APPENDIX 19—VEGETATION TREATMENTS, FOREST PRACTICES, AND RANGE IMPROVEMENTS

DESCRIPTION AND EFFECTS

Standard Operating Procedures

The Bureau of Land Management (BLM) Rawlins Resource Management Plan Planning Area (RMPPA) utilizes a variety of different best management practices (BMP) to manage vegetation communities and achieve multiple use objectives. Maintenance and improvement of the health of various vegetation communities are achieved through management prescriptions, including active treatments such as removing vegetation with fire, chemicals, biological or mechanical methods, planting or seeding vegetation, and grazing by various ungulates. This management focuses on the manipulation of selected components of the rangeland vegetation resource to meet predetermined multiple use landscape objectives. These management practices, including standard operating procedures and the desired effects of particular treatments, are described in this appendix.

Vegetation Treatments

All treatment projects are subject to appropriate National Environmental Policy Act (NEPA) of 1969 compliance review. All prescribed burn projects will be designed with a burn plan and a smoke permit from the State of Wyoming's Department of Environmental Quality (DEQ), Air Quality Division, before implementation. Consultation with the interested public that would be affected, as well as an approved environmental analysis, is required for all new vegetation treatment projects before any would be initiated. Each new vegetation treatment will be evaluated and examined in relation to multiple use objectives, including analysis of pretreatment and/or post-treatment grazing control measures, which would ensure that the management objectives of the project are met.

Pursuant to the policy of Wyoming BLM, before any vegetative treatment, a signed plan and/or agreement for grazing management will be in place. As a baseline, Wyoming BLM policy calls for deferment of livestock grazing on treated areas for two complete growing seasons, a period that may be adjusted to a lesser or greater time based on environmental conditions and/or management objectives consistent with Wyoming's Standards for Healthy Rangelands. Adjustments will be analyzed as separate alternatives in the original NEPA document prepared for the project and will be compared to the baseline alternative providing for two complete growing seasons of rest. Site-specific variables, such as project objectives, precipitation, soils, and/or plant communities, will be discussed.

Chemical treatments will consist of applying approved chemicals to meet plan objectives. Before chemicals are applied, BLM will comply with Department of the Interior regulations. All chemical applications will be preceded by an approved pesticide use proposal (PUP) and appropriate NEPA review. All applications will be carried out in compliance with label directions and the pesticide laws for Wyoming.

Permanent roads or vehicle routes (utilizing ground-disturbing methods such as blading) to new treatment sites or portions of treatment areas would be constructed only if necessary access does not exist or would not be gained by other project design features. Proposed vegetation treatments that would involve surface disturbance will be inventoried for archeological features that may be affected by the treatment. Any

identified archeological resource that would be adversely affected by the proposed treatment operation will be avoided or mitigated.

Proposed treatments will be inventoried for plants and animals that are Special Status Species. Treatments that would result in adverse impacts to BLM sensitive species will have mitigation measures incorporated into the project design features.

No action would be taken by BLM that would jeopardize the continued existence of any federally listed threatened, endangered, or candidate plant and animal species. BLM will also comply with any state laws applying to animal or plant species identified by the state as being threatened or endangered (in addition to the federally listed species).

Design of Vegetation Treatments

Prescribed Fire Treatment Guidelines

Prescribed burning involves the use of fire under a predetermined set of conditions to change the character of the vegetative community. This technique takes advantage of a variety of parameters, including the relative fire tolerance and expected response of target and desired plant species, fire behavior characteristics, pretreatment and post-treatment grazing management, and climatic patterns, to manipulate vegetation toward management objectives and goals. Prescribed burning would be useful in stratifying the overall age and structural class of vegetation, reducing fuel loads overall, inserting vegetational fuel breaks, improving watershed conditions within the project area and/or throughout a larger management block, and removing a dominant fire-sensitive overstory species, such as big sagebrush, thereby opening up the community to the natural response of fire-tolerant species. For more information on how BLM deals with prescribed fire in sagebrush, see Wyoming Guidelines for Managing Sagebrush Communities with Emphasis on Fire Management.

Prescribed burns result in direct and indirect impacts to vegetation. These impacts center around first- and second-order fire effects (the obvious removal of vegetation [woody species and herbaceous cover] due to the fire, and recovery of certain vegetative species after fire) and the tertiary responses that are expected to occur to riparian areas and uplands as a result of changes in ungulate grazing patterns expected after treatment. Depending on the type of vegetation targeted, the season and timing of the treatment, and the method of implementation, varying amounts of vegetation within the project area are removed by the treatment. Removal can range from virtually complete, in the case of light herbaceous vegetation, to limited scorching in the case of heavy live fuels where varying degrees of "thinning" are desired. These same factors, as well as additional environmental parameters, influence what, where, and how much vegetation reestablishes after treatment, and what period of time would occur before the vegetation in the treatment unit returns to pretreatment conditions. Although the immediate effects of a prescribed burn are to reduce ground cover, wildlife habitat, and livestock forage, generally the long-term effects to vegetation include increased productivity, palatability, and species diversity (including type, amounts, and age classes).

Usually, spring season prescribed burns are desirable when a lower ratio of burned/unburned vegetation and more of a broken mosaic pattern are preferred, such as treatments proposed in stands of critical seasonal wildlife habitat. Spring season prescribed burns would also be desirable to mitigate operational restrictions, such as the need for remaining snowbanks at higher elevations to control the perimeter of the project. Because of predominant climatic conditions within the RMPPA, spring cool season prescribed burns are designed with a much broader latitude of prescription parameters to achieve desired objectives but, because of the unpredictability of spring weather, the actual implementation window is usually a much shorter time period.

Late summer and fall season prescribed burns are usually undertaken in the RMPPA when objectives center around the removal of a larger amount and/or proportion of the target vegetation, or the treatment involves vegetation (such as aspen stands) that would most likely be untreatable during cooler and wetter periods. Because of more extreme environmental conditions during the late summer and early fall, there is less room for error when conducting and controlling these burn projects; therefore, more constrictive prescription parameters are usually developed for these projects. The weather and environmental conditions are usually more stable and constant during the late summer/early fall season in the RMPPA, allowing for much wider operational periods than are found during the spring. Fall treatments usually require much more stringent control and holding measures than do those in the spring; in many cases, they use artificial control lines and larger implementation crews. Constraints to implementation for fall season prescribed burns usually center on other land use activities (which tend to increase through the summer) and the lack of operational assets (as seasonal wildland fires consume resources, and personnel and equipment dwindle) rather than environmental restraints.

