Record of Decision
Nautilus Project
Final Environmental Impact Statement

USDA-Forest Service
Black Hills National Forest
Northern Hills Ranger District
Lawrence, Meade and Pennington Counties, South Dakota

Introduction

This Record of Decision (ROD) documents my decision regarding actions I am authorizing under the Nautilus Project and the rationale for my decision. The Nautilus Project was initiated in November 2009 primarily to reduce the risk of mountain pine beetle infestation on National Forest System (NFS) land within the project area. Over 70 percent of the pine stands within the project area is currently categorized as having a high insect risk rating. Areas in which a high risk rating is identified could experience extensive tree mortality if an infestation were to become established.

The Nautilus Project has been completed under the provisions of the Healthy Forests Restoration Act of 2003 (HFRA). The project qualified for HFRA under Title I, Section 102(a) of the Act, which includes areas that contain or are adjacent to an insect epidemic that poses a risk to forest resources. A forest health evaluation for the project area was completed by a Forest Service Entomologist. That report concluded that epidemic levels of mountain pine beetles exist in the Nautilus project area (Allen 2010). Craig Bobzien, the Forest Supervisor for the Black Hills National Forest, concurred with that finding and determined that the project met the criteria in Section 102(a)(4) of HFRA.

The Nautilus Project was also intended to respond to the need to reduce the risk of high intensity wildfires, improve watershed conditions, provide for a diversity of wildlife habitat, and conduct research forestry activities. All of these needs are consistent with direction contained in the 1997 Revised Black Hills National Forest Land and Resource Management Plan, as amended by the 2005 Phase II Amendment (Forest Plan, USDA-FS 2005).

The Nautilus Project was originally set to be analyzed as part of the larger Steamboat Project. After reviewing the available data and considering timelines, I determined that it would be more efficient to split the Steamboat area in two using Nemo Road and Forest Highway 26 as the dividing line. This division left Steamboat Rock, the landmark for which the original project area was named, in the eastern half, so the west half was renamed Nautilus. The east half will retain the Steamboat name and will be analyzed at a future date.

Public Involvement

Comments on the Nautilus Proposed Action (identified as Alternative B in the Nautilus Draft and Final Environmental Impact Statements), potential concerns, and opportunities for managing the Nautilus project area were solicited from members of the public, other public agencies, tribal governments, adjacent property owners, interest groups, and Forest Service specialists. Various methods were used to request comments, including:

- A Notice of Intent (NOI) to prepare an EIS was published in the *Federal Register* on November 24, 2009. The NOI asked for public comment on the proposal through December 2, 2009.
- A news release was submitted to the local news media on November 23, 2009. This release introduced the project to the public by providing a description of the project area and an explanation of the proposal. The release also solicited public comment on the project.
- A scoping letter was mailed to over 750 interested parties, including property owners, tribal members, state and federal agencies, and other organizations on November 18, 2009. This letter included a description of the project area, an overview of the planning process, a general explanation of the proposed actions, and an invitation to comment. Forty-three comments from 36 different parties were received during the scoping period. These were evaluated to determine whether significant issues existed and whether additional alternatives needed to be developed.
- A public open house meeting was held at the Community Hall in Nemo, South Dakota, on December 2, 2009. The meeting was attended by 36 interested parties who met with Forest Service officials to view maps of the project area and discuss the proposed actions. Attendees were encouraged to submit comments on the proposed actions or to document their concerns associated with the project area.
- A Notice of Availability (NOA) for the DEIS was published in the *Federal Register* on June 4, 2010.
- A legal notice announcing the availability of the DEIS was published in the *Rapid City Journal* on June 4, 2010, initiating the 45-day comment period. The Forest Service received 19 comment letters during the DEIS comment period. Content analysis identified specific, separate statements within each letter and categorized them. The full comments and the Forest Service response to each of them are presented in Appendix E of the Nautilus Project FEIS. Comments led to relatively minor clarifications in the FEIS.
- Other information sharing, communication and interaction with interested parties, agencies, and individuals has occurred on a continuing basis during project planning. Information shared by such parties has been considered by the IDT in the development of this EIS.

A legal notice announcing the availability of the FEIS was published in the Rapid City Journal on September 3, 2010, initiating the 30-day objection period. Three objections were submitted during the objection period. Objection Reviewing Officer, Dennis Jaeger (Deputy Forest Supervisor on the Black Hills National Forest), reviewed the objections that were submitted and assembled a team of resource specialists to review the information and analyses contained in the Nautilus FEIS and the project record. Based upon that review, the Reviewing Officer determined that the analysis was sufficient to allow me to move forward in authorizing a

decision based on the Nautilus FEIS. However, the Reviewing Officer required that this Record of Decision contain certain information to help the public understand my rationale for addressing the two significant issues identified in the DEIS and FEIS and to help the public understand how the Selected Action is consistent with Forest Plan direction. In particular, the Reviewing Officer's direction (Jaeger 2010) required the following:

1) explain the two issues identified in the EIS in terms of a cause and effect relationship, and
2) provide some specific citations to effects analysis to demonstrate the basis for [my] conclusions with regard to Forest Plan consistency.

This Record of Decision addresses these two items per the Reviewing Officer's direction. Item 1 is addressed below in the sections titled *Treatment of Activity Fuels* and *Measures to Reduce Mortality to Trees where Prescribed Fire is Applied* under the description of the Selected Action. Item 2 is addressed in the discussion regarding consistency with the Forest Plan in the section titled *Legal Requirements, Regulation, and Policy*.

Project Area

The Nautilus project area is located immediately west of Nemo, South Dakota and approximately 7 miles northwest of Rapid City, South Dakota. Of the 41,302 acres in the project area, 5,699 acres are private land and the remaining 35,603 acres are NFS land. Treatments are proposed only on NFS land within the Northern Hills Ranger District (NHRD) administrative boundary, except where rights-of-way are established to access NFS land across private property. The project area includes all or part of the following land base:

Table 1. Nautilus Project Area Legal Land Description

Township	Range	Section
2 North	4 East	1-6, 9-12
2 North	5 East	1-18
2 North	6 East	7, 18
3 North	3 East	36
3 North	4 East	1-5, 10-14, 20-29, 31-16
3 North	5 East	4-9, 15-22, 27-34
4 North	4 East	28, 29, 32-36
4 North	5 East	29-33
Black Hills Meridian		

Approximately 257 miles of known road, including National Forest System (NFS) and non-system roads, are located in the Nautilus project area. U.S. Highway 385, Forest Highway 26 (Vanocker Canyon Road), and Forest System Road 414.5 (Nemo Road) are the primary travel routes through the project area. Approximately nine miles of the Centennial Trail crosses the project area. Recreation features located in the project area include the Pilot Knob and Box Elder trailheads to the Centennial Trail and the Boxelder Forks campground. The Steamboat Rock Picnic Area is immediately adjacent to the project area. Two administrative sites are located in the project area: the Boxelder Job Corps, administered jointly by the Forest Service and the US Department of Labor, and the Nemo work center, administered by the Forest Service.

Private land is located across the project area with concentrations along the primary travel routes. Many private residences, both seasonal and year-round, are located in the project area.

The Nautilus project area is comprised of the following Management Areas (MA), which are identified in the Forest Plan:

- MA 5.1 (Resource Production Emphasis) – 20,069 acres
- MA 5.3A (Black Hills Experimental Forest) – 3,394 acres
- MA 5.4 (Big Game Winter Range) – 12,140 acres

As is typical of the Black Hills National Forest, the vegetated area of the Nautilus project area is dominated by ponderosa pine, which covers 98 percent of the NFS land. White spruce, aspen, grasslands and non-forested areas are present on less than one percent of the NFS land each. Numerous small pockets (10 acres or smaller) of aspen, bur oak and other hardwoods are scattered across the project area.

Decision and Description of the Selected Action

The Nautilus Project purpose and need, as specified in the Nautilus Project Final Environmental Impact Statement (FEIS) (USDA-FS 2010), provides the focus of and scope for the proposed action and alternatives under the direction of the Forest Plan. Forest Plan direction is summarized in Chapter 1 of the Nautilus Project Area FEIS. Given the purpose and need, I have reviewed the alternatives and analysis disclosed in the FEIS, the issues identified during public scoping, information contained in the project record, Forest Plan direction, public comments received on the Draft EIS, and objections filed following the release of the Final EIS. Based on this review, I have decided to implement Alternative B with minor modifications (Alternative B is hereafter referred to as the Selected Action). Design measures and monitoring applicable to the Selected Action are included in Appendix A of this Record of Decision. These measures were developed to ensure consistency with Forest Plan Standards and Guidelines. My reasons for selecting Alternative B are explained under *Rationale for Selected Action*, presented later in this ROD. The modifications to Alternative B are described under *Rationale for Modifying Alternative B to Develop the Selected Action* below.

The Selected Action

This section describes the Selected Action in detail. Map 1 in Appendix B displays the planned vegetative and fuels treatments while Map 2 in Appendix B shows the associated road construction or maintenance activities for the Selected Action.

Table 2. Summary of Major Actions Authorized in the Selected Action (Alternative B-Modified)

Primary Vegetation Treatments	Acres
Overstory Removal	7,164
Commercial Thinning (40 to 60 BA)	6,638
Pre-commercial Thinning	6,350
Individual Tree Selection	3,883
Seed Cut	2,138
Hardwood Enhancement	764
Prescribed Burning	710
POL Thinning	456
Meadow Enhancement	246
Group Selection	215
Total Treatment Acres	**28,564**
Transportation System Activities	**Miles**
Road Construction	8
Road Conversion (non-system to system)	5
Road Reconstruction/Pre-use Maintenance	148
Total Road Activities	**161**

Description of Vegetation Treatments

Overstory Removal

The objective of removing overstory trees is to liberate the established understory regeneration. In areas identified as visually sensitive, an average of 5 to 10 overstory trees per acre will be retained in a clumpy arrangement. Residual trees will also be retained at seed cut spacing where regeneration is less than 400 trees per acre at least two feet tall or where prescribed burning is done. Prescribed burning following treatment is generally not proposed in order to protect regeneration, but is included in selected stands to maintain road-to-road containment perimeters for prescribed burn units. In all stands where overstory removal is prescribed, pre-commercial thinning is also prescribed as a follow-up treatment in order to retain appropriate growing stock levels (see the description of pre-commercial thinning below). Overstory removal treatments are the appropriate silvicultural prescription in stands that have experience a seed cut in the past. Removing the overstory reduces competition and allows established understory trees to develop more fully.

Commercial Thin

Retention densities would vary from 40 to 60 square feet of basal area. The best formed, most dominant, and vigorous trees would be retained. This treatment is prescribed for stands with a ponderosa pine cover type. Species selected for retention would discriminate against white spruce. Conifers may be removed from within and up to 30 feet from the edge of aspen pockets in excess of ¼ acre. Commercial thins reduce the stocking density in ponderosa pine stands, making them less susceptible to mountain pine beetle infestation.

Pre-commercial Thinning

Pre-commercial thinning involves the reduction of standing stems less than nine inches DBH, retaining 200-400 stems per acre (~12 foot spacing). Pre-commercial thinning decreases stand density, which improves overall stand health and reduces fire hazard. While pre-commercial

thinning is prescribed as the primary treatment for 6,350 acres within the Nautilus project area, it is also authorized as a potential follow-up maintenance treatment on 19,862 acres where some other primary treatment is authorized.

Individual Tree Selection

Individual tree selection (also called single-tree selection) is a method of creating or maintaining an uneven-aged stand structure. Uneven-aged stands, when completely regulated, have at least three distinct age classes present. In this method, individual trees in all diameter classes are removed to create a broken or uneven canopy. The largest number of stems is in the smallest diameter class, with the number decreasing more or less regularly with increasing size. The fewest number of stems is in the largest diameter class. Individual tree selection creates an uneven-aged stand that contains a variety of habitat components, increasing habitat diversity for plants and animals.

