximum flexibility for restoring and maintaining fire-adapted communities and controlling exotic plants.

The most noteworthy areas of impact of the fire management plan are to vegetation and scenic resources of the Riverway. The No Action Alternative would result in moderate to major, long-term negative impact to vegetation and scenic resources by continuing practices that result in the loss of fire adapted communities and the visual variety they provide along the Riverway. Alternatives 2, 3 and 4 would result in minor to major, long-term positive impacts to vegetation and scenic resources by restoring fire adapted communities and their visual variety along the Riverway.

The *Long-Term Prescribed Fire and Hazard Fuel Reduction Plan* identifies the specific locations along the Riverway that the NPS proposes to treat with prescribed fire and/or mechanical means. Since our primary objective is to restore and maintain fire-adapted communities along the Riverway, only these types of communities are included in the *Long-Term Prescribed Fire and Hazard Fuel Reduction Plan*. A total of 593 acres at 34 sites spread along the length of the Riverway are proposed for treatment. Of these, 109 acres are in high-priority sites and 484 acres are in lower priority sites. All of the prescribed fires would be of low intensity.

The FMP describes how prescribed and wildland fire would be managed at the Riverway. It includes details on fuel management goals, fire management objectives, wildland fire prevention, fire readiness, safety measures, and fire-fighter training activities.

CHAPTER 1: INTRODUCTION

PURPOSE STATEMENT

The National Park Service (NPS) is considering changes in the way fire is managed at the St. Croix National Scenic Riverway (Riverway). Fire is currently being managed according to guidance provided in a Fire Management Plan dated February 1992. Under that plan, the NPS suppresses all fires at the Riverway, whether lightning- or human-caused, as quickly as possible. Prescribed fire has not been used as a resource management tool.

This environmental assessment (EA) provides an analysis of the alternatives now under consideration for fire management. They include the no action alternative (no change) and the use of prescribed fire and/or mechanical treatments to achieve desired natural resource conditions while protecting park resources and surrounding property from the effects of fire.

This EA analyzes the impact of each alternative on the environment. It was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and the regulations of the Council on Environmental Quality (40 CFR 1508.9). Direct, indirect and cumulative impacts are addressed. The purpose of the document is to present information needed by the NPS to make a sound resource management decision regarding the use of fire at the Riverway. It also serves as a conduit for informing the public and soliciting their input in the decision-making process.

A Fire Management Plan (FMP) and associated Long –term Prescribed Fire and Hazard Fuel Reduction Plan (FMP Appendix E) accompany this EA. The FMP Appendix E identifies specific location along the Riverway that would be treated with prescribed fire and/or mechanical means. The Draft FMP describes how prescribed fire would be managed and how safety issues would be addressed.

NEED STATEMENT

The management plans for the Riverway point out that one of its exceptional resource values is the convergence of three major biomes: prairie, hardwood forest and coniferous forest (NPS, 1998 and 2000a). Several plant communities within these biome types are fire adapted. The NPS needs to determine whether the use of fire would help maintain this resource value, help meet our resource management goals, and manage fuels.

Resource Management Goals

Our resource management goals include the following (NPS, 2000b):

maintain or restore natural resources in their natural condition, while adhering to the principles of conservation biology;

protect native species, particularly endangered species and their habitats; and minimize encroachment of exotic species populations and reduce existing populations utilizing integrated pest management techniques.

The overriding goal of a fire management program at the Riverway is to **do no harm** to natural resources, cultural resources, and adjoining properties.

Specific objectives are to:

Restore and maintain fire adapted habitats (those that have developed in the presence of fire); particularly hill prairie, basalt prairie, sand prairie, bluff prairie, pine & oak savanna and other forest types. Expectations per project would be to increase the number of desired plant species for each particular site.

Reduce the occurrence and spread of exotic plants, particularly common buckhorn, tartarian honeysuckle and spotted knapweed. Expectations per project would be 20-60% reduction over time of undesirable plants occupying the site.

Enhance seed production for native grasses. Expectations per project would be a 30-50% increase in plant numbers and seed production (measured by weight).

Manage fuels to avoid the risks associated with fire in the "wildland-urban interface."

Adjacent land managers already use fire as a resource management tool in select areas. If the Riverway were to adopt fire as a resource management tool, it may allow us to cooperate more fully with adjacent land managers to restore greater area of fire - adapted communities.

Fuels Management

Fuel management concerns at the Riverway include natural created fuels and the risks associated with the wildland-urban interface. Communities and isolated residences located adjacent to the Riverway boundary within wildland fuel situations could be threatened by an advancing fire.

The majority of hazardous fuel situations within or adjacent to the Riverway are from the annual accumulation of fine fuels (grass and forbs). In spring prior to green up, these cured dry fuels are very flammable, easily ignited, and can result in rapid rates of fire spread. A similar threat occurs during late-summer and early- fall as vegetation cures.

There is also the potential for a blow down or insect infestation to create a hazard fuel situation. While there is presently no known threat of this type, prescribed fire could also be effective in treating such hazard fire accumulations.

The major goal of fuel management would be to achieve and maintain a fuel level that ensures the protection of life, property, natural resources, and cultural resources.

BRIEF DESCRIPTION OF THE RIVERWAY

The Riverway is located in northwestern Wisconsin and eastern Minnesota and flows through Pine, Chisago and Washington counties in Minnesota and Bayfield, Sawyer, Washburn, Douglas, Burnett, Polk, St. Croix, and Pierce Counties in Wisconsin (Figure 1). It is a long narrow corridor that includes the St. Croix River, its principal tributary the Namekagon, and approximately 1/4 mile of land on either side of the rivers. The exact amount of land varies from place to place along the Riverway. Several other types of publicly owned lands are also found along the corridor including state parks, state forests, county forests and city parks.

The Riverway was established by Congress under the Wild and Scenic Rivers Act (Public Law 90-542, as amended) and is administered by the NPS. Congress established the Riverway to:

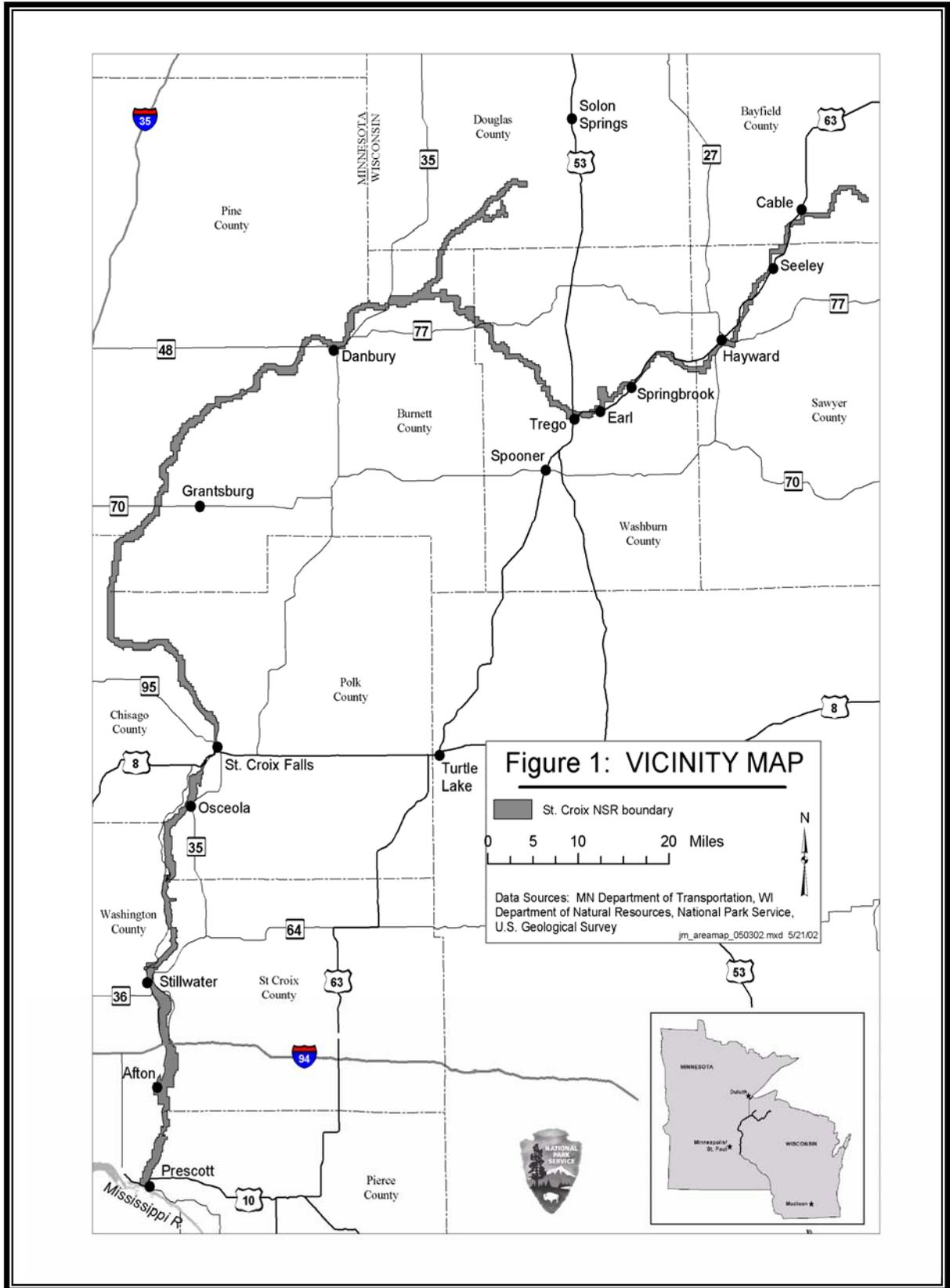
- preserve the St. Croix and Namekagon Rivers in a natural condition and as relatively free-flowing rivers
- protect and enhance the exceptional natural, scenic, and cultural resources of the Riverway for current and future generations
- provide high-quality recreational opportunities that do not detract from the exceptional natural, scenic, cultural, and aesthetic resources and values of the Riverway.

The upper 225 miles of the Riverway, (above the "Boomsite" near Stillwater, Minnesota) are managed by the NPS. The lower 25 miles are managed by the Lower St. Croix Management Commission, which includes the Wisconsin Department of Natural Resources, Minnesota Department of Natural Resources and the NPS.

APPLICABLE AREAS / EXCLUDED AREAS

Regardless of the alternative selected, the FMP **will apply only** to NPS fee-owned lands within the federally administered portion of the Riverway, upstream of Stillwater, Minnesota. It will **not apply** to private property, property where the NPS has purchased only a scenic easement, or other public lands within the boundary **unless** the private landowner or public land manager wishes to conduct cooperative prescribed fires.

In no case would the NPS use fire as a management tool on tribally-owned land or within the city limits of Cable, Seeley, Springbrook, Earl, Trego, Hayward, Danbury, St. Croix Falls, Taylors Falls, Franconia, Osceola, Marine-on-St. Croix or Stillwater.



SCOPING ISSUES

The NEPA requires public involvement in agency decision-making. The process of obtaining input from the public and other agencies is called “scoping” and takes place throughout the planning process. Initial scoping for this EA was conducted from March 15, 1999 through April 15, 1999. A scoping letter was sent to a lengthy mailing list which includes private landowners who are Riverway neighbors, the Minnesota and Wisconsin Departments of Natural Resources, local bodies of government and other interested organizations.

The NPS received several questions and suggestions in response to our scoping letter. The questions raised are addressed in the EA and FMP. No other substantive comments were received in response to the scoping letter. This Draft EA/FMP was prepared to generate additional public input in the fire management planning process at the Riverway.

Question 1: What are the fire management plan's resource objectives?

Response: To restore and maintain fire adapted habitats. See EA, page 3.

Question 2: What was the historic natural occurrence of fire along the Riverway and under what seasons/conditions did these fires burn?

Response: See EA, pages 10-15.

Question 3: What are the desired vegetation conditions?

Response: See EA, page 4.

Question 4: What planning period is covered by the plan?

Response: The EA and FMP provide guidance unless or until they are superceded by any subsequent plan that may be needed. The FMP Appendix E will provide initial guidance for yearly priorities for prescribed fire and hazard fuel reduction and will be updated periodically.

Question 5: What burn seasons are being considered?

Response: Spring, before green-up and Fall, after vegetation has cured.

Question 6: Will the plan identify all sites to be burned?

Response: Yes, see FMP Appendix E, which will be updated periodically.

Question 7: Who will determine which sites will be burned?

Response: The NPS will determine which sites will be burned on NPS fee-owned land with input from interested agencies, organizations and persons. Proposed sites are identified in Appendix E of the FMP.

Question 8: Can other, non-fire treatments achieve same/similar results?

Response: Non-fire treatments can be useful in controlling exotics and removing woody vegetation. However, it does not achieve the benefits of prescribed fire in releasing

nutrients into the soil or the seed scorching necessary for some plants indigenous to fire-adapted communities. Also, since it is very labor intensive, only limited area could be treated.

Question 9: How will access for perimeter control be developed?

Response: Access for perimeter control will be identified in the individual prescribed fire plan for each project.

Question 10: What types of natural fuels are being considered for burning, and what are the structure and density of those fuels?

Response: Fuels considered for burning are identified in the FMP Appendix E.

Question 11: Will written prescribed burn plans be prepared?

Response: Yes. The National Park Service is required to prepare prescribed fire plans for each individual project. Each individual plan will be developed by the designated Burn Boss and the NPS Border Waters Fire Management Officer and receive outside peer review before implementation.

Question 12: Will a burning permit be issued?

Response: Yes, all State and local requirements will be met.

Question 13: What burning conditions are needed?

Response: Allowable burn parameters will be identified in the individual prescribed fire plan for each project.

Question 14: Will property lines be identified before burning occurs?

Response: Yes, property lines will be identified for each proposed prescribed fire unit burn area prior to ignition.

Question 15: Will adjoining landowners be contacted?

Response: Yes, a contact list and schedule will be developed for each prescribed fire project and made part of the prescribed fire plan.

Question 15: Who will coordinate the prescribed fire effort?

Response: On Federal lands administered by the NPS, the NPS will coordinate the prescribed fire effort. On prescribed fires that cross jurisdictional or ownership boundaries burning efforts will be managed jointly.

Question 16: Administratively, who will oversee the prescribed burning?

Response: The Superintendent of the Riverway is the responsible official.

Question 17: How will the Wisconsin (and Minnesota) Department of Natural Resources be involved?

Response: All prescribed fire plans will be submitted to the Wisconsin and Minnesota Department(s) of Natural Resources for peer review and comment. In many cases the

Departments, along with local wildland fire resources, will be requested to assist with project implementation as local interagency partners.

Question 18: Who, what, and how many resources would be available for safety and control of prescribed fire?

Response: Each individual prescribed fire plan will identify required resources, including sufficient resources for suppression as identified in the prescribed fire plan contingency plan.

Question 19: How will damage on non-federal lands from fire escapes be compensated?

Response: Damage to non-federal lands from fire escape would be processed by procedures identified in the Federal Tort Claims Act and Department of the Interior Departmental Manual 451 (451 DM).

Question 20: Will the value and use of adjoining lands influence burning proposals?

Response: Yes, the value and use of adjoining lands will be analyzed as part of the prescribed fire plan planning process. Fires that cause a long term negative effect on adjoining lands will not be implemented.

Suggestion 1: Suggest no management fires between St. Croix Falls and Nevers Dam.

Response: None are proposed on this stretch in Wisconsin at this time.

Suggestion 2: Suggest a minimum distance of 500 feet from any structure, public or private.

Response: The determination of safe distance from any structure, public or private, will be determined in each individual prescribed fire plan based upon site specific environmental conditions.

Suggestion 3: Exclude fire from private property, scenic easements, riverfront easements, or existing use and occupancy properties.

Response: Prescribed fire will be used *only* on NPS fee-owned lands within the federally administered portion of the Riverway, upstream of Stillwater, Minnesota. It *will not* be applied to private property, property where the NPS has purchased only a scenic easement, or other public lands within the boundary *unless* the private landowner or public land manager wishes to conduct cooperative fires.

CHAPTER 2: FIRE ECOLOGY - AN INTRODUCTION

Fire, both naturally ignited and human-caused, has played an important role in natural ecosystems all over the world. Fire has periodically burned forests, brushlands, and grasslands for thousands of years. Varying fire frequencies and intensities help determine the structure and distribution of many of the world's plant and animal communities. In fact, many natural communities depend on periodic fire for their survival. Ecologists refer to these communities as "*fire adapted*." When fire is excluded from these communities, changes in successional patterns occur and species composition changes. In other words, the fire adapted community changes to some other type of community. If naturally functioning fire adapted ecosystems are to be maintained, fire must be reintroduced (Parsons, 1981).

FIRE HISTORY

There is little specific information on the fire history of the Riverway. However, some general information about the surrounding area is applicable.

According to Hendersen and Statz (1995), fire has long played a role in modifying and maintaining plant communities in North America, including much of what are now the states of Minnesota and Wisconsin. In fact, for the past 5 to 6 thousand years, or up until European settlers disrupted the prevailing fire regimes, half of the State of Wisconsin was covered by fire-adapted communities including prairies, southern sedge meadows, oak and pine savannas, and oak and pine woodlands. Fire was caused both by lightening and by Native Americans.

Some location specific information related to fire history in Wisconsin has been provided by the Wisconsin Department of Natural Resources (WiDNR). The WiDNR queried their fire history map and database of major fires (greater than 250 acres) for all fires that came within one mile of the Riverway. From 1930 to 1999 there were 21 major fires in or near the Riverway. The majority of these major fires were in the 1930's prior to widespread cultivation in the area. During the period between 1977 and 1998 there were 28 small fires (average size 2.6 acres) that originated on NPS property and 245 larger fires (average size 103 acres) that originated within 1 mile of the Riverway (Personal Communication with Jim Gobel, Wisconsin Department of Natural Resources, September 9, 1999).

FIRE REGIMES

Plant communities are a product of their "*fire regime*". Fire regimes have three major elements:

- 1) Fire type
 - a) crown
 - b) surface

- c) ground [in organic layers or peat]
- 2) Intensity
 - a) high/severe
 - b) low/light
- 3) Typical frequency or "return interval."

Fire regimes are important because they determine the type of revegetation that will occur following the fire. Fire regimes determine whether trees, saplings and shrubs will be killed or survive; whether the serotinous (closed) cones of the jack pine will remain closed or open to release new seed; whether stored seeds and vegetative propagules in the organic soil and in the mineral soil will be destroyed or survive; and will affect the release of carbon and nutrients to the soil (West et al, 1981).

In addition to the type, intensity and return interval of fires, the season of fire is also important. The growth stage at the time of fire affects the ability of the plant to survive or reproduce. Season of fire also determines when initial reseedling will occur, the timing of vegetative regeneration, and will influence the extent of drying of organic layers.

Fire regimes have been outlined for some plant communities. Tables 2 and 3 summarize the known fire regimes for fire adapted plant communities found along the Riverway. In reality, fire is not really as orderly as indicated in the tables. Because fire is a semi-random process, some areas are skipped for long periods while others may burn two or more times over the same period. Some of the effects of fire on fire adapted communities and their fire regimes are described below.

Prairie Communities

Fire Effects: Fire perpetuates prairie communities by keeping woody invaders in check. Prairie grasses and forbs are long-lived perennials with deep root systems that are highly adapted to surviving fire. Although fire may destroy above ground vegetation, the plants produce vigorous new shoots from growing points just at or below the soil surface. Fire also prevents the litter layer in prairies from becoming too thick. If too thick, the litter layer will absorb rainfall instead of the soil. Following most fires, production of tillers, roots, flowers and seeds increases dramatically and plants are often more luxuriant than before the fire (Tester, 1995).

Fire Regime: Prairie fires generally occur in early spring before leaf out and fall after vegetation has cured. This is due to the abundance of dried grasses and suitable meteorological conditions at these times of the year. In a study of natural occurring grassland fires in Saskatchewan, lightning was a common cause. Frequency was one year in six. In the Kansas tallgrass prairie, fire frequency was higher, ranging from 2-5 fires in a 10-year period (Kucera, 1981).