On a relatively limited basis, the RMPPA will engage in prescribed burn treatments that are independent of seasonality. These include the burning of slash piles from logging operations and/or mechanical treatment activities, usually prepared throughout the year (depending on accessibility) and implemented in the winter (when surrounded by snow), and also include broadcast burns in vegetation, where treatment objectives are independent of fire intensity. Broadcast burns take place throughout the year and mainly are dependent on operational resource availability.

Reseeding is a viable technique to establish a more desirable plant community following treatment; however, in most cases, the techniques used and sites chosen will be those that lend themselves to natural regeneration wherever possible.

Unplanned wildland fires that occur in areas with an approved prescribed fire proposal and burn plan, including an approved Finding of No Significant Impact Decision Record (FONSI/DR), will be allowed to burn as long as they remain within the prescriptions and meet land use objectives.

Development of allotment management plans (AMP) and other activity plans will further refine the acreage values according to livestock grazing, wildlife, and other resource objectives. Acreages of prescribed burns may increase or decrease on certain allotments depending on rangeland management needs as addressed in AMPs and other activity plans.

Chemical and Biological Treatment Guidelines

Chemical treatments involve the use of ground or aerially applied herbicides on target species to reduce their competitive effect on more desirable species. Many classes of herbicides exist, and all vary in action, selectivity, and persistence. However, relatively few compounds are approved for use in broadcast-scale vegetation treatments on public lands. These compounds are usually selective for broadleaf vegetation, leaving only grasses, tolerant forbs, and shrub species after treatment. Chemical treatment and applications will be used only where control would be exercised to prevent unwanted loss of desirable flora or fauna and to prevent transportation of chemicals to other areas by water or air movement. Specific methods of application will be used for the control of noxious and invasive weeds, and for the manipulation of vegetation stands, to achieve management objectives. Methods of chemical treatment of vegetation near Special Status plant populations will be determined by BLM.

Noxious and invasive weeds will be treated in accordance with the Rawlins Field Office (RFO) Biological Noxious Weed Control Environmental Assessment (EA) (WY-037-EA6-123), Chemical Noxious Weed Control and Commercial Site Vegetation Control EA (WY-037-EA6-122), and Vegetation Treatment on BLM Lands in Thirteen Western States (USDI, BLM 1991). The grantee or lessee is

responsible for the control of all noxious and invasive weed infestations on project disturbed areas and native areas infested as a direct result of the project.

Aerial application of chemicals will not be allowed within one-quarter mile of Special Status plant locations (Appendix 14). An unsprayed buffer zone of 100 feet will be maintained near live or still water. Aerial spraying in riparian areas will not be allowed without prior approval of the Authorized Officer.

All chemical treatment sites for noxious and invasive weeds on rangelands will be reevaluated to ascertain the effectiveness of the treatment program. If retreatment is necessary, county weed and pest supervisors, in cooperation with the BLM RFO, will develop a retreatment program. All chemical treatment sites for noxious and invasive weeds on leases and rights-of-way (ROW) will be reevaluated by the lease/ROW holders or their contractor and the BLM Authorized Officer to ascertain the effectiveness of the treatment program.

Vehicle-mounted boom sprayers and hand sprayers will be used in nonriparian zones. Near water, a boom sprayer will be used only where feasible.

BLM will consider the invasion of noxious and invasive weeds in the design and implementation of grazing systems. Chemical treatment would minimize loss of desirable flora and fauna and avoid transportation of the chemicals offsite.

Biological treatment (insects, grazing animals) will be considered for weakening and limiting reproduction of target vegetation in critical riparian areas or areas with sensitive plants and animals, where application of chemicals or the use of fire is not feasible or desirable. Any insects or grazing animals used for vegetation treatment will have been carefully tested for host specificity, thereby reducing or eliminating possible adverse effects on nontarget vegetation. In addition, the use of biological treatments will be evaluated for compatibility with other multiple use objectives for the management area.

Mechanical Treatment Guidelines

As with prescribed fire and chemical or biological vegetation treatment, mechanical vegetation treatment will be considered for vegetation throughout the RMPPA to alter existing vegetation.

Mechanical treatments involve the use of mechanized equipment and/or some forms of manual labor to remove target vegetation or to consume the entire community and leave a suitable seedbed. Techniques and implements are highly variable, but all share the disadvantage of high cost. Mechanical treatment procedures range from use of machinery to remove and mulch large, coarse vegetation material (such as juniper, aspen, or heavy brush) to the use of chainsaws to remove noncommercial stands of overstory trees either partially (where thinning of target vegetation is desired) or completely by removing the target species from the project area in a stand replacement-type project. Mechanical treatment also includes mowing weedy species to prevent seed production. Small-scaled types of mechanical treatments, such as thinning target vegetation by means of chainsaw, usually require some type of follow-up treatment in the area to remove debris left from the operations. Follow-up treatments include stacking and removing commercial or otherwise usable materials, piling and subsequently burning slash materials, or broadcast burning of material on the ground to remove it from a desired seedbed. In addition, agricultural mechanical equipment, such as towed brush-hog type machinery or plows, will be employed to treat suitable vegetation where topography and finances allow.

An additional use of mechanical vegetation treatment centers around preparation for other treatments, primarily prescribed burning. Brush-hog or brush-beating equipment; tractors with plows; crews with chainsaws removing high, above-ground fuels; or crews digging control lines to mineral soil by hand are

employed regularly to make control of prescribed burns practical during the season of the project. These methods can be used to provide control lines independent of other operations or to provide a baseline from which "black-line," or control lines of burned vegetation, can be produced. When coupled with other treatment projects, these actions would involve site-specific environmental analysis and coordination with affected interests, completed during the NEPA analysis of the parent improvement project.

Grazing Management Prescriptions

Rangelands in the RMPPA are open to grazing by domestic livestock as per the Taylor Grazing Act; therefore, removal of portions of rangeland vegetation by grazing ungulates can be used as a vegetation management tool. Through AMPs, cooperative management plans, grazing agreements, or the adjustment of authorized grazing use in an allotment, the type, timing, season, and duration of grazing use are managed. Primary tools center on managing livestock use on desirable rangeland species during their primary growth period. Summer cattle use (the predominant grazing use within the RMPPA) is the primary candidate for managed use patterns, as summer use tends to concentrate vegetation removal both during and after the growth stages of most forage species. Annual rotation, deferred rotation, rest rotation, split season, and dormant season grazing schedules remove pressure on the plants during at least a portion of their growth stage, and provide for uninterrupted growth and/or recovery periods.

