

# Ural-Tweed Bighorn Sheep Wildlife Mitigation Project

**Final Report  
1984 - 1990**



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URAL-TWEED BIGHORN SHEEP WILDLIFE MITIGATION PROJECT

FINAL COMPLETION REPORT

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*Abstract:* The results of habitat improvement project activities accomplished under contract #84-38 for bighorn sheep mitigation along Kooconusa Reservoir from September 1, 1984, through June 30, 1990, are reported here. Habitat treatments were applied to ten areas and covered 1100 acres. Treatments used were prescribed fire, slashing combined with prescribed fire, and fertilization. Several variations in season or intensity were used within the slashing and prescribed fire treatments. This project was coordinated with and complemented concurrent Kootenai National Forest habitat improvement activities.

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## INTRODUCTION

The Ural-Tweed bighorn sheep population, one of the two remaining native herds in northwestern Montana, occupies the steep slopes along the east side of Koocanusa Reservoir (Brown 1979, Yde et al. 1986). Previous studies conducted on the Ural-Tweed range determined the sheep preferred the bunchgrass communities under open stands of ponderosa pine and Douglas-fir (Ensign 1937, Brink 1941, Brown 1979). These results compare favorably to studies conducted on other bighorn populations (Couey 1950, Smith 1954, Geist 1971, Risenhoover and Bailey 1985, Shannon et al. 1975). The quality of the Ural-Tweed range for bighorn sheep has historically been related to fire which maintained the open bunchgrass communities. The abundance of fire scarred trees in the area (Brown 1979) and aerial photos taken in 1944 document the historical presence of numerous fires in the area adjacent to the Kootenai River.

Several factors lead to a decline in the population from an estimated 150-250 animals in the 1960's to approximately 2540 animals in the late 1970's. Construction of the Libby Dam hydroelectric facility on the Kootenai River resulted in the inundation of approximately 4300 acres of bighorn sheep winter and spring habitats. Additionally, approximately 600 acres of habitat were lost with the associated construction of Montana Highway 37. Thus, approximately 18% of the total initial range (27500 acres) has been irretrievably lost (Yde and Olsen 1984).

Fifty years of active fire suppression has also allowed ecological succession to progress. This resulted in increased encroachment of Douglas-fir (*Pseudotsuga menziesii*) into the open ponderosa pine (*Pinus ponderosa*)-bunchgrass community (vegetation names follow Hitchcock and Cronquist, 1973) with a resulting reduction of bighorn sheep forage. Stelfox (1976) noted the same type of fire suppression and resulting loss of bighorn sheep habitat due to advanced ecological succession in the Athabasca Valley, Alberta, Canada between 1921 and 1953. Dense stands of lodgepole pine (*Pinus contorta*) are also present as a result of several historic burns. Pre-treatment tree densities ranged from 1000-1500 stems/acre for trees larger than 1 inch dbh (diameter at breast height) with 90% of the stems between 1 and 4 inches dbh.

Habitat treatments reported in this paper were designed to produce habitat conditions preferred by the Ural-Tweed bighorn sheep herd. In accordance with the Pacific Northwest Electric Power Planning and Conservation Act of 1980, P.L. 96-501, a joint project between the Kootenai National Forest (USFS) and Montana Department of Fish, Wildlife, and Parks (MDFWP), funded by Bonneville Power Administration (BPA), was initiated in September, 1984, to mitigate the impacts of the construction of Libby Dam hydroelectric facility and Highway 37 on the Ural-Tweed bighorn sheep population. The portion of the project funded under contract #84-38 was directed at habitat improvement within bighorn sheep winter and spring ranges.

Monitoring of the vegetation and animal response to these treatments has been conducted by the Montana Department of Fish, Wildlife, and Parks with funding through contract #84-39.

The project area (Fig. 1) encompasses the current range of the Ural-Tweed bighorn sheep population and corresponds to the area studied by Brown (1979). This range extends along the east side of Koocanusa Reservoir from the Fivemile Creek drainage north to Holdup Gulch, an area of approximately 23,000 acres. The majority of the sheep range is located along the slopes directly above the reservoir; however, extensive seasonal use areas extend up three major drainages--Fivemile Creek, McGuire Creek, and Sutton Creek--and are also included in the project area. For a more detailed description of the project area see Brown (1979).

The range occupied by sheep is a series of broken, timbered, steep slopes (elevation 2500-5500 feet) with intermingled small grass/shrub openings.

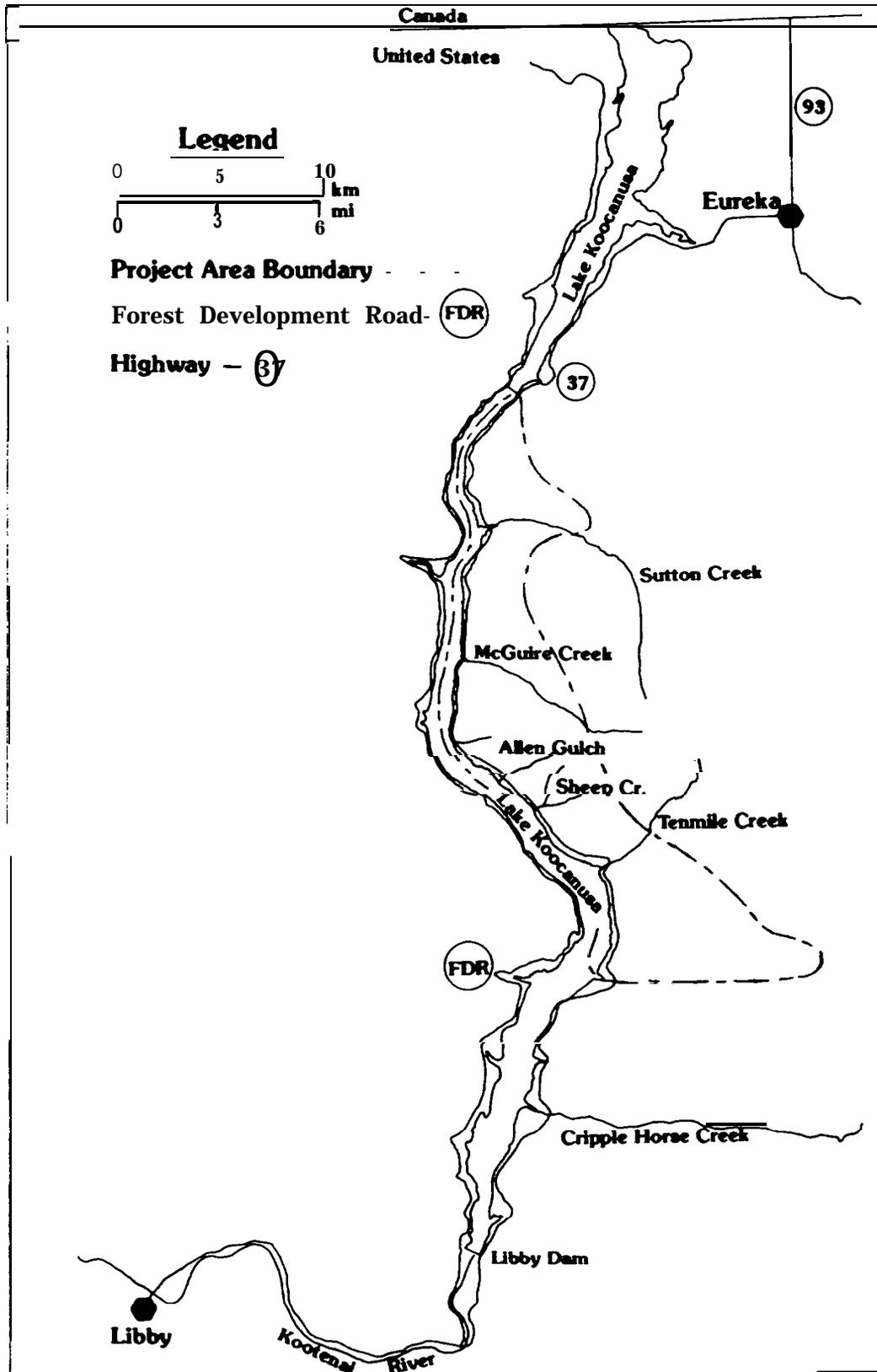


Figure 1. Map of the Ural-Tweed bighorn sheep mitigation project area.

## METHODS AND MATERIALS

The primary goal of all treatments was to stimulate production of understory vegetation while maintaining an open overstory of mature ponderosa pine and Douglas-fir. Reduction of the conifer understory was usually required to achieve the goal.

A combination of factors led to the selection of treatment areas. Animal use, habitat, size, and location were all evaluated. Sites were selected within areas of demonstrated animal use where habitat conditions were either deteriorating or already not considered to be good sheep habitat (such as the McGuire-Tweed unit). An attempt was made to select large units that were well spaced throughout the sheep range.