Seed Cut

The seed cut treatment involves thinning overstory trees to create optimal regeneration conditions. The best formed overstory trees are retained at approximately 30 square feet of basal area (approximately 35 foot spacing between trees). Site preparation for seedling establishment may be accomplished with prescribed burning. Seed cuts are prescribed to provide a sustained yield of timber over time while also reducing stocking density and, subsequently, the risk of mountain pine beetle infestation and fire hazard.

Hardwood Enhancement

Hardwood enhancement is intended to maintain or encourage hardwood growth. Maintaining or expanding hardwood stands is desirable to provide a diversity of habitat for plants and animals. Hardwood stands can also act as natural fuel breaks as they typically have a lower flammability than pine stands. This treatment may be applied to stands with either a pine or aspen cover type.

- *Stands with a pine cover type*—When applied to stands with a pine cover type, the pine portion of the stand will be treated with a commercial thin. Pine areas within stands with a 4C structural stage would be thinned to 60 BA, and pine areas within stands with a 4B structural stage would be thinned to 40 BA.
- *Stands with an aspen cover type*—When applied to stands with an aspen cover type, all commercial and non-commercial pine may be removed across the stand.

Regardless of cover type, areas of older, decadent or declining aspen may be thinned or clear-cut to regenerate the aspen. While hardwood enhancement is prescribed as the primary treatment for 764 acres within the Nautilus project area, it is also authorized as a potential alternative treatment on 1,475 acres where some other primary treatment is authorized.

Prescribed Fire

Objectives of prescribed fire include:

- reducing natural and activity fuels;
- maintaining the effectiveness of fuel treatments over time by controlling regeneration densities;

- enhancing soil conditions by returning inorganic and organic chemicals found in logging slash to the soil; and
- enhancing wildlife habitat by creating vegetative diversity across the landscape and stimulating forage production for big game.

In addition to the 710 acres of prescribed burning identified as a primary treatment in Table 2 above, prescribed burning was identified as a potential follow-up treatment on 24,640 acres where some other primary treatment was identified. It is not expected that all of this acreage would be burned. Rather, it is anticipated that approximately 1,000 acres per year (a total of 10,000 acres over the life of this project) would actually be implemented. The full 24,640 acres was analyzed for burning to allow for flexibility in the future. Specific burn units would be selected after the initial vegetation treatments have been completed and resulting site conditions are observed. For each prescribed burn that is conducted, a site specific burn plan would be developed prior to implementation.

Product-other-than-log Thinning (POL Thinning)
Products other than logs are made from trees generally 5-9" DBH. The primary objective of these treatments is to increase growth and vigor of remaining trees. Suppressed, defective, and excess trees are removed. This treatment may be commercial or non-commercial, depending on the pulp and pole markets. Dominance is a desirable characteristic and is taken into account during tree retention selection. Product other than log thinning reduces stand density at an earlier stage than commercial thinning, increasing overall stand health and reducing fire hazard.

Meadow Enhancement
This treatment involves removal of pine in historical meadow areas to increase vegetative diversity and grass production in meadow communities. Similar to hardwood stands, meadows provide a diversity of plant and animal habitat as well as natural fuel breaks where wildfires could potentially slow down or stop. While meadow enhancement is prescribed as the primary treatment for 246 acres within the Nautilus project area, it is also authorized as a potential alternative treatment on 45 acres where some other primary treatment is authorized.

Group Selection
This uneven-aged treatment creates or maintains multiple age classes in even-aged groups and maintains the age classes in perpetuity through stand regulation. Groups are up to two acres in size and are scattered throughout a site. Groups occupy 20% of the site. Groups are openings designed to create the youngest age class of trees. The rest of the site will be variable density thinned. To achieve regulation, the site would have five age classes, each age class occupying 20% of the site. Group selection creates an uneven-aged stand that contains a variety of habitat components, increasing habitat diversity for plants and animals.

Description of Road Activities

New Road Construction
Road construction refers to creating new routes where no route has previously been developed. New roads would be constructed to Forest Service specifications and would adhere to Forest Plan Standards and Guidelines, Region 2 Watershed Conservation Practices (WCPs) and project-specific design criteria.

All new roads constructed under the Nautilus Project would be closed following the completion of management activities. The method of closure would be determined based on site conditions. Possible closure methods include installing gates or fences to block access; placing boulders, logging slash, or dirt berms to block access; or route obliteration and recontouring to prevent access.

Road Conversion

Road conversion refers to the addition of non-system roads to the National Forest Road System (NFS). These are routes that currently exist on the ground. They are typically user-created routes or routes that were used in the past for forest management activities. Under this decision, the route would be added to the NFS and improved as necessary to meet Forest Service specifications. Like newly constructed roads, converted routes would also adhere to Forest Plan Standards and Guidelines, WCPs, and project-specific design criteria. As with new construction, these routes would be closed following management activities.

Road Reconstruction/Pre-use Maintenance

Reconstruction or pre-use maintenance is proposed for existing NFS roads that would require improvement prior to management activities occurring. Reconstruction could include widening the road or slight rerouting based on site specific conditions. Pre-use maintenance involves more routine activities such as grading or brushing of the roadway. These two activities were lumped together for analysis purposes to allow for flexibility in applying specific activities. Road conditions may change between the time of analysis and implementation of the project. Analyzing for both activities provides leeway for applying the most appropriate action at the time of implementation.

Temporary Roads

Temporary roads may also be required to facilitate vegetation management activities. These are generally short spurs off of other routes that are not intended to become part of the Forest's transportation system but are only intended to facilitate the management actions associated with this decision. These roads are closed to motor vehicle access following harvest activities, and closure includes any actions necessary (e.g., slashing in the route, seeding to promote revegetation, etc.) to stabilize the route surface and reduce erosion.

Description of Other Authorized Activities

Watershed Improvement Projects

Per Forest Plan direction, watershed improvement projects must be proposed when forest management activities are proposed in Class 3 watersheds. These are watersheds that have been identified as being highly sensitive to management activities. Eight out of the nine Hydrologic Unit Code (HUC) 7th-level watersheds that comprise the Nautilus project area are identified as Class 3 watersheds. For this reason, I am authorizing the following watershed improvement projects:

- The meadow and hardwood enhancement treatments that are identified in Table 2 above and that occur along streams are intended to enhance watershed conditions.
- The number of connected disturbed areas (CDAs) across the project area will be reduced through the road maintenance activities identified in Table 2 above.

- Road-stream crossings that are currently impassable to fish and that are contributing to stream sedimentation will be repaired along routes that will be used to accomplish vegetation treatments. The priority will be on perennial and intermittent streams.
- Forest System Road (FSR) 706.1A (0.22 miles) will be decommissioned. The location and condition of this road is negatively impacting Jim Creek.
- Non-functioning fish passage structures in Estes Creek, Jim Creek, South Boxelder Creek and Boxelder Creek will be repaired or removed.
- The junction of the Centennial trail and the West Fork Estes Creek near the end of FSR 740.1B will be repaired. This may involve rerouting the trail or road for a short distance. Meadow and streamside vegetation will be re-established where user-created off-highway vehicle paths have destabilized the banks of West Fork Estes Creek in this area.

Experimental Forest Research Forestry Activities

Experimental forests are places that are designated for long-term and manipulative research of forest and range vegetation (Adams et al 2004). Experimental forests are well suited to evaluate a variety of silviculture techniques and the short and long-term silvicultural, managerial, and ecological effects of these techniques. The Nautilus project area contains the Black Hills Experimental Forest. I am authorizing treatments within the experimental forest to further the research objectives developed by researchers at the USDA Forest Service Rocky Mountain Research Station. The treatments authorized include individual tree selection, pre-commercial thinning, and prescribed burning across the 3,394 acre experimental forest. These treatments are included in Table 2 above.

The research proposed within the BHEF has two primary long-term objectives. The first is to apply and evaluate the use of the irregular or free selection silvicultural system in a very productive ponderosa pine forest (Graham and Jain 2005). The second is to conduct the classic reverse J-curve uneven-aged concept (Nyland 2002). This study will evaluate a variety of ecological effects of the forest conditions created by these silvicultural systems. For example, this study will document the impact the treatments associated with each silvicultural system have on creating and maintaining forest conditions that are resilient to insect, disease, and wildfire within a changing climate. In addition, because both silvicultural systems are fully replicated using a scientific design, future research opportunities exists for wildlife, hydrology, or other research purposes.

The first of a series of replicated studies was installed on the Priest River Experimental Forest in Idaho; however, these results, if only applied in this one location, have limited applicability to other landscapes and places. Thus to fully understand the applicability of results, similar studies need testing in other locations. The BHEF study is one of several similar studies being placed within other Experimental Forests in the northern Rocky Mountains. Other locations include the Deception Creek Experimental Forest and the Boise Basin Experimental Forest, both in Idaho (Adams et al 2004).

Under the proposed vegetation treatments, harvesting of trees would provide a variety of overstory tree canopy cover. Slash created through these treatments would be managed by various means such as underburning, jackpot burning, mechanized piling, or mastication. After the stands have been treated, the establishment and development of understory vegetation would be studied and quantified using research protocols. Other ecosystem components including nutrient cycling, vegetation dynamics, species composition, gap size, shape and

orientation of openings and insect and disease activity would be evaluated as a function of the different vegetation treatments.

Sanitation Harvest Provision

I am authorizing the development and application of sanitation harvest treatments across National Forest System lands in the project area on an as needed basis. The purpose and need for the Nautilus project recognizes that there is a need to alter stand structure within the project area to reduce the threat of mountain pine beetle infestation. In an effort to be responsive to mountain pine beetle infestations as they emerge over time, sanitation harvest proposals may be prepared for newly identified areas of mountain pine beetle infestation. These proposals would identify site specific treatments intended to limit the spread of beetles.

The intent of the sanitation harvest provision is to increase the efficiency and speed at which the Forest Service is able to respond to emerging mountain pine beetle infestations. Proposed treatments would likely involve cutting green beetle-infested trees and thinning stands to residual basal areas below 80 to reduce the number of mountain pine beetle available to infest healthy trees and to increase stand resiliency and decrease the likelihood of a sustained outbreak. Consultation with a Forest Service entomologist indicated that sanitation harvest methods should be pursued when a population has reached incipient epidemic levels (Allen 2010). The first major sign of incipient epidemic levels occurring are groups of beetle-hit trees beginning to show up on a landscape scale. Specifically, when two or more groups of three to four beetle-attacked trees on 20 to 320 acres occur in two to three consecutive years (Allen 2010).

If sanitation harvest treatments are deemed necessary to respond to emerging mountain pine beetle infestations, Black Hills National Forest employees will utilize the most recent information available (e.g. aerial pest survey data, stand exam data, field verification) as they design and prioritize sanitation harvest proposals to ensure that the most effective strategy is developed. Proposals will be reviewed by resource specialists prior to implementation to determine whether any special design criteria are required to protect forest resources and to ensure that the proposals comply with Forest Plan direction. No new system roads would be constructed to access sanitation harvest units.

Harvest Systems

The specific harvest system to be employed for any given area to be treated would be determined at the time of layout. The harvest system selected will be based on topographical considerations, acceptable levels of residual fuels within stands, and soil nutrient requirements. In general, whole tree yarding is preferred within the WUI to reduce fuel loading.

