



**VEGETATION MANAGEMENT PRESCRIPTIONS
FOR
GRIZZLY BEAR HABITAT ENHANCEMENT OR RESTORATION
IN THE
CABINET-YAAK ECOSYSTEM**



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INTRODUCTION

The Kootenai National Forest management direction (goal) is to “Maintain or enhance sufficient grizzly bear habitat to meet the population recovery goals established in the grizzly bear recovery plan.” To achieve this goal, vegetation manipulation (e.g. mechanical, prescribed fire) is one useful tool. To be successful in producing grizzly bear habitat, using this tool requires an understanding of what habitat components grizzly bears use and what treatments can produce those components. It has been concluded through intensive monitoring programs that bear movements within home ranges are generally dictated by the distribution and seasonal availability of preferred plant and animal foods (Madel, 1982).

Research on grizzly bear habitat use across the Cabinet-Yaak ecosystem has been on going since the early 1980s. Information on what habitat conditions are used by grizzly bears has been refined over the past 20 plus years to the point that it is possible to develop vegetation management prescriptions designed specifically to enhance or restore conditions favored by the grizzly bear.

Research has categorized the seasons of bear habitat use as spring (4/1 or den exit to 6/15), summer (6/16 to 9/15), fall (9/16 to 11/30 or den entry) and den use (12/1-3/31). Differences in habitat components used during those periods may be used to develop season specific prescriptions for vegetation management of grizzly bear habitat. This paper provides general treatment guides and descriptions and examples of those seasonal management prescriptions.

RESEARCH SUMMARY

The most recent research progress report (Kasworm et.al. 2007) summarizes the past 20 plus years (e.g. Kasworm & Manley 1988, Kasworm et.al Annual CYE Monitoring reports 1989-2006) of monitoring seasonal grizzly bear use of 19 different habitat vegetation components; elevations (6 different 200 meter categories); four cardinal aspects (N, S, E, W); and four species of berries (huckle, buffalo, service and mountain ash berries). Seasonal habitat conditions strongly selected by the grizzly bear are summarized below. When important differences occur between habitat uses in the Yaak portion of the ecosystem versus the Cabinet Mountains portion, they are also displayed. It is important to note that there are seasonal overlaps on aspects and elevations. Also, grizzly bears use a very wide range of food sources (Kasworm and Thier 1993) but the summary below displays only those items the bears tended to favor in the CYE.

See attached Appendix A for a brief description (from Appendix 2 of Kasworm et.al 2007) of the preferred vegetation habitat components identified below by season. Appendix B displays the biophysical settings for each habitat component, the habitat types and forest types most commonly found.

Spring Habitat

The four most used spring habitat components in the Yaak portion of the ecosystem in order are: closed timber, timbered shrub field, graminoid side hill park, and mixed shrub/cutting unit. In the Cabinet mountains portion in order they are: mixed shrub/snow chute, graminoid side hill park, closed timber, and timbered shrub field.

A strong preference for south aspects is present in the Cabinet Mountains portion of the ecosystem. All aspects appear to be used in the Yaak portion; however a slight selection for south and east aspects seems to be evident.

Spring habitat is primarily below 1600 meters (5,250 feet) in elevation in the Cabinet Mountains portion and below 1400 meters (4,590 feet) elevation in the Yaak portion.

Food habits indicate bears are using grasses, sedges, succulent forbs, and the corms of glacier lily and biscuit root in the spring.

Summer Habitat

The three most used summer habitat components in the Yaak portion of the ecosystem in order are: timbered shrub field, mixed shrub/cutting unit and closed timber. In the Cabinet mountains portion in order they are: timbered shrub field, mixed shrub/snow chute, and mixed shrub cutting unit.

In the Cabinet Mountains portion of the ecosystem all aspects appear to get substantial use with the exception of north aspects in September. All aspects appear to be used equally in the Yaak portion.

Summer habitat is primarily above 1600 meters (5,250 feet) in elevation in the Cabinet Mountains portion and above 1500 meters (4,920 feet) elevation in the Yaak portion.

Dominate food sources include succulent forbs, insects, and berries (mostly huckleberry).

Fall Habitat

The three most used fall habitat components in the Yaak portion of the ecosystem in order are: timbered shrub field, closed timber, and mixed shrub/cutting unit. In the Cabinet mountains portion in order they are: timbered shrub field, closed timber, and mixed shrub/snow chute.

In the Cabinet Mountains portion of the ecosystem all aspects appear to get equal use except south aspects in November. All aspects appear to be used equally in the Yaak portion.

Fall habitat is primarily above 1400 meters (4,590 feet) in elevation in the Cabinet Mountains portion, with the exception of November. Lower elevation use in November (down to 1100

meters) seems to be a combination of early snows, before den entry, and availability of carrion associated with big game hunting season. Use is above 1400 meters (4,590 feet) elevation in the Yaak portion as well.

Bear diets revert back to grasses and sedges during late rains and subsequent green-up. Berries may still be important when huckleberries are still available and mountain ash berries persist on plants beyond the first snow fall.

Den Use

The two most used den habitat components in the Yaak portion of the ecosystem in order are: timbered shrub field and closed timber. In the Cabinet mountains portion in order they are: beargrass side hill park and timbered shrub field.

A clear preference for south aspects is present in the Cabinet Mountains portion of the ecosystem, however all aspects are used. In the Yaak portion south aspects appear to be avoided while other aspects are equally used.

Dens are around 1700 meters (5,580 feet) in elevation in the Yaak portion of the ecosystem and higher (mean elevation of 1891 meters, 6,200 feet) in the Cabinet Mountains portion.

See Appendix B for a summary of the seasonal grizzly bear habitat conditions and Appendix C for the associated biophysical setting, habitat types, forest type, etc.

DESCRIPTION OF MANAGEMENT PRESCRIPTIONS

Seral plant communities, which originate from wildfires, provide many of the key grizzly bear foods. In the absence of the large wildfires, common before fire exclusion practices, silviculture methods can provide similar plant communities. Brief management prescriptions are suggested for each habitat component. While these prescriptions focus on areas and foods grizzly bears have shown a tendency to favor; this species uses all aspects, elevations, and a wide variety of food sources. Appendix D summarizes important grizzly bear food sources and common season of use.