The recommended frequency of prescribed fires to maintain prairies varies. In Wisconsin, one study advocates a 2-year interval for maximizing grass production. However, grass

production is not necessarily related to community diversity. Other studies in the Midwest indicate a range of 1-3 years as an optimum for increasing community diversity (Kucera, 1981). On a native prairie in northwestern Minnesota, prescribed fires are conducted in spring and fall on a 4-year rotation to retard woody plant growth. Prescribed fires are augmented by summer cutting of the larger trees that are difficult to top-kill by fire. Spring fires are conducted from mid-April to mid-May. Early fires are used where grassland stimulation is the primary goal. Fall fires generally commence after September 15 (the average date of the first fall frost) and may continue through October depending on moisture conditions (Svedarsky, W.D. *et al*, 1986).

Forest Communities (General)

Fire Regimes of forests: Seven kinds of fire regimes have been distinguished for northern forest ecosystems (Heinselman, 1981). They are as follows:

- 0 No natural fire (or very little).
- 1 Infrequent light surface fires (more than 25-year return intervals).
- 2 Frequent light surface fires (1- to 25-year return intervals).
- 3 Infrequent, severe surface fires (more than 25-year return intervals).
- 4 Short return interval crown fires and severe surface fires in combination
- 5 Long return interval crown fires and severe surface fires in combination (100- to 300-year return intervals)
- 6 Very long return interval crown fires and severe surface fires in combination (over 300 year return intervals)

Pine Barrens:

Fire effects: In dry forest types, such as pine barrens, fire eliminates the seedlings of mesic forest trees and creates openings so that jack pine is not replaced by more shade tolerant species. Fire is also required for jack pine to reproduce. Jack pine cones will not open and release their seeds without fire. If the temperature exceeds 116 F, the resins of the cone will soften and allow the scales to open and scatter seeds on the burned ground (Tester, 1995). The burned ground surface creates a favorable seedbed for jack pine. Most germination will occur in the first few years. Growth of jack pine seedlings is rapid. They grow so rapidly that they are able to produce seeds in 5-10 years.

Moderately intense fires will provide the scorching necessary to release the seeds, but high intensity fires can consume the cones rather than just release the seeds. The result of a high intensity fire would be converting the forest to aspen. Aspen is capable of invading areas after fire because its seeds travel long distances in the wind and can colonize sites when all other species have been killed off (Tester, 1995).

Fire Regime: The presettlement fire regime of pine barrens was a combination of frequent light surface fires (1-25 year return interval) and short return interval crown fires and severe surface fires (25-100 year return interval). Fire suppression has interrupted jack pines cycle

of self-replacement and the community is now rare in Wisconsin. In general, repeated prescribed fires at intervals greater than 5-10 years will serve to perpetuate jack pine on the site. More frequent fires may cause the area to become more prairie-like with only a few scattered jack pine trees.

The WiDNR is maintaining some wildlife areas in northwest Wisconsin as pine barrens. They include portions of Crex Meadows, Fish Lake, Amesterdam Sloughs and the Namekagon Barrens. A 4- to 8-year rotation is used to maintain the savannah appearance (Evenson, 1986). Timber sales, non-commercial knockdown, firebreak construction, prescribed fires on a 3-7 year rotation (primarily dormant season), mowing, and small-scale wick herbicide application are also used at Crex Meadows in Burnett County to restore and maintain barrens (Kooiker, 1995).

Oak Forests:

Fire Effects: In oak forests, as in the pine barrens, fire eliminates the seedlings of mesic forest trees (cherry, maple, basswood) and creates openings so that the oaks are not replaced by the more shade tolerant mesic species. The oaks are able to withstand fire while the mesic species are not.

Oak woodlands range from dry oak savannas to more mesic oak/maple forests. Oak savannas are a plant community characterized by fairly widely spaced oaks with a herbaceous layer of prairie grasses and forbs. There is no understory of saplings or shrubs. This gives savannas a "park-like" appearance. Oak savannas are a transitional community between the prairie and deciduous forest communities. Historically this community dominated much of the Midwestern landscape. At the time of European settlement, there were over seven million acres of oak savanna in southern and western Wisconsin (Curtis, 1971). Unfortunately, oak savanna as a functioning ecosystem has been virtually non-existent for over 100 years. Little is known about the ecology and, therefore, the management of oak savannas except that fire is an important force in their development and maintenance (Henderson, 1986).

Absent fire, things progress along the successional continuum and oak savanna gives way to denser dry oak forests and then to dry mesic forests dominated by oaks and maples.

Fire Regime: Little is known about the fire regime of oak savannas and forests. It is generally agreed that fire played an important role in maintaining oak savannas prior to European settlement. Fire probably occurred frequently in these communities. We know this because after 10 years of fire exclusion, savanna openings fill with small trees and shrubs, and after 30 years they become dense oak forests (Curtis, 1971).

In central Minnesota a scrubby oak community was burned annually between 1965 and 1979 in an attempt to restore the area to the presettlement oak savanna. The annual prescribed fires eliminated the understory and reduced the density and basal area of overstory. However, the overstory was still higher than estimated savanna values because of

the persistence of stems greater than or equal to 25cm in diameter breast height (DBH). The results indicated that annual prescribed fire is gradually restoring the area to savanna. Reversing the trend from oak savanna to oak woods may take more than 13 years using annual spring fires. In addition, annual fires alone may not completely restore savannas because it has little effect on oaks over 25cm dbh (White, 1983).

Studies of oak-maple forests indicate that prescribed fires alone will not promote oak regeneration in mesic oak-maple forests. However, the prescribed fires do remove mesic species from the understory and can be used in conjunction with girdling and planting to promote the regeneration of oaks (Will-Wolf, 1991).

Pine Forests:

Fire Effects: Frequent low-intensity fires maintain older white and red pine stands. Such fires will remove understory trees, but will not kill adult pines. Once bark of young trees has developed to withstand heat, red and white pines are relatively safe from surface fires.

Pine forests depend on fire for stand establishment. To make a site suitable for pine reproduction the fire must be intense enough to expose the mineral soil by burning accumulated litter. Fire must also remove the shrub and herb layer so that light intensity at ground level will be high. Seeds must be available from nearby live trees shortly after the fire and before the establishment of a dense cover of shrubs and herbs.

Fire Regime: The presettlement fire regime of red and white pine forests in northern Minnesota is one of frequent light surface fires (1 to 25 years) in combination with long return interval crown fires and moderate to severe surface fires. The severe surface fires or crown fires were at much longer intervals -- perhaps 160 years -- and killed portions of stands and brought in new age classes (Heinselman, 1981).

Wet (Riparian) Forests: These forests burned infrequently. Fires would not carry frequently because of generally wet conditions and lack of fuel. All mature trees of wet forests, except willows have a moderate or high degree of resistance to ground fires (Curtis, 1971). However, fires would kill-off seedlings and saplings leaving a gap in age classes to replace older trees as they die off.

CHAPTER 3: COMPLIANCE

The NPS will comply with all applicable regulations, statutes, laws and executive orders in carrying out the planning and implementation of a fire management program at the Riverway.

APPLICABLE IMPACT TOPICS DISCUSSED IN THIS EA

National Environmental Policy Act of 1969: This act sets forth a federal policy to preserve important historic, cultural, and natural aspects of our natural heritage. It requires federal agencies to use a systematic, interdisciplinary approach in planning and decision making. This FMP/EA was prepared pursuant to the National Environmental Policy Act (NEPA).

Clean Air Act (42 U.S.C. 7401 et seq., as amended): The Clean Air Act of 1963 stipulates that federal land managers have a responsibility to protect a park's air quality from adverse air pollution impacts. Air quality would be affected to various degrees by fire events inside the park. Direct, indirect and cumulative air quality impacts are therefore analyzed in this EA. To mitigate the nuisance and public safety hazards (on roads and airports) posed by smoke intrusions and to prevent deterioration of air quality, the NPS will follow Federal and State smoke management and air quality requirements.

Executive Order 11990 "Protection of Wetlands" (3 CFR 121, Supp. 177): This order requires Federal agencies to provide leadership and take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial value of wetlands. It further requires Federal agencies to avoid undertaking or providing assistance to new construction located in wetlands. The fire management program does not propose any construction in wetlands; however, a fire management program may have some effect on wetlands. Therefore, wetland impacts are analyzed in this EA.

Wild and Scenic Rivers Act (Public Law 90-542, as amended): The Riverway was established under the Wild and Scenic Rivers Act (Act). The purpose of designation under the Act is to preserve and protect selected rivers along with their immediate environments. Their free-flowing character, water quality and outstandingly remarkable resource values are to be protected. Outstandingly remarkable values can include scenic, recreational, geologic, fish and wildlife, biological, historic, cultural or other similar values. The Riverway was set aside specifically to protect its outstandingly remarkable scenic, recreational, biological and geologic values. A fire management program would have no effect on the free-flowing character of the Riverway. However, it could affect water quality and scenic, recreational, biological, and fish and wildlife values. The effects of a fire management program on these purposes of designation are considered under the related impact topics and a special section on scenic resources.

Endangered Species Act of 1973, as amended (16 USC 1531 et seq.): The Endangered Species Act requires all federal agencies to consult with the U.S. Fish and Wildlife Service

to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitat. Several Federally listed species occur at the Riverway. Therefore, the impact of a fire management program on these species is analyzed in this EA.

In addition, NPS management policies (2001) also require assessment of impacts to certain state-listed rare, candidate, declining and sensitive species. There are numerous state-listed and special concern species that occur along the Riverway. The impact of a fire management program on these species is also evaluated.

National Historic Preservation Act, as amended in 1992 (16 USC 470 et seq.) and Executive Order 11593: This Act and order require Federal agencies to survey, document, and where feasible, preserve historic properties (i.e.: those that are on or eligible for listing on the National Register of Historic Places). Section 106 of the National Historic Preservation Act requires Federal agencies 1) to survey and assess properties against National Register criteria and, if eligible 2) assess the effect of the proposed undertaking, and 3) if necessary, mitigate adverse effect. A fire management program has the potential to impact historic properties. Therefore, its effect is analyzed in this EA.

Impairment: While Congress has given the NPS management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirements of the NPS Organic Act of 1916 and the NPS General Authorities of 1970 which prohibit the impairment of park resources and values. The NPS organic Act states that the NPS “shall promote and regulate the use of Federal areas known as national parks, monuments, and reservations...by such means and measures as conform to the fundamental purpose of said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them *unimpaired* for the enjoyment of future generations” 16 USC 1). The General Authorities Act of 1970 supplemented these provisions by clarifying that the provisions of the Organic Act apply to all areas included in the National Park System and that “the authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress” (16 USC 1a(1)).

Impairment is an impact that, in the professional judgment of the responsible NPS manager would harm the integrity of park resources or values. Rarely will there be clear-cut evidence that impairment will occur. However, an impact would be more likely to constitute an impairment to the extent that it affects a resource or value whose conservation is necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park; key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or identified as a goal in the park’s general management plan or other relevant NPS planning documents.

The St. Croix National Scenic Riverway is an area of the National Park System established to protect and enhance its free-flowing character, water quality and outstanding natural, scenic, cultural and recreational values for current and future generations. Impairment is analyzed in this EA for each alternative, including no-action, and each impact topic. For each, we answer the question "Is the impact of this action going to be serious enough to impair park resources or values?"

NONAPPLICABLE IMPACT TOPICS NOT DISCUSSED FURTHER IN THE TEXT OF THIS EA

Executive Order 11988, "Floodplain Management:" The purpose of this order is to avoid, to the extent possible, the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development. It requires all federal agencies to reduce the risk of flood loss, minimize the impact of floods on human safety, health and welfare, and restore and preserve the natural and beneficial values of floodplains. The fire management program would not result in occupancy or modification of floodplains or support floodplain development. Therefore this impact topic is not discussed further.

Prime and Unique Farmland/Farmland Protection Policy Act (7 U.S.C. 4202(b)) This act requires Federal agencies to determine whether a proposed action will affect prime or unique farmlands. Prime farmlands are those whose value derives from their general advantage as cropland due to soil and water conditions; unique farmlands are those whose value is derived from their particular advantage for growing specialty crops. These areas can be cultivated land, pasture, or woodland. Efforts should be made to assure that such farmlands are not irreversibly converted to other uses unless other national interests override the importance of preservation or otherwise outweigh the environmental benefits derived from their protection. Along the lower Riverway Natural Resource Conservation Service has identified numerous areas of prime farmland in Minnesota and Wisconsin. Detailed soil surveys have not been completed for much of the upper Riverway and environs. In Wisconsin small areas of prime farmland have been identified between St. Croix Falls and Nevers Dam. No prime or unique agricultural soils are known north of Nevers Dam or on the Namekagon River (NPS, 1998).

A fire management program at the Riverway would not irreversibly convert any prime or unique farmlands. Therefore this impact topic is not discussed further.

Socioeconomic Environment

There are 11 counties adjacent to the Riverway (Pine, Chisago and Washington counties in Minnesota) and Bayfield, Washburn, Sawyer, Douglas, Burnett, Polk, St. Croix and Pierce counties in Wisconsin. The counties adjacent to the upper Riverway (above St. Croix Falls) are largely rural in character. State and local roads connect small towns, but between them

lie farmland, forestland, wetlands, and the many lakes of Minnesota and Wisconsin. The counties adjacent to the lower Riverway also maintain a great deal of their rural character but are subject to increasing urban pressures from the sprawling Twin Cities. Throughout the length of the Riverway are several state parks, state and county forests, and wildlife areas.

The Riverway and adjacent public lands provide a popular recreation resource for both residents of the area and visitors from the nearby Twin Cities. The proximity of the Twin Cities Metropolitan Area sets the stage for large numbers of visitors to become temporary recreation users in the area. The local tourism industry provides necessary services such as food, lodging, gasoline etc. The tourism industry is seasonal in nature and very much dependent on the weather, even in summer.

The use of prescribed fire at the Riverway would not affect any communities overall population, income or employment base. Therefore, this impact topic is not included for further analysis in this EA.

CHAPTER 4: ALTERNATIVES

ACTIONS COMMON TO ALL ALTERNATIVES

Under all alternatives, the NPS and cooperators would continue to **suppress all unplanned wildland fire** at the Riverway as soon as possible, regardless of whether it was caused by lightning or human activities. Suppression tactics/decisions shall take into account the need to protect cultural resources from disturbance/damage.

ALTERNATIVES

We are considering the following four alternatives for fire management at the Riverway:

Alternative 1: No Action. Suppress All Fire, No Prescribed Fire

No change from current procedure would take place. All fires, regardless of their origin would be suppressed immediately to limit fire spread. Rapid assignment of firefighters with hand tools and/or in some situations, mechanized equipment would be utilized to extinguish all fires. No mechanical treatment or prescribed fire would be used to meet resource management goals or reduce any hazard fuels.

Alternative 2: Prescribed Fire

Under this alternative prescribed fire would be used to manage natural resources. Prescribed fire would be used to maintain and restore fire adapted communities; protect native species, particularly the rare; and minimize the encroachment of exotic species. Prescribed fire would also be used as necessary to reduce hazardous fuel accumulations. All prescribed fires would be implemented in accordance with a written prescribed fire plan. Each plan would be reviewed and approved by a qualified Burn Boss as well as the NPS Border Water Area Parks Fire Management Officer (FMO). In addition each plan would receive peer review by a qualified (outside the NPS) prescribed fire practitioner and local and state fire management officials.

Prescribed fires would be conducted under the direction and operational control of a fully qualified Prescribed Fire Burn Boss. Qualification certification and experience for this position will meet or exceed those standards currently in use by the National Wildfire Coordination Group. All other positions needed to conduct and hold the prescribed fire would be filled with fully qualified resources, including any resources held in reserve. All resources listed in any project prescribed fire plan would be available for the duration of the fire. If any resource identified in the prescribed fire plan could not be available for the duration of the fire, the fire would be postponed.

Operational guidelines, range of acceptable fire behavior and favorable weather conditions to implement the prescribed fire would be specified in each prescribed fire plan. Each project would include monitoring and evaluation criteria as an integral component of the plan and would be implemented continuously during the prescribed fire operation to ensure that fire behavior and weather conditions remain within the prescribed fire plan parameters.

Current and expected weather conditions, fuel loading and fuel moisture and their associated fire dangers would be monitored closely to determine if and when prescription criteria are met. A current spot weather forecast would be obtained on the planned day of ignition, and all prescription elements would be verified to ensure all conditions and parameters were within desired ranges. If all criteria were met, and the "go-no go" checklist indicated the prescribed fire was acceptable and within prescribed parameters, a test fire would be ignited to determine on site fire behavior. If the test burn indicated fire activity and resource benefits consistent with the plan, the project would continue. If not, the test burn would be suppressed and the project postponed until more favorable conditions were present.

All application of fire would be through hand ignition techniques, usually by drip torch. Light hand ignition methods and sequences would be used to encourage low intensity fire behavior appropriate to the vegetation to be burned and the resource benefit objectives to be met. The NPS would ensure that sufficient fire-fighting resources are available should the weather change and fire behavior exceed expectations. Resources would include personnel, water, and support from other entities. Equipment would be brought in by boat, on existing paved or unpaved roadways, or on foot. Hand tools and chainsaws would be used for cutting vegetation and scraping fire lines.

Avoidance/Mitigation Measures: To minimize the impact of prescribed fire on natural and cultural resources, the following avoidance/mitigation measures would be implemented for each prescribed fire:

Air Quality: Prescribed fire plans would be prepared for every prescribed fire. The prescribed fire plans would document the steps taken prior to, during, and after the prescribed fire to reduce air emissions. This could include actions such as rapid and complete mop up. When conditions are unfavorable for smoke dispersion and air quality standards would be threatened, prescribed ignitions would be postponed. The NPS would implement the fire management plan in conformance with State and Federal standards.

Water Resources: A mosaic of vegetation would be left immediately adjacent to the St. Croix River, Namekagon River and their tributaries in prescribed fire units to minimize the potential for erosion from runoff after a fire event. Small areas of unburned islands throughout each prescribed fire unit would be left to help stabilize soil and reduce run-off. In areas with high potential for erosion, such as steep sandy slopes, prescribed fire would not be used.

Rare Species: The following measures would be undertaken to avoid impacts to Federally or State listed threatened and endangered species and species of concern:

- All species: All prescribed fire units would be assessed prior to prescribed fires to determine the presence of rare species, their occurrence or use of special habitats in the area and their ability to thrive after the fire event.
- Karner blue butterfly: The Riverway does not currently have suitable habitat for Karner Blue butterfly because its host plant, wild lupine, does not occur within the boundary. Therefore, there would be no effect on Karner blue butterfly. However, the NPS does plan to seed wild lupine into some suitable habitats. If wild lupine is successfully established at the Riverway and sites containing it are proposed for prescribed fire, the NPS would reconsult with the USFWS to determine the best course of action to avoid adverse effects to Karner blue butterfly.
- Kirtland's Warbler: While this species has not been documented at the Riverway, precautions would be taken in potential habitat. Adverse effects of prescribed fire to this ground nesting species would be avoided by scheduling fires in jack pine forest either prior to or after their nesting season.
- Bald Eagles: Restoration of natural processes, such as fire would be conducive to providing and maintaining bald eagle nesting areas. However, to protect the bird from potential short-term adverse effects, all prescribed fire units would be assessed for nesting bald eagles prior to prescribed fires. If nesting bald eagles are present, all prescribed fire activity would be kept back at least 660 feet from the nest during the most critical and moderately critical nesting periods which run from February 1 to July 31. In the unlikely event that prescribed fire closer than 660 feet during this period is deemed desirable in order to meet other resource management goals, the NPS would reconsult with USFWS to determine the best course of action to avoid adverse effects to bald eagles. In all cases, the risk of fire to trees used for nesting within the past three years or less would be assessed for the risk of damage by fire. If vulnerable, the tree would be protected from the fire.
- Gray Wolves: Wolves would be protected from the effects of prescribed fire by protecting den sites during the spring. Each year, the sites to be treated with prescribed fire the following spring would be identified and compared with the most recent information available from WiDNR on the location of wolf pack territories. Dens tend to be found near the center of a pack's territory. If a site near the center of a territory is scheduled for prescribed fire the following spring, the NPS would consult with the USFWS and the WiDNR to determine the best methods for determining if a den site could occur. Possibilities would include checking the area in late winter before a scheduled spring burn for signs of denning activity

and/or increasing the intensity of track surveys in the area. If denning activity is discovered in or near an area schedule for prescribed fire, the NPS would continue to consult with USFWS and WiDNR to determine the best course of action to avoid adverse effects to gray wolves.