Treatment of Activity Fuels

During the scoping period, I received comments raising concerns about the absence of a detailed discussion of the treatment of activity fuels resulting from commercial and non-commercial harvest activities associated with the proposed action. I determined this to be a significant issue, as fire hazard reduction was identified as a component of the purpose of and need for action within the Nautilus project area. Activity fuels resulting from harvest activities have the capacity to affect wildfire behavior. If limbs and tree tops are left on-site and scattered throughout stands following commercial harvest activities or small diameter trees are lopped and scattered throughout a stand during pre-commercial thinning activities, these woody by-

products increase the level of surface fuels within stands. Surface fuel loading is an important component in determining the intensity and severity of fire. Stands that have higher levels of surface fuels burn more intensely and can pre-heat the canopies of surrounding vegetation. This pre-heating drives the moisture from and raises the temperature of the needles, allowing the canopy to more readily ignite. For this reason, I felt it was important to clarify and include in the description of Alternative B how activity fuels resulting from commercial and non-commercial treatments will generally be treated. I determined that this issue could be addressed by clarifying the proposed action but did not feel that it required the development of an additional alternative. A description of the Northern Hills Ranger District's approach to addressing activity fuels resulting from commercial and non-commercial treatment activities within the Nautilus project area follows and is incorporated as part of the Selected Action.

Commercial Treatments
Commercial treatments entail cutting commercial-sized trees and removing the logs from the site. There has not historically been a market for the residual material (i.e., limbs and tops of trees) resulting from commercial timber harvest. The residual material, often referred to as slash or activity fuel, functions as a fuel source that could potentially feed a forest fire. Because fuels reduction is a key objective in the Forest Plan, harvest methods that allow for the removal of activity fuels are generally preferred over those that do not. This is especially true in the wildland urban interface and adjacent to private property. In such areas, slash is generally piled and burned. Less frequently, material is chipped and distributed on site. As markets for biomass develop, it is expected that logging slash will become commercially valuable. As that happens, slash may be hauled off-site rather than piled and burned.

Sometimes, it is neither feasible nor desirable to pile and burn activity slash. This is the case in areas where the terrain makes the use of certain logging equipment a challenge or in areas where soil productivity is a concern. In such areas, slash is often lopped and scattered on site.

Non-Commercial Treatments
Pre-commercial thinning treatments entail cutting trees that are not of a commercial size. Where funding and terrain allow, this is usually accomplished with a masticator/chipper. The machinery cuts the trees and grinds or chips them, dispersing the material across the forest floor. On steep sites or in rocky areas, such machinery cannot be used. Instead, trees are cut by hand, and the material is lopped and scattered on site. Mastication/chipping is a preferred method for accomplishing pre-commercial thinning because the activity fuels, while left on site, pose less of a fire hazard than the larger material resulting from the lop and scatter method. If trees are hand-felled adjacent to private property and fuel loading is a concern in that area, the material is often piled and burned to eliminate high levels of surface fuels.

<u>Measures to Reduce Mortality to Trees where Prescribed Fire is Applied</u>
During the scoping period, I received comments raising concerns about the absence of a detailed discussion of the measures that would be taken to ensure that tree mortality resulting from prescribed fire remains within acceptable limits and to ensure that prescribed fires do not escape containment. Many stands within the project area were previously treated with a silvicultural prescription that emphasized stand regeneration. Prescribed fire, under certain conditions, has the capacity to kill the regeneration in these stands and reduce stand productivity. For this reason, I felt it was important to clarify and include in the description of Alternative B the objectives of prescribed fire within the Nautilus project area and the factors

taken into consideration when determining whether to apply prescribed fire in an area. I determined that this issue could be addressed by clarifying the proposed action but did not feel that it required the development of an additional alternative. The description of prescribed burning above in the description of treatments comprising the Selected Action includes discussion of the objectives of prescribed burning. A description of the factors considered when developing prescribed burn unit boundaries as well as procedures for implementing prescribe fire follows and is incorporated as part of the Selected Action.

Procedures for Implementing Prescribed Fire
Prior to any prescribed burn taking place on the ground, a burn plan will be developed. Burn plans will be reviewed by Forest resource specialists to ensure consistency with the Forest Plan and will be authorized by the Line Officer. These plans identify the area in which a prescribed burn would take place, the objectives of applying fire to the ground, the conditions under which a burn would be allowed, and the methodologies for achieving the objectives of the burn.

Considerations for Determining Prescribed Fire Unit Boundaries
As burn plans are developed for areas within the Nautilus project area, the following items will be considered when determining the boundaries of prescribed burn units:

1) Prescribed burning would be emphasized in pine stands that are proposed to be commercially thinned or in areas where hardwoods are prevalent. Commercially thinned stands where little regeneration is present allows for a larger window in which burns may be carried out to meet specified objectives. Prescribed burning in both pine and hardwoods can also create diversity in vegetative conditions across the landscape and reduce the rate at which a wildfire might spread across the landscape.
2) Stands that are within ½ mile of concentrated urban interface areas (e.g. Elk Ridge Subdivision, Misty Meadows) would not generally be included as part of a prescribed burn unit to alleviate concerns about the potential for escape. However, prescribed burning may be considered as a follow-up or maintenance treatment in these areas when doing so would meet stand objectives and the potential for escape is determined to be low.
3) Stands that have either been treated in the past with a silvicultural prescription that emphasized stand regeneration (e.g. overstory removal or seed cut) or are proposed for such a treatment under the Nautilus proposed action would not generally be included as part of a prescribed burn unit if the following apply:

    a) Pre-commercial thinning within the stand has already been accomplished or is prescribed, or
    b) There are nine or more tons per acre of dead and down fuels three inches in diameter or less.

    However, prescribed fire may be authorized in such stands as a follow-up or maintenance treatment to achieve stand objectives when other treatment methods are not available. The goal behind this consideration is to reduce tree mortality in areas where regeneration harvest has or will be applied. It is estimated that approximately 10 tons of dead and down fuels will produce fireline intensities or flame lengths sufficient to kill 95 percent of pine trees 20 feet in height and less. Trees that are 20 feet tall are those that have a diameter breast height (DBH) of 3 to 5 inches. Where there is a

specified objective to retain trees smaller than 3 inches to 5 inches, surface fuel loadings would be such that the fireline intensity would achieve objectives provided by a Forest Service silviculturist. Prescribed burning may be used to treat stands in which the majority of stems per acre are in the seedling stage, provided surface fuel loading does not produce fireline intensities that would result in unacceptable mortality in trees as defined by a Forest Service silviculturist.

There may be instances in which such stands are included in a prescribed burn unit boundary. Reasons for inclusion may be to consolidate a burn block and reduce the need for dozer line construction, which leads to additional and longer lasting ground disturbance, or to control seedling/sapling density to maintain or enhance fuel treatment effectiveness.

Post-sale Activities

The Knutson-Vandenburg (KV) Act authorizes the Forest Service to collect money from timber sales for resource enhancement, protection, and improvement work in the timber sale area. In addition to the activities already described, I am authorizing the following enhancement, protection, and improvement work within the Nautilus project area. These activities will be implemented as staffing and funding allow:

- **Regeneration Surveys and Site Preparation:** All stands in which Seed Cut harvest is applied will be examined three and five years after harvest to determine if planned treatments were successful in establishing a new stand or if additional treatments are needed to reforest the stand. All stands in which Overstory Removal is applied will be examined three and five years after harvest to ensure minimum stocking standards have been met. Site preparation may be needed in some of these stands based on the results of surveys. Site preparation may include activities such as mechanical scarification or prescribed burning to expose mineral soil for ponderosa pine establishment.
- **Vegetation monitoring:** Post treatment data collection for use in monitoring and evaluation of activities. Follows standard stand exam protocols for complete condition evaluation. Could be implemented on any treatment type not covered by 3rd and 5th year post-harvest regeneration surveys.
- **Removal of encroaching pine from hardwood stands:** Removal of pine from selected hardwood stands. All activity-created material would be hand-piled and burned. These treatments may occur in addition to those areas proposed for hardwood enhancement under the Selected Action as described in Table 2.
- **Removal of encroaching pine from meadow areas:** Removal of pine from selected meadows. All activity-created material would be lopped and scattered. These treatments may occur in addition to those areas proposed for meadow enhancement under the Selected Action as described in Table 2.
- **Noxious weed treatment and monitoring:** Spray and monitor noxious weeds following ground disturbing activities.

Rationale for Modifying Alternative B to Develop the Selected Action

Modification of Treatments: Previously Authorized Treatments

I have decided to modify stand treatments for two stands totaling 21 acres because I have decided to implement previously authorized treatments in these stands. Under the Research Rochford Decision Notice (USDA-FS 2004), POL thinning treatments were authorized on NFS land overlapping stands 81804-79 and 81903-74. As displayed in the Table 3 below, I am retaining the option to conduct pre-commercial thinning or prescribed burning under this decision but am not authorizing the commercial treatment identified in Alternative B of the Nautilus Project FEIS.

Table 3. Treatments Modified Due to Previously Authorized Treatments

Stand Number	Stand Size (Acres)	Alternative B Proposed Treatment	Modified Treatment for the Selected Action
081804- 79	5	Commercial Meadow Enhancement/Pre-Commercial Thinning/Prescribed Burning	Pre-Commercial Thinning/Prescribed Burning
081903-74	16	Seed Cut (30 BA)/Pre-Commercial Thinning/Prescribed Burning	Pre-Commercial Thinning/Prescribed Burning

Modification of Transportation System Actions: Previously Authorized Conversions to the NFS

I have decided to modify Alternative B for the Selected Action to show that approximately 1 mile less of existing road will be converted (or added) to the National Forest Road System (NFS) and 1 mile of more existing road may be maintained or reconstructed to facilitate treatments under this decision. My rationale for doing so is that about one mile of road identified for conversion to the NFS under the Nautilus project has already been authorized to be added to the NFS under the *Black Hills National Forest Travel Management Plan Record of Decision* (USDA-FS 2010). While a decision has already been made to add these routes to the NFS, I am retaining the option to conduct maintenance on these routes or to reconstruct them as needed in order to conduct the treatments authorized under this decision. The changes from Alternative B to the Selected Action are displayed in Table 4 below.

Table 4. Road Activities Modified Due to Previously Authorized Changes

Route Identifier in the Nautilus FEIS	Route Length (Miles)	Alternative B Proposed Activity	Modified Activity for the Selected Action
Unclassified Route 080193	0.55	Road Conversion (non-system to system)	Road Reconstruction or Pre-use Maintenance
Unclassified Route 120135	0.11	Road Conversion (non-system to system)	Road Reconstruction or Pre-use Maintenance
Unclassified Route 130122	0.30	Road Conversion (non-system to system)	Road Reconstruction or Pre-use Maintenance

Additional Soils Mitigation

There are 168 stands in the project area identified as having soils for which retention of sufficient soil nutrients is of concern. I have determined that additional mitigation is required on 4 of these stands to ensure adequate soil nutrient retention on site. These are stands for which a commercial treatment that is part of the shelterwood system is authorized but for which no

follow up thinning is scheduled to occur. To ensure an appropriate amount of organic material on site, activity slash in these stands must either be lopped and scattered throughout the stands or harvest must be accomplished during the winter months, as winter logging results in additional limb breakage and, consequently, additional activity slash on the ground.

Table 5. Treatments Modified to Ensure Adequate Soil Nutrients

Stand Number	Stand Size (Acres)	Selected Action	Mitigation Measure
081703-49	24	Commercial Thin (60 BA)/Prescribed Burning	Lop and scatter or winter log
081704-42	7	Overstory Removal	Lop and scatter or winter log
081705-36	13	Commercial Thin (60 BA)	Lop and scatter or winter log
081902-27	45	Commercial Thin (60 BA)	Lop and scatter or winter log

Rationale for Selected Action

Need for Action

A total of two alternatives were analyzed in detail in the Nautilus Project FEIS. Alternative A was the No Action Alternative. The No Action Alternative, as its name implies, involves taking no action in the project area at this time. Alternative B was the Proposed Action that was intended to respond to the purpose of and need for action identified for this project and that was released for scoping prior to the release of the DEIS. After reviewing the issues, analysis and public comments, I have selected Alternative B with modifications as described above. I feel that the Selected Action best addresses the purpose and need for action and the objectives for management within the project area. Table 6 below displays how each alternative addresses elements of the purpose and need for the project.