The type of livestock permitted on specific rangelands can also be utilized to concentrate use on target species or, alternatively, to remove all or a portion of grazing pressure from desirable species, depending on management objectives. Sheep use during the fall and winter, although including a significant portion of dormant herbaceous forage (when available), also includes a significant amount of rougher, woody, browse species, significantly more so than would be found with cattle use during the same period or with sheep use during other parts of the year. Sheep or goats during the early spring period, when target vegetation species are beginning to green up, can be used to increase the grazing pressure on certain weedy species, similarly to the use of biological weed treatments. Such grazing treatments will be short term and used on an annual basis, so as to pressure target species while leaving desirable species intact.

The following BMPs can be used to manage vegetation with livestock grazing. Some of these BMPs address grazing management directly, and others address associated activities that include range improvements.

Consideration must be given to season of use, soil type, precipitation, rangeland condition, stocking rates, type of livestock, plant growth rates, and range site potential.

Some BMPs used for livestock grazing—

- Manage livestock use of plant communities so that plant cover and desired community composition are maintained and erosion and sedimentation are not accelerated above acceptable levels
- Maintain or increase plant cover, including residue, which should in turn slow down or reduce runoff and increase water infiltration
- Adjust livestock stocking rates, distribution, timing and duration, kind and class to improve vegetation health and soil cover
- Develop additional water sources to improve distribution of livestock and control water source availability to move use in or out of specific areas.

- Locate salt/mineral and supplemental feeding facilities in areas to increase use from livestock. Hoof action increases vegetation disturbance and accelerates the mineral cycle, thereby improving long-term vegetation health.

Plantings of Vegetation

Live native vegetation common to a project site will be planted, usually in relatively smaller scale projects. This type of treatment is employed to stabilize soils and watersheds, particularly along stream banks or within lentic-type water systems. In many cases, this type of treatment is applied to smaller scale riparian area improvement projects, usually on sites that previously contained the target vegetation, which for one reason or another currently lack it. Riparian woody and grass-like species are procured from adjacent sites or from an outside source, transported to the specific project site, and planted by hand or with machinery. Subsequently the plantings are "encouraged" by allowing them to proliferate, free of season-long grazing pressure by livestock, wild horses, or wildlife. This can be accomplished through the use of exclosures to keep selected animals from the project; by utilizing season-long, rotational, shorter-duration, and/or seasonal grazing patterns with permitted livestock; or placing the plantings in less accessible sites.

When coupled with rangeland improvement projects (such as the construction of a dam or the development of a spring), these actions will be examined on a case-by-case basis in relation to multiple use objectives and will involve site-specific environmental analysis and coordination with affected interests, in most cases completed during the NEPA analysis of the parent improvement project.

Seedings of Vegetation

Vegetation seeding is undertaken on a relatively limited basis within the RMPPA, but native vegetation can be established (or reestablished) from seed in a variety of sites and situations. Usually employed to more quickly revegetate upland sites, this technique can be used on disturbed sites where vegetation has been mechanically removed, including reclamation projects such as well pads, pipelines, roads, and abandoned reservoirs, or in instances where vegetation has been lost as a result of a natural event, such as a wildland fire or flood. In addition, vegetation treatment projects, including prescribed fire, chemical treatments, and mechanical vegetation removal, can include reseeding of native upland plants following implementation, depending on a variety of factors (including environmental parameters, project objectives, or the nature/severity of the treatment). In most cases where more desirable vegetation is sought on a large-scale basis (such as watershed or sub-basin), other vegetation manipulation methods, described above, are the primary and most practical choice.

Seeding of upland vegetation can be accomplished through a variety of methods, including application by fixed- or rotary-wing aircraft, all-terrain vehicles, towed agricultural equipment (such as a rangeland drill), or manual labor. The method of application is totally site and project dependent, influenced by cost, terrain, topography, land use and/or political restrictions, and management objectives.

All the previously described vegetation manipulation techniques can be used to prepare a seedbed suitable for artificial reseeding. Where needed, reseeding is a viable technique to establish a more desirable plant community. However, seed and application costs can be high and are sometimes difficult to prove cost-effective. As noted previously in the prescribed fire section, BLM in the RMPPA strives to design vegetation treatments that will not require reseeding of native vegetation. However, reseeding can be a viable alternative in specific situations, depending on management and/or project objectives. Prescribed fire projects can be useful in preparing a seedbed for artificial seeding, although the nature of the project and the type of burn utilized will influence the need or practicality of subsequent seeding operations. Although chemical treatments can have less total initial impact to the project site than burning or

mechanical treatments, the seedbed resulting from a chemical treatment is usually not as suitable for reseeding because of the amount of standing litter. Mechanical treatments, especially those resulting in a high degree of surface disturbance, such as chaining or plowing, usually produce a highly receptive seedbed. Manually applied mechanical treatments, such as thinning or stand-replacing projects, can require some type of intermediate treatment, such as burning of slash piles before applying seed mixtures.

In many cases, the most economical and feasible seeding mixtures (i.e., those with the most probability of success) involve perennial native grasses and forbs. On special habitat such as mule deer crucial winter range, where disturbance has occurred and reclamation is necessary, or where upland seedings are proposed for specific management objectives, the mixtures could include a variety of high-quality shrub seedlings, such as winterfat, shadscale, four-wing saltbush and, in certain instances, mountain mahogany and antelope bitterbrush, to complement the usual grass mixture. Shrub mixtures are usually much more expensive, and the success of establishment can be variable—highly dependent on the condition of the seedbed. Exclusion of wild horses and livestock and possible reseeding operations may be required in severely unstable watersheds, although the large scale and resulting high expense of this type of management usually makes it prohibitive. Because of terrain irregularities and topographical features, vegetation treatments are usually irregular in shape, providing for edge effect, cover, and visual aesthetics.

As with other treatment methods, upland seedings will be examined on a case-by-case basis in relation to multiple use objectives and will involve site-specific environmental analysis and coordination with affected interests. In the cases of seeding projects coupled with other projects, including reclamation or rehabilitation projects, the examination is completed during NEPA analysis of the parent development.