Spring Habitat

Vegetation management prescriptions designed to enhance or restore spring grizzly bear habitat should focus on south aspects in the Cabinet Mountains portion of the ecosystem. In the Yaak portion south and east aspects may provide the best opportunities. Treatment areas should be below 5,200 feet elevation across the ecosystem, and preferably below 4,600 feet in the Yaak portion. The treatment objective is to create vegetation conditions found in timbered shrub fields, graminoid side hill parks, and mixed shrub/cutting units or mixed shrub/ snow chutes. The treatment should increase grasses, sedges, succulent forbs, glacier lilies, and/or biscuit root.

Summer Habitat

Vegetation management prescriptions designed to enhance or restore summer grizzly bear habitat would be on any aspect throughout the ecosystem. Treatment areas should be above

5,000 feet elevation across the ecosystem. The treatment objective is to create vegetation conditions found in timbered shrub fields, mixed shrub/cutting units, mixed shrub/ snow chute or closed timber stands. The treatment should increase succulent forbs, huckleberries and insects.

Fall Habitat

Vegetation management prescriptions designed to enhance or restore fall grizzly bear habitat would be on any aspect throughout the ecosystem. Treatment areas should be above 5,000 feet elevation across the ecosystem. The treatment objective is to create vegetation conditions found in timbered shrub fields, mixed shrub/cutting units, mixed shrub/ snow chute or closed timber stands. The treatment should increase grasses and sedges as well as, huckleberries and/or mountain ash.

Den Use

Opportunities to maintain, enhance or restore den habitat are likely to be very limited due to the preference for closed timber stands. Vegetation management prescriptions designed to enhance or restore grizzly bear den habitat would be on south aspects in the Cabinet Mountains portion of the ecosystem and generally on south or east aspect in the Yaak portion. Treatment areas should be above 5,500 feet elevation across the ecosystem, but preferably above 6,000 feet in the Cabinet Mountains portion. The treatment objective is to create vegetation conditions found in timbered shrub fields or closed timber stands across the ecosystem. In the Cabinet Mountains portion beargrass side-hill-park like conditions are also desired. Coordination with local grizzly bear researchers would be needed prior to proposing treatments designed to benefit den habitat.

General Prescription Guides

The following descriptions would apply across all seasons, unless stated other wise. They are provided to help design management activities that respond to grizzly bear needs for food, cover, and security from human disturbance (reduce human caused mortality risk). Application of these guides should:

- reduce needs for multiple entry, thus reducing human disturbances for longer periods
 - ensure a mosaic of cover and forage across grizzly bear habitat
 - provide cover for bear movement across the landscape and contribute to reduced mortality risk
 - establish vegetation that can follow normal succession pathways
 - prescriptions should consider desired plant species ecological requirements
- ✓ In general, when designing habitat treatment in the Cabinet Mountains portion of grizzly bear habitat, unit shape should mimic snow chutes, usually created by snow slides. That is, units would lay parallel with the slope and generally be longer than they are wide.
- ✓ Retention of cover adjacent to feeding areas is important, especially around wet meadows, riparian areas, alpine meadows, avalanche chutes, berry fields and along travel routes (stream bottoms and ridges). Distance to cover should not exceed 600 feet. Interspersed areas of forage and cover should be the basic pattern of management activity in grizzly bear habitat.

- ✓ Silviculture systems are preferred in which seral plant communities and mosaic patterned forests (eg. interspersed forage and cover) are developed or maintained. When improved forage is the objective, even-age management systems should generally be applied over selection systems for uneven-age management, except in areas where cover should be retained (e.g. Den habitat, riparian areas: see cover guide above).
- ✓ Uneven-aged management maybe entirely suitable when considering opportunities to improve riparian habitat for bears. It is important to keep in mind that many of the low gradient stream bottoms are in moist, habitat types. These settings are generally in mature forests with a closed canopy structure, often with little under story vegetation. Avoid ground based activities during the spring season.
- ✓ Project planning should develop large scale prescriptions (e.g. designed to treat an entire drainage over a relative short time) to reduce human disturbance by reducing or eliminating re-entry needs.
- ✓ Avoid mechanical site preparation on moist or wet sites where bear forage species, such as cow parsnip, angelica and certain grasses and sedges, respond negatively to soil compaction or displacement. Where practical, winter operations may be suitable mitigation for treatment on these types of sites.
- ✓ Limit mechanical site preparation when the goal is to increase berry producing shrubs as this tends to cause damage by uprooting plants.
- ✓ In areas where mechanical treatment of vegetation or fuels is not appropriate, prescribed burning can often be used to create or maintain favorable habitat conditions.
- ✓ Where practical, use prescribed fire for site preparation in harvest units or other areas when the goal is to increase berry producing shrubs. Most of these shrubs reproduce well vegetatively but poorly by seed. Under some scenarios, prescribed fire may not be practical at upper elevations or on wet aspects (ie: NW to NE).
- ✓ Prescribed fire use should be designed to occur during spring conditions (higher soil moisture) as this timing is favorable to huckleberries and other shrubs because it protects the rhizomes (Miller 1977).
- ✓ When planning silviculture treatments in grizzly bear habitat, seasonal habitat components should be mapped (See Appendix F). Overlays showing associated information, such as vegetation response units, forest cover type, fire groups, etc. may also be helpful with prescription development.

Detailed Prescriptions

Appendix E provides specific examples of silviculture prescriptions designed to achieve various site specific objectives related to grizzly bear habitat maintenance or enhancement.

Summary

Management for the recovery of the grizzly bear offers some unique challenges to biologists and silviculturists. Special requirements for grizzly bear habitat such as feeding and security must be considered, when preparing management plans and silviculture prescriptions. Silviculture activities must be scheduled to minimize disturbance to the bears, and access to areas in grizzly bear habitat may be difficult because of road closures. Grizzly bear habitat requirements need to be considered in selection of silvicultural systems, site preparation for reforestation, reforestation method, tree species, and harvest unit size, shape, and location.

