Wildfire Planning
Indiana Creek Watershed
Breckenridge, Colorado

Prepared for: The Town of Breckenridge
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Breckenridge, CO 80424

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Cover photograph: Goose Pasture Tarn and Indiana Creek watershed top left, Hayman watershed lower right

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1 INTRODUCTION

The Town of Breckenridge has one sole water source, the Goose Pasture Tarn (Tarn), located just south of the Town boundary adjacent, in part, to U.S Forest Service (USFS) lands. The Town has been working in conjunction with the USFS to produce a Wildfire Planning document to aid in both pre-wildfire and post-wildfire planning. The purpose of this report is to provide recommendations and measures that would likely reduce impacts of a wildfire should a wildfire occur, and to present proposed measures to minimize sediment-associated impacts on the Tarn.

The majority of USFS lands are within the Indiana Creek watershed, located within the White River National Forest and managed by the Department of Interior, USFS. As such, much of this report is specifically aimed at identifying tools that could potentially be utilized by the U.S Forest Service Burned Area Emergency Response (BAER) Team to accelerate recovery within the White River National Forest, specifically in the Indiana Creek watershed. It is recognized that some of these tools and recommendations should be applied on private property to achieve the goal of protecting the water supply and the storage volumes within the Tarn, and that these measures would only be implemented with permission of the property owners and likely be implemented, with potential assistance from the Town, and other federal agencies such as the National Resource Conservation Service (NRCS). This report also presents recommendations on pre-wildfire recommendations that closely align with recommendations developed by the USFS in the Breckenridge Forest Health and Fuels Project (BFHFP).

1.1 Background

In 2010 the USFS completed the Breckenridge Forest Health and Fuels Project (BFHFP) Environmental Assessment (USFS, 2010). This report notes the following:

… the forests in the vicinity of Breckenridge have experienced an increase in tree mortality as the mountain pine beetle travel into higher elevation forests. Mortality rates of mature lodgepole pine in some areas are over 80 percent of the basal area. It is reasonable to suspect that within a 10-year period, many dead lodgepole pines will deteriorate and fall to the ground. The resulting condition would be heavy fuels accumulations that could support large-scale wildfires characterized by high severity/high intensity fire behavior.

In 2011, the U.S. Geological Survey (USGS), in cooperation with the Town, performed a study to determine the potential for post-wildfire debris flows, and volume of post-wildfire debris flows in the upper Blue River watershed. The USGS report concluded that five of the 10 sub-watersheds within the Indiana Creek watershed have the greatest probability of post-wildfire debris-flows within the Blue River watershed. Specifically, over half the sub-watersheds tributary to the Tarn have a high probability of post-wildfire debris-flow occurrence combined with a large estimated volume of material (Elliot et. al., 2011).

1.2 Report Organization

This report first describes the watershed and hydrologic conditions under existing conditions, presents background and details on estimated volumes of post-wildfire mud and debris flows, and provides recommendations for pre-wildfire planning and strategies for post-wildfire stabilization. The report includes base mapping with pertinent watershed elements and features, details for proposed treatments, and written documentation, both developed in general conformance with the policies and standards outlined in the Interagency Burn Area Emergency Response Guidebook (Guidebook) (USDOI, 2006) and as described herein. The Plan is developed using existing available data, analyses and resources. Pertinent resources are also provided in the appendices for ease in accessing referenced information.

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2 WATERSHED AND GEOMORPHIC CHARACTERISTICS OF INDIANA CREEK

The Indiana Creek watershed area is approximately 8.7 square miles (mi^2) measured at its confluence with the Tarn (**Figure 1**). Most of the watershed is located within the White River National Forest with the exception of 400 acres that lie within the Spruce Valley Ranch (SVR) subdivision. SVR is located in Summit County, outside of the Town of Breckenridge jurisdiction. SVR consists of 49 large-acreage home sites. The watershed sits at and above 9900 feet in elevation, extending to the continental divide at an elevation of approximately 13000 feet. Portions of the watershed extend above coniferous forest tree line, covered by high alpine tundra grasses and rock scree. The watershed is thus vegetated by subalpine coniferous forest (predominately spruce and lodgepole pine) and alpine tundra.

The river corridor is typically 50 to 200 feet wide and traverses through a broad wetlands/meadow complex (**Photo 1**). Stream health is robust, with minimal man-made disturbance, stable bed and banks, riffle-pool morphology, and a healthy riparian corridor. The river valley extends from the upper watershed to the Tarn for almost 4 miles at an average slope of 4.5 percent. Several roads traverse the basin both paved, within the SVR subdivision, and dirt roads within the White River National Forest. One short stretch of road, approximately 300 feet in length, located in the White River National Forest immediately upstream of the SVR, is actually located within the bed of a tributary to Indiana Creek. Here the stream is in relatively poor condition.

The Tarn is a manmade reservoir located approximately 1½ miles south of Breckenridge and immediately adjacent to U.S. Highway 9. The Tarn was constructed in 1965 and has an approximately 771-acre-foot capacity. The Tarn is fed by both Indiana Creek and the Blue River (Figure 1). The Blue River watershed upstream from the reservoir has a drainage area of approximately 42 mi^2 (Elliot et al., 2011).

2.1 Water-quality Impacts from Wildfire

In a report prepared for the Town of Breckenridge, an assessment was conducted to evaluate the potential effects of a wildfire on water quality, and in particular the impacts a wildfire would have on the Tarn and the water quality in Indiana Creek (HDR, 2013). This report notes the following:

> *Supply reliability pertains to both short and long-term fire impacts on the availability and quality of surface water at the utilities point of supply. Water availability concerns relate to the impacts of debris from the burn area in the stream flows during runoff events and potential reductions or blockages of flow to the water supply system intakes or diversions. Water-quality concerns include turbidity, metals, alkalinity, pH, total organic carbon, nitrate, phosphate and ammonia. The degree to which fire effects surface water availability and quality is dependent on factors that determine the intensity and severity of a fire. Changes in water availability occur due to flushing of debris, ash and sediment into streams and reservoirs. Debris can block or reduce flow into water plant intakes. Sediment volume collecting in reservoirs can be of such a magnitude that the reservoir capacity is significantly reduced. Water quality changes typically arise from dissolution of compounds from the sediment and ash that are washed into the streams and reservoirs by runoff.*

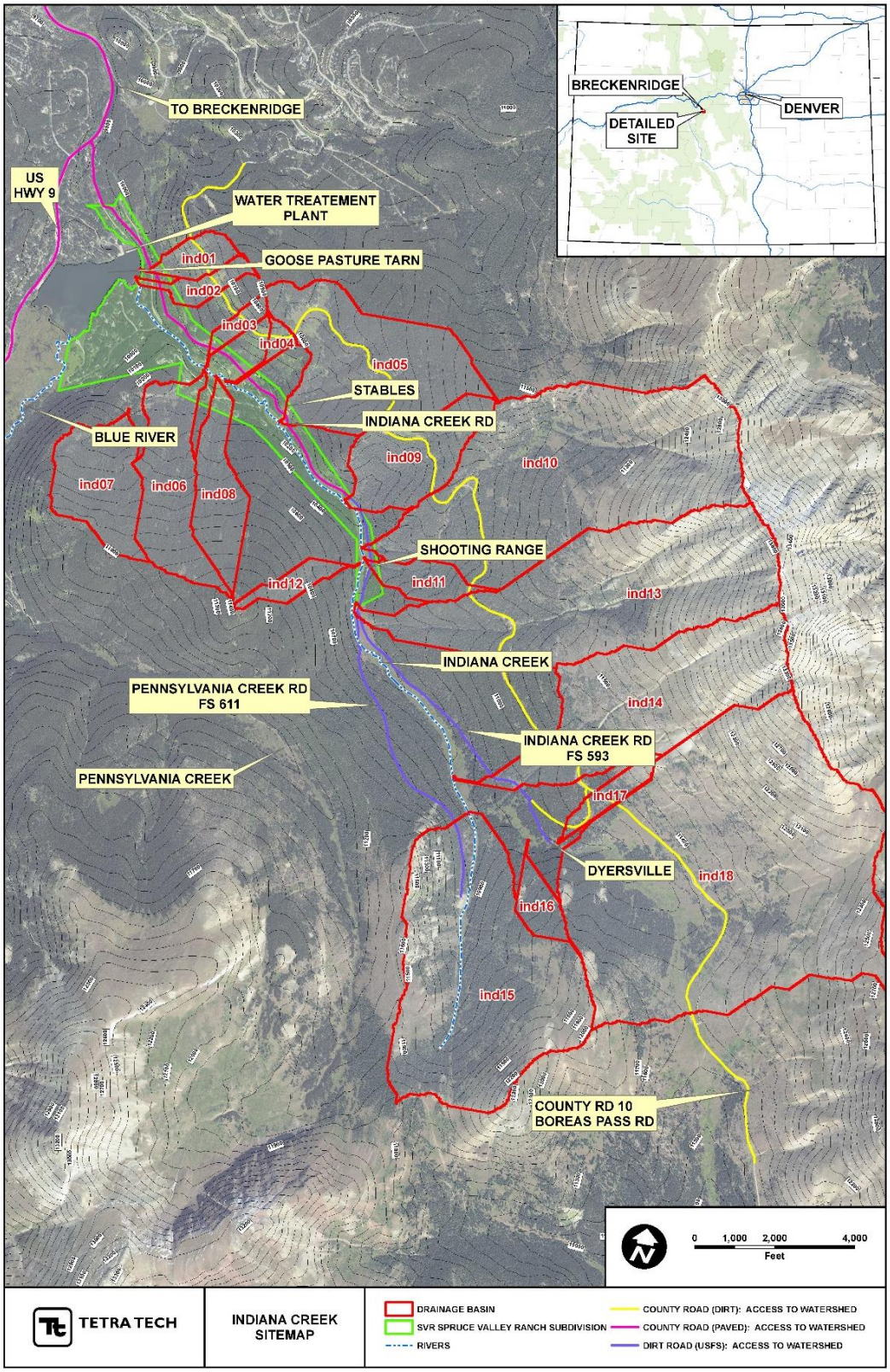

Figure 1. Indiana Creek site map.

Photo 1. Indiana Creek valley with steep wooded sideslopes above the valley floor.

2.2 Watershed Characteristics

A field assessment was conducted on October 12, 2012, and again on November 2, 2012, to assess conditions of the watershed. A photo log is included in **Appendix A**. Indiana Creek watershed can generally be described as having steep, forested side slopes and a relatively flat, river corridor of open wetlands and meadows, vegetated with willow and grasses. Portions of the adjacent side slopes extend above tree line and are covered by high alpine tundra including grasses and rock scree. The river valley has an average longitudinal slope of 4.5 percent; the steep side slopes extend above the river corridor between 25 and 35 percent.

2.3 Hydrologic Impacts

Streams draining burned areas tend to have higher annual discharge and an increase in peak flows due to the loss of vegetation and decreased soil infiltration. Precipitation interception is reduced by loss of vegetation and wildfire-formed hydrophobic soils severely limit infiltration. Infiltration can be reduced by as much as one to two orders of magnitude, and rills can form, increasing erosion. Flooding may be life-threatening, and sediment mobilization may seriously impair recreation, stream ecology, and water supply systems (USFS, 2010; HDR, 2013). This effect will alter and often increase sediment supply and transport. Sediment yield increases present risks to downstream reservoirs, and in the case of Indiana Creek, the Tarn in particular which may lose significant capacity due to increases in sedimentation.

A cursory hydrologic analysis was conducted to estimate clear water storm flows for Indiana Creek using StreamStats, a web-based Geographic Information System (GIS) that provides streamflow statistics, drainage-basin characteristics, and other information for user-selected sites on both gaged and ungaged streams. StreamStats is developed by the U.S. Geological Survey (USGS) and is available at http://water.usgs.gov/osw/streamstats.

The watershed delineation for Indiana Creek is shown on **Figure 2**, with an estimated area of 8.7 square miles. The mean basin slope is 33.3 percent and the mean annual precipitation is 28.9 inches. Clear-water peak flow estimates at the confluence of Indiana Creek and the Tarn, from Stream Stats, are presented in **Table 1**.

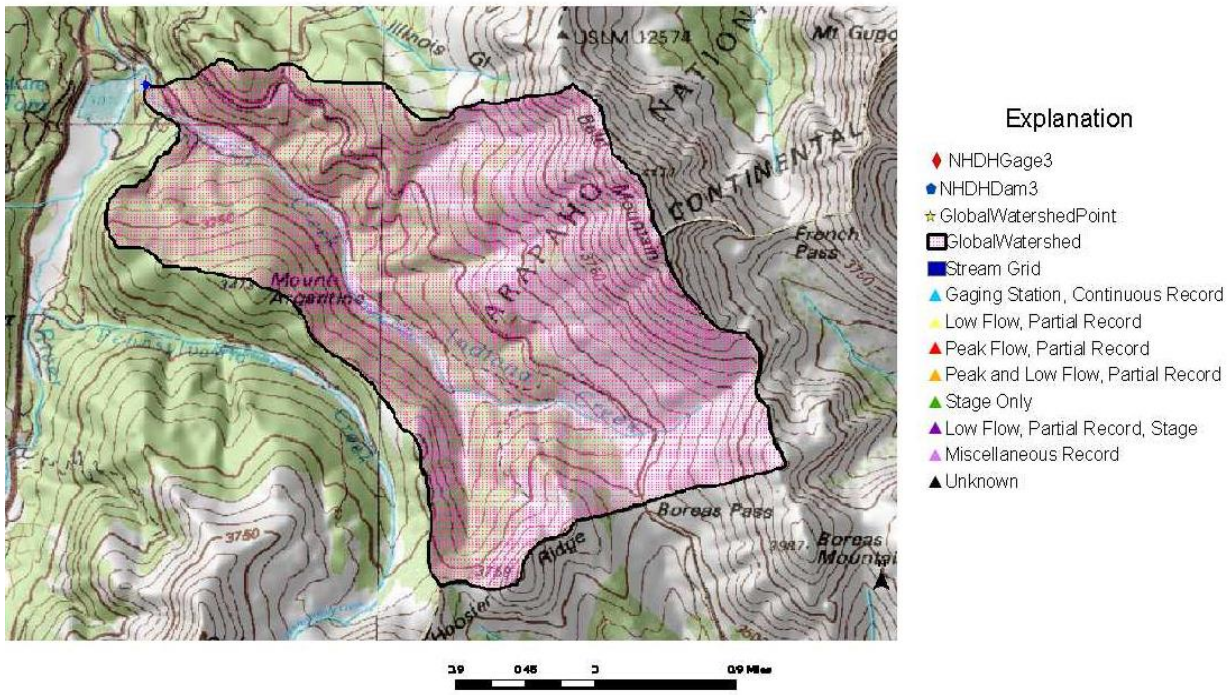

Figure 2. Indiana Creek watershed delineation.

Table 1. Clear-water peak flow estimates for Indiana Gulch.

Recurrence Interval (yr)	Peak Flow, cubic feet per second (cfs)
2	102
5	144
10	171
25	205
50	243
100	268
500	337

Runoff rates under post wildfire conditions can increase significantly depending on the severity, location and extent of the wildfire. Observations of post-wildfire in the Front Range of Colorado indicate that peak flood flows after wildfires in the western United States can range up to three times the magnitude compared to pre-wildfire conditions (Robichaud et al., 2003). Indiana Creek watershed is located in the high alpine terrain of the west slope of Colorado and as such, experiences rainfall and snowmelt patterns that are typically less severe during the summer but have higher snowmelt runoff compared to the Front Range. However it is reasonable to assume that, similarly to the Front Range, peak runoff will increase under post-wildfire conditions and under some conditions, such as high snowmelt runoff and/or summer thunderstorms, the increases could be significant. Should a wildfire occur estimated peaks would be calculated by the BAER team and reflect the site specific conditions of the wildfire and watershed, such as the extent, severity and location of the burned areas.

2.4 Sediment and Debris Flow Estimates

Stream structure and function will be affected by wildfire; headwater reaches will tend to undergo erosion and can become unstable, while flatter downstream reaches will receive sediment and aggrade. In studies conducted following the Hayman wildfire, sediment loading in rivers were found to be seven times higher in severely burned watersheds compared to moderately burned watersheds. A water repellent layer (hydrophobic soils) extended from a few centimeters to 10 cm depth in the soil and was expected to persist for 1 to 2 years. (Graham, 2003). The timing, magnitude, and duration of storms immediately after a wildfire are also key factors in determining erosion; the most severe erosion may occur when a severe wildfire is followed by heavy rainfall.

Debris volume estimates prepared by the USGS study (Elliot et. al., 2010) indicate that a 25-year recurrence, 1-hour-duration rainfall could generate a total potential debris flow volume of 203 acre-feet under post-wildfire conditions within the Indiana Creek watershed.

The USGS debris flow estimates, defined as ‘fast-moving, high-density slurries of water, sediment, and debris’ are based on empirical models developed from extensive studies of post-wildfire debris flows that have occurred in recent years on burned watersheds in similar environments (Cannon et al., 2007 and 2009). The USGS study divided Indiana Creek into 18 sub-watersheds as shown on Figure 1. The USGS also assigned a debris flow hazard ranking to each watershed, based on physical parameters and estimated severity of burn (with 1 being the highest). Note that the five highest debris flow hazard ranking sub-watersheds are Ind 05, 07, 09 10, and 15. The volume of debris flow estimates for the 25-year event and associated hazard ranking for each of the 18 watershed are presented in **Table 2**.

Table 2. Debris Volume Estimates for Indiana Gulch (Elliot et al., 2010).

Sub-watershed	Drainage Area		25-year 1-hour rainfall debris flow volume		25-year 1-hour rainfall debris flow hazard rank
	km^2	ac	m^3	ac-ft	
ind01	0.15	37.1	1,800	1.5	18
ind02	0.12	29.6	1,800	1.5	17
ind03	0.08	19.8	1,500	1.2	14
ind04	0.05	12.4	1,000	0.8	21
ind05	1.21	299.0	9,700	7.9	2
ind06	0.63	155.7	2,900	2.4	16
ind07	0.55	135.9	4,200	3.4	6
ind08	0.40	98.8	3,200	2.5	11
ind09	0.56	138.4	6,300	5.1	1
ind10	2.65	654.8	21,300	17.2	5
ind11	0.18	44.5	2,000	1.6	10
ind12	0.12	29.7	1,900	1.5	12
ind13	2.13	526.4	14,500	117.5	10
ind14	1.52	375.6	8,800	7.1	21
ind15	2.29	565.9	19,000	15.4	5
ind16	0.15	37.1	1,900	1.5	15
ind17	0.13	32.1	700	0.5	30
ind18	4.43	1094.7	18,300	14.8	17
Total	**17.35**	**4287.3**	**120,800**	**203.4**	

2.5 Post-Wildfire Mud Flow Routing Analysis

To address the issues of sediment delivery, a qualitative analysis was completed using guidance found in the National Engineering Handbook (NEH), and estimated mud and debris flow volumes for burned conditions in Indiana Creek determined by the USGS (Elliott et al., 2011). For the purposes of this assessment the 25-year peak flow calculated using the Stream Stats site is bulked by 2 ½ times the clear water peaks to account for mud flows in accordance with the peak flow increases noted in Section 2.3. Calculations indicate that should a 25-year runoff event occur, post-wildfire, most all of the debris volume as calculated by the USGS (203.4 acre-feet) will reach the Tarn. Incipient motion estimates also indicate that, under the same flood conditions boulders up to 16 inches in diameter could be mobilized. Calculations are Appended (Appendix A).

Observations from a storm event in the Sawmill Creek watershed in July 2011 provides some additional insight to mud and debris flow mobility in Indiana Gulch. Sawmill and Indiana Creeks are similar in elevation, and vegetation composition, although Sawmill Creek had not experienced a wildfire prior to this flood event. Sawmill Gulch, however, experienced an intense rainstorm, estimated to be on the order of a 100-year return period, which in turn, generated mud and debris flow within the watershed. The headwater and steeper reaches became unstable and eroded, while flatter downstream reaches experienced heavy sediment and debris deposits (**Photo 2**).

Indiana Gulch, which is about twice the length (almost 4 miles) and four times the basin size of Sawmill Creek (2.1 compared to 8.7 square miles) could behave similarly if it also experiences a severe event. Under post-wildfire conditions, the available supply of material would likely be significantly greater than that

observed and mobilized in Sawmill Gulch. Observations of the Sawmill Creek mud and debris flow event that are likely to be representative of potential conditions in Indiana Creek include the following:

- ✓ Deposition of sediment and debris at grade breaks where the creek flattens,
- ✓ Deposition and clogging of culverts and bridges,
- ✓ Formation of levee-like features on the upper banks, alongside the creek, and
- ✓ Mobilization of material ranging in size from 6 to 16 inches with pockets of sand and gravels.

Under post wildfire conditions it is likely Indiana Creek would be capable of transporting debris material for the full length of the creek to the Tarn including high concentrations of fine sediment. Depending on the size of material and volumes, and the intensity and length of the runoff events, the movement of these particles could occur in a single event or could take many years to move through the watershed and along the main channel. However, left unchecked, this material, once mobilized will likely, eventually, reach the Tarn.

Photo 2. Sawmill Creek depositional zone at the Breckenridge Ski Area.

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3 PRE-WILDFIRE PLANNING AND STRATEGIES

In October 2010 the USFS completed the Environmental Assessment (EA) for Breckenridge Forest Health and Fuels Project (BFHFP) (USFS, 2010). This EA prescribes a variety of pre-wildfire actions and treatments to lower fuels load and speed up recovery from post-beetle impacts on National Forest Service land, including the White River National Forest and Indiana Creek, thereby reducing the potential for wildfire and subsequent impacts. These treatments include:

1. Mechanical and hand removal of trees,
2. Piling and burning of slash,
3. Mechanical site preparation to enhance the establishment of seedlings,
4. Vegetation and weed-control guidelines for post-tree removal,
5. Road improvement for accessing the watershed to implement treatments,
6. Silviculture and revegetation for reestablishment of trees, and
7. The creation of a 400- to 600-foot Community Protection Zone (CPZ) (as opposed to a 30-foot defensible space).

3.1 Removal of Trees

The BFHFP originally delineated nine unit treatment areas within the Indiana Creek watershed, all of which would be treated with clear cutting, either by hand or mechanically, and restored with silviculture prescriptions. These nine units have since been reduced to three cutting units, numbered 117, 118 and 119. All nine units are shown, overlaid on the debris flow sub-watershed basins on the site map and presented in **Figure 3**. **Table 3** provides a comparison of the debris basins, cutting units and hazard classification. Note that the five highest ranked basins for debris flow hazard (Ind 5, 7, 9, 10, and 15 shown in red bold text) are not within the three designated cutting units. In addition, sub-watersheds Ind 01, 02, 03, 04, 06 and 07 are located in the downstream portions of the watershed and will either flow directly into the Tarn without the benefit of the effects of Indiana Creek to further reduce sediment loading, and are also not currently within the three designated cutting units.

In further discussion with the Town and USFS the general consensus was that the cost of treating the three units (117, 118 and 119) would not be good use of the USFS limited funds since it wouldn't measurably affect fire behavior or severity in the watershed (to help protect Goose Pasture Tarn), and these units are not located in sub-watershed ranked as high debris flow areas. Further, based on indications from the USFS, the lodgepole pine mortality, to date, has been less than predicted. Thus the USFS is deferring treatment of these units. Other fuel reduction and forest health strategies, which may be applicable and/or helpful in the Indiana Creek watershed are provided in the BFHFP (**Appendix B**). One of these strategies is the relocation of Indiana Creek Road (FS 593) out of the creek bed for the protection of water quality and to provide reasonable access to the upper watershed for fire suppression and reclamation purposes. The USFS has indicated it would be agreeable to partner with the Town and others to implement this strategy. See further discussion in Section 3.2.

The USFS also indicated it would be amenable to coordinating a larger watershed vegetation management assessment and fire modeling effort. The purpose of this comprehensive assessment would be to develop a proposal to treat vegetation in the Town's areas of concern (highest ranked sub-watersheds for debris flow hazard) and possibly the larger watershed in order to affect fire behavior and fire severity, with the goal of reducing post-fire sediment loads on Goose Pasture Tarn.

Table 3. Comparison of USGS sub-watersheds and BFHFP cutting units.

USGS Sub-watershed	Original BFHFP Cutting Units	Revised BFHFP Cutting Units	25-year 1-hour rainfall debris flow hazard rank
ind01	**415**		**18**
ind02	**415**		**17**
ind03	**415**		**14**
ind04	**415**		**21**
ind05	**116, 337**		**2**
ind06	**120, 338**		**16**
ind07	**120, 338**		**6**
ind08	120		11
ind09	**337**		**1**
ind10	**none**		**5**
ind11	117	117	10
ind12	120		12
ind13	118	118	10
ind14	119	119	21
ind15			**5**
ind16			15
ind17	119	119	30
ind18			17

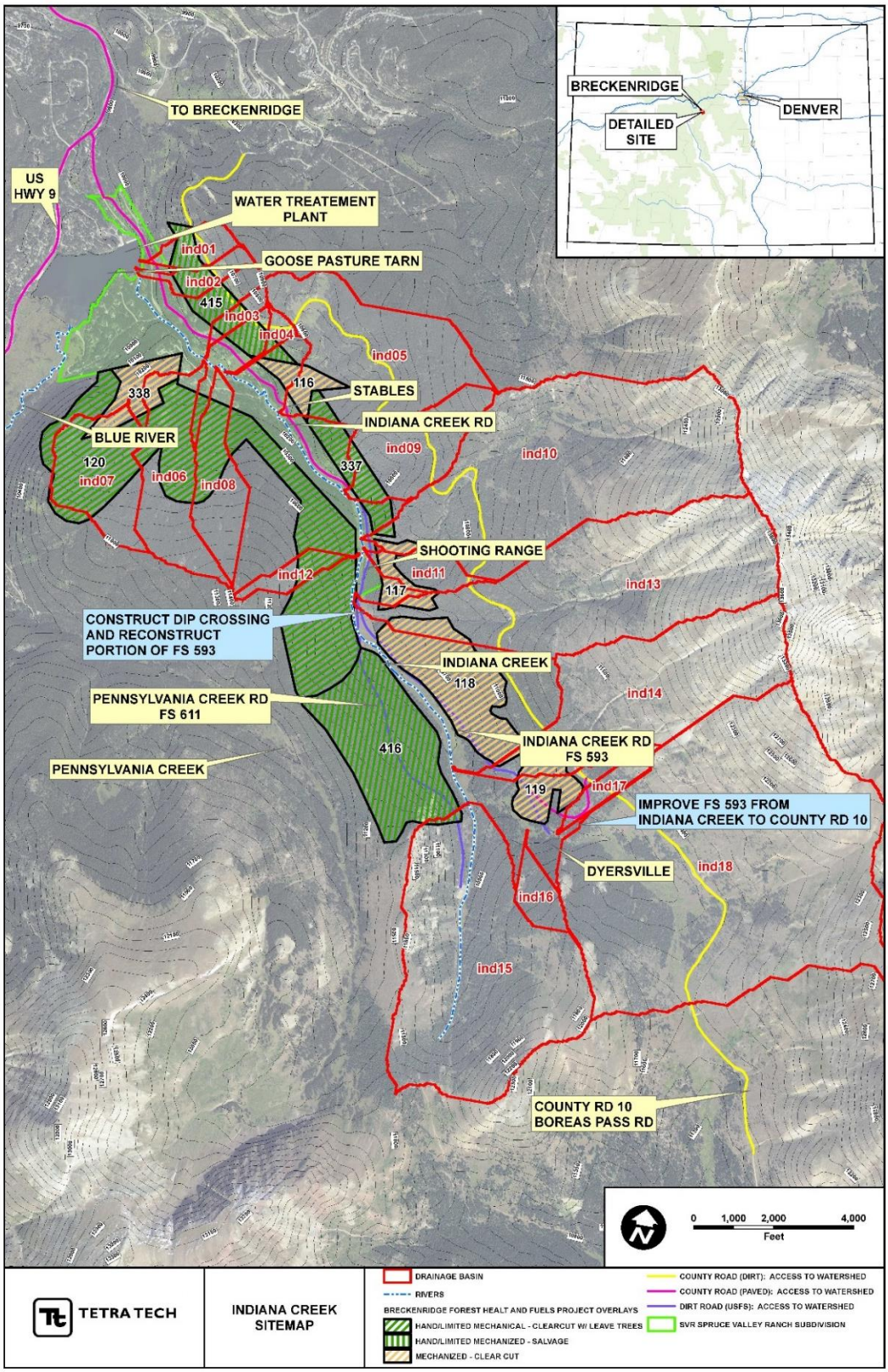

Figure 3. Site map with cutting units from the BFHFP and recommended pre-wildfire improvements.

3.2 Indiana Creek Road (FS 593)

Indiana Creek watershed is accessible by following Wagon Wheel Road in SVR, for approximately one-third mile south of US Highway 9, to Indiana Creek Road. Indiana Creek Road runs another 2 miles until it enters USFS managed lands where it becomes a dirt road. Within the USFS managed lands Indiana Creek Road (FS593) connects to both Boreas Pass Road (County Road 10) and Pennsylvania Creek Road (FS 611).

Three recommendations are presented here for improvements to the existing road as it pertains to pre-wildfire planning. First there is a water crossing required to access Pennsylvania Creek Road (FS 611) and the south and west portions of the watershed. The BFHFP recommends a temporary crossing at this location for use during fuels reduction activities in sub-watershed Ind 15 and 16. This crossing might also be utilized should a wildfire occur along the ridge between Indiana and Pennsylvania Creek watersheds (Figure 1). Due to the potential for sediment and debris flows that could block a culvert, the use of a dip crossing is recommended. Considering both potential needs for pre- and post-wildfire, and the fact that this river crossing is already used by recreational vehicles, a permanent dip- or low-water crossing is recommended to facilitate the fuels reduction activities, stabilize the crossing for current vehicular use and provide a constructed dip crossing in the event of a wildfire. The crossing would have a simple rock reinforced driving surface and rock-stabilized approaches and banks. Design guidance is provided by the U.S. Department of Agriculture Forest Service National Technology and Development Program (Clarkin et al., 2006). A typical detail is provided in **Appendix C**.

The second road-related issue in the Indiana Creek watershed is that the current road alignment follows a tributary to Indiana Creek, Ind 13, for approximately 0.36 miles. This is causing damage to the creek, including channel widening and damage to adjacent wetlands as vehicles and pedestrians often navigate around the creek during times of high flows. This portion of Indiana Creek Road (FS 593) accesses the upper tributary and would be utilized to access sub-watersheds Ind 14, and 16-18 should a wildfire occur. Thus, a road relocation is recommended and should be considered for implementation as a permanent improvement, preferably under pre-wildfire conditions. This road realignment is also recommended in the BFHFP. This would require construction of 0.36 miles of new road. A new culvert crossing or dip crossing would be required to pass flows from basin Ind13 under or across the new road. A conceptual site plan showing a proposed road re-alignment is provided in Appendix C as well as a typical culvert detail.