Design of Range Improvements

All range improvements will be designed and constructed to minimize environmental impacts while maximizing function and cost effectiveness. Before any range improvements are installed, an environmental analysis will be prepared. Whenever possible, water will be provided to benefit the seasonal needs for wildlife.

Springs and Seeps

Spring and seep water sources are usually developed by collecting the water using a perforated pipe and/or head box, diverting the water into a drinking trough. The source is usually fenced for protection of the soils and the vegetation around it. During most of the year, spring and seep sources run freely (not through a trough) and maintain the riparian system. When water is run to a trough, the overflow water is piped back to the original drainage course.

Troughs

Troughs are an integral part of many water developments. They are used in conjunction with spring and seeps, wells, pipelines, and offsite waters below reservoirs. They come in various shapes and sizes; however, the most common styles include large tires; Powder River troughs; fiberglass; aluminum; and concrete-bottom, metal-sided tanks. All troughs require some type of escape route for small birds and mammals, with a wire/concrete ramp or rock pile most commonly used. The overflow water will be piped back to the original drainage course.

Wells

Wells are usually drilled in areas where other water sources are unavailable to provide a reliable water source for livestock and wildlife. Power sources for pumps may include generators, windmills, solar panels, or electrical hookups to power lines. The facility could be designed with a water storage tank at the well or at a location where pipelines would gravity-feed water to other sites. Drinking troughs may be installed near the well and/or at various locations from a pipeline. Well sites will be selected based on geologic well site investigations.

Water Pipelines

Pipelines consist of plastic—usually polyethylene—or steel pipe that is buried by mechanical pipe-laying implements or laid on the soil surface. Pipelines designed for spring through fall use are usually placed 12 to 18 inches below the surface, whereas winter pipelines are 5–6 feet deep. Pipelines originate at creeks, wells, or spring/seep sources and are used to distribute water to otherwise nonserviced areas. Drinking troughs and in some cases, a storage tank, are situated along the pipeline.

Reservoirs

Reservoirs are constructed across drainages by building a dike to store water, with an overflow pipe and spillway to pass excess streamflow or high-flow events. Pit-style reservoirs are constructed on small side drainages and basins without a pipe, where the spillway directs excess water into a neighboring draw or gentle terrain. The impoundments created are designed to catch temporary runoff or permanent streamflow to provide a more reliable source of water for livestock and wildlife. Design requirements are determined mainly by the nature and amount of source water. Where there are opportunities to create reservoirs of sufficient size and depth to support fisheries, more specific livestock management may occur, including fencing off the reservoir and providing offsite watering facilities (troughs).

Fences

Fences are constructed to provide livestock management boundaries. They provide interior pastures or boundaries for grazing allotments. Because of different management considerations, fence design is highly variable (BLM Manual Handbook 1741-1, Fencing). Wire may be smooth, barbed, mesh, or a combination, depending on the type of project and/or livestock species involved. Exclosure fences may be built to restrict livestock (and, in some cases, wildlife) access to sensitive areas. Wooden braces are usually spaced one-quarter to one-half miles apart, or closer if necessary. Line posts may be steel, wood, or fiberglass, with spacing based on the fence type, topography, and resource objectives. Electric fences may also be used in some instances. Because of the potential for impact to wildlife movement, portions of historic woven wire fences are identified for modification.

Cattleguards

Cattleguards will be installed where fences cross heavily traveled roads or in situations where opened gates would severely compromise management. Cattleguards are generally 8 feet wide and vary in length depending on traffic needs.

Instream Structures

Instream structures are primarily steel sheet-piling, gabions, or check dams of rock, logs, or concrete and steel placed in streams and ephemeral draws to maintain water tables, slow water flow, and reduce erosion.

FOREST MANAGEMENT

Forestry Program

Overview

This appendix was developed to supplement the discussion of forestry in Chapters 1 through 4 of the Proposed Resource Management Plan (RMP)/Final Environmental Impact Statement (EIS) by providing more information about forest resources and the forestry program in the RMPPA.

The forestry program in the RMPPA is directed at managing the forested lands in a healthy and productive manner. Forest management activities include timber sales and harvests, site preparation for tree regeneration, forest stand improvement through commercial and precommercial thinnings, forest inventory surveys, tree planting, and forest health improvements through biomass removal, hazardous fire fuels reductions, and close observation of insect and disease problem areas. Table A19-1 and Table A19-2 provide information on the major tree species and acres of forest type in the RMPPA.

Table A19-1. Major Tree Species

Common Name	Scientific Name
Lodgepole Pine	*Pinus contorta*, **Dougl.**
Engelmann Spruce	*Picea engelmanii*, **Parry**
Subalpine Fir	*Abies lasiocarpa*, **(Hook.) Nutt.**
Ponderosa Pine	*Pinus ponderosa*, **Laws.**
Douglas Fir	*Pseudotsuga menziesii*, var. *glauca*, **(Beissn.) Franco**
Quaking Aspen	*Populus tremuloides*, **Michx.**
Limber Pine	*Pinus flexilis*, **James**
Rocky Mountain Juniper	*Juniperus scopulorum*, **Sarg.**

Table A19-2. Current Estimation of Forest Type Acres Within the RMPPA

Forest Types	Acres
Lodgepole Pine	43,164 (includes 14,651 acres in Ferris Mtn WSA)
(All) Fir-spruce	663
Ponderosa Pine	16,539
Aspen	28,642
Woodland (P-J and Limber Pine)	107,926
Total	**196,934**

Based on 2000–2005 GAP Data

Forest Health Management

Forest stand communities will be managed to restore, maintain, or enhance stand community health, composition, and diversity (considering density, basal area, canopy cover, age class, stand health and understory) through forest management practices and to provide for late successional vegetation, but not as the dominant forest landscape feature, while providing for multiple use of BLM-administered lands.

Forest stand communities will also be managed for a healthy mix of natural successional stages that incorporate diverse structure and composition into each forest stand type. All forest communities within the RMPPA (196,934 acres) will be managed in accordance with Wyoming Standards for Healthy Rangelands Management (1997), the Healthy Forest Initiative, and the Healthy Forest Restoration Act of 2003.

Management of commercial forest communities (28,513 acres) will be for production and harvest of wood products (both minor and commercial: e.g., saw timber, post and poles, firewood, Christmas trees, wildlings/transplants) and to improve opportunities to harvest forest products while providing for other forest values and uses. In addition, 1,000-hour fire fuels overloading hazards and risks within forest stand communities will be managed by implementing both stewardship and hazardous fire fuels reduction projects to reduce fuel loading.

