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Service

Rocky
Mountain
Region



Hayden Pass Wildfire BAER

Resource Report

Fisheries Resources

San Isabel National Forest

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Objectives

Assess the effects of the Hayden Pass Wildfire, both within the fire perimeter and downstream, to:

1. Threatened, endangered, and candidate fish species and designated and proposed critical habitat.
2. Important recreational fisheries.
3. Fish habitat improvements (i.e. structures to enhance habitat, fish barriers)

And to prescribe emergency stabilization and rehabilitation measures to protect or minimize effects to these critical natural resources.

Methodology Process

Information used in this assessment was generated from review of relevant recovery and management plans, GIS databases, BARC maps, and discussions with species experts from Colorado Parks and Wildlife (CPW), U.S. Fish and Wildlife Service (USFWS), and Greenback Cutthroat Trout Recovery Team.

Forest Service specialists representing engineering, hydrology, fisheries, wildlife, wilderness, recreation, cultural, and timber assessed fire impacts to values at risk in the field and utilized helicopter flights to assess impacts in areas that were not easily accessible (i.e. wilderness and primitive areas).

Identification of known values at risk (VARs) is crucial to accurately assessing fire effects. GIS data of known listed species occurrences was available to the BAER Team for analysis. A map of VAR occurrence locations was generated from the above data sources and overlaid with burn severity map to identify areas where effects to VARs may occur.

This assessment is not intended to definitively answer the many questions on fire effects to specific species that arise during incidents such as the Hayden Pass Wildfire. The purpose of this assessment is to determine the need for immediate, emergency actions that may be necessary to prevent further negative effects to identified VARs. The VARs discussed in this assessment extend beyond the fire perimeter and across land ownership boundaries and it is important to discuss potential impacts to VARs beyond the San Isabel National Forest boundaries.

The burn severity map used for this assessment was produced on July 24, 2016.

Models to determine pre and post fire runoff and erosion were utilized and can be found in the Hydrology and Soil specialist's reports.

Contacts Made During Assessment

Greg Policky, Aquatic Biologist, Colorado Parks and Wildlife

Kevin Rogers, Aquatic Research Scientist, Colorado Parks and Wildlife

Doug Krieger, Aquatic Biologist and Greenback Recovery Team Member, Colorado Parks and Wildlife

Leslie Ellwood, Consultation Biologist and Greenback Recovery Team Member, Fish and Wildlife Service

Assumptions

An attempt was made to visually (from ground and air) observe important fishery resource values within the fire area. However, walking the entire length of South Prong of Hayden was not possible due to ongoing fire activity, time constraints to provide this assessment and inaccessibility. The risk assessment relied heavily on the burn severity map and the assumption that it was represented burn severity accurately. In areas that were visited the burn severity map was field verified and updated to be representative of what was observed on the ground.

Stream flow models to estimate pre and post fire flows was conducted by the hydrology team and any assumptions made for that modeling effort is described in the Hydrology Specialist Report.

Inventory of Resource Values in Burned Area

Important and unique habitats, occurrence of a Threatened species and recreational fishery opportunities occur within and downstream of the fire area. Table 1 summarizes the critical aquatic values-at-risk found in or near the fire.

Table 1. Summary of Critical Fisheries Values-At-Risk for the Hayden Pass Wildfire					
VAR	VAR Threat	Location	Probability of Loss	Magnitude of Consequence	Risk From BAER Assessment
Cutthroat Trout population listed as TES (ESA)	Short and long term modification of suitable and occupied habitat due to scouring, sediment and debris flows. Modifications to water quality due to sediment and ash. Modification of streamside vegetation and stream bank conditions. Spread of non-native fish into occupied habitat. Loss of population due to ash and debris flows.	South Prong of Hayden Creek	Very Likely	Major	Very High
Fish Barrier	Breach due to high stream flows & debris flows; Plunge pool filling in reducing hydraulic jump rendering barrier ineffective. Invasion of non-native brown trout. Loss of threatened Cutthroats	South Prong of Hayden Creek	Very Likely	Major	Very High
Instream Habitat Improvement	Destruction of habitat enhancement completed in 2006 structures being washed out and pools filled with Sediment	South Prong of Hayden Creek	Possible	Moderate	Intermediate
Recreational Fishery	Impacts to sportfish populations due to ash flow. Reduced water quality	Arkansas River downstream from Coaldale	Possible	Minor	Low

Resource Condition prior to Wildfire

The fire burned portions of South Prong of Hayden, Big Cottonwood, Wolf, Cottonwood and Mosher Creeks, Butter Creek, Deep Gulch, Foothills Gulch, Italian Gulch, Milliball Gulch, Mud Gulch, Oak Creek, Pole Gulch, Rattler Gulch, Spring Gulch, and Sullivan Creek.