Last, consideration should be made to implementing improvements to Indiana Creek Road (FS 593) from Boreas Pass Road to provide a second point of access to the river valley for vehicles to access the watershed for timber management, and in the event of a wildfire, emergency access. Currently FS 593 intersects Boras Pass Road approximately 1 ½ miles below the summit and extends for approximately 1 ½ miles through a steep and wooded section until reaching the open meadows. Improvements would be required over the length of the 1½ mile connection and would include widening and regrading of the road, and improvements to the water bars and ditches.

3.3 Sediment Basins

Sediment basins are proposed as a post-wildfire measure to protect the water supply and preserve the water storage in the Tarn. Eight potential sediment basins are proposed as described and presented in Section 5 and Appendix C of this report. One or more of these sediment basins might be constructed depending on the location and severity of the wildfire. Some of these sediment basins are shown on private property and would not be constructed without permission from the property owner. Other basins are shown on USFS lands and would require USFS approval prior to construction. Thus, one of the pre-wildfire planning strategies recommended herein is for the USFS and the Town of Breckenridge to develop a pre-wildfire approval and procedure that would provide for rapid deployment of these sediment basins should a wildfire occur.

These sediment basins would be small, limited in size by the topography. None of these basins would fall within the guidelines of a jurisdictional dams (impoundment greater than 10 feet in height, 20 acres in

surface area or 100 acre-feet in volume). Sediment basins would be temporary requiring ongoing maintenance while in-place, and removal and revegetation at some time following the wildfire when the watershed is considered sufficiently stable.

3.4 Other Pre-wildfire Planning Considerations

3.4.1 Spruce Valley Ranch

There are an estimated 49 home sites in SVR. Most sites are developed and homes here are considered 'high-end' typically selling well above the median price range for homes in the Summit County region. Within the subdivision there are also several buildings providing amenities including a skeet facility, horse stable, and a boathouse on the Tarn.

SVR has also developed a forestry management plan whereby they encourage their residents to remove 'weak' trees, spray for pine beetle and consult with forestry experts. Implementation of the recommendations presented in the BFHFP would benefit SVR, including the development of a CPZ

3.4.2 Cultural Resources

There are several old cabins in the Town Sites of Dyersville and Boreas as well as several abandoned mine sites within the watershed. Boreas is located at the summit of Boreas Pass. This community provided an intermittent stop along Boreas Pass Road (CR 10) to and from Como as well as a stop for the Denver, South Park and Pacific Railroad narrow gauge. A depot, section house, engine house, and other buildings were constructed. A post office was established in 1896 but was discontinued in 1905. Only the walls of the two-story section house and a partially roofed shed remain. An old water tank used by the railroad still exists mid-way up Boreas Pass Road.

The Warrior's Mark Mine was established in the early 1880s by Father John L. Dyer. Dyer built several cabins and opened several mines. The Dyer cabin, and a few other ruins, are located along Indiana Creek approximately one mile below Boreas Pass.

As of the date of this report, these structures are not in the National Register of Historic Places and no pre-wildfire planning specifically for these structures is recommended at this time. Should these structures be added to the National Register of Historic Places, treatment must consider the effects on historic properties and seek ways to avoid, minimize or mitigate any adverse effects on historic properties.

3.4.3 Threatened and Endangered Species

All BAER Plans should be reviewed to determine if threatened or endangered species or their habitats would be benefited or adversely affected by the implementation of BAR treatments. Agencies must consult with the USFS (Ecological Services Offices) or National Marine Fisheries Service, as appropriate, on all BAER actions that may affect a threatened and endangered listed species or its habitat to ensure compliance with Section 7 of the Endangered Species Act. Timeframes for review and consultation may last several months. Therefore, every effort should be made to initiate these actions early in the BAER planning process. Post-wildfire monitoring of threatened and endangered species status or recovery is not funded with BAER funds unless the monitoring is for the purpose of assessing treatment effectiveness of threatened and endangered species habitat rehabilitation measures and is in an approved BAER Plan.

The Environmental Assessment prepared for the BFHFP, prepared in October 2010 concludes that the Canada Lynx or lynx habitat is the only T&E species that occurs within the proposed project area. No habitat for other T&E species is known or suspected to occur in the proposed project area. Field-verified potential habitat for Canada Lynx, denning or high-quality winter foraging, includes units 338 and 416 of the Indiana Creek watershed which overlaps with Ind 06, 07, 08, and 12. There were also two plant species assessed and determined to not be present (Penland alpine fen mustard and Ute Ladies' tresses).

Boreal toad (*Bufo boreas boreas*) and Colorado River cutthroat trout (*Onchorhynchus clarkii pleuriticus* are two FS Sensitive species that, although may be present in the Blue River watershed, were not found within the Indiana Creek watershed.

3.5 Permitting

The following is a list of potential permitting and regulatory compliance issues that might be required for implementation of any of the proposed pre-wildfire planning strategies, particularly the reconstruction of Indiana Creek Road.

- Section 404 of the Clean Water Act (CWA) is regulated by the U.S. Army Corps of Engineers, and is intended to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Such activities include fill such as required for road reconstruction, and infrastructure development. A regional or nationwide permit would likely be applicable for some of the proposed pre-wildfire strategies.
- Water-quality regulation is overseen by the CDPHE for protection of water quality under Section 401 Certification in the event that dredge and fill materials are produced that may impact the aquatic environment. Under the Colorado 401 certification regulations, all nationwide permits also include Section 401 certification.
- Changes to the aquatic environment that could affect threatened and endangered species would require Endangered Species Act consultation and compliance with the USFWS.
- A 1041 permit from Summit County may be required to identify, designate, and regulate areas and activities of state interest through their local permitting process.

3.6 Summary of Pre-wildfire Recommendations

The following is a summary list of pre-wildfire recommendations discussed in the preceding sections. An annotated Site Map depicting these pre-wildfire recommendations and locations of physical improvements is included Figure 3.

- Working together, the Town of Breckenridge and the USFS should implement the BFHFP recommendations to lower fuels load and speed up recovery from post-beetle impacts on National Forest Service land. Consider the addition of cutting units originally proposed in the BFHFP, particularly those that overlap the five highest debris flow hazard ranking as well as cutting units Ind 01, 02, 03, 04, 06 and 07 which are directly tributary to the Tarn.
- Implement the Community Protection Zone (CPZ) around private land adjacent to the USFS.
- Pre-authorize the use of sediment basins and develop an implementation strategy for rapid deployment of the sediment basins should a wildfire occur.

4 BURNED-AREA EMERGENCY ASSESSMENT

The Burned-Area Emergency Assessment (BAER) is a rapid evaluation conducted by the UFSF to determine if critical values are at risk due to imminent post-wildfire threats and to develop appropriate actions to manage unacceptable risks (USFS, 2012). The process as outlined in FSM 2520, is presented as a five-step process which includes assessing; (1) critical values, (2) threat identification to critical values caused by the wildfire, (3) risk evaluation and emergency determination, (4) response action prescription, and (5) response action proposal. In addition, the assessment includes documentation and funding request.

While much of the BAER assessment is dependent on the specific wildfire and extent of damage, the following information is intended to provide advanced planning and input with the goal of expediting an evaluation and response should a wildfire occur in the Indiana Creek watershed.

4.1 Potential Critical Values and Threat Identification

4.1.1 Human Life and Safety

The USFS lands within the Indiana Creek watershed is contiguous to the SVR subdivision. Surface conditions on the USFS lands are similar on the privately owned lands in terms of forest cover, ground cover, soils conditions and slopes. No wildfire breaks were observed at the time of the field visit. Thus, a wildfire on the White River National Forest could easily spread into the privately owned lands. There are an estimated 49 home sites in the SVR subdivision, most of which are built on and occupied. Occupancy of these homes and structures within a burn area would likely present a high risk of loss of life.

Indiana Creek watershed is also a popular back county area used for hiking, camping, mountain biking, off-road vehicle use, hunting and other similar uses. A wildfire would likely impact these uses including the safety of the public during a wildfire and following a wildfire due to the potential for floods, and mud and debris flows. Indiana Creek Road runs parallel to Indiana Creek and in close proximity particularly on USFS managed lands. Thus, in many locations, flooding and debris flows from the creek could overtop the banks and encroach on homes and on the road, impeding or preventing travel along the road and eroding and damaging the existing riverbanks.

4.1.2 Property and Infrastructure

4.1.2.1 Homes and Structures

There are an estimated 49 home sites in the SVR subdivision. Most sites are developed and homes here are considered ‘high-end’ typically selling well above the median price range for homes in the Summit County region. Within the subdivision there are also several buildings providing amenities, including a skeet facility, horse stable, and a boathouse on the Tarn. Hazardous materials released from burned homes or building in the watershed also present a risk should a flood event mobilize these materials and wash them downstream toward the Blue River.

4.1.2.2 Breckenridge Water Treatment Plant

The Tarn is the Town’s primary water supply. Water is diverted to the treatment plant, treated and dispersed over 80 miles of pipeline serving over 10,000 homes and businesses. The Town conducted a study to assess impacts to the water treatment plant and ability to operate, should a wildfire occur (HDR, 2013). The assessment indicates that a bare minimum of 2 million gallons per day (MGD) would be required to service current water users. This assumes a ban of all outside water use and likely some inside use restrictions.

Two scenarios are presented here, which depend on whether the water treatment plant is damaged as part of the wildfire or if it can function but must operate with special treatments to remove wildfire-related pollutants. Costs are based on a 2-year time period until water quality is of sufficient quality that special treatment or additional resources are no longer required, and that during the winter the debris and ash would be locked in the snow and special treatment would not be required.

Scenario 1: Under this scenario the treatment plant is operational but a temporary treatment is required. Estimates for temporary treatment are expected to be approximately $412,500 per month or a total of $5,000,000 for two 6-month summer periods for a total of 12 months (Roberts, 2015a).

Scenario 2: Should the water treatment plant be damaged and become unusable, and/or the loss of storage in the Tarn render water supply unusable or untreatable or both, a temporary water supply would like be required until the plant could be brought back on line. The cost of importing water is estimated to be $2 billion dollars over the course of a two year time period (Roberts, 2015b). Repairs to the water treatment plant would also be required. The extent and cost would be a function of damage to the facility, including the building, if it was also damaged by the wildfire. An estimated cost to replace the Water Treatment Plant is 15 million dollars.

In addition to the cost of water and/or treatment, long-term sediment control would also be required to maintain storage in the Tarn, including excavation to remove sediment deposits, and possibly additional filtering of fine sediment and ash from runoff. Estimated cost to dredge the Tarn is 10 to 15 million dollars and will depend on the volume to be excavated and disposal costs.

4.1.2.3 Overhead Electric Transmission Line

The XCEL/PSCo Dillon-Malta 230kV overhead transmission line traverses the upper portion of the watershed. A wildfire could burn transmission lines and subsequent runoff events could threaten the foundations of the towers.

4.1.2.4 Station House and Ken's Cabin

The Station House and Ken's Cabins are used primarily by overnight hikers and skiers. These buildings are maintained and managed by the Summit Huts Association. Individuals staying at the Station House and Ken's cabin would be at risk should a wildfire occur. Under post-wildfire runoff conditions, individuals traveling to or from the cabins would also be at risk under flood and debris-flow conditions as the road may become impassable.

4.1.2.5 Roads

From a public access perspective post-wildfire runoff could damage existing roads by either high erosive flows, fallen trees, and/or to debris flows from the drainages that flow across or overtop the road-driving surface. There are three primary roads of concern. The first is four miles of paved roads within the SVR subdivision. The second is Indiana Creek Road within the USFS lands (FS 593), and the third is Boreas Pass Road (County Road 10). Boreas Pass Road is primarily used for recreational purposes, including access to the historic Station House and Ken's cabin (part of Summit Huts Association). Boreas Pass Road follows the old railroad grade connecting Breckenridge to Como and is a dirt road easily navigable by 2-wheel drive automobiles. It is located high up in the watershed, running east of Indiana Creek generally following the contours between elevations 10,000 and 11,500 feet, mean sea level.

Indiana Creek Road (FS 593) is a dirt road connecting the paved portion of Indiana Creek Road (through Spruce Valley Ranch) to Boreas Pass and Pennsylvania Creek. Indiana Creek Road is accessible only by four-wheel drive vehicles, or all-terrain vehicles and hikers as well as by skiers and mountain bikers.

4.1.2.6 Mines

There are no active mines within the watershed. Remnant tailing sites can be observed at various locations within the watershed but little is known about tailing composition, adits or the potential for contamination should a wildfire occur.

4.1.3 Natural Resources

4.1.3.1 Water Supply

Indiana Creek watershed is a water supply source for the Town of Breckenridge. A wildfire on the White River National Forest would likely impact the quality of water, possibly rendering it unsuitable for human consumption. Wells are the source of water for the SVR residents. Water quality in the wells has the potential to be degraded by post-wildfire pollutants. Erosion and sediment could also potentially damage or bury the well heads making them inaccessible. Water quality concerns include turbidity, metals, alkalinity, pH, total organic carbon, nitrate, phosphate and ammonia (HDR, 2013).

4.1.3.2 Riparian Habitat and Floodplain

Wetlands exist within the Indiana Creek watershed along the riparian corridor. Wetlands were mapped for the BFHFP using the Summit County Mapping Department dataset, which was compiled through the interpretation of aerial photography and are depicted in the BFHFP. A copy is included in this report in Appendix B. Generally the wetlands follow the river and are within the open non-treed meadow as seen on Photo 1. Wetlands provide stabilization for the creek banks and floodplains and filter sediment from runoff and high-water flow. Loss of wetlands from a wildfire could destabilize the banks and reduce natural filtration.

Water levels in the creek may also be higher than water levels that would otherwise be experienced in a stable watershed due to increased runoff from reduced infiltration, and due to bulked flows from sediment entrainment. Many of the homes in SVR and Indiana Creek Road are in close proximity to Indiana Creek and could be at risk of post-wildfire flooding.

4.1.3.3 Wildlife

As previously noted the Canada Lynx or lynx habitat is the only T&E species that occurs within the proposed project area. No habitat for other T&E species is known or suspected to occur in the proposed project area. Boreal toad (*Bufo boreas boreas*) and Colorado River cutthroat trout (*Onchorhynchus clarkii pleuriticus* are two Forest Service Sensitive species that occupy the upper Blue River watershed but have not been found to occur within the project area. Species that occur in the greater project area, which are likely to be found in the Indiana Creek watershed include the red fox (*Vulpes vulpes*), coyote (*Canis latrans*) moose (*Alces alces*) and red squirrel (*Tamaisciurus hudsonius*) (BFHFP).

4.1.4 Cultural and heritage resources

As of the date of this report, the remnant cabins and old Town sites previously noted are not in the National Register of Historic Places. However, treatment should consider the effects on historic properties and seek ways to avoid, minimize or mitigate any adverse effects on this properties consistent with Section 106 of the National Historic Preservation Act (NHPA), where possible.

4.2 Risk Evaluation

Risks associated with a wildfire in Indiana Gulch will depend on the areas burned and the severity of the wildfire. Critical values identified in Section 4.1 would be evaluated following a wildfire and rated for risk levels and threats to human life, property, infrastructure and recourse. Ratings of Very High and High are unacceptable and would likely receive treatments. Intermediate risk treatments may be needed if human life of safety is the critical value. The risk matrix shown below (**Figure 5**) is Exhibit 2 of the FSM 2520 (USFS, 2012) which may be used to evaluate the risk level for each value identified during the Assessment.

2523.1 - Exhibit 02

BAER Risk Assessment

Probability of Damage or Loss	Magnitude of Consequences		
	Major	Moderate	Minor
	RISK		
Very Likely	**Very High**	**Very High**	**Low**
Likely	**Very High**	**High**	**Low**
Possible	**High**	**Intermediate**	**Low**
Unlikely	**Intermediate**	**Low**	**Very Low**

Probability of Damage or Loss: The following descriptions provide a framework to estimate the relative probability that damage or loss would occur within 1 to 3 years (depending on the resource):

- Very likely. Nearly certain occurrence (90% - 100%))
- Likely. Likely occurrence (50% - 89%)
- Possible. Possible occurrence (10% - 49%)
- Unlikely. Unlikely occurrence (0% - 9%)

Magnitude of Consequences:

- Major. Loss of life or injury to humans; substantial property damage; irreversible damage to critical natural or cultural resources.
- Moderate. Injury or illness to humans; moderate property damage; damage to critical natural or cultural resources resulting in considerable or long term effects.
- Minor. Property damage is limited in economic value and/or to few investments; damage to critical natural or cultural resources resulting in minimal, recoverable or localized effects.

Figure 4. Risk matrix which may be used to evaluate the risk level for each value identified during the Assessment (Exhibit 2 of the FSM 2520; USFS, 2012).

5 POTENTIAL EMERGENCY RESPONSE STRATEGIES

Post-wildfire studies with potential applicability to Indiana Creek were reviewed for guidance on emergency stabilization treatments and approaches to design of post-wildfire stabilization. A summary of some of the applicable treatments are discussed below.

5.1 Emergency Stabilization Treatments

Emergency stabilization treatments implemented by the BAER teams are conducted within one year of a wildfire to stabilize the burned area, protect public health and safety and reduce the risk of additional damage to critical resources. These stabilization activities may be followed by several years of monitoring, restabilization and rehabilitation. Treatments noted here represent an overview of potential emergency stabilization options. Detailed designs of treatments will vary depending on the severity and extent of the wildfire, threatened critical values and the risk assessment. In addition, the science behind the techniques for implementing post-wildfire treatment is changing and improving as treatments are being implemented and evaluated over the years following wildfires, particularly in response to recent wildfires that have occurred in Colorado, such as the Hayman, Fourmile Canyon, Waldo Canyon and High Lake wildfires. Furthermore, the expertise for design and implementation of these treatments lies with the BAER Team who will be developing treatments in response to a wildfire. Thus, treatments are presented as a conceptual overview.

Material-testing requirements and installation criteria for treatments shall be in compliance with the White River National Forest 2002 Land and Resource Management Plan (White River National Forest Plan), the BFHFP and/or as mutually agreed upon between the White River National Forest and the BAER Team. A copy of the White River National Forest Plan, Chapter 2- Forest-Wide Standards and Guidelines is provided in **Appendix D** for ease in reference.

5.1.1 Erosion Barriers

Erosion barriers are intended to slow surface-water runoff, create localized ponding, and store eroded sediment. Erosion barriers are laid perpendicular to the slopes in staggered tiers and can be felled logs, straw wattles, hay bales and contour trenches. The use of straw wattles and hay bales is typically less desirable than felled logs because of the potential for the hay or straw to include non-native seed. They are also expensive to use compared to felled logs due to the cost of materials, shipping and installation.

5.1.2 Reseeding

Site preparation using integrated pest management methods on burned land may be funded with BAER funds for re-vegetation treatments. The potential for invasive non-native plant invasion is considered when developing the seed prescription.

Use of native species is preferred to the use of non-natives. However, a mixture of native and non-native species is preferable to using only non-natives if the desired natives are not available, and if the use of non-natives is consistent with approved land management plans. Competitive non-natives should be avoided in the seed mixture to facilitate the establishment and persistence of the native species.

The White River National Forest recommends the following seed mix for high mountain regions such as the Indiana Creek watershed (**Table 4**). Alternatively, the seed mix outlined in the BFHFP (Appendix B) could also be considered. Should a species in the specified seed mix be unavailable, the mix may be adjusted and a new species may be substituted as determined by the White River National Forest and the BAER Team.

Table 4. White River National Forest seed recommendations.

Species	Percent of Seed Mix by Weight
Idaho Fescue	25
Rocky Mountain Fescue	20
Western Wheatgrass	15
Mountain Brome	15
Slender Wheatgrass	15
Prairie Junegrass	6
American Vetch	2
Needle & Thread Grass	2
Suggested seeding rate: 20-25 lbs/ac	

All seed shall be tested to ensure compliance with the State noxious-seed requirements recognized in the Administration of the Federal Seed Act. All purchased seed must meet all requirements of the Federal Seed Act (7 USC 1551-1610), the state seed laws where it will be delivered, and Federal specifications JJJ-S-181. All seed will be tested for purity and germination (Pure Live Seed or Tetrazolium) to meet contract specifications and should be tested for weed and noxious weed seed by an independent seed testing organization. Certified seed (e.g., source identified tag) ensures the genetic origins of the parent plant material or the collection origin.

5.1.3 Mulch

Mulch is used as an emergency post-wildfire treatment to reduce rain drop impacts, reduce overland flow, increase infiltration, increase moisture content and decrease surface compaction. It is often used in conjunction with reseeding but can be a stand-alone treatment. Mulch typically is most beneficially in the first year or two following its application.

There are a variety of mulch types that have been used to stabilize post-burn watersheds, including straw, wood-based, burn needle cast and hydromulch. Hydromulch is a mixture of organic fibers with tackifiers, seeds and other material mixed with water and applied to the soil surface. Hydromulch is typically used on bare soil, exposed due to construction such as on road cuts but could also be applied to post-burn areas. Hydromulch components are transported as dry material and mixed with water to form a slurry that is sprayed or dropped on the soil. Materials used for mulching should be purchased as certified weed-free by a State agricultural agency or should be sampled and tested for noxious weeds prior to use, and be native in origin.

5.1.4 Vegetation

Forest management may be considered if the ecosystem is unlikely to recover naturally from wildfire damage, as prescribed by a certified silviculturalist to not regenerate for 10 years following the wildfire. The White River National Forest 2002 Land and Resource Management Plan (Appendix D) outlines standards for minimum number of seedlings for adequate restocking of a regeneration site, which would be applicable to revegetation of post-burned areas. Reforestation goals should consider the following:

- ✓ Re-establish native tree species and seed sources lost in a stand replacement wildfire.
- ✓ Facilitate the succession and stabilization of forest ecosystems.
- ✓ Re-establish habitat for federally listed threatened, endangered or special status species.

Minimum standards for the required minimum number of seedlings for adequate restoration of a regeneration site are provided in **Table 5**.

Table 5. Seedling restocking requirements.

Growing stock: all live trees								
Species	Spruce Fir	Aspen	Douglas Fir	Lodgepole Pine	Ponderosa Pine	Piñon Juniper	Other Softwood	Other Hardwood
Trees per acre	150	300	150	150	150	120	150	300

No minimum seedling height requirements are specified. Seedlings must have survived a minimum of one year and be expected (on the basis of research and experience) to be able to produce the desired future stand condition specified for this area in the White River National Forest Plan.

5.1.5 Non-native Invasive Control

The White River National Forest has an approved management plan for invasive species work (**Appendix F**). This document includes USFS approved herbicides. BAER will implement non-native invasive control in compliance with this management plan and typically pay for the first year of invasive species control. USFS will typically fund the second- and third-year treatment.

5.1.6 Channel Treatments

Channel treatments are design to prevent or reduce flooding and debris torrents farther downstream. Some in-channel structures slow water flow and allow sediment to settle out and the sediment is released gradually as the structure decays. Bank stabilization may also be required. Treatments are typically site-specific in response to the wildfire-related impacts.

5.1.7 Detention Basins

Detention basins should be considered to protect the water supply and preserve the water storage in the Tarn. Eight potential detention basins are proposed as shown on **Figure 5**. One or more of these basins might be constructed depending on the location and severity of the wildfire. Some of these basins are shown on private property and would not be constructed without permission from the property owner. Other basins are shown on USFS lands and would require USFS approval prior to construction. There are two types of proposed detention basins recommended for use in reducing post-fire sediment and debris loading to the Tarn: debris flow check dams and sediment basins. Both types of basins would be constructed, in series, with the debris flow check dams removing the larger debris, and sediment basin(s) removing fine sediment.

5.1.7.1 Debris Flow Check Dams

The purpose of the debris flow check dam is to filter wood, boulders and larger sediment mobilized during high flow events (spring runoff and summer thunderstorms) while allowing for flows and sediment to pass downstream under average and low flow conditions. Debris flow check dams recommended for use in Indiana Creek are based on technology developed in the Bavarian Alps (Wallerstein, et.al.) where excessive debris flows in the rivers have occurred from landslides and accelerated tree loss due to air pollution. Physical models were developed and tested at the Hydraulics Laboratory of the Technical University of Munich to identify the most efficient configuration for removal of debris. This configuration is a v-shaped alignment with the "V" pointing downstream. The structure is comprised of circular wood posts, with the posts spaced to capture the minimum length of debris that is desired to trap.

The debris flow check dams used in the Alps were set in concrete, four meters above and below grade (for a total of 8 meters) and .66 meters in diameter. These posts were designed for flows in excess of 4000 cfs, far in excess of the anticipated flows in Indiana Creek. A schematic-level detail for a similar configuration for use in Indiana Creek is presented in Appendix C with a slightly modified post design that are set to

match the top of bank, buried to an equal height using wolmanized wood, 12 inches in diameter and backfilled with flowable concrete. Details are provided in Appendix C. This designed should be reviewed prior to implementation and adjusted as required to accommodate its location, anticipated debris size, and anticipated peak flows. The location and number of debris flow check dams to be constructed would depend on the location and extent of the fire. For example a small fire in sub-watershed Ind09 might result in the construction of debris flow checks at D5 only. Or a large fire in Ind10 might require structures at D3, D4, and D5.

5.1.7.2 Sediment Basin

The second type of sediment basin is designed for finer sediment, such as those that might be required to protect water quality and the Tarn storage volume. Depending on the extent of the fire and estimated loading it is possible only one sediment basin would be required for the collection of fine sediment. This sediment basin would be located close to or adjacent to the Tarn and downstream of the debris flow check dams to insure most of the larger material has been removed.

One possible location for a sediment basin is along the perimeter of the Tarn at the confluence of Indiana Creek and the Tarn. This would require lowering the water level down and exposing creek bed delta at the confluence of Indiana Creek and the Tarn. A sediment basin would generally consist of an earthen dam structure with an outlet as shown on the appended details. The earthen dam will require maintenance to remove accumulated fines to insure water quality improvements to the Tarn. Details are provided in Appendix C.

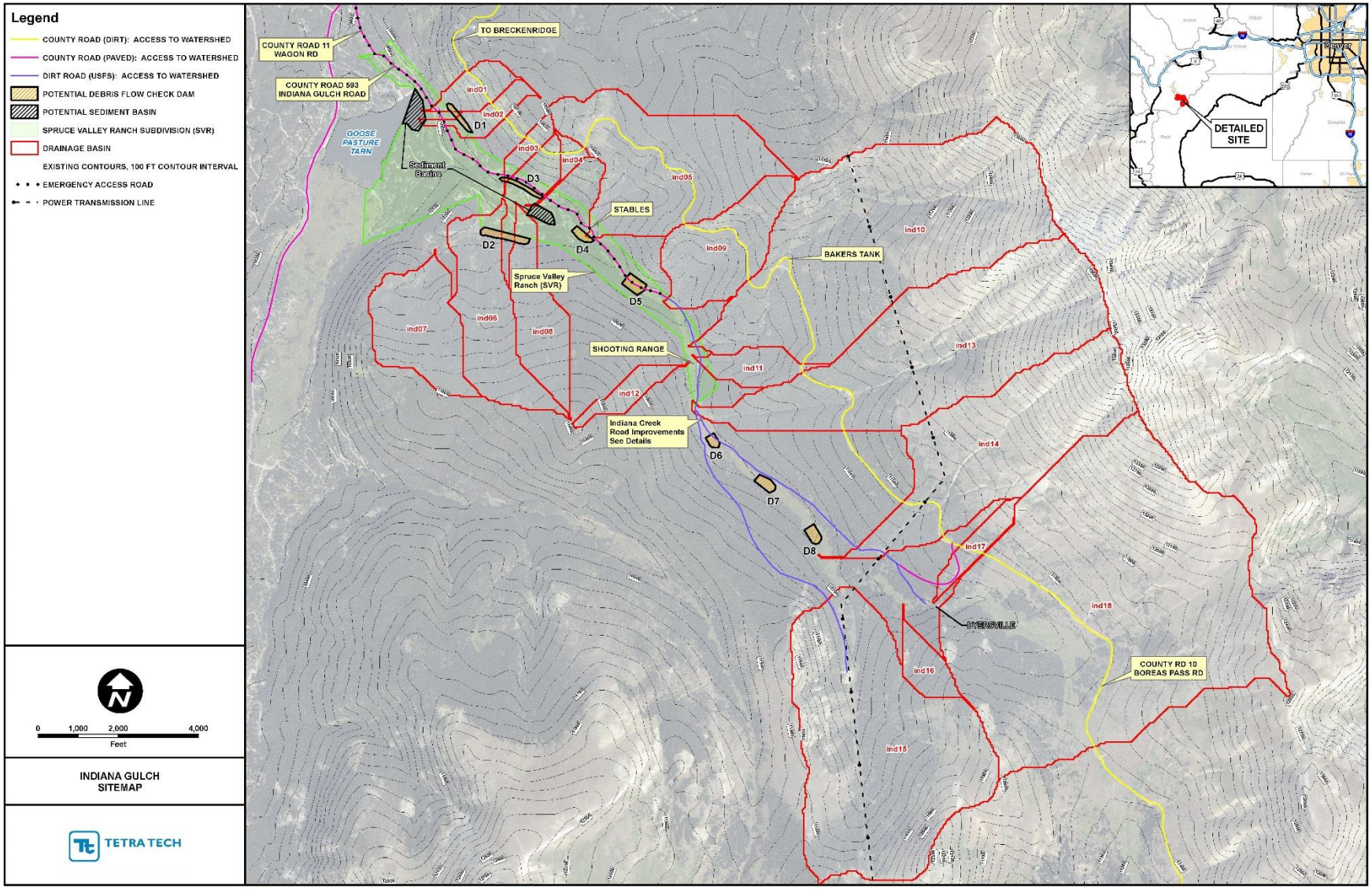

Figure 5. Site map with potential sediment basins.

Table 6 provides a list of which sediment basins should be constructed should wildfires occur in a given drainage basin. Note it's highly probable that multiple watersheds could be in a wildfire footprint in which case multiple basins might need to be constructed. Table 6 also includes an estimate of maximum available volume of the sediment basin based on the aerial topography and the sediment basin details, the potential debris volume that would be generated from a 25-year event (Elliot et al., 2011).

Table 6. Sub-watershed debris volumes and sediment basins volume.

For Wildfires in these Drainage Basins	Potential Debris Volume from 25-year Event (ac-ft)	Construct These Sediment Basins	Estimated Maximum Available Volume of Storage (ac-ft)
Ind01	1.5	D1	6
Ind02	1.5	D1	6
Ind03	1.2	D3	6
Ind04	0.8	D3	6
Ind05	7.9	D4	15
Ind06	2.4	D2	6
Ind07	3.4	D2	6
Ind08	2.6	D2	6
Ind09	5.1	D5	15
Ind10	17.3	D5	15
Ind11	1.6	D5	15
Ind12	1.5	D5	15
Ind13	11.8	D5	15
Ind14	7.1	D6, D7, and/or D8	7 to 15
Ind15	15.4	D6, D7, and/or D8	7 to 15
Ind16	1.5	D6, D7, and/or D8	7 to 15
Ind17	0.6	D6, D7, and/or D8	7 to 15
Ind18	14.8	D6, D7, and/or D8	7 to 15

Note that the estimate volumes of sediment basins is based on aerial imagery with 2-foot contours and conceptual layout and grading. Actual volumes will likely diverge from these values. Further the exact location of the basin could be effected by the location of a wildfire, which would in turn effect the estimated volume available for sediment storage.