Rendezvous sites are also generally found near the center of a packs territory. These are sites where adult wolves leave their pups during mid-to-late summer while they go off to hunt and return with food. Prescribed fire would not be used at the Riverway during mid-to-late summer in a typical year because vegetation would be too green to carry a fire.

Therefore, rendezvous sites would not be affected by prescribed fire. In the unlikely event that a prescribed fire would be scheduled for mid-to-late summer and the area corresponds with the center of a packs territory, the NPS would consult with the USFWS and WiDNR to determine the best course of action to detect and protect rendezvous sites.

- Rare mussels: The sites proposed for treatment with prescribed fire are all small sites. The mitigation measures described above for protecting water resources would protect rare mussels from the effects of sedimentation. Therefore, prescribed fire would have no effect on rare mussels.

Cultural Resources: All prescribed fire units would be assessed prior to prescribed fires to determine the presence of known cultural resources and the likelihood that unidentified resources may exist. An assessment would also occur on the potential effects of fire and erosion and the impact they could have on any cultural resources. **No heavy equipment would be allowed to drive on known mounds or burial sites. Extra caution would be used near archeological sites to prevent ground disturbance.** In addition, the following measures would be undertaken to avoid impacts to significant cultural resources:

- Prehistoric Archeological Resources: All known archeological sites would be evaluated for vulnerability to fire. Surface sites would be excluded from the prescribed fire units. Threats to buried sites would be reviewed against the prescription for the fire, including the hazards of burning roots and large fuel masses. No heavy equipment or ground disturbance would be allowed on burial mounds or known grave sites. If stumps exist on burial mounds they would be cut flush with the ground and covered with soil so fire is not carried through the roots. No petroleum or chemical based sources of ignition would be used on the surface of any known archeological sites. Appropriate equipment including hand tools would be used as necessary to avoid impacts. A qualified archeologist or a staff member who has completed the NPS, Midwest Region paraprofessional archeologist training would walk the site after the prescribed fire to see if any artifacts from known or unknown sites were exposed on the ground surface and assess the potential for erosion on or near the archeological site.

- Historic Archeological Resources: All avoidance/mitigation measures described under “Prehistoric Archeological Resources” would also apply to historic archeological resources. Historic archeological resources are often nearer the surface than prehistoric and may not have been exposed to fire in the past. Therefore, the NPS would consider excluding historic archeological resources from prescribed fire, or would reduce the heat of the fire through the archeological site by wetting the area or reducing the fuels present before the prescribed fire is set.
- Historic Structures: There are currently 3 National Register eligible properties identified on NPS-owned lands at the Riverway, involving 11 structures. Each of these properties would be excluded from prescribed fire. The properties are the Gibson cabin, the Lessner cabin, and the Platter/Schaeffer cabin. Any additional structures that may be identified in the future as historic would also be excluded from prescribed fire.
- Cultural Landscapes: There are currently no cultural landscapes identified in the Riverway. If landscapes are identified, they will be reviewed to see whether fire would help maintain or damage the landscape. Prescribed fire would be excluded from significant cultural landscapes.
- Ethnographic Sites: Currently no ethnographic areas have been identified. If sites are identified, the park will work with the tribes to determine the best methods for protecting them, which might include fire.
- Cultural resources would also be protected from fire line construction: Staging areas would be located in developed areas, rather than undeveloped, to avoid impacts to cultural resources. In most cases, wetlines and blacklines would be used to contain prescribed fire. No fire lines would be built in an area with known archeological sites or a high potential for archeological sites. **No ground disturbance would occur in areas known to be mound sites or likely to include human burial sites.**

Recreation: Areas would be burned during times of low recreation use (early spring and late fall) and scheduled (year to be burned) in relation to other treatment areas to have the least impact on recreation use. Notice would be provided to visitors about timing of potential prescribed fire activities, what they should expect, and safety measures. Where necessary, trails and landings may be temporarily closed to ensure visitor safety. Visitor facilities such as backcountry footbridges and steps would be protected from the effects of fire.

Scenic Resources: All prescribed fire units would be assessed prior to prescribed fires to determine the potential effect of opening views. If fire would open views to intrusive structures, vegetative screening would be maintained between the primary viewing area and the structure.

Control lines would be rehabilitated post-fire where visible to the public to leave them as naturally appearing as possible. Obvious large accumulations of cut limbs, seedlings and saplings would be scattered. Brush and limbs would be scattered on the control lines.

Alternative 3: Mechanical Treatment

Under this alternative, mechanical treatments would be used to manage natural resources and reduce hazardous fuel accumulations. Chain saws, chippers, mowers, pruning shears and rakes would be used to trim and remove trees, thin and remove brush, and mow herbaceous vegetation. Debris associated with mechanical treatment would be hauled off-site to an approved landfill or piled and burned. Topical herbicides would be used on a limited basis to prevent sprouting of exotic species such as buckthorn and honeysuckle. Herbicides would be used in strict adherence to label requirements. In accordance with NPS policy, an integrated pest management plan would be developed for all species targeted for herbicide treatment.

Avoidance/Mitigation Measures: Mitigation measures would be similar to those included in Alternative 2 except that they would be applied to removal of fuels by mechanical means rather than by prescribed fire. To protect water quality, no equipment would be used on steep or unstable slopes. To prevent rutting, tracked or rubber-tired equipment would only be used on dry or frozen ground.

Scenic Resources: Where tree cutting occurs near campsites, trails, adjacent to the river, or other areas readily visible to the public, stumps will be cut flush with the ground or a slant cut will be used.

Cultural Resources: **No heavy equipment would be allowed to drive on known mounds or burial sites. Extra caution would be used near archeological sites to prevent ground disturbance.**

Alternative 4 (Preferred): Integrated Program

Under this alternative both prescribed fires and mechanical treatment would be used to meet resource management goals and reduce any hazardous fuel accumulations. Mechanical treatments and prescribed fires would often be used in the same prescribed fire unit. Mechanical treatments would be used to reduce fuel loading in and around structures or trees that should be protected from fire, to establish fire lines, to remove encroaching woody plants that do not easily burn, to perform selective clearing, to cut and control exotic plants, and, if necessary, to cut forest understory to minimize fuel ladders. Exotic plants that are prone to sprouting after cutting may also be treated with topical herbicides as described above. Prescribed fires would be used to restore and maintain fire adapted communities including prairies, pine barrens, oak savannas, oak forests and pine forests. Prescribed fire would be used to control woody encroachment in prairies; prevent the succession of pine

barrens, oak woodlands and pine forests to more shade tolerant plant communities; and control exotic species.

This is the NPS preferred alternative. As the alternative that would best protect, preserve and enhance natural and cultural resources, it is also the "environmentally preferred alternative."

Avoidance/Mitigation Measures: Avoidance/Mitigation measures would be the same as those included in Alternative 2 and Alternative 3.

ALTERNATIVES CONSIDERED BUT NOT ANALYZED FURTHER

Numerous private lands and homes lie just outside the narrow corridor of the Riverway. Therefore, an alternative where naturally occurring fires (Wildland Fire Use) are allowed to burn under certain specific conditions to meet resource objectives *is not* being considered. This alternative is not appropriate for the narrow corridor of the Riverway. It is unacceptable because it would significantly increase the potential to impact public safety, property and park resources.

TABLE 1: SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Impact Topic	Alternative 1: No Action Suppress All Fire, No Prescribed Fire	Alternative 2: Prescribed Fire	Alternative 3: Mechanical Treatment	Alternative 4: (Preferred) Integrated Program
Air Quality	No impact. However, a wildland fire may be somewhat more likely to occur under this alternative since fuel reduction through prescribed fire would not occur. A wildland fire would result in minor to moderate, short-term negative impacts depending on the intensity and duration of the fire.	Minor, short-term negative impacts. Changes in air quality would be measurable, but small, localized and short-term. Class II increments would not be exceeded.	Negligible short-term impacts caused by emissions from internal combustion engines and small-scale burning of slash piles. Changes at or below the level of detection.	Combined effects of Alternatives 2 and 3. Provides option of using mechanical treatments where smoke may be an issue.
Soils	No impact. However, a wildland fire could result in minor to major, long-term negative impacts depending on intensity and duration of fire. Impacts could arise from emergency suppression efforts, nutrient volatilization, decreased soil porosity and increased erosion.	Moderate, long-term positive impacts by releasing nitrogen for plant uptake and reducing duff layer so more water reaches the soil.	Minor, short-term impacts. Limited to compaction caused by equipment.	Combined effects of Alternatives 2 and 3.
Water Quality	No impact unless an intense wildland fire, which may be slightly more likely under this alternative occurred. Wildfire could have moderate, short-term negative impacts from soil erosion and sedimentation if not immediately suppressed.	Negligible to minor, short-term impacts. Most erosion and sedimentation avoided by creating a low intensity fire and leaving a mosaic of vegetation.	Negligible impacts related to limited soil disturbance and erosion.	Combined effects of Alternatives 2 and 3.
Floodplains	No impact	No impact. There would be no occupancy or modification of floodplains.	No impact. There would be no occupancy or modification of floodplains.	No impact.
Wetlands	No impact unless an intense wildland fire, which may be somewhat more likely under this alternative occurred. Wildland fire could have moderate, long-term negative impacts to wetland soils and vegetation.	Minor to moderate, long-term positive impacts from restoration efforts to control exotics and provide a seed bed for native plants.	Minor, short-term negative impacts if equipment is operated along wetland edges.	Combined effects of Alternatives 2 and 3.

TABLE 1: SUMMARY OF ENVIRONMENTAL CONSEQUENCES CONTINUED

Impact Topic	Alternative 1: No Action Suppress All Fire, No Prescribed Fire	Alternative 2: Prescribed Fire	Alternative 3: Mechanical Treatment	Alternative 4: (Preferred) Integrated Program
Vegetation	Major, long-term negative impact by continuing practices that result in the loss of fire adapted communities and reduce biological diversity	Moderate, long-term positive impacts on native vegetation by restoring fire adapted communities and increasing biological diversity.	Minor, long-term positive impacts on native vegetation by removing exotic plants.	Combined effects of Alternatives 2 and 3.
Wildlife	Moderate, long-term to permanent negative impact by loss of wildlife associated with fire adapted communities. Effects detectable, long-term, localized, consequences at the population level. If an intense, fast-moving wildland fire occurred that could not be immediately suppressed it could have negative impacts by trapping wildlife, consuming nests, and destroying habitat.	Moderate, long-term positive impacts to wildlife associated with fire adapted communities. Increases biological diversity. Minor, short-term negative impacts. Negative effects could be detectable, but localized, small and of little consequence to species population.	Minor, positive impacts by limited control of exotics and encouraging native species which provide better food and cover for wildlife.	Combined effects of Alternatives 2 and 3. Provides maximum opportunities for control of exotics and improving food and cover for wildlife.
Threatened, Endangered and Rare Species	Moderate, long-term to permanent negative impact by continuing practices that result in the loss of fire adapted communities and the rare species that occur in them, including Karner blue butterfly, Kirtland's warbler, prairie fame-flower and kitten-tail's. If an intense, fast-moving wildland fire occurred that could not be immediately suppressed then negative impacts to mussels could occur from soil erosion and sedimentation.	Moderate, long-term positive impacts to rare species associated with fire adapted communities including Kirtland's warbler, Karner blue butterfly, fame- flower and kitten-tails. Not likely to adversely affect any listed species or its critical habitat.	Minor, long-term positive impacts by providing limited restoration of fire adapted communities. Not likely to adversely affect any listed species or its critical habitat.	Combined effects of Alternatives 2 and 3. Not likely to adversely affect any listed species or its critical habitat.

TABLE 1: SUMMARY OF ENVIRONMENTAL CONSEQUENCES CONTINUED

Impact Topic	Alternative 1: No Action Suppress All Fire, No Prescribed Fire	Alternative 2: Prescribed Fire	Alternative 3: Mechanical Treatment	Alternative 4: (Preferred) Integrated Program
Prehistoric Archeological Resources	No impact unless a wildland fire, which may be slightly more likely under this alternative occurred. That could have moderate to major, negative impacts to prehistoric resources from emergency wildland fire suppression efforts such as fire line construction and intense fire.	Negligible impacts through implementation of avoidance/mitigation measures on every prescribed fire. No adverse effect on prehistoric archeological resources.	Negligible impacts through implementation of avoidance/mitigation measures on every prescribed fire. No adverse effect on prehistoric archeological resources.	Combined effects of Alternatives 2 and 3. No adverse effect on prehistoric archeological resources.
Historic Archeological Resources	No impact unless a wildland fire, which may be slightly more likely under this alternative occurred. That could have moderate to major, negative impacts to historic archeological resources from emergency wildland fire suppression efforts such as fire line construction and intense fire.	Minor impacts through implementation of avoidance/mitigation measures on every prescribed fire. Any No adverse effect on historic archeological resources.	Minor impacts through implementation of avoidance/mitigation measures on every prescribed fire. No adverse effect on historic archeological resources.	Combined effects of Alternatives 2 and 3. No adverse effect on historic archeological resources.
Historic Structures	No impact unless a wildland fire occurred. Then a major negative impact could occur if historic structures could not be protected and were consumed by fire.	No impact. Protection of historic structures would be a priority.	No impact. Historic structures would be excluded from treatment area.	Combined effects of Alternatives 2 and 3. Allows selection of the method most appropriate to the site and protection of cultural resources. No adverse effect on historic structures.
Ethnography	Possible moderate, long-term negative impacts. Fire adapted communities would succeed to another plant community and could effect affiliated groups' practices in certain areas.	Possible moderate, long-term positive impacts by restoring ecosystem processes and supporting traditional practices associated with fire adapted communities.	Possible minor, long-term positive impact by removing exotic species from native habitats in limited areas.	Combined effects of Alternatives 2 and 3. Provides maximum opportunity for positive impacts to native habitats and associated traditional practices.

TABLE 1: SUMMARY OF ENVIRONMENTAL CONSEQUENCES CONTINUED

Impact Topic	Alternative 1: No Action Suppress All Fire, No Prescribed Fire	Alternative 2: Prescribed Fire	Alternative 3: Mechanical Treatment	Alternative 4: (Preferred) Integrated Program
Cultural Landscapes	No impact or major, long-term negative impact depending on what makes the landscape significant. Negative impact if fire is needed or would be helpful in maintaining the landscape.	Moderate, long-term positive impacts to landscapes that require or would benefit from fire.	Moderate, long-term positive impact to landscapes that could benefit from mechanical treatment to remove woody invaders or remove exotics.	Combined effects of Alternatives 2 and 3. Provides maximum flexibility of methods to maintain landscapes.
Recreation / Visitor Use	Moderate, long-term negative impact from continuing practices that result in the loss of fire adapted communities and visual and biological diversity along the Riverway. A wildland fire, which may be slightly more likely under this alternative, could have short-term negative impacts from emergency closures and smoke intrusion.	Moderate, long-term positive impacts by providing more diverse scenery and a new opportunity to learn about and observe fire ecology. Minor, short-term negative impacts from temporary closures during the off-season.	Minor, short-term negative impacts from noise. Impacts would be minimal since work would be conducted in the off-season.	Combined effects of Alternatives 2 and 3.
Scenic Resources	Moderate, long-term to permanent negative impact from continuing practices that result in the loss of fire adapted communities and visual variety along the Riverway.	Moderate, long-term positive impacts by restoring fire adapted communities and visual as well as biological diversity to the Riverway.	Minor long-term positive impacts from limited restoration of native communities.	Combined effects of Alternatives 2 and 3.

CHAPTER 5: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter examines the potential environmental consequences of the four alternatives under consideration. The analysis provides a basis for comparing the advantages and disadvantages of each alternative. Direct, indirect and cumulative impacts are considered. Direct impacts are those potentially caused by the action (prescribed fire and/or mechanical treatments) that would occur at the same time and place as the action. Indirect impacts are those caused by the action that would occur later in time and/or would be farther removed in distance but are still reasonably foreseeable. Cumulative impacts are impacts on specific resources that result from the incremental impact of that action when added to other past, present and reasonably foreseeable future actions regardless of what agency or person undertakes the other actions.

Note: Wildland fire could occur under any of the alternatives. It is perhaps somewhat more likely that a wildland fire, if it occurred, would be more difficult to contain if Alternative 1 were selected since no fuels management would be taking place under that alternative. Therefore, the potential consequences of wildland fire are described as an indirect impact of Alternative 1 although they are still possible under any of the alternatives.

CLIMATE

Description: The climate of the area is sub-humid continental. Both cool and dry continental air masses from the north and moist air masses from the Gulf of Mexico influence it. Weather is characterized by warm, humid summers and cold winters. Average daily maximum temperatures varies from 71 °F to 85 °F in July and 11 °F to 23 °F in January depending on the location, with the colder temperatures being experienced in the northern limits of the Riverway. The spring months are generally cool and rainy, with June usually being the wettest month of the year. During the summer and early fall, the weather becomes progressively drier. Total annual precipitation varies from 34 inches in the northeastern portion of the St. Croix Basin to 29 inches in the east-central area. Snowfall contributes about 15% of the total annual precipitation (NPS, 1998 and 2000a).

Consequences: None of the alternatives would have any impact on the climate of the area. It is described simply to provide context for the reader.

AIR QUALITY

Description: The Clean Air Act, as amended (42 U.S.C. 7401 et seq.) established a program to preserve, protect, and enhance the air quality in clean air areas of the United States. The Riverway was designated as a Class II clean air area. Under this designation, limited development can be permitted in the vicinity as long as the levels of particulate matter, sulfur dioxide, and nitrogen dioxide do not exceed the Class II increments.

Consequences: The quantity of smoke emissions from fires and the impact of those emissions on local and regional air quality vary dramatically with the size and type of fire that occurs. The number of acres burned is the single most important factor in determining the total emissions. Large fires produce more total emissions than small fires. The fire type also influences the quantity of emissions. Prescribed fires typically produce lower per-acre emissions than wildland fires. Head fires, which burn with the wind, typically produce lower per acre emissions but have higher emission rates than backing fires, which back into the wind. Surface fires typically produce lower per-acre emissions than crown fires, which burn through the tree canopy. The differences that occur may be attributed to differences in meteorological conditions (e.g. mixing height, transport and mid-flame wind speeds) and differences in fuel properties (e.g. fuel moisture content and fuel loading, size, arrangement and continuity) and differences in the resultant fire behavior and fuel consumption (USDA, Forest Service, 2000).

Alternative 1: No Action: Suppress All Fire

Under this alternative there would be no prescribed fire activity. All fire, regardless of origin, would be suppressed as soon as possible. There would be no emissions from prescribed fire and no changes to air quality. However, this does not necessarily mean that there would be no fire at the Riverway. Wildland fires could still occur. If a wildland fire occurred at the Riverway and was quickly suppressed, emissions would be limited. If it could not be quickly suppressed and meteorological and fuel conditions were favorable, emissions could be high. This could result in moderate, short-term impacts. This means that changes in air quality would be measurable and would have consequences, although the effect would be relatively local. Recovery would take less than 7 days.

Alternative 2: Prescribed Fire

Under this alternative, prescribed fire would be used in conjunction with the avoidance/mitigation measures described in Chapter 4. Prescribed fire would result in minor short-term impacts to air quality. This means that changes in air quality would be measurable, but the changes would be small, short-term, and the effects would be localized. Recovery would take less than 7 days. The avoidance/mitigation measures would ensure that Class II increments would not be exceeded and nuisance smoke would be kept to a minimum.

Alternative 3: Mechanical Treatment:

Under this alternative, mechanical treatment would be used to meet resource management objectives and manage fuels. The impact of this alternative would be limited to emissions from internal combustion engines on equipment used. The impacts to air quality would be negligible and short-term. This means that no changes would occur or changes would be just at or below the level of detection.

Alternative 4 (Preferred): Integrated Program:

Under this alternative, prescribed fire and mechanical treatments would be used in conjunction with the avoidance/mitigation measures in Chapter 4. It would have the combined effects of Alternative 2 and 3. Impacts to air quality would be minor, short-term and localized. The option of using mechanical treatments in areas where smoke could become an issue provides an additional means of minimizing impacts.