9,726 acres of the fire are within the Sangre de Cristo Wilderness.

Forest cover types that are present across the burn area are spruce-fir, mixed conifer, aspen, lodgepole pine, pinon juniper and Gambel oak. Tree species represented on the landscape include: Ponderosa Pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), Limber Pine (*Pinus flexilis*), Bristlecone pine (*Pinus aristata*), Lodgepole pine (*Pinus contorta*), White fir (*Abies concolor*), Sub-alpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmannii*), Aspen (*Populus tremuloides*). Shrub species include Pinon pine (*Pinus edulis*), Juniper (*Juniperus scopulorum*), and Gambel Oak (*Quercus gambelii*).

The greenback cutthroat trout (*Oncorhynchus clarkii stomais*) is Colorado's state fish. Historically, it was thought to have occupied the Arkansas and South Platte River watersheds; however, recent genetic analysis indicates it naturally occurred only in the South Platte River watershed (Metcalf et al. 2012). The genetic study by Metcalf in 2012 found that the cutthroat population in the South Prong of Hayden Creek is unique in the literal meaning. It is the only known existing population of its kind. The only match found is a museum specimen collected in 1889. While the whole genetic picture is still being studied it has been suggested that this population may represent the sole remaining population of cutthroat native to the Arkansas River drainage.

In 2005-2006 habitat in the South Prong of Hayden was enhanced by building a manmade barrier to exclude downstream brown trout from migrating into cutthroat habitat, installing structures to increase sediment transport, creation of deeper pool habitats, and converting a road that was within the WIZ to a single track multiple use trail. This population was once in danger of extinction and when last surveyed in 2014 at least five age classes were present and numerous fry were collected. A self-sustained, robust population resided in the habitat improved reach easily meeting population stability criteria.

In 2014 the Arkansas River from Lake Fork near Leadville to Parkdale (102 miles) was designated as a "gold medal" water by the Colorado Division of Wildlife, a tag meaning the site has the highest quality habitat for trout that exists in Colorado and also offers the greatest potential for trophy trout fishing. Only 322 miles of Colorado's 9000 miles of trout streams, carry

the "Gold Medal" signature. CPW conducted angler surveys in 2012 and found that over 50,000 anglers fish the stretch of river between Salida and Canon City throughout the year.

Condition of Resource Values after the Wildfire

There are multiple threats to water quality, hydrologic function and fisheries habitat within and downstream of the burned area. The magnitude of post-fire impacts to water quality are dependent on the size, intensity, and severity of the fire. In general the following effects are observed in post wildfire conditions:

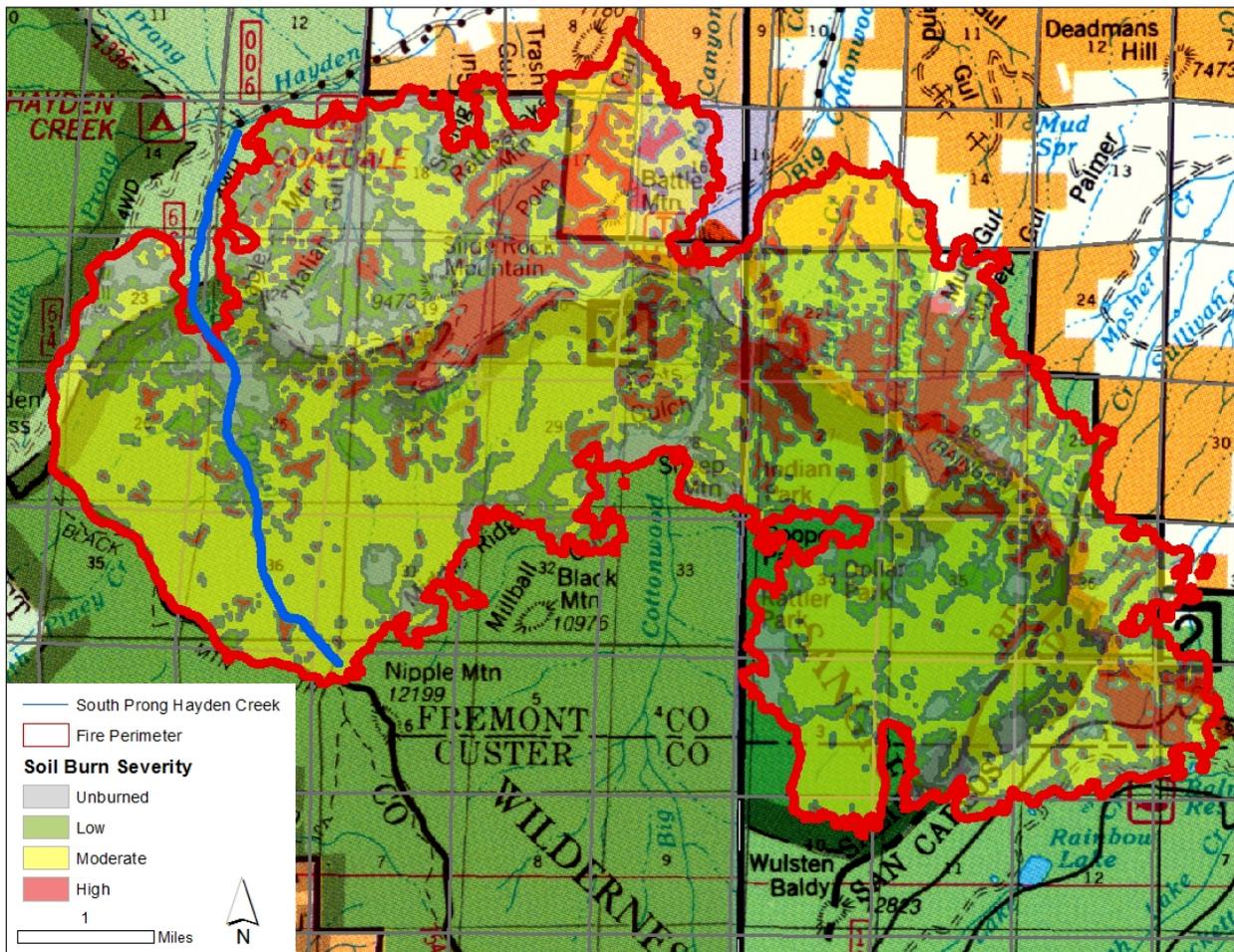
- Accelerated rates of erosion and channel scouring can deliver large amounts of sediment to neighboring water bodies. As a result, suspended sediment concentrations and turbidity will increase in surrounding rivers and lakes. Post-fire increases in suspended sediment and turbidity are expected to be most evident in the first year following the fire, and to return to levels similar to pre-fire conditions within 3-5 years.
- Sediment delivery is largely a function of hill slope and channel gradient, with steeper hill slopes delivering more sediment to water bodies, and steep streams acting as transportation conduits to lower gradient depositional areas. The steep gradients of many of the smaller tributaries in the burned area indicate that substantial transport and deposition will occur in depositional areas downstream of the burned area in lower gradient areas.
- Increased concentrations (in water bodies) of nitrogen, phosphorus, sulfur, chloride, bicarbonate, and heavy metals all have the potential to occur following fire events. However, documented cases of exceeding National Primary and Secondary Drinking Water Standards are rare (USDA Forest Service Gen. Tech. Rep. RMRS-GTR-42-vol. 4. 2005).

For the entire Hayden Pass Wildfire area, the estimated increase in sediment delivery for the first year after the fire will be dramatically greater than the normal sediment delivery. In the South Prong of Hayden Creek a 10 year storm would typically increase flows by 35 cfs above base flows post fire flows are expected to increase to 465 cfs.

The cutthroat trout, their habitats, and habitat improvements within the fire perimeter have largely been unaffected by the fire itself. The South Prong of Hayden Creek is 4.34 miles from the headwater to the confluence with Hayden Creek. 2.43 miles of adjacent land were unburned, .74 miles are of low soil burn severity, .80 miles of moderate and .37 miles of high as shown in Figure 1. The highest quality habitat exists for the first mile upstream of the confluence and slowly reduces in quality as you move upstream. A majority of occupied habitat and surrounding

riparian vegetation has not burned but some uplands and a majority of the headwater is burned. The habitat and cutthroat are at risk to future losses, disturbances, and habitat degradation from post-fire watershed events. These impacts include potential for localized extirpations due to ash flows; reduced water quality and changes in water chemistry due to ash delivery and changes in water temperature from loss of canopy shading; and scouring of riparian/aquatic vegetation and changes in streambed/pool habitat due to debris flows and sediment delivery. Because of the fish barrier, fish that swim downstream to escape debris flows will not be able to return to their native habitat and will be lost to the population.

Figure 1. South Prong of Hayden Soil Burn Severity



Floods, debris flows and sediment deposits may result in a temporary loss or reduction of suitable stream habitat. This small and isolated populations is at great risk of local extinction and the precarious situation of only existing in the hatchery and an extremely small population that was moved to another stream on July 20th 2016.

If the barrier were to breach, non-native sport fish could invade the stream. It is well documented that brown and brook trout outcompete cutthroat and rainbow trout will hybridize.

