FISHLAKE NATIONAL FOREST

BIOLOGICAL EVALUATION OF

SENSITIVE AQUATIC ANIMALS

FOR THE

OHV ROUTE DESIGNATION PROJECT

/s/ James E. Whelan 12/11/06

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Introduction

This biological evaluation analyzes the potential effects of the proposed OHV Route Designation Project on aquatic species on the Regional Forester's sensitive vertebrate species list, which may occur on the Fishlake National Forest. The name and status of these species are shown in Table 1. The purpose of this biological evaluation is to make a determination regarding the likely effects of the proposal on the status of these species.

There are no threatened, endangered, or candidate fish or other aquatic biota species with habitat in the proposed project area.

Table (1): Status of sensitive aquatic vertebrate species known or suspected to occur on the Fishlake National Forest.

STATUS OF SENSITIVE SPECIES			
	CANDIDATE	**REGION 4**	**STATE**
SPECIES	**CLASS**	**SENSITIVE**	**RANK**
COLORADO CUTTHROAT TROUT *Oncorhynchus clarki pleuriticus*		**X**	CS
BONNEVILLE CUTTHROAT TROUT *Oncorhynchus clarki utah*		**X**	CS

Existing Condition

(The tables referred to in this section are numbered according to those found in the EIS that has been prepared for this project)

There has been rapid growth in off-highway vehicle (OHV) use that was not anticipated when the 1986 Fishlake Forest Plan was written. Combined use on the Paiute and Great Western Trail systems has increased 205 percent since 1995 (Reid 2005). OHV registrations in Utah increased 212 percent from 1998 to 2004 (Hayes 2005). New retail sales of OHVs increased 163 percent between 1995 and 2001 (Motorcycle Industry Council 2002). Most of these vehicles are used on public lands (Fisher et. al. 2001, Motorcycle Industry Council 2001). The existing travel plan allows seasonal or yearlong motorized cross-country travel on over 62 percent of the Forest. This is not desirable or sustainable, especially given the existing numbers of users and expected growth. This is also inconsistent with the travel regulations that were finalized on November 2, 2005.

The enforcement method used for the existing travel plan relies on "open unless signed or mapped closed", which is complicated to interpret and difficult to administer. In addition, the lack of consistent travel policies between the Fishlake National Forest and other nearby forests and land management agencies is confusing for the public and inhibits cooperative law enforcement and successful prosecution of offenders.

All of the factors described above have contributed to the current situation where some motorized travel is occurring in areas and on routes where motorized use is prohibited. In some open areas, networks of user-developed routes continue to appear that are creating user conflicts and resource impacts. Problems do not occur equally throughout the analysis area. Some of this use has occurred in riparian areas and on

highly erodible slopes. In other areas, use is very light and little or no effects from wheeled motorized cross-country travel are evident. Types of impacts include the introduction and spread of invasive plants, displacement and compaction of soils, impacts to rare plants, rutting of wetlands, disturbance of wildlife and livestock, damage to cultural resources, and impacts to water quality, riparian and fisheries habitats. The majority of motorized impacts are occurring during hunting season and spring antler shed gathering, in play areas next to communities, and around popular dispersed camping areas.

Purpose of and Need for Action

In order to comply with travel management regulations (36 CFR parts 212, 251, and 261, which incorporate Executive Orders 11644 and 11989) and Forest Plan direction, the Forest Supervisor has determined that there is a need to improve management and enforcement of the motorized travel policy on the forest. Specifically the purpose of and need for the proposed action is to

1. address the immediate need to better manage motorized cross-country travel,
2. create an implementable user friendly motorized travel plan that is simple to understand and is as consistent (seamless) as possible with adjacent public lands,
3. create a travel plan that is inherently easy to enforce to the fullest practical extent,
4. better accommodate current motorized use while addressing concerns related to future growth,
5. reduce the potential for motorized conflicts and impacts to other resource uses and values, and
6. increase user certainty about which roads and trails are part of the managed system of motorized and non-motorized routes. The tables discussed in this section are labeled as found in the EIS for this project.

Alternative 5, Final Preferred Alternative

The Final Preferred Alternative blends elements from each of the other action alternatives in response to route and area specific concerns identified by the public and through internal reviews. This alternative also accounts for the additional route inventory incorporated in 2005 and 2006 and represents the culmination of applying the criteria described in the Development of Alternatives. Alternative 5 fixes errors in Alternative 2, 3, and 4 that were discovered after release of the DEIS, including those identified by the public. There are differences in content between Alternative 5 and the other action alternatives that are not readily evident in the mileage comparisons. This is due in part to having different, but offsetting additions and deletions to motorized access in each alternative. Careful evaluation and comparison between the alternatives reveals the imprint from the route-specific public comments that the forest received. Implementation requirements are tracked in the fishlake_travel_plan_changes.mdb Microsoft Access database, which is located in the project file.

Alternative 5 adds 580 miles of unauthorized routes to and would remove 73 miles of authorized routes from the forest's existing motorized system. About 635 miles of unauthorized motorized routes would be obliterated and 23 miles converted to non-motorized trail. This action would result in a system of roughly 2,181 miles of road and 639 miles of trail for a combined total of 2,820 miles of motorized routes. Of the latter total, 2,742 of these miles would be open to the public. The amount of seasonally restricted routes would increase from 329 miles to 424 miles. The ending date for the seasonal closure period that starts on January 1st would be lengthened from March 31 to April 15th. The existing configuration of the Paiute and Great Western Trail systems would be retained. Motorized travel off designated routes would be prohibited except for open use areas, over-snow vehicles, or as specified for access to dispersed camping, firewood gathering, emergency fire suppression, search and rescue, law enforcement, military operations, and Forest Service administrative use. Some changes in area restrictions for winter travel by over-snow vehicles are proposed to protect critical mule deer winter ranges. The preferred alternative designates 690

acres in two open use areas west of Richfield, UT and 189 acres at Velvet Ridges above Torrey, UT where motorized cross-country travel would be permitted. Like Alternative 3, Alternative 5 proposes changes to the open use area boundary at Velvet Ridges to reduce potential for impacting sensitive plants and to make the boundary more manageable. Contrary to Alternatives 2 and 3, the most northern open use area on the Fillmore district would be dropped in Alternative 5. The open use areas remaining are open to motorized cross-country travel in the current travel plan.

Table 2-24 provides a summary of the area restrictions associated with Alternative 5. Detailed maps are included on the CD-ROM that accompanies the FEIS and can be reviewed interactively on the map server link from the project web page

Table 2-24. Alternative 5 - Area summary of proposed motorized travel plan restrictions on the Fishlake National Forest (total of 1,454,380 acres for [2] and [4]).

District	Seasonal Winter Closure[1]	Travel on Designated Routes Only[2]	All Winter Closure[3]	Open Use Area[4]
Fillmore	23,308 acres	470,697 acres	68,111acres	690 acres
Beaver	20,987 acres	297,444 acres	48,038 acres	0 acres
Richfield	30,264 acres	422,387 acres	22,436 acres	0 acres
Loa	61,911 acres	262,974 acres	18,882 acres	189 acres
FOREST TOTAL	136,470 acres	1,453,501 acres	157,467 acres	879 acres

[1] this area designation is the same as the "A" area restriction on the current travel plan, but would only appear on the winter motor vehicle use map in Alternative 5.
[2] this is the same as the "B" areas on the current travel plan, and will not need to be shown on the summer motor vehicle use map because except for open use areas, the entire forest will be restricted to designated routes only.
[3] this is similar to the "C" restrictions on the current travel plan, but would only appear on the winter motor vehicle use map.
[4] this is the same as the unrestricted areas on the current travel plan, except that it is officially designated in the action alternatives and would be shown on the motor vehicle use map.

Table 2-25 shows the mileages for motorized route designations that would result from implementing Alternative 5. The data are displayed by ranger district.

Table 2-25. Alternative 5 - Motorized route mileage summary (grand total of all motorized designations = 2,820.2 miles).

District	Open Yearlong	Open Seasonally	Street Legal Vehicles Only	Administrative Use Only	Undesignated Open	Undesignated Closed
Fillmore	710.5	17.6	25.2	0.5	0	0

Table 2-25. Alternative 5 - Motorized route mileage summary (grand total of all motorized designations = 2,820.2 miles).

District	Open Yearlong	Open Seasonally	Street Legal Vehicles Only	Administrative Use Only	Undesignated Open	Undesignated Closed
Beaver	371.1	29.5	106.8	38.7	0	0
Richfield	651.8	232.8	71.8	16.6	0	0
Loa	321.1	143.6	59.9	22.6	0	0
FOREST TOTAL	2,054.5	423.6	263.7	78.4	0	0

Table 2-26 shows the types of changes to use designations that would create the mileages shown in Table 2-25. Tables that show detailed route designation and status changes for Alternatives 5 are located in Appendix E.

Table 2-26. Alternative 5 - Road and trail miles for the Fishlake National Forest where use designations would be changed.

FROM	TO	Roads	Trails
Open Yearlong	**Open Seasonally**	144.4	17.7
	Street Legal Only	35.9	0
	Administrative Use Only	8.2	0
	Non-motorized	7.6	11.2
	Obliterated	48.3	7.7
Open Seasonally	**Open Yearlong**	54.3	6.8
	Street Legal Only	0	0
	Administrative Use Only	0.8	0.6
	Non-motorized	0.2	0.2
	Obliterated	54.8	63.2
Street Legal Only	**Open Yearlong**	12.3	0
	Open Seasonally	0.4	0
	Administrative Use Only	1.1	0
	Non-motorized	0.3	0
	Obliterated	0	0
Administrative Use Only	**Open Yearlong**	0	0
	Open Seasonally	0	0
	Street Legal Only	0	0
	Non-motorized	0	0
	Obliterated	1.4	0
Undesignated Open	**Open Yearlong**	147.2	111.6
	Open Seasonally	43.3	38.9
	Street Legal Only	7.7	0

Table 2-26. Alternative 5 - Road and trail miles for the Fishlake National Forest where use designations would be changed.