SUPPORTING RESEARCH PAPERS

Kasworm, Wayne; H. Carriles; T.G. Radant; and C. Servheen. 2007. Cabinet-Yaak Grizzly Bear Recovery Area 2006 Research and Monitoring Progress Report. USFWS, U. of MT, Missoula, MT 69 pp.

Kasworm, W. and T. Manley. 1988. Grizzly bear and black bear ecology in the Cabinet Mountains of Northwest Montana. MT Fish, Wildlife & Parks. 122 pp

Kasworm, W. and T. Their. 1992. Cabinet-Yaak Ecosystem Grizzly Bear and Black Bear Research 1992 Progress Report. USFWS, U. of MT, Missoula, MT 77 pp.

Madel, Micheal J. 1982. Grizzly Bear Habitat Delineation and Reconnaissance in the Cabinet Mountains: A Procedural Description. Kootenai National Forest. 37 pp.

Miller, Melanie. 1977. Response of blue huckleberry to prescribed fires in a western Montana larch-fir forest. USDA Forest Service. Intermountain Forest And Range Experiment Station, Ogden, UT. Res. Paper INT-188, 33p.

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Appendix A

Description of “preferred” Grizzly Bear Habitat Components in the CYE

1. **Closed timber** – timber stands with tree cover greater than 60% and a variable but often sparse under story
3. **Timbered shrub field** – open timbered sites with tree cover of 30 to 60%, and a shrub dominated under story. Except for more xeric aspects, the shrub layer is well developed, and the forbs layer is characteristically sparse due to limited light penetration.
4. **Mixed shrub/snow chute** – Shrub dominated communities resulting from, and often maintained by sudden snow slides on steep timbered drainages. They exist as narrow, linear openings in the forest canopy, or as extensive, broad chutes covering an entire slope.
5. **Mixed shrub/cutting unit** – open sites which have been harvested and are currently dominated by shrubs. Structure and composition is variable depending on harvest method, site treatment, habitat type, topographic position and time since harvest.
15. **Graminoid side hill park** – graminoid dominated communities on moderate to steep slopes with convex topography, from mid to high elevations. Local topographic, edaphic and climatic influences combine to limit tree growth.
16. **Beargrass side hill park** – beargrass (*xerophyllum tenex*) dominated communities on moderate to steep slopes with convex topography, from mid to high elevations. Generally located on shallow, well drained soils of south to west aspects. They exist as large homogenous openings along upper slopes and ridges, and small patches on basin headwalls.

(Source: Kasworm et.al. 2007 Appendix 2)

Appendix B

Seasonal Grizzly Bear Habitat Conditions

Habitat	Area	Setting	Aspect	Elevation (feet)	Plant Use
Spring	Yaak	Closed timber, timber shrub field, graminoid side hill park, mixed shrub/cutting unit	South and East	< 4590	Grasses, sedges, succulent forbs, glacier lily, biscuit root
	Cabinet	Closed timber, timber shrub field, graminoid side hill park mixed shrub/snow chute	South	<5,250	
Summer	Yaak	Timbered shrub field, mixed shrub/cutting unit, closed timber	All	>4920	Succulent forbs, insects, berries (pref hucks)
	Cabinet	Timbered shrub field, mixed shrub field, mixed shrub/snow chute, mixed shrub/cutting unit.	All	>5,250	
Fall	Yaak	Timbered shrub field, closed timber, mixed shrub/cutting unit	All	>4590	Grasses and sedges, hucks, mtn ash
	Cabinet	Timbered shrub field, closed timber, mixed shrub/snow chute	All but South aspects- Nov		
Winter Den Use	Yaak	Timbered shrub field, closed timber	All but South	>5580	N/A
	Cabinet	Beargrass side hill park, timbered shrub field	South	>6200	N/A

Appendix C

**Grizzly Bear Habitat
Biophysical Setting and Vegetation Types***

Habitat	Area	Vegetation Response Unit	Habitat Type	Forest Type
Spring	Yaak	VRU 5 S, 2 S VRU 4 S, 3, 5 N, 7 S	571, 570 531, 260, 530	DF, LP, L
	Cabinet	VRU 5 S VRU 2 S, 5 N, 7 S, 4 S, 9	570, 571 260,520,670,573,690	DF SAF, WH, GF, L, LP, C
Summer	Yaak	VRU 7, 9, 5 VRU 10	670, 690, 571, 570, 620, 730	SAF, LP, L
	Cabinet	VRU 7, 9, 10 VRU 5, 11	670, 690, 10, 830, 570,620	SAF NF, LP, DF
Fall	Yaak	VRU 5, 9, 7	670, 571, 690, 570, 531	SAF, LP, L, DF, C, NF
	Cabinet	VRU 7, 9, 5 VRU 10, 11	670, 570, 690, 10, 620	SAF DF, NF LP, WH
Winter	Yaak	VRU 9, 10, 7 N	670, 690, 10	SAF, NF
	Cabinet	VRU 9, 7 S, 10	690, 10, 830, 670	SAF, NF

*Information on VRU, Forest Types and Habitat Types in BOLD represent the predominant vegetation types in the particular setting and not all of the possibilities. This information is also presented in order of their predominance.

* Vegetation Response Units that aren't specific to aspect represent both south and north aspects.

Appendix D

**Key Grizzly Bear Plant Foods:
Non Forested Habitat Components and General Season of Use**

Plant Species	Habitat Component	Spring	Summer	Fall
Graminoids: Carex spp., Gramineae Forbs/Ferns: Angelica arguta Angelica dawsonii Athyrium filix-femina Claytonia lanceolata Equisetum arvense, Erythronium grandiflorum Heracleum lanatum Smilacina stellata Veratrum viride Shrubs: Sorbus Scopulina Vaccinium globulare	Mixed ShrubField/Snowchute	X	X	X
Graminoids: Cyperaceae, Gramineae Forbs/Ferns: Cirsium spp. Equisetum spp. Smilacina stellata Shrubs: Amelanchier alnifolia Sheperdia canadensis Sorbus scopulina Vaccinium globulare	Mixed Shrubfield/Cutting Unit	X	X	X
Graminoids: Cyperaceae, Graminae Forbs/Ferns: Smilacina stellata	Mixed Shrubfield/Burn	X	X	