Maintenance would be required for these sediment basins once installed included periodic inspections and the removal of sediment on a frequent basis following rainfall and snow melt runoff events. Overall these sediment basins are relatively small, limited in size by the topography. It is unlikely and undesirable to construct a basin that is large enough to fall within the guidelines of a jurisdictional dams (impoundment greater than 10 feet in height, 20 acres in surface area or 100 acre-feet in volume) for several reasons. First, as noted, the steep topography limits the size of the basins. Secondly, a jurisdictional dam would require State approval, extending the time required for implementation. Sediment basins would be temporary requiring removal and revegetation at some time following the wildfire when the basin is considered sufficiently stable.

5.1.8 Wildlife Management

Livestock, wild horses and burros are not present in this watershed. However, exclusion of native wildlife may be critical for the recovery of burned vegetation or establishment and maintenance of newly seeded sites. Thus re-vegetated and recovering areas may be restricted to wildlife using fencing to promote recovery of burned perennial plants and/or facilitate the establishment of seeded species. An assessment is needed to determine the length of time exclusion is required to meet BAER objectives. The actions must be consistent with approved land management plans and coordinated with the Colorado Division of Parks and Wildlife.

5.1.9 Facilities

The repair or replacement of minor improvements and facilities (e.g., kiosks, fences, interpretive or boundary signs, recreation facilities, corrals, trails, permanent long-term monitoring plots, etc.) burned or damaged by wildfire to pre-wildfire specifications is authorized with the use of BAER funds only if these improvements or facilities are necessary for implementing an approved land management plan. Replacement or repair of major facilities (e.g., visitor, centers, residential structures, administration offices, work centers or similar facilities and their contents) with BAER funds is prohibited.

There are no major U. S. Forest Service facilities in the watershed. There are several signs and trail markers that might require replacement.

5.1.10 Utilities

There are no major utilities lines in SVR. Water service to the homes are provided by individual wells. Sewer service is provided by Breckenridge Sanitation District. An overhead transmission line located in the upper watershed is owned and maintained by XCEL/PSCo. Should a wildfire occur, access to the power line would be required (see discussion below).

5.1.11 Emergency Access Road Reconstruction

Pre-wildfire planning recommendations include several improvements to Indiana Creek Road including the relocation of 0.36 miles of road from out of the creek bed, and the construction of a dip crossing. These improvements should also improve access under post-wildfire conditions, including emergency egress to the public, access for fire fighters, and access to XCEL/PSCo Dillon-Malta 230kV transmission line.

Under post-wildfire conditions, it is possible the road will undergo damage as a result of high runoff, typical of post-wildfire conditions, reduced bank stability due to loss of vegetated banks and post-wildfire erosion. Thus, some additional road reconstruction may be required. Road construction standards shall be in compliance with the White River Forest 2002 Land and Resource Management Plan (see Appendix C for road realignments and cross-section recommendations).

5.1.12 Public Use Management

Agency administrators should consider area closures to protect public safety, natural recovery, and active BAER treatments. Burned or seeded areas may be temporarily closed to the public by excluding vehicle, bicycle, horse, and foot use if unacceptable resource damage would occur or if danger to the public is present due to wildfire damage or BAER activities. The White River Land management plans should be reviewed prior to implementing BAER measures to identify other areas of special management concern to ensure BAER treatments are consistent with management objectives for these special management areas.

5.1.13 Removal of treatment

Any treatments, or parts thereof, installed using BAER funds can be removed using BAER funds if removal is completed within three years of containment of the wildfire. If treatments remain after three years of wildfire containment other funds must be used for removal costs and other programs must become responsible for managing and maintaining the treatments.

5.1.14 Monitoring

BAER funds for monitoring are limited to (1) determine if the treatment was implemented according to plan specifications, and (2) to monitor whether a treatment achieved its objective (e.g., whether herbicide eradicated the invasive species or whether willow and cottonwood trees successfully survived, grew, and rehabilitated the streambank).

5.2 Permitting

The following is a list of potential permitting and regulatory compliance issues that might be required for implementation of any of the proposed post-wildfire planning strategies.

- Section 404 of the Clean Water Act (CWA) is regulated by the U.S. Army Corps of Engineers, which seeks to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Such activities include fill which may be required for road reconstruction. A regional or nationwide permit would likely be applicable for the proposed pre-wildfire strategies.
- Water-quality regulation is overseen by the CDPHE for protection of water quality under Section 401 Certification in the event that dredge-and-fill materials are produced that may impact the aquatic environment. Under the Colorado 401 certification regulations, all nationwide permits also include Section 401 certification.
- Changes to the aquatic environment that could affect threatened and endangered species would require Endangered Species Act consultation and compliance with the U.S. Fish and Wildlife Service.
- A 1041 permit from Grand County would be required to identify, designate, and regulate areas and activities of state interest through their local permitting process.

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6 REFERENCES

Beschta, R.L., Rhodes, J.J., Kauffman, J.B., Gresswell, R.E., Minshall, G.W., Karr, J.R., Perry, D.A., Hauer, R.F., and Frissell, C.A., 2004. Postfire management on forested public lands of the western United States. Conservation Biology. Volume 18, No. 4, August, pp. 957-967.

Clark, S., Fuller, G., Rogers, J., Huston, T., and Amato, M., 2004. Scorched-Earth policy. Civil Engineering, July, pp. 68-73.

Clarkin, K. Dimas, S., Keller, G., Warhol, T., Hixson, S., 2006. Low-Water Crossings: Geomorphic, Biological, and Engineering Design Considerations. U.S. Department of Agriculture Forest Service (USFS), National Technology and Development Program. October.

Elliott, J.G., Flynn, J.L., Bossong, C.R., and Char, S.J., 2011. Estimated Probabilities and Volumes of Postwildfire Debris Flows, a Prewildfire Evaluation for the Upper Blue River Watershed, Summit County, Colorado: U.S. Geological Survey Scientific Investigations Report 2011-5039, 22 p.

Gill, D.D., 2004. The impacts of forest fires on drinking water quality. Arizona State University.

Graham, R.T. (ed), 2003. Hayman Fire Case Study. Gen. Tech. Rep. RMRSGTR-114. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research. Station. 396 p.

HDR Engineering, 2013. Technical Memorandum 6, Wildfire Impacts and Utility and Response, Draft. Prepared for the Town of Breckenridge, Colorado.

JW Associates, Inc., 2010. Blue River Phase 1 Watershed Assessment. Prepared for USDA Forest Service, Rocky Mountain Region, Bark Beetle Incident, May.

Rhoades, C., Entwistle, D., and Butler, D., 2006. Initial streamwater response to the Hayman fire, Colorado Front Range. In Proceedings 2nd Interagency Conference on Research in the Watersheds, Coweeta Hydrologic Lab., Otto, NC. May 15-18, pp. 89-98.

Roberts, G., 2015a. Town of Breckenridge, Water Manager, Public Works. Email communication. February 3.

Roberts, G., 2015b. Town of Breckenridge, Water Manager, Public Works. Email communication. February 25.

Robichaud, P., MacDonald, L., Freeouf, J., Neary, D., Martin, D., and Ashmun, L., 2003. Postfire Rehabilitation of the Hayman Fire. U.S. Department of Agriculture, Forest Service General Technical Report. RMRS-GTR-114.

Robichaud, P.R., Ashmun, L.E., and Sims, B.D., 2010. Post-Fire Treatment Effectiveness for Hillslope Stabilization. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. General Technical Report. RMRS-GTR-240.

Stednick, J.D., 2012. Potential effects of wildfires on water quality. Colorado Water, Newsletter of the Water Center of Colorado State University. vol 29, Issue 5, pp. 24-26.

Wallerstein, N., Thorne, C.R., Abt, S. R. 1997. Debris Control at Hydraulic Structures in Selected Areas of the United States and Europe: U.S. Army Corps of Engineers, Waterways Experiment Station, contract Report CHL-97-4. December 1997.pp 6-10.

Writer, J.H., McCleskey R.B., and Murphy, S.F., 2012. Effects of wildfire on source-water quality and aquatic ecosystems, Colorado Front Range. In Wildfire and Water Quality: Processes, Impacts and Challenges (Proceedings of a conference held in Banff, Canada 11-14 June 2012)(IAHS Publ. 354, 2012), pp. 117-122.

U.S. Geological Survey (USGS), 2013. StreamStats Web application at http://water.usgs.gov/osw/streamstats/

U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), 2008 National Engineering Handbook (NEH). Available at http://directives.sc.egov.usda.gov/default.aspx

U.S. Department of Interior (USDOI), 2006. Interagency Burned Area Emergency Response Guidebook, Interpretation of Department of the Interior 620 DM 3 and USDA Forest Service Manual 2523 for the Emergency Stabilization of Federal and Tribal Trust Lands, Version 4.0. February.

U.S. Department of Agriculture, Forest Service (USFS), 2010. Environmental Assessment, Breckenridge Forest Health and Fuels Project. Dillon Ranger District, White River National Forest, Summit County Colorado. October.

U.S. Department of Agriculture, Forest Service (USFS), 2012. Forest Service Manual, FSM 2500 Watershed and Air Management, chapter 2520, Watershed Protection and Management, Section 2523, Emergency Stabilization, Burned Area Emergency Response (BAER), National Headquarters, Washington D.C.

Wildfire Planning
Indiana Creek Watershed
Breckenridge, Colorado
Appendices

Appendix A
Photo Log and Debris Flow Routing Estimates

Photo 001, looking down valley in north west area basin 5.

Photo 002, looking down valley in north west area basin 5.

Photo 003, looking up road in north west area basin 5.

Photo 004, looking up road in basin 10.

Photo 005, looking up road in basin 10.

Photo 006, looking down hill from road in basin 10.

Photo 007, looking up hill drainage in basin 13.

Photo 008, looking up road at drainage in basin 13.

Photo 009, looking up road at drainage in basin 13.

Photo 010, looking up drainage in basin 14.

Photo 011, looking up drainage in basin 14.

Photo 012, looking down road, looking north in basin 18.

Photo 013, looking north down road in basin18.

Photo 014, looking north down road in basin 18.

Photo 015, looking up towards basin 17 & 18.

Photo 016, looking up towards basin 17.

Photo 017, looking towards bottom of basin 14.

Photo 018, looking in the area at bottom of basin 14.

Photo 019, area at bottom of basin 14.

Photo 020, looking down hill of basins 17 & 18.

Photo 021, looking down hill of basins 17&18.

Photo 022, looking down hill in north area of basin 15.

Photo 023, looking up valley in north area of basin 15.

Photo 024, looking in north area of basin 15.

Photo 025, looking in north area of basin 15.

Photo 026, looking north down hill at north edge of basin 15.

Photo 027, looking up slope south at north edge of basin 15.

Photo 028, down stream from basins 14,15,16,17,18, looking north.

Photo 029, down stream from basins 14,15,16,17,18.

Photo 030, down stream from basins 14,15,16,17,18.

Photo 032, down stream from basins 14,15,16,17,18.

Photo 033, looking down stream at bottom of basin 13.

Photo 034, looking across field east at basin 13.

Photo 035, looking up valley.

Photo 036, looking down valley at bottom of basins 13.

Photo 037, looking up valley at bottom of basin 13.

Photo 038, looking across field at bottom of basin 13.

Photo 039, looking across field at bottom of basin 13.

Photo 040, looking down valley at bottom of basin 13.

Photo 041, looking at field at bottom of basins 11 & 12.

Photo 042, looking at field at bottom of basins 11 & 12.

Photo 043, at bottom of basin 10.

Photo 044, at bottom of basin 10.

Photo 045, at the bottom of basin 5.

Photo 046, at bottom of basin 5, end of site photos.

Appendix B
Breckenridge Forest Health and Fuels Project
With Project Area Maps and Wetlands, Water Bodies and Stream Analysis

APPENDIX B: BRECKENRIDGE DESIGN CRITERIA

Table B-1 Design Criteria

<table>
<tr><th>Resource Category</th><th>Design Criteria</th><th>Source</th></tr>
<tr><td colspan="3">Botany</td></tr>
<tr><td>#1</td><td>Four populations of Moonworts (Botrychium species) that were found during the field reconnassance would be identified on the ground and buffered from management actions that would directly or indirectly negatively impact population viability:

a) The protection buffers would be a minimum of 50 feet in radius from the identified population boundaries.
b) Exclude mechanized equipment from identified buffered sites.
c) Exclude tree felling from within identified buffered sites.
d) Fell trees away from identified buffered populations.
e) Do not place or burn slash piles or broadcast burn slash in buffered areas.</td><td>Forest Plan
TESP Standard #3</td></tr>
<tr><td>#2</td><td>Re-vegetation will be completed using local native seed when technically and economically feasible.

Seed lot tags and seed should be available to the USFS at least 2 months prior to seeding in order for the USFS to conduct noxious weed seed testing.
All seed shall be free of all noxious weed seeds listed on the All States noxious weed seed exam with the exception of cheatgrass (Bromus tectorum) and smooth brome (Bromus inermis). For these two species, the number of viable seeds present per pound or kg shall not exceed the average number of viable seed present per pound or kg of routine noxious seed test results of the Colorado Seed Lab at Colorado State University. If noxious weed seeds are found, or if cheatgrass or smooth brome seeds are found above average levels, seed may be rejected. The Contractor shall be responsible for the replacement cost of seed.

The following seed prescription is recommended for upland habitats: Mountain District Broad Spectrum Upland Mix: Suggested for the following sites: disturbed ground in aspen or coniferous cover types; mesic to dry mountain meadows; sagebrush or mixed mountain shrub sites with at least moderately deep soils; and foothill, montane and subalpine zones. Suggested seeding rate: 20-25 pounds per acre.
<table>
<tr><th>Species</th><th>% of Mix by Weight</th></tr>
<tr><td>Big bluegrass (Poa ampla) - Sherman</td><td>4</td></tr>
<tr><td>Mountain bromegrass (Bromus marginatus) – Bromar or WRNF</td><td>40</td></tr>
<tr><td>Blue wildrye (Elymus glaucus)- WRNF or ROUTT Sources</td><td>33</td></tr>
<tr><td>Slender wheatgrass (Elymus trachycaulus) - San Luis</td><td>23</td></tr>
<tr><td>Total</td><td>100</td></tr>
</table>
If a species in the specified seed mix is not available, the Contractor shall provide written evidence by three seed vendors that the species is not available. On written approval by the USFS, the mix may be adjusted and a new species may be substituted after consultation with the USFS.

To prevent soil erosion, non-persistent, non-native annuals or sterile perennial species may be used while native perennials are becoming established.</td><td>Forest Plan
Biodiversity Standard #1</td></tr>
</table>

Resource Category	Design Criteria	Source
Roads		
#1	In the Indiana Creek drainage, the existing road prism will be realigned uphill, to remove it out of the creekbed. An aquatic organism passage culvert will be installed where this realignment will be crossing one of the tributaries.	IDT
#2	A temporary bridge will be installed across Indiana Creek; an existing road way will be rehabilitated to improve water quality.	IDT
#3	State, county, federal highways and National Forest System roads shall be posted with warning signs and traffic control devices shall be employed in accordance with the "Manual on Uniform Traffic Control Devices". Some roads may be closed temporarily during logging operations and some roads will require flaggers for traffic control. Temporary road closures may be one day to two weeks.	IDT
#4	Portions of Galena Gulch Road (NFSR 350.1) and Indiana Creek Road (NFSR 593) will be closed on weekdays to public access during hauling and skidding operations for units 104, 117, 118, 119, 338 and 416.	IDT
#5	Road obliteration (Prospect Hill, Lincoln Park, and Indiana Gulch) will occur within one year of the completion of the realignments. Obliteration will include (minimally) brushing (piling of debris) and seeding on the first 100 feet of the road.	IDT
#6	All haul routes will have the following included in the design: a. Best management practices shall be utilized for soil erosion control. b. Log hauling shall be suspended during periods of precipitation that result in excessive road damage and may contribute to possible sediment discharges into stream channels. Hauling shall be suspended until the road sub-grade can adequately carry loaded log trucks and road damage will not occur. c. Road maintenance, improvements, and reconstruction shall include adequate surface drainage and rolling dips (reinforced with geotextile and aggregate, if needed). Rolling dips shall not be installed on grades less than 2 % or greater than 10 % as determined by site conditions. d. On haul roads, all ruts, holes and washboards shall be removed by scarifying or cutting the bottoms of such defects. Fines accumulated in blading roads or from drainage ditches shall not be wasted over fill shoulders. e. Remove, 'thin' or prune roadside vegetation to create adequate sight distance for oncoming vehicles. Where feasible, retain vegetation serving as a screen into harvest units. f. Slash and debris shall be kept out of ditches and drainage channels unless specified otherwise in the contract. g. The maximum vertical grade requirement will vary depending on site conditions. h. Level 2 roads shall have turnouts where they naturally occur. i. Level 3 roads shall have turnouts constructed to provide safe operation. j. Culvert design typically uses a minimum storm event of 20 years and may be designed for as much as a 100-year event. All roads shall have a minimum curve radius of 50 feet.	IDT

<table>
<tr><th>Resource Category</th><th>Design Criteria</th><th>Source</th></tr>
<tr><td></td><td>
k. Slope ratios shall be designed to reduce soil loss.

l. All haul routes crossing perennial or intermittent stream channels shall have drainage structures installed. Drainage structures shall be sized to pass debris and allow unimpeded movement of the aquatic ecosystem. Engineers will work with hydrologists and aquatic biologists on site design. Stream crossings shall be hardened to withstand floods as follows:
<table>
<tr><td>Design Life (years)</td><td>1</td><td>2</td><td>5</td><td>10</td><td>25</td><td>100</td></tr>
<tr><td>Design Flood (years)</td><td>10</td><td>10</td><td>25</td><td>50</td><td>100</td><td>200</td></tr>
</table>
m. Where culverts are removed, associated fills shall be removed to the extent necessary to permit normal maximum flow of water. Root wads used for blocking temporary roads shall be placed where they are not visible in the foreground from an open road or trail.

n. Temporary or unauthorized roads to be rehabilitated shall use the following techniques including:

• Place stumps, rocks, slash and logs on the ripped road (8- to 12-inch depth) with a density and depth that mimics the surrounding forest floor areas.
• Push, pull, or deposit excavated soils and rock to fill in road cut.
• Every 10 to 200 feet along the roadway, fell or place live and/or dead trees across the roadway and suspend off cutbanks, where feasible.
• Suspend logs and tress across the road at different heights to block over-the-snow travel.
• Revegetate all disturbed areas to specifications detailed in the contract per the area improvement plan.
• Install waterbars, outsloping and cross drains as needed to stabilize the rehabilitated surface.

o. Road design shall comply with the following standards and guidelines:

• FSH 2509.25 – WATERSHED CONSERVATION PRACTICES HANDBOOK
• FSH 7709.56 – ROAD PRECONSTRUCTION HANDBOOK, WO AMENDMENT, CHAPTER 2 – ROAD LOCATION
• FSH 7709.56 – ROAD PRECONSTRUCTION HANDBOOK, WO AMENDMENT, CHAPTER 4 – DESIGN
• FSH7709.56b – TRANSPORTATION STRUCTURES HANDBOOK, WO AMENDMENT 7709.56B-94 – 1, CHAPTER 6 – HYDRAULICS
• FSH 7709.58 – TRANSPORTATION SYSTEM MAINTENANCE HANDBOOK 12.6 – Exhibit 01, Maintenance Prescription Guidelines
• A guide for Road Closure and Obliteration in The USFS, USDA Forest Service, Technology and Development Program, 7700 Engineering June 1996 9677 1205.
• USFS Water-Road Interactions Technology Series – http://www.stream.fs.fed.us/water-road/ .
• American Association of State Highway and Transportation Officials
</td><td></td></tr>
</table>

Resource Category	Design Criteria	Source
	(AASHTO) Materials & Testing – http://www.transportation.org . • Manual on Uniform Traffic Control Devices, MUTCD. • Occupational Safety and Health Administration Handbook, (OSHA). • Highway Safety Act.	
Recreation		
#1	USFS staff will coordinate treatment activities and recreational special use events to provide for public safety.	IDT
#2	System trails (WRNF TMP) and those trails that are part of the Golden Horseshoe Master Plan will be protected. Slash, debris, and logs will be removed from within 15 feet (horizontal) of the tread on both sides.	IDT
#3	Trails and roads within cutting units will be closed to public access during logging operations when cutting within 1 1/2 tree lengths of roads and trails. Special orders will be prepared by the timber staff and signed by the Forest Supervisor. News releases regarding the closures will be issued and signs (meeting USFS standards) will be posted on the ground at major access points.	IDT
#4	Reconstructed roads will be made available to the public immediately upon completion (unless felling and skidding is still occurring adjacent to the roads). They will be signed to advise the public of log truck traffic.	IDT
#5	On the haul road (FSR 3.1B and 3.1C) used by the Breckenridge Nordic Center special use permit, hauling shall cease after October 15 when snow depth of 6 inches or greater is measured on the haul road.	Breckenridge Nordic Center operations
#6	During tree felling operations, safety measures will be in place along designated snowshoe trails at the Breckenridge Nordic Center to notify trail users of logging operations. Safety measures could include posting a flagger at points along the trail, posting signage in appropriate locations and potentially closing the trail for the duration of the operation.	Breckenridge Nordic Center operations
Fuels		
#1	In units outside of the CPZ the amount of total fuel loading should remain below 15 tons per acre. Fuel loading by size class will be addressed through fire behavior analysis.	Brown et al. 2003 Forest Plan pg. 2-5.
#2	Lop and scatter slash to within 18 inches of the ground. Where total fuel load is greater than 15 tons per acre, and the excess slash would be burned, restrict hand piles to 300 cubic feet (10'x10'x7' and conical in shape) and landing piles to 7068 cubic feet (smoke permit limits efficient burning to a maximum pile size of 45'x20'x15' and conical in shape). Burn piles with ≥2" of permanent snow pack to reduce residual damage to soils.	WRF East Zone programmatic piles burn plan. Colorado APCD Standard pile worksheet
#3	In mechanical units within the CPZ total fuel loading should remain at or below 8 tons per acre (t/a) for lodgepole pine and at or below 12 t/a for spruce fir (Brown). Fuel loading by size class will also be addressed through fire behavior analysis.	Brown et al. 2003 Forest Plan pg. 2-5.
#4	A Prescribed Burn Plan would be developed before any pile burning would take place. These plans address burn prescriptions, smoke management, safety, public information, and required resources needed to safely accomplish the burn.	FSM 5100 Fire Management Chapter 5140 Fire Use 5142 Prescribed Fire
#5	To reduce the potential fire behavior in areas that have a known high risk of human wildfire starts, pile and burn logging slash 100 feet from either side of roads and trails open to motorized use, leaving a maximum of 15 tons per acre.	IDT
#6	Machine piles shall be located at least twice their diameter from residual timber so damage will not occur during burning operations.	IDT
#7	If slash at the landing exceeds the maximum pile size of 45'x20'x15', slash	Timber Sale

Resource Category	Design Criteria	Source
	would be backhauled into the treatment unit and distributed evenly, or put into another pile. Slash will be kept to the maximum allowed under criteria #1.	Contract Provision C6.7# Slash Disposal. (FS-2400-6) or similar IRSC clause
#8	Where hand treatments are implemented in the CPZ zone, pile and burn limbs and tops less than 6 inches. Boles greater than 6 inches will be bucked to 6 feet and placed perpendicular to the slope and in contact with the ground. Maximum dead and down fuel greater than 6 feet is not to exceed 30 tons per acre.	Brown, James K.; Reinhardt, Elizabeth D.; Kramer, Kylie A. 2003. Coarse woody debris: managing benefits and fire hazard in the recovering forest. Gen. Tech. Rep. RMRSGTR-105.
Vegetation/Silviculture		
#1	Logging Operations, including felling, bucking, skidding, decking hauling, road maintenance and snow plowing may occur at any time during the calendar year except when explicitly restricted.	IDT
#2	Where helicopter yarding operations are being conducted over or in close proximity to roads and trails to be kept open as shown on Sale Area Map, Purchaser shall furnish and post flagmen during active yarding operations to prevent the passage of vehicular or pedestrian traffic beneath such yarding operations.	RO-C6.331# or similar IRSC clause
#3	Detailed silviculture prescriptions will be prepared for cutting units prior to harvesting.	IDT
#4	Retain lodgepole pine advanced regeneration (<5”DBH with >60% crown) to the extent feasible.	IDT
#5	Broadcast chipping would be restricted to the CPZ and would not exceed 3” average depth throughout the cutting unit.	IDT
#6	In the event trees need to be felled near power lines on NFS lands, the USFS Representative would assure that contractors are aware of applicable OSHA regulations (1910.269), ANSI requirements (Z-133.1) and other applicable state requirements (Colorado Revised Statutes Title 9 Safety-Industry and Commercial, Article 2.5-High Voltage Power Lines) when performing work near overhead lines.	IDT
#7	To minimize disturbance to homeowners from contractor operations in the Peak 7 subdivision area (Modified Proposed Action units 123-131; Alternative 3 units 123-124, 129-131 and 349-350) prohibit fuels reduction and logging activities (felling, bucking, burning, slashing, skidding, yarding, loading, and hauling) from midnight Friday through midnight Sunday, throughout the year. Specific operations may be allowed to occur within this time period upon approval by the USFS.	IDT
#8	The USFS would work with homeowners and HOAs to ensure that live trees that had been sprayed with Carbaryl are left uncut during harvesting operations.	IDT
#9	The USFS will monitor for wind throw and noxious weeds while conducting 1st, 3rd, and 5th year stocking surveys. If wind throw or noxious weeds are observed, treatments will be developed based on the extent and species present.	IDT
#10	A soils scientist will conduct an onsite stability exam prior to implementation in areas identified as potentially unstable. Potentially unstable land is described as having a “high” or “very high” instability ranking or classified as “unstable” or “marginally unstable”. Limit extensive ground disturbing activities on unstable slopes identified during examinations.	Guideline #1 from the WRNF LMRP Chapter 2, page 2-5

Resource Category	Design Criteria	Source
Wildlife		
#1	Protect known active and inactive raptor nests within the project area. The extent of the protection will be based on proposed management activities, human activities existing before nest establishment, species, topography, vegetation cover, and other factors. A no-disturbance buffer around active nest sites will be required from nest-site selection to fledging (generally March 1 through August 15). Exceptions may occur when individuals are adapted to human activity as determined by a wildlife biologist.	Migratory Bird Treaty Act; Forest Plan Wildlife Standard #5
#2	To protect active Northern Goshawk nesting sites (unless otherwise agreed to in writing), the following purchaser operations: falling, skidding, loading, hauling and road construction (reconstruction) shall be discontinued during the months of March 1 to September 1 within ¼ mile of an active Northern Goshawk nest if the activity will cause nesting failure or abandonment as determined by a wildlife biologist.	Goshawk recovery plan
#3	Minimize logging damage to residual trees that have live branches within 2 to 6 feet of the ground surface within harvest units. Where feasible, avoid placing skid trails, temporary roads, and landings in areas with high concentrations of trees with limbs within 2 to 6 feet of ground surface.	Lynx Conservation Strategy, conserving lynx prey species
#4	In lynx habitat that is field verified as denning or high quality winter foraging, temporary roads and skid trails should be designated in locations to reduce damage to dead and down logs and understory conifers. The units that will be affected are 338 and 416.	IDT
#5	Maintain a minimum of the following types of snags for each affected cover type. The amounts are to be calculated as per acre averages for each 1000 acres over a silvicultural landscape assessment area. **Spruce-fir**: Retention Density = 3 snags per acre (greater than 10" DBH and greater than 25' tall) and 1 snag per 5 acres (greater than 20" DBH and greater than 50' tall). **Lodgepole pine**: Retention Density = 3 snags per acre (greater than 8" DBH and greater than 25' tall) and 1 snag per 5 acres (greater than 20" DBH and greater than 50' tall). **Aspen:** Retention Density = 3 snags per acre (greater than 10" DBH and greater than 25' tall) and 1 snag per 5 acres (greater than 20" DBH and greater than 50' tall).	Forest Plan Biodiversity Standard #2
#6	Create wildlife piles in clearcut openings that are larger than 40 acres. There should be one pile per 10 acres, with each pile being approximately 200 to 250 square feet in base area and up to 15 feet high. Keep piles 100 feet from National Forest System trails.	IDT
#7	To minimize the disturbance to elk on winter range, no logging operations (cutting, skidding, yarding, loading, hauling) in the units within MA 5.43 Elk Habitat and MA 5.41 Deer and Elk Winter Range from December 1 to April 14. Affected units of Alternative 2 include units 130-134, 347, and 348 in Barton Creek, units 301-317 and 401 in Swan River Drainage (Unit 134 does not exist in Alternative 3); To minimize disturbance to elk calving, no logging operations (cutting, skidding, yarding, loading, hauling) April 15 to June 20. Exceptions may be granted depending on local conditions at the time. Affected units include units 127-131 and 427 in Barton Creek for Alternative 2 and units 129-131, 350, and 427 for Alternative 3.	Forest Plan MA 5.43 Wildlife Guideline #2
#8	Retain live or decedent aspen trees that have nesting cavities in the trees. Retain	IDT