Although the primary emphasis for the BPA (and nearby USFS projects) was habitat improvement for bighorn sheep, due to the extensive nature of the treatments the designs incorporated considerations for other wildlife species. The units were well distributed throughout the entire sheep range to enhance habitat diversity and create a habitat mosaic (Fig. 2). Habitat diversity was enhanced on a unit basis by leaving small drainages, selected conifer covered benches, and patches of deciduous trees untreated. Prescribed fires further enhanced diversity due to the varying intensities that resulted from discontinuous fuels, variable fuel loadings, and the burning prescriptions. In an attempt to reduce the interspecific competition between big game ungulates on important bighorn sheep wintering areas, selected treatment units were actually designed to primarily benefit mule deer (*Odocoileus hemionus*) and moose (*Alces alces*)

### Treatments

Three basic habitat treatments were used singly or in combination.

1. Slashing.
2. Prescribed fire.
3. Fertilization.

Slashing.-Slashing (sawing down trees) treatments were used to achieve one or more of the following objectives:

1. Increase the fuel loading to create a desired fire intensity or behavior;
2. Directly reduce the conifer overstory--primarily regeneration or subdominant trees; and
3. Protect specific tree species and individuals from the effect of heating or consumption.

Three slashing techniques were used:

1. Broadcast. Slashing all conifers up to a specified diameter over the entire treatment unit. (except areas designated for no treatment to increase habitat diversity such as riparian areas.) Most commonly used technique.
2. Strip slashing. Slashing alternating strips 50-80 feet wide with the purpose of creating sufficient fuel to generate a fire that would carry into the unslashed strip and thin the canopy. Strip slashing was utilized in areas of dense, small diameter conifers to create a heavy fuel loading.
3. Hand piling. Like broadcast slashing except that slashed conifers were hand piled away from fire sensitive black cottonwood trees (*Populus trichocarpa*) to prevent them from being killed or injured by the follow up prescribed burn.

Sometimes more than 1 slashing technique was combined within a given unit. Slashing was accomplished by USFS saw crews or through contracting with a private company. Slashing was done manually within treatment areas using gasoline powered chainsaws equipped with conventional 18-24 inch bars. Slashing was conducted during all seasons of the year depending on the suitability of weather, terrain, and availability of crews. Slash was allowed to dry for at least one summer and normally 1 year or more before burning.

Prescribed fire.--Prescribed fire was used to meet one or more of the following objectives:

1. Rejuvenate decadent stands of shrubs, grasses, and forbs;
2. Reduce the conifer overstory--primarily seedling, sapling, and pole sized subordinate trees, and
3. Reduce slash accumulation from previous treatments.

Prescribed fire was used alone or as the final phase of slashing treatments. A specific burning prescription was written using the BEHAVE program (Andrews 1986) after the objectives for a unit were defined. This fire behavior computer program defines a range of climatic conditions and fuel moistures under which a fire would achieve specific objectives. Examples of burning prescriptions and wildlife prescriptions are found in Appendix 1.

Aspect, fuel loading, soil type, presence or absence of fire sensitive species, and desired level of conifer mortality were utilized in selection of the burning season. Spring and late fall burns were planned for areas containing the important fire sensitive browse species bitterbrush (*Purshia tridentata*). Soil moisture is usually sufficient during these periods to reduce the damage to plant root collars (Noste and Bushey 1987). These cooler season burns were also utilized when slashing had created heavy fuel loading and minimal damage (< 10% mortality) to the remaining trees was desired. Late spring and early fall burns were scheduled in areas where more intense fires were needed for slash reduction or to produce 15 to 75% mortality in conifers remaining. Late August burning was utilized in areas where fuel loadings were light and discontinuous.

Natural fuel breaks were utilized with only 2 exceptions where short hand-dug fire lines were built. State of Montana air quality guidelines for smoke management were followed.

Either hand or aerial ignition was used depending on the terrain and the size of the unit. Drip torches (using a mixture of 75% diesel fuel and 25% gasoline) or, infrequently, fusees were used for hand ignition. Aerial ignition was accomplished with helicopters (Bell JetRanger, Hughes 500) using a PREMO MARK III aerial ignition device. The aerial ignition device uses small plastic spheres (approximately 1 inch diameter) filled with potassium permanganate which are then injected with 2 cc of ethylene glycol and ejected from the machine. The chemical reaction causes the balls to burst into flame in approximately 20 seconds. Approximately 10 balls/acre was the normal ignition rate with the aerial ignition device.

Hand ignition was accomplished with Forest Service crews under the direction of the Fire Management Officer from the Rexford Ranger District. Normally, 4-8 crew members using drip torches walked in parallel lines along the contour of the burn unit at intervals of 30-150 feet. The interval between ignited strips depended on fuel loading and desired fire intensity. A holding crew patrolled along Highway 37 and any hand-dug firelines.

Aerial ignition was accomplished by igniting strips basically along the contour of the unit beginning at the uphill, downwind side of the unit. Width between ignited strips varied from 100-300 feet depending on the fuel loading and desired fire intensity. A holding crew patrolled along Highway 37 and along the hand-dug firelines.

Ignition generally took place after 1200 hours to take advantage of higher afternoon temperatures, lower humidities, and prevailing winds. Professional expertise of the Rexford Ranger District Fire Management Officer was also used to select time of ignition.

Fertilization.--Aerial application of fertilizer to open, rocky areas within the sheep range with the objective to improve the forage quality and quantity.

Several open, rocky, steep areas exist within the sheep range that do not lend themselves to slashing and burning type treatments. These areas contain scattered stands of grasses dominated by rough fescue (*Festuca scabrella*), Idaho fescue (*F. idahoensis*), and bluebunch wheatgrass (*Agropyron spicarum*). Due to the discontinuous fuels and broken topography these areas could not be effectively treated with fire.

A relatively flat, rocky bench with a vegetation composition similar to the steep, broken areas was chosen as a trial plot. The topography of the plot facilitated monitoring vegetation response which could not have been logistically accomplished on the majority of the proposed units. In 1986, a helicopter was used to apply 200 lb/ac of nitrogen fertilizer (20-0-0) to the test plot. The application was based on soil tests and the recommendation of the Forest Soil Scientist.

#### Coordination

The nature of this project--a joint venture between the Kootenai National Forest: Montana Department of Fish, Wildlife, and Parks: and Bonneville Power Administration--required intensive interagency coordination among the involved agencies. Coordination of the various aspects of the project included numerous interagency meetings and field inspections to design, implement, and monitor the habitat treatments.

Another important aspect of the coordination involved the USFS Kooconusa Whirlybird Timber Sale. The timber sale was designed to enhance bighorn sheep habitat and was implemented concurrently with the BPA funded project. The BPA habitat treatment units were designed to integrate with and complement the timber sale habitat treatment units.

## RESULTS

Habitat enhancement work was initiated in the fall of 1984 and continued through 1990. A total of 10 treatment units were accomplished with 1100 acres of habitat enhanced for bighorn sheep and mule deer winter and spring range (Table 1, Fig. 2). Five of the habitat improvement treatment sites were located between the reservoir and Highway 37, four above Highway 37, and 1 on the west side of the reservoir. Size of treatment units ranged from 25 to 280 acres. Table 1 details the treatment type, season, year, and size of each accomplished unit. Fig. 2 illustrates juxtaposition of the treatment units.

The amount of work, and therefore the cost, needed to accomplish treatments varied both between the type of treatments and for a particular type of treatment. Table 2 gives the costs associated with the treatments. The variation in cost was related to the type of crew used (USFS or contract), extent and type of slashing, terrain (work in rough terrain was slower), and the size of the unit (unit costs generally lower for larger prescribed fires).