<p>Shrubs: Amelanchier alnifolia Sorbus scopulina Vaccinium globulare</p>			X	X
			X	X
<p>Graminoids: Carex spp., Gramineae:</p> <p>Forbs/Ferns: Angelica dawsonii Athyrium filix-femina Claytonia lanceolata Equisetum spp. Erythronium grandiflorum Heracleum lanatum Ligusticum canbyi Osmorhiza occidentale Smilacina stellata Veratrum viride</p> <p>Shrubs: Sorbus scopulina</p>	Alder Shrubfield	X	X	X
			X	X
<p>Graminoids: Gramineae</p> <p>Shrubs: Sorbus scopulina Vaccinium globulare Vaccinium scoparium</p>	Huckleberry Shrubfield		X	X
			X	X
<p>Graminoids: Cyperaceae, Gramineae</p> <p>Forbs/Ferns: Angelica arguta Angelica dawsonii Athyrium filix-femina Equisetum spp. Heracleum lanatum Ligusticum canbyi Ligusticum verticillatum Osmorhiza occidentalis</p>	Riparian Streambottom	X	X	
		X		
		X	X	
		X	X	
		X	X	
		X	X	
		X	X	
		X	X	
		X	X	

Smilacina stellata Veratrum viride		X X	X X X	
Shrubs: Cornus stolonifera			X	X
	Snowchute			
Graminoids: Carex spp., Gramineae		X	X	
Forbs/Ferns: Angelica arguta		X	X	
Athyrium filix-femina		X	X	
Claytonia lanceolata		X	X	
Erythronium grandiflorum		X	X	
Heracleum lanatum		X	X	
Osmorhiza occidentalis		X	X	
Smilacina stellata		X	X	
Veratrum viride		X	X	
Shrubs: Sorbus scopulina Vaccinium globulare				X X
	Graminoid Sidehill Park			
Graminoids: Carex spp., Gramineae		X	X	
Forbs/Ferns: Claytonia lanceolata		X	X	
Erythronium grandiflorum		X	X	
Lomatium spp.			X	X
Shrubs: Amelanchier alnifolia			X	X
Sorbus scopulina				X
Vaccinium globulare			X	X
	Beargrass Sidehill Park			
Graminoids: Gramineae			X	
Forbs/Ferns: Erythronium grandiflorum			X	

Shrubs:				
Sorbus scopulina				X
Vaccinium globulare			X	X

Adapted from:

USDA, Forest Service. 1982 Grizzly Bear Habitat Delineations and Reconnaissance in the Cabinet Mountains: A Procedural Description. and from Kasworm and Thier 1993.

Appendix E

Silvicultural Prescription Examples

Example 1: Timbered Shrub Field – selective slashing with prescribed burning only

Example 2: Timbered Shrub Field – salvage cut, lop and scatter, delayed underburn

Example 3: Riparian Stream Bottom – single tree selection, selective slashing, jackpot burn

Silvicultural Prescription

Example 1: Timbered Shrub Field

Selective Slashing with Prescribed Burning only

Silvicultural Prescription

Example: Selective Slashing with Prescribed Burn only

Sale Name: Go Grizz
Unit Number: 44
FACTS ID: A310200169

Prepared by: Russ Gautreaux
Date: 6/23/08
Treatment Acres: 115
GPRA Code: EH1C

Setting and Biophysical Information:

<i>Stand</i>	<i>Acres</i>	<i>Forest Cover Type</i>	<i>Landtype</i>	<i>Slope</i>	<i>Aspect</i>	<i>Elevation</i>	<i>Habitat Type</i>	<i>VRU</i>	<i>MA</i>	<i>Size Class</i>
43102169	165	SAF	357	65	NE	5200	690	9	19	MLRS

****Existing Stand Conditions:**

Biophysical Setting: this unit is located in a lower subalpine setting and is characterized as Vegetation Response Unit 9, a cool and moderately dry habitat setting. This timbered shrubfield is used by a variety of wildlife and small mammals. Grizzly bears use these areas in the late summer and early fall, when key shrubs are producing large quantities of fruit. Although the canopy is moderately closed, browse remains available.

Species Composition and Stand Structure: Stand is composed of 30% SAF, 30% DF, 25% ES, 25% LP. Structure is open canopied (approx. 60% tree cover), essentially even aged and developing as two storied. Ingrowth of subalpine fire occurs in patches. Stand age ranges from 110 (LP, ES) to 140 years (DF). Stand density averages 150 sq. ft/acre in basal area (55% in DF/ES over 14" dbh).

Stand Condition and Fuels: Historic Fire Regime IV and Fire Regime Condition Class 1. Stand is currently in the old forest single-story structural stage with a partially open canopy and lack of significant, recent disturbance. Some natural openings occur, although ingrowth of saplings is evident due to fire exclusion. This is a generally healthy stand but with some loss in vigor and diameter growth due to age of the trees, and increasing competition for moisture. Forbs are somewhat lacking, due to the canopy cover. Although most shrubs are relatively healthy and well distributed, huckleberry bushes show signs of heavy animal browsing and less vigorous in more shaded areas. Some cambium stripping by bears has been noted.

Although not common yet, some LP has died and is on the ground from bark beetle affects. Average annual basal area growth was 1.2 sq.ft/acre, with a PAI of 65 cubic ft/acre. Live Crown ratio of 35%. Fuel loadings are generally low with a potential to increase. Some ladder fuels but not anything significant. No recordable wildfires since late 1880's.

Understory Vegetation: beargrass, grouse whortleberry, blue huckleberry, pinegrass, heartleaf arnica, elk sedge, some twinflower.

****Stand History and Past Forest Conditions:** Originated from a stand replacing wildfire sometime around 1889. A few scattered large diameter, overstory DF survived at that time. Historically a stand such as this would have experienced mixed severity fires, prior to another stand replacement fire. However, these type of fires have been effectively suppressed for the last 75 plus years. Area is characterized as being within Fire Group 8.

****Forest Plan Management Objectives:** MA-19: Goals are to maintain the vegetation in a healthy condition and minimize surface disturbance. Maintain viable populations of existing native wildlife species.