Forest stands will be managed to supply forest products to the public as a by-product with forest health, landscape restoration, and reduction of forest fuels objectives. Up to 28,513 acres of forestlands, of which 6,700 acres are areas of steep slope and riparian buffer zones, and 3,000 acres of immature stands will be available for forest management actions to improve forest stand or ecosystem health.

Forestlands and woodlands within wilderness study areas (WSAs) (67,720 acres) will be reserve managed to meet wilderness characteristics and healthy forest landscape objectives in accordance with management plans and IMP.

Old growth management areas and the connectivity of the old growth area will be maintained as appropriate within forestlands and woodlands.

Forest stands will also be managed to provide a sustainable supply of forest products (both minor and commercial) to the public on public demand.

Forestlands and woodlands outside WSA areas (85,003 acres) will be managed to meet healthy forest landscape objectives in accordance with the Healthy Forest Initiative and Healthy Forest Restoration Act of 2003 as well as all other applicable state and federal guidance.

An average of 75 to 100 acres of forestland "forestland ecosystem management areas" and 75 to 100 acres of woodland "woodland ecosystem management areas" will be treated annually by mechanical methods (thinnings [commercial and precommercial], stewardship/fuels reduction projects, timber harvests [select, partial, clear cut, etc.]) or prescribed fire to reduce stocking levels and structure/composition to more historical conditions. These areas will be managed with restrictive management prescriptions for wildlife management guidelines.

Approximately 28,513 acres of forestland will be actively managed and called "forest ecosystem management areas," with an annual allowable probable sale quantity of 650 MBF.

Approximately 67,720 acres of forestland in WSA areas in the RMPPA will be managed by prescribed fire or wildland fire used as a tool to simulate natural alteration of vegetation to meet wilderness and healthy forest landscape objectives. No mechanical and/or surface disturbing activities will be prescribed. No forest products will be removed from this area. The forestlands within the WSA will be called "reserved forest ecosystem management areas."

Approximately 85,003 acres of woodland (aspen, Ponderosa pine, limber pine, juniper, and other woodland species) will be managed as "woodland ecosystem management areas." Included in these woodland acres are Ponderosa pine forest stands located on BLM-administered lands in the Pedro

Mountain and Laramie Peaks area. These areas (scattered woodland and forested areas with very limited public access due to land ownership) will be managed with restrictive management prescriptions for wildlife and to meet healthy forest landscape objectives in accordance with the Healthy Forest Initiative and Healthy Forest Restoration Act of 2003, and enhanced for multiple use purposes. No specified annual sale quantity will be identified within these areas.

Approximately 12,698 acres of other isolated scattered pockets of forest and woodlands located on BLM-administered lands within the resource area will have minimal management due to lack of legal public access.

Old growth forest areas will be retained and other forested areas may be restored to old growth condition at appropriate locations and distribution levels as evaluations occur using an adaptive management approach. Old growth management areas include coniferous trees greater than 150 years old and aspen trees greater than 100 years old, in association with various old growth forest characteristics. Presettlement old growth forest characteristics will be identified for the various forest types. Connectivity of existing or potential old growth areas will be adopted whenever feasible.

SILVICULTURAL PRACTICES

Silvicultural practices are on-the-ground activities that are used to influence the establishment and/or the growth of forest stands. The major silvicultural practices used in the RMPPA are described in the following sections, and the applicability and use of these practices are explained.

Regeneration

Regeneration refers to the reforestation process in which trees in an area are reestablished. The term also can refer to the tree seedlings that become established in the area.

In areas where the existing tree cover has been totally or partially removed by natural or manmade causes, natural or artificial regeneration may be used. In natural regeneration, the area is allowed to reforest itself through the seeds left on the site, seeds blown into the site from adjacent forests, or a process called root suckering. Natural regeneration requires proper seedbed preparation, a good seed crop, and cooperating weather. The majority of forest tree species common to the RMPPA are more acceptable of this method of regeneration.

Artificial regeneration is carried out by the forester, who places seeds on or in the ground or plants tree seedlings. Artificial regeneration can be used to reestablish tree growth to an area in a shorter time, to convert a site from one tree species to another, or to provide a means of regeneration if natural regeneration fails. On commercial timber stands, after a timber harvest, artificial regeneration can be used to supplement natural regeneration to achieve a desired stocking level or to improve the genetic stock in an area (usually economically unfeasible for the RMPPA).

Stand Development

The stand development period refers to the time from which the forest stand was established (regeneration) to the time the forest stand is harvested or dies from natural progression. Silvicultural practices are performed during this period to improve a forest stand's health and growth, to help reduce insect and disease infestations, or to achieve other management objectives if the area is being managed for multiple uses. Common stand development activities are precommercial and commercial thinning.

Thinning is a procedure used to reduce the number of trees per acre so that stagnation of growth is prevented and the overall stand health and growth are improved. This activity leaves a specified number of trees per acre at a desirable spacing. Thinning also can be used to help slow the spread of dwarf mistletoe and help slow the spread of mountain pine beetle outbreaks.

Precommercial thinning is used when a forest stand is in need of thinning at an immature age (from seedling to between 8 to 10 years of age) and little merchantable product can be attained. In such cases, a forest stand may be precommercially thinned through the public sale of Christmas trees (only during December); or as in most cases, BLM will have the thinning done in-house by its BLM fire fuels crew or by hire of a professional contractor. In precommercial thinning, 10- to 15-foot spacing is left between stand trees to allow for maximum growth production.

Commercial thinning is used when a forest stand has reached a DBH (diameter at breast height) average of 5 to 6 inches and an average height of 25 to 30 feet or a merchantable post and pole size. In such cases, a forest stand may be commercially thinned by the public sale of post and poles; or as in most cases, BLM will sell the materials to a willing individual buyer from the public or professional contractor through a post and pole sale. In commercial thinning, 15- to 20-foot spacing is left between standing trees to allow for maximum growth production.

Table A19-3 shows the change in age-class distribution of lodgepole pine over the next 100 years. As shown in the table, an improvement in age-class distribution will occur.