Table 6. Movement toward the Purpose and Need by Alternative

Purpose and Need Element	Alternative			
	A		B	
Element 1: Reduce Pine Beetle Risk	**Acres**	**Percent**	**Acres**	**Percent**
Insect Risk Rating				
High	24,763	72%	4,758	14%
Moderate	7,366	22%	11,948	35%
Low	2,169	6%	17,592	51%
Element 2: Reduce Fire Hazard	**Acres**	**Percent**	**Acres**	**Percent**
Fire Hazard Rating				
Very High	23,627	66%	5,202	15%
High	8,125	23%	4,753	13%
Moderate	3,056	9%	14,244	40%
Low	795	2%	11,404	32%
Element 3: Provide Diversity of Wildlife Habitat	**Acres**			
Structural Stage 5 (Late Succession)	1,250		1,250	
Hardwood Enhancement	0		764	
Meadow Enhancement	0		246	
Element 4: Improve Watershed Conditions				
Number of Connect Disturbed Areas Remaining	44		12	
Roads Decommissioned (miles)	0		0.2	
Hardwood Enhancement (acres along streams)	0		162	

Meadow Enhancement (acres along streams)	0	189
Element 5: Provide Opportunities for Research Forestry	**Acres**	
Research Treatment in Experimental Forest	0	3,394

In determining which alternative to select for this project, I first considered whether active management is appropriate in the project area at this time. After reviewing all materials related to this project, including the analysis documented in the Nautilus Project FEIS, specialist reports and supporting documents, public input, and Forest Plan direction, I believe active treatment is appropriate and needed in the project area at this time for the following reasons:

Mountain Pine Beetle Infestations and Conditions for Epidemic Infestation

The Forest Plan provides direction for maintaining a mosaic of vegetation conditions to reduce the susceptibility of ponderosa pine stands to mountain pine beetle infestation. Forest Plan Objective 10-07 states that where outbreaks of mountain pine beetle could present risks to management objectives for ponderosa pine, the acreage of ponderosa pine stands that are at medium or high risk for infestation should be reduced.

Aerial pest surveys conducted in 2007 and 2008 indicate that pockets of mountain pine beetle activity are established in the southwestern portion of the Nautilus project area with the potential to spread into densely stocked pine stands to the east and north. Currently, 89% of the ponderosa pine stands in the project area are rated as being at a high or medium risk of mountain pine beetle infestation.

A forest health evaluation conducted by a Forest Service entomologist specifically for the Nautilus project are concluded that mountain pine beetles were present at epidemic levels within the project area and had the potential to spread into densely stocked pine stands (Allen 2010).

The Selected Action will substantially reduce the acreage of pine stands that are at medium or high risk for infestation.

Reduce Risk of High Intensity Fires

Forest Plan Objective 10-01 directs that the Forest be managed for 50-75% moderate-to-low fire hazard in the wildland urban interface (WUI). The Nautilus project area includes 5,699 acres of interspersed private land. The Lawrence, Meade and Pennington County Community Wildfire Protection Plans establish a ½ mile WUI buffer around all structures.

Currently, there are 489 known private structures located either within the Nautilus project area or within ½ mile of the project area boundary. Approximately 89% of the forested land in the project area is rated as high or very high fire hazard and only 11% is rated low or moderate. The amount of NFS land in the project area classified as at-risk WUI is 22,732 acres, 64% of the total NFS land in the area.

Improve Watershed Conditions

Forest Plan direction calls for improving watershed conditions in Class 3 watersheds, which are identified as being impaired and in need of improvement. The Forest Plan states that "management activities can still occur in these watersheds, but watershed improvement

projects, or other activities which will improve the health of the watershed, must be a part of project planning." The Nautilus project area includes all or portions of nine hydrologic unit code 7th-level (HUC 7) watersheds. Eight of these nine watersheds are identified as Class 3.

Provide for a Diversity of Wildlife Habitat

The Forest Plan provides for a diversity of forest structure, and wildlife habitat, through structural stage objectives in specific MAs. These structural stage objectives outline the desired Forest-wide distribution of ponderosa pine age classes and are designed so that a variety of structure, ranging from open grassland to late successional (i.e., old growth) forest, will exist across the forest. Structural stage objectives are in place for MAs 5.1 and 5.4 in the Nautilus project area (Objectives 5.1-204 and 5.4-204).

The Nautilus project area contains 20,069 acres of MA 5.1 and 12,140 acres of MA 5.4. In general, the structural stage distributions, both Forest-wide and within the project area, are skewed heavily to mature forest (structural stage 4) with a lack of early to mid-successional habitat (structural stages 1, 2 and 3) and late successional habitat (structural stage 5). Habitat for a variety of wildlife species, including Region 2 Sensitive Species, Management Indicator Species and Species of Local Concern is located within the project area.

Conduct Research Forestry Activities

Forest Plan direction is in place for conducting research on forestry practices and techniques on the Black Hills Experimental Forest. Objective 5.3A-701 calls for cooperation with the Rocky Mountain Research Station (RMRS) to accomplish research activities. Objective 5.3A-201 directs the use of harvest practices, including untested experimental practices, to meet the needs of designed experiments. The overall goal of the Experimental Forest is to provide an area to apply experimental techniques, which may not be typically used elsewhere in the Black Hills, and to use information gained from that research to provide insight into effective management of the entire BHNF and, possibly, other ponderosa pine forests in the western United States.

Conclusion

Given this information, I believe that active management should be utilized in the project area to address the needs discussed above. The road construction, conversion and reconstruction/pre-use maintenance activities identified above are necessary at this time to access units selected for treatment and to affect an appreciable change within the project area. I have concluded that active management is the best course of action for this project and I therefore reject Alternative A (No Action).

Reasons for Not Selecting Other Alternatives Considered

In addition to the selected action, I considered one other alternative in detail. A brief summary of this alternative along with my rationale for not selecting it is presented below. Further information can be found in Chapter 2 of the FEIS. See Table 5 below for a comparison of the alternatives.

Alternative A (No Action)

The National Environmental Policy Act (NEPA) requires study and use of the no action alternative as a basis for comparing the effects of the proposed action and other alternatives.

This alternative assumes no implementation of any elements of the proposed action or other action alternatives. Under the no action alternative, no effort to modify existing vegetation or related fuels and habitat conditions in the project area would occur. Actions such as ongoing Forest protection efforts and recurring maintenance on system roads would continue as directed by the Forest Plan. Actions analyzed under past projects or proposed by future projects may still occur.

Given the existing fire hazard ratings and insect risk ratings, as well as the amount of wildland urban interface, existing mountain pine beetle infestations, and prevalence of Class 3 watersheds in the project area, I feel that taking no action at this time would be a mistake that has the potential to result in real and substantial losses in forest resource values. For this reason, I did not select Alternative A.

Alternatives Considered but Eliminated from Detailed Analysis
The Nautilus IDT considered 13 additional alternatives that were not carried forward for detailed analysis in the EIS. Descriptions of these alternatives and an explanation for why each was eliminated from detailed analysis are located in the FEIS, Section 2.3.

Table 5. Comparison of Vegetation Treatments (in acres) by Alternative

Vegetation Treatment	Alternative	
	A	B
Commercial Hardwood Enhancement	0	463
Commercial Meadow Enhancement	0	45
Non-commercial Hardwood Enhancement	0	301
Non-commercial Meadow Enhancement	0	206
Overstory Removal	0	7,164
Commercial Thin to 40 BA	0	3,286
Commercial Thin to 50 BA	0	660
Commercial Thin to 60 BA	0	2,692
Seed Cut	0	2,154
Individual Tree Selection	0	489
Group Selection	0	215
Product-other-than-log	0	456
Experimental Forest	0	3,394
Pre-commercial Thin	0	6,329
Total Acres	**0**	**27,854**
Total Sawtimber Volume (MBF)	**0**	**93,658**
Total Roundtimber Volume (CCF)	**0**	**187,316**
Fuels Treatment	**Alternative**	
	A	**B**
Standalone Prescribed Burning	0	710
Prescribed Burning Following Vegetation Treatments	0	24,640
Total Acres	**0**	**25,350**
Road Construction	**Alternative**	
	A	**B**
New Road Construction	0	8
Non-system to System Road Conversion	0	6

Existing Road Reconstruction/Pre-use Maintenance	0	147
Total Miles	**0**	**161**

The Environmentally Preferred Alternative

Disclosure of one or more environmentally preferable alternatives is required [Section 101 NEPA; 40 CFR 1505.2(b)]. The environmentally preferable alternative is not necessarily the alternative that will be implemented and it does not have to meet the underlying need for the project. It does, however, have to cause the least damage to the biological and physical environment and best protect, preserve, and enhance historical, cultural and natural resources. In the case of the Nautilus Project, I have determined that Alternative B is environmentally preferred.

From a short-term (less than 5 years), non-disturbance perspective, the no action alternative (Alternative A) meets many of the criteria for being environmentally preferred. In the short term, Alternative A provides the most acres for species preferring more mature, dense pine habitat, maintains the highest number of snags for wildlife, and has the least risk of damaging cultural resources. However, it risks long-term negative effects from epidemic mountain pine beetle infestations and high intensity wildfires within this area.

Taking a longer term perspective over the next twenty years, Alternative B is considered the environmentally preferred alternative. Although some activities would generate short-term disturbance related to vegetation management, these activities would also reduce significant long-term environmental risks such as fire hazard and the risk of epidemic mountain pine beetle infestation. Alternative B would also lessen the impacts to watersheds in the project area by repairing roads and eliminating the majority of the existing connected disturbed areas (CDAs) that are currently contributing to sedimentation of streams. In addition, activities such as meadow and hardwood enhancement would maintain or improve structural diversity in the project area, preventing pine from overtaking open or hardwood areas.

Legal Requirements, Regulation, and Policy

Another aspect of the process for selecting an alternative is ensuring that the decision actions comply with all legal requirements and policy. The Selected Action meets the following legal requirements:

Federal Laws

<u>The National Historic Preservation Act of 1966, as amended</u>
All surveyed and inventoried cultural sites considered eligible or potentially eligible for the National Register of Historic Places will be buffered and avoided during resource management activities. New sites discovered during operations will be protected. Any identified Traditional Cultural Properties and sacred areas will be protected. Reference is made to the consultation with the South Dakota State Historical Preservation Officer (SHPO) under State Laws section below.

The National Environmental Policy Act (NEPA), 1969
NEPA establishes the format and content requirements of environmental analysis and documentation. The process of preparing the Telegraph EIS and ROD was completed in accordance with NEPA.

The Endangered Species Act, 1973
A determination was made that no threatened or endangered species currently exist in the Nautilus project area nor does the project area contain critical habitat for any listed species. Therefore, a Biological Assessment (BA) was not necessary since the Nautilus project would have "No Effect" on threatened or endangered species and no impact on critical habitat.

Effects of the Nautilus Project on Region 2 Sensitive Species were analyzed and documented in the Wildife/Fisheries Biological Evaluation (BE) (Goldberg 2010a) and the Botany BE (Larson 2010), which are summarized in Chapter 3 of the FEIS. A determination was made that the proposed activities may adversely impact individuals but are not likely to result in a loss of viability in the planning area, nor cause a trend toward federal listing.

The Clean Water Act, 1982
The Selected Action will conform to the Clean Water Act as amended in 1982. This act establishes a non-degradation policy for all federally proposed projects. The Selected Action is not likely to degrade water quality below standards set by the State of South Dakota. This will be accomplished through planning, application, and monitoring of Best Management Practices and other design criteria of project activities.

Clean Air Act Amendments, 1977
The Selected Action will be implemented to meet the National Ambient Air Quality standards through avoidance of practices that degrade air quality below health and visibility standards.

The National Forest Management Act (NFMA) 1976, which amends the Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974
All alternatives were developed to be in full compliance and consistent with NFMA as summarized below.

