

LIBBY DAM WILDLIFE HABITAT ENHANCEMENT
FINAL REPORT

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Prepared for:

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Abstract: The results of habitat improvement project activities accomplished under Bonneville Power Administration contract DE-AI79-88BP93247, project # 8843 for mule deer mitigation along Lake Koocanusa from September 1, 1988, through December 31, 1991, are reported. Treatments were applied to five areas, encompassing 820 acres. Treatments included 840 acres of prescribed fire and 318 acres of slashing followed by prescribed fire. Variation in treatment times and treatment intensities were used. The treatments complimented existing Kootenai National Forest management activities, other BPA contracts and Montana Department of Fish, Wildlife and Parks Trust Fund projects.

The treatment areas range in size from 80 to 250 acres and are primarily southerly aspects. All of the areas were open ponderosa pine stands historically, providing good foraging opportunity for big game.

Four of the treatment areas were selectively slashed and allowed to dry for 1 year prior to treatment by prescribed fire, one treatment area was selectively logged (6 acres) prior to the slashing treatment, and one treatment area was treated with prescribed fire only.

INTRODUCTION

Construction of the Libby Dam hydroelectric facility on the Kootenai River resulted in the inundation of approximately 29,000 acres of suitable big game winter and spring range. In addition, active fire suppression for the past 6 decades has allowed increased encroachment of Douglas-fir (*Pseudotsuga menziesii*) into the open ponderosa pine (*Pinus ponderosa*) - bunchgrass community (vegetation names follow Hitchcock and Cronquist, 1973). This community is naturally maintained by periodic (8-22 year frequency) light intensity fires which selectively favor continuation/perpetuation of the open ponderosa pine community by killing Douglas-fir seedlings and saplings which are highly susceptible to fire mortality when young. Douglas-fir establishment results in canopy closure which shades out grass and browse species important to big game. These forage species are generally adapted to and survive best with periodic fire.

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 for the loss of big game winter and spring range by the Libby Dam hydroelectric facility. Approximately 1100 acres were treated under project #84-38 between 1984 and 1990. Project X8843 was a continuation of the mitigation and bridged the time between project #84-38 and the establishment of the Montana Wildlife Mitigation Trust Fund. The portion of the project funded under project #88-43 was directed at habitat improvement within mule deer winter and spring ranges.

The project area (fig. 1) is included within the suitable wintering areas utilized by resident mule deer as well as other big game, including white-tailed deer, elk and moose.