Cumulative Impacts: Cumulative impacts would arise from wildland or prescribed fire within the Riverway coupled with fires that can and do occur outside of the park on adjacent lands. However, implementing the applicable state Smoke Management Plan(s) would ensure that the additive effect of prescribed fire (Alternatives 2 or 4) at the Riverway on the air quality of the region would be minimal.

Impairment: None of alternatives under consideration would result in impairment to air quality.

GEOLOGY

Description: Volcanic flows, seas, glaciers, and flowing water have all shaped the landscape of the St. Croix and Namekagon rivers. The bedrock of this region consists of volcanic and sedimentary rocks that are 1.1 billion years old. These rocks were deposited in a split in the earth's crust extending from Lake Superior southwest to Kansas, called the Mid-continent Rift system. The rifting event formed a synclinal basin, bounded by major faults. The basin was initially filled with basalt from numerous volcanic lava flows, followed by sandstone and shale laid down by streams and lakes. These rocks were subsequently covered by Cambrian sandstone and shale deposited by the sea that advanced into the area from the south 570 to 500 million years ago.

The current topography of the region is largely a result of glacial activity and the erosional force of water. The St. Croix and Lake Superior basins helped funnel glaciers into the region during the Pleistocene epoch, beginning more than 1.5 million years ago. The St. Croix basin was covered many times by ice sheets during the Pleistocene. The Superior lobe (glacial ice moving south out of the Lake Superior basin) covered most of the Riverway area at different times during this period. Most of the bedrock layers in the St. Croix basin are covered by several hundred feet of glacial till and outwash, but in some areas, such as the Dalles of the St. Croix, the rivers have cut down to and exposed bedrock.

Consequences: None of the alternatives would have any impact on the geology of the area. It is described only to provide context for the reader.

SOILS

Description: Most of the soils along the St. Croix and Namekagon Rivers formed in material laid down by glaciers. Some soils also formed from organic material, while others formed

from alluvium and wind blown deposits. In general, the soils of the St. Croix basin are silts and sandy loam. Most soils are well drained or excessively well drained, although there are areas of some-what poorly drained loamy soils. There are also large areas of peat deposits along the Riverway.

The largest area of outwash plains is known as "The Barrens." For the most part, the Barrens are located east of the St. Croix River. It is an extensive area of sandy soils, with pine and scrub oak common. It stretches northeastward from the St. Croix River, in northwestern Polk County, Wisconsin, for about 120 miles, into the Bayfield Peninsula (Cahow, 1985).

Consequences: Soils can be negatively impacted by wildland fire-fighting efforts, such as bulldozed fire lines or from fires that burn so hotly that they volatilize nutrients.

Many factors influence the extent to which fire affects soils. Moisture conditions, fuel loading, temperature, humidity, proximity of fuels to the soil surface, ground cover, and the intensity of the fire are all factors. Changes to the organic layer are the principal effect of fire on soils.

Moderate and low intensity fires can increase the amount of nitrogen available for plant uptake. This increase lasts for a couple of years following the prescribed fire and stimulates revegetation in the burned area. On the other hand if fire is intensely hot, burning can hasten the loss of nutrients stored in organic matter by direct volatilization (USDA, Forest Service, 2000). When fire volatilizes organic matter it affects the soil by reducing bulk density and destroying its structure. Lower porosity and the filling in of surface pores by ash and loose soil particles can reduce infiltration and increase ponding and erosion. Lower infiltration rates can then affect plant productivity and the composition of the plant community. Fire can reduce the litter and duff layer, which if too thick, keeps water from reaching the soil and blocks plant growth. On the other hand, if the litter and duff layer is completely destroyed by an intense fire it can reduce soil productivity. A light litter and duff layer helps water infiltrate soil, reduce evaporation from the soil surface, and store moisture for plant use.

Alternative 1: No Action, Suppress All Fire

Under this alternative, there would be no prescribed fire activity. All fire would be suppressed as soon as possible. If a wildland fire occurred, impacts to soils could range from minor to major depending on how quickly a fire could be suppressed. Wildland fire is more likely to occur when moisture levels are lower and fuel loads higher. Therefore, they are more likely to burn hotter and have negative soil impacts by volatilization of nutrients, consuming the duff and organic layers, exposing mineral soil to erosion, and killing near surface soil organisms. Minor impacts would mean they would be detectable, but the effects to soil fertility and area would be small. Major impacts would mean that the effect on fertility would be readily apparent, likely long-term – taking more than 3 years to recover – with substantial changes to the character of soils over a relatively large area.

Alternative 2: Prescribed Fire

Under this alternative, prescribed fire would be used in conjunction with the avoidance/mitigation measures described in Chapter 4. The effects of prescribed fire on soil are significantly different from those of intense wildland fires. Prescribed fire can be planned and implemented in ways that minimize the adverse impacts to soils and maximize the beneficial impacts. Prescribed fires are only ignited under specific conditions of fuel and moisture. Moisture levels are significantly higher than those typically associated with wildland fire. The higher moisture conditions results in fires that burn less intensely, consume less organic material, and volatilize less nitrogen. Prescribed fire would actually have moderate, long-term positive impacts on soil by increasing the amount of available nitrogen. This means that the positive effect to soil fertility would be readily apparent and last over 3 years. Fire control lines would be carefully planned, often utilize natural breaks such as waterways, or use wetlines or blacklines to avoid impacts to soils. Any constructed line would be rehabilitated. The negative impact of fire control lines on soils would be minor and short-term. This means that they may be detectable but the affected area would be small and would take less than 3 years to recover.

Alternative 3: Mechanical Treatment

This alternative would have little positive or negative effects on soils. Soil impacts would be limited to compaction from equipment. Rutting would be avoided by using tracked or rubber-tired equipment on dry or frozen ground *only*. Impacts would be minor and short-term. Minor impacts would be detectable but the effects to soil fertility and area would be small and take less then 3 years to recover.

Alternative 4 (Preferred): Integrated Program

The impact of an integrated program on soils would have the combined effects of Alternative 2 and 3. Positive impacts would be moderate and long-term. Negative impacts would be minor and short-term.

Cumulative Impacts: Soils at the Riverway are impacted by recreational use (vegetation trampling, compaction and subsequent erosion) and sometimes by construction activities in or adjacent to the Riverway. Prescribed fire would not have further adverse impacts to soil, and in, fact would benefit soils as described in Alternative 2 above. Mechanical treatment would have minor impacts on soils. Only wildland fire, if it started and could not be immediately suppressed would have any major additive adverse effect on soils.

Impairment: None of alternatives under consideration would result in impairment to soils.

WATER QUALITY

Description: The St. Croix and Namekagon Rivers are generally considered to have high water quality. The water in the Riverway is characterized as a calcium bicarbonate type,

which reflects the glacial drift through which the groundwater flows. Dissolved oxygen is generally high, above 5 milligrams per liter. The water has a moderate brown color caused principally by organic acids and fine organic detritus drained from the thousands of acres of marshes and peat bogs in the basin. Sources of pollution include non-point sources outside the Riverway such as runoff from lands developed by agriculture, forestry, roads, or residential or industrial areas. Sediments carried into the Riverway from tributaries during heavy runoff events can cause turbidity. Water transparency, as measured by Secchi disc readings, may vary from 2 to 4 feet depending on the time since last runoff (NPS, 1998).

To help protect its water quality, the Riverway has been designated by Wisconsin as an "outstanding resource water" and by Minnesota as an "outstanding resource value waters - restricted." The Wisconsin classification means that a proposed new discharge or an increased discharge from a municipal or industrial source would not be permitted unless the effluent meets the background level in the river. Minnesota's classification means that a proposed new or increased discharge would not be allowed unless there was no prudent or feasible alternative.

Consequences: The effect of fire on water quality varies depending on the season of the fire, local relief, vegetation type, and soil type. Both wildland and prescribed fire effect vegetation and soil to differing degrees and can increase runoff from the burned areas. The runoff can affect water quality, including turbidity, sedimentation and nutrient loading. Sedimentation is the deposition of eroded sediment. Turbidity is a measure of reduced transparency of water due to suspended material. Accelerated nutrient inputs can lead to eutrophication. Liquid fire retardants and foams are sometimes used to control prescribed and wildland fires. Most of these retardants include the chemical fertilizers ammonium phosphate and sulfate as the principal components. The principal ingredient, ammonia can be toxic to aquatic organisms.

Alternative 1: No action: Suppress All Fires

Alternative 1 would have no impact on water quality unless a wildland fire occurred that could not be immediately suppressed. Since wildland fire generally occurs under conditions that are more likely to create an intense fire and have adverse impacts on soils, they also have the potential to adversely impact water quality through erosion and sedimentation. During a wildland fire, fire fighters are reacting to an emergency. Use of retardants is less controlled and could have greater impacts to water quality. The impacts of a wildland fire on water quality could be negligible to moderate depending on the intensity of the fire. Negligible impacts mean that water quality would not be affected, or changes would be either non-detectable or if detected, would have effects that would be slight, local, and short-term. Moderate impacts mean that chemical or physical changes would be measurable, but relatively local.

Alternative 2: Prescribed Fire

Under this alternative prescribed fire would be used in conjunction with the avoidance/mitigation measures described in Chapter 4. Because the effect of

prescribed fire on soils is significantly different from those of wildland fire, its effects on water quality are significantly different. Prescribed fire would only be ignited under specific conditions of fuel and moisture that would create a fire that would burn less intensely, minimize adverse impacts to soil, and reduce the potential for erosion. Prescribed fire would be planned in such a way to leave a mosaic of vegetation immediately adjacent to the St. Croix River, the Namekagon River and their tributaries. This mosaic of vegetation would catch eroding soil before it entered the waterway. If needed, sediment traps and water bars could also be installed to prevent any eroding soil from reaching the water. Retardants would not be used near the waters edge and would be used only selectively. Therefore, impact of prescribed fire on water quality would be negligible to minor. Minor impacts mean that changes in water quality, if any would be small, short-term, and localized.

Alternative 3: Mechanical Treatment

Mechanical treatment would have little impact on water quality. Any impacts would be related to the minor soil disturbance discussed above. The impacts would be negligible. Changes in water quality would either be non-detectable or, if detectable, the effects would be slight, local, and short-term.

Alternative 4 (Preferred): Integrated Program

An integrated program would combine the approaches of Alternatives 2 and 3 and would have negligible to minor, short-term impacts to water quality.

Cumulative Impacts: Water quality at the Riverway is impacted by run-off of nutrients and sediments in the watershed and by point sources such municipal and industrial discharges. Prescribed fire would not have further adverse impacts to water quality. If wildland fire started and was not immediately suppressed, it could have an additive adverse effect on water quality due to increased potential for soil erosion and sedimentation.

Impairment: None of alternatives under consideration would result in impairment to water quality.

WETLANDS

Description: Much of the land within the Riverway boundary is covered by various types of wetlands, including swamps, marshes, bogs, fens, wet meadows, ponds, sloughs and seeps. These wetlands exist primarily on the riverine edge and islands within the Riverway. They also occur on more upland sites where the water table is close to the surface, or where surface water is trapped in depressions with restricted drainage. Wetlands within the Riverway boundary have been mapped and inventoried for the entire Federally-administered zone (NPS, 1998). The survey noted that most of the wetlands in the Riverway were in excellent condition, with little evidence of disturbance to the sites.

Consequences: Because of inundated or saturated soils and high moisture content of the vegetation, wetlands are generally less affected by fire than adjacent upland areas and often function as natural fire breaks. Wildland and prescribed fire can both reduce and kill vegetation and burn the organic soils typical of wetland areas. The severity of these impacts is weather dependent. In periods of prolonged drought, when water tables are low and organic soils sufficiently dry, even low intensity fires may smolder for a long time and have severe effects on the soils and vegetation of wetlands. Potential impacts include plant mortality from burning, trampling from personnel, uprooting during construction of control lines and introduction of exotics. If prolonged dry weather enables fire to burn organic material in wetlands, a loss of wetland functions related to protecting water quality could be expected (USDA, Forest Service, 2000).

Alternative 1: No action: Suppress All Fires

This alternative would have little impact on wetlands unless a wildland fire broke out that could not be immediately suppressed. The impact of wildland fire on wetlands would depend on weather and moisture conditions. Wildland fires are more likely under drier conditions. Fire under drier conditions can severely affect wetland soils and vegetation. The impact of a wildland fire on wetlands could be moderate and long-term. If a wildland fire occurred that could not be immediately suppressed, the effects to wetlands could be readily apparent, including a long-term effect on wetland vegetation.

Alternative 2: Prescribed Fire

Prescribed fire would only be ignited under specific conditions of fuel and moisture that would create a fire that burns less intensely and avoids or minimizes impacts to wetlands. Prescribed fire could also be used to restore plant diversity to wetland areas. Wetland areas invaded by exotics such as reed canary grass could be treated to kill the exotics and then burned to provide a seedbed for native plantings resulting in a positive impact to wetlands. This positive impact of prescribed fire on wetlands would be minor to moderate and long-term, depending on the success of the overall restoration effort. Minor impacts mean that the positive effect to wetlands would be detectable, but relatively small in terms of area and nature of change. Moderate impacts mean that the positive effect to wetlands would be readily apparent and have a long-term effect on vegetation by restoring greater native species composition. Wet prairies are considered wetlands and are included in the Long Term Prescribed Fire Plan.

Alternative 3: Mechanical Treatment

This alternative would have no or little adverse impact to wetlands. Adverse impacts would be minor and limited to slight disturbance when operating equipment along the edges of wetland areas. Positive impacts would also be minor due to the limited area that could be treated. Minor impacts mean the effects would be detectable and relatively small in terms of area and nature of change.

Alternative 4 (Preferred): Integrated Program

An integrated program of prescribed fire and mechanical treatment in conjunction with the avoidance/mitigation measures described in Chapter 4 would have the combined effects of Alternative 2 and 4.

Cumulative Impacts: Wetlands along the Riverway are in good condition and well protected. Impacts are limited to some disturbance during construction activities that take place within the Riverway boundary. The only fire scenario that would have any noteworthy additive impact would be wildland fire that could not be immediately suppressed, which is slightly more likely under Alternative 1.

Impairment: None of alternatives under consideration would result in impairment to wetlands.

VEGETATION

Description: The names of plant communities along the Riverway vary depending on the vegetation classification system used. The following discussion of vegetation relies primarily on the vegetation classification system used in "The Vegetation of Wisconsin - An Ordination of Plant Communities" (Curtis, 1971). Since the Riverway lies partly in Wisconsin and partly along the border of Wisconsin and Minnesota, the Curtis system should be applicable to Riverway lands in both states.

The Riverway traverses two distinct floristic provinces. The northern hardwood province is found in the northern reaches and the prairie-forest province to the south. A narrow band or zone separates the two and contains floristic elements of both provinces. This "tension zone" has been mapped across Wisconsin. Along the Riverway, the tension zone passes through the St. Croix Falls area. The same band can be traced through Minnesota (Curtis, 1971).

Within each province are local assemblages of vegetation called plant communities. Plant community distribution along the Riverway is governed by a variety of site conditions such as soil type, landform, aspect, slope, and moisture. Many of these communities are intermingled and lack well-defined boundaries. They blend into one another based on geography, changes in site conditions, and their current status along the successional continuum. A summary description of each terrestrial plant community type in the northern hardwood province can be found in Table 2. Summaries of terrestrial plant communities of the prairie-forest province are found in Table 3.

In addition to the communities listed in the tables, secondary forest, which comes in following timber harvest, is common, especially along the upper Riverway. After the white pines were harvested, there was little conifer seed source available. Aspen and birch, which have wind dispersed seeds, replaced the pines after logging. Because there is no historical precedent for timber harvest and fire suppression, little is known about the successional

pathways of these secondary forests (what community might replace them) beyond 100 years of age.

The Riverway is also rich in communities that are transitional between terrestrial and aquatic. They include alder thickets, river beach, and emergent aquatic plant communities. Fire can occur in these communities during prolonged dry periods. In November 2000, a fire that started in a hardwood community outside the Riverway also burned through an emergent wetland within the boundary. However, fire is not generally a factor in determining the vegetative make up of transitional wetland habitats. Therefore, they are not described in the tables. Exotic plants that occur in these communities include purple loosestrife and reed canary grass.

**TABLE 2: SUMMARY OF MAJOR TERRESTRIAL PLANT COMMUNITIES
St. Croix National Scenic Riverway: Northern Hardwood Province**

Community	Dominant Plants	Stability	Next Successional Community	Function of Fire	Fire Regime*	Rare Species	Problems/Concerns
Sandy Pine-Barren Prairie	Big blue stem and little blue stem (dry-mesic sites). A grass (<i>Calamovilfa longifolia</i>), needle grass and sedges.	Unstable in absence of fire	Pine barrens	Arrests woody encroachment	Probably fires every 2-6 years	Fame-flower	Invaded by exotic spotted knapweed and exotic thistles (Canada, bull and musk).
Pine Barrens	Blueberry, hazelnut, flowering spurge, dog bane, sweet fern, jack pine, Hill's oak, bur oak, red pine	Low unless burned frequently	Northern Dry Forest	Prevents succession to next community. Required for jack pine seed dispersal (>116 degrees F). Exposes mineral soil for stand establishment.	2/4	Kirtland's warbler (potential)	Occupies a much smaller area than it once did. Much of area is now covered with red and white pine plantations or has grown up into a northern dry-mesic (oak-pine) forest Invaded by spotted knapweed and exotic thistles
Northern Dry Forest	jack pine, red pine, white pine, Hill's oak, quaking aspen	Low. A one-generation forest in the absence of fire	Northern Dry-Mesic or Mesic Forest	Exposes mineral soil for stand establishment. Controls understory competition.	2/5	Kirtland's warbler (observed, 1990)	

TABLE 2: CONTINUED
SUMMARY OF MAJOR TERRESTRIAL PLANT COMMUNITIES
St. Croix National Scenic Riverway: Northern Hardwood Province

Community	Dominant Plants	Stability	Next Successional Community	Function of Fire	Fire Regime*	Rare Species	Problems/Concerns
Northern Dry-Mesic Forest	White pine, red maple, red oak, paper birch, sugar maple	Fairly stable	Northern Mesic Forest		6		
Northern Mesic Forest	Sugar maple, yellow birch, basswood	Very stable - a climax forest	A climax forest absent disturbance		6	Canada Yew	
Northern Wet-Mesic Forest	White cedar, balsam fir, yellow birch, black ash	Very stable	Northern mesic forest by physiographic changes in water supply		6		
Northern Wet Forest	Black spruce, tamarack, white cedar, balsam fir, white pine	Very stable	Northern wet-mesic forest by physiographic changes in water supply		6		

*** Presettlement Fire Regimes**

- 0 = No natural fire or very little
- 1 = Infrequent light surface fires (more than 25-year return intervals)
- 2 = Frequent light surface fires (1- to 25-year return intervals)
- 3 = Infrequent, severe surface fires (more than 25-year return intervals)
- 4 = Short return interval crown fires and severe surface fires in combination (25- to 100-year return intervals)
- 5 = Long return interval crown fires and severe surface fires in combination (100- to 300-year return intervals)
- 6 = Very long return interval crown fires and severe surface fires in combination (over 300-year return intervals)

**TABLE 3: SUMMARY OF MAJOR TERRESTRIAL PLANT COMMUNITIES
St. Croix National Scenic Riverway: Prairie - Forest Province**

Community	Dominant Plants	Stability	Next Successional Community	Function of Fire	Fire Regime*	Rare Species	Problems/Concerns
Basalt Glade** (Glenn-Lewin, 1988) (Type of dry prairie, Curtis)	Mosaic of bare rock, crustose lichens, bryophytes, and prairie species including big blue stem, little blue stem, sedges and, at the richest sites, prairie drop seed	Fairly stable due to the nature of the substrate		Prevents woody invasion	See ** below	Fame-flower, prickly pear	Invaded by woody plants, especially staghorn sumac and prickly ash. Invaded by spotted knapweed.
Hill Prairies (Glenn-Lewin, 1988) (Type of Dry to dry-mesic prairie)	Little blue stem, big blue stem, needle grass, side-oats grama, June grass, hairy grama, muhly grass	Unstable in absence of fire	Southern dry forest.	Prevents woody invasion	Probably 2	Kitten-tails	Woody plant invasion has reduced many of these sites to small openings. Woody invaders include smooth sumac, Hill's oak, prickly ash, eastern red cedar, bur oak. Invaded by exotics including spotted knapweed, exotic thistles, exotic cool season grasses.
Southern dry forest	Black oak, white oak, bur oak, black cherry, red oak	Unstable in absence of fire	Southern dry-mesic	Prevents succession to more shade tolerant species. Prepares seed bed.	Probably 2/5	Kitten-tails may persist on bluff edges	Subject to invasion by spotted knapweed
Southern dry-mesic	Bur oak, white oak, basswood, sugar maple, slippery elm	One generation stands	Southern mesic forest		Probably 6		Subject to invasion by garlic mustard

TABLE 3: CONTINUED
SUMMARY OF MAJOR TERRESTRIAL PLANT COMMUNITIES
St. Croix National Scenic Riverway: Prairie - Forest Province

Community	Dominant Plants	Stability	Next Successional Community	Function of Fire	Fire Regime*	Rare Species	Problems/Concerns
Southern mesic forest	Sugar maple, basswood, slippery elm, red oak	Very stable. A climax forest.	A climax forest in the absent disturbance		0	Ginseng, stemless tick-trefoil	Invaded by buckthorn, especially from Never's dam south
Southern wet-mesic forest	American elm, sugar maple, red ash, basswood, black ash	Relatively stable	Southern mesic forest only by physiographic changes in water supply		0	Bog bluegrass drooping sedge in wetter areas	
Southern wet forest	Silver maple, black willow, cottonwood, American elm, river birch	Very stable, subject to flooding	Southern wet-mesic forest by physiographic changes in water supply		0		Heavily invaded by buckthorn. Some honeysuckle invasion.