Resource Category	Design Criteria	Source
	standing dead aspen snags that have nesting cavities if the dead tree is stable and not a hazard tree or cut the dead aspen with cavities during August 1 to April 30 when the nesting cavity would be vacant.	
#9	To minimize disruption of hunting activity and movement of game animals, logging operations (cutting, skidding, yarding, loading, hauling) will be suspended in units 116-119, 337, 338 (south half), 416, and 417 from September 1 to October 15. To minimize disruption of hunting activity logging operations (cutting, skidding, yarding, loading, and hauling) will be suspended in units 306-316 from October 20 to November 30.	IDT
Fisheries/Aquatics		
#1	To prevent direct mortality to boreal toads, restrict all mechanical felling and yarding activities in Modified Proposed Action units 123-126 (units 123-124 and 349 for Alternative 3) and yarding activities in units 345, 346, and 425 from April 1 to July 31 when adult toads are migrating to breeding habitats.	Forest Plan Guideline 1 for Boreal Toad and Leopard Frog (2002 LRMP, 2-26)
#2	To prevent direct mortality to boreal toads, restrict management-ignited fire treatments within Modified Proposed Action units 123- 126, 345, 346, and 425 (123-124, 345, 346, 349, and 425 for Alternative 3) to the period between November 1 and March 31 when adult toads are generally inactive.	Same as above
#3	Fish spawning and passage should be considered when placing or removing culverts at stream crossings. Any culverts installed or replaced should conform to aquatic organism passage standards. Numerous fish bearing streams flow through the project area and contain populations of brook trout (fall spawning), cutthroat trout (spring spawning), or both. To protect fish eggs and spawning gravels, work on stream crossings should be restricted to the period between August 1 and September 30.	Management Measure 4 (WCPH - Watershed Conservation Practices Handbook - FSH 2509.25)
#4	The proposed realignment of FS Road 593 in Unit 116 requires a stream crossing on a tributary of Indiana Creek. The crossing would require the installation of a culvert that should meet aquatic organism passage standards. In addition, all work on the crossing should take place between August 1 and September 30 to protect spawning fish, eggs and spawning gravels from increased sedimentation. As a result of the road realignment, approximately 600 meters of existing road will be obliterated. The tributary to Indiana Creek currently flows down this section of road. The road should be obliterated in a manner that would re-route the tributary back into its original channel and to match surrounding contours. Stream banks affected by obliteration activities should be reconstructed to match the existing natural channel and planted with willow for stabilization and cover. The rehabilitated roadway should be re-vegetated with willow cuttings taken from local stock and seeded. Large wood additions to create fish habitat and cover should be considered when restoring this section of stream. All work in this area should be completed under direct supervision of USFS hydrologists and/or fish biologists.	Forest Plan Colorado Cutthroat Trout Standard #1; Guidelines #2 and 3; Management measure 4 (WCPH)
#5	Some proposed harvest units possess stream courses, lakes, or ponds that are within their interior. For these units, buffers of 100 feet or average height of the mature trees (whichever is greater) would be used to avoid these areas.	Management Measure 3 (WCPH)
#6	Temporary roads opened and used over more than one operating season will have approved erosion control devices placed within the road prism at the end of seasonal use to prevent sediment discharge into streams or wetlands during the non-operating season.	Management Measures 11 & 12 (WCPH)
Heritage Resources		
#1	No mechanical treatment will occur within known eligible and field-eligible historic property boundaries including a 50-foot buffer around each property. The 50-foot buffers will be flagged prior to implementation. Timber harvest activities will be	Mountain Pine Beetle Management and Hazard Tree

Resource Category	Design Criteria	Source
	monitored by a Forest Archeologist or the Timber Administrator to ensure these properties are protected.	Reduction Programmatic Agreement among ACHP, Colorado SHPO, & WRNF (WR Agreement No. 07-MU-11021500-043)
#2	If treatment is necessary, historic properties and the 50-foot buffer will be hand-treated for hazard trees and accumulated fuel build up utilizing the treatment options outlined in Stipulation C of the PA. Under this PA, chainsaw thinning is determined to be an exempt undertaking when defined as: a thinning action that consists of employees or contractors who walk to stands from developed roads and utilized chain saws to thin out trees. All vehicles will be one-ton or smaller with rubber tires. Any chippers utilized will be restricted to those which are equipped with rubber tires and are small enough to be pulled by a one-ton vehicle.	WR Agreement No. 07-MU-11021500-043
#3	Exceptions to the exclusion of mechanical treatment within eligible and field eligible historic properties and 50-foot buffer may be made on a case-by-case basis by a Forest Archeologist/Timber Administrator for safety concerns. Feller-buncher grapple piling from a road, on a mine dump, or in a previously disturbed area of the historic property may be treatment options in situations where hand felling is unsafe or unfeasible.	WR Agreement No. 07-MU-11021500-043
#4	Proposed landings, haul roads, temporary roads, and road improvements will be designed to avoid impacts to historic properties and features (including standing structures and equipment) by providing a 50-foot buffer of protection. Existing roads may not allow for this buffer; a temporary barricade may be used to keep logging traffic from impacting the historic property.	WR Agreement No. 07-MU-11021500-043
#5	The WRNF has identified approximately 1500 acres of proposed mechanical treatment of hazardous trees needing cultural resource inventory in the Breckenridge Forest Health project area. Approximately 5.5 miles of access and temporary roads will also require inventory, including reconstruction of segments of Prospect Hill Road, Lincoln Park Spur 1A, and Indian Gulch Road. The purpose of the inventories will be to identify additional historic properties and evaluate the eligibility of undetermined properties. In addition, the inventories will assess their risk to hazardous trees and to potential threat of wildfire. Inventories will also be conducted to determine whether eligible sites can be protected using the 50-foot buffer and hand treatments. Nineteen known historic properties are situated within or adjacent to (within 200 feet) mechanical treatment units that have been determined eligible to the National Register of Historic Places or need additional data. A number of unrecorded mining features are also known to exist in the project area. These properties will be revisited and additional documentation and mapping will be conducted. Table 3-26 lists these historic properties by Alternative and treatment unit.	Andrea Brogan
Scenery		
#1	Openings in the canopy should have a natural appearance with uneven edges rather than straight lines where possible. When it is possible, coordinate with adjacent property owners to soften the edges of cutting units. The shape should be an irregular pattern like the existing natural openings and should avoid straight-line edges. The edges of the stands should be varied and random to soften and blend with the native vegetative mosaic. Favor existing healthy dominant trees such as Aspen and woody shrubs to shape the edges of areas where materials are	CP – Forest Plan & Scenery Management Handbook

Resource Category	Design Criteria	Source
	to be removed. Blend with natural landscape features such as natural meadows or openings and rock outcrops when possible. This will create free form vegetative shapes that mimic natural patterns. Make clearing edges irregular and freeform, feathering and undulating edges where possible.	
#2	Unit boundary paint shall face away from open system roads, be removed, or 'blacked out' after treatment activities are completed.	DC – Forest Plan & Scenery Management Handbook
#3	Root wads created by the harvest activities that are visible in the foreground of an open system road shall be buried or otherwise removed from sight unless used to close temporary roads.	CP – Forest Plan & Scenery Management Handbook
#4	Cut stumps as low to the ground as feasible within the immediate foreground (approximately 25 to 200 feet from the edge) of roads, trails and recreation sites located in MAs that are assigned High and Moderate Scenic Integrity Objectives. All other stumps should be 12 inches high or less.	DC – Forest Plan & Scenery Management Handbook
#5	Scattered slash and logging debris should be limbed and scattered over disturbed areas to a maximum depth of 18 inches of the ground surface within 100 feet of open system roads and trails. After completion of pile burning, blackened logs and stumps should be scattered back into harvest units or removed. Leave some logs on the ground to provide wildlife habitat and visual diversity. Forest Plan guidance regarding coarse woody debris will be met.	DC– Forest Plan & Scenery Management Handbook
#6	All equipment and construction debris (man-made debris and trash, including old culverts) caused by timber operations shall be removed from the site after treatment activities are completed.	CP – Forest Plan & Scenery Management Handbook
#7	Exposed soils resulting from vegetation management activities and road and landing construction can create strong color, form, and line contrasts. These contrasts can be reduced, by reestablishing vegetation on the exposed soil. Re-establishment of vegetation in the vegetation management stands, and re-vegetation of temporary roads will restore the landscape to a natural appearance. Areas should be re-vegetated using the appropriate seed mix developed by the forest botanist.	CP – Forest Plan & Scenery Management Handbook
#8	Any skid trails should be rehabilitated to reduce the color contrast of the exposed soil by randomly scattering and spreading slash or replacing scraped material. Cover exposed bare soil with adjacent organic material. Where feasible, construction of skid trails should avoid creating straight line corridors when the skid trails connect with open system roads and trails. Temporary roads and skid trails will be held to the minimum number, width, and length.	CP – Forest Plan & Scenery Management Handbook
#9	"Leave Trees" to occur at random distances and spaces. Maintain groups of "Leave Trees" if possible for a more natural appearance. The goal is to avoid appearance of regular spacing. Foreground – leave small clusters of 5-30 trees/shrubs approximately 5'to 10' outside circumference in irregular patterns for visual age class diversity, screening, and wildlife cover. Leave clumps of trees/shrubs to occur at random patterns about 75 to 250 feet, if possible.	CP – Forest Plan & Scenery Management Handbook
#10	Where possible, place landings in existing openings, (in or adjacent to aspen sites) unless doing so would adversely affect other resources. If an existing opening cannot be used, clearing size and form of the landings should mimic that of surrounding vegetative mosaic as seen from middle ground and background views (distances greater than ½ mile). The shape of landings should be an irregular pattern like the existing natural openings and should avoid straight-line edges.	DC – Forest Plan & Scenery Management Handbook
#11	Excessive cut/fill slopes shall be avoided. Vary cut/fills to blend with the adjacent	DC – Forest Plan

Resource Category	Design Criteria	Source
	terrain and leave in a roughened condition to facilitate revegetation. Stabilize fills and re-establish natural drainage configuration to the degree possible.	& Scenery Management Handbook
#12	Do not create straight lines of unit boundaries along the roadless area and wilderness area.	DC – Forest Plan & Scenery Management Handbook
#13	A landscape architect will be involved with the initial layout strategy with other resource specialists including timber and fuels layout crews. A portion of each project area that is representative of the whole project area will be used to convey specific resource prescriptions and overall marking strategies.	CP – Forest Plan & Scenery Management Handbook
Weeds		
#1	Off-road equipment shall not be moved into project area without having first taken reasonable measures to make sure it is free of soil, seeds, vegetative matter, or other debris that could contain noxious weed seeds. USFS Representative shall be notified at least 24 hours in advance of off-road equipment arriving on the Forest, to provide the option of inspecting the equipment to ensure it has been cleaned as required. Equipment may also require inspection prior to moving it from areas infested with invasive species of concern to areas free of such invasive species. Reasonable measures include pressure-washing or steam cleaning in an offsite location so oil, grease, soil and plant debris can be contained and provide optimal protection of project areas. All equipment surfaces should be cleaned especially drive systems, tracks and "pinch points" to ensure removal of potentially invasive debris.	Forest Plan Disturbance Process Standard #1-4
#2	Pre-treat existing infestations within, near, or along travel routes prior to implementing the proposed project. This will help to eradicate existing weeds and/or suppress seed production.	Forest Plan Disturbance Process Standard #1-4
#3	Monitor the harvest units for a minimum of four years after project completion and treat any new infestations in a timely manner.	Forest Plan Disturbance Process Standard #1-4
Watershed		
#1	Minimize Connected Disturbed Area by ensuring that roads, road ditches, and other disturbed areas drain to undisturbed soils rather than directly to streams. Manipulate drainage from disturbed areas as necessary using natural topography, rolling dips, waterbars, ditch-relief culverts, etc., to disconnect disturbed areas from streams.	WCPH Management Measure 1

<table>
<tr><th>Resource Category</th><th>Design Criteria</th><th>Source</th></tr>
<tr><td>#2</td><td>Retain the average per-acre levels of coarse woody debris (CWD) summarized in the table below.
<table>
<tr><th>Forest Type</th><th>Minimum Retention for Small Diameter Component (tons per acre)</th><th>Minimum Retention for Large Diameter Component (tons per acre)</th><th>Total Down CWD Retention (tons per acre)</th></tr>
<tr><td>Lodgepole pine</td><td>4.25</td><td>0.75</td><td>5</td></tr>
<tr><td>Aspen</td><td>2.5</td><td>0.5</td><td>3</td></tr>
<tr><td>Spruce-fir</td><td>8.5</td><td>1.5</td><td>10</td></tr>
</table></td><td>WCPH Management Measure 2,
Forest Plan Soils Standard #7</td></tr>
<tr><td>#3</td><td>Retain live and dead trees within 100 feet of perennial and intermittent streams, lakes, and ponds, except within designated stream crossings. Within the Community Protection Zone, hand felling and removal of dead trees may be allowed if approved after a site-visit by the USFS. USFS would mark which trees may be felled and removed. No ground-based machinery would be used to remove this material.</td><td>IDT, WCPH Management Measure 3</td></tr>
<tr><td>#4</td><td>Locate all landings and skid trails at least 100 feet away from perennial and intermittent streams, lakes, and ponds.</td><td>WCPH Management Measure 3</td></tr>
<tr><td>#5</td><td>Keep heavy equipment out of streams, swales, and lakes, except to cross at designated points, build crossings, or do restoration work, or if protected by at least 12 inches of packed snow or 2 inches of frozen soil.</td><td>WCPH Management Measure 3</td></tr>
<tr><td>#6</td><td>Design stream crossings to withstand floods as follows:
<table>
<tr><td>Design Life (years)</td><td>1</td><td>2</td><td>5</td><td>10</td><td>25</td><td>100</td></tr>
<tr><td>Design Flood (years)</td><td>10</td><td>10</td><td>25</td><td>50</td><td>100</td><td>200</td></tr>
</table></td><td>WCPH Management Measure 4</td></tr>
<tr><td>#7</td><td>Size culverts to easily pass sediment and debris transported by the stream to be crossed. Do not use culverts less than 18 inches in diameter to cross any stream channel.</td><td>WCPH Management Measure 4</td></tr>
<tr><td>#8</td><td>Designate the locations of stream crossings on temporary roads. Install stream crossings on straight and resilient stream reaches, as perpendicular to flow as practicable.</td><td>WCPH Management Measure 4</td></tr>
<tr><td>#9</td><td>Add or remove rocks, wood, or other material in streams or lakes only if such actions maintain or improve stream health. Avoid altering the stream bed and banks and maintain the natural character of the streams.</td><td>WCPH Management Measure 5</td></tr>
<tr><td>#10</td><td>Keep ground vehicles out of wetlands unless protected by at least 12 inches of packed snow or 3 inches of frozen soil. Do not disrupt water supply or drainage patterns into wetlands.</td><td>Forest Plan Soils Guideline #3</td></tr>
<tr><td>#11</td><td>Do not skid logs on sustained slopes steeper than 40%.</td><td>WCPH Management Measure 9</td></tr>
<tr><td>#12</td><td>Outslope temporary roads to shed water rather than concentrating water on the road surface or in ditches.</td><td>WCPH Management Measure 9</td></tr>
<tr><td>#13</td><td>Do not install culverts during spring runoff, or during periods of heavy precipitation.</td><td>WCP Management Measure 9</td></tr>
<tr><td>#14</td><td>Do not locate roads, landings, or skid trails on slopes that show signs of instability, such as slope failure, mass movement, or slumps.</td><td>WCPH Management Measure 9</td></tr>
<tr><td>#15</td><td>Locate and construct log landings in such a way as to minimize the amount of</td><td>WCPH Management</td></tr>
</table>

Resource Category	Design Criteria	Source
	excavation needed and to reduce the potential for soil erosion. Design landings to drain water to undisturbed soils rather than retaining water, or draining to streams. After use, treat landings to disperse runoff, prevent surface erosion, and encourage revegetation.	Measures 9 and 13
#16	Minimize sediment delivery to streams from temporary roads. Wherever stream crossings are required, use outsloping, rolling dips, waterbars, or ditch-relief pipes to drain water and sediment to undisturbed soils outside the WIZ rather than directly to streams.	WCPH Management Measure 10
#17	For re-construction of National Forest System roads, apply road surfacing near stream crossings as needed to minimize sediment delivery to streams.	WCPH Management Measures 10 and 11
#18	For temporary roads that will be operated for more than one season, install additional waterbars near stream crossings at the end of the operating season to prevent sediment delivery to streams during the off season.	WCPH Management Measure 11
#19	Limit the width of skid trails to 12 feet and ensure the spacing between skid trails is no closer than 120 feet on average.	IDT, WCPH Management Measure 13
#20	Keep logging slash and debris out of ditches and drainage channels.	IDT
#21	Reclaim disturbed areas promptly when use ends to prevent resource damage and invasion of noxious weeds. Rehabilitate temporary roads when project is complete by: • Removing all culverts; • Removing all fill in stream channels and recontouring stream banks to the original geometry; • Installing additional cross drains and/or outsloping to reestablish natural drainage patterns; • Ripping and seeding of road segments located within 100 feet of streams; and • Placing additional waterbars as needed.	WCPH Management Measure 12
#22	Obliterate skid trails after operations are complete by pulling slash on skid trails; building waterbars where needed; placing barriers within skid trails to prohibit mechanized and motorized use; and seeding skid trails with approved seed mix, where necessary, to establish vegetation.	WCPH Management Measure 12
#23	Manage land treatments to limit the sum of severely burned and detrimentally compacted, eroded, or displaced land to no more than 15% of any activity area. Specifically: • Designate the location and size of landings and major skid trails; • Minimize the length of temporary road approved to meet objectives; • Limit the width of skid trails to 12 feet and ensure the spacing between skid trails is no closer than 120 feet on average; and • Rip all landings and main skid trails to a depth of 8-12 inches and seed with USFS approved seed mix immediately upon closure.	WCPH Management Measure 13
#24	Do not allow grading, log skidding, or hauling during periods of heavy precipitation or when soils are muddy and prone to rutting and compaction.	WCPH Management Measure 13
#25	Designate the location and size of log landings and major skid trails.	WCPH Management Measure 13
#26	If machine piling of slash is done, conduct piling to leave topsoil in place and to avoid displacing soil into piles or windrows.	WCPH Management Measure 14
#27	Locate vehicle service and fuel areas on gentle upland sites at least 100 feet away from streams to prevent pollutants from contaminating water.	WCPH Management Measure 15

Resource Category	Design Criteria	Source
Lands/Special Use/Minerals		
#1	Locate and construct temporary roads, log landings and skid trails in such a way as to protect all improvements in special use permit areas, including buried and overhead utility lines (water, natural gas, electric, telephone, etc.).	Special Use Administration/ IDT
#2	Keep open all authorized access roads to special use permit activities and facilities.	Special Use Administration/ IDT
#3	Locate and construct temporary roads, log landings and skid trails in such a way as to protect all improvements in active mining claims that have an approved Notice or Intent of Plan of Operations.	Special Use Administration/ IDT
#4	Keep open all authorized access roads and mine site areas to active mining claims that have an approved Notice of Intent or Plan of Operations.	Minerals Administration
#5	An abandoned mine site specialist will make on-site determination for use of mechanical equipment in units with abandoned mines.	IDT
#6	Require on-site coordination with Xcel Energy vegetation management specialists and USFS for determination of harvest techniques within authorized right-of-way of utility corridors.	Special Use Administration/ IDT
#7	To avoid trespassing onto adjacent private lands, land line boundaries must be identified and corner monuments set following approved federal survey standards prior to project implementation.	Land Surveying (FSM 7151.02) Landline Location Program (FSM 7152)

NOTE: All references to unit numbers are applicable to both Alternative 2 and Alternative 3, unless otherwise specified.

Figure 2-2 – Southwestern Project Area

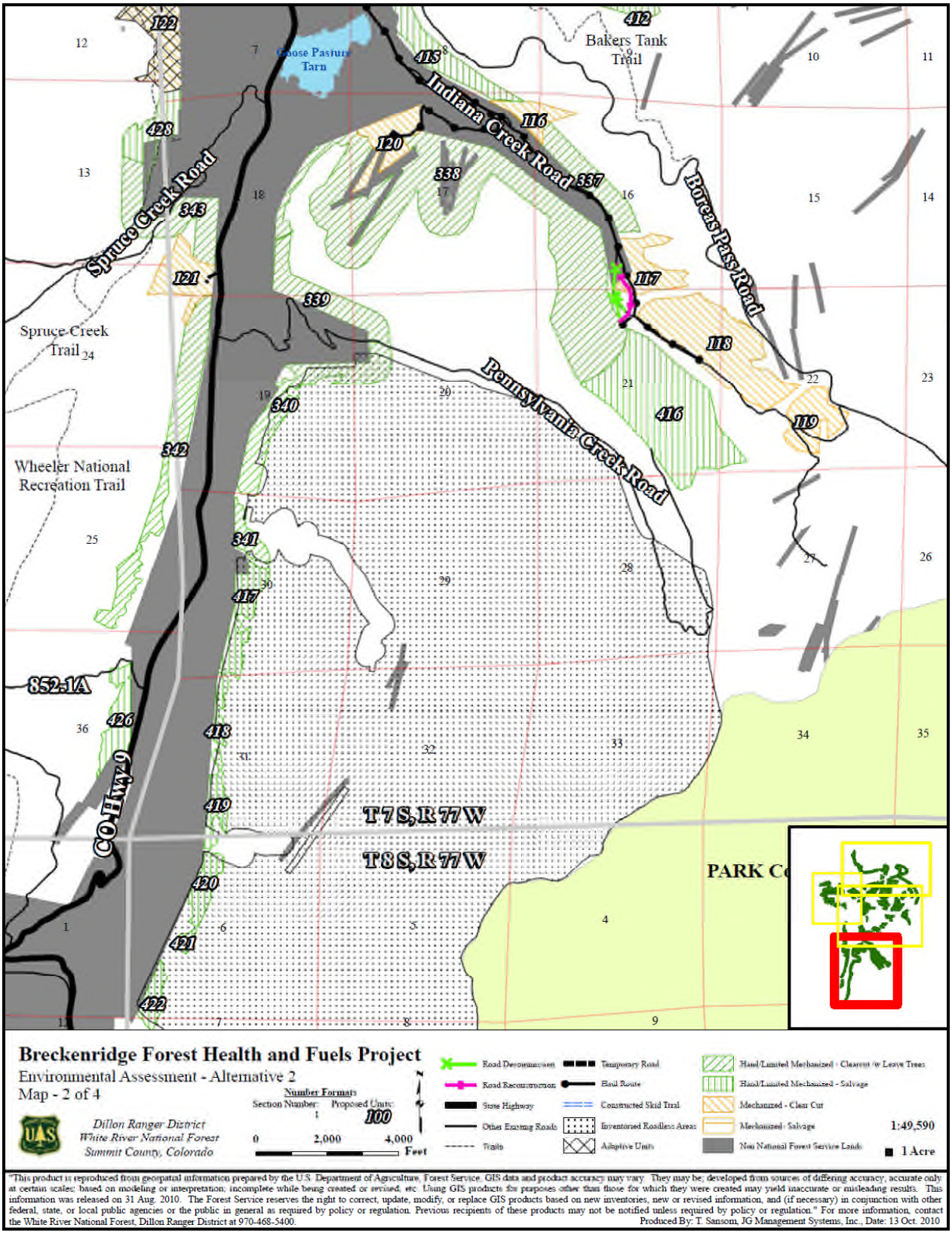
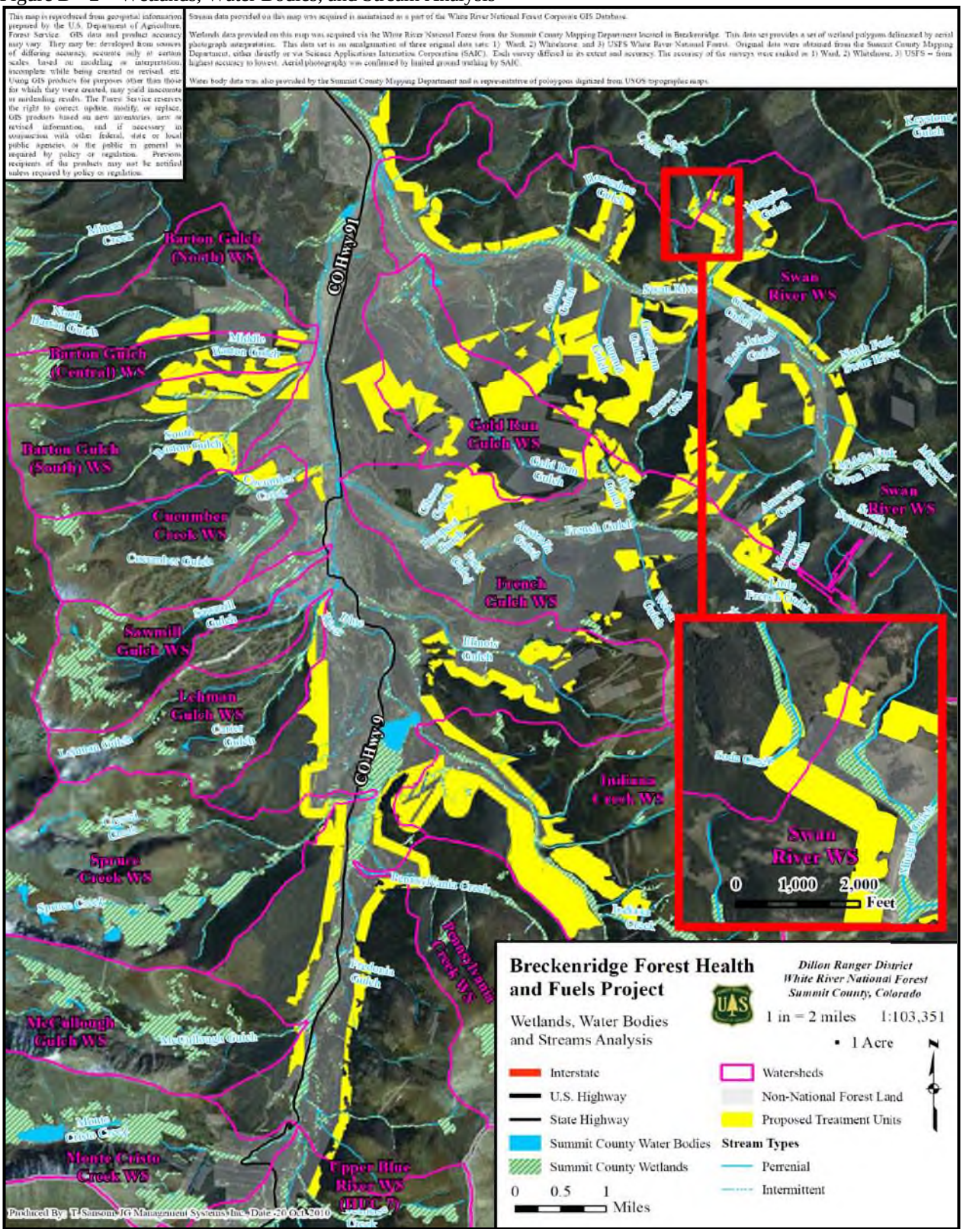
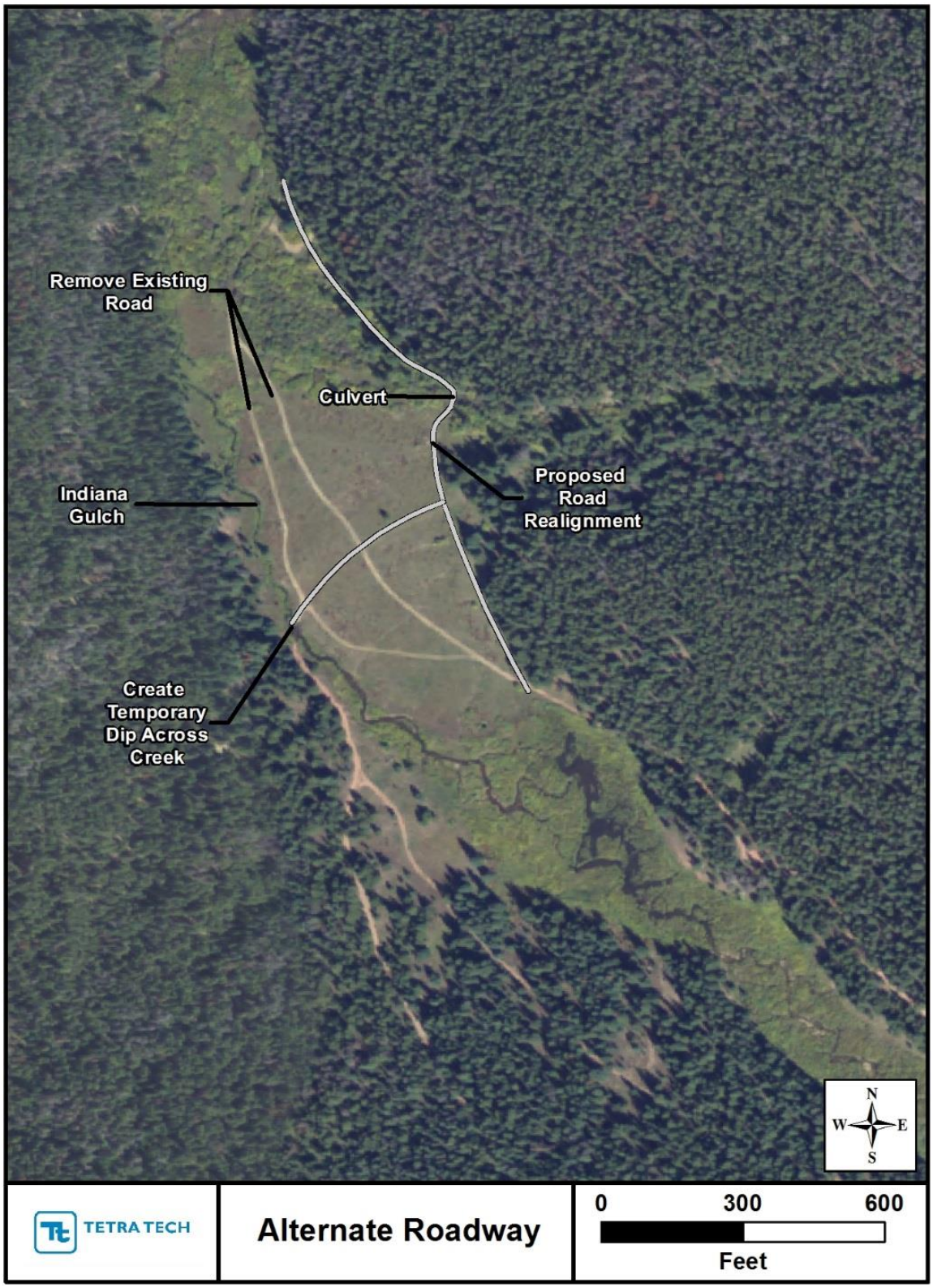


Figure D - 2 – Wetlands, Water Bodies, and Stream Analysis



Appendix C
Conceptual Details

Conceptual-level details are provided for informational purposes only. These details are subject to modification pending restoration needs and preliminary and final designs.