FROM	TO	Roads	Trails
	Non-motorized	2.4	11.5
	Obliterated	134.4	250.6
Undesignated Closed	**Open Yearlong**	74.9	43.4
	Open Seasonally	8.2	0
	Street Legal Only	8.9	0
	Non-motorized	5.4	7.3
	Obliterated	39.6	108.1
Non-motorized	**Open Yearlong**	0	26.1
	Open Seasonally	0	5.2
	Street Legal Only	0	0
	Administrative Use Only	0	3.0
	Obliterated	0	29.8

Table 2-27 displays the route classification changes associated with Alternative 3 for the forest. The data are displayed by route type.

Table 2-27. Alternative 5 - Road and trail miles for the Fishlake National Forest where route type authorization would be changed.

FROM	TO			
	Forest Road	**Forest Motorized Trail**	**Forest Non-motorized Trail**	**Obliterate**
Forest Road		41.5	11.8	63.3
Forest Motorized Trail	1.6		11.2	9.4
Forest Non-motorized Trail	0	27.6		8.2
Unauthorized Road	322.3	12.8	4.2	215.2
Unauthorized Motorized Trail	2.6	242.3	19.0	420.2
Unauthorized Non-motorized Trail	0.1	6.5	99.8	21.6

Table 2-28 breaks out the individual and combined changes in use designation and authorization that are proposed to the existing travel plan for Alternative 5. Road and trail mileages are presented for the forest. Note that most of the existing route designations and classifications are not changing from current conditions.

Table 2-28. Alternative 5 - Forest route mileage summary of proposed use designation and authorization changes.

Route Type	Change in Designation Only	Change in Authorization Only	Change in Designation and Authorization	No Changes
Forest Roads*	273.4	39.5	77.1	1,581.5
Forest Motorized Trails	42.9	0	11.0	276.4
Forest Non-motorized Trails	27.6	0	8.2	856.1
Unauthorized Roads	215.5	39.5	299.4	0
Unauthorized Motorized Trails	422.1	26.7	235.3	0
Unauthorized Non-motorized Trails	21.6	99.8	6.7	0
Forest Totals	**1,003.1**	**205.5**	**637.7**	**2,714.0**

* State, Federal, and County roads located on forest are added for completeness even though they are not Forest Roads.

Table 2-29 shows that number of new barriers that would be constructed in Alternative 5. A map showing the location of these barriers is included on the CD-ROM maps and on the interactive map server linked to the project web page.

Table 2-29. Alternative 5 - Number of new travel barriers by use restriction and type.

Use Restriction	Closure Type	Number
Closure to All Motorized Use	Barrier	175
Closure to Motorized Vehicles > 50 inches in width	Barrier	3
Seasonal Closure to All Motorized Use	Gate	20
Administrative Use Only	Gate	21

Habitat Suitability

There are currently no threatened, endangered, or candidate aquatic species on the Fishlake National Forest (see Fishlake N.F. 2006 letter to the U.S. Fish and Wildlife Service and their reply). Since no threatened, endangered, or candidate aquatic species are present on the Forest, there will be no effect to any threatened, endangered, or candidate aquatic species from this project. Therefore, there will be no further discussion for aquatic species in these categories.

The project area contains suitable habitat for two aquatic sensitive vertebrate species that are known or suspected to occur on the Fishlake National Forest. Table 2 indicates the suitability of the project area for these Sensitive Species.

Table (2): Habitat Suitability for sensitive vertebrates known or suspected to occur on the Fishlake National Forest.

SUITABILITY OF HABITAT FOR SENSITIVE SPECIES		
SPECIES	**SUITABLE**	**HABITAT UNSUITABLE BASED ON THE FOLLOWING**
COLORADO CUTTHROAT TROUT *Oncorhynchus clarki pleuriticus*	**X**	
BONNEVILLE CUTTHROAT TROUT *Oncorhynchus clarki utah*	**X**	

Cumulative Effects Area

The cumulative effects analysis area for individual Colorado and Bonneville cutthroat trout populations are the individual HUC 6 sub-watersheds that support these Colorado and Bonneville cutthroat trout populations. These sub-watersheds can be identified by the HUC numbers in the tables in Appendix A for the Aquatic Biota Biological Evaluation, and by comparing these numbers to HUC maps in the project record. For the entire OHV Route Designation Project the cumulative effects analysis area for both the aquatic biota report and this aquatic Biological Evaluation for Colorado and Bonneville cutthroat trout is the same as the watershed cumulative effects area. This is the area bounded by the HUC 5 sub-watersheds on the Fishlake National Forest at and above pour points near the Forest boundaries. This area is shown in the FEIS in Figure 3-3. To help place the Forest-wide cumulative effects analysis in perspective, a supplementary write-up has also been prepared discussing the project with regard to cumulative effects and the past, present and potential threats listed in the Conservation Agreements and Strategies for these subspecies for their respective Southern Geographic Management Units (which contain the Fishlake N.F.). This discussion in Appendix C for the Aquatic Biota Biological Evaluation helps put the Fishlake N.F. situation into a broader regional (subspecies-wise) perspective.

Species Account, Life History and Habitat Status

The paper "Life History Trend Analysis of Endangered, Threatened, Candidate, Sensitive and Management Indicator Species of the Fishlake National Forest" (Rodriguez 2006, version 4.1) is a comprehensive description of life histories and habitat requirements for species that occur or have habitat on the Fishlake National Forest. This document also provides estimates on population trends for management indicator species, and addressed the likely persistence of these species at the Forest level. Principle habitats described in this paper were used to assess the sensitive species and the habitat conditions for Fishlake Access Management project. The following review of habitat requirements and reference conditions are a brief synthesis of information contained in this document, Rodriguez (2006, version 4.1), and is hereby incorporated by reference. This paper is located within the project file for this proposal. Potential effects and determinations are based in part upon the data presented in this document.

Species Effects

Colorado and Bonneville Cutthroat Trout

For a detailed description of habitat, reproduction and food requirements, see Rodriguez (2006). Because these species use similar habitats and forage on similar species they will be analyzed together.

Reference Condition: Life History

Both the Colorado and Bonneville cutthroat trout have been petitioned for listing as a threatened species under the Endangered Species Act. The Colorado cutthroat trout is currently under review to see if listing is warranted. The Bonneville cutthroat trout was found to be not warranted for listing by the U.S. Fish and Wildlife Service. Both subspecies are currently managed as a Regional Sensitive Species. Both cutthroat subspecies are also managed under an interagency Conservation Agreement and Strategy. These two native trout subspecies occupy about 1/10 of their historic habitat on the Forest.

Colorado cutthroat trout once occupied almost all stream miles on the Forest that could support trout that drained into the Colorado River basin, except areas above geologic barriers. There are currently 2 Colorado cutthroat trout populations on the Loa side of the Fremont River Ranger District analyzed in the cumulative effects analysis area for the OHV Route Designation project. The Colorado cutthroat trout population in UM Creek has been monitored yearly by the UDWR since 1999 as part of an ongoing study. The results of this study have not been published. The Sand Creek Colorado trout population was last monitored in 1999, although spot shocking of the stream was conducted in 2004.

Bonneville cutthroat trout are a unique subspecies of the western cutthroat trout complex, native to pluvial Lake Bonneville, which covered parts of Utah, Idaho, Nevada, and Wyoming up to 10,000 years ago. With desiccation of Lake Bonneville they became restricted to headwater streams and remnant lakes with suitable trout habitat. Bonneville cutthroat trout once occupied almost all stream miles on the Forest that could support trout that drained into the Pleistocene Lake Bonneville (Bonneville basin) except those above geologic barriers. There are currently 10 populations on the Fishlake N.F., with several more proposed reintroductions. Monitoring for Bonneville cutthroat trout has occurred on about a 7-year schedule, last completed in 2001-2002 (reported in Hepworth et al. 2003); additional monitoring of streams is conducted as needed.

Both cutthroat trout subspecies require cool, clean water with a variety of habitat types (shallow riffles to deep pools) to provide for all life stage needs such as spawning, rearing, low flow summer holding, and wintering habitat. They need stable vegetated banks to prevent sedimentation, and provide shade and overhead cover. They prefer cool summer water temperatures but can survive in water up to 70 degree F. Limitations to this species include loss of habitat and habitat simplification from man-made causes, although the greatest impact has been the loss of genetic purity as a result of hybridization and competition from non-native trout. Additional information can be found in Rodriguez (2006).

Existing Condition and method of analysis:

There are currently 2 Colorado cutthroat trout populations on the Loa side of the Fremont River Ranger District analyzed in the cumulative effects analysis area for the OHV Route Designation project. These populations are both reintroductions, although a few remnant Colorado cutthroat trout were present in the headwaters of UM Creek when the stream was rotenoned in the 1990s as part of a whirling disease control effort. Those fish were not genetically evaluated to determine their purity prior to their loss.

Known stream miles of Bonneville cutthroat trout have increased on the Fishlake N.F. since 1977 due to their reintroduction to several new Forest streams (although yet unknown remnant populations were likely becoming more restricted at the same time). This figure increased slightly by 2004 as they become established into two streams with recent reintroductions. There are now 8 known populations of >99% pure “core conservation” and 1 >90% pure “conservation” populations of Bonneville cutthroat trout inhabiting approximately 38 miles of stream habitat on the Fishlake National Forest (Rodriguez 2006). One other Bonneville cutthroat trout population is undergoing genetic evaluation to determine its status.