****Project-level Resource Objectives and Desired Conditions:** Resume ecosystem processes and vegetative conditions that historically were provided by mixed severity fire. Restore and/or maintain key grizzly bear habitat components, and assist in the recovery of the grizzly bear. Maintain favorable conditions for late summer and early fall grizzly bear use of this timbered shrubfield. Provide for the maintenance or enhancement of other wildlife species, especially big game.

Diagnosis of Treatment Needs

Defer	Modify	Uneven-aged Mgt.	Shelterwood	Seedtree	Clearcut
No, understory trees beginning to crowd and shade important forage base.	Yes, prescribed fire will maintain and/or enhance browse species, restore ecosystem processes and reduce ladder fuels.	N/A	N/A	N/A	N/A

Alternatives Considered - 1. No action, defer treatment. 2. Prescribed burn with selective slashing.

Preferred Alternative and Rationale - Alt 2 is preferred as it best meets the desired future condition and the project-level objectives. The stand would be burned in the late fall, after a good wetting rain, to maintain and/or enhance the important bear foods present, reduce natural fuels (primarily ingrowth), and create some of the effects of mixed severity fire. As close to spring-like burning conditions is recommended as it is expected to consume mostly the fine fuels, minimize consumption of and better increase the huckleberry vigor and distribution. This type of burning also generally occurs under favorable soil moisture and duff conditions, which protect the plant rhizomes from excessive heat. Prior to burning, selective slashing of understory trees would be implemented. Alt 1 would not accomplish stand or project-level objectives and would further prolong the impending stagnation of the forage base. Regeneration harvest was not considered as management area objectives preclude this type of treatment. It is unsuitable due to slope steepness, soil stability and site productivity concerns.

Target stand: Prescribed burning would maintain an open timbered shrub field condition, with a species mix that included both fire adapted species and others. Fire dependant forbs and shrubs would be healthy and produce a characteristic forage base, berry crop, etc. The stand structure would be managed generally as even aged and single storied, except where shade tolerant species encroach. In time, if management objectives are amended to include timber harvest, some improvement cutting could be initiated to somewhat mimic the effects of mixed severity fire, reduce the LP component, and maintain a more open canopy.

Target Stand Attributes

Density 120-150 sq ft basal area, up to 60% canopy cover
Trees/Ac. < 7" dbh – 150-250
Habitat Function: timbered shrubfield, summer/early fall grizzly bear use
Species Composition 15% SAF, 40% DF, 25% ES, 20% LP.
Trees/Ac. > 7" dbh – 100-150
Structure: even aged mostly single storied

Logical Treatment Sequence – year 1- selective slashing, year 2- prescribed burning, year 4- monitor treatment effectiveness, year 20- exam for treatment need and schedule next logical entry

DETAILED PRESCRIPTION SUMMARY

Sale Name: Go Grizz Prepared by: Russ Gautreaux
 Unit Number: 44 Date: 6/23/08
 Treatment Need: No harvest treatment- Code 01 Parent Stand: 43102-169

FACTS (ACUN 100)

ACTIVITY SUBUNITS					LOCATION		SPECIFICS								FUELS			
FACTS ID (Stand #)	Sub unit	Type	Num of Units	U O M	WUI Y/N	Legal Locat.	Suit.	Slope	Elev	Asp.	Wtshed	Fir e Reg	M A	Prod Clas s	FR Condition Class (by %)			
															1	2	3	%
A310200169	000	Area	115	Acre	n	T37N, R30W, Sec 16	710	65	52	NE	Camp	4	19	5	100			

FACTS (ACTV 100)

Action	FACTS Code	Local Qualifier (cost/unit)	Unit	Method	Equip	Date Planned	W F	Fund Code	KV Pri	KV Req
Diagnosis Prescription	4320 4331		acres	0	0	2008	FA	NFWF		No
Specifications: Stand diagnosis completed for entire stand, detailed prescription written for acceptable treatment. Selective slashing, late fall underburn.										

Slashing of Natural Fuel	1162		acres	100	111	year 1	FA	WFHF		No
Specifications: Force account slashing of sapling-sized trees to create continuity of fuel bed, reduce chance of flames reaching the overstory, and to reduce conifer encroachment. Limb and lop trees.										

Natural Fuels UB	1113		acres	300	302	year 2	FA	WFHF		
Wildlife Habitat Rx fire	6101							NFWF		
Specifications: moderate intensity spring burn of natural fuels to meet stated objectives. See burn plan for more details on recommended fuel/duff moisture, anticipated flame heights, etc. Some mortality of overstory ES, AF, LP is expected.										

Post Treatment Monitoring	4346		acres	0	0	year 4	FA	NFWF		
Specifications: Examine to see if Rx objectives are met, including the evaluation of improved forage potential, resprouting of shrubs, etc.										

Stand Exam	4310		acres	921	0	Year 20	FA	NFWF		
Specifications: Evaluate stand condition and consider future treatment needs										

Silvicultural Prescription

Example 2: Timbered Shrub Field

Salvage Cut, lop and scatter, delayed underburn

Silvicultural Prescription

Example: Salvage Cut, lop and scatter, delayed underburn

Sale Name: Go Grizz
Unit Number: 50
Parent Stand Number: 37-2-132
Facts ID: A370200132

Prepared by: Russ Gautreaux
Date: 7/1/08
Treatment Acres: 38

Setting and Biophysical Information:

Stand ID	Stand Acres	Forest Cover Type	Land Type	Slope	Aspect	Elev.	Habitat Type Code	M.A.	Size Class	Fire Group	V R U
37-2-132	115	DF	352tl	32	SW	4600	520	12	Muls	11	4

Existing Stand Conditions:

Biophysical Setting: Unit is within a larger mapped area, characterized as Vegetation Response Unit 4, a moderately warm and moist habitat setting. . Site has full stocking potential, having little to no surface rock. The soils are formed in volcanic ash-influenced loess overlying glacial till. This **timbered shrub field** is used by bears, mule deer, and elk. Some hiding cover is available in the tall shrub component, as well as the tree bole densities. While this area is not in the subalpine zone, more commonly used by grizzly bears into the fall, the disturbance history of this stand has created very suitable conditions for preferred bear foods. LP salvage occurred, some time ago and create some canopy gaps which are providing abundant huckleberry bushes, an important forage for grizzly bears in the late summer-early fall. Bears have been known to also use this type of habitat as bedding areas, especially where next to open, forage habitat.