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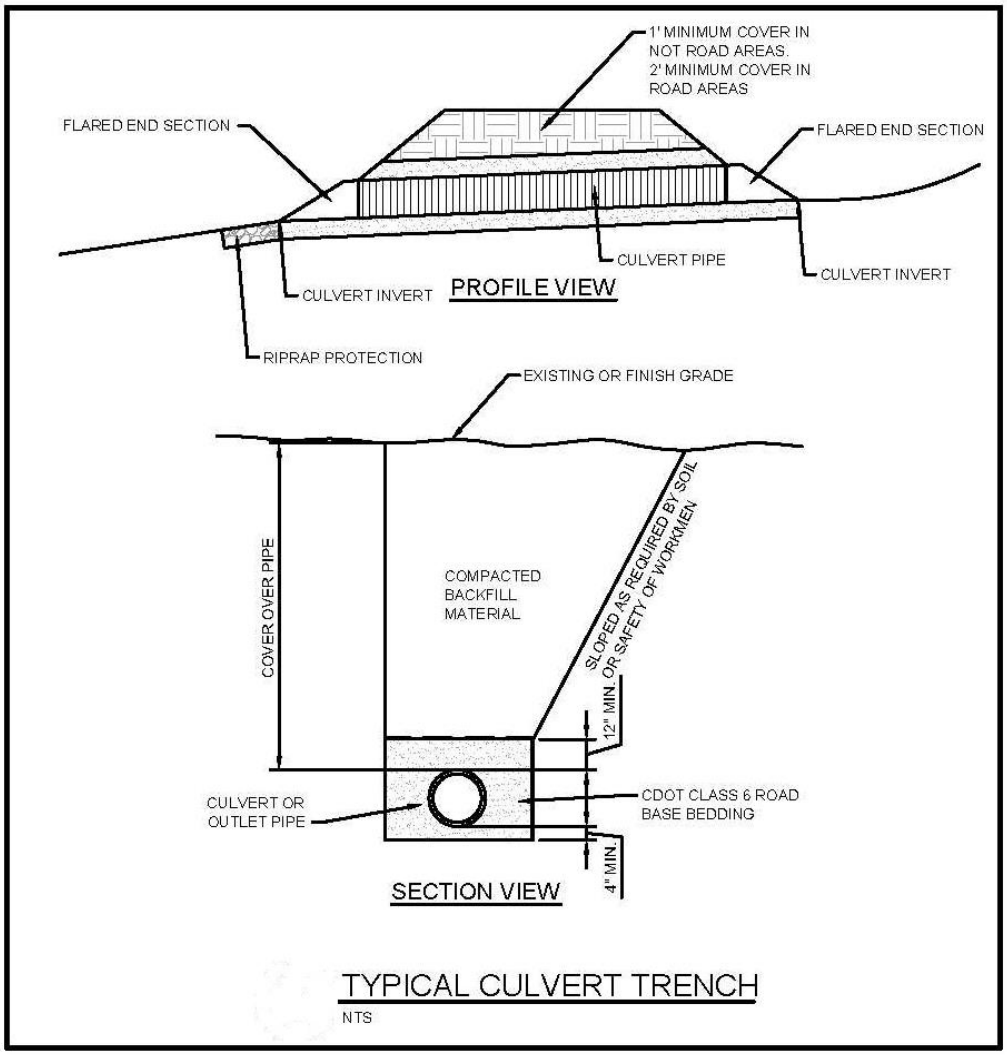
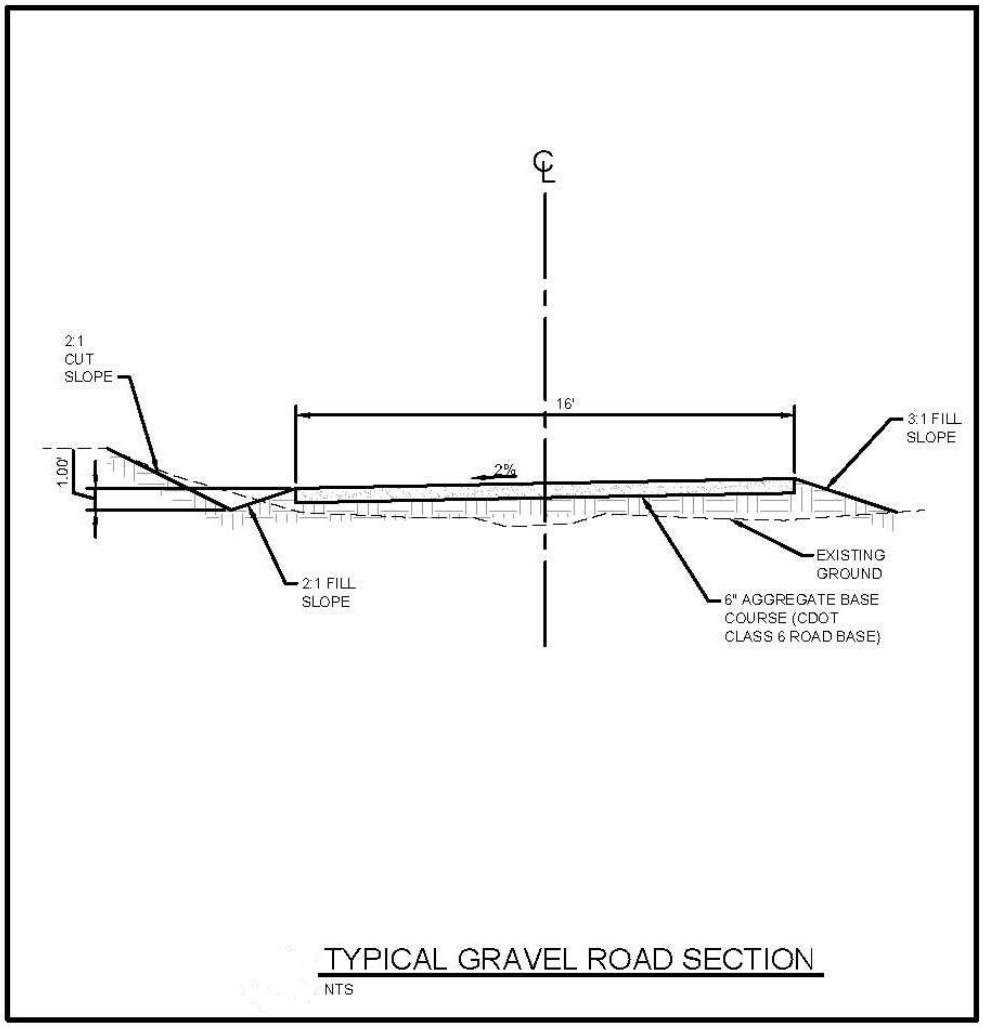


Conceptual-level details are provided for informational purposes only. These details are subject to modification pending restoration needs and preliminary and final designs.



TYPICAL GRAVEL ROAD SECTION

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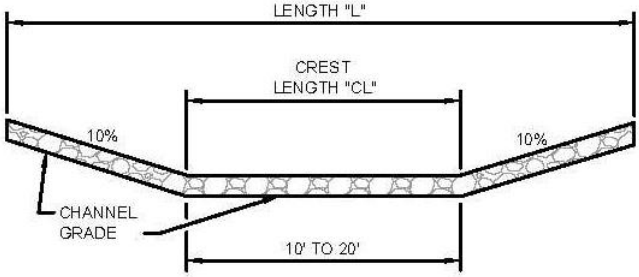
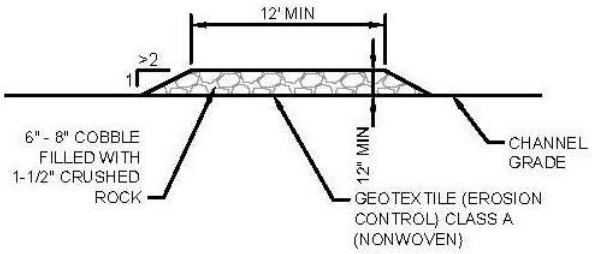
Conceptual-level details are provided for informational purposes only. These details are subject to modification pending restoration needs and preliminary and final designs.



PROFILE VIEW



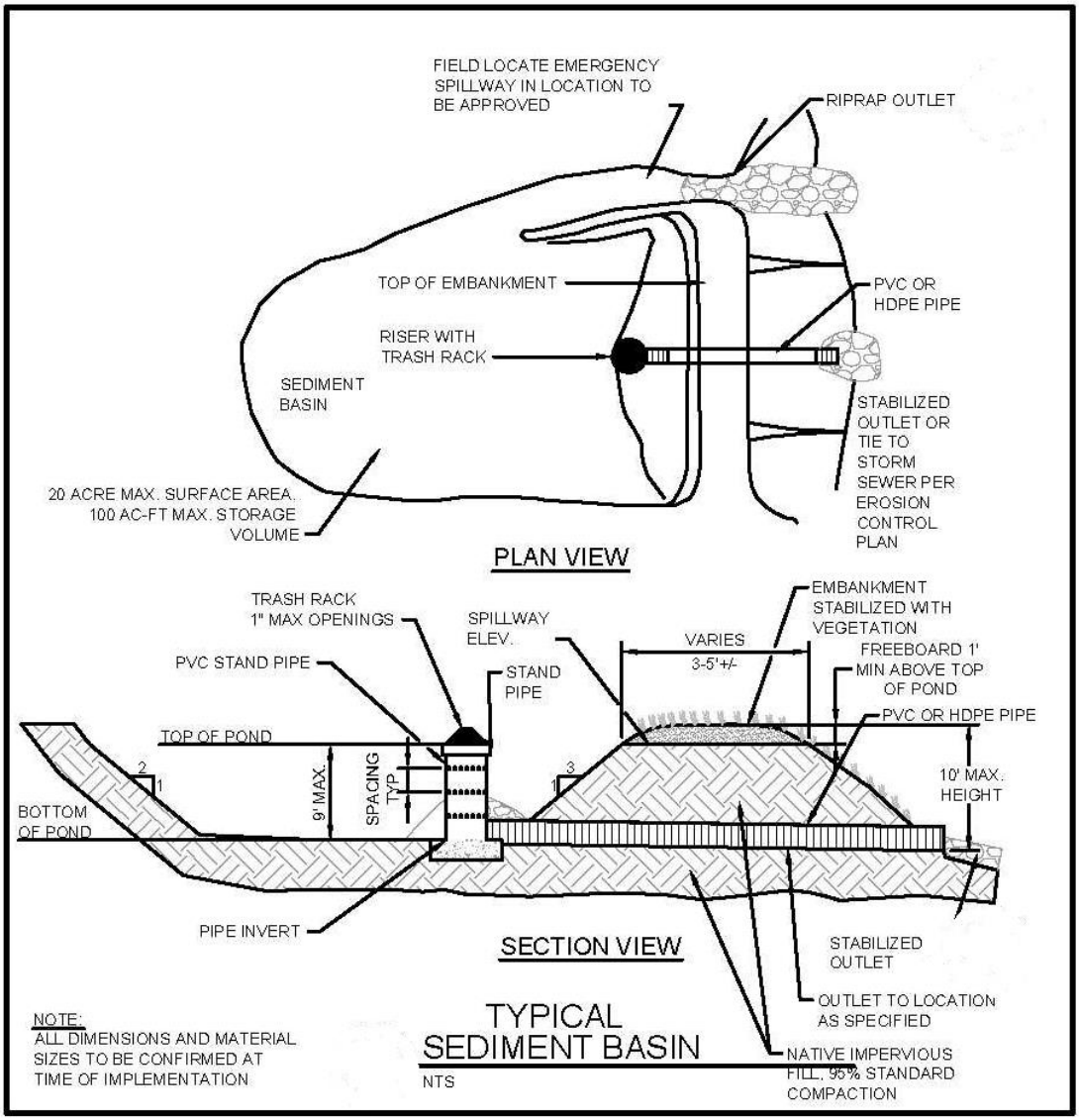
SECTION VIEW

1. SEE PLAN VIEW FOR:
   - -LOCATIONS OF TEMPORARY STREAM CROSSING
   - -STREAM CROSSING TYPE (FORD OR CULVERT)
   - -FOR FORD CROSSING: LENGTH, "L", CREST LENGTH, "CL", AND DEPTH, "D"
   - -FOR CULVERT CROSSING: LENGTH, "L", CREST LENGTH, "CL", CROSSING HEIGHT, "H", DEPTH, "D",
   - -CULVERT DIAMETER, "CD", AND NUMBER, TYPE AND CLASS OR GAUGE OF CULVERTS
2. TEMPORARY STREAM CROSSING DIMENSIONS, D$_{50}$, AND NUMBER OF CULVERTS INDICATED (FOR CULVERT CROSSING: SHALL BE CONSIDERED MINIMUM DIMENSIONS; ENGINEER MAY ELECT TO INSTALL LARGER FACILITIES. ANY DAMAGE TO STREAM CROSSING OR EXISTING STREAM CHANNEL DURING BASE-FLOW OR FLOOD EVENTS SHALL BE THE CONTRACTOR'S RESPONSIBILITY.
3. FOR A TEMPORARY STREAM CROSSING THAT WILL CARRY LOADS, THE TEMPORARY STREAM CROSSING MUST BE DESIGNED BY THE STRUCTURAL ENGINEER.

TEMPORARY STREAM CROSSING

NTS

Conceptual-level details are provided for informational purposes only. These details are subject to modification pending restoration needs and preliminary and final designs.



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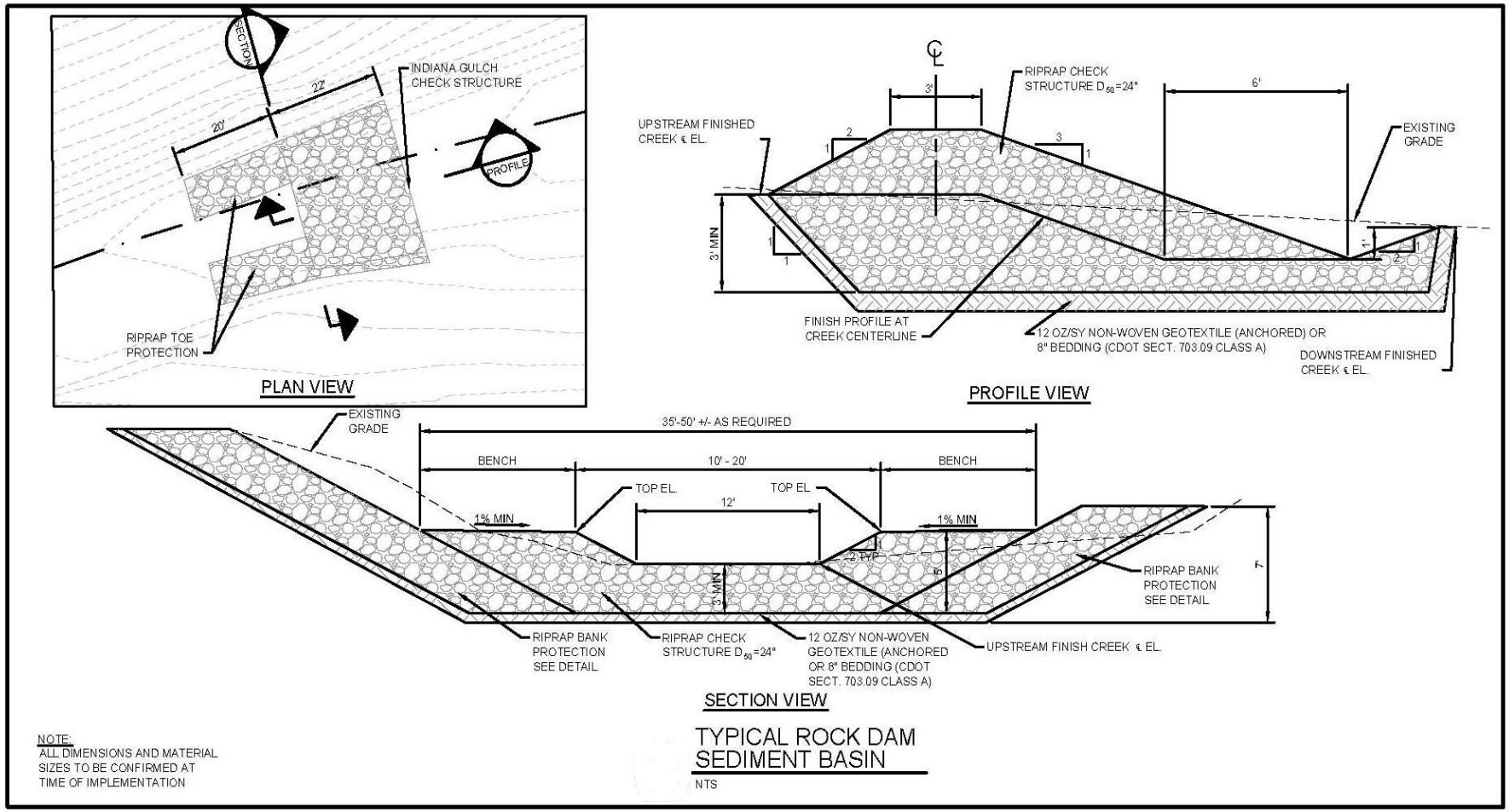

Appendix D
White River National Forest 2002 Land and Resource Management Plan, Chapter 2- Forest-Wide Standards and Guidelines

United States
Department of
Agriculture

Forest Service

Rocky Mountain
Region

Land and Resource Management Plan - 2002 Revision

WHITE RIVER
NATIONAL FOREST

LAND AND RESOURCE MANAGEMENT PLAN
2002 REVISION
for the
WHITE RIVER NATIONAL FOREST

Eagle, Garfield, Gunnison, Mesa, Moffat, Pitkin, Rio Blanco,
Routt, and Summit Counties, Colorado

Lead agency:
USDA Forest Service
White River National Forest
PO Box 948
Glenwood Springs, CO 81602

Responsible official:
Rick Cables, Regional Forester
USDA Forest Service
Rocky Mountain Region
PO Box 25127
Lakewood, CO 80225
(303) 275-5350

For further information contact:
Martha Ketelle, Forest Supervisor
White River National Forest
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Glenwood Springs, CO 81602
(970) 945-2521

E-mail address for general forest information:
Mailroom_r2_white_river@fs.fed.us

Abstract

This **Revised Land and Resource Management Plan** (**2002 Forest Plan**) was prepared according to Department of Agriculture regulations (36 CFR 219) which are based on the on the Forest and Rangeland Renewable Resources Planning Act (RPA), as amended by the National Forest Management Act of 1976 (NFMA). This plan was also developed in accordance with regulations (40 CFR 1500) for implementing the National Environmental Policy Act of 1969 (NEPA).

Because this plan revision is considered a major federal action significantly affecting the environment, a detailed **final environmental impact statement** (FEIS) has been prepared as required by NEPA and 36 CFR 219. If any provision of this plan or its application to any person or circumstances is found to be invalid, the remainder of the plan and its applicability to other persons or circumstances will not be affected.

Note to readers

The Forest Service believes that reviewers should be given notice of several court rulings related to public participation in the environmental review process. First, reviewers of Draft EISs must structure their response to the proposal to make clear the reviewer's position and contentions [*Vermont Yankee Nuclear Power Corp. v. NRDC,* 435 US 519, 53 (1978)]. In addition, environmental objections that could be raised at the Draft EIS stage but are not raised until after completion of the FEIS may be waived or dismissed by the courts [*City of Angoon v. Hodel,* 803F.2d 1016, 1022 (9th Circuit 1986) and *Wisconsin Heritages, Inc. v. Harris,* 490. Supp. 1334, 1338 (E.D. Wis. 1980)].

Please recycle this document when it is ready to be discarded.

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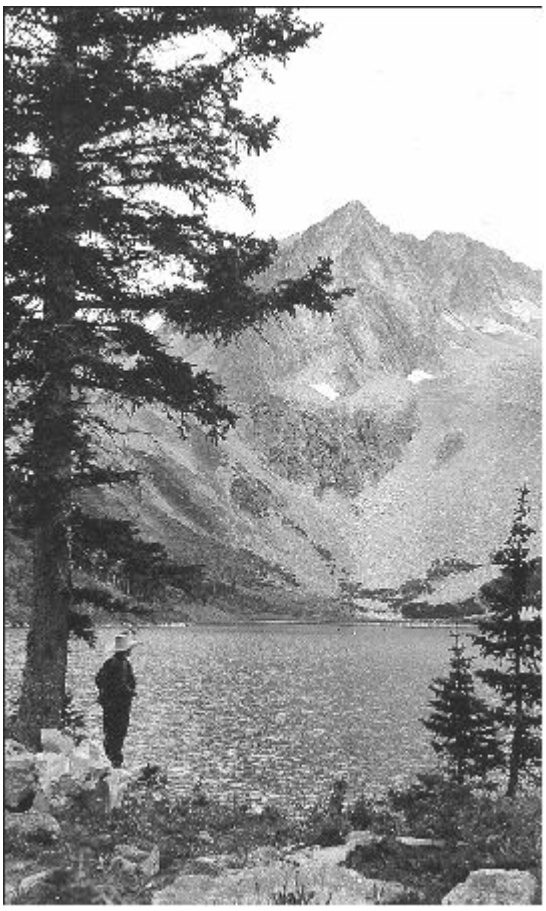
CHAPTER TWO

Forest-wide Standards and Guidelines



Snowmass Lake, Maroon Bells-Snowmass Wilderness

Chapter 2

Forest-wide Standards and Guidelines

Introduction

Background

This chapter presents the forest-wide standards and guidelines for the White River National Forest. These standards and guidelines for the protection or management of different forest resources apply to all areas of the forest. Additional standards and guidelines specific to each management area prescription are listed in Chapter 3.

A standard is defined as a course of action that must be followed, or a level of attainment that must be reached, to achieve forest goals. Adherence to standards is mandatory. Standards are used to assure that individual projects are in compliance with the forest plan. They should limit project-related activities, not compel or require them. Deviations from standards must be analyzed and documented in a forest plan amendment. Standards are developed when:

- Applicable laws or policies do not exist, or clarification is needed of existing laws or policies.
- They are critical to the achievement of objectives.
- Unacceptable impacts may occur if a standard is not in place.

A guideline is a preferred or advisable course of action or level of attainment. Guidelines are designed to achieve desired conditions (goals). Deviation from a guideline and the reasons for doing so are recorded in a project-level National Environmental Policy Act (NEPA) document; a forest plan amendment is not required. Guidelines are developed when:

- They contribute to the achievement of goals.
- They are needed to respond to variable site conditions.
- They are needed to respond to variable overall conditions.
- Professional expertise is needed.

When forest-wide standards and guidelines conflict with management area standards and guidelines, those that are more stringent or restrictive are applied.

Standards and guidelines are implemented slightly differently for species of viability concern. See the directions on page 2-18 (Wildlife Section, Proposed, Threatened, Endangered, Sensitive Species and Species of Viability Concern heading) for details.

Conformance with other direction

This set of standards and guidelines is designed to be specific to the forest. Laws, regulations, and Forest Service directives generally are not repeated in this package, although references to particular laws or directives are included to provide needed emphasis for the protection and management of specific resources.

For example, there are references to:

- The Clean Air Act
- The Colorado Air Quality Control Act
- FSM 2467.16 (botanical collections)
- FSH 2409.26 (silvicultural systems)
- The Region 2 Wilderness Management Philosophy
- FSH 2409.18 (timber utilization standards)
- Recreation Opportunity Spectrum (ROS) User's Guide
- Several federal acts protecting heritage resources
- Landscape Aesthetics: A Handbook for Scenery Management (Agriculture Handbook 701)
- The Outfitter-Guide Administration Guidebook

The lack of specific standards and guidelines for a particular resource in this chapter does not mean that the White River National Forest does not manage or consider this resource. Nor does it indicate that the Forest Service considers a particular resource less important than those listed. The entire forest plan, including the appendices, must be read carefully to understand how all forest resources will be managed. Refer to the forest-wide desired condition and goal statements, forest-wide objectives, and to the appendices for complete information. In particular, Appendices AA through HH provide references or repeat key direction for resource management found outside the forest plan.

Changes between Draft and Final

Several sections of the standards and guidelines have been modified from what was presented in the Proposed Revised Forest Plan. These changes are the result of comments on the draft, information becoming available after the Proposed Revised Plan was complete, and internal agency review. These changes have resulted in direction that pertains to and is appropriate for the White River National Forest.

Examples of direction in this chapter that has changed between draft and final include, but are not limited to, standards and guidelines on:

- Species of Viability Concern – resulting from a re-examination of species viability as described in FEIS Chapter 3, Topic 1, Species Assessment
- Water and Riparian Resources – resulting from an update to the Watershed Conservation practices Handbook
- Canada Lynx – resulting from the Canada lynx being listed as a Threatened species under the Endangered Species Act

Section One

Physical

AIR RESOURCES

Standards

1. Meet state and federal air quality standards and comply with local, state, and federal air quality regulations and requirements either through original project design or through mitigation for such activities as prescribed fire, ski area development or expansion, mining, and oil and gas exploration and production.

2. Perform conformity determinations or apply appropriate mitigation to zero out pollutants in order to maintain conformity with the State Implementation Plan for proposed activities that will contribute to air pollutants to Environmental Protection Agency (EPA) designated non-attainment and maintenance areas.

Guidelines

1. For water bodies in both Class 1 and Class 2 wilderness areas for which the acid neutralizing capacity (ANC) is greater than 25 micro-equivalents per liter, the limit of acceptable change (LAC) from human-caused air pollution is no more than 10 percent change in ANC. For those extremely sensitive water bodies in which the ANC is less than 25 micro-equivalents per liter, the LAC is no greater than one micro-equivalent per liter.

2. For plume visibility impairment in wilderness, the LAC is a 5 percent change in contrast. The LAC for haze visibility impairment in wilderness is a 0.5 percent change in deciview or 5 percent change in light extinction.

3. Minimize the impact of smoke for each wildland fire by identifying smoke-sensitive areas, using "best available control measures," monitoring smoke impacts, and following guidance in state smoke management plans.

4. Reduce the impacts to air quality and loss of energy resources by only allowing flaring of gas from oil wells during production testing of wells. Connection to a pipeline or reinjection will be required once production is established. Exceptions will be considered on a case-by-case basis.

CAVES

Guidelines

1. Manage natural surface drainage and vegetation that may affect known caves or cave resources to protect cave micro-environments.

2. Management activities that may affect known caves will be designed to protect cave ecosystems.

3. Identified significant caves will be withdrawn from mineral entry.

GEOLOGY, MINERAL, AND ENERGY RESOURCES

Standards

1. Recommend consent to lease with appropriate lease terms or stipulations, as set forth in the *Oil and Gas Leasing Final Environmental Impact Statement for the White River National Forest* (1993).

2. In areas of moderate-to-high potential for valuable mineral deposits, perform site-specific mineral evaluations prior to making substantial capital investments, such as recreational developments.

3. Avoid development of capital investments in areas that will be jeopardized by moderate-to-high mineral potential on non-federal mineral estate ownership.

PALEONTOLOGICAL RESOURCES

Standards

1. Sensitive paleontological information will not be subject to Freedom of Information Act disclosure.

2. Prohibit the collection of vertebrate fossils on National Forest System lands without a permit.

3. Allow collection of paleontological vertebrate resources with authorization (permit or area designation) for educational and scientific purposes. Prohibit the commercial collection of fossils**.**

Guidelines

1. Identify areas of potential paleontological resources in Classes 3, 4, and 5 of the Fossil Yield Potential Classification for the presence or absence of management-relevant paleontological resources. If resources are identified, protect from disturbance or mitigate disturbances to conserve scientific, educational, interpretive, and legacy values.

2. Survey and post land boundaries where paleontological sites have sensitivity rankings of 3, 4, or 5.

SOILS

Standards

5. Manage land treatments to maintain or improve soil quality, limiting the sum of detrimental soil impacts to no more than 15 percent of an activity area.

7. Design vegetation and fuels management treatments to retain the average per-acre levels of coarse woody debris (CWD) displayed in Table 2-1. Coarse woody debris retention will help maintain long-term site productivity by reducing soil movement, retaining soil moisture, and providing microsites for new plant establishment. Where these levels do not presently exist, evaluate long-term potentials and consider treatments that could help move coarse woody debris levels towards the desired condition.

Table 2-1
Coarse Woody Debris Retention Levels by Forest Type

Forest Type[4]	Minimum Retention for Small Diameter Component[1] (Tons per acre 3 to 8 or 10 inches in diameter[2])	Minimum Retention for Large Diameter Component[1,3] (Tons per acre greater than 8 or 10 inches in diameter[2])	Total Down CWD Retention[1] (Tons per acre of materials greater than 3 inches in diameter)
Spruce-fir	8.5	1.5	**10**
Lodgepole pine	4.25	0.75	**5**
Aspen	2.5	0.5	**3**
Douglas-fir	4.25	0.75	**5**
Ponderosa pine	3.5	0.5	**4**

Notes:

[1]These amounts are to be calculated as per-acre averages for each 1,000 acres over a silvicultural landscape assessment area (see Silviculture Guideline 1).

[2]The minimum diameter of CWD is measured at the larger end of the material.

[3]The large diameter component satisfies wildlife needs for CWD retention in Table 2-2.

[4]The 8 inch minimum diameter applies to lodgepole pine and aspen while the 10-inch minimum applies to spruce-fir, Douglas-fir, and ponderosa pine types.

Guidelines

1. Conduct an onsite slope stability exam in areas identified as potentially unstable. Potentially unstable land is described as having a "high" or "very high" instability ranking or classified as "unstable" or "marginally unstable." Limit intensive ground-disturbing activities on unstable slopes identified during examinations.

2. Where there is potential for toxic contamination of soil from ground-disturbing activities, develop a contingency plan to prevent or rehabilitate soil contamination.

3. When logging over snow, conditions should allow for 1 foot of packed snow to be continuous (i.e. not patchy) and competent enough so that wheeled or tracked vehicles do not break through. When logging over frozen ground, a minimum of 3 inches of continuous frozen ground should be present.

4. To minimize soil impacts, the following practices should be followed for vegetation management activities:

- Use practices other than brush rake piling and crushing by heavy equipment to dispose of slash,
- Limit the width of skid trails to 12 feet and spacing between trails to no closer than 120 feet on average,
- Limit heavy equipment such as feller-bunchers to 3 round trip passes on designated skid trails,
- Utilize low p.s.i. (less than 7 p.s.i.) tracked equipment when available.

WATER AND RIPARIAN RESOURCES

Standards

1. In each stream currently supporting a self-sustaining fish population, ensure that projects maintain sufficient habitat, including flow, for all life history stages of native and desired non-native aquatic species.

4. Naturally occurring debris shall not be removed from stream channels unless it is a threat to life, property, important resource values, or is otherwise covered by legal agreement. Removal in designated wilderness must consider wilderness values.

Guidelines

1. When projects are implemented that can affect large woody debris, retain natural and beneficial volumes of this material for fish habitat, for stream energy dissipation, and as sources of organic matter for the stream ecosystem.

2. Keep vehicles and equipment out of streams, lakes, and wetlands except to cross at designated points, build crossings, do restoration work, or where protected by one foot of snowpack or frozen soil.

3. Maintain existing federal water rights. Take appropriate action to use and protect water rights, including but not limited to changing uses to meet federal needs for water. If the water rights are not needed to meet national forest purposes, sell, lease, or exchange these federal water rights.

Section Two

Biological

ALPINE

Standards

1. Prohibit new structural facilities in alpine wetlands, streams, and riparian areas except when needed to reduce existing resource impacts.

Guidelines

1. Campfires are prohibited above treeline to protect fragile alpine soils and vegetation. Barbeques and grill which are operated to cause no impacts to soils and vegetation may be permitted in appropriate places and facilities by permit.

2. Minimize new roads, trails, and livestock driveways in alpine ecosystems.

3. Minimize soil excavation and disturbance in alpine ecosystems.

4. Minimize the size and number of structures in alpine ecosystems.

5. Manage public uses to minimize resource damage in alpine ecosystems.

BIODIVERSITY

Standards

1. Use genetically local (at the ecological subsection level) native plant species for revegetation efforts when technically and economically feasible. Use seed mixtures and mulch that are noxious weed-free. To prevent soil erosion, non-persistent, non-native annuals or sterile perennial species may be used while native perennials are becoming established.