This Biological Evaluation tiers to and incorporates by reference the Watershed Report and the Aquatics Biota Information Supplemental Report and their supporting analysis, references, and other documentation in the project file. This Biological Evaluation for sensitive aquatic species is basically a subset of the process used for the Aquatic Biota report. The Watershed Report analyzed watershed and hydrologic measures by sub-watershed, breaking the forest into 71 HUC 5 and HUC 6 level sub-watersheds. For the Aquatic Biota report, all sub-watersheds with major fisheries values in relationship to the overall sub-watershed were used to define more specific resource values, trends and monitoring data, and project effects. This resulted in 48 HUCs being used in the Aquatic Biota report, most being HUC 6 but with a few of the larger HUC 5 sub-watersheds included. Table AB-1 in the Aquatic Biota report described aquatic biota resources in the HUC. Table AB-2 described recent monitoring, trend data, habitat impacts, and general habitat information. Table AB-3 summarized the extensive quantitative GIS analysis of 8 hydrologic and watershed measures done for the Watershed Report, which included areas open to cross-country travel in a specific watershed (Watershed report Table D-4), miles of encroaching motorized route (WR: Table D-1), miles of motorized route in the riparian influence zone (WR: Table D-2), stream crossing frequency (WR: Table D-3), motorized route density (WR: Table D-6), and miles of motorized route on sensitive soils (WR: Table D-9). Table AB-3 thus contains a mean normalized value for each alternative of these 8 measures for each of the 48 HUCs used in the Aquatic Biota report. Table AB-4 used a more qualitative approach using information known from field visits, maps, and the spatial relationship of the routes in comparison to aquatic resources. Finally, this quantitative analysis in Table AB-3 and the qualitative analysis in Table AB-4 was merged using the professional opinion of the forest fisheries biologist to make a call on the relative effect of each alternative for each HUC, which was shown in Table AB-5.

For the aquatic Biological Evaluation, the subset of HUCs that contain Colorado or Bonneville cutthroat trout or that are proposed for reintroduction of native cutthroat trout were selected out from the Aquatic Biota report for easier reference into Appendix A. Minor changes in wording were made to make the tables more specific to cutthroat trout. For example, HUC 140700030103 contains Seven Mile Creek, a brook trout fishery, and Tasha Creek, proposed for Colorado cutthroat trout reintroduction. The tables in the Aquatic Biota report included information for both creeks, but weighted more towards the larger Seven Mile Creek. The tables in Appendix A for the aquatic Biological Evaluation only include information on Tasha Creek, the stream proposed for reintroduction. Table ABBE-2 summarizes recent monitoring, trend data, habitat impacts, and general habitat information for cutthroat trout HUCs. Table ABBE-3 provides the summary normalized values for the quantitative GIS analysis for the cutthroat trout HUCs. Table ABBE-4 provides the qualitative analysis considering field visit information, routes, and spatial relationships. Finally, this quantitative analysis in Table ABBE-3 and the qualitative analysis in Table ABBE-4 was merged using the professional opinion of the forest fisheries biologist to make a call on the relative effect to cutthroat trout of each alternative for each HUC. The results are presented in Table ABBE-6 for Bonneville cutthroat trout and Table ABBE-7 for Colorado cutthroat trout.

Effects of the Proposed Action

Colorado and Bonneville Cutthroat Trout

Environmental Consequences

On the Fishlake National Forest major effects to aquatic biota are occurring due to system roads, non-system roads, and motorized trails, which generally run alongside streams and riparian zones and canyon

bottoms in areas where locations for routes are constrained, and often run near water even in unconstrained upper mountain headwaters and plateaus. Under the current OHV management situation OHV impacts are becoming a problem on several important forest aquatic habitats supporting cutthroat trout. While the concerns are currently secondary to those caused by National Forest roads and other management activities such as livestock grazing, this pattern of increasing use and impacts, especially in areas along streams, lakes and waterways will continue to increase cumulative effects to cutthroat trout. In time, it could become a primary issue of concern to these resources on many waters.

Direct Effects

Direct effects to Colorado and Bonneville cutthroat trout from all alternatives will be generally unlikely but may occur in uncommon situations. The most likely example of direct effects would include direct injury of eggs in spawning redds by an OHV crossing a stream or accidental introduction of toxic materials such as a large quantity of gasoline into the stream from an OHV while crossing the stream. The chance of spawning redds occurring directly at a crossing are highly unlikely, as is the likely event of a spill large enough to directly affect cutthroat trout. These risks would both increase in the event of unauthorized use of an OHV directly traveling in the streambed for extended distances. Such unauthorized use is rare but is increasing under the current management situation.

Indirect Effects

Indirect effects to Colorado and Bonneville cutthroat trout would be those effects that impact water quality and stream channel morphology. Indirect effects of motorized routes include increased stream channel confinement, reduced stream sinuosity, increased gradient, increased sedimentation, reduced riparian shading and decreased amounts of large woody debris (LWD). Easy access also generally increases the degree of land management activities in an area, such as grazing or timber harvest, and increases human activity such as recreation. All of these aspects can increase effects to aquatic habitat that in turn affect aquatic biota. Examples of potential effects are reduced carrying capacity due to the loss of cover, increased water temperature, degradation of water quality, introduction of fine sediment, and introduction of non-native organisms, or aquatic nuisance species (ANS). Fine sediment increases can change the species composition, diversity, and abundance of macroinvertebrates that provide food for these fish, as well as suffocate trout eggs and fry. It also can reduce pool volume, reducing suitable habitat for adults during low flow stream periods, as well as reducing wintering habitat carrying capacity. Finally, fine sediment can carry harmful nutrients and chemicals into the streams. The Watershed Report contains additional information on indirect effects of OHV use to water quality.

Environmental Consequences of the No Action Alternative

Because OHV use is occurring in watersheds containing Bonneville cutthroat trout and Colorado River cutthroat trout, under the No Action alternative native trout habitat will continue to be impacted by OHVs. High levels of impacts have been noted in a few native cutthroat streams such as UM Creek, Birch Creek (E), North Fork of North Creek, and Pine Creek, although some impacts are occurring in other native cutthroat watersheds. These impacts are also occurring in some streams proposed for reintroductions, such as Fish Creek. Table ABBE-4 shows current OHV concerns in Colorado and Bonneville cutthroat trout watersheds.

Under Alternative 1 a large percentage of most sub-watersheds are open to cross-country OHV travel. Drainage bottom use can affect fisheries due to the direct proximity to streams, including sedimentation, stream bank damage, and damage to vegetation. At present it is not a major problem on most streams, but

over the last 6 years field work has found more and more areas and incidents of OHV use in riparian areas, along streams, in wetlands, and even up stream channels. If use levels continue to increase and new routes continue to be pioneered in sensitive areas, OHV use could become a major problem on many streams in the near future. Table ABBE-6 summarizes the effects to Bonneville cutthroat trout and Table ABBE-7 the effects to Colorado cutthroat trout of the No Action alternative. In all of the sub-watersheds across the forest that contain Colorado or Bonneville cutthroat trout or are proposed for reintroductions, Alternative 1 will likely lead to increasing degradation of aquatic habitat from increasing OHV use and cross-country travel.

Environmental Consequences Common to all Action Alternatives

All of the action alternatives are greatly preferable to the existing situation (No Action alternative, Alternative 1). All make considerable improvements (i.e. reductions) in hydrologic measures such as miles of encroaching road, watershed acres open to cross-country travel, numbers of stream crossings, etc. The primary effect of implementing all action alternatives will be a major reduction in areas open to cross-country OHV use, which should reduce current ongoing and future impacts and reduce the proliferation of new unplanned user created routes. All action alternatives attempt to improve compliance and prevent motorized use of non-motorized use areas by installation of barriers. One factor of route design and selection was the ability to place barriers in effective sites. Finally, all of the action alternatives have obliteration of routes that are unneeded and/or have high resource impacts. Therefore, there is a relatively large change between the No Action alternative and all four of the action alternatives.

Recreational activities are often concentrated in riparian areas and along stream banks, which leads to stream bank damage, water quality problems, and potential transfer of Aquatic Nuisance Species (ANS) or the spread of diseases such as whirling disease. The action alternatives would reduce recreational impacts from dispersed camping in riparian areas by restricting OHV use to access to and from the camp site along existing routes while prohibiting travel between multiple dispersed sites, play areas, race tracks and travel across wet meadows and riparian areas.

At the individual HUC level the action alternatives effects would range from maintaining current habitat conditions on 2 cutthroat streams where OHV use is of little concern at present, to slight improvement in most cutthroat streams, to improved habitat conditions on 2-3 cutthroat streams (depending on the alternative selected).

Because OHV use will continue in watersheds containing Colorado and Bonneville cutthroat trout, OHV use under all of the action alternatives may impact Colorado or Bonneville cutthroat trout but will not likely lead to a trend towards federal listing of these cutthroat trout sub-species. Under current OHV use native trout habitat is being impacted by OHVs in several of the key native cutthroat streams such as UM Creek, Birch Creek (E), North Fork of North Creek, and Pine Creek, although some impacts are occurring in other native cutthroat watersheds. These impacts are also occurring in some streams proposed for reintroductions, such as Fish Creek. Under all of the action alternatives there would be some improvement to native cutthroat trout habitat, especially in the watersheds mentioned above. Tables ABBE-6 and ABBE-7 summarize the effects to Bonneville and Colorado cutthroat trout watersheds, respectively.

Relative Rankings of the Action Alternatives

The differences between the action alternatives are relatively minor between themselves, when compared to the No Action alternative. Generally speaking, there is a slight reduction (or improvement) of such measures of enchroaching road, riparian influenced road, area open to cross-country travel and other

hydrological values as one compares the later action alternatives to Alternative 2. When the hydrologic (Table ABBE-3) and aquatic biota (Table ABBE-4) measures are ranked and summarized across all HUCs (Table ABBE-6 and Table ABBE-7) Alternative 4 ranks as best for cutthroat trout. Alternative 3 and 5 ranked 2nd overall, in part due to the smaller (150') exemption for travel to reach established campsites. Alternative 5 does have small changes that opened short sections of routes that had been closed in Alternative 3, but not enough to cause a major difference in the rankings. Again, all 4 action alternatives are much better for cutthroat trout than the No Action alternative.