Species Composition and Stand Structure: An average of 100-120 sq.ft. of basal area in overstory of PP, DF,WL with GF, WP, SAF. While the stand has open canopy gaps, it is still considered closed timber (approx. 70% tree cover) and largely single storied. A new cohort of sapling size GF and DF (approx. 200-700 tpa) has regenerated within skid trails and openings. Stand is currently in the understory re-initiation structural stage.

Stand Condition and Fuels: Area is characterized as Fire Group 11. Live crown ratio averages 33% but a number of trees have less live crown and are flat topped. Overall stand radial growth is good in dominant trees. However, DF beetle mortality is occurring and some mortality of WP due to blister rust. Heavy snows in winter 1997/1998 has resulted in some top breakage and blowdown. Natural regen of shade tolerant and mid-tolerant species occurs. Existing fuel loadings are generally low, but increasing fire risk from fuels associated with beetle-caused mortality, snow damaged trees. Ability to begin habitat maintenance burning is delayed due to conditions described above.

Understory Vegetation: Understory vegetation includes willow, huckleberry, maple, serviceberry. Forage value for wildlife is very good at this time due to canopy openings from past harvest. Huckleberry shrubs are particularly abundant.

****Stand History and Past Forest Conditions**

Approximately 40 acres of this 115 acre stand was shelterwood cut in 1980. Stand master list indicates that portions of the unit were either machine piled or underburned. Natural regeneration was initiated and stand was certified as stocked in 1989. A shelterwood final cut was planned for 2005 but deferred due to a change in resource objectives, and concerns for the perceived difficulty with restocking given the aspect and shrub competition.. This stand was a cone collection site for DF in 1978.

Forest Plan Management Objectives: MA 12 - Goals are to maintain or enhance nonwinter big-game habitat and produce a programmed yield of timber. Associated goals include maintaining or enhancing sufficient grizzly bear habitat to meet the recovery goals established in the grizzly bear recovery plan.

****Project-level Resource Objectives and Desired Conditions:** General purpose and need is to improve forest health, improve winter range conditions for big game, improve water quality, contribute timber products to the economy. More specifically in this area the objectives include modifying stand conditions to further reduce canopy cover to maintain the vigorous huckleberry shrub component, capture the economic value in poor quality, dead and/or high risk trees, in particular WP and DF, while retaining a manageable stand (with important forage values for bears, and some hiding/thermal cover values) until final regeneration harvest entry is appropriate. Additional objectives include reducing susceptibility of the DF to further impacts from DF beetle.

Diagnosis of Treatment Needs (NFMA)

Defer	Modify	Uneven-aged Management	Shelterwood	Seedtree	Clearcut
No, stand health and vulnerability to DF beetle requires a timely response	Yes, salvage or other intermediate harvest treatments can address P/N while maintaining or enhancing important browse species, etc.	No, even aged management has been initiated with previous entry	Not at this time, although a final SW cut has been prescribed	No, it is beneficial to retain a higher stocking on this site and aspect	No, this method would not result in assurance of restocking.

Target stand: it is desirable to retain overstory structure in healthy, fire-adapted species for long term ecosystem sustainability, continued natural regeneration, and resilience towards endemic levels of insects and disease. Over time, the stand would be maintained as two-storied stand composed of mid tolerant and shade intolerant species. The trend would be towards retention of

large diameter PP, WL and lesser DF, the continued establishment of a new stand in the understory, and within small openings. The stand should be maintained through periodic light, understory burning. It is expected that some mortality will occur in the less fire-adapted species (ie: GF, SAF) with burning.

Alternatives Considered - 1. Defer. 2. Salvage. 3. Shelterwood Final Cut

Preferred Alternative and Rationale - Alt 2 is preferred to address immediate concerns for reducing canopy closure and maintenance of the vigorous huckleberry shrubs. It also addresses the need to capture economic value in poor quality, dead and/or high risk trees, while maintaining important wildlife values within a manageable stand. Following harvest the unit would be lop and scattered. Following a post-treatment assessment, underburning will be scheduled. Alt 3 is feasible from strictly a silvicultural standpoint and was programmed for 2005 at the time the Rx was written in 1980. However, the original Rx does not consider the adjacent unrecovered opening, the need to retain hiding cover, as well as the desire to retain overstore structure for snag replacement, species and structural diversity. A variation of Alt 3 may be the next logical entry in this stand, within the next ten years. Alt 1 doesn't meet the economic objectives described nor does it reduce susceptibility of high risk DF to additional beetle impacts. Burning is deferred due to the current vulnerability of the mature, high risk DF to bark beetles. Also, the understory vegetation shows little sign of stagnation, at this point.

Logical Treatment Sequence for the Rotation – Year 1- harvest and fuels treatment. Year 5, exam for next logical entry – ecosystem maintenance burning.

DETAILED PRESCRIPTION SUMMARY

Sale Name: Go Grizz

Prepared by: Russ Gautreaux

Unit Number: 50

Date: 7/1/08

Diagnosed Treatment Need: Salvage Cut -09

Facts ID: A370200132

FACTS (ACUN 100)

ACTIVITY SUBUNITS					LOCATION		SPECIFICS								FUELS			
FACTS ID (Stand #)	Sub unit	Type	Num of Units	U O M	WUI Y/N	Legal Locat.	Suit.	Slope	Elev	Asp.	Wtshed	Fire Reg	M A	Prod Clas	FR Condition Class (by %)			
															1	2	3	%
A370200132	000	Area	38	Acre	N	T29N, R33W, Sec 1, 2	500	32	46	SW	Thicket	III	12	4		100		

FACTS (ACTV 100)

Action	FACTS Code	Local Qualifier (cost/unit)	Unit	Method	Equip	Date Planned	W F	Fund Code	KV Pri	KV Req
Diagnosis Prescription	4320 4331		acres	0	0	2008	FA	NFTM		No
Specifications: Stand diagnosis completed for entire stand, detailed prescription written for priority treatment area. Salvage Cut, lop and scatter										