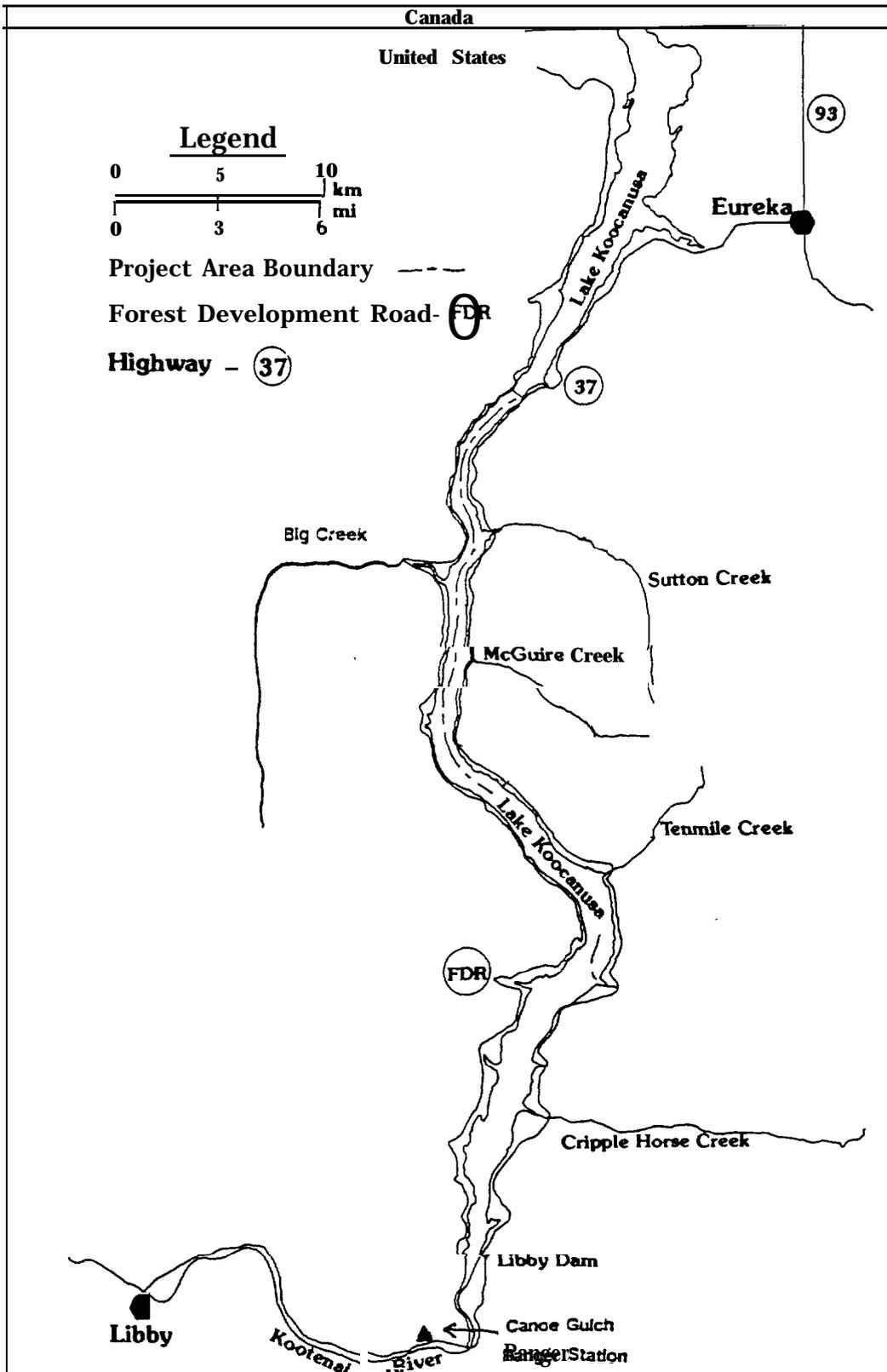


Figure 1 - Habitat Enhancement Project Area

METHODS AND MATERIALS

The primary goal of the treatments was to enhance winter/spring habitat for big game to mitigate for lands inundated by Libby Dam. This could best be accomplished by re-establishing the open ponderosa pine-bunchgrass communities by eliminating Douglas-fir ingrowth and restoring the natural role of fire. Fire rejuvenates understory shrubs, grasses and forbs to provide increased foraging opportunity for big game.

Treatment areas were selected to improve key mule deer range which had deteriorated due to Douglas-fir encroachment resulting from the absence of fire. Areas where little treatment had occurred previously were targeted over those where some treatment had already occurred through normal agency funded improvement programs. An effort was made to utilize large (>100 acres) treatment units which provide habitat useful to mule deer, in addition to being most cost-effective.

The nature of the treatments provided an ecosystem management approach, incorporating a mosaic on the landscape based on slashing treatments and fire intensities. Small drainages, occasional conifer covered benches, and patches of deciduous trees were protected by not slashing them and allowing the fire to back through these areas, resulting in lower fire intensities than those achieved by continuous ignition. Fire intensities varied, based on fuel loading, continuity of fuels and burning conditions.

Treatments

Two basic types of treatments were used either singly or in combination,

1. Slashing in Conjunction with Prescribed Fire
2. Prescribed Fire

Slashing in Conjunction with Prescribed Fire -This treatment incorporates slashing (the sawing down of selected trees) followed by the application of prescribed fire. The slashing is selective, specific tree species or those of specific size (diameter class) are targeted for removal. In most instances, slashing was prescribed to remove patches of non-merchantable understory Douglas-fir seedlings and saplings that had encroached on the treatment sites. Slashing was also utilized to create or restore small forage openings within closed stands. Slashing was accomplished by both force account (FS crews) and private contractors, and was done during all seasons of the years as agency crews were available, or at the contractor's discretion. In all cases, the slash was allowed to cure (dry out) for one year prior to burning. Prescribed fire was then used to reduce (consume) the slash and rejuvenate grass and browse species. This treatment, while more costly than solely using prescribed fire, has several advantages, Slashing generally results in a more continuous and uniform fuelbed which allows a longer burning window and more predictable results, It also guarantees the removal of certain trees (Douglas-fir encroachment) which often cannot be removed through the application of fire alone. Finally, slashing allows a fuelbed for higher intensity fire to kill larger understory trees which have developed fire-resistant bark.

One of the treatment areas, Warland Creek, was subjected to logging prior to the slashing treatment. The logging operation removed select tree species from a portion of the treatment area.

Prescribed Fire - Prescribed fire was also used as a single treatment to rejuvenate decadent stands of shrubs, grasses and forbs; and to eliminate or reduce some of the competing conifer understory (seedling, sapling and pole-sized, subdominant trees). This is the preferred treatment in open, grassy stands or shrubfields; or in timbered stands where little tree encroachment has occurred. Burning prescriptions were prepared specific to each treatment area using the BEHAVE fire program (Andrews

1986). The BEHAVE program allows the definition of the range of climatic conditions (fuel moisture, ambient air temperature, relative humidity, wind speed) to achieve the desired results. Examples of burning and wildlife prescriptions are found in Appendix 1. A strip-head fire technique was used in all of the treatments. In this type of fire, individual strips are successively lit (ignited) starting at the top of the unit. The intensity (flame length, and energy release in Mu 's) of the fire is controlled by adjusting the width of the strip (the amount of fuel available to the fire). The firing pattern and lighting sequence is controlled by a burn boss. This method of lighting was used for both hand and aerial ignition methods.

Coordination

The MDFWP and FS worked cooperatively on all treatment areas, providing technical expertise and biological support for the project. Bonneville Power Administration provided the necessary funding to make this project possible. Numerous interagency meetings and field trips involving MDFWP and FS personnel were required to design and implement the habitat treatments. Contacts with interested and concerned public, particularly where treatment areas near private landholdings, were established.