Environmental Consequences Specific to Alternative 2

Alternative 2 is generally less preferable than Alternatives 3, 4, and 5 for Colorado and Bonneville cutthroat trout due to the larger distance designation for access to dispersed camping sites in Alternative 2. There are also several changes in Alternatives 3, 4, and 5 that address specific fisheries concerns. There are some areas proposed for closure and obliteration or seasonal closure in Alternative 2 that are opened in Alternatives 3, 4 and 5, however. The most important specific change from Alternative 2 to Alternatives 3, 4, and 5 is the elimination of OHV travel from along the length of Fish Creek by Alternatives 3, 4, and 5. This user created OHV trail is the major impact to the stream in the upper Fish Creek watershed. Alternative 2 does not eliminate this trail and will allow impacts to continue to this upper stream and keep it from reaching its potential condition.

Environmental Consequences Specific to Alternative 4

Alternative 4 is most favorable for Colorado and Bonneville cutthroat trout, due to additional route closures and obliteration but would generally have relatively minor improvements for native cutthroat trout over Alternatives 3 and 5. This is due to the fact that much of the proposed obliteration is in the upper watersheds rather than adjacent to streams. There are a few specific areas where Alternative 4 would have additional benefits to Colorado and Bonneville cutthroat trout. These are UM Creek, where closure of the Left Hand Fork trail would reduce some sedimentation and lower the disease transfer risk to Colorado cutthroat trout. In Manning Creek closure of the trail past Barney Lake would help reduce sedimentation and impacts to Bonneville cutthroat trout. In Sam Stowe Creek motorized route closures in the upper watersheds would reduce sedimentation impacts to the stream slightly reducing impacts to Bonneville cutthroat trout.

Environmental Consequences Specific to Alternative 5

In Alternative 5, the upper Pine Creek (west Tusher Mts.- Bonneville cutthroat trout) route above the confluence with South Fork of Pine Creek that was closed to motorized travel in Alternatives 2, 3, and 4 will be designated as a motorized trail left open to OHVs. This route is currently little traveled and is actually brushing in over time, making travel in full sized vehicles difficult. There are management considerations for allowing motorized access for fuels management, livestock management, and livestock exclosure maintenance. Alternative 5 would likely result in a small improvement from current conditions by eliminating full-sized vehicle use on this upper canyon route. This route is in close proximity to the creek, contributes sediment directly to the stream in numerous areas, and has several stream crossings. If OHV use levels increase in the future, however, there could be an increase in effects from this route to the aquatic habitat given these factors. Monitoring of OHV use levels and impacts to the stream will be necessary to ensure that long-term effects are not negative. If monitoring indicates concerns, management adjustments may be needed.

Cumulative Effects

This write-up tiers to and incorporates by reference the cumulative impacts section of the main body of the Watershed Report, including its table of reasonably foreseeable actions (Appendix C of the Watershed Report). Table ABBE-6 and Table ABBE-7 made consideration of the actions listed in the Watershed Report table of reasonably foreseeable actions and effects from past actions when making the final determination of cutthroat trout cumulative effects trend by watershed for each alternative.

The cumulative effects analysis area for individual Colorado and Bonneville cutthroat trout populations are the individual HUC 6 sub-watersheds that support these Colorado and Bonneville cutthroat trout populations. These sub-watersheds can be identified by the HUC numbers in the tables in Appendix A for the Aquatic Biota Biological Evaluation, and by comparing these numbers to HUC maps in the project record. For the entire OHV Route Designation Project the cumulative effects analysis area for both the aquatic biota report and this aquatic Biological Evaluation for Colorado and Bonneville cutthroat trout is the same as the watershed cumulative effects area. This is the area bounded by the HUC 5 sub-watersheds on the Fishlake National Forest at and above pour points near the Forest boundaries. This area is shown in the FEIS in Figure 3-3. To help place the Forest-wide cumulative effects analysis in perspective, a supplementary write-up has also been prepared discussing the project with regard to cumulative effects and the past, present and potential threats listed in the Conservation Agreements and Strategies for these subspecies for their respective Southern Geographic Management Units (which contain the Fishlake N.F.). This discussion in Appendix C for the Aquatic Biota Biological Evaluation helps put the Fishlake N.F. situation into a broader regional (subspecies-wise) perspective.

In summary, water manipulation (irrigation diversions, dams, and municipal developments), livestock grazing, recreation, timber operations, chaining, reforestation and seeding of native and non-native plant species, fire suppression, natural and prescribed fire, pesticide application, noxious weed control, mining activities, fishing, introduction of non-native fish, fish stocking, and the accidental introduction of fish diseases within the cumulative effects area has affected these sensitive fish populations. One Colorado cutthroat drainage within the analysis area is infected with whirling disease (UM Creek). Fish stocking of non-native fish species no longer occurs in these watersheds (sterile hybrid Tiger trout have been stocked in UM Creek in the past to meet sport fishing demand while the native cutthroat trout population was rebuilding).

Reasonably foreseeable future activities – There are two reasonably foreseeable future activities that deserve special mention in this report as they are likely in the cumulative effects area for these cutthroat trout populations and they have potential for short-term and long-term beneficial and negative effects. First is an increased level of upland vegetation treatments to reduce fire fuel loading, set back succession to earlier seral stages, restore browse stand vitality, improve wildlife habitat, and restore a more natural fire regime. These projects are part of the national Healthy Forests and various wildlife habitat initiatives. Increased vegetation treatment levels could increase sedimentation impacts to these streams in the short-term, temporarily reducing carrying capacity. Use of Best Management Practices (BMPs) and the Forest Plan General Direction of “special protection and management” within 100 feet of a stream should reduce impacts. Long-term this project work may reduce the risk of catastrophic fire, reducing the risk of loss of these populations from wildfire.

The second reasonably foreseeable future activity is continued Colorado and Bonneville cutthroat trout reintroductions on the Forest as a cooperative project between the Utah Division of Wildlife Resources and the Fishlake National Forest. Future vegetation treatments and reintroductions may go hand in hand

to reduce fire risk before reintroductions, while new introductions reduce the risk of vegetation treatments to established populations.

When looking at the overall cumulative effects and risks to populations such as these, it is helpful to review the suite of risks to long-term persistence of these populations. Rieman et al. (1993) presented an excellent overview of these risks, which are further discussed in Appendix B for the Aquatic Biota Biological Evaluation. One important point is that these populations face risks from several factors, some of which are beyond the control of management (such as droughts, widespread wildfires during droughts, etc.). Long-term climate change since the Pleistocene has naturally fragmented some populations, while historic diversions, roads, and other man caused changes have further fragmented and isolated them. Isolated populations are more at risk to local extirpation. Three points that come from this review for the small and fragmented cutthroat populations on the Fishlake N.F. – 1) monitoring the populations so management can intervene if problems arise is important, 2) long-term it is important to restore cutthroat populations into high quality habitat and develop meta-populations if possible, and 3) improving habitat quality can reduce the risks of these cutthroat populations to factors beyond our control. In Appendix B the populations and genetic stocks on the Fishlake N.F. are shown relative to the factors discussed in Rieman et al. (1993). Thus the action alternatives, which will slightly improve to improve almost all of the native cutthroat trout stream's habitat, and maintain it in the two watersheds where OHVs are not currently a major issue, will make these populations more secure compared to the current situation.

Therefore, the effects of the past, present, and reasonably foreseeable activities listed above in combination with this proposed action may impact Colorado and Bonneville cutthroat trout individuals and/or their habitats but is not likely to cause a trend toward federal listing or a loss of viability. Some reasonably foreseeable activities could further increase the number of stream miles, distribution, and security of these cutthroat trout subspecies on the Fishlake National Forest.

DETERMINATION

As a result of this evaluation it is my determination that implementation of the proposed OHV Route Designation Project may impact individuals or habitat of the sensitive aquatic species Colorado and Bonneville cutthroat trout that occur in the project area, but the proposed activities will not likely contribute to a trend towards federal listing or cause a loss of viability to the populations or species for these two native cutthroat trout subspecies .

RATIONALE FOR DETERMINATION

1. OHV use occurs in the sub-watersheds containing Colorado and Bonneville cutthroat trout. Therefore, some indirect effects are already occurring on these cutthroat trout streams (Tables ABBE-2 and ABBE-4 describe habitat conditions and current OHV concerns). Under the proposed action OHV use will continue, but it will occur on designated routes only (except for two open areas not located near cutthroat trout habitat) and with greater enforcement measures and use restrictions to protect habitat quality.

2. Monitoring since 2000 of Colorado and Bonneville cutthroat trout streams have found almost all established populations to be generally stable. Reintroduced populations have been building (increasing) in numbers.

3. The one Bonneville cutthroat trout stream that has shown a downward trend in population monitoring was Birch Creek (West). This stream has few OHV impacts at present. OHVs are not believed to be a factor in the decline of this population, which was likely due more to long-term drought, naturally marginal stream habitat, combined with other management impacts (note: improved management in 2002-2003 improved habitat conditions). All action alternatives would at least maintain habitat conditions on Birch Creek (W) and prevent new OHV impacts from developing, which is critical to maintain this population. The slight improvement shown by Alternative 4 would not practically improve this population's security as it closes a trail in the headwaters above the population that likely has very minimal sediment delivery impacts (Table ABBE-6).

4. All action alternatives would either slightly improve to improve cutthroat trout habitat on all of the remaining Bonneville cutthroat trout streams compared to current conditions (Table ABBE-6).

5. The one Colorado cutthroat trout stream (proposed for reintroduction) where habitat would be maintained has almost no current OHV concerns and has relatively good habitat conditions. All action alternatives would prevent new OHV impacts from developing in this sub-watershed, which will maintain and protect this habitat (Table ABBE-7).

6. The other two Colorado cutthroat trout steams have some OHV concerns at present. These would be either slightly improved or improved by all action alternatives compared to current conditions (Table ABBE-7).