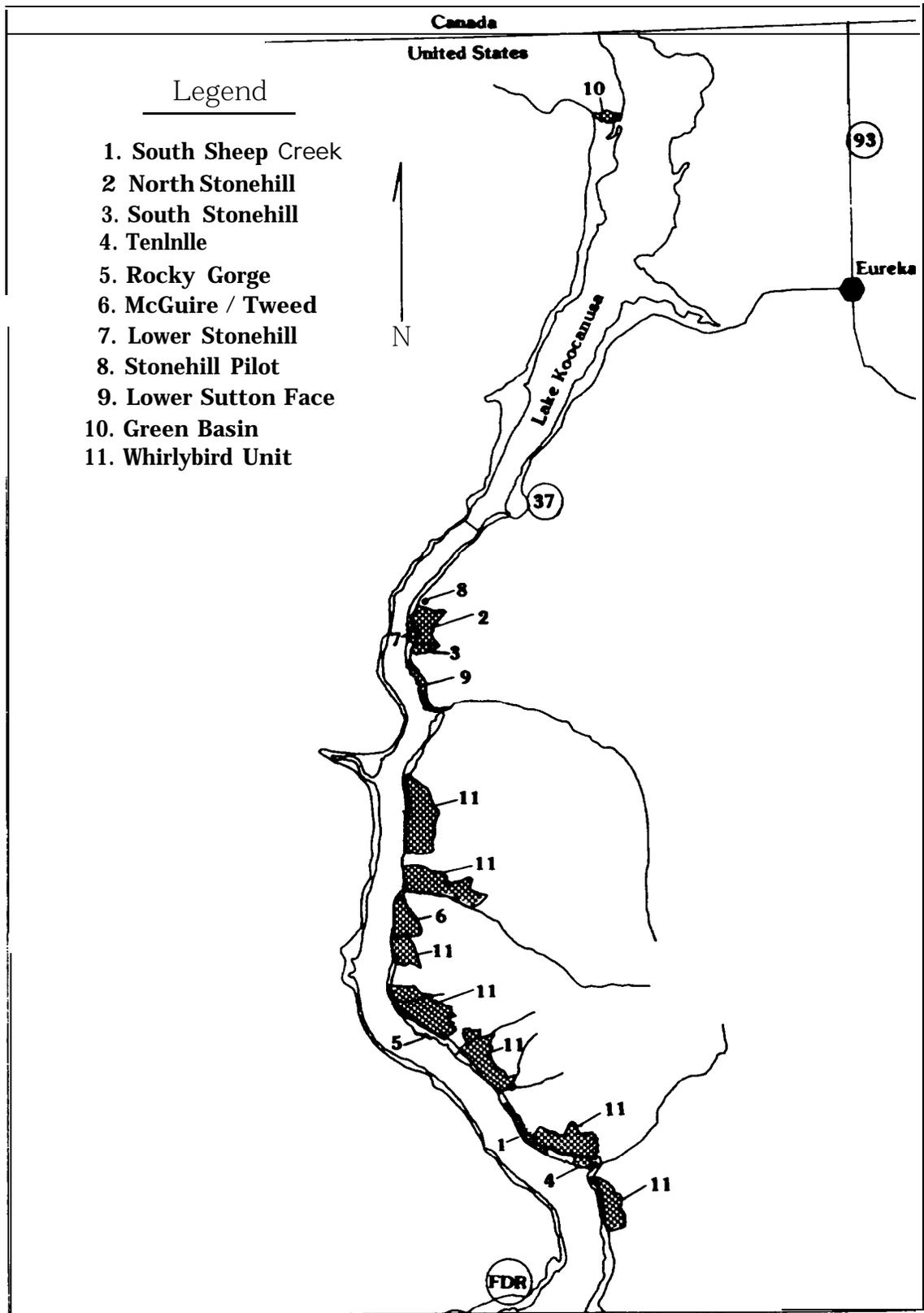


Figure 2. Location of the Ural-Tweed bighorn sheep habitat enhancement projects and their juxtaposition to the Whirlybird helicopter logging units.

Table 1. Habitat treatments and unit sizes on the Ural-Tweed bighorn sheep range in northwestern Montana

Unit name	Treatment	Size (ac)
South Sheep Creek	slash 1984/burn late spring 1987	120
North Stonehill	slash 1985/burn late summer 1987	280
South Stonehill	strip slash 1985/burn late summer 1987	140
Tenmile	slash 1985/burn spring 1988	100
Rocky Gorge	slash & handpile 1985/burn fall 1985	30
McGuire-Tweed	slash 1986/burn late summer 1987	140
Lower Stonehill	prescribed bum spring 1986	85
Stonehill-pilot	fertilize spring 1986	25
Lower Sutton Face	prescribed bum spring 1988	100
Green Basin	slash spring 1990	80
	total	1100

Table 2. Costs associated with habitat treatments between 1984 and 1990 on the Ural-Tweed bighorn sheep range in northwestern Montana.

Treatment	Cost (\$/ac)
spring burn	15-36
late summer or fall burn	30-80
slash	40-1 32
strip slash	64
slash and hand pile	93
fertilization	128

#### Habitat Treatment Units

Habitat treatments accomplished from September, 1984, through June, 1990, are described by unit as follows:

South Sheep Creek.--This area, located below Highway 37, consists of approximately 120 acres of south- to southwest-facing slopes. The area was at one time a more open ponderosa pine/bunchgrass community; however, conifer encroachment, including ponderosa pine and Douglas-fir, reduced the forage production potential of the site.

Treatment prescribed for the unit was broadcast slashing followed by a high intensity prescribed fire with the objective of significantly reducing the canopy coverage of conifers. Based on a field review, it was decided to slash all conifers < 10 in. dbh to reduce canopy coverage and increase the fuel load for later prescribed burning.

This area has potential to provide yearlong habitat to the bighorn sheep population. Past (Brown 1979) and current observations indicate the bighorn sheep use this area and adjacent habitats, with preference for the area demonstrated during the winter and spring periods. Numerous bands of sheep have been utilizing this area during the current project.

This unit complements the habitat treatment on the adjacent unit of the Kooconusa Whirfybird Timber Sale.

1984. The majority of the young conifer < 10 in. dbh were slashed during October and November by USFS saw crews and left to dry. While some of these trees were of limited commercial value, a combination of topography, logistics, and economics precluded any commercial timber harvest by conventional means.

1985. A prescribed fire was scheduled to be completed during the fall of 1985. Due to unfavorably wet conditions during August and September, the prescribed burn was not accomplished and was rescheduled for fall 1986.

1986. Again, unfavorable wet conditions during September and early October precluded any attempt to burn the area. The burn was rescheduled for fall 1987.

1987. The unit was burned in late spring (May 8-10). Very dry, warm conditions created a situation whereby the objective for killing overstory trees could be achieved in the spring rather than waiting for the fall as in the original prescription. Another concern that contributed to changing to a spring burn was that the slash had been down for two years already and waiting any longer would have reduced the fine fuels needed to achieve the prescribed high intensity fire.

The unit was ignited with a USFS crew using drip torches. A thunderstorm blew in shortly after ignition was begun and halted work for the day. The remainder of the unit was ignited on the following 2 days.

Due to the visual sensitivity of this unit between the reservoir and Highway 37 and the number of merchantable trees killed by the fire, most of the fire killed trees were sold to and harvested by the helicopter logging company that was working on the adjacent USFS Kooconusa Whirfybird timber sale.

North Stonehill--A 280 acre treatment area within the 1958 Stonehill burn was scheduled for slashing followed by prescribed fire.

The area is utilized yearlong by bighorn sheep, mule deer, and moose, with some use noted by elk, and is important winter range for the first three species. Therefore, increased forage production of grasses, shrubs, and forbs was the primary management objective while maintaining stands of conifers to provide thermal and security cover.

The area contains a series of south- to west-facing benches largely covered with dense conifer regeneration. The area also contains fairly abundant bunchgrass and shrub foraging areas. The slashing treatment was designed to add significant fuel loadings to the available ground fuels. Due to the discontinuity of the fuels it was expected that patches of conifers will remain unburned and would serve as thermal and security cover for the big game species utilizing the area

1984. No treatment was completed.

1985. The slashing was completed during the fall and winter using USFS crews. Broadcast slashing was used over much of the area but especially on the southwestern portion. On most of

the ledges with dense strips of lodgepole pine the slashing was more strip oriented to generate a fire that would carry into the remaining conifers. On the northwest part of the area, strip slashing was also used in a larger patch of small lodgepole pine. Strips about 40 feet wide were cut both along the contour and up and down the slope.

1986. A joint field review of the area after the slashing was completed resulted in revision of the wildlife prescription for the area. Concensus during the review was that the prescribed bum should be planned to remove more of the remaining conifers than was originally planned. The burn prescription was revised to utilize an ignition pattern that would result in the majority of the remaining conifers being killed. Also at the same field review it was decided to bum both this unit and the South Stonehill unit at the same time since during a fall bum the small creek channel separating the two areas would not be sufficient to prevent the spread of fire to the adjoining unit.

During the summer, the slashed fuels were checked for gross moisture conditions. The slashed trees on top of the piles were dry, while those toward the bottom were still green and maintaining high moisture conditions. This indicated the two-year drying time was necessary.

1987. Based on fire management personnel concerns about potential adverse effects on soil and bunchgrasses by high intensity fire with a fall burn on the southwestern slope, it was decided to burn the unit in two sections. The lower elevation, southwestern and western slopes would be burned in the spring and the remainder in the fall as originally planned.

In early April the southwestern and western slopes were ignited using a helicopter and the PREMO MARK III aerial ignition device.

In late August the remainder of the unit was aerially ignited. The adjoining South Stonehill unit was ignited at the same time.

South Stonehill.--This area, a west- to northwest-facing slope within the 1958 Stonehill burn, is approxiamately 75 acres of dense, diverse shrub, deciduous tree, and conifer regeneration. The area is extensively utilized by mule deer and moose throughout the year. Bighorn sheep seldom utilize the area for foraging probably due to the dense conifers. However, they frequently travel through the area as they move between adjacent habitats which they use frequently.

The treatment designed for the area was strip slashing followed by a prescribed fire. Alternating 50-80 feet wide strips were slashed with the objective of creating sufficient fuel to generate a fire that would carry into the unslashed strips and further reduce the conifer overstory.

Enhancement of the area for use by mule deer and moose will reduce competition for forage on other sites used more frequently by bighorns. Movement through the area by bighorns will be facilitated by reducing the conifer overstory and more suitable foraging sites will be available for bighorns.

1984. Treatment planning was accomplished; however, no on-the-ground treatment was accomplished.

1985. The area was slashed during November and December using a contract crew.

1986. No habitat treatment was completed during 1986; however, the burn prescription was revised to incorporate the burn into a joint aerial ignition project with the North Stonehill unit.