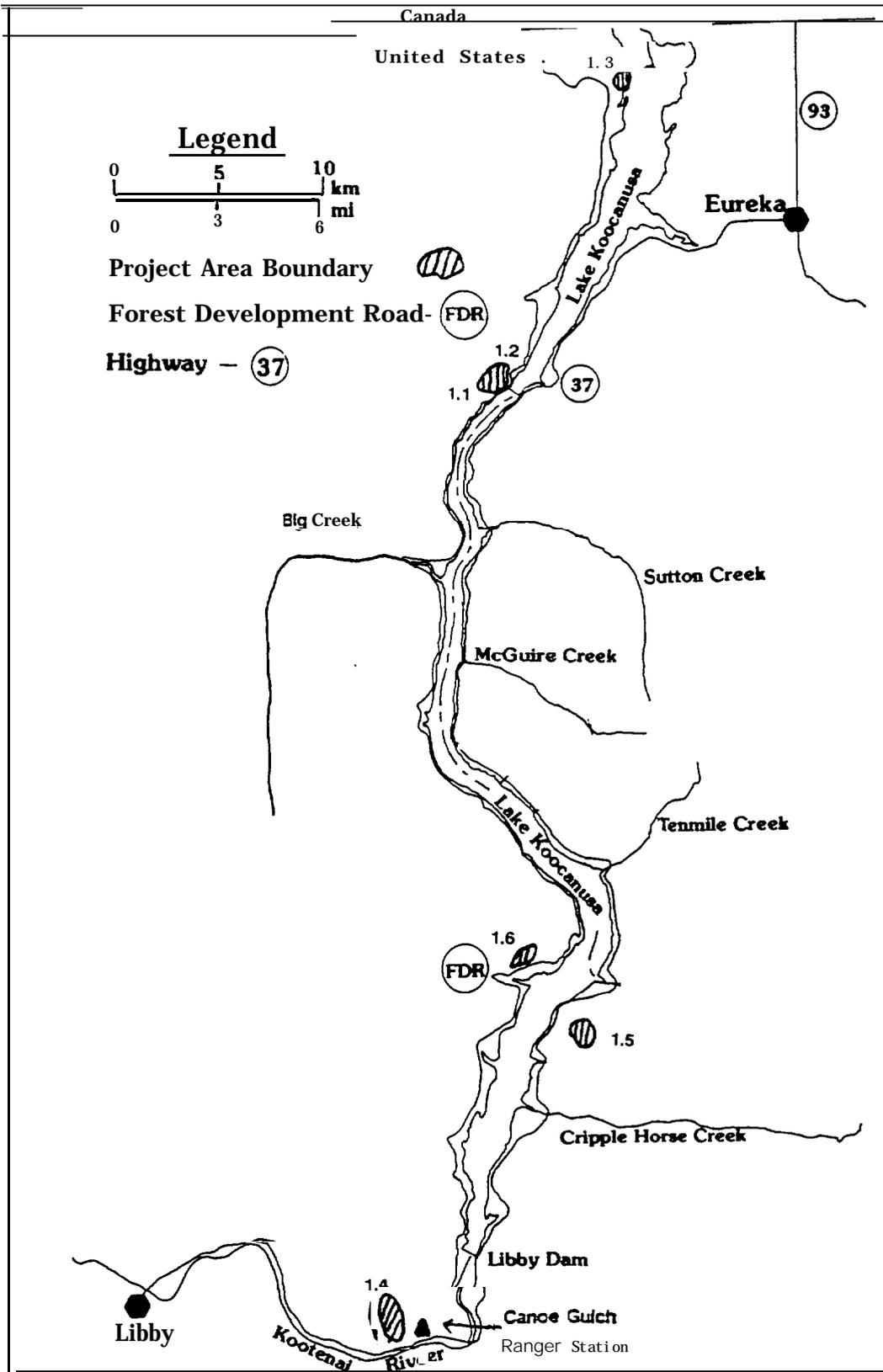


Figure 2 - Positioning and Juxtaposition of the Treatment Units

RESULTS

Habitat enhancement work began in 1988 and continued through 1991. Five areas were treated for a total of 820 acres of mule deer winter and spring range (figure 2). The associated costs for each treatment unit and treatment type was variable (Table 1). Generally, slashing costs were higher in rough terrain and where access was poor, and varied between FS crews **and** contracted crews. Prescribed fire costs were generally lower for the larger acreage treatments. Table 2 illustrates the timing of each of the treatments as well as the type of treatment used.

Table 1. Treatment area timetables and sizes.

UNIT NAME	UNIT #	TREATMENT TIMING	SIZE/ACRES
Boulder Face West	1.1	Slash (4/89) Burn (4/90)	160
Boulder Face East	1.2	Slash (4/90) Burn (4/91)	100
Green Basin	1.3	Slash (4/90) Burn (4/91)	100
Reinshagen	1.4	Burn (4/90)	250
Warland/Ant Hill	1.5	TS (1990) Slash (10/90) Burn (1993)	120
Ziegler	1.6	Burn (4/90)	110

NOTE: The Warland/Ant Hill unit has not been burned. Burning was attempted in the spring 1992, but atmospheric conditions were not favorable and the burning attempt was aborted. The unit has been incorporated into the long-term plan for accomplishment.

Table 2. Costs associated with treatment types.