7. As noted in the discussion under the Cumulative Effects section regarding using the Rieman et al. (1993) paper to evaluate Forest cutthroat trout streams, the action alternatives, which will slightly improve to improve almost all of these native cutthroat stream's habitat, and maintain it where OHVs are not currently an issue, will make these populations more secure compared to the current situation.

MITIGATION MEASURES

1. For Alternative 5 monitor OHV use levels, OHV use compliance, the Bonneville cutthroat trout population, and aquatic habitat conditions in upper Pine Creek (west Tusher Mts.) to ensure motorized use and increasing use levels are not creating an increase in impacts over time.

2. Findings of any new problems or impacts to Colorado or Bonneville cutthroat trout related to motorized recreation will be immediately reported to the Forest Fisheries Biologist.

ADDITIONAL LITERATURE REVIEWED

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APPENDICES

FOR

COLORADO AND BONNEVILLE

CUTTHROAT TROUT

FOR THE

BIOLOGICAL EVALUATION OF

SENSITIVE ANIMALS

FOR THE

OHV ROUTE DESIGNATION PROJECT

APPENDIX A

AQUATIC BIOTA BE – SUMMARY CUTTHROAT TABLES

The tables below are *numbered* consistently to correspond with the tables AB-2 through AB-7 in the Watershed and Aquatic Biota report. For more information on how tables were derived, please see the Watershed and Aquatic Biota report pages 123-160.

Note: HUC 140700030103 in the Watershed and Aquatic Biota report includes both Seven Mile Creek and the smaller Tasha Creek. In this appendix, the HUC description ONLY includes Tasha Creek, which is proposed as a reintroduction stream for Colorado cutthroat trout. Other small differences between these tables and those in the Watershed and Aquatic Biota report are also due to the native cutthroat emphasis of these tables.

Table ABBE-2a: Bonneville Cutthroat Trout Habitat Condition

HUC Number	Macro-invert.	Trout information	Surveys	Current habitat impacts	Limiting Factors	Current Habitat Condition Summary
160300010603 Birch Creek E	At or near S&G. Down-ward trend.	B cutthroat trout – increased since 2001 plant but still limited by habitat conditions.	Spot shock 2003, 2004, 2006 IRE 2004	Grazing, wildfire, OHV	Limited flow, pool volume	Wildfire impacts to marginal habitat with grazing effects extripated wild brook trout population in 1996. Habitat improved after 5 years rest but current impacts and marginal habitat limit fisheries.
160300030101 Fish Creek*	Below S&G. No trend data	Brown trout Rainbow trout Proposed for B. cutthroat trout reintroduction.	Electroshock 2003, 2006 IRE 2005	OHV, grazing, past flooding damage (1983), historic mining	Sedimentation (upper), Temperature (lower), channel morphology/ few pools (from mill to I-70)	Upper stream is in relatively good condition but is impacted by user created OHV route along stream. Area from mill to I-70 affected by grazing, OHV trail, which has limited recovery from 1983 flooding.
160300030102 Shingle Creek*	Below S&G. No trend data	Brown trout Rainbow trout Proposed for B. cutthroat trout reintroduction	Electroshock 2002, 2003, 2004 IRE 2005	Grazing (lower), Prescribed fire, recreation, OHV	Sedimentation, temperature, channel/pool (lower)	Upper stream is in relatively good condition. Lower stream affected by grazing and recreational use. Fish distribution appears to be limited by temperature at lower end.
160300030103 Three Creeks / Pole Creek*	Slightly below S&G. No trend data	Rainbow trout, cutthroat hybrids. B cutthroat trout headwaters	Electroshock 2003 IRE 2005 Genetic samples 2001, 2006	Grazing, OHV use pioneered along stream in 1 mile 2006	Flow, sedimentation	Generally in good condition
160300030105 Sam Stowe Creek	Below S&G. Downwa rd trend	B cutthroat trout	Electroshock 2002 IRE 2005	-	Low flow, sedimentation, pool volume	Naturally limited flow, recovering from past impacts

HUC Number	Macro-invert.	Trout information	Surveys	Current habitat impacts	Limiting Factors	Current Habitat Condition Summary
160300030203 Manning Creek	Mostly above S&G. Static trend.	Upward trend following reintroduction	Electroshock 2001 IRE 2004	Grazing, high recreational use, OHV	Water quality (reservoirs)	Most of drainage is in good condition. Impacts mainly occurring in upper headwaters around and between reservoirs and on some tributaries
160300030204 Ten Mile Creek	Above S&G. No trend data	Upward trend following reintroduction	Electroshock 2004 IRE 2003	Grazing, OHV	Low flow, pool volume, sedimentation	Stream heavily impacted in past. Much of stream downcut. Succession has also increased conifer shading affecting riparian vegetation.
160300030205 Pine Creek* (Bullion Canyon)	ND	Rainbow trout, cutthroat trout. Proposed for B. cutthroat reintroduction.	Visual inspection, Electroshock 2005 by UDWR (1 station-upper) IRE 2006	High recreational use (lower), road	Inherently flashy watershed	Upper watershed is in good condition. Some impacts to lower watershed from road. Flashy watershed subject to flooding damage.
160300030402 Upper Salina	Slight below S&G. Static trend.	B. cutthroat trout present, Unk. trend. Presence of Brown trout Rainbow Trout Brook trout	Electroshock 2000, 2003, 2004 IRE 2003 Genetic Samples 2001, 2004, 2005	Grazing, recreation (lower), road (lower), erosive soils	Water quality, sedimentation, Pools	Upper watershed in relatively good condition. Heavy recreation use affects riparian and stream banks along road. Some grazing impacts. Some road impacts. Some private land in poor condition.
160300030602 Willow Creek*	Below S&G. Downward trend.	Intgrogressed B. Cutthroat trout present. Rainbow trout	Electroshock 2000, 2003 Genetic sample 2003	Grazing, recreational use, road, erosive soils	Sedimentation, erosive soils, pool volume	Upper watershed in relatively good condition. Some impacts from erosive soils. Impacts from road, grazing, and recreation where stream is along road. Sedimentation limits trout population.
160300070203 South Fork of North Creek*	ND	Proposed for B. cutthroat reintroduction	IRE 2002	Dam/water management	-	Stream is near potential condition.
160300070206 Birch Creek W	Below S&G. Downward trend	Trend down to very low numbers	Electroshock 2001 IRE 2002	Grazing	Low flow, pool volume, sedimentation, temperature (lower)	Marginal stream had impacts limiting fish supporting potential. Improved management in 2002, 2003 improved habitat conditions.
160300070208 North Fork of North Creek	Below S&G. No trend data	Trend up after reintroduction. 2005 flooding effects unknown.	Electroshock 2001 IRE 2002	Road, grazing, recreation, OHV	Pool volumes, sedimentation	Stream has excessive riffles from past watershed impacts. Current impacts from road, grazing, and OHVs. Additional flood impacts in May 2005

HUC Number	Macro-invert.	Trout information	Surveys	Current habitat impacts	Limiting Factors	Current Habitat Condition Summary
160300070501 Pine Creek (Tusher Mts)	Below S&G.	Bonneville cutthroat trout – trend static at low numbers 1995-2001, slightly up by 2005 after grazing rest for prescribed fire.	Electroshock 2001, 2005 IRE 2002	Grazing, road along creek with numerous stream crossings, recreation, prescribed fire	Pool volume, sedimentation	Increased sedimentation and bank damage has limited cover and pools.

* = Proposed for reintroduction (in some cases only a portion of the stream)

Table ABBE-2b: Colorado Cutthroat Trout Habitat Condition

HUC Number	Macro-invert.	Trout information	Surveys	Current habitat impacts	Limiting Factors	Current Condition Summary
140700030101 UM Creek	Mostly below S&G. Downward trend at WF	Headwaters and exclosures improving. Population in mainstem increasing since reintroduction but whirling disease effects increasing	Electroshock 1999-2006 IRE 2002	Grazing, heavy recreational use, OHV	Sedimentation, temperature, whirling disease	Habitat condition is improving since 2002, esp. in exclosures, but is still below potential. Meadows have lost woody shrubs. Stream is excessively wide in places and stream bottom is excessively silty.
140700030103 Tasha Creek portion only*	Near S&G level. No trend data.	Brook trout	Electroshock 2003 IRE 2002	Some grazing and recreational use	Relatively low flow stream.	Generally appears to be in good condition. Beaver active in drainage.
140700030304 Sand Creek	ND	Unknown trend since 1999	Spot shock 1999, 2004 IRE 2006	Water management Road/route (lower)	Temperature, flashy watershed, sediment (sand), flow	Upper stream in pretty good condition. Lower affected by flooding and water management.

* = Proposed for reintroduction

For additional information on how tables ABBE-3a and ABBE-3b were developed, see the Watershed and Aquatic Biota report pages 134-135. The alternative with the lowest mean value of the hydrological impact measures for a given HUC was assigned a level of 1. The other table values were then calculated to show the relative increase in the measure values for that alternative for each HUC. To create the summary table, the mean value for each alternative was calculated from the normalized values for the 8 hydrologic measures. The smaller the table values the less impact or potential impact will occur to cutthroat trout habitat.

Table ABBE-3a: Bonneville Cutthroat Trout Normalized Hydrological Measures

HUC Number	Hydrological Alternative Ranking (comments)				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
160300010603 Birch Creek E	2.5	1.3	1.1	1	1.2
160300030101 Fish Creek*	5.6	1.7	1.1	1	1.1
160300030102 Shingle Creek*	4.2	1.5	1.2	1	1

HUC Number	Hydrological Alternative Ranking (comments)				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
160300030103 Three Creeks / Pole Creek*	6.1	1.7	1.3	1	1.2
160300030105 Sam Stowe Creek	3.9	1.6	1.2	1	1.2
160300030203 Manning Creek	8	1.9	1.4	1	1.4
160300030204 Ten Mile Creek	19.6	1.4	1	1	1
160300030205 Pine Creek* (Bullion Canyon)	4.1	1.4	1.1	1	1
160300030402 Upper Salina Creek	NC	NC	NC	NC	NC
160300030602 Willow Creek*	1.9	1.9	1.5	1	1.6
160300070203 South Fork of North Creek*	5.4	1.6	1.1	1	1.1
160300070206 Birch Creek W	3.3	4.6	3.5	1	3.5
160300070208 North Fork of North Creek	4.6	1.5	1	1	1
160300070501 Pine Creek (Tusher Mts)	16.5	1.6	1.2	1	2.2
Mean Value Summary by Alt. of Table AB-3	6.6	1.8	1.4-	1	1.4+

* = Proposed for reintroduction.