1987. The area was ignited in late August by the USFS using a helicopter and the PREMO MARK III aerial ignition device. This was done at the same time as the adjoining North Stonehill unit.

**Tenmile.**--This is an area of approximately 100 acres at the mouth of Tenmile Creek between Highway 37 and Lake Koocanusa. The area contained a multi-story conifer canopy. A past fogging operation removed selected mature conifers prior to the Libby Dam project.

Treatment planned for this unit was a broadcast slashing of all conifers < 10 inches dbh followed by a prescribed fire. The objective of the fire was to significantly reduce the small conifers but leave the mature ponderosa pine, Douglas-fir and larch. The riparian habitat along Tenmile Creek and another smaller drainage were targeted for non-treatment, preserving important habitat components and diversity.

The grassy meadow at the mouth of Tenmile Creek received relatively heavy recreational use during the spring, summer and early fall months. To preserve the importance of the area to wildlife and protect the investment in habitat enhancement the access road to the area was scheduled to be permanently closed.

The area receives use by mule deer, primarily during the winter and spring months. Bighorn sheep travel through the area on a regular basis. Because the area is used as a traditional travel corridor for yearlong bighorn sheep movements, it is felt that the habitat enhancement will be used by sheep as a foraging area.

1984. No treatments were conducted. Project planning was initiated.

1985. The conifers < 10 in. dbh were slashed using USFS crews.

1986. In November, a Forest Service crew closed the access road into the area with an earthen barrier. The road closure will maintain the value of the area for wildlife and protect the investment already made in habitat enhancement. The earthen barrier was breached twice during the summer by people filling in a 3-4 feet deep ditch.

1987. The earthen barrier was replaced with a locked, swinging metal gate.

People again managed to get past the gate by filling in part of a ditch. A dumptruck load of boulders up to 3 feet diameter was placed to block vehicle access around the gate. No further unauthorized use of the road has been noted.

1988. The unit was ignited by USFS crews using drip torches in mid-April. The unit was burned on the cool end of the fire prescription to minimize the mortality of larger overstory trees so the consumption of the slash was not as complete as hoped.

**Rocky Gorge.**--Several small peninsulas along the east shore of Koocanusa Reservoir comprising about 30 acres receive extensive use by mule deer and limited use by bighorn sheep. A large mineral lick located within the area is utilized seasonally by both species. All the peninsulas were within the area cleared during the initial construction phase of the Libby Dam project, and had revegetated into relatively dense stands of lodgepole pine.

The original prescription was to use bulldozers to remove the conifers and prepare a seedbed for drilling or broadcast seeding grasses and legumes. Fertilization of the seeded area was also planned. Cultural resources on the area precluded use of bulldozers, therefore the prescription was changed to slashing and burning.

This treatment complimented two existing treatment areas. In 1984, the USFS thinned an adjacent stand of ponderosa pine to create a seed cone plantation. The conifer thinning was consistent with winter range habitat treatments for mule deer and bighorn sheep. A large unit of the Kooconusa Whirlybird Timber Sale, designed to enhance the sheep range, also lies adjacent to the area. The combination of these treatments and the remaining untreated bench to the northwest is considered to be an effective mixture of daily and seasonal habitat components.

1984. No treatments were conducted in 1984.

1985. Using a 10-person USFS crew, 15 acres of young lodgepole pine were slashed and piled for burning during July and August. On one peninsula where numerous small cottonwoods (*Populus trichocarpa*) were present, the slashed conifers were piled away from the cottonwood stands to prevent damage to them during the prescribed burning. It was decided to maintain the cottonwood trees within the area in an effort to preserve habitat diversity, which should be more attractive to a larger number of wildlife species, particularly cavity nesters and those avian species dependent of the deciduous tree canopy. The slash piles were burned in October with the fires allowed to wander through the entire area.

A metal swinging gate was installed on road #14008 to restrict motorized traffic and subsequent human harassment within the Rocky Gorge area.

1988. The Forest Service conducted an underburn within the adjacent seed cone plantation. Part of this latter fire burned into the eastern-most control unit, but did not modify a very large percentage of the area.

1987. Based on field reviews, it was decided to delete the seeding and fertilization treatment due to the tremendous response of native vegetation after treatment.

McGuire-Tweed.--Originally, 140 acres of slashing and burning were scheduled for Holdup Gulch on the northern end of the sheep range. Based on a field review by the project biologists, an area between McGuire and Tweed creeks was selected for treatment in place of Holdup Gulch. Selection was based on good spatial relationship to other treatments, sheep use of the area, and current vegetative conditions that could be effectively treated by slashing and thinning. Holdup Gulch, Sutton Face and Sheep Creek (above the highway) were reviewed but not selected due to being located close or adjacent to areas already or soon to be treated, or still having a fairly good vegetative condition.

McGuire-Tweed area is a relatively steep, west-facing slope bisected by a series of rocky benches. Bighorn sheep use the area yearlong; sometimes as a travel corridor, while at other times they utilize the area for a period of days to 2-3 weeks.

Treatment planned was a broadcast slash of conifers > 8 inches dbh over the majority of the area, strip slashing in a small patch of lodgepole pine, and followed by a prescribed fire.

1984. No work was completed on this treatment.

1985. No work was completed on this treatment.

1988. A review of several areas was made and the McGuire-Tweed Creek site selected for a slash and prescribed burn treatment. A six-man USFS crew slashed approximately 140 acres in October. Generally all conifers <8 in. dbh were slashed. Aspen groves and conifer stands in draws were left unslashed to provide vegetative diversity, cover for big game other than bighorn sheep, and

watershed protection. A few areas of very dense, small diameter trees were slashed with 100-ft cut strips alternating with 50-ft. leave strips.

1987. The unit was ignited in late August using a helicopter and the PREMO MARK III aerial ignition device. The normal September rains failed to materialize so this unit continued to burn until about mid-November. The fire burned well outside the planned unit, but it stayed within wildlife winter range so no suppression action was taken except for a small area along McGuire Creek to keep it from spreading across the creek to the north. This fire also burned the adjoining Tweed Creek unit of the Kooconusa Whirlybird Timber Sale which was planned for burning the following spring anyway. The fire reached a total size of about 800 acres.

Lower Stonehill.--This area of approximately 85 acres is located within the 1958 burn which scorched the west slope of Stonehill. The area is a relatively flat bench with a steep west-facing slope to Lake Kooconusa. Mule deer and moose use the area yearlong, while bighorn sheep utilize the area and adjacent habitats primarily during the winter months. The area was divided into a 30 acre control and 55 acre treatment unit.

Originally, a fall prescribed burn was scheduled to reduce the amount of conifer regeneration and stimulate the shrub production within the area. The fall burn was selected since the area contained low ground fuel loads, and it was believed that a fall burn would be more intense and have a greater chance of killing more of the conifer regeneration. After further field inspections of the site, fire management personnel concluded that similar results could be obtained with a spring burn and that would allow for an extra burning window during the year.

Selected areas of deciduous shrubs were targeted for protection from the burn. These large, robust shrubs add increased habitat diversity to the area and are heavily utilized by a number of avian species.

A cultural resource site required special treatment to protect it. A low-intensity ground fire was used within 20-30 feet of the site on the day preceding the main burn to create a fire break and greatly reduce the heat at the site.

1984. No treatment was completed.

1985. The fall prescribed burn was postponed due to wet, unfavorable conditions.

1986. Approximately 55 acres were burned in two stages. In late March a strip along the upper side adjoining Highway 37 was burned to create a blackline on the uphill side. Then, in early April, the remainder was burned using a USFS crew of eight people. An ignition pattern was used that created the hottest possible fire given the generally light fuels. The spring burn was a change from the originally planned fall burn. The change of seasons was based on the fire management specialists' evaluation of the fuels, aspect and elevation of the site. Their analysis indicated that similar results would be obtained with either spring or fall burning. The change to the spring burn also benefitted the bitterbrush present on the site due to the greater resprouting rate with spring burns.

Immediately after the burn, a 33 percent mortality of the conifers was estimated. By mid-summer the mortality was estimated to approximate 46 percent (Yde et al., 1986).

The conifer mortality was lower than 46 percent across the majority of the area; however, the fire caused almost 100 percent mortality within a dense stand of lodgepole along the south side of the unit. This mortality increased the overall kill for the treatment.

To further enhance the area by reduction of the conifer overstory, the area was selectively slashed by USFS crews during the fall.

**Stonehill fertilization Pilot-Several areas throughout the sheep range contain stands of bunchgrasses.** The majority of these stands are on steep, rocky slopes unsuitable for most habitat enhancement treatments such as prescribed fire. In an attempt to improve these stands it was decided to experiment with aerial application of fertilizer. **A 25 acre** trial plot plus seven other areas were initially selected for fertilization treatments.