Healthy Forests Restoration Act (HFRA), 2003
The Healthy Forests Restoration Act of 2003 (HFRA, Public Law 108-148) was signed by President Bush after being passed by a large bi-partisan majority in both the House and Senate. The act contains a variety of provisions to expedite the approval of hazardous fuel reduction and forest health restoration projects on specific types of Federal land that are at risk to wildland fire or insect and disease epidemics. The Nautilus project area meets the insect and disease criteria set forth by HFRA in that mountain pine beetle infestations are present both within and adjacent to the project area and forest conditions within the project area are such that there is a risk of an epidemic infestation (Allen 2010). Therefore, the Nautilus Project was analyzed using the provisions of Title I, Sec. 102(a) of HFRA.

The following demonstrates the Nautilus Project's consistency with applicable portions of HFRA:

- The proposed action is consistent with the Forest Plan.
- The proposed action does not include treatments in designated wilderness, wilderness study areas or other Federal land where timber harvest is prohibited.

- Collaboration with local governments was conducted through the scoping process and informal meetings.
- The proposed action is on Federal land that includes or is adjacent to an epidemic of disease or insects that pose an imminent risk to a forest resource (Allen 2010).
- The primary objective of the project's purpose and need is to reduce mountain pine beetle risk.

Consistency with the National Forest Management Act
The NFMA law (16 U.S.C. 1604(i)) requires me to ensure that permits, contracts, cooperative agreements, and other activities carried out on the Black Hills National Forest are consistent with the Forest Plan. My decision is consistent with this direction in that:

- Planned activities will contribute to Forest Plan goals and objectives (FEIS, Chapter 1).
- I have reviewed the Black Hills National Forest Fiscal Year 2008 Monitoring and Evaluation Report (USDA-Forest Service 2001) and Region 2 Management Indicator Species (MIS) guidance for projects. The effects of planned activities on MIS are consistent with the Forest Plan (FEIS, Chapter 3).
- Planned activities are consistent with management area direction (FEIS, Chapter 3).
- Planned activities comply with Forest Plan standards (FEIS, Chapter 3).

The 1982 planning rule has been superseded and is no longer in effect. The scope of analysis for a Forest Plan's Management Indicator Species (MIS) is determined by the Forest Plan's management direction, specifically, its standards and guidelines (Chapter II) and monitoring direction (Chapter IV). The Black Hills National Forest Land and Resource Management Plan (Forest Plan) contains no obligation to conduct project-specific monitoring or surveying for MIS (Phase II ROD, pp. 8, 20; Forest Plan, p. I-11, Objective 238). The Forest Plan establishes monitoring and evaluation requirements that do not require population monitoring for MIS, but rather employ habitat capability relationships (Phase II ROD, pp. 20; Forest Plan, p. I-11, Objective 238). The Nautilus Project analyzed the following MIS because habitat for these species is available in the project area: black-backed woodpecker, brown creeper, golden-crowned kinglet, grasshopper sparrow, ruffed grouse, song sparrow, beaver, white-tailed deer, and mountain sucker.

<u>Consistency with Plan Direction—Forest Plan Objectives</u>
This section contains a discussion of how the Selected Action is responsive to a number of Forest Plan Objectives. It is not an exhaustive listing; however, it provides information on key objectives related to this project as well as the specific objectives identified by those who submitted objections during the project's objection period. The Selected Action is consistent with the direction in the Forest Plan because:

- It meets Objective 103, for maintaining and improving long-term stream health. Existing stream condition is discussed on pages 143-147 of the FEIS. The direct, indirect and cumulative effects of Alternative B are discussed on pages 152-156. Design criteria, which will be implemented to maintain and improve long-term stream health, are listed in Appendix C of the FEIS under 'Soil and Water'.
- It moves toward meeting Objective 201, managing for a maximum of 92,000 acres of aspen. The Selected Action includes 764 acres of commercial and non-commercial hardwood

enhancement, which would maintain and possibly expand existing aspen stands by removing encroaching conifers. Post-harvest projects are included which would remove all non-commercial sized conifers from existing and converted aspen stands (FEIS, page 42).

- It is consistent with Objective 221, which calls for the conservation or enhancement of habitat for Region 2 Sensitive Species and species of local concern (SOLC). This is documented in the wildlife and botanical resource analyses prepared for this project. Project-specific design criteria intended to ensure conservation of Region 2 Sensitive and SOLC wildlife and plant species is included in Appendix A of this Record of Decision.
- It is consistent with Objective 238a to maintain or enhance habitat for ruffed grouse, beaver, song sparrow, grasshopper sparrow, white-tailed deer and brown creeper. Refer to discussion of Objective 201 above. The Selected Action will maintain meadow acres (objective 205) through 251 acres of meadow enhancement treatments. See pages 89 and 104-109 in the FEIS for a discussion on meadow and grassland habitat. The Wildlife BE discusses snags (Objective 211) in the analysis of effects on the black-backed woodpecker on pages 26-29 and snags are protected through design criteria in Appendix C listed under "Snags and Down Woody Material". Spruce (Objective 239-LVD) is discussed on pages 88 and 104-109 of the FEIS. Movement toward Management Area Objectives 5.1-204 and 5.4-206 are discussed on pages 68-70 of the FEIS.
- It is consistent with Objective 238b to maintain habitat for black-backed woodpecker (Goldberg 2010a, pages 26-29). The Wildlife BE discusses snag objective 211 and standard 2301 in the black-backed woodpecker analysis on pages 26-29 and snags are protected through design criteria in Appendix C listed under "Snags and Down Woody Material". Movement toward Management Area Objectives 5.1-204 and 5.4-206 are discussed on pages 68-70 of the FEIS.
- It is consistent with Objective 238c to maintain habitat for golden-crowned kinglet (Wildlife Report, pages 39-41). Spruce (Objective 239-LVD) is discussed on pages 88 and 104-109 of the FEIS.
- It is consistent with Objective 238d to maintain or enhance habitat for mountain suckers (Goldberg 2010a, pages 58-62).
- It is consistent with Objective 10-07 to reduce acreage of ponderosa pine at medium or high risk for infestation of mountain pine beetle. Refer to Table 2-3 on page 47 and Table 3-7 and Figure 3-4 on page 60 of the FEIS for a comparison of how each alternative affects pine beetle risk. The discussion of the effect of the project on mountain pine beetle risk is found on pages 61-64 and 71-73 of the FEIS.

<u>Consistency with Plan Direction—Forest Plan Standards and Guidelines</u>

With the implementation of the design criteria identified in the Nautilus Project FEIS and incorporated into this Record of Decision (Appendix A) as well as the additional mitigation measures outlined in this decision, I have determined that the Selected Action is consistent with Forest Plan Standards and Guidelines. The design criteria that appear in Appendix A were developed by the project Interdisciplinary Team specifically to ensure consistency with Forest Plan Standards and Guidelines. These measures were also included in the DEIS and FEIS, and the resource effects analyses prepared for the Nautilus Project assumed that these design measures would be implemented.

Below I am providing additional information regarding how my decision is consistent with two Forest Plan standards that were identified in the objections submitted during the project's objection period.

- **Standard 1301**: My decision is consistent with Forest Plan Standard 1301, which states that only those actions that maintain or improve long-term stream health and riparian ecosystem condition are allowed in the water influence zone next to perennial and intermittent streams, lakes, and wetlands. Effects to stream health and riparian ecosystem condition were discussed in the watershed analysis prepared for this project (Dempsey 2010). Specific management measures to ensure consistency with this standard are included in Chapter 10 of *Forest Service Handbook 2609.25—Watershed Conservation Practices* Handbook (USDA-FS 2006). Where the Interdisciplinary Team felt additional clarification on implementation of those measures was needed, they produced project-specific design criteria. These are included in the Soil and Water sections of the design criteria in Appendix A of this Record of Decision.

- **Standard 2305**: My decision is consistent with Forest Plan Standard 2305, which states that all soft snags should be retained unless they are a safety hazard. Design measures specifying the treatment of snags for the Nautilus Project were included in both the Nautilus DEIS and FEIS. They are also included as part of this decision and are specified in Appendix A. In addition, the wildlife analysis prepared for this project includes a discussion of snags and the anticipated effect of Alternative B on snag habitat (Goldberg 2010b).

Best Available Science

My decision is also based upon consideration of the best available science. I have reviewed the record and found it contains a thorough review of relevant scientific information and responsible opposing views, and, where appropriate, acknowledges incomplete or unavailable information, scientific uncertainty and risk. Specifically, the extensive literature citations in specialist reports show that relevant literature has been reviewed and considered by resource specialists in preparation of this EIS. In addition, the record shows that all literature cited by the public during the comment period has been reviewed and considered by resource specialists on the Nautilus Project IDT.

Resource Management Requirements

The NFMA directs the Secretary of Agriculture to establish certain resource management guidelines included in the agency directives system. I find that the activities in this project decision comply with the NFMA law, as follows:

- Irreversible resource damage will not occur. The project will not cause irreversible resource damage, such as to soil productivity or watershed condition (FEIS, Chapter 3).
- Adequate restocking is assured (see Silviculture report in project file).
- No clearcutting is proposed (FEIS, Chapter 3 and Appendix B).
- No timber harvesting will occur on lands not suited for timber production. No harvest will occur for timber production purposes on lands classified as unsuitable for timber harvest (see Silviculture report in project file).
- No created openings will be larger than 40 acres (FEIS, Chapter 3 and Appendix B).

- Culmination of Mean Annual Increment (CMAI) requirements are met (FEIS, Chapter 3 and Appendix B).

Other Laws
South Dakota State Best Management Practices (BMP) are incorporated into project design.

Consultation with the South Dakota State Historic Preservation Officer (SHPO)
The SHPO offices have been consulted concerning the proposed activities in the Nautilus project area. The SHPO concurred with our determination of "No Historic Properties Affected". The Advisory Council on Historic Preservation (ACHP) will be consulted about measures to protect significant archeological sites from adverse effects, should any be identified during project implementation.

Administrative Review

This decision is not subject to review under regulations at 36 CFR 215. The analysis for this project was completed under the authority of the Healthy Forests Restoration Act of 2003. Section 105 of the Act specifies that a "Special Administrative Review Process" be established for authorized projects and that a pre-decisional review be utilized. This pre-decisional review process is contained in 36 CFR 218.

The Nautilus Project FEIS and preferred alternative were made available to the public on September 3, 2010. A legal notice for the FEIS was published in the Rapid City Journal on September 3, 2010. In this notice, the public was notified that the decision based on the FEIS for the Nautilus Project would be made following the pre-decisional objection process, pursuant to Forest Service regulations at 36 CFR 218. The Objection Reviewing Officer also submitted a written response to each objection on November 3, 2010, as required by 36 CFR 218.11.

Implementation

Implementation of activities under the Selected Action will occur based on this Record of Decision. Acreages and locations are approximate and may vary during implementation depending on site conditions. Once this decision is signed, implementation of the Nautilus Project selected action can begin immediately pursuant to regulations at 36 CFR 218.12.

Contact Person
For additional information concerning this decision contact Rhonda O'Byrne, District Ranger, Northern Hills Ranger District, 2014 North Main Street, Spearfish, SD 57783, or Ed Fischer, Environmental Coordinator, Black Hills National Forest, 1019 North 5th Street, Custer, SD 57730.

Signed: Rhonda O'Byrne Date: 11/9/10

RHONDA O'BYRNE
District Ranger
Northern Hills Ranger District
Black Hills National Forest

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Appendix A
Nautilus Selected Action
Design Criteria and Monitoring

Nautilus Selected Action Design Criteria and Monitoring

Forest Service Manual and Handbook direction, Regional Watershed Conservation Practices (WCPs, Forest Service Handbook 2509.25), Forest Plan Standards and Guidelines, South Dakota Best Management Practices and other management requirements apply to the proposed activities. Management requirements such as applicable Forest Plan standards are repeated here only if clarification is required. An ArcGIS shapefile containing site-specific design criteria information is located in the Nautilus planning record. This spatial data will be used by those implementing the Selected Action to help ensure application of the design criteria.