NC: Indicator data for this HUC6 sub-watershed was not calculated.

Table ABBE-3b: Colorado Cutthroat Trout Normalized Hydrological Measures

HUC Number	Hydrological Alternative Ranking (comments)				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
140700030101 UM Creek	7.7	2	1.6	1	1.7
140700030103 Seven Mile Creek inc. Tasha Creek*	3	1.4	1	1	1.1
140700030304 Sand Creek	2.7	1.4	1.3	1	1.5
Mean Value Summary by Alt. of Table AB-3	4.5	1.6	1.3	1	1.4

* = Proposed for reintroduction

For additional information on how tables ABBE-4a and ABBE-4b were developed, see the Watershed and Aquatic Biota report pages 137-138. For this table fisheries survey results, IRE Level II survey and the field experience and professional opinion of the forest fisheries biologist were utilized while looking at maps of specific routes, especially those near aquatic habitat by sub-watershed for each alternative. This step primarily considered current routes, user patterns, and the proposed travel route for each alternative, and was primarily qualitative with greater emphasis on the spatial location of impacts and routes with greater concern/weighting for routes and impacts close to streams and lakes.

Table ABBE-4a: Bonneville Cutthroat Trout Effects Ranking by Alternative

HUC Number	Current OHV Concerns	Fisheries Alternative Ranking (rationale)				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
160300010603 Birch Creek E	OHV use in upper watershed has increased sedimentation and captured stream, reducing potential habitat.	Increased impacts.	Improved conditions due to route closure above campground.	Same as Alt. 2	Same as Alt. 2	Same as Alt. 2
160300030101 Fish Creek*	Formerly un-roaded drainage has user created OHV route along majority of the stream with numerous stream crossings.	Increased impacts.	Improvement due to OHV use limited to about 3 miles of stream from Old Mill to access point S of I-70.	Greater improvement due to elimination of OHV use along all of stream. One stream crossing remains. Majority of Fish Creek will be able to reach its potential.	Same as Alt. 3	Same as Alt. 3
160300030102 Shingle Creek*	Most of drainage does not have a motorized route near stream. Access at lower and one upper site.	Increased impacts.	Slight improvement due to Street Legal only designation in upper watershed.	Same as Alt. 2	Very slight improvement over Alt. 2 due to elimination of one stream crossing.	Very slight improvement over Alt. 2 due to closure short way from stream in upper watershed.
160300030103 Three Creeks / Pole Creek*	Most of the fish-supporting stream currently receives almost no OHV use, access currently by foot trail. However, OHV use pioneered along 1 mile of Pole Cr. in 2006 during fire suppression work. Some impacts in upper watershed above Three Creeks Reservoir.	Increased impacts.	Closure to cross-country travel and barriers should maintain current conditions in most of watershed and slightly improve middle watershed by closing pioneered trail.	Same as Alt. 2	Very slight improvement over Alt. 2 due to route obliteration in upper watershed.	Same as Alt. 2

HUC Number	Current OHV Concerns	Fisheries Alternative Ranking (rationale)				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
160300030105 Sam Stowe Creek	Most of the drainage is too vegetated and rugged for OHV use. Some access into headwaters.	Potential for increased impacts in headwaters or after fire.	Closure to cross-country travel and barriers should maintain current conditions.	Same as Alt. 2	Improvement in headwaters due to route obliteration along upper drainage bottom.	Same as Alt. 2
160300030203 Manning Creek	Most of the drainage is too rugged for OHV use, but impacts are increasing in the headwaters, especially around Barney Reservoir.	Increased impacts to lake water quality and critical amphibian habitat.	Closure to cross-country travel and barriers should slightly improve current habitat conditions.	Same as Alt. 2	Improvement in water quality at Barney Reservoir due to route closure past lake.	Same as Alt. 2
160300030204 Ten Mile Creek	OHV use is pioneering along stream bottom and could increase impacts to marginal but important stream.	Increased impacts.	Slight improvement due to closure of route beyond Bumblebee Spring.	Same as Alt. 2	Same as Alt. 2	Same as Alt. 2
160300030205 Pine Creek* (Bullion Canyon)	Popular OHV loop with lower section on system road and upper route away from creek. Upper watershed has no motorized use.	Potential for increased impacts.	Partial closure of Bullion pasture, closure to cross-country travel and barriers should slightly improve habitat conditions.	Partial closure of Bullion pasture, closure to cross-country travel and barriers should slightly improve current conditions.	Same as Alt. 3	Complete closure of Bullion pasture to motorized use, closure to cross-country travel, barriers should improve habitat conditions.
160300030402 Upper Salina Cr.	Some OHV use and concerns in dispersed rec sites but much of upper watershed already closed to OHV use.	Potential for increased impacts.	Slight improvement.	Slight improvement but less obliteration than Alt. 2	Slightly more improvement than Alt. 2 due to minor additional obliteration.	Same as Alt. 3
160300030602 Willow Creek*	Minor impacts occurring at some dispersed recreation sites.	Increased impacts.	Closure to cross-country travel and barriers should maintain habitat conditions.	Same as Alt. 2	Same as Alt. 2	Same as Alt. 2

HUC Number	Current OHV Concerns	Fisheries Alternative Ranking (rationale)				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
160300070203 South Fork of North Creek	Minimal OHV impacts at present.	Potential for increased impacts.	Closure to cross-country travel and barriers should maintain habitat conditions, except greater snow closure in headwaters may have slight protection for water quality.	Closure to cross-country travel and barriers should maintain habitat conditions.	Same as Alt. 3	Same as Alt. 2
160300070206 Birch Creek W	Minimal impacts occurring at present. One OHV trail crossing in headwaters.	Potential for increased impacts.	Closure to cross-country travel and barriers should maintain habitat conditions.	Same as Alt. 2	Similar to Alt. 2 with very slight improvement due to one trail closure in headwaters.	Same as Alt. 2
160300070208 North Fork of North Creek	Impacts from road, vehicles, and OHV use occurring along majority of occupied habitat.	Increased impacts.	Closure to cross-country travel and barriers should slightly improve habitat conditions.	Similar to Alt. 2 with slightly improved conditions due to minor obliteration.	Same as Alt. 3	Same as Alt. 3
160300070501 Pine Creek (Tusher Mts)	Impacts from road and OHV use occurring along majority of occupied habitat.	Increased impacts.	Improved conditions due to closure of motorized route above S. Fork of Pine Creek.	Same as Alt. 2	Same as Alt. 2	Continued route and use impacts along most of occupied habitat. Slight potential for short-term improvement due to no street legal motorized vehicles above S. Fork of Pine Creek. Less impact than Alt. 1 but more than Alts. 2, 3, and 4. Potential for long-term increase in impacts if motorized use levels increase. Monitoring of use levels necessary.

* = Proposed for reintroduction

Table ABBE-4b: Colorado Cutthroat Trout Effects Ranking by Alternative

HUC Number	Current OHV Concerns	Fisheries Alternative Ranking (rationale)				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
140700030101 UM Creek	Increasing sedimentation to stream from heavy dispersed recreation use including OHV use in riparian areas and wetland meadows and OHV use on foot and horse trails along stream. Potential for contamination of upper Right Fork with whirling disease.	Motorized use levels are increasing. OHV use is creating additional routes and OHV use is increasing on former foot and horse trails. Increased impacts and continued decline in habitat conditions expected, although exclosures will allow recovery of some high use areas.	Improved conditions due to elimination of OHV use on foot and horse trails along stream and preventing the creation of new routes. Some obliteration of routes in lower watershed.	Slightly less improvement compared to Alt. 2 due to less obliteration in lower watershed, somewhat offset by lower distance designation for dispersed camping. Areas of most concern are addressed by this alternative, however.	Most improvement due to the greatest amount of route obliteration. Elimination of the Left Fork route reduces disease transmission risk.	Similar to Alt. 3, but slightly more designated routes on uplands offset with greater seasonal closures. Slightly less improvement compared to Alt. 2 due to less obliteration in lower watershed, somewhat offset by lower distance designation for dispersed camping. Areas of most concern are addressed by this alternative, however.
140700030103 Seven Mile Creek (Tasha Creek portion only*)	A minimal concern at present but use is increasing.	Potential for increased impacts.	Tasha Creek portion - Closure to cross-country travel and barriers should maintain habitat conditions.	Same as Alt. 2	Same as Alt. 2	Same as Alt. 2
140700030304 Sand Creek	OHV route parallels stream. Some impacts to lower potential habitat but most impacts from routes (and hydro diversions) are below potential trout habitat.	Increased impacts.	Closure to cross-country travel and barriers should maintain habitat conditions.	Same as Alt. 2	Closure of route below the confluence with Hells Hole may improve lower potential habitat slightly.	Same as Alt. 2

* = Proposed for reintroduction

For additional information on how tables ABBE-6 and ABBE-7 were developed, see the Watershed and Aquatic Biota report page 143. To develop the final summary table of combined effects the forest Fisheries Biologist compared Table AB-3, which displayed the effects to aquatic biota based on ***quantified*** hydrologic indicator measures across the entire sub-watershed, and Table AB-4, which more ***qualitatively*** described the known and potential effects to aquatic biota from routes considering their spatial arrangement across the landscape, i.e. with heavier weighting for routes that were within close proximity to aquatic resources.