*** Presettlement Fire Regimes**

- 0 = No natural fire or very little
- 1 = Infrequent light surface fires (more than 25-year return intervals)
- 2 = Frequent light surface fires (1- to 25-year return intervals)
- 3 = Infrequent, severe surface fires (more than 25-year return intervals)
- 4 = Short return interval crown fires and severe surface fires in combination (25- to 100-year return intervals)
- 5 = Long return interval crown fires and severe surface fires in combination (100- to 300-year return intervals)
- 6 = Very long return interval crown fires and severe surface fires in combination (over 300-year return intervals)

** Basalt glade prairies are probably physiographic in origin but probably also burned periodically. Glenn-Lewin recommends burning to control woody invasion and control *Poa pratensis*, with the frequency to be determined by burning experiments and monitoring.

Consequences:

To Native Plant Communities:

To predict the potential effects of the alternatives on vegetation at the Riverway, it is first necessary to understand how each of the major community types responds to fire or lack of fire. As indicated in Tables 2 and 3, there are several communities that must have fire to perpetuate. They are the sandy pine barren prairies; pine barrens; northern dry forest; hill prairies; southern dry prairies; and, to some extent, basalt glades. Without fire, the next community on the successional scale would replace these communities. The suppression of fire since European settlement has resulted in the succession of fire dependent communities along the Riverway. Additional information on what is known about the fire regimes of these communities is given in Chapter 2: Fire Ecology - An Introduction

To Exotic Plants:

Prescribed fire may help control some of the exotic plants that occur at the Riverway particularly if used in conjunction with other control methods. A summary of fire effects on most of the terrestrial exotic plants that occur along the Riverway is given in Table 4 (USDA, 2001 and anecdotal evidence).

Alternative 1: No action: Suppress All Fires

Under this alternative, prescribed fire would not be used to perpetuate fire adapted communities or control exotic plants. The absence of fire has had and continues to have an impact on vegetation at the Riverway. Fire adapted communities have succeeded or are in the process of succeeding to the next successional stage. Habitats that were once common, such as prairies and jack pine forests are disappearing. Native plant communities are being invaded by exotics, some of which could be controlled, at least to some degree, by the use of fire. Soil disturbance from fireline construction during wildland fire suppression, which is somewhat more likely under this alternative, could cause an increase in exotic species. The no action alternative would have a major, long-term impacts to vegetation of the Riverway because fire adapted communities would eventually disappear. This alternative would have a major, negative impact on vegetation. This means that there would be a considerable long-term effect on native plant populations that would affect a relatively large area of the Riverway.

Alternative 2: Prescribed Fire

Under this alternative, prescribed fire would be ignited under the specific conditions of season, fuel and moisture to perpetuate the target community. It would have beneficial impacts on native vegetation by perpetuating fire adapted communities that are disappearing. By reinvigorating native plants, prescribed fire may also help control certain exotic species. Adverse impacts to vegetation would be avoided by using prescribed fire only under conditions and at sites that would perpetuate the target community. Prescribed fire would take the plant community back to an earlier stage along the successional continuum. Alternative 2 would have a moderate, long-

term positive impact on vegetation of the Riverway by restoring and maintaining fire adapted communities. This means that there would be considerable long-term effect on native plant populations. The area would be limited at first, but expand over the course of several years as additional sites are treated with prescribed fire.

Alternative 3: Mechanical Treatment

This alternative would have minor impacts on native vegetation by killing and removing exotics. This means that it would affect some individual native plants and relatively small portions of species populations. Because mechanical treatment would be labor intensive, only a limited area could be treated. The absence of fire in pine barrens would not allow jack pine to regenerate, and would allow the prairies to degrade.

Alternative 4 (Preferred): Integrated Program

This alternative would combine the positive impacts of Alternatives 2 and 3. It would perpetuate fire adapted communities and have the added benefit of using mechanical treatments in conjunction with prescribed fire to provide the best control of the widest range of exotic species. Alternative 4 would have a major, long-term, positive impact on vegetation of the Riverway by restoring and maintaining fire adapted communities.

Cumulative Impacts: Vegetation at the Riverway is impacted by recreational use (trampling and erosion), the suppression of fire, and occasional construction activities. Vegetation in the surrounding area is impacted by land use practices. With the exception of some of the state parks and county forests that use prescribed fire, suppression is occurring both inside and outside the Riverway boundaries. The combination of impacts from various activities (and lack of fire activity) and in various areas has a cumulative negative effect on vegetation communities, particularly those that are fire adapted. They are disappearing from the landscape. Alternative 1 would continue to have an additive negative effect on fire adapted communities since no prescribed fire would be conducted at the Riverway. Alternatives 2 and 4 would help restore fire adapted communities. Both would allow the Riverway to cooperate with interested adjacent land managers to restore native communities over larger areas.

Impairment: During the general management planning process for the Upper Riverway (NPS, 1998), the following significance statement was developed: "As they travel the river, visitors can observe the convergence of three terrestrial biological communities (prairie, hardwood forest, and coniferous forest) and cold- and warm-water communities. A similar statement was developed during the cooperative management planning process for the Lower Riverway (NPS, 2000a): "The 52 miles of the Lower St. Croix River is at the junction of three major biomes: conifer-hardwood forest, deciduous forest-woodland, and the prairie." The no-action alternative is resulting in a decrease in prairie and other fire adapted communities along the Riverway. Under Alternative 3, only limited areas could be treated. Therefore, the no action alternative and Alternative 3 may result in impairment to the vegetation of the Riverway.

TABLE 4: EFFECTIVENESS OF FIRE IN CONTROL OF EXOTIC PLANTS

Species	Fire Effects	Control Recommendations
Smooth brome	Late spring fires damage and help control. Early spring and late summer/fall can increase productivity by removing the litter layer.	Frequent (annual) late spring fires for several years.
Kentucky bluegrass	Late spring fires, after plants have been growing for about a month, help control. Cool fires at other times of the year have little effect.	Cannot withstand frequent spring fires. Frequent (annual or biennial) late spring fires can be used to control and promote growth of warm season grasses.
Reed canary grass	Late spring fires can prevent it from producing seed. Early spring fires may cause increases.	Can be controlled to a limited extent by burning every 2 to 3 years during the dry season. Marshes can be burned in winter (when ice is 9-12 inches thick) to reduce density and improve wildlife feeding areas.
Spotted knapweed	Can be top killed but resists low-severity fires because of its taproot. Late summer or early fall fires can remove flower and seed heads. Probably colonizes after fire from seeds buried in soil and from off-site sources.	Shows moderate increases after fire. Prescribed fires alone is probably not effective for controlling, but may be useful in conjunction with herbicides.
Canada thistle	Can be top killed but resists low severity fires due to buds on extensive underground root system. Invades burned areas via wind dispersed seed.	Prescribed spring fires may slow the spread by reducing the number of mature plants and functional flower heads and by stimulating growth of native grasses.
Musk thistle	Fire probably kills. Seeds buried in soil survive most fires and come in from off-site sources.	Prescribed fires to maintain vigorous native prairie plants will help prevent the invasion of musk thistle.
Purple Loosestrife	May kill above ground portions but rootstocks survive.	Fire is ineffective. Because it begins spring growth after its native associates, spring fires may actually favor purple loosestrife.
Garlic mustard	No species-specific information. Other members of the family are either readily killed or moderately resistant due to sprouting from buds on rhizomes. Fire may be effective if burned while flowering or in seed production.	Effectiveness of fire is unknown. Some members of mustard family sprout rapidly following fire. Burning to remove flowers and seeds may help prevent spread.
Grecian foxglove	No species-specific information.	Prescribed fire is not recommended because it could release potentially fatal toxins (digitalis).
Common buckthorn	No species-specific information. Others of the same genus are resistant to fire. May be top-killed but vigorously resprout. Local experience shows fire is effective in killing seedlings.	Prescribed fire alone is probably not effective for controlling, but may be useful in conjunction with mechanical treatments and herbicides. Frequent fires may control the species but may also be detrimental to associated riparian forest species.
Tartarian honeysuckle	No species-specific information. Others of same genus may be top-killed but vigorously resprout from the root crown. Local experience shows fire is effective in killing seedlings.	Prescribed fire and herbicides used in combination have the greatest success in controlling others of same genus. Fire should be used with caution if shrubs or vines have ascended to the tops of trees, as they become fire ladders that may destroy valuable pines or hardwoods.

WILDLIFE

Description: The variety of upland, lowland, and aquatic habitats found along the Riverway supports a highly diverse and abundant wildlife population. More than 430 species of animals have been recorded. These include insects, mussels, fish, amphibians, reptiles, birds, and mammals (See Appendix C).

Insects: Approximately 190 species of insects have been identified along the Riverway. They include a diverse array of both terrestrial and aquatic species.

Mussels: The Riverway supports the most diverse mussel population in the upper Mississippi River system, with 90% of all potential mussel species being present (NPS, 2000b). Approximately 40 species of native mussels occur at the Riverway, including two Federally-listed endangered species and several State-listed species. Additional information on mussels is given in the section on threatened and endangered species.

Fish: The Riverway supports a healthy, diverse fish population. Warm-water riverine fisheries occur on the St. Croix River and on the Namekagon River from Trego to the confluence with the St. Croix. Common fish found on these stretches include smallmouth bass, walleye pike, northern pike, catfish, a variety of redhorse suckers, and minnows. Cold water riverine fisheries are present on the Namekagon from Lake Namekagon to Hayward, and cool water fisheries are present from Hayward to Trego. Portions of these stretches are classified as Wisconsin trout waters. Fish that occur here include rainbow, brook and brown trout, mottled sculpin and a variety of suckers and minnows.

Amphibians and Reptiles: Common species present include the red-backed salamander, American toad, spring peepers, green frogs, snapping turtle, eastern spiny softshell turtle, painted turtle, eastern garter snake, green snake, and hog nosed snake.

Birds: The Riverway supports a diverse population of upland and water birds and is an important route for migrating birds. More than 200 species have been documented at the Riverway; about 158 likely nest here. Birds commonly seen or heard include the redwing blackbird, great blue heron, green heron, belted kingfisher, bald eagle, tree swallows and a variety of warblers. Five raptor species are present including osprey, red-tailed hawk, red-shouldered hawk, broad-winged hawk, rough-legged hawk and bald eagle. Upland game species include ruffed grouse, sharp-tailed grouse, woodcock, and turkey. Common waterfowl include the wood duck, Canada geese, mallard and common merganser.

Mammals: Many mammals common to both the northern coniferous forest and the temperate deciduous forest use the Riverway and move back and forth across the Riverway's boundaries. Approximately 60 species of mammals have been observed. The white-tailed deer is the most common big game animal. Other common mammals include mink, weasel, skunk, otter, muskrat, beaver, woodchuck, raccoon, gray squirrel, red squirrel, masked shrew, short-tailed shrew, deer mouse, meadow vole, little brown bat, and big brown bat.

Mammals that occur, but are less likely to be seen, include snowshoe hare, black bear, coyote, badger, red fox, gray fox, and gray wolf.

Consequences: Fire can impact wildlife directly and indirectly, positively and negatively. The nature of the impacts is closely related to the intensity of the fire, with high intensity fire resulting in the most negative impacts. Direct effects include disturbance and displacement. Most mobile wildlife species can escape fire, but it can sometimes result in direct mortality, particularly if it is a fast moving intense wildfire. Indirect effects of fire include changes to the existing wildlife habitat. In general, fire will convert vegetation to an earlier successional stage, benefit the species associated with early successional habitats, and stimulate the cycle of vegetation and wildlife succession. Table 5 summarizes the effect of fire on game species and furbearers (USDA, 2001).

TABLE 5: EFFECT OF FIRE ON WILDLIFE (GAME AND FURBEARING SPECIES)

Species	Direct Fire Effects	Indirect Fire Effects
Ruffed grouse	Early spring fires can consume nests and hatchlings.	Can be beneficial in regenerating aspen. Can improve habitat by removing forest debris, eliminating hiding cover for predators, enhancing the growth of important food species, and controlling plant diseases and grouse parasites. In Minnesota studies, greatest abundance appeared 2-4 and 10-12 years after fire. Early stages of plant growth fire created good brood habitat. Later stages are better for adults.
Sharp-tailed grouse	Fire during the nesting season may kill and destroy nests	Fire is important to creating and maintaining sharp-tailed grouse prairie habitat. Helps maintain early successional stages of grasses, sedges, forbs and shrubs, all of which provide food and cover.
Mallard	Early nesters that can be adversely affected by spring fires. Can destroy nests.	Can be beneficial by reducing predator activity through elimination of hiding cover. Can be used to establish red goosefoot, an important duck food, by reducing impenetrable reed canary grass.
Wild turkey	Spring fires can destroy nests. Fast moving-fires may kill newly hatched poults, but once they can fly, fires are probably not much of a problem.	Can stimulate the growth of food plants, reduces litter exposing seeds and insects and reduces brush to eliminate hiding cover for predators. Can be used to create edges to increase nesting habitat. Can reduce parasites such as ticks and lice.
Snowshoe hare	Probably able to escape most fires	Fire maintains a mosaic of successional stages, which provides good snowshoe hare habitat. Depend on small new stems which are abundant on recently burned areas. Nearly every plant that is important to snowshoe hares is favored by fire: jack pine, black spruce, quaking aspen, birches, blueberries, northern white-cedar and tamarack.
Red squirrel	Probably escape most fires. Important habitat includes mature trees unlikely to be affected by low-severity fires. Severe fire could destroy mature trees.	Use of fire to maintain coniferous forest types benefits the species.
Black bear	Fire can cause direct mortality but probably has little effect on the population as a whole.	Fires that favor early and mid-seral fruit-producing shrubs and plentiful grasses and forbs are beneficial to bears. Many bear foods, such as blueberries are enhanced by fire.
White-tailed deer	Mobile species that escapes most fires. Fast-moving fires can confuse, trap and kill deer.	Patchy burns that create a mosaic of browse and cover are beneficial. Whitetails are seen foraging more frequently on burned sites than adjacent unburned sites.

TABLE 5: EFFECT OF FIRE ON WILDLIFE (GAME AND FURBEARING SPECIES)

Species	Direct Fire Effects	Indirect Fire Effects
Beaver	Probably easily escape fire since lodges are typically built over water.	Often benefits beaver which are adapted to the early successional stages of forest succession. Quaking aspen, willows, alders, and red-osier dogwood are prime beaver food and sprout vigorously after fire.
Mink	Fire is unlikely to affect these highly mobile, semi-aquatic animals that often den underground.	No reports in the literature.
Gray foxes	Highly mobile animals unlikely to be effected by fire unless it is fast moving and intense.	Use brush and brushy woods. Fire that reduces brush cover will reduce gray fox habitat. Usually increases productivity of early successional prey species. Can improve predator efficiency by reducing hiding cover for prey.

In addition to game and furbearing species listed on the table, there are many small mammals that are important to the ecosystem of the Riverway. Two of the most common species are the meadow vole and the deer mouse. Prescribed fire can kill individual small mammals through burning and increased predation. However, many survive fire by moving into borrows or adjacent unburned areas. Small mammals are scarce on freshly burned sites, due to the lack of cover. However, they return as vegetative recovery increases cover and biomass. Fire generally benefits small mammals or causes only temporary declines.

There is little information available on the effect of fire on reptiles and amphibians. However, those species that have been studied respond similarly to small mammals. There is some mortality but other survive by burrowing or moving to adjacent unburned areas and move back in once vegetative cover has been reestablished.

The effect of fire on aquatic animals such as mussels and fish will largely depend on the intensity of the fire and its effect on vegetation and soils. Intense fires that adversely impact soils by creating erosive conditions could have negative impact on mussels and fish by increasing sedimentation. Low intensity prescribed fire that leaves a mosaic of vegetation throughout the site and along streambanks will have little or no impact on fish or mussels.

Birds are highly mobile species that escape most fires. Ground nesting species could have their nests destroyed if the fire takes place during their nesting season. Over the long run, fire would benefit birds associated with fire adapted communities such as the Kirtland's warbler. The effect of fire on rare species, including the Kirtland's warbler and other rare birds, is discussed in the next section of this document on threatened and endangered species.

Alternative 1: No action: Suppress All Fires

Under this alternative prescribed fire would not be used to perpetuate fire adapted plant communities or their associated wildlife. Fire suppression has had and continues to have an impact on wildlife at the Riverway. Fire adapted communities have succeeded or are in the process of succeeding to the next successional stage. Habitats that were once common, such as prairies and jack pine forests are disappearing. Because there is less of a variety of plant communities, there is less diversity of wildlife than there might be if fire were returned to the landscape. Native plant communities are also being invaded by exotics, which generally have less food and habitat value to wildlife than native vegetation. The indirect effects of the no action alternative would have a moderate, long-term to permanent impact on wildlife. This means that effects to wildlife would be readily detectable, long-term and localized, with consequences at the population level. Fire adapted communities and their associated wildlife would be slowly eliminated from the Riverway through succession.

Wildland fires that could not be immediately contained could create a more severe burn and could have adverse effects on wildlife. Wildland fires move faster and more intensely than prescribed fires and can cause direct mortality to wildlife unable

to escape. They can also burn so severely that rare communities such as jack pine forests are destroyed instead of rejuvenated. Intense wildland fires also have more potential to impact soils to such a degree that erosion and sedimentation become a problem and could adversely impact the aquatic faunal species of the Riverway. A wildland fire could have moderate effects on wildlife. This means that effects to wildlife would be readily detectable, long-term and localized, with consequences at the population level.

Alternative 2: Prescribed Fire

Prescribed fire would be ignited under the specific conditions of season, fuel and moisture to perpetuate the target community. Prescribed fire would benefit the wildlife of fire adapted communities such as sharp-tailed grouse of the pine barrens, snowshoe hare and species like white-tailed deer that benefit from the mosaic of vegetation that prescribed fire can be used to create. Prescribed fire would also benefit wildlife by controlling exotic plants and improving food sources. Therefore, Alternative 2 would have a moderate positive impact on wildlife. This means that positive effects to wildlife would be readily detectable, long-term and localized, with consequences at the population level. Prescribed fire would provide habitat for wildlife associated with fire-adapted communities. The negative impacts of prescribed fire on wildlife would be minor. This means that effects would be detectable, but effects would be localized, and would be small and of little consequence to a species population

Alternative 3: Mechanical Treatment

This alternative could help restore some native plant communities and associated wildlife by removing woody invaders and controlling some exotics. Since it is very labor intensive it could only be used to treat limited areas. Only a small amount of fire adapted communities could be maintained. Therefore, Alternative 3 would have a minor impact on wildlife of the Riverway. This means that effects to wildlife could be detectable, but the effects would be localized, and of little consequence to a species population.