Applies To:	Measure
All Activities	**Brush Disposal:** • Disposal of slash piles created through timber harvest or fuel treatments would be funded appropriately. Rehabilitation of pile sites would include site preparation and seeding to return the sites to productivity and control the spread of noxious weeds.
All Activities	**Heritage Resources:** • All culturally sensitive areas, Traditional Cultural Properties, graves, potential graves and sites eligible or considered unevaluated to the National Register of Historic Places should be avoided under proposed activities with a 100-foot buffer. Further mitigations if defined would be identified in the project file for each property and would be required for project implementation; any properties with mitigations not identified in this EIS would need Heritage review and SHPO concurrence before project implementation. Heritage site locations and specific mitigations are outlined in Section 106 of the National Historic Preservation Act compliance reports, on file at the Northern Hills Ranger District. Heritage site locations are not identified in this EIS to protect sensitive site information according to Section 304 of the National Historic Preservation Act (1966, as amended) and Section 9 of the Archaeological Resources Protection Act (1979). • In the event that culturally sensitive areas, Traditional Cultural Properties, graves, potential graves and sites eligible or considered unevaluated to the National Register of Historic Places cannot be avoided, or new heritage resources are found during implementation of the project, all activity must stop and a member of the District Heritage Staff must be notified to determine an appropriate course of action. Appropriate consultation with the State Historic Preservation Office, Tribal Historic Preservation Offices, and other applicable parties would take place as directed by 36CFR800. • Leaders of project activities described in this EIS will review the heritage report and geospatial data for areas to protect and consult with District Heritage Staff on specific mitigations. Project leaders should contact District Heritage Staff for additional assistance in marking the sites for protection on the ground.
All Activities	**Improvements:** • All Forest Service-authorized improvements, such as fences and water developments, would be shown as protected improvements on timber sale area maps and protected during management activities. • Protect all documented NFS land boundary corners, posts, and bearing trees.

Applies To:	Measure
	• Avoid or protect utility infrastructure in the project area during project implementation. • Avoid or protect improvements under special use permit. • Protect all mining corner posts and active mining claim developments.
All Activities	**Meadows:** • White spruce will not be removed from wet meadows unless they are considered a safety hazard. • Surface disturbing activities (e.g., creation of skid trails, location of landings, construction of temporary roads, etc.) will be avoided as much as possible in meadows. If during implementation activities such as these cannot be located outside of meadows, the district hydrologist, botanist, and wildlife biologist will be contacted prior to implementation to determine if special requirements are warranted to protect site integrity.
All Activities	**Noxious Weeds:** • Contracts and permits issued as part of this project would include measures to limit spread of noxious weeds. Where proposed activities would occur in areas infested with noxious weeds and considered to be at high risk for spread, off-road equipment associated with the activity will be washed before leaving the site to prevent spread of weeds to adjacent NFS and private lands. Known areas meeting these criteria will be identified by District staff before commencement of any timber sale contract associated with this project. Known weed infestations will be displayed on the timber sale map. • Where ground-disturbing activities occur in areas infested with weeds, weeds would be treated prior to project implementation, where feasible, to reduce future spread and establishment of noxious weeds. • Review of the area for noxious weed infestations will continue during management activities. If new noxious weed infestations that could be spread by management activities are found during implementation, actions to minimize spread would be taken.
All Activities	**Public Safety:** • Appropriate signing or other cautionary measures would be implemented in conjunction with all management activities to ensure public safety. Implementation of these measures would be the responsibility of the person initiating the action (e.g., logging contractor, prescribed fire manager).
All Activities	**Range:** • Managers of vegetation treatment projects would consult with District range managers to ensure alteration of natural barriers does not allow livestock to circumvent fences.
All Activities	**Region 2 Sensitive Plant Species:** • Refer to the botany design criteria shapefile for identified plant habitat and to the Biological Evaluation/Specialist Report for a verbal description of plant habitat. • Any suitable habitat for sensitive plant species outside of treatment units would be avoided unless approved by a qualified botanist for entry. • Any R2 Sensitive plant or animal species or plant or animal Species of Local Concern located after contract or permit issuance will be appropriately managed by active coordination between permittee, contractor or purchaser, Forest Service line officer, project administrator,

Applies To:	Measure
	and biologist and/or botanist.
All Activities	**Recreation:** • Non-motorized trails would be shown as protected improvements on timber sale maps. Project administrators would ensure protection of trails during project implementation.
All Activities	**Revegetation:** • Disturbed soil would be revegetated in a manner that optimizes plant establishment for that specific site. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and placement of weed-free mulch as necessary. Revegetation would be initiated as soon as possible, generally not to exceed 6 months, after termination of ground-disturbing activities. All disturbed soils would be revegetated with native species when available, using seed mixtures free of noxious weeds. On areas needing the immediate establishment of vegetation, non-native, non-aggressive annuals, non-aggressive perennials, or sterile perennials may be used until native perennials become established. These species can be used to prevent the spread of noxious weeds and prevent erosion. Only weed-free mulch would be used.
All Activities	**Scenery:** • Activity slash would be reduced to natural levels within 300 feet of US Highway 385, Nemo Road, or Forest Highway 26 (Vanocker Canyon Road) unless not visible due to changes in topography. Slash would be treated within 1 year of harvest completion.
All Activities	**Snags and Down Logs:** • Conifer snags over 20 inches dbh and those with cavities would be cut only for safety reasons. Conifer snags under 20 inches dbh would be cut only for safety reasons or when necessary for construction of roads, skid trails, firelines, and log landings. – Standard 2301a • Retain all hardwood snags except for those that are considered a safety hazard.—Standard 2301b • Retain at least 50 linear feet per acre of coarse woody debris with a minimum diameter of 10 inches in ponderosa pine stands and 100 linear feet per acre in white spruce stands to help retain moisture, trap soil movement, provide microsites for establishment of forbs, grasses, shrubs, and trees, and to provide habitat for wildlife.—Standard 2308a • In vegetation treatment units, 1 pile of woody material per 2 acres would be left to create near-ground structure for small mammal species, except within 300 feet of buildings.—Standard 3117 • Any snag cut for safety reasons will be retained on site as coarse woody debris.
All Activities	**Soil and Water:** • Implement Region 2 Watershed Conservation Practices to ensure adequate protection of soil, aquatic, and riparian systems. • Some proposed activities would take place on soils identified as having a potential for severe erosion. The following provisions, intended to minimize the amount of exposed bare soil, off-site transport, and soil displacement, are to be implemented: (1) on slopes over 30 percent, harvesting and skidding methods that minimize the amount of soil displaced into piles or windrows would be used in order to leave soil intact and in place; (2) prescribed burns on slopes over 30 percent would be conducted when soil, duff, and large fuels are sufficiently moist to

Applies To:	Measure
	retain duff as ground cover for prevention of erosion. • Some proposed activities would take place on soils that are more susceptible to compaction. The following provisions, intended to reduce the risk of detrimental compaction would be implemented. 1) Heavy equipment would avoid streams and swales (low-lying or depressed and often wet stretches of land) except to cross at designated points, build crossings, or conduct restoration, unless protected by at least one foot of packed snow or two inches of frozen soil. • To reduce potential for compaction and/or rutting, the following measure applies on all soil map units: Heavy equipment will be operated for land treatments only when soil moisture is below the plastic limit (Soil moisture exceeds the plastic limit if the soil can be rolled into 3-mm threads without breaking or crumbling), the soil is protected by at least one foot of packed snow, or the top two inches of the soil are frozen (WCPH management measure 13/design criteria (b)). • No wheeled or tracked equipment will be allowed within 50 feet of perennial or intermittent streams or springs. • No wheeled or tracked equipment will be allowed within 100 feet of wetlands.
All Activities	**Wildlife:** • Any newly discovered raptor nests, snail colonies, red-bellied snake hibernacula or bat roosts (i.e., snags/rock formations observed being used by bats, or newly discovered mines and caves) would be evaluated by a district wildlife biologist prior to implementation to determine if special requirements are warranted to protect site integrity. These resources would be protected in accordance with Forest Plan Standards. • To minimize disturbance to nesting goshawks a timing restriction will apply from April 1 through August 15 within ½ mile of active nests by minimizing human-caused noise and disruption beyond that occurring at the time of nest initiation. The following activities would not occur during the timing restriction: fuel reduction activities, cutting, skidding, yarding, decking, hauling, road construction and other activities that may disturb nesting birds. Exceptions might be: hauling within ½ mile of active nest sites during the nesting season if it is reasonable to assume that goshawks in the area are habituated to this type of disturbance or surveys indicate that goshawks are not nesting in the area (consult with a district wildlife biologist to determine an appropriate course of action). Specific site locations and GIS shapefile are documented in the project file. – Standard 3111 • To minimize disturbance to nesting osprey a timing restriction will apply from April 1 through August 31 within ¼ mile of active nests by minimizing human-caused noise and disruption beyond that occurring at the time of nest initiation. The following activities would not occur during the timing restriction: fuel reduction activities, cutting, skidding, yarding, decking, hauling, road construction and other activities that may disturb nesting birds. Exceptions might be: hauling within ¼ mile of active nest sites during the nesting season if it is reasonable to assume that osprey in the area are habituated to this type of disturbance or surveys indicate that ospreys are not nesting in the area (consult with a district wildlife biologist to determine an appropriate course of action). Specific site location and GIS shapefile are documented in the project file. – Standard

Applies To:	Measure
	3204 • Tree marking will not occur from April 1 through August 15 within 1/8 mile of active goshawk nests to assure that goshawks do not abandon nests. From April 1 through August 15, if crews are being aggressively watched or attacked by goshawks during marking activities they will immediately abandon all marking efforts within ½ mile of the active goshawk nest. • Avoid creating barriers (e.g., new open roads) between red-bellied snake hibernacula and riparian areas or wetlands. There are currently no known hibernacula in the planning area. This design criterion will apply to any newly discovered hibernacula.—Standard 3116
All Activities	**Travel Management:** • While any projects resulting from this analysis are taking place, all gates that would normally be closed will remain closed accept for administrative purposes.
Timber Harvest	**Aspen:** • Where hardwood enhancement sites are adjacent to commercial treatment units, clear cut all conifers within one tree length (approximately 75 feet) of aspen stand to maintain vegetative diversity within the stand. • Conserve all live hardwoods (Standard 2301b) with wildlife cavities and all snags (Standard 3124), except for those that are considered a safety hazard. • Cut and "hinge" all conifers within hardwood enhancement units to remove encroaching ponderosa pine and spruce. "Hinging" conifers is intended to provide protection to aspen suckers and minimize impacts of browsing. Cutting shall be in the form of "hinging" the pine approximately 4 feet up from the ground. A solid hinge will keep the tree elevated, creating an aerial barrier to ungulates. A series of pine should be toppled over top of each other to form a "hedgerow" on the outside of the clone to prevent native ungulates and livestock from crossing into the clone. Conifer cut outside the clone could have the big tops and limbs dragged into or thrown into the protected aspen clone to increase on-site material barriers. Lop and scatter, or pile and burn, all conifers too small to "hinge". • Whenever possible, skid trails (or other surface disturbing activities) will be placed directly adjacent to aspen stands (but not birch stands) to promote expansion of aspen clones which are likely to benefit from openings and ground disturbance.
Timber Harvest	**Harvest:** • Existing pine regeneration would generally be protected in stands proposed for overstory removal harvest. Provisions related to felling, bucking, and whole tree yarding would be included in the timber sale contract. Log length yarding is the preferred method of timber removal. Skid trails within these stands would be approved by the sale administrator before commencement of logging. Landing locations would, where feasible, take advantage of existing openings or areas with no regeneration. • To increase the likelihood of successful conifer regeneration, stands proposed for seed cuts would be logged in the summer or early fall where feasible to maximize the site scarification provided by the skidding