Table A19-3. Long-Term (100 Years) Age-Class Redistribution of Lodgepole Pine Under Current Management

Age Class (Years)	Present Situation (%)	Long-Term Change (%)	Ideal Age Class Distribution (%)
0–10	6	8	10
10–40	17	24	30
40–70	16	24	30
70 or more	60	44	30

Source: Medicine Bow-Divide (Great Divide Resource Area) EIS, 1988 (with the present situation percentage and updated to account for changes occurring during the past 15 years)

Harvesting/Treatment Method

Several methods of harvesting/treatments are used in the RMPPA.

Stewardship Projects/Contracting

Stewardship contracting is a new authority for the BLM, originating from the 2003 Appropriations Act (P.L. 108-7). Stewardship involves caring for the public lands through broad-based public and community involvement. The projects and/or treatments will be designed to achieve ecological restoration and maintenance objectives that may include the capture of some value of forest or rangeland material that is created as a part of the project. This material will offset the cost to taxpayers of the restoration project and should provide opportunities for local economic development in the fields of biomass for energy and alternative wood products.

Ultimately, these projects and/or treatments will make forests and rangelands more resilient to natural disturbances, such as wind, flood, fire, insects, and disease.

Stewardship contracting is intended to achieve key land-management goals that improve, maintain, or restore forest or rangeland health; restore or maintain water quality; improve fish and wildlife habitat; reestablish native plant species and increase their resilience to insects and disease; and reduce hazardous fuels that pose risks to communities and ecosystem values through an open, collaborative process. The legislation also requires that projects meet local and rural community needs in addition to the land management goals.

Clear-Cutting

Clear-cutting is a harvesting and/or project treatment method in which all the trees in a designated area are cut and removed. This method is used in areas that require complete over-story removal due to damage from insects, disease, wind (blow-down), or poor stand quality and/or health or to meet the regeneration requirements of a particular tree species. Regeneration of clear-cut areas is done by natural or artificial means.

Tree Selection or Select Cut

Tree selection or select cut is a harvesting and/or project treatment method in which trees within a particular area or stand are individually marked, cut, and removed. The selection can be based on a number of stand criteria, such as stand overstocking, stand health, tree size, and tree species. This method yields the least environmental impacts and relies on natural regeneration.

Group Selection or Group Select Cut

Group selection or group select cut is a harvesting and/or project treatment method in which trees within a particular area or stand are cut and removed in small groups. The results yield small openings no more than 3 to 6 acres in size. Regeneration is usually accomplished through natural regeneration.

Shelter-wood Cut

Shelter-wood (reserve or cut tree selection) is a harvesting and/or project treatment method in which the older mature trees (the shelter-wood) are removed in two or more successive cuttings between 10 and 20 years apart. This method provides a source of seed protection for the regeneration. Though this method does provide shelter protection for the seed in a treatment area, it is a poor use of control for dwarf mistletoe. This method usually relies on natural regeneration.

Seed Tree Cut

Seed tree (reserve tree selection) is a harvesting and/or project treatment method in which all trees scheduled to be removed are done so in one harvest, leaving a small number of seed-bearing trees, usually eight to ten trees per acre. The seed trees will later be harvested from the site after regeneration is established. This harvesting and/or project treatment method is inapplicable in areas of high winds because the majority of the seed trees left will blow over within several years. This method relies on natural regeneration.

Sanitation Cut

A sanitation cut is a harvesting and/or project treatment method used to remove dead, damaged, or susceptible trees to prevent the outbreak or spread of insects, disease, or catastrophic wildland fire events. After a sanitation cut, if regeneration is desired, it can be achieved through a natural process or artificial means.

Salvage Cut

A salvage cut is a harvesting and/or project treatment method used to remove dead, damaged, or susceptible trees after a natural event, such as a wind blow-down and/or the outbreak or infestation of insects or disease, to reduce hazardous fire fuel loading, lessening the chances and/or intensity of catastrophic wildland fire events. After a salvage cut, if regeneration is desired, it can be achieved through natural processes or artificial means.

Slash Disposal

Slash is the tops, limbs, and other unusable portions of trees left in an area after harvesting. Two methods of slash treatment are described in the following section.

Lop and Scatter

Lop and scatter is a slash treatment method in which the tops and large branches of trees are cut so that the slash will be at a predetermined height off the ground. This method is used in areas where the amount of slash is light. This method allows for a speedy natural decomposition process.

Pile and Burn

The pile and burn method of slash treatment is used in areas where tree species need an exposed mineral soil seedbed for successful seed germination. The dominant tree species in the RMPPA, lodgepole pine, needs such a seedbed. After harvesting, the slash is pushed up into a pile, usually with a bulldozer. This process exposes the mineral soil seedbed needed for successful seed germination of lodgepole pine. Not all the slash is piled. About 30 percent is left scattered over the area as protection for newly regenerated seedlings. The slash piles are later burned in the winter when a protective layer of snow allows for safe burning.

The pile and burn method is also used to dispose of undesirable or nonmerchantable woody materials collected in forest health projects, such as stewardship projects and hazardous fire fuels reduction projects. It is also used to dispose of slash from precommercial and commercial thinnings. These slash piles are also burned in the winter when a protective layer of snow allows for safe burning.

Broadcast Burn

Broadcast burning is a form of slash disposal or treatment where a ground fire is used to burn the slash that is left after harvesting. The fire removes the top duff layer, exposing the mineral soil. This increases the rate of nutrient cycling. Broadcast burning may destroy the seeds onsite if the ground fuel loading is at extreme levels or if the duff layer is too thick, so another seed source must be provided if natural regeneration is desired. Adjacent forest stands may be a good source for these seeds. This method of slash removal is especially helpful in aspen stands.

Rollerchopping

The rollerchop method of slash removal involves the use of a large metal drum filled with water and equipped with protruding stubs. The roller is pulled back and forward over the slash by a bulldozer. This exposes mineral soil, preparing the site adequately for lodgepole pine regeneration.

MANAGEMENT DIRECTION FOR FORESTS AND WOODLANDS

Forests and woodlands are categorized as lands available for intensive management of forest products, lands available for restricted management of forest products, lands where forests are managed to enhance other uses, and lands not available for management of forest products. These categories are described in the following section.

Intensive Management

Lands available for intensive management of forest products are areas where forest management is one of many uses, but where other uses or resource values are not emphasized. These lands are managed to achieve a highly productive forest by implementing forest management activities to enhance overall forest health and growth production. Commercial timber activities are concentrated in these areas.

Lands placed under this category are commercial forestlands that have the least amount of conflicts with other resource programs.