Alternative 4 (Preferred): Integrated Program

This alternative would have the combined effects of Alternatives 2 and 3. It has the added benefit of using mechanical treatment in conjunction with prescribed fire to provide the best possible control of exotic species and improvement of food sources for wildlife. Alternative 4 would have moderate, long-term impacts to wildlife of the Riverway by providing habitat for wildlife associated with fire-adapted communities.

Cumulative Impacts: The no action alternative has potential for cumulative negative impacts to native wildlife. With the exception of some of the state parks and county forests that use prescribed fire, suppression is occurring inside and outside the Riverway boundaries. Fire adapted plant communities are disappearing from the landscape. Wildlife is not as diverse as it might be if fires were reintroduced and fire adapted communities restored. Alternatives 2 and 4 would compliment the prescribed fire activities of adjacent land managers and have

a positive cumulative impact by allowing the restoration of fire adapted communities and increasing the diversity of wildlife over larger areas.

Impairment: During the general management planning process for the Upper Riverway (NPS, 1998), the following significance statement was developed: “The St. Croix National Scenic Riverway is a protected north-south corridor that serves as a refuge for large populations of diverse flora and fauna, including federally and state-listed threatened and endangered species. A similar statement was developed for during the cooperative management planning process for the Lower Riverway (NPS, 2000a): “The natural communities, both terrestrial and aquatic, are diverse and of high quality. The sloughs, backwaters, braided streams, and other river features provide habitat for native plants and animals. Rare and endangered plants and animals including mussels, eagles, and others, thrive here. The river corridor is an important flyway for migrating birds and contains an exceptionally diverse fishery. The no-action alternative is resulting in a decrease in plant diversity. Wildlife is not as diverse as it might be if fire were reintroduced to the landscape, however, the level of impact of the no-action alternative on wildlife would probably not cross the threshold into impairment. None of the action alternatives would result in impairment to wildlife at the Riverway.

THREATENED AND ENDANGERED SPECIES

Description: The Riverway serves as a refuge for a number of species that are threatened, endangered or of special concern. Federally listed endangered species that occur in the Riverway include the Higgins' eye pearly mussel and the winged mapleleaf mussel. Federally listed threatened species that occur along the Riverway include the gray wolf and bald eagle. Other Federally listed species that could occur along the Riverway because their habitat is present include the Canada lynx, Kirtland's warbler, and Karner blue butterfly.

Essential habitat areas for Higgins' eye have been identified on the river between St. Croix Falls and Osceola, and near Hudson and Prescott in the State-administered zone. In addition, two Higgin's Eye mussels were found near the confluence of the Snake River in Summer 2000. This is the first record of the species occurring above St. Croix Falls. The winged mapleleaf mussel occurs on a short stretch of the St. Croix between St. Croix Falls and Osceola. This stretch of river supports the only known reproducing population of winged mapleleaf mussel in the world. The exact habitat requirements of these mussels are unknown. However, in general, native mussels require high water quality.

Much of the area surrounding the upper Riverway is potential wolf habitat. While the Riverway alone is too narrow to fully support a wolf pack, there are a number of packs in the vicinity. The Riverway serves as an important travel corridor for wolves and provides hunting opportunities for them. The junction of the Namekagon and St. Croix Rivers appears to serve as an important staging area for dispersing wolves (NPS, 1998).

The Riverway provides important bald eagle habitat, both for breeding and wintering. Nesting bald eagles are associated almost exclusively with lakes, rivers or seacoasts. Fish are the major item of their diet. Adults tend to use the same breeding area, and often the same nest, each year. The nests are primarily in large trees, usually within 0.25 miles of shorelines of fish-bearing streams or lakes. Along the Riverway many of the nest trees are large white pines. Essential habitat have 1) space for individual and population growth and normal behavior; 2) food, water, air, light, minerals or other nutritional or physiological requirements; 3) cover or shelter; 4) sites for breeding, reproduction, rearing of offspring; and 5) protection from disturbance. An abundant, readily available food supply, in conjunction with one or more suitable night roost sites, is the primary characteristic of good winter habitat.

Although Canada Lynx has never been documented as occurring at the Riverway, it does provide potential habitat. Lynx occur in mesic coniferous forests that have cold snowy winters and provide snowshoe hare prey (USDA, Forest Service, 2000).

Likewise, Karner blue butterflies have never been documented along the Riverway. However, potential habitat does exist. The pine barrens along the Riverway support lupine which is the butterfly's host species.

The endangered Kirtland's warbler was observed once several years ago outside the Riverway boundary. It was in the vicinity of the upper reaches of the St. Croix River, above the Namekagon confluence about 2 miles outside the Riverway boundary. None have been seen since then. The jack pine forests along the Riverway, although much more scarce than they once were, provide potential habitat for Kirtland's warblers.

Species of Concern

The USFWS also maintains a list of species of concern. Further information is needed on these species to determine if it is appropriate to consider them for addition to the federal list. There are 6 plant and 15 animal species of concern that are known to occur along the Riverway. These species are indicated in the table in Appendix D. Prairie fame-flower and kitten-tail are two species of concern that could be affected by fire.

The Minnesota and Wisconsin Departments of Natural Resources also maintain lists of species that are threatened, endangered or of special concern in their states. These State-listed rare species are also shown in Appendix D.

Consequences: Fire can have both positive and negative impacts on federally-listed species known to occur or potentially occur at the Riverway. The intensity and season of the burn largely determine the nature of the impact. The potential impact of fire to rare species that occur or may occur along the Riverway is summarized in Table 6 (USDA, 2001).

Alternative 1: No action: Suppress All Fires

Under this alternative prescribed fire would not be used to perpetuate fire adapted plant communities or their associated wildlife. Fire suppression has had and continues to have an impact on rare species. Species that depend on fire adapted communities, such as the Kirtland's warbler and Karner blue butterfly are adversely affected by the absence of fire. The no action alternative could have a moderate, long-term to permanent impact to rare plant and animal species that are associated with fire adapted communities by continuing to reducing their available habitat. This means that the alternative could affect an individual(s) or a population of listed species. The effect could have some long-term consequence to the individual, population or habitat.

Alternative 2: Prescribed Fire

Prescribed fire would be ignited under the specific conditions of season, fuel and moisture to perpetuate the target community. The avoidance/mitigation measures described in Chapter 4 would be implemented to avoid or minimize adverse impacts to rare species. Prescribed fire would have a moderate, long-term positive impact to some rare species. This means that an individual or population of a rare species would be noticeably affected. The effect could have some long-term consequence to the individual, population, or habitat. Rare species that would benefit from prescribed fire could include Kirtland's warbler, Karner blue butterfly, fame flower, kitten tails, and prickly pear. Since prescribed fire would be used only in conjunction with the avoidance/mitigation measures in Chapter 4, it is not likely to adversely affect any listed species or its critical habitat.

Alternative 3: Mechanical Treatment

This alternative could restore fire adapted communities to a degree by removing woody invaders. However, it would not provide the scorching necessary to regenerate jack pine or create the soil conditions necessary for regeneration of red and white pine. Because mechanical treatment is labor intensive the area treated would be limited. Alternative 3 would have a minor, long-term positive impact to rare species by providing limited restoration of fire adapted communities. This means that it may affect an individual or individuals of a listed species, but the change would be small. The avoidance/mitigation measures described in Chapter 4 would be implemented to avoid or minimize adverse impacts of this alternative to rare species. Therefore, mechanical treatment is not likely to adversely affect any listed species or its critical habitat.

Alternative 4 (Preferred): Integrated Program

Alternative 4 would have the combined effects of Alternatives 2 and 3. This alternative has the benefit of using mechanical treatment in conjunction with prescribed fire to improve habitat for rare species. For example, in the Huron National Forest in Michigan, Kirtland warbler habitat is being favored by cutting, burning, and planting in order to provide dense jack pine stands from 5-15 feet in height interspersed with small openings (Niering, 1981). This alternative would allow similar techniques to be used at the Riverway, if appropriate. The

avoidance/mitigation measures described in Chapter 4 would be implemented to avoid or minimize adverse impacts of this alternative to rare species. Therefore, an integrated program using prescribed fire and mechanical treatment is not likely to adversely affect any listed species or its critical habitat.

Cumulative Impacts: The no action alternative has the greatest potential for cumulative impacts to rare species. With the exception of some of the state parks and county forests that use prescribed fire, suppression is occurring inside and outside the Riverway boundaries. Rare species that depend on fire adapted communities are disappearing. Alternatives 2 and 4 would have less cumulative impact by restoring some fire adapted communities and creating habitat favorable for associated rare species. Alternatives 2 and 4 would allow the Riverway to cooperate with adjacent land managers to restore fire adapted communities over larger areas providing more habitat for the rare species associated with those habitats.

Impairment: None of the alternatives would result in impairment to threatened and endangered species at the Riverway.

TABLE 6: EFFECT OF FIRE ON RARE SPECIES

Species	Direct Fire Effects	Indirect Fire Effects
Gray wolf	No direct effect of fire on wolves has been documented.	Since fire benefits the primary prey species of wolves, including beaver and deer, fire would benefit wolves.
Canada lynx	No apparent and probably no significant fire-related mortality.	Lynx populations oscillate with snowshoe hare populations, their primary prey. Since fire benefits snowshoe hare, it would benefit lynx.
Bald eagle	Have continued nesting during fire and returned to the nest the following year.	Fires that destroys old-growth forests can reduce eagle populations. Managed fire can be used to allow more vigorous trees to reach maturity providing old-growth habitat for bald eagles. Fire can also help regenerate white pines, the preferred nesting tree.
Kirtland's warbler	A ground fire during nesting season could destroy Kirtland's warbler nests. However, fires in jack pine communities are more likely in late summer or fall (after nesting) when ground cover is dry.	Fire is beneficial. Under natural conditions, the nesting habitat (jack pines) of Kirtland's warbler is created only by forest fires. The birds start using the burn area about post-fire year 6 and reach the peak at about 11 years following the fire. The creation of suitable nesting habitat requires prescribed fire along with special planting techniques.
Trumpeter swans	Non-molting adults can probably easily escape fire.	No specific information. Fire that removes excess accumulations of fast growing hydrophytes may favor more desirable trumpeter swan food such as pondweed and duckweed. Large scale autumn burning could be detrimental by reducing the retention of drifting snow, which is vital to marsh survival.
Karner blue butterfly	All life stages can be killed by fire. To minimize these adverse effects fire should not be too frequent or extensive (Leach, 1995)	Since fire maintains prairie, oak savanna, and jack pine habitats with wild lupine, (the host plant for Karner Blue Butterfly) it would benefit Karner Blue Butterfly.
Higgin's eye pearly mussel	Fire would have no direct impact on this aquatic species	High intensity fire could lead to erosion and sedimentation and could have adverse effects. Well-managed prescribed fire would have no impact.
Winged mapleleaf mussel	Fire would have no direct impact on this aquatic species	High intensity fire could lead to erosion and sedimentation and could have adverse effects. Well-managed prescribed fire would have no impact.

PREHISTORIC ARCHEOLOGICAL RESOURCES

Description: Archeological resources reflect use and occupation of the St. Croix Valley for thousands of years. The Riverway was used as a transportation corridor and food source, with occupation sites along its shores since the retreat of the glaciers. Resources were also extracted from the area to support the Native people's (primarily Dakota and Ojibwe) lifestyle, including the raw materials for tools and pottery. Burial mounds and graves have also been identified on the bluffs and shorelines. While hundreds of sites have been identified, few in the Riverway have been investigated in detail.

Consequences: Fire has little impact on prehistoric archeological resources since they have typically been subject to fire before, are found at greater depths and are, therefore, protected by soil. Impacts can occur from fire and from soil disturbance associated with fireline construction, and include fracturing and charring, of lithic artifacts; fracturing and discoloration of stone artifacts; discoloration, oxidation and fracturing of ceramic artifacts; and removing artifacts from their context. However, impacts are generally restricted to the top 2 inches of soil horizon. The consequences that could be expected are described below under each alternative.

Alternative 1: No action: Suppress All Fires

Under this alternative, there would be no prescribed fire at the Riverway. However, the no action alternative could impact prehistoric resources through emergency wildland fire suppression efforts. Wildland fires may be more likely under this alternative. Without prescribed fire, fuels can build up. The continuing build-up can lead to hotter, more intense fires that could harm prehistoric sites. If a wildland fire should start, there is more potential for prehistoric archeological resources to be harmed during emergency suppression efforts.

Alternative 2: Prescribed Fire

Under this alternative, prescribed fire would be ignited only after careful planning and in conjunction with the avoidance/mitigation measures described in Chapter 4. A carefully thought out prescribed fire allows management to make protection of all cultural resources a priority during and after the fire. Most prehistoric resources have been subject to fire in the past. In most cases prescribed fire would be controlled with wetlines or blacklines, so there would be no soil disturbance. In the event that firelines are needed, they would be carefully planned to avoid impacts to prehistoric resources. Since avoidance/mitigation measures in place, impacts would be negligible. This means that impact would be barely perceptible and not measurable. This alternative would have no adverse effect on prehistoric archeological resources. The use of prescribed fire would have the added benefit of reducing the intensity of wildland fires and their impacts.

Alternative 3: Mechanical Treatment

This alternative would allow for reduction of fuel load and could decrease the intensity of any wildfires that might occur, allowing for some potential protection of cultural resources. Any large scale mechanical treatment that would require the use of heavy equipment carries the potential to impact or disturb the soils and adversely affect archeological resources. However, implementing the avoidance/mitigation measures described in Chapter 4 would help avoid impacts to prehistoric resources. Since these mitigation measures would be in place, impacts would be avoided or negligible. This alternative would have no adverse effect on prehistoric archeological resources.

Alternative 4 (Preferred): Integrated Program

An integrated program would have the combined effects of Alternatives 2 and 3. This alternative would allow management the optimum flexibility to determine which method or combination of methods would have the least impact on the resources in that specific area. The Preferred Alternative would be implemented in conjunction with the avoidance/mitigation measures described in Chapter 4. With these mitigation measures in place, impacts would be negligible. This alternative would have no adverse effect on prehistoric archeological resources.

Cumulative Impacts: Prehistoric archeological resources at the Riverway have been impacted by the river eroding shorelines and human activities including: farming, building of homes and roads, and recreational activities. Recreation use has compacted soil and worn off the topsoil layer leading to erosion at some sites. The Alternative 1: No Action would have the most potential for additive impacts due to the increased potential of wildfire and the unpredictable consequences of the emergency actions taken to extinguish it. Alternatives 2, 3 and 4 would have no or minor impacts since prescribed fire and/or mechanical treatment would take place only after having taken steps to protect prehistoric resources.

Impairment: None of the alternatives would result in impairment to prehistoric resources at the Riverway.

HISTORIC ARCHEOLOGICAL RESOURCES

Description: Historic archeological sites include trash middens and portions or evidence of structures and associated features built on the landscape. They can include wood components or other materials intolerant of heat and are typically closer to the soil surface than prehistoric sites.

Consequences: Impacts to historic archeological resources can occur from fire and from soil disturbance associated with fireline construction. Since historic archeological resources are more recent and frequently nearer the surface than prehistoric archeological resources, they may not have been subject to fire in the past and may be less protected by layers of soil. Historic archeological sites also frequently contain artifacts and features more sensitive to

the effects of fire. Therefore they can be vulnerable. Impacts of fire to historic archeological resources could include fracturing and charring of lithic artifacts; fracturing and discoloration of stone artifacts; discoloration, oxidation and fracturing of ceramic artifacts; and removing artifacts from their context. However, impacts are generally restricted to the top 2 inches of soil horizon. The consequences that could be expected are described below under each alternative.

Alternative 1: No action: Suppress All Fires

Under this alternative, all fire would be suppressed as soon as possible. However, the no action alternative could impact historic archeological resources through emergency suppression efforts. Wildland fires may be more likely under this alternative. Without prescribed fire, fuels can build up. The continuing build-up can lead to hotter, more intense fires that could harm historic archeological sites. If a wildland fire should start, there is more potential for historic archeological resources to be harmed during emergency suppression efforts.

Alternative 2: Prescribed Fire

Under this alternative, prescribed fire would be ignited only after careful planning and in conjunction with the avoidance/mitigation measures described in Chapter 4. A carefully thought out prescribed fire allows management to make protection of all cultural resources a priority during and after the fire. In most cases prescribed fire would be controlled with wetlines or blacklines, so there would be no soil disturbance. In the event that firelines are needed, they would be carefully planned to avoid impacts to archeological resources. Since the avoidance/mitigation measures described in Chapter 4 would be in place for every prescribed fire, impacts would be minor. This means that disturbance of sites would result in little, if any loss of integrity. Prescribed fire would have no adverse effect on historic archeological resources. The use of prescribed fire would have the added benefit of reducing the intensity of wildland fires and their impacts.

Alternative 3: Mechanical Treatment

The avoidance/mitigation measures described in Chapter 4 would be in place for each area selected to undergo mechanical treatment. Therefore, impacts to historic archeological sites would be minor. In addition, this alternative would allow for reduction of fuel load and could decrease the intensity of any wildfires that might occur. Albeit small, this would allow for some potential protection of cultural resources.

Alternative 4 (Preferred): Integrated Program

An integrated program would have the combined effects of Alternatives 2 and 3. This alternative would allow management the optimum flexibility to determine which method or combination of methods would have the least impact on the resources in that specific area. Prescribed fire may be appropriate for sites containing historic archeological resources after mechanical fuel reduction has occurred near the site. The Preferred Alternative would be implemented in

conjunction with the avoidance/mitigation measures described in Chapter 4. With these mitigation measures in place, impacts would be minor. The preferred alternative would have no adverse effect on historic archeological resources.

Cumulative Impacts: Archeological resources at the Riverway have been impacted by the river eroding shorelines and human activities including: farming, building of homes and roads, and recreational activities. Recreation use has compacted soil and worn off the topsoil layer leading to erosion at some sites. The Alternative 1: No Action would have the most potential for additive impacts due to the increased potential of wildfire and the unpredictable consequences of the emergency actions taken to extinguish it. Alternatives 2, 3 and 4 would have negligible or minor impacts since prescribed fire and/or mechanical treatment would take place only after having taken steps to protect historic archeological resources.

Impairment: None of the alternatives would result in impairment to historic archeological resources at the Riverway.

HISTORIC STRUCTURES

Description: There are 3 historic national register eligible properties, involving 11 structures, currently identified on NPS-owned land at the Riverway. They include the Gibson cabin, the Lessner cabin, and the Platter/Schaeffer cabin. Additional historic structures may be identified in the future.

Consequences: Fire can burn historic structures.

Alternative 1: No action: Suppress All Fires

Under this alternative all fires would be suppressed as soon as possible. If a wildland fire could be suppressed before reaching a historic structure, there would be no impact. However, wildland fires may be more likely and more difficult to suppress under this alternative due to the availability of more fuels. Wildland fires, when they do occur, have an unpredictable intensity with little time to protect vulnerable historic structures.

Alternative 2: Prescribed Fire

The protection of historic structures would be a priority under Alternative 2. Prescribed fires would be planned so as to exclude historic structures from fire. Therefore, Alternative 2 would have no impact on historic structures.

Alternative 3: Mechanical Treatment

Under this alternative, historic structures would be excluded from areas to be treated. Therefore, alternative 3 would have no impact on historic structures.

Alternative 4 (Preferred): Integrated Program

Under the preferred alternative, historic structures would be excluded from the effects of prescribed fire and mechanical treatment. Therefore, there would be no impact to historic structures. The preferred alternative would have no adverse effect on historic structures.

Cumulative Impacts: Historic structures at the Riverway have been impacted by vandalism, weathering, and removal. Alternative 1 with its increased risk of wildland fire and the resulting increased risk for adverse impacts to historic structures would have the greatest potential for additive effects. Alternatives 3 and 4 would provide more long-term protection.

Impairment: None of the alternatives would result in impairment to historic structures at the Riverway.

ETHNOGRAPHY

Description: Ethnographic resources can encompass any of the numerous cultural or natural resources of the Riverway. Among the more common types of ethnographic resources are sacred and traditional use sites, traditional properties, ceremonial sites and areas, and sites and features from prehistoric and historic periods. Other cultural resources, including buildings, structures, and archeological sites, may also constitute ethnographic resources. Natural resources such as vegetation, wetlands, wildlife, waterways, and landscapes may also qualify as ethnographic resources.