Applies To:	Measure
	operation, provided there are no concerns related to riparian areas, noxious weeds, or sensitive plants. Cutting would be done in such a way that areas would be restocked with trees within five years after harvest. • Where stand variation dictates an alternative treatment to the majority treatment, this variation shall be accommodated. For example, a quarter acre pocket of aspen within a commercial thin stand of ponderosa pine shall be cleared of conifers within and up to one tree length (approximately 75 feet) from the edge of the pocket in an effort to maintain vegetative diversity within stands.
Timber Harvest	**Road Restrictions:** • Timber sale units would be laid out to facilitate existing road restrictions (for example, trees around gates and other barriers would be left uncut to maintain obstructions and discourage driving around the gate or barrier).
Timber Harvest	**Scenery:** • Layout and marking of timber sale units would comply with Forest-wide marking guides in effect at the time of implementation. • Where possible, treatments would be designed to reduce the chance of wind damage to residual trees. This may include retaining higher density of mature trees on exposed ridges, lee slopes, and other areas prone to high winds and heavy snow accumulation. • To reduce effects of continuously even tree spacing on wildlife and scenery, commercial thin treatments would emphasize tree health and crown size over spacing. Residual trees in overstory removal and seed cut units would be variably spaced. • Skyline logging corridors would be as narrow as possible to minimize visual effects of any soil displacement. • Where existing conditions allow, treatments in forested areas adjacent to other ownership would blend into adjacent tree density conditions rather than creating strong vegetation edges. A horizontal transition zone of two chains (132 feet) is suggested to achieve this transition in tree density. • Within 300 feet of US Highway 385, Nemo Road, Forest Highway 26 (Vanocker Canyon Road) and the Centennial Trail the following design criteria will be in place: 1. Skid trails will be utilized during dry or frozen conditions to minimize soil disturbance, and will be re-seeded with native grasses. These techniques have been effectively used to reduce soil displacement and speed up the re-vegetation process along these skid trails, reducing highly visual evidence of skid trails. 2. Where possible along these routes, remaining vegetation should be in a variety of sizes and spacing to maintain a more natural appearance. This technique has been very effective in maintaining a natural appearance. Locations where it was not used resulted in a 'tree-farm' appearance (all trees same height and evenly spaced across the landscape). 3. Rehabilitate log decks within 300 feet of travel corridors by returning to original contours, scarifying to eliminate compaction (as necessary), and planting with native grass seed. 4. Slash will be cleaned up to natural levels within 300 feet of these

Applies To:	Measure
	travel corridors. This can be accomplished by slash clean up (e.g. scattering and underburning, piling and burning, or chipping) after logging. 5. Slash, once placed on the ground, needs to be treated in accordance with Forest Plan guidelines 4112 and 5606.
Timber Harvest	**Range:** • All pasture gates would be identified on Timber Sale Area maps and kept closed during the grazing season (June through October). Maintained fences would be protected during logging operations. • If log hauling or movement of heavy equipment related to the proposed timber harvest causes damage to cattleguards, the timber purchaser would be responsible for repair.
Timber Harvest	**Region 2 Sensitive Plant Species and SOLC**: • Occurrences of Region 2 Sensitive Plants and Plant Species of Local Concern would be avoided during all proposed timber harvest activities. Known areas are identified in the design criteria shapefile. • Suitable plant habitat would be excluded from mechanical treatment areas. Known plant habitat is identified in the design criteria shapefile. • Any skid trails, temporary roads, landings, or other disturbances associated with logging activities in plant habitat would be designated in consultation with a qualified botanist. These areas are included in the design criteria shapefile. • Any plant habitat outside of treatment units would be avoided unless approved by a qualified botanist for entry. These areas are included in the design criteria shapefile.
Timber Harvest	**Recreation:** • Snowmobile trails would be shown as improvements on timber sale area maps and protected during harvest operations. An evaluation of the potential for conflicts between logging and trail use would take place at the time of timber sale appraisal and contract preparation. If conflicts appear likely between use of the snowmobile trails and specific logging units or haul routes, logging would be restricted between December 1 and March 31 unless a logical and desirable alternative snowmobile route is identified. Only those units and/or roads in conflict would be restricted so that logging operations could proceed in the remainder of the sale area. • Winter operations of timber sale units that necessitate skidding across a snowmobile trail but do not otherwise affect the trail may be allowed. Determination would be made on a case-by-case basis, with crossings permitted only at locations approved by the sale administrator and with proper cautionary signing installed by the timber contractor.
Timber Harvest	**Soil and Water:** • Implement Region 2 Watershed Conservation Practices to ensure adequate protection of soil, aquatic, and riparian systems. • In stands where Lakoa, Rockoa or Citadel soils are present and slopes exceed 30%, ensure that an overstory density of at least 80 BA remains following timber harvest, unless more site specific Design Criteria is established. If there is an urgent need (example: bark beetle mortality; unable to create lower fuel loading mosaic around the site) to reduce BA below this level, consult the district hydrologist for field verification of the site to determine further potential of slope stability impairment

Applies To:	Measure
	associated with additional levels of BA reduction. • In stands where slopes exceed 55%, ensure that a tree overstory component with a basal area density of at least 80 BA remains following timber harvest and post sale activities. If there is a need to reduce BA below this level, consult the district hydrologist for field verification of the site to determine further potential of slope stability impairment associated with additional levels of BA reduction. • Skid trails: Place slash in a well-distributed pattern across the skid trail surface and install waterbars, where necessary.following harvest activities. • When logging in previously disturbed stands, use existing skid trails and landings whenever possible. • Avoid locating any temporary roads, skid trails, or log landings within 100 feet of perennial or intermittent streams, springs, or wetlands. • Avoid conducting vegetation treatments that remove overstory trees within 50 feet of perennial or intermittent streams, springs, or wetlands.
Timber Harvest	**Wildlife:** • No treatments will be conducted within 500 feet of adit portal or shaft openings of mines or caves to maintain microclimate of bat hibernacula or nurseries, unless it is determined through bat surveys that the site is not bat roost habitat. Bat surveyors and bat survey protocols must be pre-approved by the district wildlife biologist and surveys must be conducted prior to implementation. The 500 foot no treatment zone may be reduced dependent upon survey results and topography and will be determined by a district Wildlife Biologist. Known mine site locations are documented in the project file.—Standard 3207 • Known snail sites with R2 Sensitive Species or Species of Local Concern will be avoided (i.e., no vegetation treatments, no heavy equipment use, and no skid trails, landings, temporary roads or any other activity that may compact soils or alter ground cover, moisture regimes or litter composition). Known site locations are documented in the project file.--Standard 3103 • Disturbance of newly discovered colonies of land snails would be avoided until it is evaluated by a district wildlife biologist in order to determine if R2 Sensitive Species or Species of Local Concern are present. The district wildlife biologist would determine appropriate buffer areas (no treatment zones) around newly discovered colonies based on site-specific conditions. Avoidance zones or mitigation measures would be determined on a case-by-case basis. • In the event that a bald eagle is documented in a stand, the wildlife biologist will be notified and harvest operations will be suspended until the eagle has vacated the stand.--Standard 3101d.
Timber Harvest	**Spruce Habitat:** • Commercial and non-commercial treatments of ponderosa pine in spruce dominated stands will not occur except within 200 feet of buildings or where spruce is encroaching into hardwoods so long as other identified design criteria does not apply in these areas.

Applies To:	Measure
Prescribed Fire	**Burn Plan:** • Prescribed burning would be implemented only under conditions defined in a prescribed burn plan. • In stands that have been designated as part of the suitable timber base, at least 90 percent of the trees greater than 9 inches in diameter will be retained. In other stands, at least 50 percent of the trees greater than 9 inches diameter will be retained. • The District Silviculturist will assist with the preparation of or review the final prescribed burn plan.
Prescribed Fire	**Improvements:** • Measures will be taken to protect utility lines and any other improvements within the burn unit during prescribed burns.
Prescribed Fire	**Region 2 Sensitive Plant Species:** • Where possible, direct ignition would not occur in habitat suitable for supporting sensitive plants. These areas are included in the design criteria shapefile. • Control lines that disturb soil, i.e. hand lines or dozer lines, would not be located in plant habitat, unless needed to ensure safety. These areas are included in the design criteria shapefile.
Prescribed Fire	**Soil and Water:** • Implement Region 2 Watershed Conservation Practices to ensure adequate protection of soil, aquatic, and riparian systems. • Prescribed burns in some sites would take place all or partly on soils with severe erosion hazard. These burns would take place only when burn severity could be kept low. • Small wetlands located in or immediately adjacent to any burn units would be excluded from areas to be burned and protected from disturbance. • Prescribed burn plans will include monitoring measures to evaluate the breakdown of hydrophobic soils, where applicable, following burn implementation.
Prescribed Fire	**Scenery:** • Where possible, prescribed burns adjacent to US Highway 385, Nemo Road, and Forest Highway 26 (Vanocker Canyon Road) would be burned so that overstory trees visible from the road show as little scorch as possible.
Prescribed Fire	**Wildlife:** • In any given year, conduct prescribed burns on no more than 60% of a contiguous meadow (that is >20 acres in size) to minimize impacts of prescribed fire on butterflies and ground nesting birds. Timing restriction would apply to meadows from May 15 to August 15, to minimize impacts to ground nesting birds. Fall burns are preferred.—Standard 3125 • Prescribed burns within ½ mile of historic goshawk nests would be coordinated with district wildlife biologist. Timing restriction would apply from April 1 through August 15 if the nests are active. • All documented land snail colonies with R2 Sensitive Species or Species of Local Concern that are in prescribed burn units would be protected by burning when snails are hibernating (i.e., when average daytime temperatures are <50 degree Fahrenheit) or else these colonies will be avoided. Specific site locations are documented in the project file.—

Applies To:	Measure
	Standard 3103 • No fire lines or direct ignition of fire will occur on known snail colonies any time of the year. Specific site locations are documented in the project file. • During prescribed burning, protect existing guzzlers. Use whatever technique the burn boss deems appropriate (e.g., foam, black lining, wrapping, etc.), based on site conditions. • If Atlantis fritillary or regal fritillary butterflies occur in meadows that are within burn units, redesign the project to conserve important habitat components of known sightings (survey for butterflies as appropriate). No known occurrences of either species exist in proposed burn blocks. Check with the district biologist prior to burning to determine if new information indicates their presence.—Standard 3105 • Prescribed burning in areas with caves or mines would be coordinated with a district wildlife biologist. Impacts to bat hibernacula would be avoided with the use of timing restrictions and/or establishing buffer zones. Specific mitigations will be determined by a district Wildlife Biologist and Fuels Specialist during burn plan development. Specific site locations are documented in the project file. This design criterion will also apply to any newly discovered hibernacula.—Standard 3102
Prescribed Fire	**Range:** • To avoid conflicts with grazing and to ensure that prescribed fire mitigation is implemented, prescribed fire projects will be coordinated in advance with the range management specialist.
Prescribed Fire	**Recreation:** • Personnel from the South Dakota Department of Game, Fish and Parks will be notified prior to the initiation of prescribed burns if the burn unit includes or is adjacent to a designated snowmobile trail so that trail markers may be removed or protected. • Generally, slash piles will be located away from designated snowmobile or cross-country ski trails where possible. Where that is not possible and piles are located immediately adjacent to trails, piles will either not be burned between December 1 and March 31 to prevent melting of the snow on the trail, or specific mitigation will be instituted to prevent snow melt on the trail.
Prescribed Fire	**Heritage:** • In the event that sites are within a prescribed burn boundary, both prehistoric and historic sites would be avoided by both hand line and dozer lines. Sites with consumables such as wood would either be wrapped with structure protection material, or have either a wet line or hand line placed around the resource.
Transportation System	**Dust Control:** • Dust control, if necessary, may be done with water, magnesium chloride, calcium chloride, or equivalent.