TREATMENT	COST (\$/AC.)
Spring Burn (hand ignition)	1535
Slashing	40-1 00
Prescribed Burning (Helicopter)	20-1 10

Habitat **Treatment Units**

Contract #88-43 identified 6 tasks (1 .1 - 1.6) to be accomplished under the terms of the contract. Each of the treatment units are described in further detail in the following paragraphs:

Task 1.1 and 1.2 - Boulder Face

The Boulder Face units (tasks 1 .1 and 1.2) are a contiguous area lying above the Forest Development Road (FDR) and encompassing some 260 acres. The treatment area is comprised of multiple rock benches and moderate to steep slopes, Historically the area supported a ponderosa pine-bunchgrass community with intermingled patches of Douglas-fir. Active fire suppression during the past 6 decades allowed the encroach-

ment of Douglas-fir and ponderosa pine regeneration into normally open stands, reducing the forage production potential of the site.

The prescribed treatment for the area was broadcast slashing followed by a moderate intensity prescribed fire to stimulate the understory shrubs, grasses and forbs. Emphasis was placed on retaining selected subdominant ponderosa pine, deciduous trees and cover within the draw areas throughout the treatment area. The overall objective for this area was to create numerous foraging areas (3-5 acres in size) adjacent to hiding cover and stimulate the understory vegetation while maintaining the ponderosa pine overstory.

Boulder Face West (Task 1.1) and Boulder Face East (Task 1.2) differed in stand characteristics and in Management Area (MA) allocations. The Kootenai National Forest has identified areas of land (MA's) to be managed differently based on the productive potential of the site, value to wildlife, visual considerations and a host of other values. The majority of both Boulder Face treatment areas are within MA 11 (big game winter range with a programmed yield of timber). A smaller portion of the Boulder Face treatment area is contained within MA 10 (strictly big game winter range).

Slashing prescriptions differed between the Boulder Face East and Boulder Face West areas based on stand conditions and MA allocations. Selective slashing occurred over 90% of the 160 acre Boulder Face West area with emphasis on reduced amounts of slashing in the MA 11 portion of the area. Fifty percent of the Boulder Face East area was selectively slashed, again with reduced amounts of slashing in the MA 11 portion of the 100 acre area. The selective slashing concentrated on primarily Douglas-fir regeneration that was 5 inches diameter at breast height and smaller.

Both areas were treated with a spring burn (the entire area was treated with prescribed fire at one time) following the slashing treatment in May of 1990. Hand ignitions by a USFS crew of 6 with drip-torches was used to control the timing of the ignition and intensity of the burn.

The combination of selective slashing and prescribed fire successfully accomplished the objectives set forth in the prescription for the treatment area.

Task 1.3 - Green Basin

The Green Basin treatment unit is approximately 80 acres in size on the west side of Lake Koocanusa. The treatment unit lies adjacent to Lake Koocanusa and within 1 mile of the U.S - Canadian border. Topography is primarily gentle and rolling with the exception of a steep break at the shoreline of Lake Koocanusa. Exposure is primarily south, with some areas having southeast or southwest aspects. The area is historically a dry site, dominated by a ponderosa pine-bunchgrass community. Active fire suppression for the past 6 decades allowed natural succession to continue unchecked, permitting the encroachment of Douglas-fir and ponderosa pine regeneration and reducing the forage potential of the area.

The prescribed treatment for the area was select broadcast slashing of stagnant conifers (< 6' diameter at **breast height**) in the area followed by a moderate intensity prescribed fire to stimulate the understory. Select areas were to remain unslashed to provide security/thermal habitat for big game. The overall objective of the treatment was to reduce the overstory canopy, provide fuels for a prescribed fire and stimulate the understory vegetation.

The area was slashed in April 1990 by USFS slashing crews following the closing of a 10-year Christmas tree sale that included the Green Basin area.

The area was treated with a moderate intensity prescribed fire in April 1991 by a USFS crew of 6, using drip torches to control the timing of the ignition and intensity of the burn.

Objectives set forth in the prescription for the treatment area were accomplished by the select slashing and prescribed fire treatments.

Task 1.4 - Reinshagen Gulch

The Reinshagen Gulch treatment area is located on the north side of the Kootenai River near the Canoe Gulch Ranger Station and is approximately 250 acres in size. The area is an open, grassy hillside with a southerly exposure. Few trees occur on this site.

The prescribed treatment for the area was a prescribed burn to remove dead and decadent vegetation and stimulate regrowth of forage species. Target species included: serviceberry (*Amelanchier alnifolia*), chokecherry (*Prunus emarginata*), willow (*Salix* spp.), bitterbrush (*Purshia ridenrara*), Idaho fescue (*Festuca idahoensis*), and rough fescue (*Festuca scabrella*).

The Reinshagen Gulch area was treated with a prescribed fire in April of 1990. Ignition was accomplished using a PREMO MARK III aerial ignition device. This area is MA10 (big game winter range). Most goals set forth in the prescription were accomplished. A hand crew of approximately 12 persons was needed to construct fireline to protect a special use permit, ground based television signal line which traversed the length of the unit. Burning intensities were not as intense as expected due to sparse fine fuels (lack of fuelbed continuity) and less than ideal atmospheric conditions (increasing cloud cover and relative humidity in the late afternoon). This unit was lit with a 5-15 mph upslope wind to help push the fire through the areas of light fuels. This treatment resulted in a mosaic induced by the fuelbed. The treatment was a success overall because areas with continuous fuels burned; those without continuous fuels or sparse fuels didn't burn.