The Stonehill Pilot is about 25 acres on a relatively flat bench with a mixed grass/shrub community. Its location, accessibility and vegetative community made the area a good site for the pilot program. Additionally, bighorn sheep utilize the **area extensively during winter, spring and early summer.** Mule deer also make yearlong use of **the area.**

1984. No work accomplished on this project.

1985. The area was selected for the pilot fertilization area. Soil samples were taken from the area and analyzed to determine the best fertilizer composition to apply to **the area.**

1986. The 25-acre plot was separated into a 17-acre treatment and an **8-acre** control. In early June, the fertilizer was applied to the test plot using a spreader slung below a helicopter. The fertilizer (21-0-0 nitrogen) was applied at a rate of approximately 200 lbs./acre. Good rainfall **throughout the** remainder of the month served to move the fertilizer into the soil where it was available for uptake by the vegetation.

1987. vegetation monitoring under project #84-39 continued

1988. Vegetation monitoring under project #84-39 continued.

Based on the results of the monitoring (Yde. in press), it was decided to delete the remaining scheduled fertilization treatments. Monitoring detected a positive vegetative response for 1-2 years, but showed a rapid decline back to control plot production levels.

**Lower Sutton Face.**--A prescribed burn was scheduled to modify approximately 100 acres of habitat on this bench above the reservoir. This area contains extensive **stands of mixed shrubs** which are currently being encroached upon by conifer regeneration. The treatment has been designed to reduce the conifer regeneration while stimulating the forage species - mixed shrubs and grasses.

The area currently receives yearlong use by mule deer and moose, with winter use by bighorn sheep. During periods of deep snow, the area increases in value to wintering bighorn sheep.

1984. The initial treatment prescription was developed.

1985 No work was completed on this unit.

1986. Project review was completed by an interagency team. The original prescription was modified and the prescribed burn was scheduled for spring 1987. In order to help reduce the young conifer regeneration, the area was opened to commercial Christmas tree harvest during December 1986.

1987. The season of bum was rescheduled from spring to fall in order to provide a contrasting season comparison between this and the Lower stonehill bum and keep this dispersed recreation site from being black through much of the recreation season.

In June, another field review led to changing the prescribed fall bum to a spring bum. It was a consensus that a spring bum would be more beneficial to the bitterbrush which is an important component of the shrubs on the site.

The area was opened to commercial Christmas tree harvest again this year.

1988. The unit came into prescription and was burned in mid-April. USFS crews used drip torches to ignite the area.

Green Basin.--This area was substituted for an area originally planned in Volcour Gulch. It is an 80 acre area of ponderosa pine and Douglas-fir on the west side of the reservoir and outside the bighorn sheep range, but in heavily used mule deer and white-tailed deer range.

The prescription for the area was slashing and prescribed burning with an objective of opening the overstory except in selected thick patches of Douglas-fir that were retained as snow-intercept and hiding cover, and visually sensitive areas along the reservoir and Young's Bay access road. A spring burn was prescribed to obtain the maximum amount of resprouting from the bitterbrush which is a major component of the understory. The prescribed fire follow-up to the slashing is planned for completion under the long-term plan.

1988. The area was designed for inclusion in the short-term plan.

1989. Interagency field reviews confirmed the slash and prescribed fire prescription.

1990 USFS crews completed the broadcast slashing during April.

#### Treatment Unit Modifications

Both the actual site and prescription for habitat treatments were sometimes modified during the life of the contract. When field reviews indicated that a change would be more beneficial than what was originally planned, prescriptions were changed or a contract modification was obtained where necessary. For example, the habitat treatment scheduled for the Holdup Gulch area was moved to the McGuire-Tweed Creek area. Based on interagency field reviews, it was felt that this would result in an increased benefit to the bighorn sheep project. Changes in the prescriptions were discussed for each treatment unit.

Contact modifications were obtained to delete or substantially modify originally planned treatments as shown in Table 3.

Table 3. Planned treatment units on the Ural-Tweed bighorn sheep range that were deleted or changed through contract modifications.

Unit name	Treatment	Size (ac)
Rocky Gorge	seed grasses, legumes	30
Allen Gulch	seed grasses, legumes	20
Sutton	fertilize	70
Tweed	fertilize	25
Allen Gulch	fertilize	30
Sheep Creek	fertilize	15
Pack Rat	fertilize	20
Holdup Gulch	slash/burn, changed to McGuire-Tweed	140
Volcour Gulch	burn, changed to Green Basin	200

## DISCUSSION

A number of effects have been observed from the various treatments used on the bighorn sheep range. Many of these have biological, logistical, political, and social implications for future treatments.

It became apparent very early in the project that flexibility was needed in scheduling treatments. Unfavorable weather often caused prescribed burns to be postponed or rescheduled, and narrow burning prescription 'windows' increased the probability of delays. In some cases, burns were delayed 23 years.

Large treatment units (85-280 ac) were used with a few exceptions. These were well distributed throughout the range. Large units are expected to benefit bighorn sheep by reducing intraspecific and interspecific competition as well as providing larger total quantity of forage. A habitat mosaic was obtained within each of the units due to the variations in topography, fuel loadings, and vegetative conditions throughout a large unit. This mosaic helped ensure the suitability of the unit for bighorn sheep use following treatment. Also, the per acre costs of prescribed burning was reduced.

Aerial ignition was demonstrated to be the most efficient and practical technique for prescribed burning large units and rugged terrain. A 6-8 person crew could safely ignite approximately 100 acres on gentle to moderately rough terrain in one daily burning period while up to 1000 acres could be safely ignited in any sort of terrain in the same amount of time using the PREMO MARK III aerial ignition device. Rapid ignition capability also permitted us to take advantage of short-lived, yet favorable weather conditions to complete several burning units. For example, on August 28, 1987, using one helicopter, 3 areas totaling over 500 acres were ignited in one afternoon.

The PREMO MARK III aerial ignition device worked well where fine fuels (such as grasses, litter, and slash with dead conifer needles) were available. Hand ignition worked well in all fuel types and was the most precise method. It was especially valuable in heavy fuel loadings where the pattern and rate of ignition was critical to meet an objective of retaining most of the mature overstory conifers.

The response of bitterbrush in the Lower stonehill unit demonstrated that bitterbrush stands of this species can successfully be treated with fire. A high soil moisture content at the time of the spring burn plus a low fire intensity seemed to contribute to good resprouting of the mature plants. An estimated 75% of the bitterbrush plants resprouted following burning (Yde, in press).

Retention (or lack thereof) of needles on conifer slash is critical to achieving fire intensity, and fire intensity is directly related to achievement of desired objectives. It was much easier to generate the fire intensities needed to meet objectives where the pine and fir needles had dried but not fallen off the branches. Treatments on the Ural-Tweed bighorn sheep range as well as elsewhere on the Rexford Ranger District of the Kootenai National Forest have demonstrated that Douglas-fir will retain a majority of its needles for a maximum of 1 year after slashing and ponderosa pine and lodgepole pine will retain needles for up to 3 years. In one case in heavy lodgepole pine slash on a BPA treatment unit, green needles were still present near the ground after 1 year. Because of the difference in needle retention, units with predominately Douglas-fir slash were much more critical for scheduling and accomplishing the prescribed burn than those units with ponderosa pine or lodgepole pine.

Needle retention is also directly related to the visual effects of prescribed burning. Since all of the treatment units are visible from Kooconusa Reservoir and a major highway, visual effects were important. Standing dead conifers with 'red' needles are visually objectionable to certain portions of the public, but it is a short-term impact since the needles drop over a 1-3 year period.

Fuel loadings created by slash were directly related to the ability to achieve a desired level of conifer mortality. This was true for all size classes of trees. On treatments where an objective was to remove sapling and pole sized conifers (5-10 inch dbh), it was generally necessary to slash most of those trees to achieve the desired results. Where the intermediate sized trees were common, the fire intensity created by slash from smaller conifers was not adequate to achieve the desired mortality levels.

Under warmer and drier conditions, burning produced the desired results of slash reduction and 25-75% mortality of the remaining conifers.

Large ponderosa pine on the South Sheep Creek unit that were stressed by a late spring burn were observed to become more susceptible to attack by mountain pine beetle (*Dendroctonus ponderosae*) and western pine beetle (*Dendroctonus brevicornis*). These trees were stressed immediately prior to the major flight of the pine beetles. The objective of the slashing and prescribed burn treatment was to kill 20-30% of the mature overstory and that was the initial result. However, after the infestation by the pine beetles, the mortality increased to 50-60%. The total mortality was significantly increased over that caused by the prescribed burning alone and the secondary (indirect) effects need to be considered in defining future treatment objectives.

Use of timber harvesting to achieve wildlife objectives increased public acceptance of the project because the local economy is based largely on forest products. Social and political support is needed for the long term habitat management of the Ural-Tweed bighorn sheep range. Commercial Christmas tree harvest was used on the Lower Sutton Face unit and fire-killed trees were harvested by helicopter from the South Sheep Creek unit.

Fertilization was demonstrated to have only short-lived benefits to forage quantity. Fertilization was also less cost-effective than other treatments since the benefits lasted a shorter time than the slashing and prescribed fire treatments. Pearson et.al (1989) also described fertilization as not being economical when applied to native forages to improve nutritive value or yields.