The determination of status as an ethnographic resource is made through research and consultation with affected groups. The park is currently involved with six tribal groups in determining the significance of Riverway resources. Early discussions recognized the importance of a healthy ecosystem for support of their spiritual and traditional lifestyle.

Consequences:

Fire can be important in maintaining healthy ecosystems and could therefore have a positive impact on ethnographic resources. However, the determination of whether the impact of fire on a particular site would be positive or negative can only be achieved by consulting with the potentially affected tribe.

Alternative 1: No action: Suppress All Fires

Under this alternative all fire would be suppressed as soon as possible. It would not allow for the proactive protection or enhancement of fire adapted habitats or species. The NPS believes that continuing all fire suppression and not reintroducing fire to the landscape could have a moderate impact on ethnographic resources. This means that impacts would be apparent and would alter resource conditions. Fire adapted communities would succeed to another plant community and could effect affiliated

groups' practices in certain areas. Wildfire may also be more likely under this alternative and could result in higher intensity and more destructive fires.

Alternative 2: Prescribed Fire

Prescribed fire would allow for the protection and maintenance of fire adapted communities and species. Prescribed fire would be used to target removal of exotic species and encourage growth of native species or habitat. The NPS believes that prescribed fire may have a moderate positive impact on ethnographic resources. This means that the relationship between the resource and affiliated groups' practices could be enhanced by restoring ecosystem processes. Consultation with potentially affected tribes will clarify this.

Alternative 3: Mechanical Treatment

Thinning and removal of undesirable vegetation using mechanical methods could enhance native vegetation and have some positive impact on ethnographic resources. These methods can be used in areas where it may be inappropriate to use prescribed fire. Alternative 3 may have a minor impact on ethnographic sites. This means that mechanical treatment may have a slight, but noticeable impact but would not appreciably enhance the relationship between the resource and the affiliated groups' practices due to the limited area that could be treated.

Alternative 4 (Preferred): Integrated Program

The preferred alternative would have the combined effects of Alternatives 2 and 3. This alternative would allow selection of the most appropriate treatment for each area. The NPS believes that the preferred alternative would have a moderate positive impact on ethnographic resources. This means that the relationship between the resource and affiliated groups' practices would be enhanced by restoring ecosystem processes. Consultation with potentially affected tribes will clarify this.

Cumulative Impacts: The affected tribes must determine impacts to ethnographic resources. It is unclear whether impacts are already occurring to ethnographic sites and what, if any, additive impacts the alternatives under consideration may have. The NPS believes that Alternative 1 may have negative cumulative impacts due to the increased potential for wildfire and that Alternatives 2, 3 and 4 would have positive impacts. A final determination will be made in consultation with the tribes.

Impairment: We do not believe that any of the alternatives would result in impairment to ethnographic resources at the Riverway. Further consultation with the tribes during their review of this draft document will clarify this.

CULTURAL LANDSCAPES

Description: The Riverway and surrounding area exhibit the effect of human habitation including associated landscapes. Landscapes include a mix of vegetation and open space.

The location and species of plants may be significant. All cultural landscapes require management to be maintained. Depending on the landscape, treatment methods to maintain it may be quite different. The Riverway does not have a cultural landscape report.

Some settings within the Riverway may be determined to be important illustrations of the cultural activities in the area. The NPS is required to identify and protect significant historic or cultural landscapes under its jurisdiction. At this time the landscapes associated with three cabin properties have been identified as having the integrity needed to make them eligible for listing on the National Register of Historic Places. Additional sites are under consideration. Also, some landscapes may be important for their interpretive value and the NPS may choose to maintain them for this purpose.

Consequences

Fire can either help maintain or destroy a cultural landscape depending on the aspects that define it.

Alternative 1: No action: Suppress All Fires

Under this alternative there would be no prescribed fire at the Riverway. Depending on what makes the landscape significant, this may have either a major, permanent negative impact by not providing for maintenance of the landscape or have no impact if management does not require fire. Wildfire, which may be more likely in the Riverway under this alternative, could have major negative impacts by destroying cultural landscapes in intense fires or through emergency suppression efforts.

Alternative 2: Prescribed Fire

Prescribed fire is ignited after careful planning. The potential for cultural landscapes to occur in any potential burn site would be assessed prior to burning. Cultural landscapes that can be managed with fire would be included in the prescribed fire. For example, prescribed fire could help maintain open space between established trees and slow other woody encroachment. Landscapes that would be damaged by fire, and that are national register eligible or important for their interpretive value, would be excluded from prescribed fire. Therefore, Alternative 2 could have a moderate, long-term positive impact on cultural landscapes.

Alternative 3: Mechanical Treatment

Under this alternative, mechanical treatment would be used to meet resource management objectives. Mechanical treatment can allow for more control in selecting vegetation to kill, protect, or enhance. There would be a moderate, long-term positive impact in treated areas. However, since this alternative is labor intensive, less area can be treated. If large landscapes are identified that may benefit from treatment it may not be possible to cover the entire area under this alternative.

Alternative 4 (Preferred): Integrated Program

Combined effects of Alternatives 2 and 3. This alternative provides maximum flexibility to choose the best way to maintain a landscape. Alternative 4 would be used to manage cultural landscapes that would benefit from fire. Cultural landscapes that would be damaged would be excluded from prescribed fire. Used in this way, Alternative 4 would have a moderate, long-term positive impact on cultural landscapes.

Cumulative Impacts: Cultural landscapes at the Riverway may be impacted by encroachment of woody vegetation and exotic species, human modification, and neglect. Currently, no planning has occurred to determine the best methods for maintaining landscape features associated with National Register eligible properties. Alternative 1 would seem to have the additive impact of not allowing for restoration of fire adapted communities that might also be considered cultural landscapes and by increasing the potential for a destructive wildfire. Alternatives 2, 3, and 4 would each allow for treatment and maintenance of important cultural landscapes.

Impairment: None of the alternatives would result in impairment to cultural landscapes at the Riverway.

RECREATION / VISITOR USE

Description: Water-based recreation activities are the primary uses of the Riverway. Its scenic character and high water quality (suitable for body-contact recreation) make it popular for all types of boating recreation. The upper reaches are most suitable for canoeing and small fishing boats. The wider, deeper sections of the lower reaches see more power boating. Other recreational experiences offered along the Riverway include swimming, fishing, camping, and nature appreciation. The general management plans for the upper and lower Riverway set forth the basic management philosophy for the area. The plan for the upper 200 miles of the Riverway states that one of its primary purposes is to provide for high quality recreational opportunities that do not detract from its exceptional natural, scenic, cultural, and aesthetic resources and values (NPS, 1998). The plan for the lower 52 miles states that one of the primary purposes is to accommodate a diverse range of recreational opportunities that do not detract from the exceptional natural, cultural, scenic and aesthetic resources. (NPS, 2000)

Recreational facilities at the Riverway include the Namekagon Visitor Center in Trego, WI the Marshland Visitor Center on Highway 70 west of Grantsburg, and the St. Croix Visitor Center and headquarters. In addition, there are numerous landings, primitive riverside campsites, picnic areas, and toilet facilities along the Riverway. There are also several trails. Trails include the Trego Nature Trail, Trego Lake Ski Trail, Sandrock Cliffs Trail, St. Croix Trail, Indianhead Trail, Ridgeview Trail, and Arcola Bluff Trail (need map showing general location of trails).

Summer is the busiest season for both day-users and overnight visitors. Visitation numbers at the Riverway come from a variety of sources. The visitor centers at Trego, Highway 70, and St. Croix Falls keep visitor statistics. However, most visitors do not stop at a visitor center, but access the Riverway from one of the many landings scattered along its length. For this reason, it is difficult to keep accurate recreation use statistics.

A study initiated in 1999 has provided some insights into recreational use at the Riverway. River Use Monitoring was conducted on the Namekagon River in Summer 1999, on the upper St. Croix in Summer 2000, and on the lower St. Croix in Summer 2001. The purpose of the study is to obtain counts of watercraft and conduct river user interviews at major landings to obtain perceptions about crowding (Serafin and Chilman, 1999). The most important aspect of this study will be trend data collected over a period of years. When this document was prepared, one year of study and reporting had been completed on each of the 3 sections of the Riverway; the Namekagon River, the upper St. Croix, and the Lower St. Croix. A brief summary of the results of the first year of data are shown below.

Namekagon River: The Namekagon River from Phipps Landing to Riverside Landing (on the St. Croix just below the confluence) (77 miles) was split up into 7 zones. Weekend watercraft densities during Summer 1999 were as follows:

Average = 7.3 per mile

Low = 1.1 per mile (McDowell to Riverside)

High = 24.4 per mile (Earl Park to Trego)

Hayward to Stinnett was most representative of the average at 6.0 watercraft per mile

Upper St. Croix: The portion of the upper St. Croix River from Gordon Dam to Lion's Park in St. Croix Falls (102 miles) was split up into 14 zones. Weekend watercraft densities during Summer 2000 were as follows:

Average for entire 102 miles = 11.2 per mile

Low = 1.0 per mile (Gordon Dam to CCC Bridge)

High = 74.91 per mile (Yellow River to Thayers)

Nelsons to Soderbeck was most representative of the average at 10.89 watercraft per mile

Lower St. Croix River: The portion of the lower St. Croix River from Interstate State Park to Boomsite Landing north of Stillwater, MN (20 miles) was split up into 3 zones. Weekend watercraft densities during Summer 2001 were as follows:

Average for Entire 20 miles = 33.8 per mile

St. Croix Falls to Osceola = 35.3 per mile

Osceola to Log House = 9.09 per mile (the Low)

Log House to Boomsite = 57 per mile (the High)

On all three sections studied, weekday densities were lower than the weekend densities. The NPS hopes to continue this monitoring and will rotate between the Namekagon, upper St. Croix and lower St. Croix every three years.

Consequences: Fire can result in smoke, burned and charred surroundings, noise, and temporary closures. Backcountry recreational facilities such as campsites and trails could become less inviting for a time, due to the presence of ash. However, these effects would be minor and short-term as vegetation would be quickly reestablished. Fire could burn over trails, making them more open than at present.

Fire can also provide a new recreational/educational activity by providing an opportunity to learn about fire ecology. Visitors may want to return to burned areas to experience the changes that take place.

Alternative 1: No action: Suppress All Fires

Under this alternative prescribed fire would not be used. The negative effects of fire suppression would continue. Fire adapted communities would continue to disappear and there would be fewer and fewer opportunities for visitors to observe the convergence of a variety of ecosystems along the Riverway. This would result in a moderate, permanent impact to recreational use of the Riverway. In addition, this alternative would preclude the opportunity to observe the effects of prescribed fire on plant succession at the Riverway.

Wildland fire that could not be immediately contained could result in adverse impacts to recreation since with wildland fire there is no control over the timing or the extent of burn. These fires burn more intensely and have more adverse impacts to resources. There may be a slight increased chance for minor, short-term impacts to recreation from emergency closures and smoke.

Alternative 2: Prescribed Fire

Prescribed fire would be ignited under the specific conditions of season, fuel and moisture to perpetuate the target community. Prescribed fire, coupled with the mitigating measures described in Chapter 4 would have minor, short-term, localized negative impacts to recreation. Temporary closures of trails and campsites may occur, but since they would be in the off-season few visitors would be impacted. Moderate, long-term positive impacts would occur by maintaining and restoring the scenic value associated with fire adapted communities and by providing new opportunities to learn about fire ecology.

Alternative 3: Mechanical Treatment

Noise during treatment (depending on method used) would be the chief impact of this alternative on recreation. Removal of vegetation would be done to minimize visual impacts. These impacts would be minor and short-term.

Alternative 4 (Preferred): Integrated Program

Combined effects of Alternatives 2 and 3. Treated areas could be restored to the most natural condition possible for visitors to enjoy by using prescribed fire in conjunction with mechanical treatment to give the best control of exotics. Moderate, long-term to permanent positive impacts would occur by maintaining and restoring

the scenic value associated with fire adapted communities and by providing new opportunities to learn about fire ecology.

Cumulative Impacts: Cumulative impacts on recreation can result from the additive effects of activities that disrupt the recreational experience. These activities include construction and maintenance activities and other man-made intrusions to visitors seeking a natural experience. Since prescribed fire would have only minor, short-term negative impacts it would have no additive effect.

SCENIC RESOURCES

Description: The St. Croix National Scenic Riverway was established under the Wild and Scenic Rivers Act to protect and enhance its outstanding scenic and other resource values. The Riverway has a natural appearance for much of its length, with exceptions where towns and villages occur along its banks. It passes through various landscapes - ranging from a narrow, meandering, and densely forested stream to areas that provide expansive views of a wide river valley. The scenery includes an abundance of wildlife including turtles, songbirds, herons, bald eagles and the occasional otter. Both the management plan for the upper Riverway and that for the lower state that the area is significant, in part, because "*visitors can observe the convergence of three terrestrial biological communities as they travel the river; the coniferous forest, hardwood forest and prairie.*"

Consequences: Fire results in changes to the plant community type. It can add to the variety of vegetation by breaking up a continuous scene. Whether this is positive or negative can depend on individual preferences, but generally, diversity is thought to enhance the visual experience. Fire can reduce vegetative cover, resulting in more panoramic views or it can eliminate existing screening of intrusive structures.

Alternative 1: No Action: Suppress All Fires

Under this alternative prescribed fire would not be used to meet natural resource goals. Without fire, fire adapted communities would continue to succeed to other types of plant communities. This would result in a more continuous scene of similar vegetation along the Riverway. In time, the conditions that led to the statement that the Riverway is significant because "*visitors can observe the convergence of three terrestrial biological communities as they travel the river; the coniferous forest, hardwood forest and prairie*" may disappear. Therefore, the no action alternative would result in moderate, long-term to permanent negative impacts on scenic values.

If an intense wildland fire occurred that could not be quickly contained it would tend to kill most vegetation in the affected area and may leave a rather barren scene with the exception of blackened standing dead trees. However, new growth would appear within the first year and, over the long-term, vegetation would recover.

Alternative 2: Prescribed Fire: Prescribed fire would be ignited under the specific conditions of season, fuel and moisture to perpetuate the target community. It would result in more open views and more of a variety of plant communities along the Riverway. This would be considered a moderate, long-term positive impact on scenic values.

Prescribed fires are not so hot and intense that they would kill all vegetation. Prescribed fire would leave more of a mosaic of vegetation types and age classes, thereby adding to variety. Post fire conditions usually provide an abundance of wildflowers, barrens and unique plant communities.

Negative impacts of opening views to intrusive structures would be avoided by implementing the mitigating measures in Chapter 4.

Alternative 3: Mechanical Treatment

This alternative would open views to a degree by removing exotics and woody invaders in prairies. Because this alternative would be very labor intensive, only limited areas could be treated. Therefore, this alternative would have a minor, long-term positive impact by providing limited restoration of native communities.

Alternative 4 (Preferred): Integrated Program

Combined effects of Alternatives 2 and 3. Treated areas would be restored to the most natural condition possible by using prescribed fire in conjunction with mechanical treatment to give the best control of exotics. Restoring fire adapted communities would have a moderate, long-term to permanent positive impact on the scenery of the Riverway. It would enable the NPS to maintain the conditions reflected in the following significance statement "*visitors can observe the convergence of three terrestrial biological communities as they travel the river; the coniferous forest, hardwood forest and prairie.*"

Cumulative Impacts: Cumulative impacts on scenery result from the additive effects of activities or developments that degrade the natural scene. The natural scene at the Riverway includes a mosaic of plant communities, including those that are fire adapted. The no action alternative would not maintain this mosaic of vegetation and would have additive negative effects on the scenery of the Riverway.

Impairment: As stated in the vegetation section above, during the general management planning process for the Upper Riverway (NPS, 1998), the following significance statement was developed: "As they travel the river, visitors can observe the convergence of three terrestrial biological communities (prairie, hardwood forest, and coniferous forest) and cold- and warm-water communities. A similar statement was developed during the cooperative management planning process for the Lower Riverway (NPS, 2000a): "The 52 miles of the Lower St. Croix River is at the junction of three major biomes: conifer-hardwood forest, deciduous forest-woodland, and the prairie." These statements relate to both the vegetation and scenic resources of the Riverway. The no-action alternative is resulting in a decrease in

prairie and other fire adapted communities along the Riverway. Therefore, the no action alternative may be resulting in impairment to the scenery as well as the vegetation of the Riverway.

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CHAPTER 7: CONSULTATION AND COORDINATION / PREPARERS

CONSULTATION AND COORDINATION

Public scoping for the fire management plan was initiated by letter of March 15, 1999 to interested parties including neighbors, the Wisconsin and Minnesota Departments of Natural Resources, local units of government and conservation organizations. The issues raised during initial scoping are summarized in Chapter 2. To be addressed, they required the NPS to develop more detail in a draft fire management plan/environmental assessment and 5-year plan and present it to the public. Scoping will continue through the review of this draft document.

The NPS initiated consultation under Section 7 of the Endangered Species Act of 1973, as amended by letter of March 27, 2001. The U.S. Fish and Wildlife Service responded by letter of April 27, 2001. Their letter provided an up-to-date species list for the counties bordering the Riverway. Their letter also stated that due to the nature and location of the proposed activities they concluded that the listed species would not be affected. The Draft EA and 5-year plan will also be provided to the U.S. Fish and Wildlife Service for their review.

The draft document will also be sent to the Wisconsin and Minnesota State Historic Preservation Offices and potentially affected Indian tribes for review.

PREPARERS

An interdisciplinary team that included the following staff members contributed to the development of this EA and the 5-year plan. They included:

St. Croix National Scenic Riverway

Brian Adams -- Chief of Resource Protection
Randy Ferrin -- Chief of Resource Management
Robin Maercklein -- Biologist
Jill Medland -- Compliance Specialist
Jean Schaeppi -- Cultural Resource Specialist
Dan Watson -- Namekagon District Ranger
Marianna Young -- GIS Specialist

Midwest Regional Office

Kelly Ann Gorman -- Fire Ecologist, Great Lakes Ecoregion
Jim DeCoster -- Fire Ecologist, Midwest Region

Voyageurs National Park

Dave Soleim, Border Waters Fire Management Officer

Wisconsin Department of Natural Resources

Paul Kooiker, Biologist, Governor Knowles State Forest

APPENDIX A: GLOSSARY

Back-fire: a fire that burns into the wind

Barrens: refers to an area with sparse vegetation or stunted plants, caused by harsh growing conditions such as infertile, droughty, or thin soils.

Biological Diversity: the variety of life and processes that govern life.

Blacklines: Lines established to control fire by burning fuels along a strip of land.

Climax forest: the relatively stable association of forest species that represents the final stage of succession absent disturbance under the existing conditions of soil, climate and

Community: all the plants and animals in a particular habitat that are bound together by food chains and other relationships. They are classified and described according to their vegetation, successional status, topography, hydrological conditions, substrates, soils and disturbance regimes.

Conservation Biology: a field of study that concentrates on the phenomena that affect the maintenance, loss and restoration of biological diversity. The overall goal is to maintain and restore the earth's biodiversity.

Cultural Landscapes: an area that can include both cultural and natural resources, wildlife or domestic animals that is associated with a historic event, activity, or person, or which exhibits other cultural or aesthetic values.

Dominant: describes plant species that shape the character of a community by virtue of its size, abundance, dense shade, or effects on soils.

Ethnographic Resources: objects and places, including sites, structures, landscapes, and natural resources that are of traditional significance to traditionally associated peoples.

Exotic species: Nonnative species. A species that has been introduced to an area by humans. By far, most of the exotic species in the St. Croix River Valley have been introduced from outside North America since the mid-1800's.

Fire Adapted Community: a naturally occurring community of plants and associated animals that depends on periodic fire for its survival.

Forest: a complex community of plants and animals in which trees are the most conspicuous members.

Habitat: the locality, site, and particular type of local environment in which plants, animals and other organisms live.

Head-fire: a fire that burns with the wind.

Integrated Pest Management: a decision-making process which helps one decide if a pest treatment is necessary and appropriate, where the treatment should be administered, when treatment should be applied, and what strategies should be integrated for immediate and long-term results.

Native species: a species that occurs naturally within a given region.

Prairie: An upland plant community composed of grasses and forbs. Prairies generally lack trees; shrubs, if present, are not prominent.