Task 1.5 - Ant Hill/Warland

The Ant Hill/Warland treatment area is approximately 120 acres in size on the East side of Lake Kootenai. The lower portion of the unit is MA 11 (big game winter range/timber production), the upper portion of the unit is MA 10 (big game winter range). The area was historically an open ponderosa pine-bunchgrass community with intermingled Douglas-fir. Active fire suppression allowed the encroachment of Douglas-fir and ponderosa pine regeneration to close the overstory canopy and reduce the forage production in the area.

The original prescription for this area called for selective slashing of a portion of the treatment area (approximately 40%) to remove Douglas-fir encroachment and create small forage openings, followed by prescribed fire to stimulate the understory vegetation, remove the conifer regeneration, and maintain the mature conifer overstory.

Field review of the treatment area by the interdisciplinary team (IDT) led to an alteration in the original prescription. The mature canopy needed to be opened up to allow increased sunlight exposure to the understory. The IDT determined that a small timber sale to remove select sawtimber from the lower 25% of the treatment area would benefit big game and contribute to the overall objectives set forth in the original prescription.

The timber sale (1 Spur Horse TS) was comprised of 2 cutting units and removed 17,000 board feet of sawtimber. The trees taken were primarily Douglas-fir and a small number of ponderosa pine. The harvest of this timber followed the recommendations set forth by the IDT following their review of the treatment area. The timber sale provided Knutson-Vandenberg (K-V) dollars which will be collected to help offset the costs of burning the area.

The treatment area was selectively slashed following the timber sale to remove smaller Douglas-fir (<5' diameter breast height) in an effort to compliment existing openings and provide additional fuels for the

prescribed fire treatment. A riparian area in the lower portion of the unit was not slashed to protect the dense Douglas-fir thermal cover and bedding sites it provides.

Prescribed fire will be used to regenerate decadent forage species and provide nutrient recycling while further reducing the mature overstory canopy.

Prescribed burning of the treatment area is planned for the spring of 1993 and costs will be covered by the Trust Fund and K-V dollars collected from the timber sale.

Task 1.6 - Ziegler Mountain

The Ziegler Mountain treatment area is approximately 110 acres of mature ponderosa pine and Douglas-fir canopy with a diverse understory of chokecherry (*Prunus virginiana*), setviceberry (*me/ancier alnifolia*), willow (*Salix* spp.), Idaho fescue (*Festuca icfahoensis*) and bluebunch wheatgrass (*Agropyron spicafum*). The treatment area is on the west side of Lake Koochanusa with a south-southeast aspect

The original prescription for the Ziegler Mountain area indicated a slash treatment would be used. Field verification by the IDT determined that slashing would not be needed to accomplish the rejuvenation of the understory vegetation.

The Ziegler Mountain treatment area was burned in April 1990. Ignition was accomplished using a PREMO MARK III aerial ignition device. Control lines for the prescribed fire were established using FS personnel with drip torches prior to the aerial ignition of the main portion of the treatment area. This unit was burned in conjunction with an adjacent 250 acre burn funded by the Forest Service.

DISCUSSION

Effects of the prescribed treatments previously described are wide ranging. They include environmental, social, political and logistical. All of the effects should be considered in future treatments of this type.

Flexibility in the scheduling of prescribed treatments, particularly prescribed fire, is one of the key elements for successful results. Unfavorable atmospheric conditions caused delays of 13 years in the treatment of some units. Prescribed burning in marginal conditions (high humidity, high fuel moistures) yielded less than optimum results including incomplete burns, failure to reduce fuel loadings and less than desired stimulation of the understory shrubs, grasses and forbs. Burning in extreme conditions (low humidity, high winds, low fuel moistures) resulted in increased risk of higher mortality in upper canopy trees and the potential for removing more cover than desired.

Generally, larger treatment areas (> 100 acres) are more cost effective. Ecologically, the larger units provide the opportunity to manage on a landscape scale and a greater mosaic of habitat zones are created. Differing topography, fuel loadings, aspects and vegetative cover affected the treatment intensity for both slashing and prescribed fire treatments.

Socially or politically, prescribed fire treatments generate concerns and comments from the public sector and special interest groups, primarily over 'red' trees (either live trees with some scorched needles attached or trees that are killed by fire and retain the red needles for 24 years) and air quality. In most cases, concerns can be substantially alleviated by informing the concerned parties of the desired goals and anticipated effects prior to the burn.

Short-term effects include needle-scorch and regeneration mortality and blackened ground level vegetation. 'Red' needles from needle scorch generally are a visual concern for the initial 1-2 years following the prescribed fire and then are shed by the tree. Regeneration mortality is also a visual concern and as the needles are shed from the dead trees, they become less conspicuous. In nearly all treatment prescriptions regeneration mortality is sought in order to maintain the open canopy and retain the browse production potential of the sight.

Air quality is a short-term effect that can be minimized by timing prescribed fires when conditions for smoke dispersal are good and avoiding late fall burning.

Long-term effects are mostly positive. Increased forage production follows a successful prescribed fire, providing higher quality winter and early spring range for big game. The restoration of the ponderosa pine-bunchgrass habitats provides increased opportunities and continuing habitat for those non-game species utilizing the ponderosa pine-bunchgrass community. Periodic fire is essential in maintaining the ponderosa pine-bunchgrass community.