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**APPENDIX**

**Wildlife Prescription  
and  
Burning Prescription  
for**

**North Stonehill**

**and**

**South Sheep Creek**

WILDLIFE PRESCRIPTION

Stand No. 18-3-16  
North Stonehill

Photo No. 147

Area: 300 A.

Slope: Flat benches in between  
steep rock cliffs-some 40-60%.

Elevation: 2800 -4400

Aspect: W-NW

Successional Stage:  
Grass/Forb-j Pole/Sapling

Habitat Type  
DF/Phma & DF/Fesc

Fuels: Light but continuous  
on benches.

Site Productivity: Low for  
timber, Moderate for forage.

Wildlife Species to manage for:  
Bighorn sheep, MD, Moose Elk

Vegetation Species to manage for:  
Fesc, Feid, Amal. Ceve, Privi.  
PP. DF

Land Managements Objectives: Management Unit 10 - Same objective as other  
prescription.

Present Stand Situation: The stand was burnt by wildfire in 1958. The benches have restocked in heavily with DF, PP and LP. There has been no stand examine data collected on the area, but the densities are >500 TPA on the benches and in a small stand on the NW corner of the area. The benches and side hills that do not have trees on them are covered with bunch grasses and browse species with some forbs. The bunch grasses are predominately Fesc, Feid and Agsp. The browse species are: Amal, Salix, Ceve, Cese, Privi, Phma, Hodi. Syal and some Acgl. The stand is presently receiving light to moderate use by moose, mule deer, bighorn sheep and elk. The preferred browse species of Sslix, Amal. Privi are in Form class 2 or 3. The grass species appear to be receiving light use.

Because of the light use on the grasses there has become a high amount of decadence within the crown therefore reducing the production that the site is capable of. Also some of the browse species have been hedged severely enough that the vigor and production of these species is in a downward trend. Also some of the browse species have died due to the shading effect from the conifer reproduction that has reestablished itself.

Proposed Treatment: In order to reduce the stocking level of trees on benches and rejuvenate decadent browse species and grasses, fire will be induced on the entire area by the use of the helicopter drip torch. Prior to fire - a force account slashing crew will cover the benches and spot slash in order to add additional fuels on the ground in order to allow fire to get into the crowns of dense pockets and thin out the timbered pockets.

Flame heights should be in the 2-7 foot range in order to get into the crowns and carry into the timber pockets.

There are two control areas within the stand that will be flagged in blue and will not have any slashing or fire introduced into the areas (See Photo).

It is recommended that the preferred treatment of this area with fire will be fall. If it is to be burnt in the fall then it could be ignited with the South Stonehill unit.

Alternative Treatment: An alternate treatment to the area would be just to burn the area with the helicopter drip torch without any prior slashing treatment.

Proposed Treatment Schedule:

Fall	- 1985	- Oct-Dec	- Spot Slash
Fall	- 1986	- Sept-Oct	- Burn (preferred)
Spring	- 1987	- May-April	- Burn (alternate)

SLASHIXG SPECS

The stand in the northwest corner will have a 20 ft strip left above the cut bank. From there a 50 ft leave strip will be left then another 50 ft strip will be slashed. This should continue up the stand until the meadow is reached. The rest of the treatment area is made up of timbered stringers. One half of these stringers, unless >100 ft wide, will be slashed and then every 100 ft cut a 50 ft swath clear through the stringer. In the stringers all PP & WL >8 ft tall should be left. If the stringer is greater than 100 ft wide just slash a 50 ft swath on the lower edge of the stringer.

The south side of the area (see map) is a PP stand and this will be thinned leaving PP > 5" dbh where these are clustered thin to 25 ft spacing plus or minus 5 ft.

Donald Godtel  
Wildlife Biologist

BURNING PLAY COVER PLAN

5150

PRESCRIBED BURNING PLAN

NORTH STONEHILL

Burning UNIT

REXFORD Ranger District

Kootenai NATIONAL Forest

Prepared By: \_\_\_\_\_ Date: \_\_\_\_\_

Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_

The approved Prescribed Burning Plan constitutes the authority to burn. so one has authority to burn without an approved plan or in a manner not in compliance with the approved plan. Actions taken in compliance with the approved Prescribed Burning Plan will be fully supported. Peronnel will be held accountable for actions taken which are not in compliance with the approved plan regardless of the outcome of the burn. The same level of authority required to approve the Prescribed Burning Plan is required to amend the plan. This project and plan are rated as Complex X , Intermediate , Non-Complex . pursuant to R-1 1981 Fuel Management and Treatment Guides

Approved by \_\_\_\_\_ date: \_\_\_\_\_

ACCOUNTING COST: 000929  
 EST. COST/ACRE: \$30

SALE: Stonehill Unit: 3 Final COSTS: \_\_\_\_\_  
 Location T35n R28W SEC. N 24. S 13 TOTAL COST/ACRE: \_\_\_\_\_  
 STAND: 18-3-16.10 ACRES: 190 ELEVATION: TOP 4000 BOTTOM 2700  
 DRAINAGE: Lake Kooconusa SLOPE: 20-60 X ASPECT: VNW  
 HABITAT TYPE: \_\_\_\_\_ NFDR FUEL MODEL: \_\_\_\_\_ F.B.FUEL MODEL: 5/11

FUELS: NATURAL X ACTIVITY x AGE 2 YRS ASSESSMENT L M H x  
 DOWN WOODY PRIVATE PROPERTY ADJACENT None  
 0-1/4" 1.9 T/A DUFF DEPTH 0.5 IN. FUEL DEPTH 15.2  
 1/4-1" 3.8 T/A TOTAL FUEL 20.0 T/A  
 1-3" 4.2 T/A ADJACEST FUEL Fuels are broken up by rock bluffs. Mix  
 3+ " 11.1 T/A of fuel types (8.5.9.2). Dominant FM = 5/2. 70/30

OBJECTIVES OF BURS (CHECK)	(RANGE OF ACCEPTABLE RESULTS)
HAZARD REDUCTION <u>X</u>	<u>Reduce 3"- fuels to 3 T/A</u>
SILVICULTURE _____	_____
SITE PREPARATION _____	_____
WILDLIFE HABITAT <u>X</u>	<u>Reduce conifer cover by 75%. Rejuvenate browse and grass. 70%.</u>
RANGE MANAGEMENT _____	_____
OTHER _____	_____

PRESCRIPTION	SEASON: <u>Fall</u>	TIME: <u>1300-2000</u>
TEMPERATURE: <u>55</u> TO <u>80</u>	FUEL MOISTURE	INSIDE OUTSIDE
R H . <u>20</u> TO <u>35</u>	O-1/4 <u>7</u> TO <u>11</u>	<u>7</u> TO <u>11+</u>
WIND SPEED <u>4</u> TO <u>10</u>	1/4-1 <u>9</u> TO <u>13</u>	<u>9</u> TO <u>13+</u>
DIR. <u>SW</u> (Preferred) <u>NWS</u> (Accepted)	1-3 <u>13</u> TO <u>20</u>	<u>13</u> TO <u>20+</u>
	DCFF (LOVER) <u>N/A</u> TO <u>-</u>	<u>-</u> TO <u>-</u>
	SHRUBS <u>50</u> TO <u>150</u>	<u>50</u> TO <u>150+</u>
ERC _____ TO _____	IGNITION METHOD <u>Aerial ignition system</u>	
BI _____ TO _____	FIRING PATTERN <u>Strip headfire</u>	
RATE OF SPREAD <u>2</u> TO <u>10</u>		
FLAME LESGTH <u>3</u> TO <u>8</u>		
SCORCH HEIGHT <u>10</u> TO <u>35</u>		

EXPECTED FIRE BEHAVIOR In areas where slash is present. spread rates, flame lengths, and scorch heights sll be high. Intensities will be low to moderate in the areas where there is no slash due to the light fuels and broken terrain. If the weather continues warm and dry for a few days after the burn. the fire may continue to work its way to the top of the old 1958 burn. but no further.

PREPARATION:  
 TYPE OF FIRELINE: HAND N/A TRACTOR R/A CREW SIZE: IGNITION 2 HOLDING 4  
 PORTATASKS - PUMPS - HOSE - ENGINES 1 SHOVELS 3 PULASKIS 3  
 SAWS 1 TORCHES 4 FUEL 2000 balls \_\_\_\_\_ RADIOS 4  
 PREPARATIOS NEEDED PRIOR TO BURN \_\_\_\_\_

FIRING ASD HOLDING PLAS: (See attached map or photo) Helicopter with either the helitorch or Ping Pong dispenser will be used to ignite the unit. Rapid strip headfires will be used to achieve a maximum kill on the trees.  
Alternate Hand Ignition: If the helicopter is not available. 6-8 people will ignite the area using staggered strip headfires Ignition strips will be lit one right after the other but caution will be taken to insure that nobody gets stuck out on a bluff with fire underneath them. Widths should be 100-200 feet.  
Holding: No holding is necessary but an engine will be on the lower road in case something rolls down onto the road and to warn motorists.

HAZARD AREA: (See attached map or photo) none

MOPUP AND PATROL PROCEDURES: Unit will be patrolled daily until it is felt safe and then periodically until out.