Salvage	4231		acres	420	420	year 1	PR	PPPP		No
Specifications: ITM- Leaving an ave of 90 basal area/acre in healthy dominant/co-dominant PP,WL, DF (in that order), mark to remove dead,dying and poor quality trees w/emphasis on taking out GF/LP, beetle-impacted DF, and blister rust affected WP. Note: <u>DF with pitch streamers alone (no boring dust, pitch tubes) may not be currently impacted by beetles and should be considered for leave.</u> Where harvest might reduce stand density below the target BA healthy trees of other species may be substituted. Some areas are currently at the target BA and may not need marking. Leave trees should have healthy appearing crowns (>30% LCR, not flat topped or broken), min evidence of defect or insect/disease symptoms as compared with others, and have potential to benefit from this treatment (good recent growth,windfirm,etc). Leave all existing, functional snags Limb and lop trees. Protect existing, healthy advanced regeneration.										

Lop and Scatter	1251		acres	100	111	year 1	PR	PPPP		No
Specifications: Purchaser lop and scatter tops to reduce fuel height, reduce intensity of unplanned wildfire in unit, and provide some fuel abatement. If the purchaser chooses to whole tree or yard tops, it may significantly reduce this need.										

Harvest Eval	4347		acres			year 2	FA	CWKV		Yes
Specifications: Silviculturist and wildlife biologist review of post harvest stand conditions to validate planned prescription and need for any additional treatment. In particular, look at forage response to openings created by harvest and whether stand continues to have vulnerability to DF beetle. Validate plans for subsequent maintenance underburn.										

Natural Fuels UB	1113		acres	300	302	year 7	FA	WFHF		No
Wildlife Habitat Rx fire	6101							NFWF		
Specifications: Assuming silv diagnosis results are favorable, initiate moderate intensity spring burn of natural fuels to meet stated objectives. See burn plan for more details on recommended fuel/duff moisture, anticipated flame heights, etc. Some mortality of advanced regeneration and less fire-adapted overstory, is expected.										

Post Treatment Monitoring	4346		acres	0	0	year 8	FA	NFWF		No
Specifications: Examine to see if Rx objectives are met, including the evaluation of improved forage potential, resprouting of shrubs, etc.										

Stand Exam	4310		acres	921	0	year 15	FA	NFWF		
Specifications: Evaluate stand condition and consider future treatment needs (ie: maintenance underburn)										

Silvicultural Prescription

Example 3: Riparian Stream Bottom

**Single Tree Selection, selective slashing,
jackpot burn**

Silvicultural Prescription

Example: Single Tree Selection, selective slashing, jackpot burn

Sale Name: Go Grizz
 Unit Number: 007
 FACTS ID:

Prepared by: Russ Gautreaux 7/23/08
 GPRA Code: EH1C
 Treatment Acres: 157

Setting and Biophysical Information:

<i>Stand</i>	<i>Acres</i>	<i>Forest Cover Type</i>	<i>Landtype</i>	<i>Slope</i>	<i>Aspect</i>	<i>Elevation</i>	<i>Habitat Type</i>	<i>VRU</i>	<i>MA</i>	<i>Size Class</i>
	165	C	103	5	LR	2800	550	6	14	MULT

**Existing Stand Conditions:

Biophysical Setting: this site is located in a forested riparian area that is adjacent to a stream. Cold air ponding is a common occurrence. The area is characterized as Vegetation Response Unit 6, a moderately cool and wet habitat setting. The soils here are silts and gravel and very productive, a result of nutrient input from hardwood trees. There is a thin layer of volcanic loess, lending to a high level of productivity and a high moisture holding capacity. Soils are generally moist year round.

This wide riparian stream bottom is used by a variety of wildlife and small mammals. In general, grizzlies use riparian areas for feeding, travel corridors, and bedding sites. Bears are known to use these areas first thing, in the spring, as graminoids and succulent wet site forbs emerge. These areas provide relatively secure cover for foraging. In years of low berry production, grizzlies are known to use streambottoms in the fall, to forage on remaining succulent forbs and fruit-bearing plants. Some sign of beaver activity noted.

Species Composition and Stand Structure: Stand is composed of 40% WRC, 15% ES, 20% WP, 10% WH, 10% AF, and 5% cottonwood. Structure is closed canopy (approx. 90 % tree cover), natural openings only occur directly adjacent to streamside. Uneven-aged and multistoried stand structure. Very little ingrowth of conifers, due to lack of disturbance. Stand age ranges from 150 (AF, ES) to 240 years (WRC, WH, WP). Stand density averages 225 sq. ft/acre in basal area (over 50% in WRC, WP over 14" dbh).

Stand Condition and Fuels: Historic Fire Regime V and Fire Regime Condition Class 1. Stand is currently in the old forest multi-story structural stage with few open canopied areas. No new growth of hardwood trees, largely due to lack disturbance. This is a generally healthy stand but with some loss in vigor and diameter growth due to age of the trees. Stand structure is becoming more even and uniform. Competition for moisture is not an issue. Forbs are somewhat lacking, due to the canopy cover. As stated above, openings are few and limited in distribution. Although most shrubs are relatively healthy and well distributed, they show signs of heavy animal browsing and are less vigorous in more shaded areas.

Blister rust fungus is responsible for the declining health and mortality of some WP. Scattered cottonwood are mature, some broken tops, no resprouting. Live Crown ratios average 30%, higher in ES. Fuel loadings are generally low as is fire risk. Some ladder fuels but not anything significant. No recordable wildfires since late 1800's.

Understory Vegetation: willow, horsetail, wild ginger, Hooker's fairybells, arrowleaf groundsel, twisted stalk, dogwood, buckthorn, rose, graminoids, .

****Stand History and Past Forest Conditions:** It appears that the portions of the stand originated following a mixed severity wildfire that would have backed into this riparian area, many years back. Some of the large diameter, overstory trees survived at that time. Historically a stand such as this would have experienced periodic mixed severity fires, although the very wet conditions would likely preclude fire spread except during a major event, likely originating from an adjacent hillside. Mixed severity fires have been effectively suppressed for the last 75 plus years. Area is characterized as being within Fire Group 11

****Forest Plan Management Objectives:** MA 14: Maintain or enhance grizzly bear habitat, reduce human/grizzly conflicts, assist in the recovery of the grizzly bear, realize a programmed level of timber production, and provide for the maintenance or enhancement of other wildlife species, especially big game.