Table ABBE-6: Bonneville Cutthroat Trout Summary

HUC Number	Bonneville Cutthroat Trout Effects				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
160300010603 Birch Creek E	Increased impacts	Improvement	Improvement	Improvement+	Improvement
160300030101 Fish Creek*	Increased impacts	Improvement	Improvement+	Improvement++	Improvement++
160300030102 Shingle Creek*	Increased impacts	Improvement	Slight improvement+	Slight improvement++	Slight improvement++
160300030103 Three Creeks / Pole Creek*	Increased impacts	Slight improvement	Slight improvement+	Slight improvement++	Slight improvement+
160300030105 Sam Stowe Creek	Potential for increased impacts	Slight improvement	Slight improvement+	Slight improvement+	Slight improvement+
160300030203 Manning Creek	Increased impacts	Slight improvement	Slight improvement+	Improvement	Slight improvement+
160300030204 Ten Mile Creek	Increased impacts	Slight improvement+	Slight improvement++	Slight improvement++	Slight improvement++
160300030205 Pine Creek (Bullion Canyon)*	Potential for increased impacts	Slight improvement	Slight improvement	Slight improvement	Slight improvement+
160300030402 Upper Salina Creek	Potential for increased impacts	Slight improvement	Slight improvement	Slight improvement+	Slight improvement
160300030602 Willow Creek*	Increased impacts	Proposed actions maintain habitat condition	Slight improvement	Slight improvement+	Slight improvement
160300070203 South Fork of North Creek*	Potential for increased impacts	Slight improvement	Slight improvement+	Slight improvement+	Slight improvement+
160300070206 Birch Creek W	Potential for increased impacts	Proposed actions maintain habitat condition	Proposed actions maintain habitat condition	Slight improvement	Proposed actions maintain habitat condition
160300070208 North Fork of North Creek	Increased impacts	Slight improvement	Slight improvement+	Slight improvement+	Slight improvement+
160300070501 Pine Creek (Tusher Mts)	Increased impacts	Improvement	Improvement	Improvement	Slight improvement

* = Proposed for reintroduction

Table ABBE-7: Colorado Cutthroat Trout summary

HUC Number	Colorado River Cutthroat Trout Effects				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
140700030101 UM Creek	Increased impacts	Improvement	Improvement +	Improvement++	Improvement+
140700030103 **Tasha Creek portion only***	Potential for increased impacts	Proposed actions maintain habitat condition	Proposed actions maintain habitat condition	Proposed actions maintain habitat condition	Proposed actions maintain habitat condition
140700030304 Sand Creek	Increased impacts	Slight improvement	Slight improvement+	Slight improvement++	Slight improvement

* = Proposed for reintroduction

APPENDIX B

AQUATIC BIOTA BE – RISKS TO CUTTHROAT TROUT PERSISTENCE

Risks to Persistence

Rieman et al. (1993) reviews processes that contribute to local and regional extinctions of salmonids. Planning and assessments need to consider habitat disruption and population response at the local and regional scale and replication, dispersion, and connections among populations. They note that extinction risks for salmonids are influenced by complex interacting factors that are difficult to quantify. Quantitative viability analysis models have been developed for use in situations such as anadromous salmon populations where extensive data collection and passage counts at dams have allowed estimation of fecundity and survival parameters for different life stages. This data is not available for Bonneville and Colorado River cutthroat trout populations on the Fishlake National Forest, nor is it reasonable to obtain (due to cost and sampling impacts to the population being monitored). Given the lack of data, Rieman et al. (1993) provides a useful understanding of the nature of extinction process that can be used to formulate management prescriptions that minimize risks to individual populations.

Risks to local populations can be described as deterministic, stochastic, and genetic. Deterministic processes are a change in the environment that result in a sustained decreased birth rate or increased death rate. Examples for trout would be elimination of large wood decreasing the number of large pools needed during low summer flows of overwinter habitat, increase in fine sediments that degrade spawning habitat, and increased competition or predation with introduction of exotic fish. Rieman et al. (1993, p. 2) notes that "Any habitat change that irreversibly reduces survival or growth at any life stage increases the risk of deterministic extinction" and that "Much, if not most, of the loss of salmonid populations probably results from habitat change and other actions…..that induce deterministic responses".

Stochastic processes are chance events. They can be further categorized as environmental and demographic. Environmental stochastic processes include drought and catastrophic fire events. Catastrophic fire events and subsequent flooding lead to the loss of 4 Bonneville cutthroat trout populations in southern Utah from 2001 through 2003 (Note: some of these have been refounded by reintroductions and work to reintroduce the other populations is in progress). Drought has become an increasing concern in recent years. Demographic stochastic processes – small random variations in birth and survival rates – can also lead to extinction and is most of concern in very small populations. Temporal variability that affects recruitment and survival is another component of this stochastic risk. Habitat complexity, watershed health, and weather patterns are integrated into the total risk component. Stable flow regimes and weather patterns, complex habitat that provides refuges and healthy watershed conditions would combine for a low risk. Frequent flood and drought events (common in southern Utah), coupled with poor watershed conditions that make the watershed more "flashy" and simplified habitat that provides less refuges would raise this risk to high.

Some important points raised by Rieman et al. (1993) regarding stochastic events are that the risk increases sharply as populations drop below 1,000-2,000 individuals, and that loss of habitat (quality and quantity, i.e. smaller less complex habitats) increases the risks from stochastic events.

Genetic risks are more theoretical, but are based on modeling that indicates minimum population sizes are needed to maintain the genetic diversity of a population and prevent genetic drift or inbreeding depression. One suggested population level for maintaining genetic diversity in closed populations is the 50/500 rule, where 50 is the minimum needed to prevent inbreeding and 500 is needed to maintain genetic variation (Rieman et al. 1993). This is effective (breeding animals) population size, which is less than (or a subset of) the total population. Recent experience suggests that genetic risks are a secondary concern compared to environmental stochastic processes. These processes can interact to increase the risks to populations. Habitat changes, for example, that isolate, simplify, or reduce the amount of habitat can increase the risk to a population from environmental stochastic events or genetic factors.

Rieman et al. (1993) goes on to note that local extinctions were and still are part of a natural part of regional population dynamics. Connected populations that form a "metapopulation" allow for dispersal, emigration, and recolonization that help regional populations survive. Land management has also disrupted metapopulation processes by water diversions, dams, habitat changes, and introductions of exotic species. Some streams in southern Utah have become naturally isolated by climate change since the Pleistocene due to either reduced stream flows drying up connections or water warmer than salmonids can tolerate becoming thermal barriers. The island mountain geography also naturally fragments habitat, reducing metapopulation potential in the Intermountain West. Rieman et al. (1993, p. 7) conclude that "We believe maintaining strong populations in the best possible habitats throughout the landscape and preserving metapopulation structure and function are the best hedges against extinction". [Note - there have also been some benefits to local populations from isolation. This has primarily been protection from non-native trout species that allowed pure remnant genetic stocks to survive. It is also useful to help prevent the spread of Aquatic Nuisance Species (ANS) and diseases. Where local populations are isolated, fisheries biologists must take the role of the dispersal and recolonization agent.]

Based on the above discussion, the Bonneville and Colorado River cutthroat trout streams within the project area have been individually rated using the professional opinion of James Whelan, forest fisheries biologist, based on existing population and habitat data, and entered into tables below derived from *Table 1: Relative risk of extinction for local populations* found in Rieman et al. (1993, p. 8). It is important to understand that the action alternatives – route and area designation including closure of the forest to unrestricted cross-country travel, elimination of impactive routes, and enforcement actions such as barriers - affects primarily the growth and survival category rated as a deterministic risk. It must be kept in mind those changes due to the OHV route designation project affects one variable within the larger suite of risk elements, many of which are fixed (not affected by management actions) regardless of the effects of this proposed action. Also, other land management uses (such as livestock grazing) and management changes may affect growth and survival (deterministic risk).

The tables below describe the current management conditions, which would be maintained, slightly improved, or improved under the action alternatives. The No Action alternative would result in potential and actual increased motorized recreation impacts over time, which would decrease habitat quality and possibly quantity, increasing the risk of local population extinctions.

Bonneville cutthroat trout

Birch Creek East

Population Characteristics	Nature of Risk - Primary	Risk of Local Population Extinction			
		Low	Moderate	High	Extreme
Temporal Variability	Stochastic			X	
Population Size	Stochastic		X		
Growth/Survival	Deterministic		X----------		
Isolation	Stochastic				X

This stream was rested from grazing for 5 years from 1996-2001 following a wildfire that extripated the brook trout population. The rest allowed good riparian recovery but field visits since 2001 have showed some concerns since grazing resumed.

Pole Creek (headwater portions only)

Population Characteristics	Nature of Risk - Primary	Risk of Local Population Extinction			
		Low	Moderate	High	Extreme
Temporal Variability	Stochastic			X	
Population Size	Stochastic		X----------	X*	
Growth/Survival	Deterministic		X*		
Isolation	Stochastic				X

*Potential to lower this risk with reintroduction of remnant stock back into entire stream.

Sam Stowe Creek

Population Characteristics	Nature of Risk - Primary	Risk of Local Population Extinction			
		Low	Moderate	High	Extreme
Temporal Variability	Stochastic			X	
Population Size	Stochastic		X		
Growth/Survival	Deterministic	------	X		
Isolation	Stochastic				X

Manning Creek

Population Characteristics	Nature of Risk - Primary	Risk of Local Population Extinction			
		Low	Moderate	High	Extreme
Temporal Variability	Stochastic	X	----------	X	
Population Size	Stochastic	X			
Growth/Survival	Deterministic	X----------	X		
Isolation	Stochastic		X	----------	X

Ten Mile Creek

Population Characteristics	Nature of Risk - Primary	Risk of Local Population Extinction			
		Low	Moderate	High	Extreme
Temporal Variability	Stochastic			X	
Population Size	Stochastic		X		
Growth/Survival	Deterministic		X		
Isolation	Stochastic				X

Upper Salina Creek

Population Characteristics	Nature of Risk - Primary	Risk of Local Population Extinction			
		Low	Moderate	High	Extreme
Temporal Variability	Stochastic	X	----------	X	
Population Size	Stochastic	X----------			
Growth/Survival	Deterministic	X----------	X		
Isolation	Stochastic		X		

Presence of non-native competitors (brown trout and a few brook and rainbow trout from past stocking) increase risk to this population.