2. Develop prescriptions during project planning to identify the amount, size(s), and distribution of downed logs and snags to be left onsite, as well as live, green replacement trees for future snags. On forested sites, retain snags and downed logs (where materials are available) in accordance with the average minimums specified in **Table 2-2**.

Table 2-2
Minimum requirements for snag, snag recruitment, and woody debris retention

	Snags				***Large Snags***			***Downed Logs***	
Forest Type	**Minimum diameter at DBH** (inches)	**Retention density** (number per acre)	**Recruitment density** (number per acre)	**Minimum snag height** (feet)	**Minimum diameter at DBH** (inches)	**Retention density** (number per five acres)	**Minimum snag height** (feet)	***Minimum diameter** (inches)	**Retention density** (linear feet per acre)
Spruce-fir	10	3	3	25	20	1	50	10	150
Lodgepole pine	8	3	3	25	20	1	50	8	100
Aspen	8	3	3	25	20	1	50	8	50
Douglas-fir	10	3	3	25	20	1	50	10	100
Ponderosa pine	10	3	3	25	20	1	50	10	50

Note: These amounts are to be calculated as per-acre averages for each 1,000 acres over a silvicultural landscape assessment area (see Silviculture Guideline #1). The retention density of large snags is a portion of the retention density of all snags. *The minimum diameter of downed logs is measured at the larger end of the log.

3. If no snags meet the minimum diameter and height requirements, use the largest snags available.

4. Manage late-successional and old-growth forests according to the map, table, and explanation found in Appendix FF of this document.

Guidelines

1. Favor native and desirable non-native plant and animal species over undesirable exotic species during management plan implementation activities. Within designated wilderness, use genetically local native species preferentially.

2. Because of the ecological importance of the aspen vegetative type on the forest, analyze aspen's historical spatial and structural occurrence in the landscape during project design. Compare proposed changes to reference landscape conditions where such conditions have been developed. Make comparisons within the same ecological landtype association. Reference landscape conditions should provide a baseline depiction of the following spatial attributes:

- Landscape composition.
- Landscape configuration.
- Patch and size distribution.
- Distance between patches.

The intent is to maintain or enhance these attributes when compared to the reference landscape. An interdisciplinary team has the latitude during project design to propose how much to change each spatial attribute when comparing the landscape of interest to the reference landscape.

3. The following are high priorities for aspen regeneration:

- Decadent stands (stands with significant amounts of canker, stem decay, and root disease);
- Stands with less than 10 feet per acre basal area of aspen in a conifer stand;
- Isolated clones, low-elevation stands, and stands that are heavily used by animals; and
- Cost-efficient stands that contribute to aspen distribution.

4. Base priorities for conserving potential or existing late-successional stands on values for maintaining biotic diversity, and evaluate factors of size, adjacency between late-successional stands, and degree of habitat variation between such late-successional stands and intervening vegetation. Also consider the following:

- Conserve older, unmanipulated stands over younger, manipulated stands;
- Favor stands with limited access by humans or livestock; and
- Provide potential for reintroduction of plant and animal species that have become locally eliminated.

RANGELAND ECOSYSTEM MANAGEMENT

Standards

1. For animal damage control activities conducted by other governmental entities, cooperate by providing mitigation measures to protect national forest resources. Mitigation measures emphasize protection of public safety; proposed, threatened, endangered, and sensitive species, water quality, and other resource values.

2. Allow continuous season-long grazing in an allotment only where determined to achieve or maintain the desired ecosystem conditions.

Guidelines

1. Identify desired plant communities and designate key areas to evaluate whether the existing plant communities are at, moving toward, or moving away from desired conditions in site-specific analyses required for allotment management plans.

2. During range allotment planning, develop site-specific herbaceous vegetation utilization, vegetation residue, streambank disturbance, and woody species utilization guidelines. In the absence of updated planning and approved decision documents, the following allowable use and riparian vegetation residue guidelines and mitigation measures will apply. These utilization guidelines are applicable at the time the livestock leave the unit and include use by both domestic livestock and wildlife. **Table 2-3** shows the maximum allowable use guidelines for cattle allotments. Sheep allotment utilization guidelines are given by narrative description. **Table 2-4** provides riparian residue guidelines for both cattle and sheep.

Table 2-3
Maximum allowable use guidelines (percent utilization by weight) for cattle allotments

	If existing rangeland condition is:*	
Type of management	**Satisfactory**	**Unsatisfactory**
Season long	40	30
Deferred rotation		
Units grazed > 30 days	45	35
Units grazed < 30 days	55	45
Rest rotation		
Units grazed > 30 days	45	35
Units grazed < 30 days	55	45

Notes:

Rangeland condition is defined as the present state of vegetation on a range site in relation to the climax (natural potential) plant community.

Sheep allotments

The following visual description of post-grazing conditions should be used to determine the proper measure of allowable use on sheep allotments:

- After sheep have completed using an area, there should be only moderately visible signs that they have used the area. One should have to walk or ride through the area to see where use has been made. Although bedgrounds may show more evidence of use than areas sheep have only

grazed through, one should still have to walk or ride through the bedground to determine that animals had bedded there.

- Soil and vegetation should be restored to at least the pre-grazing condition by the return to the same point in the next grazing cycle.
- Forage should show that it has been topped and selectively grazed. Favored forbs such as *Angelica spp.*, cow parsnip, Porter lovage and *Senecio spp.* may be stripped of their leaves, but in most cases, the stem is standing.

Table 2-4
Riparian vegetation residue guidelines

Remove livestock from riparian areas when the average stubble height of Carex species reach:

	If existing rangeland condition is:	
Type of management	**Satisfactory**	**Unsatisfactory**
Spring Use (up to July 15)	3 inches	4 inches
Summer/fall use (after July 15)	4 inches	6 inches

Note: Measurements are of plant heights.

3. The following should be applied to all riparian habitats:

- Avoid season long grazing in riparian areas and wetlands.
- Implement short-duration grazing (generally less than 20-30 days) as feasible to provide opportunity for re-growth and avoid utilization of woody species.
- Remove livestock from a grazing unit when stream bank disturbance (trampling and exposed soils) from the current year's livestock grazing reaches 20 to 25 percent of the key area stream reach.
- Design grazing systems to limit utilization on woody species. No more than 50 percent of the twigs of woody species should be browsed during one growth cycle.
- Limit utilization of herbaceous species to 40-45 percent of weight.
- Keep stock driveways out of riparian areas except to cross. Rehabilitate or relocate stock driveways that are causing damage to riparian areas.

SILVICULTURE

Standards

1. The scientifically defined silviculture systems, shown by forest cover type in **Table 2-5**, which meet the management objectives for the landscape or individual stands of trees within a landscape setting are acceptable. Both even-aged and uneven-aged management systems can be used and applied at scales ranging from a few acres to many hundreds of acres. These silvicultural systems are to be applied in a manner that will ensure natural regeneration where artificial regeneration is not necessary for other resource objectives. Tree stand vegetation management treatments are to be approved by certified silviculturists.

Table 2-5
Appropriate silviculture systems by forest cover type

Forest cover type	Even-aged	Two-aged	Uneven-aged
Ponderosa pine	Shelterwood, clearcut, and seed-tree	Irregular shelterwood	Group selection and single-tree selection
Mixed conifer	Shelterwood, clearcut, and seed-tree	Irregular shelterwood	Group selection and single-tree selection
Aspen	Coppice[1]	Coppice with standards[2]	Group selection[3]
Lodgepole pine	Shelterwood, clearcut, and seed-tree	Irregular shelterwood	Group selection
Engelmann spruce Subalpine-fir	Shelterwood and clearcut	Irregular shelterwood	Group selection and single-tree selection

Notes:

[1]Coppice is a vegetation reproduction method with clearfelling or clearcutting. Clearfelling (clearcutting) stimulates sprouting from the residual roots.

[2]"Standards" are selected overstory trees reserved for a longer rotation at the time each crop of coppice material is cut.

[3]Use of group selection as an appropriate silviculture system in aspen is currently under study to determine regeneration success, but is authorized on a test basis.

[4]. Clearcuts are acceptable systems for Ponderosa Pine and Englemann spruce, but not standard practice except to meet specific resource or stand requirements.

2. When trees are harvested to meet timber production objectives, assure that the technology and knowledge exists to adequately restock these areas with trees within five years after final harvest. Minimum restocking levels are defined in **Table 2-6**.

Table 2-6
Standards for the required minimum numbers of seedlings for adequate restocking of a regeneration site.

	Growing stock: all live trees							
Species	**Spruce-fir**	**Aspen**	**Douglas-fir**	**Lodgepole pine**	**Ponderosa pine**	**Piñon-juniper**	**Other softwood**	**Other hardwood**
Trees per acre	150	300	150	150	150	120	150	300

3. No minimum seedling height requirements are specified. Seedlings must have survived a minimum of one year and be expected (on the basis of research and experience) to be able to produce the desired future stand condition specified for this area in the forest plan. The number of seedlings in **Table 2-6** represents the minimum number of seedlings required to produce a merchantable timber stand at rotation age without intermediate treatments, taking into consideration natural mortality.

4. Five years after final harvest means five years after clearcutting, five years after the final overstory removal in the shelterwood and seed tree system, or five years after selection cutting. The requirement for adequate restocking within five years is initiated by the final harvest. The timing of the first-year and third-year restocking surveys is initiated by the reforestation treatment.

5. The maximum size of openings created by even-aged management will be 40 acres regardless of forest type, with the following exceptions:

- When proposals for larger openings are approved by the Regional Forester after a 60-day public review;
- When larger openings are the result of natural catastrophic conditions; or
- When the area that is cut does not meet the definition of created openings.

6. The size of the uncut forest areas between openings must be based on the management objectives for the landscape being analyzed. If these objectives include creating a mix of vegetation types to benefit the kinds of wildlife associated with early successional stages and edges, the uncut units can be small. If the objectives include provisions for old-growth-associated species, the uncut units should be large enough to function as an ecological system not overly influenced by the edge.

7. Where disease can spread from an uncut stand to a newly regenerated stand, it is desirable to cut the adjacent infected stand before the newly regenerated stand reaches a height of six feet.

8. When trees are to be harvested on other than suitable lands, exceptions to the five-year restocking standards are appropriate as documented in project decisions when the harvest meets one of the following:

- Where it provides permanent openings that serve specific management direction;
- Where provided for in specific management practices and prescriptions; or
- Where it is desirable to delay the onset of regeneration and crown closure to meet specific desired conditions and management objectives.

9. In order to assure that adequate restocking of openings created as a result of final harvest is accomplished, at a minimum stocking surveys are conducted at the end of the first and third growing seasons following reforestation treatment. Adequate stocking cannot be certified until after the third growing season survey.

10. Utilization standards for live and dead trees are shown in **Table 2-7.** These standards apply forest-wide (FSH 2409.18, Ch. 50).

Table 2-7
Timber utilization standards

Type of product	Minimum diameter at breast height (inches)	Top diameter (inches)	Minimum length (feet)	Merchantability factor
Live trees				
Coniferous sawtimber	7-8	5-7	8-10	10.67
Aspen sawtimber	7-8	5-7	8	8
Products other than sawtimber	5	4	6.5	variable
Dead trees				
Sawtimber	7-12	7-10	6-18	10.67
Products other than sawtimber	5	4	variable	variable

11. Artificially created openings will no longer be considered openings when the trees in the openings have reached a height and density that meets the objective established for the management area. Considerations in determining when an opening is no longer an opening include:

- The desired future conditions planned for the management area;
- Visual sensitivity of the area;
- The character of the landscape;
- Abundance, quality and need for cover for big game animals;
- Other vegetation that may be present (such as tall shrubs);
- Forest health;
- Need for seed sources;
- Need for interior forest area;
- Production of wood fiber; and
- Watershed and riparian area protection.

Table 2-8 illustrates some guidelines that could be considered in developing local standards for management areas.

Table 2-8
Guidelines for when an opening is no longer considered an opening.

Forest cover type	Trees per acre	Height of trees
Ponderosa pine and mixed conifer		
Big game cover	200	6 feet
High and moderate scenic integrity objectives	200	25% of the height of the adjacent stand
Lodgepole pine and spruce-fir		
Big game cover	300	6 feet
High and moderate scenic integrity objectives	150	25% of the height of the adjacent stand
Aspen		
Big game cover	500	6 feet

12. Restrict activities in the ponderosa pine cover type to managing for two-aged or uneven-aged silvicultural systems.

Guidelines

1. The landscape should be the primary unit of analysis for silviculture. A landscape is defined here to mean a distinct landform, such as a mesa or an "Order IV" watershed. There is a great variety of landscape types within the Rocky Mountain Region. Some landscapes are "fine-grained" and are characterized by many small areas in various stages of plant succession. Other landscapes are "large-grained"—forested areas with large, unbroken expanses of trees with few openings. Some areas in the region have become a patchwork of forest and open places as a result of human use before national forest establishment, past Forest Service management practices, or natural disturbances (wind, fire, insect activity, and earth movement).

2. In most circumstances, rely on or make primary use of those silviculture systems that ensure regeneration of forest stands through natural seeding and suckering.

3. Use artificial regeneration methods when it is not possible to rely on the natural sequence of events or environmental conditions to regenerate the forests within five years or earlier.

4. Use thinning practices that consider genetic diversity, competition among the trees for water, nutrients, and light. The frequency of thinning should depend upon the tree species, financial efficiency, and the site growing conditions (as commonly measured by site index).

5. Leave large woody debris on harvested or thinned sites to help retain moisture, trap soil movement, provide microsites for establishment of forbs, grasses, shrubs, and trees, and to provide habitat for wildlife (*See Soils Standard 7 and Table 2-1*).

6. Where appropriate, reduce competition between desired trees and other vegetation.

7. If the silviculture system being applied to a particular area of the landscape is uneven-aged, harvest trees designated for non-commercial or commercial timber production based on the desired density as determined by age class or size, and the objective for the area.

8. Maintain some aspen stands, even at the expense of spruce-fir or other late-successional stands.

9. These standards and guidelines should be applied at the watershed and landscape level, as well as to individual stands of trees. The standards and guidelines must be applied in such a way as to perpetuate this range of environmental conditions while supplying goods and services to people.

10. Where feasible and appropriate, use broadcast burning to dispose of slash in order to return the inorganic and organic chemicals in the foliage and small, woody material to the soil, to reduce fire hazard, and to provide seed beds for natural regeneration.

11. The choice of silviculture system should be one that allows emulation of the pattern, timing, and frequency of natural disturbances found in the landscape being treated (FSH 2409.26).

12. Regeneration harvest of even-aged timber stands (sites) should not be undertaken until the stands have generally reached or surpassed 95 percent of the culmination of the mean annual increment measured in cubic feet. Exceptions may be made in cases in which resource management objectives or special resource considerations require earlier harvest, such as:

- Stands that are in imminent danger from insect or disease attack
- Wildlife habitat improvement
- Scenery resource enhancement or rehabilitation
- Ecosystem restoration
- Areas managed for Christmas tree production.

13. Altering more than one-third of the edge of a natural opening will be avoided whenever an artificially created opening lies adjacent to a natural opening. Additional edge should not be created until previously treated areas are considered closed according to.

SPECIAL FOREST PRODUCTS

Standards

1. *Plant Collecting*—The following do not apply to the harvest of trees for timber, fuelwood, or Christmas trees.

- *Sensitive Plant Collections* –Permits are required to collect Region 2 sensitive plants or plant parts. Such collection must not jeopardize the continued vigor or existence of a plant population.
- *Commercial* – Collecting of plants or plant parts for any commercial purpose requires a commercial use permit issued by the ranger district in which the collecting activity is proposed. Commercial permits will be issued or denied after review of a proposal presented by the collecting party. No commercial permits will be issued in Management Areas 1.11, 1.12, 1.13, 1.2, 1.41, and 2.2.
- *General Botanical Collections* – Botanical collection permits may be issued to authorize collection of species other than threatened, endangered, or sensitive. No botanical collection permits will be issued in Management Areas 1.11, 1.12, 1.13, 1.2, 1.41, and 2.2.
- *Traditional Uses* – Consider American Indian traditional cultural plant use when designing projects and management activities.

Guideline

1. Make fuelwood, Christmas trees, herbs, mushrooms, plants, and plant parts, and other special forest products available for personal and commercial use where consistent with management area direction and desired conditions.

WILDLIFE

GENERAL

Standards

1. Seasonal restrictions will be applied to reduce disturbance in key wildlife habitats.

2. Restrict actions within 500 feet of cave and mine bat roosts to those that will not negatively alter the vegetative and structural characteristics of roosts or impede the movement of bats. When closing mines or caves in the course of establishing resource protection, or in response to safety concerns, minimize disturbance to resident or seasonal bat or other cave-dependent species endemic to the cave or mine and maintain microclimate conditions important to those species. Where bat concentrations are located outside of caves or mines, human disturbance will be managed to protect those populations.

3. Restrict the release of the location of bat roosts to administrative purposes only in order to minimize disturbance to roosting bats.

4. Retain all snags and trees known to be used consistently as bat roosts.

5. Protect known active and inactive raptor nest areas. The extent of the protection will be based on proposed management activities, human activities existing before nest establishment, species, topography, vegetation cover and other factors. A no-disturbance buffer around active nest sites will be required from nest-site selection to fledging (generally March through July). Exceptions may occur when individuals are adapted to human activity.

6. In riparian areas, vegetation cover will be managed to provide suitable wildlife habitat along a minimum of 80 percent of the length of riparian zones within the project area. New corridor interruptions will be spaced to minimize interruptions to habitat connectivity.

7. Vegetation treatments and new roads and trails will not reduce the elk habitat effectiveness index below 0.40 by Data Analysis Unit (DAU), or further reduce effective habitat in DAUs that are already at or below 0.40 on National Forest System lands.

8. Discourage land use practices and development that adversely alter the character of peregrine falcon hunting habitat or prey base within ten (10) miles of the nest site and the immediate habitats within one (1) mile of the nesting cliff.

9. Human activities will be restricted within one-half (½) mile of occupied peregrine falcon areas between March 15 and July 31 for nest sites, or July 1 to September 15 for hack sites. Protection distance may vary depending on local topography, potential for disturbance, and location of important habitat components.

Guidelines

1. Structures such as fences, major highways, bridge upgrades or replacements, and canals should be designed and built taking wildlife movement into consideration.

2. Human use of caves and federally owned mines identified as having bat populations should be restricted based on the following dates, depending upon the type of bat use occurring:

- *Maternity sites* – April 15 through September 1
- *Swarming sites* – August 15 through October 15; one-half hour before sunset to one-half hour after sunrise
- *Winter hibernaculum* – October 15 through May 15

3. Apply protective measures at mining or oil and gas development ponds and pits in order to minimize the likelihood of wildlife mortality from using these areas as water or foraging sources.

4. Retain access to drinking water for bats in areas with limited open water resources.

PROPOSED, THREATENED, ENDANGERED, SENSITIVE SPECIES, AND SPECIES OF VIABILITY CONCERN

Note: For lists of federally listed threatened and endangered species and Forest Service Region 2 sensitive species, and White River National Forest species of viability concern, see Appendix EE.

The following direction applies to implementation of standards and guidelines for all species of viability concern on the White River National Forest. Specifically, this applies to the Forest Plan sections on: proposed, threatened, endangered and sensitive species, species of viability concern – aquatic, species of viability concern – plants, and species of viability concern – terrestrial

The direction found in the standards and guidelines in these sections is intended to ensure the viability of all species of concern. Specifically:

Standards: All standards must be met

Guidelines: The intent of guidelines must be met. Many guidelines have two components, a quantitative part (distance, %, etc), and a statement of intent. If the quantitative part cannot be met, it must be documented in the appropriate NEPA document. The NEPA document must show how the intent of the guideline is met, or how progress is made towards the conditions described in the guidelines.

PROPOSED, THREATENED, AND ENDANGERED SPECIES AND SENSITIVE SPECIES

Standards

1. Review the forest plan as necessary to determine consistency with new information concerning proposed, threatened, and endangered species (PTES) species. Where appropriate, the plan will be amended to incorporate direction resulting from new information, such as new species listed as PTES; new recovery plans, conservation agreements or conservation strategies; newly described habitats or occurrences for PTES species; newly designated critical habitats; or regional documents that contain new management direction for PTES species.

2. Restrict activities to avoid disturbing proposed, threatened, or endangered species during breeding, young rearing, or at other times critical to survival. Exceptions may occur when individuals are adapted to human activity, or the activities are not considered a threat.

3. Activities will be managed to avoid disturbance to sensitive species that would result in a trend toward federal listing or loss of viability. The protection will vary depending on the species, potential for disturbance, topography, location of important habitat components, and other pertinent factors. Special attention will be given during breeding, young rearing, and other times that are critical to survival of both flora and fauna.

Canada Lynx

[ALL]- applies to all management projects in lynx habitat in lynx analysis units (LAUs) in occupied habitat and in linkage areas, subject to valid existing rights. They do not apply to wildfire suppression, or to wildland fire use.

[VEG]- applies to vegetation management projects in lynx habitat within lynx analysis units (LAUs) in occupied habitat. With the exception of ***Objective VEG O3*** that specifically concerns wildland fire use, these objectives do not apply to wildfire suppression, wildland fire use, or removal of vegetation for permanent developments such as mineral operations, ski runs, roads, and the like. None of these objectives apply to linkage areas.

[GRAZ]- applies to grazing projects in lynx habitat in lynx analysis units (LAUs) in occupied habitat. They do not apply to linkage areas.

[HU]- applies to human use projects, such as special uses (other than grazing), recreation management, roads, highways, and mineral and energy development, in lynx habitat in lynx analysis units (LAUs) in occupied habitat, subject to valid existing rights. They do not apply to vegetation management projects or grazing projects directly. They do not apply to linkage areas.

[LINK]- applies to all projects within linkage areas in occupied habitat, subject to valid existing rights.

Standards

S1 [ALL]. New or expanded permanent developments and vegetation management projects must maintain habitat connectivity in an LAU and / or linkage area.

S1 [LAU]. Changes in LAU boundaries shall be based on site-specific habitat information and after review by the Forest Service Regional Office.

S1 [VEG]. Unless a broad scale assessment has been completed that substantiates different historic levels of stand initiation structural stages limit disturbance in each LAU as follows: If more than 30 percent of the lynx habitat in an LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects.

Where and to what this applies: Standard **S1 [VEG]** applies to all vegetation management projects that regenerate forested stands, except for fuel treatment projects within the wildland urban interface (WUI) as defined by HFRA, subject to the following limitation: Fuel treatment projects within the WUI that do not meet Standards S1 [VEG], S2 [VEG], S5 [VEG], or S6 [VEG]shall occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (National Forest or administratively combined National Forests). In addition, fuel treatment projects may not result in more than three adjacent LAUs exceeding the standard.

S2 [VEG]. Timber management projects shall not regenerate more than 15 percent of lynx habitat on NFS lands within an LAU in a ten-year period. This 15 percent includes the entire stand within an even-age regeneration area, and only the patch opening areas within group selections. Salvage harvest within stands killed by insect epidemics, wildfire, etc. does not add to the 15 percent unless the harvest treatment would cause the lynx habitat to change to an unsuitable condition.

Where and to what this applies: Standard **S2 [VEG]** applies to all timber management projects that regenerate forested stands, except for fuel treatment projects within the wildland urban interface (WUI) as defined by HFRA, subject to the following limitation: Fuel treatment projects within the WUI that do not meet Standards S1 [VEG], S2 [VEG], S5 [VEG], or S6 [VEG]shall occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (National Forest or administratively combined National Forests). For fuel treatment projects within the WUI see guideline G10 [VEG].

S5 [VEG]. Precommercial thinning practices and similar activities intended to reduce seeling / sapling density are subject to the following limitations from the stand initiation structural stage until the stands no longer provide winter snowshoe hare habitat.

Precommercial thinning may occur only:

1. Within 200 feet of administrative sites, dwellings, or outbuildings; or
2. For research studies or genetic tree tests evaluating genetically improved reforestation stock; or

3. For conifer removal in aspen, or daylight thinning around individual aspen trees where aspen is in decline; or
4. Based on new information that is peer reviewed and accepted by the regional / state levels of the Forest Service and Fish and Wildlife Service, where a written determination states:
   a. That a project is not likely to adversely affect lynx; or
   b. That a project is likely to have short term adverse effects on lynx or its habitat, but would result in long-term benefits to lynx and its habitat.
5. In addition to the above exceptions (and above and beyond the three percent limitation for fuels projects within the WUI), precommercial thinning may occur provided that:
   a. The additional precommercial thinning does not exceed one percent of the lynx habitat in any LAU for the life of this amendment, and the amount and distribution of winter snowshoe hare habitat within the LAU must be provided through appropriate site-specific analysis and consultation; and
   b. Precommercial thinning in LAUs with more than 30 percent of the lynx habitat currently in the stand initiation structural stage is limited to areas that do not yet provide winter snowshoe hare habitat; and
   c. Projects are designed to maintain lynx habitat connectivity and provide snowshoe hare habitat over the long term; and
   d. Monitoring is used to determine snowshoe hare response.

Exceptions 2 and 3 may not occur in any LAU in which S1 [VEG] is exceeded (i.e., more than 30 percent of LAU in stand initiation structural stage).

Note: This standard is intended to provide snowshoe hare habitat while permitting some thinning, to explore methods to sustain snowshoe hare habitat over time, reduce hazardous fuels, improve forest health, and increase timber production. Project design should focus on creating irregular shapes for thinning units, creating mosaics of thinned and unthinned areas, and using variable density thinning, etc.

Where and to what this applies: Standard **S5 [VEG]** applies to all precommercial thinning projects, except for fuel treatment projects that use precommercial thinning as a tool within the wildland urban interface (WUI) as defined by HFRA, subject to the following limitation: Fuel treatment projects within the WUI that do meet Standards S1[VEG], S2[VEG], S5[VEG], or S6[VEG] may occur on no more than three percent (cumulatively) of lynx habitat on each administrative unit (a National Forest or administratively combined National Forests) for the life of this amendment.

S6 [VEG]. Vegetation management projects that reduce winter snowshoe hare habitat in multi-story mature or late successional conifer forests may only occur only

1. Within 200 feet of administrative sites, dwellings, outbuildings, recreation sites, and special use permit improvements, including infrastructure within permitted ski area boundaries; or
2. For research studies or genetic tree tests evaluating genetically improved reforestation stock; or
3. For incidental removal during salvage harvest (e.g., removal due to location of skid trails); or
4. Where uneven-aged management (single tree and small group selection) practices are employed to maintain and encourage multi-story attributes as part of gap dynamics. Project design must be consistent with VEG O1, O2, and O4, except where impacts to areas of dense horizontal cover are incidental to activities under this exception (e.g. construction of skid trails).

Exceptions 2 and 4 may not occur in any LAU where S1 VEG is exceeded.

Where and to what this applies: Standard **S6 [VEG]** applies to all vegetation management practices within multi-story mature or late successional conifer forests, except for fuel treatment projects within the wildland urban interface (WUI) as defined by HFRA, subject to the following limitation: Fuel treatment projects within the WUI that do meet Standards S1[VEG], S2[VEG], S5[VEG], or S6[VEG] may occur on no more than three percent (cumulatively) of lynx habitat on each administrative unit (a National Forest or administratively combined National Forests) for the life of this amendment.

S1 [LINK]. When highway or forest highway construction or reconstruction is proposed in linkage areas, identify potential highway crossings.

Guidelines

G1 [ALL]. Methods to avoid or reduce effects on lynx should be used when constructing or reconstructing highways or forest highways across federal land. Methods could include fencing, underpasses or overpasses.

G1 [VEG]. Vegetation management projects should be planned to recruit a high density of conifers, hardwoods, and shrubs where such habitat is scarce or not available. Priority for treatment should be given tot stem-exclusion, closed-canopy structural stage stands to enhance habitat conditions for lynx or their prey (e.g. mesic, monotypic lodgepole stands). Winter snowshoe hare habitat should be near denning habitat.

G4 [VEG]. Prescribed fire activities should not create permanent travel routes that facilitate snow compaction. Constructing permanent firebreaks or ridges or saddles should be avoided.

G5 [VEG]. Habitat for alternate prey species, primarily red squirrel, should be provided in each LAU.

G10 [VEG]. Fuel treatment projects within the WUI as defined by HFRA should be designed considering Standards S1[VEG], S2 [VEG], S5 [VEG], and S6 [VEG] to promote lynx conservation debris, piles, or residual trees to provide denning habitat in the future.

G1 [GRAZ]. In fire and harvest created openings, livestock grazing should be managed so impacts do not prevent shrubs and trees from regenerating.

G2 [GRAZ]. In aspen stands, livestock grazing should be managed to contribute to long-term health and sustainability of aspen.

G3 [GRAZ]. In riparian areas and willow carrs, livestock grazing should be managed to contribute to maintaining or achieving a preponderance of mid or late seral stages, similar to conditions that would have occurred under historic disturbance regimes.

G4 [GRAZ]. In shrub-steppe habitats, livestock grazing should be managed in the elevation ranges of forested lynx habitat in LAUs, to contribute to maintaining or achieving a preponderance of mid or late seral stages, similar to conditions that would have occurred under historic regimes.

G1 [HU]. When developing or ski areas, provisions should be made for adequately sized inter-trail islands that include coarse woody debris, so winter snowshoe hare habitat is maintained.

G2 [HU]. When developing or expanding ski areas, lynx foraging habitat should be provided consistent with ski area's operational needs, especially where lynx habitat occurs as narrow bands of coniferous forest across mountain slopes.

G3 [HU]. Recreation development and recreational operational uses should be planned to provide for lynx movement and to maintain the effectiveness of lynx habitat.

G4 [HU]. Remote monitoring of mineral and energy development sites and facilitates should be encouraged to reduce snow compaction.

G5 [HU]. A reclamation plan should be developed (e.g., road reclamation and vegetation rehabilitation) for closed mineral and energy development sites and facilities that promote the restoration of lynx habitat.

G6 [HU]. Methods to avoid or reduce effects to lynx habitat connectivity should be used when upgrading unpaved roads to maintenance level 4 or 5, where the result would be increased traffic speeds and volumes, or contribute to development or increases in human activity.

G7 [HU]. New permanent roads should not be built on ridge-tops and saddles, or in areas identified as important for lynx habitat connectivity. New permanent roads and trails should be situated away from forested stringers.

G8 [HU]. Cutting brush along low-speed, low-traffic volume roads should be done to the minimum level necessary to provide for public safety.

G9 [HU]. If project level analysis determines that new roads adversely affect lynx, then public motorized use should be restricted. Upon project completion, these roads should be reclaimed or decommissioned, if not needed for other management objectives.

G10 [HU]. Designated over-the-snow routes or designated play areas should not expand outside baseline areas of consistent snow compaction, unless designation serves to consolidate use and improve lynx habitat. This may be calculated on an LAU basis, or on a combination of immediately adjacent LAUs. This does not apply inside permitted ski area boundaries, or winter logging, to rerouting trails for public safety, to access private inholdings, or to access regulated by Guideline G12 [HU].