TEST FIRE: (If applicable) Not needed

SMOKE MANAGEMENT: Smoke from this burn will likely drift to the NE towards Eureka. The Air Quality Coordinator will be notified prior to burning to insure that smoke dispersal conditions are adequate.

SAFETY:

Public Signs and traffic controller will be placed on the highway to warn motorists of rolling material. An engine with 2 people will patrol the highway for material that may have rolled onto the road.

Burn Crew: A preburn briefing will be held covering the ignitions and holding plans. Protective clothing and gear will be worn. Good communications will be a must. Torch people must keep in touch with each other to know their whereabouts so that nobody gets stuck out on a bench with fires below them

I & I CONTRACTS: An article will be placed in the Tobacco Valley News. The Highway Patrol will also be notified the day of the burn.

REMARKS: A helicopter safety plan will be attached to this plan.

PREBURN INFORMATION

FUEL MOISTURE %:

DATE	0-1/2"	1/4-1"	1-3"	3"+	DUFF	PRECIP

BURN MONITORING DATE: TIME OF IGNITION: STOP:

BURNING BOSS: FIRING BOSS: HOLDING BOSS:

ACTUAL LEATHER: TEMPERATURE R.H. WIND SPEED/DIRECTION STATE OF WEATHER

	TEMPERATURE	R.H.	WIND SPEED/DIRECTION	STATE OF WEATHER
1 HOUR BEFORE	F	%	MPH	
START	F	%	MPH	
30 MINUTES	F	%	MPH	
60 MINUTES	F	%	MHP	
		%	MHP	
	F	%	MPH	
	F	%	MPH	
	F	%	MPH	

FUEL MOISTURES % 0-1/4" 1/4-1" 1-3" DUFF SHRUB

FIRE BEHAVIOR RATE/SPREAD CH/HR ERC X FLAME LENGTH FT

X FLAME HEIGHT X SCORCH HEIGHT FT.

POST BURN EVALUATION (Objectives Met?)

CONTINGENCY PLAN:

FIRE BEHAVIOR FUEL MODEL SO. 5/2 70/30 DISCUSSION: Open fuel type broken heavily with rock and bluffs. Fire may eventually burn its way to the top of the old 1958 but-n. Fire should slow down in the LP on top of the ridge

FIRE BEHAVIOR INPUTS "HOTTEST" CONDITONS: SHADE 3 DRY BULB 80 RH 20

1HR 7 10 HR 9 100 HR 13 LIVE 50 WIND SPEED 10

PROJECTIOS TIME 1 hour

PREDICTED FIRE BEHAVIOR: ROS 136 CHS/HR HT/UNIT AREA 702 FIRELINE INTENSITY1607

FLAME LENGTH 3- 13' PERIMETER AREA ACRES

PLAN OF ACTIOS: SO. OF PEOPLE 6 FROM WHERE Burn crew

ETA 0 LINE TO BUILD MAX ACRE ALLOWED 100 TIME SEEDED

PLAN OF ACTION: Fire will be allowed to burn above in the old 1958 burn. The main ignition will be done in the fall when shaded areas are damper and the LP stand above the old burn won't support a rapid spreading fire. Host of the LP stand is in MA 2.so no action will be taken unless it threatens a merchantable stand.

BURNING PLAN AMENDMENT

SEED FOR AMENDING PLAN

EFFECT OF AMENDMENT ON BURN OBJECTIVES

REVISED PRESCRIPTION: Temp: Upper Lower R.H.%: Upper Lower Season  
Time: Wind Direction: Preferred: Acceptable: Speed: to  
Moisture Content: 0-1/2 1/4-1 to % 1-3 to I 3+ to %  
Duff: Upper to % Lower to % Live to %  
NFDR: ERC: Max Rate/spread CH/HR Max. Flame Height Ft.  
Fireline Hand Mech. Ignition Method

EFFECT OF AMENDMENT ON CONTINGENCY PLAN

REVISE3 CONTINGENCY PLAN

Fire Behavior Fule Model So. Discussion:

Fire Behavior Inputs "Hottest" Conditions: Shade Dry Bulb RH  
1 HR 10 HR 100 HR Live WIND Speed Projection Time  
Predicted Fire Behavior: ROS CH/HR HI/Unit Area Fire Intensity  
Flame Length Perimeter CHS. Area ACS  
Plan of Action: No. of People From Where ETA  
Line to Build: Max. Acre Allowed Time Seeded

Plan of Action:

BURNING PLAN AMENDMENT APPROVAL

APPROVED BY : DATE :

WILDLIFE PRESCRIPTION

Stand No.:	SOUTH SHEEP CK II	Photo No.:	113
Area:	155A	Slope:	30-60%
Elevation:	2490 - 2800	Aspect:	SW
Successional State:	Young > Mature	Habitat Type:	DF/Syal-Agsp
Fuels:	Light but continuous	Site Productivity:*	
Wildlife Species to manage for:	Bighorn Sheep	Vegetation species to manage for:	Fesc, Agsp, Amal, Cese.

Land Management Objectives: "Big Game Winter Range" - the intent is to "manage areas of high potential for winter range, to maintain or enhance the habitat for the benefit of the appropriate species while recognizing the viewing resource in critical areas."

Present Situation: This stand has an overstory of DF and PP with a major part of the understory being grasses (Caru, Feid, Agsp). There is a shrub component of Amal, Cese, Acgl, within the stand. Bighorn sheep and mule deer are presently using this area for winter range and spring range.

The shrub component has about 10-15% of the plants (Amal) in form class three and the production of Amal is very low. The Cese seems to be producing in the low to moderate range (50-90 #/A). The grasses have been underutilized and have built up considerable amounts of decadence in the root crown.

Proposed Treatment: Recommend this stand be underburned to regenerate the browse component and also reduce the amount of decadence in the bunch grasses. There is very little need to reduce conifer reproduction because of the lack of it. Up to 20% of the trees could be lost that are under 5" and still have very little effect on the cover component. Up to 5% could be lost of the larger mature trees for snags and snag replacement for enhancement of raptor habitat (Eagle and Osprey).

This stand could be burnt either in fall (first 2 weeks fo September or early October) or in the spring (March or April) and still achieve the desired results. A strip headfire would be the technique to use.

Don Godtel, Wildlife Biologist

After review with Yde & Brown - it was decided to go ahead and slash the unit by cutting down everything  $\leq 8"$  and  $\leq 6"$  except quaking aspen and birch. Sawcrew will slash.

BURNING PLAN COVER PLAN

5150

PRESCRIBED BURNING PLAN

SOUTH SHEEP CREEK

BURNING UNIT

REXFORD Ranger District

Kootenai National Forest

Prepared By DON GODTHE DATE 8 /15 /85

Reviewed By \_\_\_\_\_ DATE \_\_\_\_\_

The approved prescribed Burning Plan constitutes the authority to burn. No one has authority to burn without an approved plan or in a manner not in compliance with the approved plan. Actions taken in compliance with the approved Prescribed Burning Plan will be fully supported. Personnel will held accountable for action taken which are not in compliance with the approved plan, regardless of the outcome of the burn. The same level of authority required to approve the Prescribed Burning Plan is required to amend the plan this project and plan are rated as **complex** \_\_\_\_\_ Intermediate X **non-complex** pursuant to R-1, 1981, Fuel Management and Treatment Guides.

Approved by \_\_\_\_\_ DATE \_\_\_\_\_

ACCOUNTING COST: 000929  
 EST. COST/ACRE: \$25  
 S91.E: South Sheep Creek Unit: 1 FINAL COSTS: \_\_\_\_\_  
 LOCATION: T 33N R 28W SEC. 17.20 TOTAL COST/ACRE: \_\_\_\_\_  
 STAND: \_\_\_\_\_ ACRES: 120 ELEVATION: TOP 2800 BOTTOM 2500  
 DRAINAGE: Lake Koocanusa SLOPE: 20-70 % ASPECT: SW  
 HABITAT TYPE: \_\_\_\_\_ NFDR FUEL MODEL: C F.B.FUEL MODEL: 2/11

FUELS NATURAL X ACTIVITY X AGE 1 YRS ASSESSMENT: L MXH  
 DOWM WOODY PRIVATE PROPERTY ADJACENT Nre  
 O-1/4" 1 T/A DUFF DEPTA 0.9 IS. FUEL DEPTH 16"  
 1/4-1" 4.2 T/A TOTAL FUEL 43 T/A  
 1-3" 4.0 T/A ADJACENT FUEL Highway 37 provides an excellent fuel  
 3+ 22.2 T/A break. S.end haavy canopy-light fuels of grass/shrub understory

OBJECTIVES O F BURN (CHECK)	(RANGE OF ACCEPTABLE RESULTS)
HAZARD REDUCTION <u>X</u>	<u>Reduce buildup of grass and pine needles plus</u>
SILVICULTURE _____	<u>slash that was created to &lt;4T/AC of 3" minus</u>
SITE PREPARATIOS _____	<u>3" &lt; 15 T/AC.</u>
WILDLIFE H A B I T A T <u>X</u>	<u>Rejuvenate browse species and decadent grasses.</u>
RANGE MANAGEMENT _____	<u>Reduce overstory canopy by another 20-50%</u>
OTHER _____	_____