Aerial ignition is efficient and effective for large treatment areas (>80 acres) or in treatment areas where topography is too steep or rugged for hand ignition to be used safely. Extremely large treatment areas can be ignited very effiiiently in a short period of time (Young 1990). The use of aerial ignitii increases the tactical **and** logistical complexity.

Two modes of aerial ignition can be used: the PREMO MARK III aerial ignition device or the heli-torch.

The PREMO MARK III uses small plastic spheres (ping-pong ball sized) containing potassium permanganate (approx. 3 grams) as the ignition delivery system. The spheres are injected with ethylene glycol and dropped from the helicopter (Bell JetRanger, Hughes 500). The chemical reaction of the potassium permanganate and ethylene glycol causes the sphere to burst into flame approximately 20 seconds after injection. The PREMO

MARK III worked well in all fuel types providing there were sufficient fine fuels to support initial ignition and that fuels were relatively continuous, to carry the fire.

The heli-torch is an externally slung device for use with a helicopter that makes use of Afumagal to jelly gasoline into an ignition agent. The heli-torch is highly effective in all fuel types and has the potential to deliver large quantities of fire in a short period of time. Generally, fire intensities are more difficult to control when using the helitorch rather than the PREMO MARK III or conventional hand ignition. Helitorch operations require a greater amount of ground support while lighting operations are active. The helitorch does not require the quantities of fine fuels and can be used where needle cast or slashed fuels is extensive. The PREMO MARK III is not nearly as effective in these conditions. The heli-torch was not used for ignition of any of the treatment units covered by project #88-43

Selection of the proper ignition method can make a significant difference in the effectiveness of a prescribed fire and subsequent results within the treatment area.

REFERENCES CITED

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- Hitchcock, C.L., and A. Cronquist. 1973. Flora of the Pacific Northwest. University of Washington Press. Seattle, WA. 730pp.
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- Young, L., and C.Yde. 1990. Ural-Tweed Bighorn Sheep Wildlife Mitigation Project - Final Completion Report. U.S. Department of Energy, Bonneville Power Administration, Project #84-38. 14pp. & appendices.

APPENDIX

Burning Plans for Tasks 1.1 and 1.2 (Boulder Face)

and

Task 1.3 (Green Basin)

BURNING PLAN COVER PLAN

5150

PRESCRIBED BURNING PLAN

BOULDER FACE
Burning Unit

REXFORD Ranger District

Kootenai National Forest

Prepared By: RLJ Date: 3/9/90

Reviewed By: George A Curtis Date: 3/9/90

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 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-, Intermediate, X Non-Complex-, pursuant to R-1, 1981, Fuel Management and Treatment Guides.

Approved by: St. Drew Bellon Date: 3/9/90

ACCOUNTING COST: 000929

EST. COST/ACRE: \$30

FINAL COSTS: _____

TOTAL COST/ACRE: _____

SALE: Boulder Face Unit: 1

LOCATION: T 35N R 29W SEC. 1

STAND: 7-4- ACRES: 287 ELEVATION: TOP 3800 BOTTOM 2800

DRAINAGE: Boulder Creek SLOPE: 40-60 ASPECT: south

HABITAT TYPE: _____ NFDR FUEL MODEL: C F,B,FUEL MODEL: 9

FUELS: NATURAL X ACTIVITY _____ AGE _____ YRS ASSESSMENT: L M H x

DOWN WOODY PRIVATE PROPERTY ADJACENT _____ None

0-1/4" 0.4 T/A DUFF DEPTH 1.2 IN. FUEL DEPTH 4.1

1/4-1" 1.4 T/A TOTAL FUEL 8.2 T/A

1-3" 1.1 T/A ADJACENT FUEL Damp and shaded areas around burn area in

3+" 5.3 T/A springtime will restrict any fire spread. FM = 8.

OBJECTIVES OF BURN (CHECK)

(RANGE OF ACCEPTABLE RESULTS)

HAZARD REDUCTION X

Reduce 3"+ fuels to 4 T/A, 3"- fuels to 2 T/A.

SILVICULTURE X

Keep mortality in regen stand to less than 20% in MA 11.

SITE PREPARATION _____

WILDLIFE HABITAT X

Reduce dense reproduction pockets of trees less

RANGE MANAGEMENT _____

than 3" by 75%. Overstory mortality less than

OTHER _____

20%. Increase and improve browse conditions.

In MA 10, reduce trees <3" DBH by 30-75%.

PRESCRIPTION

SEASON: Spring TIME: 1200-2000

TEMPERATURE: 50 TO a5

FUEL MOISTURE INSIDE OUTSIDE

R.H. 20 TO 35

0-1/4 7 TO 11 a TO 11+

WIND SPEED 2 TO 12

1/4-1 9 TO 13 10 TO 13+

DIR. _____

1-3 13 TO 20 13 TO 20+

(Preferred) (Accepted)

DUFF (LOWER) N/A TO - TO -

SHRUBS 50 TO 150 100 TO 150+

ERC _____ TO _____

IGNITION METHOD Drip torches

BI _____ TO _____

RATE OF SPREAD 2 TO 7

FIRING PATTERN Strip headfire

FLAME LENGTH 2 TO 5

SCORCH HEIGHT 5 TO 35

EXPECTED FIRE BEHAVIOR Fire should spread rather easily with the good layer of pine needles and grass with the steep slopes. Scorch heights will vary depending on width of firing strips used. Fire should burn up quickly and go out fast due to the light fuels and shallow duff layers. Some thick pockets of regen in MA 10 will thin out rather well, while others won't burn much at all.