Restricted Management

Lands available for restricted management of forest products are lands where other uses or resource values are emphasized and limited forest management activities are allowed. Forest products in the form of timber can be harvested from such lands, but harvesting methods such as clear-cutting are completely restricted.

Lands in this category are lands with steep slopes and riparian areas located in a forested area.

Enhancing Other Uses

Lands where the forests are managed to enhance other uses are areas where forest management is tailored to benefit other identified resource values or uses. Such management practices are used on the woodland areas in the RMPPA, which contain aspen and other noncommercial tree species. Forest management activities, such as the harvesting of small or minor wood products, can be carried out on these lands to a limited degree. Management activities will be undertaken to benefit other resources or to respond to requests from the public, usually for firewood, posts, poles, Christmas trees, and wildlings.

Decadent aspen stands located on these lands may also be manipulated to allow for new vigorous sapling growth to enhance the stand and provide browse for big game.

Not Available for Forest Management Activities

Lands not available for management of forest products are areas of commercial forestland that have been withdrawn from the lands available for forest management activities. Forest management activities have been excluded from such lands because they have been determined to have other resource values of importance where forest management activities would result in severe impacts. These areas include wilderness study areas, historically protected areas, and wild and scenic river areas.

Monitoring

Monitoring of a stand generally begins 1 year after the stand's harvest/treatment. Continued monitoring is made on a scheduled basis during the next 3 to 5 years to make sure that stand's regeneration or the

treatment's desired results are adequate. Monitoring during the following 20 to 60 years will be done to establish the suitability for precommercial and commercial thinning to prepare the stand for possible harvest as a commercial timber product when it reaches maturity.

Monitoring is also done on individual forest stands to observe forest health conditions to help control the spread of insect and disease outbreaks.

STANDARD OPERATING PROCEDURES

Identification of Harvest/Treatment Areas

Specific forest stands are identified for harvesting or treatment on the basis of that particular area's need for management. High-priority areas of harvest and/or treatment are characterized by having mature timber, insect and/or disease infestation issues, growth stagnation conditions, poor forest health conditions, or hazardous fire fuels (1,000-hour fuels) buildup.

Environmental Assessment/Categorical Exclusion

EAs are prepared for all timber sales and/or major forest treatment projects by an interdisciplinary team. Potential adverse impacts on soil, water, air, wildlife, riparian, cultural, visual, socioeconomic, range, and recreation resources are analyzed. The use of temporary roads and the potential harvest/treatment unit are usually determined at this time.

Categorical exclusions (CX) are scaled-down versions of an EA that sometimes can be used in place of an EA for small-scale treatments, such as fuels reductions, pile/broadcast burning (also accompanied by a burn plan), and small thinning projects, that cover all the major elements listed in an EA but are less time-consuming to prepare. CXs are commonly used for projects with very minimal impact, surface disturbance, and/or other resource concerns.

Project/Treatment Design Features

Project/treatment design features are specific measures developed during the EA/CX stage by the interdisciplinary team to minimize adverse impacts on the environment. The project design will follow all rules, guidance, restrictions, stipulations, closures, mitigations, and/or monitoring within a project area as set forth by other resource concerns, e.g., cultural, wildlife, water, soils, riparian, air, visual, range, recreation, fire/fuels, and/or all other resource areas of possible concern. Project/treatment design features may differ slightly on a case-by-case basis, given the location of the project/treatment and/or the other areas of resources involved.

AGE CLASS DISTRIBUTION

The term "age class distribution" is used to describe the condition of the forest. Defined, it is the breakdown of age classes of trees within a forest. Age class distribution is a representation of the individual trees in a forest stand if the stand is uneven-aged. If the stands are even-aged, it is a representation of individual stands in a forested area.

Even-aged stands occur when the age difference among the trees forming the main canopy level does not exceed 20 percent of the age of the stand. Uneven-aged stands have a wide variety of ages.

Table A19-4. Structure Class Age and Characteristics

Structure Class/Age	Characteristics
Early Successional 0–5 years	Recently disturbed areas from harvesting or fire; trees just becoming established; mostly grass and forb vegetation.
Seedling 6–15 years	Tree seedlings are established, usually more than 1,500 seedlings per acre; trees less than 5 feet in height.
Sapling 16–50 years	Trees range in size from 1–5" DBH and up to 40 feet in height; preferred precommercial thinning time. Trees provide excellent elk hiding cover if tree density is high. Grass and forb vegetation production is greatly diminished; maximum net primary production of wood fiber.
Poletimber 51–80 years	Trees range in size from 5–7" DBH and up to 50 feet in height; approaching maximum wood fiber growth; trees reach commercial product size (for fence posts and corral poles).
Young Saw Timber 81–100 years	Trees more than 7" DBH; stand still growing well, with little mortality. Annual net primary productivity has already peaked, but economic value of stand steadily increasing as trees reach saw timber size. Small litter (needles) decomposition rate has reached the litter accumulation rate.
Mature Saw Timber 101–120 years	Net wood fiber growth declining from previous peak; mortality starting from MPB; site has reached its maximum leaf area index; large diameter downfall starting to accumulate.
Over-Mature Saw Timber 121–150 years	Net wood fiber growth continues to decline; MPB mortality could total over 50 percent of the large trees. Pockets of tree mortality provide opportunity for regeneration, creating a two-storied stand in places. Late successional species (e.g., subalpine fir) becoming more dominant.
Old-Growth >151	Stand starting to acquire old growth structural characteristics (dead trees, fallen logs, etc.). Buildup of fallen trees has increased the fuel loading of the stand, greatly increasing risk of loss from fire. Conversion of stand to a subalpine fir forest type is dependent on site conditions and availability of the fir seed source. A minimum age of 150 years is one "must" criterion used by the United States Forest Service in Region 2 for the old growth lodgepole pine forest type.