G11 [HU]. When developing or expanding ski areas and trails, consider locating access roads and lift termini to maintain and provide lynx security habitat.

G12 [HU]. Winter access for non-recreation special uses and mineral exploration and development should be limited to designated routes or designated over-the-snow routes.

G1 [LINK]. National Forest System lands should be retained in public ownership.

G2 [LINK]. Livestock grazing in shrub-steppe habitats should be managed to contribute to maintaining or achieving a preponderance of mid or late seral stages, similar to

conditions that would have occurred under historic disturbance regimes.

Bald Eagle

Standards

1. If a winter roost or nest site is discovered, write a management plan to ensure that the necessary habitat components are maintained.

2. Human activities should be prohibited within 250 yards of bald eagle winter roosting areas between November 15 and March 1. Human activities should be prohibited within 400 yards of an active nest between February 1 and August 15.

Southwestern Willow Flycatcher

Standard

1. Rely on the riparian vegetation residue guidelines (**Table 2-3**) and implement *Range Guideline #3* as a standard within potential flycatcher habitat to improve the habitat for this species. The rationale for this approach lies in restricting the use of herbaceous forage to obtain a concurrent decrease in the amount of grazing on woody vegetation, resulting in increased amounts and density of woody vegetation in those riparian areas that can support woody vegetation.

Mexican Spotted Owl

Standards

1. Do not allow any even-aged timber management within canyons considered as having identified potential habitat and within one-half (½) mile of the canyon's rim.

2. Allow uneven-aged timber management only if the resulting timber stand contains the necessary habitat components.

3. Develop a vegetation/fire management strategy within the potential habitat that will reduce the risk of catastrophic loss of habitat.

4. If any nests are discovered, limit the amount of human disturbance around the nest through such measures as special area closures, seasonal restrictions, or re-routing of trails.

Uncompaghre Fritillary Butterfly

Standards

1. Before any ground disturbing activity (such as trail building), or livestock driveways or bedding grounds are allowed in potential Uncompagre fritillary butterfly habitat, a survey shall be conducted to determine the existence of the species. Potential habitat and survey protocols are found in the Recovery Plan. Avoid actions that would negatively impact the species know habitat or populations.

2. If any new Uncompagre fritillary butterfly populations are discovered, a "no-collecting" regulation shall be placed on the area.

SPECIES OF VIABILITY CONCERN, AQUATIC

Colorado River Cutthroat Trout

Standards

1. For management activities that have the potential to impact occupied cutthroat trout habitat, tributaries of occupied cutthroat trout habitat, or identified reintroduction areas, maintain or enhance existing cutthroat trout habitat. At minimum and where necessary:

- Reduce sediment from existing roads and trails.
- Maintain pool depths.
- Maintain riparian vegetation.
- Retain large woody debris in streams.

2. When implementing management activities in 6th field Hydrologic Unit Codes (sub-watersheds) containing cutthroat trout identified as recovery populations in the Colorado River Cutthroat Recovery Plan, maintain or reduce existing net density of roads (open or closed) to restore or prevent alteration of the hydrologic function of the sub-watershed. Temporary roads must be decommissioned upon project completion.

Guidelines

1. Restrict construction of new roads within 350 feet of occupied cutthroat streams or within 150 feet from the edge of the current or historic floodplain, whichever is greater, to maintain hydrologic function and limit road-related stream sediment.

2. Reroute roads adjacent to cutthroat trout streams and their tributaries, when possible, to reduce direct impacts to cutthroat habitat, or to improve hydrologic function.

3. In sub-watersheds with occupied cutthroat trout habitat, methods for decommissioning roads should emphasize restoring hydrologic function.

4. Where impacts on cutthroat habitat associated with livestock grazing are identified, such as hedged shrubs and collapsed banks, consider actions to reduce or remove impacts such as, but not limited to:

- Altering the timing of grazing.
- Altering the timing of livestock crossings of occupied cutthroat stream until after fish have emerged from gravel.
- Excluding sensitive or problem areas.

5. To minimize sedimentation, channel instability, and direct disturbance of spawning areas, alter routes of sheep bands or other trailed livestock. Limit sheep crossings and cattle driveways to designated locations or roads to avoid crossing occupied cutthroat streams and tributaries.

Boreal Toad and Leopard Frog

Standards

1. Allow no loss or reduction in habitat quality of occupied or known historic boreal toad or leopard frog habitat.

2. Maintain adequate vegetation cover around occupied boreal toad or leopard frog breeding ponds when implementing management activities to minimize avian predation on newly metamorphosed frogs and toads.

3. Use only chemical herbicides shown to have no effect on boreal toads or leopard frogs, or use other vegetation management techniques, within 300 feet of occupied or known historic boreal toad sites.

4. Do not use fish toxins with the potential to harm boreal toads or leopard frogs in occupied boreal toad and leopard frog habitats.

Guidelines

1. To prevent direct mortality to boreal toads, restrict the following activities to periods when toads are inactive (generally late fall to early spring):

- Management-ignited fire treatments within 3 miles of occupied boreal toad breeding sites.
- Vegetation management using heavy, ground-based equipment within 1.5 miles of occupied boreal toad breeding sites.

2. Restrict construction of new roads and trails within 300 feet of occupied or known historic boreal toad and leopard frog breeding sites to prevent direct mortality and disturbance of adjacent vegetation during construction and trail use.

3. Where impacts to occupied or known historical boreal toad or leopard frog breeding sites associated with livestock grazing are identified, consider actions to reduce or remove impacts such as, but not limited to:

- Fencing,
- Modification of season of use, or
- Provision of alternate water sources at a sufficient distance.

4. Where roads or trails are located within 300 feet of occupied or historical boreal toad or leopard frog breeding sites, consider reclaiming, redirecting, or redesigning trails and user traffic to minimize direct mortality and disturbance of adjacent vegetation.

SPECIES OF VIABILITY CONCERN, PLANT

Standards

1. Survey for the following plant species of viability concern in the identified areas prior to any activities that might impact them:

    - Harrington penstemon in sagebrush areas in the Eagle and Frying Pan River drainages;
    - De Beque phacelia in the Wasatch Geologic Formation;
    - Sun-loving meadowrue in the Parachute Creek Geologic Formation;
    - Leadville milk-vetch; Sea pink; Rockcress draba; Tundra buttercup, and Colorado tansy aster in suitable alpine areas;
    - Altai cottongrass, Kotzebue grass-of-Parnasus, and Porter feathergrass in suitable riparian and wetland areas.

Avoid disturbances that would significantly affect species viability or trend the species towards federal listing.

SPECIES OF VIABILITY CONCERN, TERRESTRIAL

Fringed Myotis and Townsend's Big-Eared Bat

Standards

1. Conduct surveys of known caves and mines before implementation of projects that have the potential to impact fringed myotis and Townsend's big-eared bat habitat.

- For projects that include the application of insecticide, the survey area includes the project area and a two-mile radius around the project area.
- For projects that do not include the application of insecticide, the survey area includes the project area and a one quarter-mile radius around the project area.

2. Prohibit aerial application of insecticides within two miles of occupied or suspected Townsend's big-eared bat and fringed mytosis roosts to retain forage sufficient for bat survival and reproductive success, and to minimize exposure of the insecticide to individual bats. Use other methods of insecticide application to treat small areas such as campgrounds and administrative sites.

Guidelines

1. Where necessary to retain forage sufficient for bat survival and reproductive success, restrict application of insecticides within 10 miles of occupied or suspected Townsend's big-eared bat and fringed myotis maternity roosts and hibernacula.

2. Restrict activities that may disturb roosting bats within one quarter mile of occupied or suspected Townsend's big-eared bat and fringed myotis maternity roosts and hibernacula to maintain survival and reproductive success. Apply restrictions as appropriate according to the following dates:

- Maternity roosts—April 15 to September 15
- Hibernacula—October 15 to May 15

Barrow's Goldeneye

Standards

1. Conduct surveys to identify occupied and potential Barrow's goldeneye habitat prior to project implementation that may have the potential to impact Barrow's goldeneye or their habitat.

2. Retain sufficient numbers of snags ≥18 inches DBH within one-third mile of occupied and suspected Barrow's goldeneye brood-rearing habitat in order to provide adequate nest cavity snags.

3. Manage or restrict animal introductions that have the potential to impact forage insects in lakes and reservoirs within occupied or suspected Barrow's goldeneye brood rearing, molting, or staging habitat to maintain existing forage insects.

4. Restrict pesticide applications to those that do not have the potential to impact aquatic invertebrates in occupied and suspected Barrow's goldeneye brood rearing and molting areas.

Guidelines

1. When implementing vegetation management activities in occupied or potential Barrow's goldeneye breeding habitat, provide through time sufficient densities of snags ≥18 inches DBH within one-third mile of occupied or potential brood-rearing areas. Where density and number of snags is determined to be insufficient in order to provide nest cavities, consider installing nest boxes.

2. Restrict management activities that have the potential to impact Barrow's goldeneye habitat or disturb individuals in occupied or suspected nesting, brood-rearing, and molting areas to maintain survival and reproductive success. Activities that may be restricted include, but are not limited to:

- Prescribed fire
- Timber harvest
- Livestock management

Apply restrictions to minimize disturbance, as appropriate, according to the following dates:

- Nesting—April 1 to July 15.
- Brood -rearing—June 1 to August 30.

Sage Grouse and Brewer's Sparrow

Standards

1. For management activities in sage grouse and Brewer's sparrow habitat, retain or enhance existing habitat by:

- Managing for native vegetation,
- Retaining a minimum of five percent of sagebrush over 48 inches in height where site characteristics allow, and
- Maintaining a minimum of 20 percent canopy cover of sagebrush.

2. Restrict the use of insecticides in sage grouse and Brewer's sparrow sagebrush habitat to maintain adequate forage insects.

3. Maintain and manage such that a minimum of 15 percent continuous canopy cover of herbaceous plants averaging at least 7 inches in height is retained in sage grouse nesting habitat during the sage grouse nesting and early brood-rearing season (generally from April 1 to July 31). If the herbaceous vegetation in an area cannot provide an average of at least 7 inches in height, maintain 15 percent continuous herbaceous plant canopy cover of the highest average height possible.

4. Restrict activities that have the potential to impact sage grouse and Brewer's sparrow breeding activities from April 1 to July 31 in areas where breeding is known or suspected in order to minimize any negative impacts to reproductive success or survival.

Guidelines

1. Within a project area or 1,000 acres, whichever is greater, restrict burning of sagebrush patches larger than five acres to less than 15% of sage grouse and Brewer's sparrow habitat over a ten-year period to maintain an adequate seed source for sagebrush regeneration.

2. If restoration of habitat in occupied sage grouse habitat is deemed necessary, design treatments to meet the goals as recommended in area specific sage grouse management plans (e.g., Greater-sage grouse conservation plan, Middle Park, Colorado, January 2001). If there is not a specific sage grouse management plan for the area, desing treatements to meet the goals as described in the current literature on sage grouse habitat (e.g., Connelly et al 2000).

3. When implementing vegetation management activities in sage grouse and Brewer's sparrow sagebrush habitat:

- Design and implement the activities so that a mosaic distribution of open and closed canopy areas will result.
- Incorporate actions to remove invading conifers in order to maintain and expand the sagebrush cover type.
- Incorporate actions to reduce or eliminate non-native plant species and promote the re-establishment of native plant species.
- Limit the use of herbicides in sagebrush areas to direct application when eliminating or reducing non-native plants in sagebrush areas in order to minimize impacts to sagebrush.

4. Limit the installation of new fences, power lines, and other structures in sage grouse and Brewer's sparrow sagebrush habitat to reduce possible raptor perches and maintain sagebrush.

5. Manage livestock activity in known or suspected sage grouse nesting areas from April 15 to June 15 to reduce the likelihood of livestock trampling of sage grouse nests. Actions to consider include, but are not limited to:

- Limiting or prohibiting livestock driving.
- Using pastures or areas during the nesting season that are not sage grouse nesting areas.
- Providing mineral supplements and water sources away from sage grouse nesting areas.

6. Manage livestock activity in known or suspected Brewer's sparrow nesting areas to reduce the likelihood of cowbird presence in Brewer's sparrow nesting areas. Actions to consider include, but are not limited to:

- Rotating livestock use by alternating years or seasons.
- Minimizung the intensity or number of livestock concentration areas.

7. Manage developments and activities within or adjacent to springs, seeps, and riparian areas that may reduce water availability or soil moisture in order to maintain or improve sage grouse brood foraging habitat. Actions to consider include but are not limited to:

- Livestock enclosures
- Natural barriers to ungulates
- Limiting or prohibiting water diversions

Pygmy Nuthatch

Standards

1. In current and potential ponderosa pine cover types, and in other cover types where pygmy nuthatches are actively nesting or winter roosting, develop prescriptions during project planning to identify the amount, size(s), and distribution of snags and cavity trees to be left on-site, as well as live, green replacement trees for future snags and cavity trees under the following requirements:

- Conduct avian and cavity surveys before projects are implemented that have the potential to impact pygmy nuthatch nest or winter roost snags and cavity trees.
- Protect any known or suspected pygmy nuthatch nest and winter roost cavity trees and snags.
- On forested sites, retain ponderosa pine snags (where materials are available) in accordance with the average minimums specified in the Table 2-1.
- Where sufficient ponderosa pine snags or cavity trees are not available, select and manage for the snag or cavity tree species that pygmy nuthatches are using in the area, or for Douglas fir, aspen, or lodgepole pine snags or cavity trees.

Guidelines

1. Manage for a diversity of tree density, size, age, and height classes, and for a diversity of herbaceous and shrub vegetation in current and potential ponderosa pine cover type areas in order to provide a wide distribution of foraging substrates for pygmy nuthatches and other birds. Emphasize retention and management of live ponderosa pine for pygmy nuthatch nest and winter roost cavities, perches, and foraging sites.

SPECIES REQUIRING MORE BASELINE INVENTORY AND EVALUATION TO DETERMINE STATUS

Standards

1. Maintain adequate water flow and vegetation at black swift colonies in order to maintain nesting activity and reproductive success.

2. Restrict action at black swift colony sites in order to maintain habitat characteristics, survival and reproductive success at the sites. Actions that may be restricted include, but are not limited to:

- Rock climbing
- Ice Climbing
- Caving
- Hiking

3. Conduct surveys of potential black swift habitat before implementation of projects that have the potential to impact black swift habitat or nesting activities.

4. Conduct surveys for the following butterfly species needing more baseline inventory and evaluation before implementation of projects that may result in not maintaining a viable population in occupied habitat: theano alpine, dark blue, white-veined arctic, indra swallowtail, and two-banded checkered skipper. Prohibit actions that may result in the extirpation of the species in an area that is occupied. Actions that may be restricted include but are not limited to:

- Recreation use and development outside of established routes.
- Livestock grazing
- Vegetation treatments
- Butterfly collecting
- Road and trail construction

Guideline

1. Limit recreational and other activities during the breeding period within 500 feet of known concentrations of spotted bat maternity roosts or hibernacula in order to minimize impacts on reproduction and survival.

Section Three

Disturbance Processes

FIRE

Standards

1. Decisions made concerning vegetation management activities including "no action" will minimize exposure of firefighters and the public to fire hazards.

2. All ignitions will receive an appropriate management response (suppression or fire use) according to the White River Fire Management Plan. The fire management map illustrates how areas are allocated to each fire management category based on Management Area direction.

Guidelines

1. Where feasible and appropriate, utilize prescribed fire to accomplish resource management goals and objectives.

2. Minimize ground-disturbing activities associated with fire management actions.

3. Fire management activities should be designed to sustain ecosystems including the interrelated ecological, economic and social components.

4. Ignitions in areas covered by specific fire use plans (prescriptions) should be managed to accomplish resource management objectives.

INSECTS AND DISEASE

Guidelines

1. Plan management activities with consideration for potential insect or disease outbreaks. Design management to meet or enhance management area objectives.

2. Manage vegetation in high-use recreation areas to provide for public safety and to improve forest health as needed to maintain or improve the desired recreation setting(s).

3. Use integrated pest management techniques, including silvicultural treatments, to meet management area objectives. Treatment activities should be based on the desired condition of the management area, the values of and risks to wildlife habitat, and adjacent private lands as well as public lands. Priority should be given to areas in which values to be protected exceed the cost of protection.

4. Project plans should consider existing infestations of insects or disease within a project area. Activities should be designed to minimize the risk of spreading the infestation while still providing habitat for those wildlife species dependent upon the presence of insects and disease.

5. Control natural insect and disease outbreaks in wilderness only when justified by predicted loss of resource values outside of wilderness.

NOXIOUS WEEDS

Standards

1. For all proposed projects or activities, determine the risk of noxious weed introduction or spread and implement appropriate prevention and mitigation measures.

2. Manage noxious weeds and other undesirable exotic species of plants according to the Integrated Weed Management Principles.

3. Use only certified noxious weed-free hay, straw, seed, or mulch for feed or revegetation projects on National Forest System lands.

4. Include provisions that are necessary to prevent the spread of and to control the introduction of noxious weeds in contracts and permits for use of National Forest System lands and resources.

Guidelines

1. Maintain the noxious weed program that addresses the following Integrated Weed Management components:

- Education and awareness
- Prevention
- Inventory
- Planning
- Integrated treatment
- Monitoring and evaluation
- Reporting
- Management activities
- Coordination and cooperation with federal, state, and local governments and adjacent private landowners.

2. Priorities for controlling noxious weeds are:

- Preventing the introduction of new invaders
- Conducting early treatment of new infestations
- Containing and controlling established infestations.

3. When setting priorities for the treatment of noxious weeds, give consideration to the following:

- Rate of spread of the species
- Potential for environmental degradation
- Invasions found within remote areas and special management areas such as research natural areas and wilderness
- Probability that the treatment(s) will be successful.

4. Implement the White River National Forest's Noxious Weed Implementation Guide.

Section Four
Social

GENERAL RECREATION

Standards

1. Prohibit camping within 100 feet of lakes and streams and system trails, unless exceptions are justified by terrain or specific design that protects the riparian and aquatic ecosystems.

2. A person is permitted to use his/her wheelchair in a non-motorized area so long as the wheelchair meets the legal definition of wheelchair, "a device designed solely for use by a mobility-impaired person for locomotion that is suitable for use in an indoor pedestrian area." (Title V, Section 507(c)(2) of the Americans with Disabilities Act).

3. At special recreation features, maintain enough water in streams to sustain the water-dependent recreation values and protect stream flows. Use the following categories to rank streams and stream reaches based on the recreation features and values described:

- *High-priority features*—waterfalls; scenic areas and overlooks; special event areas (rafting, kayaking, visitor centers); scenic byways; native threatened, endangered, and sensitive species; rivers designated under the Wild and Scenic Rivers Act; rivers eligible for wild, scenic, or recreational designation; wilderness water resources under threat of degradation; and similar features where flowing water is critical to a quality recreational experience.
- *Moderate-priority features*—recreation areas including roads, trails, campgrounds, and picnic grounds next to streams where flowing water contributes to a quality recreational experience and to aesthetic values.

4. Make outfitter and guide permits available based on need, administrative capability, and a suitable mix of guided and non-guided public capacity as determined by a forest-wide capacity study. This mix may vary by type of activity and/or season of use. Capacity validations will be made on an area-specific basis when the general forest-wide capacity determination does not adequately address the management situation.

Guidelines

1. Management activities should be consistent with guidance in the ROS User's Guide for the adopted summer and winter ROS classes on the ROS maps.

2. Satisfy demand for recreation services that are supplied by private-sector permittees at authorized sites or areas before new sites or areas are permitted.

3. Set the maximum camping stay limit at 14 days within a consecutive 30-day period unless otherwise reduced or extended in a special order.

DEVELOPED RECREATION

Standard

1. All new or reconstructed recreation facilities will provide a range of universally accessible opportunities within the limits of the site characteristics and ROS classification.

Guidelines

1. Each ranger district should document deferred maintenance and rehabilitation needs and associated costs, and update at intervals not exceeding two years.

2. Provide readily available off-site and on-site information on recreation opportunities for developed sites.

3. When campground occupancy is less than 20 percent of practical capacity during the use season, conduct analysis to decide future management of the campground.

4. Design recreation facilities to blend with the elements found in the natural landscape.

5. Developed recreation sites, both publicly and privately developed on National Forest System lands, should be withdrawn from mineral entry.

6. Current recreation residences may continue to be allocated as recreation special-use development areas unless environmental analyses show a higher need for these lands.

7. Assure that facilities provided at trailheads are consistent with the recreation setting and provide for parking, trailhead panels for trail information, and appropriate sanitation facilities.

8. Design and manage developed recreation sites according to the Recreation Opportunity Spectrum (ROS) class and the scenic integrity objective(s) as mapped.

DISPERSED RECREATION

Guidelines

1. Close, rehabilitate, or otherwise mitigate dispersed sites when:

- Campsite condition reaches Cole Class 4 or 5, or
- There are social use conflicts, or
- Unacceptable environmental damage is occurring.

2. Manage recreation use to stay within an area's capacity as determined by a forest-wide capacity analysis. Complete a site-specific capacity analysis when the forest-wide analysis does not meet management needs.

3. Proposed activities should meet a scenic integrity objective of high in the foreground of the following trails: Continental Divide National Scenic Trail, American Discovery Trail, and the Colorado Trail.

AMERICAN INDIAN RIGHTS & INTERESTS

Standard

1. Protect important cultural areas for current and future tribal use by recognizing the cultural landscape and geographic diversity left by Ute ancestors and acknowledging intellectual property rights.

2. Protect sensitive and proprietary traditional tribal knowledge.

Guidelines

1. Consult with American Indian people when projects have the potential to affect cultural rights and practices to help ensure the protection, preservation, and use of areas that are culturally important to tribes.

2. When possible, avoid physically affecting the integrity of traditional cultural properties including forest products collecting places.

3. Use the *Forest Service National Resource Book on American Indian and Alaska Native Relations* when developing an agency/tribe consultation process.

4. Follow applicable Forest Service policy addressing tribal treaty rights and federal trust responsibilities.

5. Identify the three Confederated Ute Indian traditions of gathering herbs, medicinal and edible plants, and other materials for religious purposes and make provisions for those who wish to gather such plants and materials.

HERITAGE RESOURCES

Standards

1. Conduct all land management activities in such a manner as to comply with all applicable federal, state and local regulations. Many heritage resources values can be protected effectively through application of the provisions of these regulations:

- National Historic Preservation Act of 1966 (PL 89-665, as amended)
- Native American Grave Protection and Repatriation Act (NAGPRA) (PL 101-601)
- American Indian Religious Freedom Act of 1978 (PL 96-341)
- Religious Freedom Restoration Act of 1993 (PL 103-141).

2. Leave human remains undisturbed unless there is an urgent reason for their disinterment. In case of accidental disturbance of historic graves, or reinterment, follow the appropriate tribal policies, state policies and forest policies. Forest policies are contained in the *Burial Policy for the White River National Forest*, as well as the Southern Ute Indian Tribe's *Burial Policy for the Protection of Burial Sites, Human Remains and Funerary Objects*.

Guidelines

1. Protect heritage resources from damage by project activities or vandalism through project design, specified protection measures, monitoring and coordination.

2. Manage sites on the National Historic Register according to approved management plans or annual operating plans.

SCENERY MANAGEMENT

Guidelines

1. Management activities should be designed and implemented to achieve, at minimum, the level of scenic integrity shown on the scenic integrity objective map. See the scenery section in Chapter 3 of the FEIS for definitions of scenic integrity levels.

2. Rehabilitate all existing projects and areas that do not meet the scenic integrity objectives. Set priorities for rehabilitation considering the following:

- Relative importance of the area and the amount of deviation from the scenic integrity objectives;
- Foreground of high public use areas has highest priority;
- Length of time it will take natural processes to reduce the visual impacts so that they meet the scenic integrity objective(s);
- Length of time it will take rehabilitation measures to meet the scenic integrity objectives; and
- Benefits to other resource management objectives to accomplish rehabilitation.

3. Plan, design, and locate vegetation manipulation on a scale that retains the color and texture of the landscape character, borrowing directional emphasis of form and line from natural features.

4. Choose facility and structure design, scale, color of materials, location, and orientation to meet the scenic integrity objective on the Scenic Integrity Objective Map.

5. Facilities, structures, and towers with exteriors consisting of galvanized metal or other reflective surfaces will be treated or painted dark non-reflective colors that blend with the forest background to meet an average neutral value of 4.5 or less as measured on the Munsell neutral scale.

6. Rehabilitate areas classified as "unacceptable alteration" in the existing scenic integrity inventory to the scenic integrity objective on the Scenic Integrity Objective Map.

WILDERNESS RESOURCES

Note: The following standards and guidelines apply only to units of the National Wilderness Preservation System within the boundaries of the forest.

Standards

1. No hay, straw, or unprocessed feed allowed.

2. Maximum group size:

- *White River National Forest Wilderness Areas* (except Maroon Bells-Snowmass) – no more than 15 people per group with a maximum combination of 25 people and pack or saddle animals in any one group.
- *Maroon Bells-Snowmass Wilderness* – no more than 10 people per group with a maximum combination of 25 people and pack or saddle animals in any one group.
- Parties that are larger than established limits may be allowed under permit on a case-by-case basis when compatible with other wilderness management objectives.

- The maximum group size may be lowered where biological and physical resource capability cannot support that level of use.

3. Prohibit campfires above treeline to protect alpine ecosystems. Prohibit campfires and fuel burning below treeline when the use of dead or downed wood for fuel is likely to cause unacceptable vegetative condition, soil nutrient loss, and/or erosion.

4. Manage historic structures, including eligible or listed National Register of Historic Places sites to be compatible with the desired condition for the management area.

5. Emphasize minimum impact suppression techniques in all wilderness wildland fire responses.

6. Prepare wildland fire use plans to allow fire to function as nearly as possible in its natural ecological role.

Guidelines

1. Recreational livestock should be prohibited within 100 feet of lakeshores and streambanks, except during watering and through travel unless exceptions are justified by terrain.

2. Management actions, which may include a permit system for day use and/or overnight use, area closures, and/or other actions, should be implemented to manage use levels and use patterns when conditions are outside the standards and guidelines established for the management area prescription.

3. Where resource or social impacts have been identified, minimize human impacts by:

- Designating and managing both non-outfitted and outfitted camps;
- Encouraging the use of self-contained stoves and discouraging the use of wood-fueled fires;
- Using a permit system;
- Limiting party size and pack animals; or
- Utilizing methods to reduce harassment of people, livestock, and wildlife by dogs.

4. Fish and wildlife management activities should emphasize the protection of natural processes. Implement policies and guidelines adopted by the International Association of Fish and Wildlife Agencies and the Forest Service (see Appendix DD).

5. Manage recreation use to stay within an area's capacity as determined by a forest-wide capacity analysis. Site-specific capacity analysis will be completed when the forest-wide analysis does not meet management needs.

Section Five

Administrative

TRAVEL SYSTEM INFRASTRUCTURE

Standards

1. Newly acquired facilities will not be retained unless sufficient maintenance funding is available or cooperative maintenance can be secured and a substantial government benefit can be demonstrated.

2. Close and rehabilitate temporary roads when no longer needed for project purposes.

3. Designated or new travelways are open to appropriate motorized or mechanized use unless a documented decision shows that:

- Motorized use conflicts with forest plan objectives;
- Motorized use is incompatible with the recreation opportunity spectrum classification;
- Travelways are in areas closed to motorized or mechanized use;
- Travelways are not designated routes;
- Motorized use creates user conflicts that result in unsafe conditions unrelated to weather conditions;
- Physical characteristics of travelway(s) preclude any form of motorized use;
- Travelways do not serve an existing or identified future public need;
- Financing is not available for maintenance necessary to protect resources; or
- A seasonal restriction has been issued.

4. On lands that are snow-free, prohibit motorized and mechanized travel outside of designated travelways. Exemptions are only allowed by an order signed by the Forest Supervisor or Regional Forester for:

- Administrative, emergency, law enforcement, or land management needs; or
- Special use permits and contracts.

5. Permit motor vehicle travel up to 300 feet from designated travelways for direct access to campsites, parking, firewood cutting, or gathering forest products provided that:

- Minimal resource damage occurs;
- Such access is not otherwise prohibited.

6. Motor vehicles designed for over-snow use are permitted:

- In areas compatible with forest plan management prescriptions, Recreational Opportunity Spectrum (ROS) classifications, and the travel management plan; or
- On designated routes only through areas of restriction.

Guidelines

1. Consider seasonal restrictions for travelways if:

- Use causes unacceptable damage to soil and water resources due to weather or seasonal conditions;
- Use causes unacceptable wildlife conflict or habitat degradation;
- Use results in unsafe conditions due to weather conditions;
- The area accessed has a seasonal need for protection or non-use; or
- It is necessary to resolve conflicts between users.

2. Emphasize providing a wide range of motorized, mechanized, and non-motorized recreation opportunities and difficulty levels.

3. Emphasize maintenance and reconstruction of the existing road and trail system to standard.

4. Consider road decommissioning:

- In order to meet density requirements;
- When there is no longer any need for the road;
- When environmental degradation is occurring;
- When the cost of continued maintenance exceeds available funding;
- When alternative routes may be available; and
- To protect natural or cultural resources.

5. Maintain the following strategy for trail construction:

- Construct near human populations;
- Construct loop trails where feasible;
- Protect habitats and wilderness;
- Feature attractions or interpretive opportunities;
- Look for accessibility or universal design opportunities; and
- Coordinate with trail systems developed by municipalities, counties, states, other federal agencies, and partners.

6. Emphasize public safety in the development and use of the travel system.

7. Design roads to minimize visual and environmental impacts where possible.

8. Public access restrictions may be imposed for health, safety, or other considerations.

9. Maintenance level 3, 4, and 5 roads will continue to be managed for public access with passenger cars.

AERIAL TRANSPORTATION CORRIDORS

Guidelines

1. The exterior surfaces of suspended aerial trams, gondolas, cabriolets, and supporting towers should be painted or treated with dark non-reflective colors that blend with the summer background. Windows should be darkened or treated to reduce reflectivity.

REAL ESTATE

Standards

1. In land adjustment activities, give priority to acquiring lands that contain habitat identified by the U.S. Fish and Wildlife Service as necessary for the recovery of federally listed threatened and endangered species.

2. In land adjustment activities (including land exchange, purchase, sale, donation), consider the following:

- Evaluate and balance the overall combination of all resource values and factors including wildlife habitat, fisheries habitat, riparian areas, wetlands, cultural resources, recreation opportunities, scenic value, watershed protection, timber resources, rangelands, public access, better federal land management, and other factors.
- Evaluate the effect of land adjustments on sensitive species habitat. Avoid land adjustments which could result in a trend toward federal listing or a loss of population viability for any sensitive species. Sensitive species habitat can be conveyed if conveyance would not result in a trend toward federal listing or adversely affect the population viability of the species, or if effects could be mitigated.
- Acquisition of lands that contain resource values identified during scoping as important in contributing toward National Forest System resource management goals and objectives as stated in the forest plan. Examples include wetlands, riparian areas, essential wildlife habitat, threatened or endangered species habitat, sensitive species habitat, significant cultural resources, timber lands, rangelands, or other areas.