PRESCRIPTION	SEASON: <u>Fall</u>	TIME: <u>1200-2000</u>
TEMPERATURE: <u>50</u> TO <u>85</u>	FUEL MOISTURE	INSIDE OUTSIDE
R.H. <u>20</u> TO <u>35</u>	O-1/4 <u>7</u> TO <u>11</u>	<u>7</u> TO <u>11+</u>
WIND SPEED <u>2</u> TO <u>10</u>	1/4-1 <u>9</u> TO <u>13</u>	<u>9</u> TO <u>13+</u>
DIR. <u>SW</u> s to <u>NW</u>	1-3 <u>13</u> TO <u>20</u>	<u>13</u> TO <u>20+</u>
(Preferred) (Accepted)	DUFF (LOWER) <u>N/A</u> TO <u>--</u>	<u>--</u> TO <u>---</u>
	SHRUBS <u>50</u> TO <u>150</u>	<u>50</u> TO <u>150+</u>
ERC _____ TO _____		
RI _____ TO _____	IGNITION METHOD <u>Drip torch or heletorch</u>	
RATE OF SPREAD <u>2</u> TO <u>7</u>		
FLAME LENGTH <u>2</u> TO <u>5</u>	FIRING PATTERN <u>Strip headfire</u>	
SCORCH HEIGHT <u>5</u> TO <u>35</u>		

EXPECTED FIRE BEHAVIOR Fire will spread well where there's continuous fuel but will take a lot of lighting in the rocky and steep areas where there's little fuel. Scorch heights will vary depending on fuel concentrations and the effect of shading on fuels from the thick stands of reproduction. Fire will be short-lived and will go out quickly in the light fuel areas but may hold over in logs.

PREPARATION:  
 TYPE OF FIRELINE: HAND ROAD X CREW SIZE: IGNITION 6 HOLDING 3  
 PORTATASKS \_\_\_\_\_ PUMPS \_\_\_\_\_ HOSE \_\_\_\_\_ ENGINES 1 SHOVELS 8 PULASKIS 8  
 SAWS 1 TORCHES 8 FUEL 30 RADIOS 9 for crew  
 PREPARATIOS NEEDED PRIOR TO BURN This area is ready to burn--when we start burning the topline the pumper should prewet along the guardrail so as not to damage any guardrail posts with fire.

FIRING AND HOLDING PLAN: (See attached map or photo) The strip along the road will be lit first and allowed to cool to anchor the unit. Then 4-6 torches will be staggered across the unit using strip headfires to burn the unit.  
Holding: A 300 gallon engine with 2 people will patrol the highway and can meet with any interested people passing by. No problems are expected as the wide highway provides an excellent fire and fuel break.

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HAZARD AREA: (See attached map or photo) The north end of the unit is very steep and rocky. If we light by hand the torchman must be very careful not to be under the torchman above them. The best goat torchman should be in this area.

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MOP UP AND PATROL PROCEDURES: Unit will be patrolled daily until it is felt safe and then periodically until out. Any hot spots along the edge will be mopped up in an extended dry spell continues after the burn so that it can handle a dry cold frontal passage. Make sure no fire is left around the guard t-ail posts.

TEST FIRE: (If applicable) Not needed.

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SMOKE MANAGEMENT Smoke from this burn will likely drift to the SE. The SO Fire Desk will be notified prior to burning.

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SAFETY:

Public: A sign will be placed along the road warning people of the burning operations. Highway Patrol will be notified. Engine crew will explain to people passing by the objectives of the burn. We may need to flag people.'  
Burn Crew A preburn breifing will be held covering the ignition and holding plans. Protective clothing and gear will be worn. Good communications will be a must.

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I & I CONTACTS: An article will be placed in the Tobacco Valley News.

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REMARKS: \* Use one lane traffic on inside of road if it is necessary with the aid of two flag persons on each end of the burn. will light the road strip in 3 segments the flag people should be by the immediate fire danger areas while lighting the strips.

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PREBURN INFORMATION:

FUEL MOISTURE %:

DATE	0-1/2"	1/4-1"	1-3"	3"+	DUFF	PRECIP

BURN MONITORING: DATE: \_\_\_\_\_ TIME OF IGNITION: \_\_\_\_\_ STOP: \_\_\_\_\_  
BURNING BOSS: \_\_\_\_\_ FIRING BOSS: \_\_\_\_\_ HOLDING BOSS: \_\_\_\_\_

ACTUAL WEATHER:	TEMPERATURE	R.H.	WIND SPEED/DIRECTION	STATE OF WEATHER
1 HOUR BEFORE	_____ F	_____ %	_____ MPH	_____
START	_____ F	_____ %	_____ MPH	_____
30 MINUTES	_____ F	_____ %	_____ MPH	_____
60 MINUTES	_____ F	_____ %	_____ MPH	_____
_____	_____ F	_____ %	_____ MPH	_____
_____	_____ F	_____ %	_____ MPH	_____
_____	_____ F	_____ %	_____ MPH	_____
_____	_____ F	_____ %	_____ MPH	_____

FUEL MOISTURES %: 0-1/4" \_\_\_\_\_ 1/4-1" \_\_\_\_\_ 1-3" \_\_\_\_\_ DUFF \_\_\_\_\_ SHRUB \_\_\_\_\_  
FIRE BEHAVIOR RATE/SPREAD \_\_\_\_\_ CH/HR. ERC \_\_\_\_\_, X FLAME LENGTH \_\_\_\_\_ FT.  
X FLAME HEIGHT \_\_\_\_\_ X SCORCH HEIGHT \_\_\_\_\_ FT.  
POST BURN EVALUATION (Objectives Met?) \_\_\_\_\_

CONTINGENCY PLAN:

FIRE BEHAVIOR FULE MODEL 60. \_\_\_\_\_ 9 \_\_\_\_\_ DISCUSSION: Timber canopy stand of young PP & DF 40-60 yrs old. mostly needle, grass & shrubs for understory. N end of unit is in rock or talus, Highway 37 will be a good break on the up side.

FIRE BEHAVIOR INPUTS "HOTTEST" CONDITIONS: SHADE 2 DRY BULB 85 RH 20  
1 HR 7 10HR 9 100 HR 13 LIVE 100 WIND SPEED 10  
PROJECTION TIME 1 hour

PREDICTED FIRE BEHAVIOR: ROS 70 CHS/HR HT/UNIT AREA411 FIRELINE INTENSTY385  
FLAME LESGTH 6 PERIMETER 180 CHS. AREA 228 ACRES

PLAN OF ACTION: NO. OF PEOPLE 20 FROM WHERE Eureka  
ETA 30 LINE TO BUILD 20 MAX. ACRE ALLOWED 1 TIME NEEDED 1hr

PLAS OF ACTION: Rock bluffs should prevent fire from spreading as fast as the above TL-59 outputs show. Highway 37 will prevent fire from spotting above the unit in most if not all areas. In the event a slopover does develop. extra people will be called for if needed. The ground above the unit is too steep for dozers.

BURNING PLAN AMENDMENT

REED FOR AMENDING PLAN

EFFECT OF AMENDMENT ON BURN OBJECTIVES

REVISED PRESCRIPTION: Temp: Upper    Lower    R.H.:%: Upper \_\_\_ Lower \_\_\_ Season  
Time:    Wind Direction: Preferred:    Acceptable:    Speed : \_\_\_ to \_\_\_  
Moisture Content: 0-1/2    1/4-1    to \_\_\_ 1-3\_    to \_ % 3+    to \_ %  
Duff: Upper\_ to \_% Lower to \_% Live to \_%  
NFDR: ERC: M a x    Rate/Spread    CH/HR Max. Flame Height \_\_\_\_\_ Ft.  
Fireline: Hand    Mech. \_\_\_\_\_ Ignition Method \_\_\_\_\_

EFFECT OF AMENDMENT OS CONTINGENCY PLAN

REVISED CONTINGENCY PLAN

Fire Behavior Fuel Model NO.    Discussion: \_\_\_\_\_

Fire Behavior Inputs "Hottest" Conditions: Shade    Dry    Bulb    RH \_\_\_\_\_  
1 RR    10 HR    100 HR \_\_\_ Live \_\_\_ Wind Speed    Projection Time \_\_\_\_\_  
Predicted Fire Behavior: ROS    CH/HR HT / Unit Area    Fire Intensity \_\_\_\_\_  
Flame Length \_\_\_\_\_ Perimeter \_\_\_\_\_ CHS. Area \_\_\_\_\_ ACS  
Plan of Action: So. of People \_\_\_\_\_ From Where \_\_\_\_\_ ETA \_\_\_\_\_  
Line to Build: \_\_\_\_\_ Max. Acre Allowed \_\_\_\_\_ Time Needed \_\_\_\_\_

Plan of Action: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

BURNING PLAN AMENDMENT APPROVAL

APPROVED BY: \_\_\_\_\_ DATE : \_\_\_\_\_