PREPARATION:

TYPE OF FIRELINE: ROAD x NATURAL x CREW SIZE: IGNITION 6 HOLDING 2

PORTATANKS - PUMPS - HOSE 1000' ENGINES 1 SHOVELS 3 PULASKIS 3

SAWS 1 TORCHES 8 FUEL R 50 AgallDns I 0 S 8

PREPARATION NEEDED PRIOR TO BURN Wet down above the main Boulder road.

FIRING AND HOLDING PLAN: (See attached map or photo) Ignition will begin below the main Boulder road to anchor the burn at the road. Then the upper portion of the burn area will be burned in an underburn pattern to help keep scorch and mortality at a minimum in the regen stand and MA 11 above the old Boulder road. Once the firinp has progressed below the old Boulder road into MA 10, staggered strip headfires will be used to help create more heat and to try to burn out some of the thickets. Actual ignition time may take two days.

Holding: Engine will wet down and patrol the main boulder road. Flanks will shaded and damp in the spring, and therefore will need no holding.

HAZARD AREA: (See attached map or photo) None *FIRE MAY BACK DOWNSLOPE INTO DESIGNATED OLD GROWTH BUT NO FIRING WILL BE DONE, ROCK LEDGES AND BENCHES WILL SLOW UP THE FIRE*

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 if an extended dry spell continues after the burn so that it can handle a dry cold frontal passage.

TEST FIRE: (If applicable) Not needed.

SMOKE MANAGEMENT: Smoke from this burn will likely drift to the NE. Air **quality** is usually not a problem when burning in the spring. Kootenai Dispatch (Air Quality Coordinator) will be notified prior to burning.

SAFETY:

Public: A sign will be placed along the road warning people of the burning **operations.**

Bum Crew: A preburn briefing will be held covering the ignition and holding plans. Protective clothing and gear will be worn. Good communications will **be a must.**

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

REMARKS:

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 FUEL MODEL NO. 8 DISCUSSION: Open fuel type with only scattered jackpots of fuel. North aspects and shaded areas are generally damp in the spring and slow the fires spread.

FIRE BEHAVIOR INPUTS "HOTTEST" CONDITIONS: SHADE 3 DRY BULB 85 RH 20

1 HR 8 10 HR 10 100 HR 13 LIVE 100 WIND SPEED 3

PROJECTION TIME 1 hour

PREDICTED FIRE BEHAVIOR: ROS 2 CHS/HR HT/UNIT AREA 173 FIRELINE INTENSITY 5-7

FLAME LENGTH 1 PERIMETER 5-7 CHS. AREA 0 ACRES

PLAN OF ACTION: NO. OF PEOPLE 6 FROM WHERE Burn crew

ETA 0 LINE TO BUILD 6c MAX. ACRE ALLOWED 1 TIME NEEDED 1 Hr

PLAN OF ACTION: Burn crew should be able to handle any problems that may arise. Fire should not spread very far in the shaded areas or North aspects. In the event a strong unpredicted wind develops, additional people will be requested. Eureka is .5 hours away and Murphy Lake is 1 hour away.

BURNING PLAN COVER PLAN

5150

PRESCRIBED BURNING PLAN

GREEN BASIN - BPA
Burning Unit

REXFORD Ranger District

Kootenai National Forest

Prepared By: DE J K Date: 2/22/91

Reviewed By: George A. Curtis Date: 3, 19/91

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 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: H. Drew Bello Date: 4/2/91

ACCOUNTING COST: 000910
EST. COST/ACRE: \$30

SALE: GREEN BASIN Unit 6 FINAL COSTS: _____
LOCATION: T 37N R 28W SEC. Mid 13 TOTAL COST/ACRE: _____
STAND: 1-1-4,33,39 ACRES: 74 ELEVATION: TOP 2500 BOTTOM 2500
DRAINAGE: Lake Koocanusa SLOPE: 0-10 % ASPECT: Rolling
HABITAT TYPE: _____ NFDR FUEL MODEL: C F,B,FUEL MODEL: 9

FUELS: NATURAL X ACTIVITY X AGE 80 YRS ASSESSMENT: L M H x
DOWN WOODY PRIVATE PROPERTY ADJACENT West and South
0-1/4" 1.6 T/A DUFF DEPTH 1.0 IN. FUEL DEPTH 6 in.
1/4-1" 2.1 T/A TOTAL FUEL 15.8 T/A
1-3" 4.2 T/A ADJACENT FUEL Much of the area is thick DF stands with
3+" 8.0 T/A scattered areas of Ponderosa pine stands. FM = 8/9;

OBJECTIVES OF BURN (CHECK) (RANGE OF ACCEPTABLE RESULTS)
HAZARD REDUCTION X Reduce 3"+ fuels to 6 T/A, 3"- fuels to 4 T/A,
SILVICULTURE _____ as well as reduce the ladder fuels in the pine
SITE PREPARATION _____
WILDLIFE HABITAT X Underburn the area to rejuvenate the browse and
RANGE MANAGEMENT _____ kill 50% of trees <3" DBH. Protect the thick
OTHER _____ pockets of Douglas fir.