3. Retain existing access rights where needed to meet forest plan goals and objectives.

4. Actively pursue access rights where needed to meet forest plan goals and objectives.

5. Obtain reasonable public and administrative access to all National Forest System lands in the following ways:

- Require reciprocal grants, where needed, when granting rights-of-way easements across National Forest System lands.
- Reserve in land disposal action, existing and designated inventoried rights-of-way that are needed for implementation of the management plan and to protect them for future construction and occupancy.

Guidelines

1. In land adjustment activities (including land exchange, purchase, sale, donation), consider the following:

- Reduction of Forest Service administrative costs and improvement of management efficiency. Included are reducing miles of landline boundaries and number of corners; special uses; title claims; rights-of-way grants and easements; numbers of allotments and intermingled ownership livestock pastures; and other factors that decrease administrative costs and improve management efficiency.
- The conveyance or acquisition would reduce conflicts between Forest Service and private landowner objectives, especially when conflicts are adversely affecting National Forest System management.

2. When considering opportunities to acquire non-federal lands by purchase or exchange where lands are valuable for National Forest System purposes, evaluate the following:

- Designated wilderness and other areas classified by Congress;
- Lands with historical or important heritage resources, outstanding scenic values, or critical ecosystems when these resources are threatened by change of use, or when management may be enhanced by public ownership;
- Lands with water frontage, such as lakes, streams, flood plains, wetlands and associated riparian ecosystems;
- Key wildlife habitat, fishery management areas and habitat for threatened, endangered, or sensitive species;
- Lands with important value for outdoor recreation purposes and lands needed for scenic condition protection;
- Lands needed to bring existing National Forest System lands into consolidated geographical units, or to reduce the miles of interior boundaries and number of interior corners;
- Lands or rights-of-way needed to meet resource management goals and objectives
- Lands that maintain or stabilize the economics of local government;
- Lands that will add significantly to available national forest goods and services;
- Lands where the national forest program will provide the best insurance against existing or potential uses that are incompatible with effective watershed management; and
- Lands that are suitable, and will be used for other national forest programs in addition to watershed protection.

3. Avoid land acquisition where it is likely that the lands could go to patent under the *1872 Mining Law*, unless the minerals will be donated to the United States.

4. Evaluate the following when considering opportunities to convey lands:

- Important or unique resources (such as wetlands, flood plains, essential big-game winter range, threatened, endangered, or sensitive species habitat, and important historical or heritage resources) may be disposed of, but mitigation and compensation values gained in acquired lands are to be considered;
- Lands in developed areas that have lost or are losing their national forest character;
- Lands within, and immediately adjacent to, expanding communities to assist public and private projects that have the mutual concurrence of federal, state, and local governments;
- Land conveyance to states, counties, cities, or other federal agencies when it serves a greater public interest;
- Lands that will contribute to community growth, development, and economic prosperity;
- Lands suitable for development by the private sector, if development (such as residential, agricultural, industrial, or recreational) does not adversely affect management of adjoining National Forest System lands;
- Lands isolated from other National Forest System lands;
- Reserved or acquired road rights-of-way parcels that are substantially surrounded by lands not owned by the United States, and are no longer needed for rights-of-way purposes;
- Parcels intermingled with mineral or homestead patents;
- Lands encumbered by special-use permits and occupied by substantial structural improvements that no longer serve a greater public need; and
- Lands encumbered with occupancy trespass cases and encroachments involving substantial structural improvements.

ROADLESS AREAS

Guidelines

For management areas 1.11, 1.12, 1.13, 1.2, 1.31, 1.32, 1.5 (all the 1.s), 2.2, no additional guidance for inventoried roadless areas is necessary as these do not allow for motorized summer travel and therefore roads construction will not be allowed in these management areas. These are the most restrictive management areas for development.

For management areas 2.1, 3.1, 3.31, 3.32, 3.4, 4.2, 4.23, 4.3, 4.32, 4.4, 5.5, 5.41, 5.42 the following guideline will be applied:

- Inventoried Roadless Guideline. Management activities in inventoried roadless areas should emphasize long-term maintenance of roadless characteristics and: habitat improvement for threatened, endangered, proposed, or sensitive species; or maintenance and restoration of ecosystem composition and structure such as reducing the risk of uncharacteristic wildfire effects or threat of insect or disease epidemics.

For the 5.12, 5.13, 5.4, and 5.43 management areas the following guideline will be applied:

- Inventoried Roadless Guideline. Minimize road construction in inventoried roadless areas, emphasizing temporary roads over permanent roads. Roads will only be constructed when necessary to meet management area objectives and only after other options have been examined for feasibility.

For the 7.1, 8.21, 8.25, 8.32 management area prescriptions there would be no inventoried roadless guideline in the Forest Plan. Direction for inventoried roadless management would rely on existing laws and directives.

SPECIAL USES

Standard **1.** Do not approve new uses and phase out current uses when existing permits expire where the primary use is storage or disposal of hazardous materials, including landfills.

TRANSPORTATION AND UTILITY CORRIDORS

Standards

1. Do not plan transportation and utility corridors through research natural areas or wild rivers unless required by the acts, or in designated wilderness unless authorized by the President.

2. Consider valid outstanding rights that may conflict with the occupancy and use of corridors.

3. Do not authorize conflicting uses or activities within transportation and utility corridors.

4. Coordinate the location of major transportation and utility corridors between national forests and other appropriate agencies.

5. Conserve corridors identified in the forest plan for future construction and occupancy.

6. For permit issuance or reissuance, require burial of electrical utility lines of 33 kilovolts or less and telephone lines, unless one or more of the following applies:

- Scenic integrity objectives of the area can be met using an overhead line;
- Burial is not feasible due to geologic hazard or unfavorable geologic conditions;
- Greater long-term site disturbance would result; or
- It is not technically feasible.

7. Proposals to utilize designated utility corridors will be authorized without alternative route analysis, subject to site-specific environmental analysis.

Guidelines

1. Use *National Forest Landscape Management*, *Volume 2, Chapter 2, Utilities* for principles and concepts.

2. Consolidate occupancy of transportation or utility corridors and sites wherever feasible and compatible.

3. Management activities within linear corridors should be compatible to the extent possible with the goals of the individual management areas adjacent to the corridor.

Appendix E
Invasive Species Action Plan, White River National Forest

INVASIVE SPECIES ACTION PLAN

White River National Forest

Our Approach to
Maintaining and Restoring the Health of
National Forest
Through the Prevention and Management of Invasive Species

FY 2011-2013

Rocky Mountain Region

USDA Forest Service

April 20, 2011

/s/ Buck Sanchez (for)

Invasive Species Action Plan
White River National Forest: 2011-2013

Approved by:_____

Forest Supervisor

/s/ Hal W Pearce

Prepared by:_____

Invasive Species Coordinator

Invasive Species Action Plan
White River National Forest: 2011-2013

Table of Contents

Introduction

This Action plan is designed to serve as a strategic tool for implementation of the invasive species management program on the White River National Forest, and is prepared for use in:

- Project scheduling in a Forest-wide, strategic manner in line with Forest priorities.
- Allocating Forest-wide resources for the invasives program.
- Establishing program growth as appropriate for the Forest, with leadership team concurrence.
- Monitoring and evaluation of progress on planned activities.

a. This action plan is meant to be reviewed and adjusted annually to reflect emerging needs, shifting priorities, or changes in available funding. (*For this document the term "noxious weeds" and "invasive species" are synonymous.)*

2. Priority Species and Populations on the White River NF

a. The White River National Forest has adopted the Colorado Noxious Weed List as its official "Noxious Weed List". (Apendix A)

b. This list is divided into three areas (A, B, and C)

- **i.** List A species are either unknown in Colorado or exist only in very small isolated infestations. List A plants are designated for elimination on all County, State, Federal and Private lands.
- **ii.** List B species are plants considered manageable. Noxious weed management needs to be adopted to stop the continued spread of these species.
- **iii.** List C species are more abundant throughout the state which result in challenges to manage. List C species may only be targeted for eradication and/or control in certain site specific instances.

c. There are 38 noxious weed species known to exist on or the White River NF and an additional 13 species adjacient to the Forest. (Apendix B)

d. The species listed below comprise the Forest priority weed species, based on one or more of the following criteria:

i. Low in abundance
ii. Control is mostly feasible Forest-wide.
iii. Capability of species invading a variety of relatively healthy ecosystems.
iv. Species has the ability to establish dominance in plant communities,

Absinth wormwood

Black knapweed

Bouncingbet

Chinese clematis

Common teasle

Dalmation toadflax

Dame's rocket

Diffuse knapweed

Hoary cress

Leafy spurge

Meadow knapweed

Mediterranean sage

Myrtle spurge

Orange hawkweed

Oxeye daisy

Perennial pepperweed

Plumeless thistle

Russian Olive

Russian knapweed

Scentless chamomile

Scotch thistle

Spotted knapweed

Sulfur cinquefoil

Tamarisk

Yellow toadflax

Species not known to exist on the WRNF and are on a "watch out' list are species on the Colorado Department of Agriculture's A list.

e. Species on the Colorado Department of Agriculture's B List that are troublesome in specific situations but don't necessarily have the ability to establish dominance in plant communities or have limited ability to invade a variety of relatively healthy ecosystems are a lower priority. They are fairly easy to treat. Those known to occur on the forest include Musk thistle, Houndstongue, Canada thistle. While they are species of concern, control efforts will be limited to site specific areas.

f. (Apendix C): shows a map of the known locations of noxious weed species that have been entered into the database for the White River National Forest. An eradication strategy has been selected for all priority species with the exception of yellow toadflax. Due to the widespread occurrence of yellow toadflax, areas of containment and eradication strategies have been identified. Treatments within containment areas will be aimed at reducing risk of the species spreading outside the containment area. An integrated approach will be implemented in those areas which may include biological, chemical, and cultural control measures with the long term goal being control.

g. For specific information on each weed species and its suggested method(s) of control, refer to the Colorado State Weed Fact Sheets found at: http://www.colorado.gov/cs/Satellite/Agriculture-Main/CDAG/1167928170082

h. The WRNF Weed Program will utilize all the weed management tools available. While chemical control may be our most effective tool in many cases, we will still assess each proposed site and select the best possible method of treatment. To help with that decision the Noxious Weed Decision Matrix will be utilized. (Apendix D)

3. Priority Treatment Areas 2011 – 2013

a. Current and Desired Levels of Treatment

Regional direction: Planned treatment levels should trend toward treatment of one-third of existing priority species populations annually, over the life of this plan. As a guideline, where program growth is needed, it is recommended you increase accomplishment by 20% per year, over the prior year's accomplishment. With the current budget limits, the WRNF weed program will have to emphasise high priority areas and species, as the treatment of one-third the existing inventory is unattainable.

Our current inventory shows in excess of 18,500 acres of infestations on the WRNF. (Apendix E): shows a list of acreages by weed species. This inventory is incomplete however, with the actual number of acres infested estimated to be at least twice that size and possibly larger. Due to limited budgets, the White River has always approached weed management by treating and mapping weed infestations simultaneously. Budgets were simply too thin to warrant a stand alone mapping exercise. Note: this is an actual acre inventory. Affected acreage average over the past 5 years has been just over a multiple of 3 for affected acreage. This would make the WR inventory in excess of 55,000 acres. (Affected acres treated FY2010, 5,114 acres, 9.3%)

b. Priority treatment areas for FY11-13 include

While the specific plan will differ from year to year with budget and personnel limitations, the strategy will remain as a general guideline for each of the five main priorities.

i. Priority species: any new noxious weed species found that has been previously unknown to the Forest (all list A species) and list B species that are limited in size and infestation on the WRNF.

Any report of a new and/or unknown invasive plant will be verified and dealt with as soon as possible. These will usually be very small infestations and/or single plants. The District Weed Program Manager or one of their crew will assess the infestation, record and photograph the location, and take appropriate eradication measures in accordance with the White River National Forest Invasive Plant Specie Management EA (2007).

ii. Locations that have a high level of human use. (campgrounds, trailheads, administrative sites, roadsides)

Human activities are still one of the main vectors of spread for noxious weeds. Especially new species. It is essential that these high use areas be monitored for noxious weeds and treated in a timely manner if weed species are encountered.

iii. Locations that have current earth disturbing activities inprogress.

Weed species are very opportunistic and will invade newly disturbed areas easily. Many noxious weeds are early successional species that colonize recently disturbed sites (Baker 1986). Disturbances expose subsurface organic matter and incorporate litter into the soil. By adding additional oxygen and water to organic matter, a disturbance increases soil microbial activity and subsequent mineralization, the release of inorganic molecules which are available for plant uptake.

Many weeds rapidly exploit these newly available nutrients (Best et al. 1980, Belcher and Wilson 1989). This may be one reason that the density of weedy plants increases as the intensity of the disturbance increases (Jensen 1995). It is essential that all earth disturbing activities are monitored and treated for invasive weeds in a timely manner.

iv. Areas where cooperative funding has been collected (site specific funding)

Outside funding sources (e.g. Rocky Mountain Elk Foundation, Friends of the Eagles Nest Wilderness, Bark Beetle Funds, etc) must be utilized to suppliment Forest dollars. They do often have very specific project areas where they can be utilized.

v. Small remote backcountry infestations and Wilderness

One of the main purposes for designated Wilderness is to preserve natural ecosystems. Noxious weeds and other introduced aggressive species interfere with natural systems composition, structure, and ecosystem function. These remote infestations are usually small, making treatment success high.

vi. Other know infestations Forest-wide as budget, time, and workforce allow.

Maximise resources (personnel, equipment, etc.) and cooperation forest-wide to make the White River weed program as efficient, and effective as possible.

c. Road Corridors Invasive Species Inventory and Treatment:

Roadways and other areas of high human use are by far the greatest vector for the introduction and spread of noxious weeds.

The habitat created by earth disturbance associated with roads maintenance and construction, and the constant transportation of noxious weed by vehicles pose the largest threat of weed invasion.

A future goal of the program would be to secure a portion of the CMRD budget, as well as other road/recreation budgets, to assist toward treatment of invasive weeds created by road construction and maintenance.

Table 1: Road Inventory by District, displays the number of miles of Forest Service roads by maintenance level and how many miles need to be inventoried and treated annually.

Table 1: ***Summary of Roads to be Inventoried and Treated/ year by District***

District	*Maintenance Levels*	*Total Miles*	*Miles of Inventory and Treatment Per Year**	*District Totals*
Aspen/Sopris	1 and 2	314	63 miles/year	115 miles/year
	3, 4 and 5	157	52 miles/year	
Blanco	1 and 2	205	41 miles/year	65 miles/year
	3, 4, and 5	73	24 miles/year	
Rifle	1 and 2	380	76 miles/year	102 miles/year
	3, 4, and 5	79	26 miles/year	
Eagle/HX	1 and 2	747	149 miles/year	216 miles/year
	3, 4, and 5	201	67 miles/year	
Dillon	1 and 2	378	76 miles/year	91 miles/year
	3, 4, and 5	45	15 miles/year	
	Total miles	**2579**	**589 miles/year**	

Miles of road to be inventoried by year is based on: Level 1 and 2 roads are inventoried every 5 years and level 3, 4 and 5 roads being inventoried every 3 years.

In addition to the miles of road identified in Table 1, nearly 1,000 miles of roads under state, county, private or other federal agency jurisdiction exist within the White River National Forest boundaries. Continued coordination with the appropriate agencies is neecessary to ensure that completion of roadside detection and treatment occurs.

d. Trail Corridor Invasive Species Inventory and Treatment Schedule

Most of the invasive species present in remote locations and wilderness, with the exception of yellow toadflax, occur primarily along recreational trails. Therefore, the wilderness trail system is a very high priority for inventory and treatment.

This will prevent the spread to remote locations. See Table 2. Recreation Trails by District. Table 2 provides the number of miles of trail by district that have been or need to be inventoried. Heavy use trails are priority.

Table 2. ***Summary of Recreation Trails to be Inventoried and Treated.***

District	*Miles of Trail*	*Presently Inventoried (2008)*	*Needing Inventory*
Aspen/Sopris	732 miles	256 miles	476 miles
Blanco	454 miles	182 miles	272 miles
Rifle	217 miles	103 miles	114 miles
Eagle/Holy Cross	631 miles	50 miles	581 miles
Dillon	390 miles	18 miles	372 miles

- To accomplish this inventory, all employees must assist in noxious weed inventory and report information to district weed coordinators.

e. Campgrounds / Trailheads –

Campgrounds and trailheads are a serious vector for the introduction and spread of noxious weeds into the backcountry, especially new invaders.

Inventory and treatment of noxious weeds in campgrounds and trailheads should be completed in cooperation with normal campground maintenance.

- **All campgrounds and trailheads will be inventoried and treated for invasive species annually. Followup treatments will be scheduled and monitored as necessary.**

- **Weed awareness information should be posted in every campground, trailhead and on every major road access to the Forest.**

f. Administrative Sites

Administrative sites are highly visible to the public. To project an image of our commitment to invasive species management, we must get our own house in order.

- **All Administrative sites will be inventoried and treated each year.**

g. Areas of Earth Disturbance

Areas of earth disturbance create habitat for the establishment of noxious weeds. The Forest Plan requires that a Noxious Weed Risk Assessment be completed for all earth disturbing activities. Invasive species treatment is a cost to project, e.g. Roads, trails, timber sales (including bark beetle damage), prescribed fire, recreational facilities.

- During the planning of earth disturbing activities, provisions for the treatment and monitoring of the invasive species should be incorporated into the project design. Implementation and funding need to be secured at the cost of the project. (Appendix F): Best Management Practices.

h. Areas of Special Interets-
Areas of special interest include Wilderness, Wild and Scenic Rivers, SIA areas established for botanical reasons and critical wildlife areas**.**

Wildernesses **-**The purpose of Wilderness is to preserve natural ecosystems. Noxious weeds interfere with natural ecosystem structure and function. Wilderness Areas are a high priority for eradication of noxious weeds. These areas are, however, extremely expensive to treat in remote locations. Very little of the wilderness areas have been inventoried, probably less than 1%. Invasive species inventory must be a high priority for Wilderness Rangers. Each District weed coordinator will prepare a map identifying areas that have been inventoried, and from that, coordinate an annual plan for inventory with the District Wilderness manager and other appropriate personnel. Table 3. Wilderness area and size.

Table 3: Wilderness Areas Inventory Needs

Wilderness	*District*	*Size of Wilderness*	*Planned FY11 Inventory and by Whom.*
Collegiate Peaks	Aspen	35,482 ac.	No inventory planned at this point
Eagles Nest	Dillon Eagle/Holy Cross	133,311 ac.	Friends of Eagle Nest wilderness invent./treat annually
Flat Tops	Blanco Eagle Rifle	196,344 ac.	No inventory planned at this point
Holy Cross	Eagle/Holy Cross Sopris	113,366 ac.	No inventory planned at this point
Hunter-Frying Pan	Aspen/Sopris	82,026 ac.	No inventory planned at this point
Maroon Bells/ Snowmass	Aspen/Sopris	161,984 ac.	No inventory planned at this point
PtarmiganPeak	Dillon	12,594 ac.	No inventory planned at this point
Raggeds	Sopris	16,793 ac.	No inventory planned at this point

Remote Infestations *-Remote infestations have the greatest potential to go undetected and therefore greatest potential to spread rapidly.*

As discovered, remote infestations will be treated with an early detection rapid response strategy. It must be noted that these infestations are the most difficult and expensive infestations to treat.

Botanical SIAs /RNA - Areas set aside as Special Interest areas for Botanical reasons (e.g. Hoosier Ridge) must be inventoried for invasive species and a plan for treatment and funding developed to eradicate any invasive species threatening the purpose for the establishment of the SIA.

4. Inventory and Database

Each District Weed Manager will prepare a map identifying areas that have been inventoried. From this map they will coordinate with other resource area personnel to develop an annual inventory plan for the district.

Table 4. Adequacy of existing Inventory and Database Workload 2010-2013

When	*Data sets to evaluate / migrate*	*Who*
2011		
Spring	Prepare maps of areas that have been inventoried. Identify priorities for inventory during the 2011 field season.	District Weed Coordinators
Summer	Gather weed locations using proper protocols, GPS/PDR. Inventory roads, campgrounds, trailheads and administrative sites as part of treatment. Inventory portions of Wilderness identified during spring planning	Weed crews/District Weed Coordinators Weed Crews , Recreation Crews, Campgropund Staff Weed Crews, Recreation Staff, Wilderness Volunteers, etc.
2011 Fall/ Winter	Enter data collected into Citrix database Identify priorities for inventory during the 2012 field season	District Weed Coordinators/GIS
Winter2011/ Spring 2012	Work with cooperators to secure grants for weed inventory	District Weed Coordinators
2011-2013	Continue proces until all areas have been inventoried	All

Ensure all future inventory by non-Forest Service users, (county, contractors, volunteers, wilderness rangers, etc) contains the necessary information for our FACTS and NRIS databases.(e.g. species ID, NAD83 UTM GPS coordinates, etc.)

4. Coordinated Weed Management Activities

Table 5 provides a summary of the cooperative activities that are occurring or have occured across the Forest. Most of these efforts are multiple year activities and are budget dependent. Increasing or decreasing as annual budgets fluctuate. Activities are limited for FY11.

Table 5: Coordination Efforts FY11-FY13

Action	Responsible Individual	By When
Forestwide Coordination		
Internal Awareness and Education Continue to inform LT of NW Program Order Educational supplies for Districts	Forest Weed Coordinator	Annually
External - Coordination Prepare nox. weed newspaper articles. Big Country RC&D coordination Work toward higher level of involvement by CDOT on I-70 Continue to work with County Weed programs and try to re-initiate cooperative agreements	Forest Weed Coordinator and VIS Forest Weed Coordinator Forest & District Coordinators Forest & District Coordinators	Season long as appropriate Spring/early summer Spring/summer Season long

District Coordination		
All Districts Display noxious weed and weed free posters and brouchures at all district offices, vistor centers and campgrounds, trailheads and other high public presence. Providing weed identification guides to and ask for assistance in inventory from field going personnel	VIS, Dispersed Rec., Dev. Rec. and trails and wilderness personel District Weed coordinators	Throughout field season Seasonal orientation and as appropriate
Aspen/Sopris Coordination and Partnership Effort BLM noxious weed treatment Wilderness Wrkshp Wilderness Inventory RMEF and HPP grants Garfield and Pitkin Weed Boards Weed ID and Awareness training for Forest Conservancy volunteer wilderness Rangers	Aspen District Weed Coordinator	Throughout field season Throughout year
Blanco Coordination and Partnership efforts		

Rio Blanco Weed Board mtg. RMEF Grants S&P / Rio Blanco Co. CDOW/ Oak Ridge Rio Blanco Participating Agr. CDOW HPP grants Adjacent private owners State Insectory Colorado State University Weed research DuPont Chemical	Forest and Blanco Weed Coordinator	Throughout year
East Zone Coordination and Partnership Efforts Eagle County Coordinated Weed Mgmt. Area RMEF grant Eagle and Summit County weed boards 2 FS/Eagle Co. S&P grants Ski Area coordination in Summit County	EZ Weed Coordinator	 Spring/Summer Spring Spring/Summer Winter/Spring

2 Summit Co. S&P weed grants	Dillon District Weed Coord EZ Weed Coordinator	Winter/Spring Winter/Summer Quarterly Fall-Spring Fall -Spring
Rifle Coordination and partnership efforts Oil/Gas Development with Encana, Laramie, & Delta companies- Nox. Weed Agreement Roan Plateau and roadside treatment coordination with BLM RMEF HPP Grant SRS Grant	Rifle Weed Coordinator Forest and District Coordinator	Spring- Fall
Future Coordination Efforts		
Work toward higher level of involvement by CDOT on I-70	Forest Weed Coordinator	Year round

Request involvement of other neighbors		
Continue to work with Road Crew and Recreation to identify and fund treatment of noxious weeds	Forest and District Weed Coordinators	Year round
Continue to Work with County Commissioners and municipalities to emphasis coordinated efforts.	Forest and District Weed Coordinators	Year round
Distribute invasive ornamental brochures to Towns /municipalities near Forest, key visitor points, homeowners assoc. Work with outside groups such as WRIA, outfiiter guides, educational community, receation groups, wildlife partners	District Weed coordinators	Year round Year round

5. Assessment and Development of Organizational Capacity:

Table 6: ***Current staffing and responsibilities:***

Unit	***Staffing***	***Responsibilities***
SO	Linn Pettijohn	Forest Range Staff and budget lead *Collateral duties* – Bark Beetle Deputy of Operations
	Hal Pearce	Forest Invasive Species Coordinator, Bark Beetle weed program implimentation, Forest coordination with partners/RO, grants, reporting, training etc. (FY11 limited detail as R2 Pesticide Use Coordinator)
Aspen/Sopris	Wayne Ives	District range program manager, district weed coordinator, *Collateral duties*-Facilities manager, air quality monitor, district historian
	Ben Carlsen 13/13	Range Crew supervisor, weed crew
Blanco	Mary Cunningham	District Rangeland Management Specialist *Collateral duties*-Forest sign shop
	Troy Osburn	Rangeland Mgmt. Specialist, district weed coordinator, Crew supervisor (RG & VW)
Rifle	Lydia LaBelleDeRios	District Rangeland Management Specialist,

	Joe Fazzi	Range Technician, district weed coordinator, crew supervisor. (RG & VW)
Eagle/Holy Cross	Jessica Pettee Steve Elzinga	E. Zone Rangeland Mgmt. Specialist (RG &VW) Range Technician, district weed coordinator, crew supervisor. (RG & VW)
Dillon	Jessica Miller 13/13	District weed coordinator, range technician (VW)

Current Program Deficiencies:

To effectively administer the Invasive Species Program, some deficiencies were identified in the previous action plan. Some strides have been made to address those concerns. Those gaps identified were the following:

- Noxious weed responsibilities are collateral duties for everyone presently involved in the program. *(This still continues to be an issue, but is primarily budget driven. We do now have a Forest Cooridinator and the Dillon position is primarily weeds)*
- To be effective, the invasive species program needs to be a stand alone program. It must be multi-funded and not just primarily out of the range program. *(Bark beetle funding has stepped up considerably on the east zone, but this is still an issue on the remainder of the Forest)*
- Retention of qualified applicators familiar with the ground, procedures and equipment. *(We now have at least one licensed certified applicator on each district)*
- Lack of a career ladder for employees in the Noxious Weed program.

- Fill the vacant range positions on the East Zone. *(Both the GS-11 and the GS-09 positions have been filled)*
- Develop a Forest weed program manager position to estsablish consistency and increase efficiency in the program. *(That position has been developed which has added increased consistency to the Forest weed program)*
- Provide for a full time Weed Program Manager on every Ranger District*. (Due to budget limitations this may never be practical. The district weed coordinator is still a collateral duty of the district range staff. The Forest-wide position has helped with some of the workload however)*
- Make at least one position on each weed crew a 13/13 or 18/8 to maintain the on the ground knowledge and history needed to effectively prioritize workload*. (Dillon Technician has beed added)*
- Increase the seasonal workforce for weeds and increase the number of weed treatment contracts. *(Budget dependent)*

6. Funding sources and Cooperators

Appropriated funding (NFVW) makes up only a portion of the total noxious weed program. Activity created funding, such as bark beetle, oil/gas exploration, land exchanges, as well as cooperative funding such as range betterment and KV are often used to supliment the weed program. Other partnership funding such as CDOW Habitat Partnership Program, Rocky Mountain Elk foundation, State Department of Agriculture, National Forest Foundation, and State and Private Forestry grants can make up a significant amount of the total noxious weed program. In kind services such as the volunteer inventory work of Aspen Wilderness Workshop, Friends of the Eagle's nest Wilderness, and other user groups can also play a significant role in inventory and treatment.

Rather than trying to estimate the amount of funding that is going to come to the Forest through appropriated or coop funding, the trends in funding need to be recognized when adjusting the program/organization to meet the growing need for noxious weed treatment. The following are the trends in funding.

- NFVW is projected to decrease in FY11 and may also in FY12, however emphasis toward the treatment of invasive species seems to remain at a fairly high level.
- KV is dependant on timber harvest and funding has steadily declined in recent years.
- Range Betterment funding available is expected to remain constant however all of it is not appropriate for weed control.
- Most grants such as HPP and RMEF require a minimum of 50% matching funds to qualify.
- Increase emphasis of invasive species in NFF grant where applicable.

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7. Validation Monitoring of the Action Plan and Summary of Past Years Activities:

- During FY2010 almost 5,000 acres of weeds were treated on the White River. The bulk of this acreage (3,430) was due to bark beetle funding on east zone
- Numerous grants and partnerships were utilized totaling over $28,000.00. They included RMEF, Friends of the Eagles Nest Wilderness (Forest Foundation grant), Colorado State Insectory, and private individuals.
- In FY2010 we hired 3 seasonals, had 3 volunteers, and issued 3 contracts for treatment and inventory of noxious weeds.
- Volunteer groups participated in treatment and inventory of wilderness weeds.
- Numerous State and Private Forestry grants were secured to treat weeds on adjacent private lands in Garfield, Rio Blanco, and Summit Counties as well as the City of Vail.
- Research continued with DuPont Chemical Company for yellow toadflax control.
- Over 20,000 biological control insects were released on 91 sites for yellow toadflax control.
- Continued working with the Colorado State Insectory researching biological control of yellow toadflax. (Holy Cross and Blanco)

8. Invasive Species Program Evaluation and Recommendations

Problem statement:

As budgets decline and infestations increase, it becomes increasingly difficult to accomplish the noxious weed treatments necessary to contain and/or control the continued spread of invasive species across the Forest.

Recommendations:

- Prevention and education concerning the spread of noxious weeds is a primary objective of the WRNF Invasive Weed Program. Involvement with all Forest activities is important.
- The most cost effective treatment of noxious weeds is early detection and rapid response.
- New and/or unknown species (especially List A) are priority infestations. Eradication will be the goal for this type of infestation.
- Small noxious weed infestations that have the potential to become established and eliminate native species are one of the highest priorities for treatment in the WR program.

- Trailheads, campgrounds, roadsides will have a high priority. Human activities are one of the main vectors of spread for noxious weeds. Especially new/unknown invaders.
- Infestations in Wilderness and other high priority native ecosystems must be taken into consideration. These are high priority but often the most expensive due to their accessibility or remote nature.
- A balance of easily accessible and remote acreages is the goal of the WR program.

- Since many weed species require multiple years treatments in order to achieve eradication, follow-up monitoring/treatment of previous years applications is important to ensure success. If this is not done, infestaions are likey to return and our previous control efforts have been wasted.
- Eradication/containment strategies will be made inaccordance with the Noxious Weed Decision Matrix found in Apendix D.