Source: SAF Cover Type Data

Table A19-5. Desired Target Mosaic by Forest Vegetation Type

Lodgepole Pine
Even-Aged Management • Early Successional .....2.5% • Seedling.....5% • Sapling.....17.5% • Poletimber .....15% • Young Saw Timber .....10% • Mature Saw Timber .....10% • Over-Mature Saw Timber .....30% • Old Growth Forest 20%
Spruce-Fir
• Other Successional Stages .....10% • Old Growth 90%

Ponderosa Pine	
Uneven-Aged Management	
• Various Successional Stages	80%
• Old Growth	20%
Aspen	
Even-Aged Management	
• Early Successional	<1%
• Seedling	5%
• Sapling	15%
• Poletimber	20%
• Saw Timber	20%
• Old Growth	40%
Woodland	
• Dense (>20% Crown Cover)	80%
• Open (<20% Crown Cover)	20%

Source: SAF Cover Type Data

OLD GROWTH

Definition

"Old-Growth" is defined in *The Dictionary of Forestry* (John A. Helms [ed.] Society of American Foresters. Bethesda, MD. 1998) as—

> *The (usually) late successional stage of forest development. Old-growth forests are defined in many ways; generally, structural characteristics used to describe old-growth forests include (a) live trees: number and minimum size of both seral and climax dominants, (b) canopy conditions: commonly including multilayering, (c) snags: minimum number of specific size, and (d) down logs and coarse woody debris: minimum tonnage and number of pieces of specific size.*
>
> *Old-growth forests generally contain trees that are large for their species and site and sometimes decadent (overmature) with broken tops, often a variety of tree sizes, large snags and logs, and a developed and often patchy understory. Stand age, although a useful indicator of old-growth, is often considered less important than structure because (a) the rate of stand development depends more on environmental factors and stand history than age alone, and (b) dominants are often multi-aged.*
>
> *Due to large differences in forest types, climate, site quality, and natural disturbance history (e.g., fire, wind, and disease and insect epidemics), old-growth forests vary extensively in tree size, age classes, presence and abundance of structural elements, stability, and presence of understory. The minimum area needed for an old-growth forest to be a functional ecological unit depends on the nature and management of surrounding areas; small areas often do not contain all old-growth elements.*

General Characteristics

A review of the definition suggests that old-growth forests are typically distinguished by the following characteristics:

- Large-size trees of specific species
- Wide variation in age classes and stocking levels
- Accumulations of large-size dead standing and fallen trees
- Decadence in the form of broken or deformed tops and boles
- Multiple canopy layers
- Canopy interspaces and understory patchiness.

Old-Growth Descriptions

Because the definition of old-growth is imprecise, with inherent subjectivity, the approach taken in the RMPPA was to develop old-growth descriptions of the major forest cover types found in the RMPPA. Measurable attributes (Table A19-6) are provided for each of these forest cover types and are from Mel S. Mehl, "Old-Growth Descriptions for the Major Forest Cover Types in the Rocky Mountain Region," in *Old-Growth Forests in the Rocky Mountains and Southwest Conference*. Portal, AZ, March 9–13, 1992.

Old-Growth Management

These above-mentioned descriptions will be used to evaluate areas before vegetation treatment to determine old-growth potential in the treatment units and the surrounding areas. The ROD for the RMP establishes the target percentage of old-growth in the RMPPA.

Areas determined to have old-growth potential and to be targeted as future old-growth stands may undergo some management activities (thinnings, prescribed fire, etc.) if those treatments enhance the old-growth objective for the forest stand.

Existence of "Old Growth" Within the RMPPA

Based on the above definitions and criteria, there are no old-growth forest areas identified in the commercial forest areas in the RMPPA; however, some areas of old-growth forest may exist within identified woodland and/or WSA area in the RMPPA. If old-growth forests exist in woodland and/or WSA areas in the RMPPA, these old-growth forest areas will be managed under the same provisions for woodlands and/or WSAs. Old-growth forest identification characteristics for forest areas in the region of the RMPPA are as shown below by forest type in Table A19-6.

Table A19-6. Minimum Criteria for Structural Attributes to Determine Old-Growth Forests in the RMPPA

Attribute	Spruce/Fir	Douglas Fir	Lodgepole Pine	Front Range Ponderosa Pine	Aspen	Pinyon-Juniper
Forest Cover Type, Saf Code	206	210	218	237	217	239
Standard Attributes						
Live Trees—Upper Canopy						
DBH/Drc	16	18	10	16	14	12
Trees/Acre	10	10	10	10	20	30
Age	200	200	150	200	100	200
Variation in Diameter	X	X		X	Q	X
Decadence	X	X	X	X	X	X
Multiple Canopy Layers	X	Q	Q		Q	
Dead Trees—Standing						
DBH/Drc	10	10	8	10	10	10
Trees/Acre	2	2	2	2	Q	2
Down						
Pieces/Acre	X	X	X	Q	Q	2
Additional Quality Attributes						
Slow Growing (Main Canopy)	X	X	X	X	X	
Canopy Closure 50% Plus					X	
Canopy Closure 35% Plus						X
Wide Range of Vigor	Q	X		X		
Net Growth Near Zero	X		Q			
Patchiness	X	Q	Q			
Many Stages of Decomposition	X		Q			
Multiple Tree Species			Q		Q	
Distinctive Bark	Q			Q		
Distinctive Crowns			Q	Q		

Attributes with an "X" or a numerical value are considered "must criteria." Those with a "Q" are quality criteria. The quality attributes are not required for old growth, but provide for higher quality old growth, if present. Any of the must criteria in excess of the minimums could also indicate a higher quality of old growth

DEFINING OLD-GROWTH PINYON-JUNIPER WOODLANDS

Definition

Old-growth pinyon-juniper woodlands consist of areas 5 acres or larger where more than 25 percent of the tree canopy cover is made up of trees 150 years or older. Juniper trees older than 150 years may be identified by their physical characteristics, which include a large diameter trunk (often twisted) and lower

limbs; rounded or irregular crown; deeply furrowed, reddish stringy bark; broken and dead branches; heart rot; and cavities.

Old-growth pinyon-juniper woodlands, according to the pre-fire exclusion condition, are generally characterized as having uneven-aged structure, with trees less than 150 years of age ranging from 5–25 percent of the total canopy cover. Understory plants consist of shrub, grass, and forb species consistent with the ecological site descriptions.

Management Direction

Activities using Healthy Forest Restoration Act (HFRA) authorities that alter vegetation in the old-growth pinyon-juniper woodlands described in the first paragraph in the above definition will be conducted in a manner that—

- Maintains 80 percent or more of the trees having the physical characteristics of trees 150 years and older contained in the definition on a per-acre basis
- Maintains 5–25 percent canopy cover in trees less than 150 years of age across the full range of age classes currently represented on the site on a per-acre basis
- Maintains the current understory vegetation condition or moves it toward the condition contained in the ecological site description, including plant composition, abundance, and vigor
- Limits the spread of exotic plant species into the site.