Direct and indirect fire effects can impact aquatic organisms at all life stages including eggs, juveniles and adults. Direct effects to aquatic organisms may include injury/mortality as a result of heavy ash loading to aquatic environments that can smother organisms, clog gills and fill in interstitial spaces important to many benthic aquatic species. Post-fire effects can also result in lethal changes to water quality and chemistry, as well as water quantity.

Indirect effects from fire can be significant for aquatic species. Post-fire conditions influencing species viability include modified shelter, foraging and breeding habitat, increased rates of predation, introduction of non-native species and increased competition for limited resources. These types of aquatic and riparian ecosystem changes can result in stress and mortality for fish. Fire associated impacts to aquatic ecosystems include decreased stream channel stability, greater and more variable discharge, altered coarse woody debris delivery and storage, increased nutrient availability, higher sediment delivery and transport, increased solar radiation and altered water temperature regimes. Due to mortality and removal of hill slope and riparian vegetation, it is common for post-fire water flows and sediment transport to increase significantly. High water flows have the potential for flushing individuals out of stream stretches and into downstream areas. In other cases, sediment deposits or debris flows can occur and create conditions where pools and other stream habitats are filled in and organisms are smothered or crushed. Eggs are especially susceptible to smothering from excessive sedimentation in aquatic habitats.

The recreational fishery in the Arkansas River may be impacted by ash flow leading to reduced water quality, but debris is expected to drop out before reaching the Arkansas River. Impacts are expected to be minor and short term.

In anticipation of the very high possibility of future loss of habitat a fish rescue was organized. On July 20th 194 fish were removed from the stream. 158 were sent to a hatchery and 36 were taken to another stream.

Recommended BAER Emergency Treatments

Table 2: Recommended Emergency Treatments

VAR	BAER TREATMENT	NON-BAER ACTION
Cutthroat Trout population listed as TES (ESA)	<p>None</p> <p>Due to steep slopes and lack of access to high and moderate burn severity areas at headwaters of the watershed</p>	<p>If fish are not found upstream of the barrier sample below structure and rescue cutthroats that were washed downstream</p>
Fish Barrier	<p>Storm inspection & response</p> <p>Remove sediment behind barrier and clean plunge pool as necessary</p> <p>Monitor for presence of species after major storm events</p>	<p>If breached monitor population below structure and rescue cutthroats that were washed downstream</p>
Instream Habitat Improvement	None	None
Recreational Fishery	None	None

Cost of Emergency Treatments

An estimation of costs associated with this treatment is necessary to determine BAER eligibility. Using forest IDIQ rates and my estimation of equipment, materials and personnel necessary to perform the treatments, I have determined the total cost of treatments. Inspection and monitoring are expected to continue in years two and three and appropriate documentation will be submitted at that time.

Recommended Non-BAER Treatments

After major storm events the sampling will be performed in cutthroat habitat upstream of the fish barrier. If fish are not found the fisheries biologist in cooperation with Colorado Park and Wildlife will initiate sampling below the barrier. If fish have been found to be washed below the barrier a rescue will be initiated.

Recommended Long-Term Treatments for Rehabilitation

The fire has resulted in the loss of riparian and upslope vegetation in over half of the watershed. Riparian vegetation is critical in shading creeks and streams and maintaining low water temperatures. These low water temperatures are important to the survival of native salmonids. Much of the riparian vegetation within the fire area will regenerate naturally over time. Most streams affected are within wilderness areas and active revegetation (planting) is unlikely to occur. If allowable within wilderness, willow planting is recommended. Streams will be impacted long term by lack of shading and increased water temperatures. Habitat monitoring including water quality monitoring will be needed to assess habitat quality and suitability for repatriation or supplemental stocking from the fish taken to the hatchery. This stream will experience altered hydrographs, increased sedimentation and scouring and may provide poor or unsuitable habitat for an extended time frame. Monitoring habitat suitability will be required to determine timeline for repatriating lost populations or supplementing the population. Habitat enhancement similar to what was completed in 2005-2006 may be necessary to allow cutthroat to thrive in this altered post fire habitat.

Exclusion of nonnative trout, through the maintenance of the barrier, will continue to be important to protect the cutthroat population. The BAER team assessed the potential for damage to, or loss of, the barrier. It is likely that this barrier may be damaged or destroyed and require

repair to prevent invasion of non-native species. The negative interaction between native cutthroat trout and nonnative trout, through predation and competition, and hybridization has been well documented. It is important that this barrier be monitored and if damaged or destroyed be repaired or replaced immediately.

Photos

Fish Barrier on South Prong of Hayden Creek just above confluence with Hayden Creek



South Prong of Hayden Headwaters