Applies To:	Measure
Transportation System	**Noxious Weeds:** • District staff responsible for the noxious weed program would, in coordination with the project engineer, inspect gravel pits for noxious weed infestation before transport and use of gravel and other material. Infestations would be treated to prevent spread. • District staff responsible for the noxious weed program would inspect stockpiled gravel annually for weed infestation in coordination with the project engineer.
Transportation System	**Revegetation:** • Timber sale roads would be seeded after construction but before timber harvest if any part of the gap between construction and harvest would occur between April and October. This may be accomplished under the road contract. If necessary, seeding would again occur after use of the road is complete. Seeding may be delayed until after completion of harvest if the gap between construction and harvest would be of short duration and hydrology, soils, engineering, and noxious weed specialists determine after field review that a delay would be acceptable.
Transportation System	**Soil and Water:** • Implement Region 2 Watershed Conservation Practices to ensure adequate protection of soil, aquatic, and riparian systems. • New road construction is to be designed to limit cut and fill slopes where possible, particularly when located above steep slopes. • Construction of landings, roads, and tractor and skid trails would be avoided within 100 feet (or a distance equal to the mean height of mature dominant late seral vegetation, whichever is more) of perennial seeps, springs, and wetlands. If this is not possible, crossings would be constructed and restored to prevent headcutting, gullying, erosion, and sediment transport to ephemeral or perennial channels. • Creation of large water collection points, such as road ditches or excessively large water bars, would be avoided, particularly up-gradient of existing rotational site features, such as slumps and landslides. A greater frequency of water bars than that identified as the maximum spacing recommended in FSH 2509.25 for the Rocky Mountain Region is to be used. FSH 2509.25 direction disclosed that the listed spacings were maximum spacings and should be reduced if warranted by onsite factors, such as amount of road use, downslope stability, erosion, etc. Foresty Best Management Practices for South Dakota (2003) identifies suggested drainage feature spacings (page 12) that have narrower spacings between drainage features as compared to FSH 2509.25. The 2009 Field Audit Report - Implementation Monitoring of SD Forestry Best Management Practices further support the greater need for more frequent spacing of water bars. The audit identified some areas with insufficient numbers of water bars on native surface roads. Temporary road cuts exceeding two feet would be avoided. If this is infeasible because of steep slopes, temporary roads would be re-contoured. • Where feasible, existing haul roads would be reconstructed with rolling grades instead of ditches and culverts. • Water bars and sediment barriers would be placed 10 to 20 feet below water bar outlets and culvert outlets on skid trails steeper than 15 percent. • Engineering staff would consult with a forest hydrologist and fisheries

Applies To:	Measure
	biologist on design of stream crossings. Fill slopes would be protected with riprap, gabions, prompt seeding, or other measures approved by the hydrologist, fisheries biologist, or soil scientist. • Placement of structures would comply with federal and state laws regarding construction in and near waterways, including placement of fill and measures to control sedimentation. • Generally, do not locate any new system roads within 100 feet of streams (perennial, intermittent or ephemeral), springs, or wetlands. If a stream crossing is required, ensure that it is constructed to prevent headcutting, gullying, erosion, and sediment transport to stream channels by implementing Region 2 Watershed Conservation Practices.
Transportation System	**Travel Management:** • In general, all newly constructed roads would be closed following construction until needed for timber sale or related activities and closed again after use. The exception to this would be newly constructed roads that are designated open for motorized travel under the Forest-wide Travel Management project (in progress). Roads needed for timber sale or related activities but normally closed to motorized vehicles would also be closed when not in use. • All newly constructed roads that are to be closed following use will be closed with appropriate methods, which may include: locked gates, dirt berms, boulders, downed trees, fences, or re-contouring. • Where new roads are constructed through existing range allotment fences to access timber sale units, temporary cattle guards will be installed at the crossing point. Immediately following completion of the timber sale and all related activities, the cattle guard would be removed and the fence returned to its original condition. Cattle guards would not be replaced with any form of gate. • Retain access routes as needed for utility line construction, reconstruction, and maintenance of existing right-of-way corridors. • Avoid or protect utility infrastructure during construction and decommissioning of roads.
Transportation System	**Region 2 Sensitive Plant Species:** • A botanist will work with the road engineer to determine the best placement of the proposed new road construction that will potentially cross plant habitat. These areas are included in the design criteria shapefile.
Transportation System	**Wildlife:** • Maintenance of existing roads in areas that pass through known snail colonies will be limited to the clearing limits (i.e., roads may be maintained to standard). If needed improvements or realignment of those areas go beyond the existing clearing limits, review and input by the district wildlife biologist would be required to ensure that snail colonies would not be impacted.—Standard 3103 • Avoid constructing new roads through snail colonies. Where data suggests an overlap between new roads and known snail colonies, a wildlife biologist and the engineer will together determine if there are any feasible alternate road locations.—Standard 3103 • The presence of snails in any area not previously identified will be brought to the attention of the district wildlife biologist before maintenance or construction continues.

Applies To:	Measure
Transportation System	**Heritage:** • Sites that currently have a native surface road running through them will have site specific mitigations detailed in the Heritage Specialist Report following a review by District Heritage Staff to determine if further consultation by the South Dakota State Historic Preservation Office, and appropriate Tribal Historic Preservation Offices, and other applicable parties is necessary as directed by Section 106 of the National Historic Preservation Act 1966 (as amended).

Nautilus Selected Action Monitoring

The Northern Hills Ranger District would monitor implementation of the selected alternative. Timber sale administrators or other contract administrators would complete some of the project implementation monitoring. Other resource specialists would be involved in monitoring of specific mitigation measures relating to their particular resource area. Specific monitoring requirements are listed below.

- Prescribed fire managers would establish photo points in prescribed burn units to compare pre- and post-treatment conditions and document fire behavior during implementation.
- Fuels staff would evaluate effectiveness of fuel treatments in reducing fuel loading.
- Fire managers would evaluate burned areas to establish a timeline for maintenance burning.
- Project managers would monitor revegetation of disturbed and burned areas to determine need for additional measures and noxious weed control.
- Engineering and hydrology/soils specialists would monitor effectiveness of erosion control measures (seeding, water bars, etc.) one and three years following installation.
- Hydrology/soils specialists would monitor soil compaction at a sample of timber sale landings and harvest units.
- Timber sale administrators and hydrology/soils specialists would monitor application and effectiveness of USDA Forest Service Region 2 Watershed Conservation Practices.
- District resource specialists would monitor timber sale layout as needed to evaluate project implementation of design criteria and assumptions used in the planning process. District resource specialists would monitor timber sale implementation following sale closure as needed to assess the efficacy of treatments and to gauge resource impacts resulting from implementation.
- A hydrology specialist will evaluate road-stream crossings after three years to assess revegetation. If revegetation has not been established, mitigation measures will be identified and the effectiveness of those measures monitored for the next two years to ensure revegetation occurs.

Appendix B
Nautilus Selected Action Maps

Nautilus Project
Record of Decision
Primary Vegetation Treatments

Vanocker Canyon Road

Interstate 90

Highway 385

Nemo, SD

Black Hills Experimental Forest

Lawrence County

Meade County

Pennington County

N

0 1.25 2.5 5 Miles

Legend

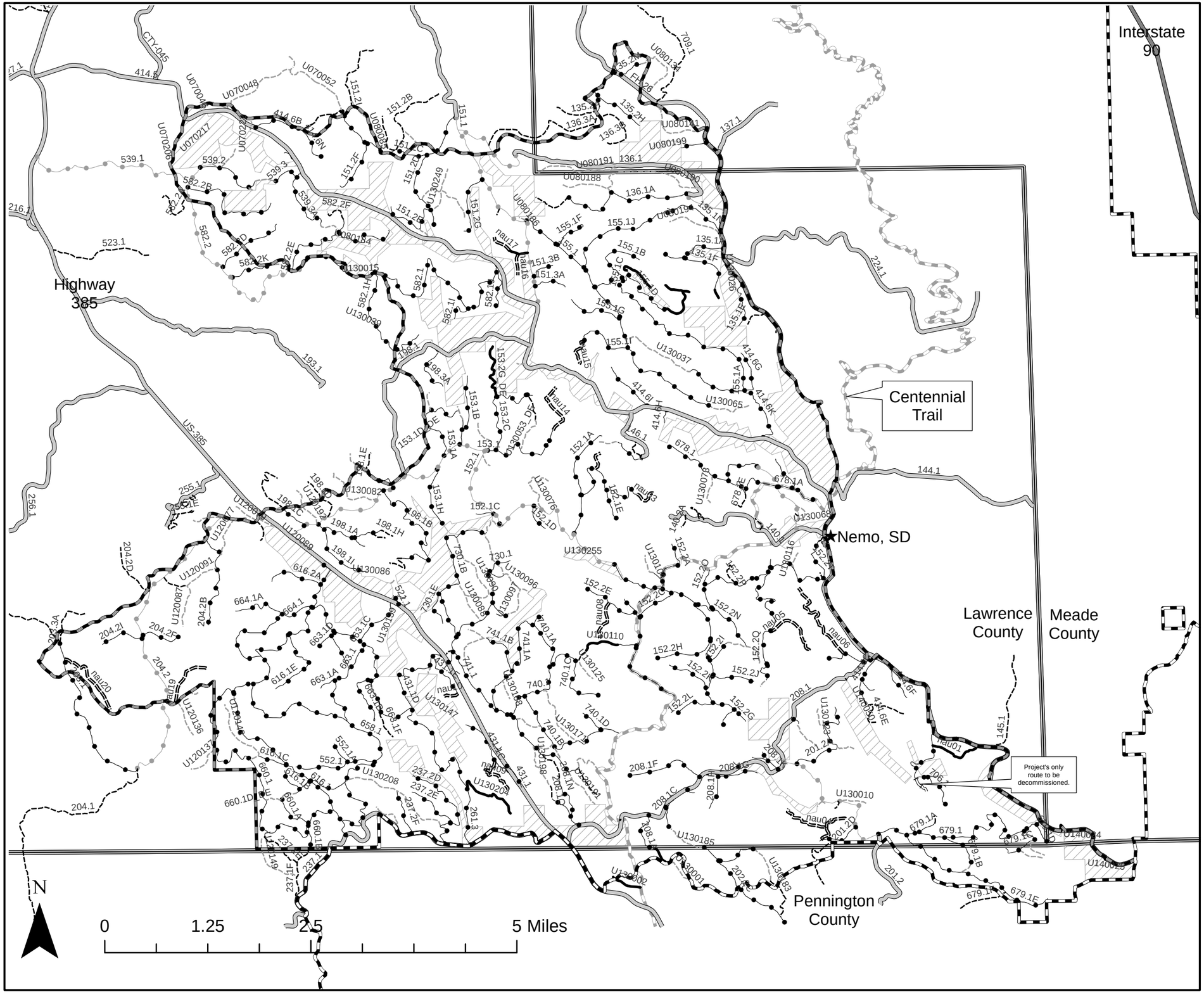
- Northern Hills RD Boundary
- Project Area Boundary
- County Lines
- Private Land
- Centennial Trail

Selected Action

Primary Vegetation Treatments

- Overstory Removal
- Commercial Thinning
- Pre-commercial Thinning
- Individual Tree Selection
- Seed Cut
- Hardwood Enhancement
- Prescribed Burning
- POL Thinning
- Meadow Enhancement
- Group Selection

Nautilus Project
Record of Decision
Project Transportation System



Legend

- County Lines
- Northern Hills RD Boundary
- Project Area Boundary
- Private Land
- Centennial Trail

Selected Action

Transportation System

- Main Roads
- New Construction
- Conversion to System
- Reconstruction or Pre-Use Maintenance
- Other Routes Proposed for Use (No Maintenance Needed)
- Road to be Decommissioned
- Other Routes Not Proposed for Use
- Unclassified Routes