PRESCRIPTION	SEASON: <u>Spring</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>	0-1/4 <u>7</u> TO <u>11</u>	<u>8</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>10</u> TO <u>13+</u>	
DIR. <u>W</u> <u>NW to SW</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>100</u> TO <u>150+</u>	
ERC _____ TO _____			
BI _____ TO _____	IGNITION METHOD <u>Drip torches</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 in the open grass and Ponderosa
pine types, but will only smolder and creep around in the shaded Douglas fir
types. Scorch heights will vary, but will be highest in areas where old log-
ging or thinning slash exists. Fire will die down and go out fairly fast,
except in the old pitchy pine stumps.

PREPARATION:
TYPE OF FIRELINE: ROAD x TRACTOR CREW SIZE: IGNITION 6 HOLDING 4-6
PORTATANKS 1 PUMPS 1 HOSE 1000' ENGINES 2 SHOVELS 6 PULASKIS 6
SAWS 2 TORCHES 8 FUEL 100 gallons RADIOS 7
PREPARATION NEEDED PRIOR TO BURN Snags will be wet down and foamed in areas
where it can be done safely. Area is surrounded by roads or the lake, except
for a small area on the NE corner. This area will be wet down prior to
lighting.

FIRING AND HOLDING PLAN: (See attached map or photo) Ignition will begin at the northeast corner and slowly be lit both to the west and south. Fire should be backed in about 100 feet before main ignition. Once the north and east sides are anchored, strip headfires should be used to burn the area. Speed and width of strips will vary depending on burning conditions. Old DF thickets should not be lit to try and protect them for hiding cover for big game.
Holding: Engines will be used to wet down and patrol the roads around the burn area, especially on the east and north sides.

HAZARD AREA: (See attached map or photo) There is private land just to the south and west of the area.

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 if an extended dry spell continues after the burn so that it can handle a dry cold frontal passage.

TEST FIRE: (If applicable) Not needed.

SMOKE MANAGEMENT: Smoke from this burn will likely drift to the NE. Air quality is usually not a problem when burning in the spring. Kootenai Dispatch (Air Quality Coordinator) will be notified prior to burning.

SAFETY:

Public: A sign will be placed along the road warning people of the burning operations.

Burn Crew: A preburn briefing will be held covering the ignition and holding plans. Protective clothing and gear will be worn. Good communications will be a must.

I & I CONTACTS: An article will be placed in the Tobacco Valley News. Adjacent landowners will also be notified prior to ignition.

REMARKS:

good!
KLDB

PREBURN INFORMATION:

FUEL MOISTURE %:

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

BURN MONITORING: DATE: 4-17-91 TIME OF IGNITION: 12:30 STOP: 1800

BURNING BOSS: G Curtis FIRING BOSS: R Hielak HOLDING BOSS: R. K3 mac

Table with columns: ACTUAL WEATHER, TEMPERATURE, R.H., WIND SPEED/DIRECTION, STATE OF WEATHER. Rows include 1 HOUR BEFORE, START, 30 MINUTES, 60 MINUTES, and 1430.

FUEL MOISTURES %: 0-1/4" 7-10 1/4-1" 12 1-3" 15-20 DUFF — SHRUB 50

FIRE BEHAVIOR RATE/SPREAD 1-10 CH/HR, ERC —, x FLAME LENGTH/- 3 FT.

x FLAME HEIGHT 1-4 x SCORCH HEIGHT 15' FT.

POST BURN EVALUATION (Objectives Met?) Shaded - best up on top... of Unburned area. All the old slash a much... of the new slash cleared right up. Shrubs & grasses... should be set back as planned. Thick pockets of DF... came through OK except for some minor toxicity.

CONTINGENCY PLAN:

FIRE BEHAVIOR FUEL MODEL NO. 8 with some 9 DISCUSSION: Open fuel type with only scattered jackpots of fuel. North aspects and shaded areas are generally damp in the spring and slow the fires spread.

FIRE BEHAVIOR INPUTS "HOTTEST" CONDITIONS: SHADE 3 DRY BULB 85 RH 20

1 HR 8 10 HR 10 100 HR 13 LIVE 100 WIND SPEED 3

PROJECTION TIME 1 hour

PREDICTED FIRE BEHAVIOR: ROS 2-25CHS/HR HT/UNIT AREA 355 FIRELINE INTENSITY 162

FLAME LENGTH 1-4 PERIMETER 55 CHS. AREA 15 ACRES

PLAN OF ACTION: NO. OF PEOPLE 6 FROM WHERE Burn crew

ETA 0 LINE TO BUILD 6c MAX. ACRE ALLOWED 1 TIME NEEDED 1 Hr

PLAN OF ACTION: Burn crew should be able to handle any problems that may arise. Fire should not spread very far in the shaded areas or North aspects. In the event a strong unpredicted wind develops, additional people will be requested. Eureka is .5 hours away and Murphy Lake is 1 hours away. Priority of holding will be to hold the north side and the private land boundaries.