****Project-level Resource Objectives and Desired Conditions:** Resume ecosystem processes and vegetative conditions that historically were provided by mixed severity fire. Assist in the recovery of the grizzly bear through practices that may restore and/or maintain the key grizzly bear habitat components, present in this riparian stream bottom (ie: feeding, travel corridor, and bedding). Provide for the maintenance or enhancement of other wildlife species, especially big game. As bears are known to use these areas in both spring and fall, the target stand is intended to provide areas of relatively secure cover for foraging.

Diagnosis of Treatment Needs (NFMA)

Defer	Modify	Uneven-aged Mgt.	Shelterwood	Seedtree	Clearcut
No, canopy closure is inhibiting growth of understory plants, an important forage base.	Yes, intermediate harvest is a reasonable option to meet target stand. However, a less uniform, uneven aged stand structure is more desirable, in this setting	Yes, this silvicultural system is the most appropriate in a riparian habitat setting..	No, not appropriate in this setting and to meet resource obj.	No, not appropriate in this setting and to meet resource obj	No, not appropriate in this setting and to meet resource obj

Alternatives Considered - 1. No action, defer treatment. 2. Prescribed burn with selective slashing, 3. Individual tree selection, selective slashing, jackpot burn

Preferred Alternative and Rationale - Alt 3 is preferred as it best meets the desired future condition and the project-level objectives. The stand would be harvested in the winter, followed by selective slashing of understory trees. When the conditions are right, a late spring jackpot burn would be initiated to maintain and/or enhance the important bear foods present, reduce fuels concentrations, and create some of the effects of mixed severity fire. Spring burning also generally occurs under favorable soil moisture and duff conditions, which protect the plant rhizomes from excessive heat. Alt 1 would not accomplish stand or project-level objectives and would further prolong the impending stagnation of the forage base Alt 2 may not fully meet resource objectives, due to the need to open the canopy structure through limited tree removal.

Target stand: Limited tree removal and prescribed burning would maintain a multi-storied, uneven aged stand structure, and the functionality of a forested, riparian habitat. Species composition would reflect the nature and characteristics of this setting and include mostly shade tolerant species. Forbs and shrubs would be healthy and produce a characteristic forage base, berry crop, etc.

Target Stand Attributes

Density ave 150-200 sq ft basal area, 70% plus canopy cover

Species Composition 40-50% WRC, 15-25% WP 10% ES, 5-10% WH, 5-10% AF, and up to 10% cottonwood.

Trees/Ac. < 8"dbh – up to 300

Trees/Ac. > 8"dbh – 150 plus

Habitat Function: riparian stream bottom - emphasis as secure foraging site for grizzlies in early spring and fall

Structure: uneven-aged, multistoried with gaps. 4-5 diameter classes maintained.

Logical Treatment Sequence – year 1- individual tree selection, selective slash, year 2- jackpot burning, year 4- monitor treatment effectiveness, year 20- exam for treatment need and schedule next logical entry

DETAILED PRESCRIPTION SUMMARY

Sale Name: Go Grizz
 Unit Number: 007
 Treatment Need: Selection- Code 06

Prepared by: Russ Gautreaux
 Date: 7/23/08
 Parent Stand:

FACTS (ACUN 100)

ACTIVITY SUBUNITS					LOCATION		SPECIFICS								FUELS			
FACTS ID (Stand #)	Sub unit	Type	Num of Units	U O M	WUI Y/N	Legal Locat.	Suit.	Slope	Elev	Asp.	Wtshed	Fir e Reg	M A	Prod Clas s	FR Condition Class (by %)			
															1	2	3	%
	000	Area	157	Acre	n	anywhere	710	5	28	LR	anywhere	V	19	4	100			

FACTS (ACTV 100)

Action	FACTS Code	Local Qualifier (cost/unit)	Unit	Method	Equip	Date Planned	W F	Fund Code	KV Pri	KV Req
Diagnosis Prescription	4320 4331		acres	0	0	2008	FA	NFTM		No
Specifications: Stand diagnosis completed for entire stand, detailed prescription written for logical treatment area. Single Tree Selection, Selective slashing, spring jackpot burn.										

Single Tree Selection	4151		acres	200	111	year 1	PP	PPPP		No
Specifications: Marking guides will describe more site-specific details. In an irregular distribution, mark to cut up to 30% of the suppressed, intermediate conifers. Preference for leave: WRC, WP, ES, H, AF (in that order). Focus on retention of the best quality dominant and codominant trees while maintaining an uneven-aged and storied stand structure. Residual stand density target should average 180-200 sq.ft/acre. Cutting and regeneration of hardwoods will done FA.										

Slashing of Natural Fuel	1162		acres	100	111	year 1	FA	WFHF		No
Specifications: Force account slashing of specific sapling-sized trees to open up growing space for understory plants, create some fuels to enable burning, reduce ladder fuels, and to reduce further conifer encroachment. Lop trees. Fall identified decadent, live hardwood trees to stimulate suckering.										

Nat Fuels Jkpt Burn	1112		acres	300	302	year 2	FA	WFHF		No
Act Fuels Jkpt Burn	1212							BDBD		
Specifications: moderate intensity spring jackpot burn of existing fuels to meet stated objectives. See burn plan for details on recommended fuel/duff moisture, anticipated flame heights, etc. Some mortality of overstory is expected.										

Post Treatment Monitoring	4346		acres	0	0	year 4	FA	NFWF		
Specifications: Silv and biologist examine to see if Rx objectives are met, including the evaluation of improved forage potential, resprouting of shrubs, etc. Review schedule for any subsequent entry.										

Stand Exam	4310		acres	921	0	Year 20	FA	NFWF		
Specifications: Evaluate stand condition and consider future treatment needs										

Appendix F Grizzly Bear Habitat Mapping Silvicultural Treatment Example