Prescribed Fire: fires deliberately ignited by managers or fires of natural origin permitted to burn under specific conditions of season, fuel and moisture to achieve predetermined resource objectives. It may be used to restore or maintain natural ecosystems, influence natural successional patterns, restore or maintain a historic scene, restore or maintain vistas, reduce fuels which contribute to wildfire hazard, create fuel breaks near developments, enhance habitat for rare species and/or control exotic species.

Presettlement: a term used for convenience to denote the time period before Euro-American settlers moved into a region. Many regions were actually settled by Native Americans for thousands of years before European-Americans arrived.

Savanna: an upland plant community formed of prairie grasses and forbs with scattered trees or groves of trees. The canopy coverage of trees in a savanna is generally between 10-70%.

Succession: the gradual replacement of one community by another. The change in vegetation over time.

Wetlines: Lines established to control fire by wetting fuels along a strip of land.

Wildfire: a fire that is out of control regardless of its origin.

Wildland Fire: Fires in natural vegetation that were not planned and may have been started by lightning, accident or arson.

Volatization: to pass off as a vapor

APPENDIX B - CROSS REFERENCE OF COMMON AND SCIENTIFIC NAMES FOR PLANTS

Grasses

Big bluestem
Bog bluegrass
Hairy grama grass
June grass
Kentucky bluegrass
Little bluestem
Muhly grass
Needle grass
Reed canary grass
Side oats grama
Smooth brome

Andropogon gerardi
Poa paludigena
Bouteloua hirsuta
Koeleria cristata
Poa pratensis
Andropogon scoparius
Muhlenbergia cuspidata
Aristida oligantha
Phalaris arundinacea
Bouteloua curtipendula
Bromus inermis

Sedges

Drooping sedge

Carex spp.
Carex prasina

Forbs

Bull thistle
Canada thistle
Dogbane
Fame flower
Flowering spurge
Garlic mustard
Ginseng
Grecian foxglove
Kittentails
Musk thistle
Prickly pear cactus
Purple loosestrife
Spotted knapweed
Stemless tick-trefoil

Cirsium vulgare
Cirsium arvense
Apocynum spp.
Talinum rugospermum
Euphorbia corollata
Alliaria officinalis
Panax quinquefolius
Digitalis lanata
Besseyia bullii
Carduus nutans
Optunia humifusa
Lythrum salicaria
Centaurea maculosa
Desmodium nudiflorum

Shrubs

Alder
Blueberry
Canada yew
buckthorn
Hazelnut
Prickly ash
Smooth sumac
Staghorn sumac
Sweetfern
Tartarian honeysuckle

Alnus spp.
Vaccinium spp.
Taxus canadensis Common
Rhamnus cathartica
Corylus americana
Xanthoxylum americanum
Rhus glabra
Rhus typhina
Comptonia peregrina
Lonicera tartarica

Trees

American elm
Aspen
Balsam fir
Basswood

Ulmus americana
Populus tremuloides
Abies balsanea
Tilia americana

Birch
Black ash
Black cherry
Black oak
Black spruce
Black willow
Bur oak
Cottonwood
Eastern red cedar
Hill's oak
Jack pine
Red ash
Red maple
Red oak
Red pine
River birch
Silver maple
Slippery elm
Sugar maple
Tamarack
White cedar
White oak
White pine
Yellow birch

Betula papyrifera
Fraxinus nigra
Prunus serotina
Quercus velutina
Picea mariana
Salix nigra
Quercus macrocarpa
Populus deltoides
Juniperus virginiana
Quercus ellipsoidalis
Pinus banksiana
Fraxinus pennsylvanica
Acer rubrum
Quercus rubra
Pinus resinosa
Betula nigra
Acer saccharinum
Ulmus rubra
Acer saccharum
Larix laricina
Thuja occidentalis
Quercus alba
Pinus strobus
Betula lutea

APPENDIX C - CROSS REFERENCE OF COMMON AND SCIENTIFIC NAMES FOR ANIMALS

Insects

Karner blue butterfly
St. Croix snaketail dragonfly
Cobweb skipper

Lycaeides melissa samuelis
Ophiogomphus susbehcha
Hesperia metea

Mussels

Higgin's eye pearly mussel
Winged mapleleaf mussel

Lampsilis higginsii
Quadrula fragosa

Fish

Brook trout
Brown trout
Channel Catfish
Mottled sculpin
Northern pike
Rainbow trout
Redhorse suckers
Smallmouth bass
Walleye pike

Salvelinus fontinalis
Salmo trutta
Ictalurus punctatus
Cottus bairdi
Esox masquinongy
Salmo gairdneri
Moxostoma sp.
Micropterus dolomieu
Stizostedion vetreum

Reptiles and Amphibians

American toad
Blanding's turtle
Eastern garter snake
Eastern spiny softshell
Green frogs
Green snake
Hognose snake
Painted turtle
Red-backed salamander
Snapping turtle
Spring peepers

Bufo americanus
Emydoidea blandingii
Thamnophis sirtalis sirtalis
Trionyx spiniferus spiniferus
Hyla cinerea
Opheodrys vernalis
Heterodon platyrhinos
Chrysemys picta picta
Plethodon cinereus cinereus
Chelydra serpentina
Hyla crucifer

Birds

Bald eagle
Belted kingfisher
Broad-winged hawk
Canada goose
Common merganser
Great blue heron
Green heron
Kirtland's warbler
Mallard
Osprey
Red-shouldered hawk
Red-tailed hawk
Red-winged blackbird
Rough-legged hawk
Ruffed grouse
Sharp-tailed grouse

Haliaeetus leucocephalus
Megascops asio
Buteo platypterus
Branta canadensis
Mergus merganser
Ardea herodias
Butorides virescens
Dendroica kirtlandii
Anas platyrhynchos
Pandion haliaetus
Buteo lineatus
Buteo jamaicensis
Agelaius phoeniceus
Buteo lagopus
Bonasa umbellus
Pedioecetes phasianellus

Tree swallow
Trumpeter swan
Turkey
Woodcock
Wood duck

Iridoprocne bicolor
Cygnus buccinator
Meleagris gallopavo
Philohela minor
Aix sponsa

Mammals

Badger
Beaver
Big brown bat
Black bear
Canada lynx
Coyote
Deer mouse
Gray fox
Gray wolf
Gray squirrel
Little brown bat
Masked shrew
Meadow vole
Mink
Muskrat
Otter
Raccoon
Red fox
Red squirrel
Short-tail shrew
Skunk
Snowshoe hare
Weasel
White-tailed deer
Woodchuck

Taxidea taxus
Castor canadensis
Eptesicus fuscus
Ursus americanus
Lynx canadensis
Canis latrans
Peromyscus maniculatus
Urocyon nereoarcteus
Canis lupus
Sciurus carolinensis
Myotis lucifugus
Sorex cinereus
Microtus pennsylvanicus
Mustela vison
Ondatra zibethica
Lutra canadensis
Procyon lotor
Vulpes fluva
Tamiasciurus hudsonicus
Blarina brevicauda
Mephitis mephitis
Lepus americanus
Mustela frenata
Odocoileus virginianus
Marmota caligata

APPENDIX D: LISTED SPECIES OF THE ST. CROIX NATIONAL SCENIC RIVERWAY

December 23, 1999

SCIENTIFIC NAME:	COMMON NAME:	STATUS		
		US	MN	WI
PLANTS				
<i>Asclepias ovalifolia</i>	Dwarf Milkweed			TH
<i>Allium cernuum</i>	Nodding Wild Onion		TH	
<i>Anemone caroliniana</i>	Carolina Anemone			EN
<i>Arabis missouriensis</i>	Rock Cress	C2		
<i>Aristida tuberculosa</i>	Sea-beach Needlegrass		SC	
<i>Astragalus crassicaarpus</i>	Prairie Plum			EN
<i>Aureolaria pedicularia</i>	Fernleaf False Foxglove		TH	
<i>Baptisia alba</i>	White Wild Indigo		SC	
<i>Besseyia bullii</i>	Kitten-tails	3C	TH	TH
<i>Calamovilfa longifolia</i>	Sand Reed			TH
<i>Calypso bulbosa</i>	Calypso Orchid			TH
<i>Carex annectens</i>	Yellow-fruited Sedge		SC	
<i>Carex prasina</i>	Drooping Sedge			TH
<i>Carex typhina</i>	Cattail Sedge		SC	
<i>Carex xerantica</i>	Dry Sedge		SC	
<i>Catabrosa aquatica</i>	Brook Grass			EN
<i>Cephalanthus occidentalis</i>	Buttonbush		SC	
<i>Dalea villosa</i>	Silky prairie clover			SC
<i>Decodon verticillatus</i> var. <i>laevigatus</i>	Waterwillow		SC	
<i>Desmodium illinoense</i>	Illinois Tick-trefoil		TH	
<i>Desmodium nudiflorum</i>	Stemless Tick-trefoil		SC	
<i>Drosera anglica</i>	English Sundew		SC	TH
<i>Dryopteris goldiana</i>	Goldie's Fern		SC	
<i>Echinochloa walteri</i>	Walter's Barnyard Grass		SC	
<i>Floerkea proserpinacoides</i>	False Mermaid		TH	
<i>Hamamelis virginiana</i>	Witch-Hazel		SC	
<i>Hydrocotyle americana</i>	American Water-pennywort		SC	
<i>Juglans cinerea</i>	Butternut		SC	
<i>Lechea tenuifolia</i>	Narrow-leaved Pinweed		EN	
<i>Liatris punctata</i> var. <i>nebraskana</i>	Dotted Blazing Star			EN
<i>Lonicera involucrata</i>	Fly Honeysuckle			EN
<i>Lysimachia quadrifolia</i>	Whorled Loosestrife		SC	
<i>Minuartia dawsonensis</i>	Rock Sandwort		SC	
<i>Myriophyllum farwellii</i>	Farewell's Water-milfoil		SC	
<i>Oenothera rhombipetala</i>	Rhombic-petaled Evening Primrose		SC	
<i>Opuntia fragilis</i>	Brittle Prickly-pear			TH
<i>Orchis rotundifolia</i>	Small Round-leaved Orchis			TH
<i>Panax quinquefolius</i>	Ginseng	3C	SC	
<i>Parmelia stuppea</i>	Species of Lichen		SC	
<i>Paronychia fastigiata</i>	Forked Chickweed		EN	

SCIENTIFIC NAME:	COMMON NAME:	STATUS		
		US	MN	WI
PLANTS				
<i>Pellaea atropurpurea</i>	Purple Cliff-brake		SC	
<i>Petasites sagittatus</i>	Sweet Coltsfoot			TH
<i>Poa paludigena</i>	Bog Bluegrass	C2	TH	TH
<i>Polygala cruciata</i>	Cross-leaved Milkwort		EN	
<i>Polygonum arifolium</i> var. <i>pubescens</i>	Halberd-leaved Tearthumb		SC	
<i>Prenanthes aspera</i>	Rough White Lettuce			EN
<i>Primula mistassinica</i>	Bird's-eye Primrose	3C		
<i>Ruellia humilis</i>	Toothcup, Wild Petunia		EN	EN
<i>Scutellaria parvula</i>	Small Skullcap			EN
<i>Solidago caesia</i>	Blue-stemmed Goldenrod			EN
<i>Solidago sciaphila</i>	Cliff Goldenrod		SC	
<i>Talinum rugospermum</i>	Prairie Fame-flower	C2	EN	
<i>Tephrosia virginiana</i>	Goat's-rue		SC	
<i>Verbena simplex</i>	Narrow-leaved Vervain		SC	
<i>Waldsteinia fragarioides</i>	Barren Strawberry		SC	
MUSSELS				
<i>Actinonaias ligamentina</i>	Mucket			TH
<i>Alasmidonta marginata</i>	Elktoe			TH
RULE				
<i>Anodonta imbecillis</i>	Paper Pondshell			
RULE				
<i>Cumberlandia monodonta</i>	Spectaclecase	C2	TH	EN
<i>Cyclonaias tuberculata</i>	Purple Wartyback		TH	EN
<i>Ellipsaria lineolata</i>	Butterfly		TH	
<i>Elliptio crassidens crassidens</i>	Elephant-ear		EN	EN
<i>Elliptio dilatata</i>	Spike		SC	
<i>Epioblasma triquetra</i>	Snuffbox	C2	TH	EN
<i>Fusconaia ebena</i>	Ebonysell		EN	EN
<i>Lampsilis higginsii</i>	Higgins eye	EN	EN	EN
<i>Lasmigona compressa</i>	Creek Heelsplitter		SC	
<i>Lasmigona costata</i>	Fluted-shell		SC	
<i>Ligumia recta</i>	Black Sandshell		SC	
<i>Megalonaias nervosa</i>	Washboard		TH	
<i>Obovaria olivaria</i>	Hickorynut		SC	
<i>Plethobasus cyphus</i>	Bullhead			EN
<i>Pleurobema sintoxia</i>	Round Pigtoe			
RULE				
<i>Quadrula fragosa</i>	Winged Mapleleaf	EN	EN	EN
<i>Quadrula metanevra</i>	Monkeyface		TH	TH
<i>Simpsonaias ambigua</i>	Salamander Mussel	C2	TH	TH
<i>Tritogonia verrucosa</i>	Pistolgrip, Buckhorn		TH	TH

SCIENTIFIC NAME:	COMMON NAME:	STATUS		
		US	MN	WI
BUTTERFLIES AND DRAGONFLIES				
<i>Atrytonopsis hianna</i>	Dusted Skipper			SC
<i>Erynnis persius</i>	Persius Dusky Wing		EN	
<i>Hesperia ottoe</i>	Ottoe Skipper		TH	
<i>Incisalia irus</i>	Frosted Elfin			TH
<i>Lycaeides idas nabokovi</i>	Nabokov's Blue, Northern Blue		SC	EN
<i>Lycaeides melissa samuelis</i>	Karner Blue Butterfly	EN	EN	
<i>Ophiogomphus anomalis</i>	Extra-striped Snaketail	C2	SC	EN
<i>Ophiogomphus howei</i>	Pygmy Snaketail	C2		TH
<i>Ophiogomphus susbehcha</i>	St. Croix Snaketail		SC	EN
<i>Phyciodes batessi</i>	Tawny Crescent Spot	C2		
<i>Speyeria idalia</i>	Regal Fritillary		SC	EN
FISH				
<i>Acipenser fulvescens</i>	Lake Sturgeon	C2	SC	RULE
<i>Ammocrypta asprella</i>	Crystal Darter	C2	SC	EN
<i>Coregonus artedi</i>	Lake Herring, Cisco			RULE
<i>Cycleptus elongatus</i>	Blue Sucker	C2	SC	TH
<i>Etheostoma microperca</i>	Least Darter		SC	
<i>Hiodon alosoides</i>	Goldeye			EN
<i>Hybopsis aestivalis</i>	Speckled Chub			TH
<i>Ictiobus niger</i>	Black Buffalo		SC	TH
<i>Moxostoma carinatum</i>	River Redhorse			TH
<i>Moxostoma valenciennesi</i>	Greater Redhorse			TH
<i>Notropis amnis</i>	Pallid Shiner		SC	EN
<i>Notropis anogenus</i>	Pugnose Shiner 1928		SC	TH
<i>Opsopoeodus emiliae</i>	Pugnose Minnow		SC	
<i>Percina evides</i>	Gilt Darter		SC	TH
<i>Polyodon spathula</i>	Paddlefish	3C	TH	TH
AMPHIBIANS AND REPTILES				
<i>Apalone mutica</i>	Smooth Softshell		SC	
<i>Chelydra serpentina</i>	Snapping Turtle		SC	
<i>Clemmys insculpta</i>	Wood Turtle		TH	TH
<i>Coluber constrictor</i>	Blue Racer		SC	
<i>Crotalus horridus</i>	Timber Rattlesnake		TH	
<i>Emydoidea blandingii</i>	Blandings Turtle	C2	TH	TH
<i>Eumeces fasciatus</i>	Five-lined Skink		SC	
<i>Hemidactylum scutatatum</i>	Four-toed Salamander		SC	
<i>Pituophis melanoleucus</i>	Gopher Snake, Bullsake		SC	

SCIENTIFIC NAME:	COMMON NAME:	US	MN	WI
BIRDS				
<i>Accipiter cooperii</i>	Cooper's Hawk			RULE
<i>Accipiter gentilis</i>	Northern Goshawk	C2		
<i>Ammodramus henslowii</i>	Henslow's Sparrow		EN	TH
<i>Ammodramus nelsoni</i>	Nelson's Sharp-tailed Sparrow		SC	
<i>Asio flammeus</i>	Short-eared Owl		SC	
<i>Buteo lineatus</i>	Red-shouldered Hawk		SC	TH
<i>Casmerodius albus</i>	Great Egret			TH
<i>Cygnus buccinator</i>	Trumpeter Swan			EN
<i>Dendroica cerulea</i>	Cerulean Warbler		SC	TH
<i>Dendroica kirtlandii</i>	Kirtland's Warbler	EN		RULE
<i>Empidonax virescens</i>	Acadian Flycatcher		SC	TH
<i>Falco peregrinus anatum</i>	American Peregrine Falcon	EN	TH	EN
<i>Haliaeetus leucocephalus</i>	Bald Eagle	TH	SC	
<i>Lanius ludovicianus</i>	Loggerhead shrike	C2	TH	EN
<i>Larus pipixcan</i>	Franklin's Gull		SC	
<i>Nycticorax violaceus</i>	Yellow-crowned Night-Heron			TH
<i>Oporornis formosus</i>	Kentucky Warbler			TH
<i>Pandion haliaetus</i>	Osprey			TH
<i>Pelecanus erythrorhynchus</i>	American White Pelican		SC	
<i>Phalacrocorax auritus</i>	Double-crested Cormorant			
<i>Podiceps auritus</i>	Horned Grebe		TH	
<i>Podiceps grisegena</i>	Red-necked Grebe			EN
<i>Seiurus motacilla</i>	Louisiana Waterthrush		SC	
<i>Sterna caspia</i>	Caspian Tern			EN
<i>Sterna forsteri</i>	Forster's Tern		SC	EN
<i>Sterna hirundo</i>	Common Tern		TH	EN
<i>Wilsonia citrina</i>	Hooded Warbler		SC	TH
MAMMALS				
<i>Canis lupus</i>	Timber Wolf	EN	SC	EN
<i>Lynx canadensis</i>	Lynx	C2		RULE
<i>Martes americana</i>	Pine Marten	3C		EN
<i>Myotis septentrionalis</i>	Northern Myotis		SC	
<i>Pipistrellus subflavus</i>	Eastern Pipistrelle		SC	

EN – Endangered

TH – Threatened

C2 – Candidate (not enough data to support listing)

3C – Former candidate (more abundant than once thought)

SC – Special concern

RULE – Protected or regulated (by state or federal legislation or policy)

NOTE: ADDITIONAL RARE, THREATENED, OR ENDANGERED SPECIES MAY OCCUR WITHIN THE BOUNDARIES OF THE RIVERWAY - HOWEVER, HARD DATA IS CURRENTLY LACKING TO CONFIRM SUCH SPECIES' PRESENCE

Information obtained from the Minnesota Natural Heritage Program (1995) and the Wisconsin Natural Heritage Program (1993 and 1995). The MN data included rare occurrences within the SACN and LOSA statutory boundaries, and the WI data included rare features for townships bordering SACN. Additional information obtained from the following reports:

- Doolittle, C. J. 1988. Distribution and Relative Abundance of Freshwater Mussels in the Saint Croix National Scenic Riverway. Cable Natural History Museum Sigurd Olson Environmental Institute, Ashland, WI.
- Heath, D. J., and P. W. Rasmussen. 1990. Results of Base-Line Sampling of Freshwater Mussel Communities for Long-Term Monitoring of the Saint Croix National Scenic Riverway, Minnesota and Wisconsin. Prepared for USDI, NPS, St. Croix NSR, by WIDNR, Madison, WI.
- Judziewicz, Emmet J. 1994. FINAL REPORT: Inventory and Monitoring of Rare Vascular Plants, St. Croix National Scenic Riverway, Minnesota and Wisconsin. Department of Botany, University of Wisconsin, Madison, WI.
- Maercklein, R.A. and T. O'Halloran. 1999. A Checklist of Birds at St. Croix National Scenic Riverway. Unpublished document. National Park Service. St. Croix Falls, Wisconsin. 2pp.