Briggs Creek (small minor side tributary in South Fork of North Creek drainage)

Population Characteristics	Nature of Risk - Primary	Risk of Local Population Extinction			
		Low	Moderate	High	Extreme
Temporal Variability	Stochastic			X	
Population Size	Stochastic		X----------	X	
Growth/Survival	Deterministic	X+			
Isolation	Stochastic				X

+Habitat has some natural water quality limitations even in pristine conditions.

Birch Creek West

Population Characteristics	Nature of Risk - Primary	Risk of Local Population Extinction			
		Low	Moderate	High	Extreme
Temporal Variability	Stochastic			X	
Population Size	Stochastic		X----------	X	
Growth/Survival	Deterministic		X	----------	X++
Isolation	Stochastic				X

++Effects are more likely on this stream due to a combination of naturally marginal habitat quality, grazing, and environmental stochastic events (drought).

North Fork of North Creek

Population Characteristics	Nature of Risk - Primary	Risk of Local Population Extinction			
		Low	Moderate	High	Extreme
Temporal Variability	Stochastic			X	
Population Size	Stochastic		X		
Growth/Survival	Deterministic		X^		
Isolation	Stochastic				X^^

Grazing also impacts this population. Some introgression (hybridization) concerns.
^Potential to lower this risk by reducing Forest road impacts or by road relocation.
^^Potential to lower this risk with a future reintroduction project /elimination of a barrier.

Pine Creek (W Tusher Mts.)

Population Characteristics	Nature of Risk - Primary	Risk of Local Population Extinction			
		Low	Moderate	High	Extreme
Temporal Variability	Stochastic			X	
Population Size	Stochastic		X		
Growth/Survival	Deterministic		X		
Isolation	Stochastic				X

Grazing also impacts this population.

Colorado Cutthroat Trout

UM Creek

Population Characteristics	Nature of Risk - Primary	Risk of Local Population Extinction			
		Low	Moderate	High	Extreme
Temporal Variability	Stochastic	X	----------	X	
Population Size	Stochastic	X			
Growth/Survival	Deterministic		X		
Isolation	Stochastic		X		

Grazing also impacts this population, but fencing, exclosures, and off-stream water developments are being installed to reduce effects. Whirling disease impacts appear to be increasing as population rebuilds.

Sand Creek

Population Characteristics	Nature of Risk - Primary	Risk of Local Population Extinction			
		Low	Moderate	High	Extreme
Temporal Variability	Stochastic			X	
Population Size	Stochastic			X	
Growth/Survival	Deterministic		X		
Isolation	Stochastic				X

One of the major objectives of fisheries managers is to maintain each pure remnant genetic stock of native cutthroat trout. Relatively few pure stocks have been identified in southern Utah. These stocks are more secure if they form a metapopulation, as described above, or at least if they are replicated to several streams dispersed across the landscape in cases where metapopulation potential is limited for habitat, biological, or social reasons. Metapopulation potential is limited on the Fishlake National Forest, so replication has been used to date. Based on the above discussion, the Bonneville and Colorado cutthroat trout genetic stocks within the project area have been rated using the professional opinion of James Whelan, forest fisheries biologist, based on existing conditions and entered into tables below derived from *Table 2. Relative risk of extinction for regional populations* found in Rieman et al. (1993, p. 9). These tables provide background information to help assess the concerns related to local populations shown in above tables. Note: Pole Creek stock is still undergoing genetic evaluation and was not included in the following tables.

Bonneville cutthroat trout

Pine Creek/Manning (mixed) Stock

Population Characteristics	Nature of Risk - Primary	Risk of Local Population Extinction			
		Low	Moderate	High	Extreme
Replication	Stochastic		X		
Synchrony	Stochastic	X	----------	X	

North Fork of North Creek (somewhat introgressed or hybridized) Stock

Population Characteristics	Nature of Risk - Primary	Risk of Local Population Extinction			
		Low	Moderate	High	Extreme
Replication	Stochastic				X
Synchrony	Stochastic			X	

Birch Creek Stock

Population Characteristics	Nature of Risk - Primary	Risk of Local Population Extinction			
		Low	Moderate	High	Extreme
Replication	Stochastic		X*	----------	X
Synchrony	Stochastic			X	

*****Potential to lower this risk with a future reintroduction project into high quality habitat.

Colorado Cutthroat Trout

Boulder Creek Stock (originated from the Dixie N.F.)

Population Characteristics	Nature of Risk - Primary	Risk of Local Population Extinction			
		Low	Moderate	High	Extreme
Replication	Stochastic	X			
Synchrony	Stochastic	X--------			

APPENDIX C

AQUATIC BIOTA BE – GEOGRAPHIC MANAGEMENT UNIT OVERVIEW

Southern Bonneville Geographic Management Unit Overview

To help put the project cumulative effects in context it is helpful to look at them within the context of a larger regional perspective. An appropriate large area for discussion of Bonneville cutthroat trout is the Southern Bonneville Geographic Management Unit (SBGMU). This is a planning unit in the Utah Conservation Agreement and Strategy for Bonneville cutthroat trout.

The Utah Conservation Agreement and Strategy lists past, present, and potential threats to this subspecies as habitat degradation, detrimental interactions (hybridization, disease, and competition), overutilization, inadequate regulation, and other natural or human factors (Lentsch et al. 1997).

Within the Southern Bonneville GMU (and the subspecies range in general) certainly the greatest past impact that reduced the distribution of Bonneville cutthroat trout was hybridization with nonnative rainbow trout and nonnative subspecies of cutthroat trout. Stocking of nonnative rainbow and cutthroat trout is no longer being conducted in Bonneville cutthroat trout habitat in the SBGMU. There is still risk in some streams that nonnative trout could get past a fish barrier or be illegally planted, however. Competition with brook and brown trout likely occurred in the past, but is not currently a factor in the SBGMU except in rare cases such as upper Salina Creek. In most cases there is a potential risk of future illegal or accidental introductions with brown or brook trout, but this threat is far less serious than hybridization. Whirling disease has not been documented in any SBGMU Bonneville cutthroat trout waters, but there is a threat it could spread to them in the future.

Probably the second greatest impact in the past to SBGMU Bonneville cutthroat trout waters was habitat degradation from heavy grazing, timber management, low standard roads, etc. Land management has improved in recent years, and while some Bonneville watersheds do still have habitat impacts, these have not been enough to threaten the persistence of any of the populations in the SBGMU, with the possible exception of Birch Creek West.

Inadequate (harvest/fishing) regulation may have been a factor in the past, but is not considered a current threat. Overutilization was not known to be a factor in Bonneville cutthroat trout declines or the current situation. Current Bonneville streams do not have excessive recreational fishing pressure that would impact the populations. Natural flood events, compounded by degraded habitat less able to withstand floods, impacted some Bonneville habitat in 1983. Socio-political factors are still factors reducing recovery potential, and could increase if Bonneville cutthroat trout are actually listed as a threatened species.

The overall impact of these factors, primarily hybridization due to past/historic stocking of nonnative trout and secondarily past habitat degradation, was that Bonneville cutthroat trout were reduced to very few miles of creek in the SBGMU by the 1970s. Some of this habitat was heavily impacted by land uses such as trailing of livestock. In southwestern Utah only three local populations of Bonneville cutthroat trout were known to exist in 1977 when conservation efforts to protect them and expand their distribution began (Hepworth et al. 1997). Their distribution has expanded dramatically during the 1980s and 1990s through renovation treatments and reintroductions, so that by 1997 there were 14 pure populations occupying 36 miles of stream and 58 surface acres of lake habitat in the SBGMU (Lentsch et al. 1997). One broodstock lake has been developed to provide Bonneville cutthroat trout for sport fish stocking and reintroductions. In addition, habitat management and protection has improved with the fencing of some creeks, grazing exclosures, designation of habitat as "fish management emphasis" in management plans, designation of the Pine Valley Mountains Wilderness, and purchase of stream water rights, thus improving habitat quality.

There was a short-term decrease in the total number of stream miles of Bonneville cutthroat trout in the SBGMU as 4 populations were lost from fire in 2002. Two populations (one remnant and one reintroduction) were lost from a prescribed fire that escaped prescription on Mount Dutton. Two populations were lost on the Pine Valley Mountains from a naturally started wildfire. In 2003 one of two very limited populations on the west side of the Pine Valley Mountains was lost due to drought, possibly exacerbated my management impacts. Reintroduction projects have already been undertaken on the Pine Valley Mountains, and while efforts have begun on Mount Dutton, habitat conditions are still unstable and continued reintroduction work will be necessary. Hepworth et al. (2003) discusses the 2002 fire losses, recovery plans, and the need for dispersed replications of core populations.

Southern Colorado River Geographic Management Unit Overview

It is also helpful to discuss larger scale regional trends of this widely distributed sub-species to place the project in context. An appropriate scale to discuss regional trends of Colorado River cutthroat trout is the Southern Geographic Management Unit (GMU). This is a planning unit in the Utah Conservation Agreement (CA) and Strategy for Colorado River cutthroat trout. This CA lists past, present, and potential threats to this subspecies as habitat degradation, over-utilization, detrimental interactions (hybridization, disease, and competition), and other factors (Lentsch and Converse 1997).

Within the Southern GMU (and the subspecies range in general) certainly the greatest past impact that reduced the distribution of Colorado River cutthroat trout was hybridization with non-native rainbow trout and other subspecies of cutthroat trout. Stocking of non-native rainbow and cutthroat trout is no longer being conducted in occupied conservation population Colorado River cutthroat trout habitat in the Southern GMU. There is still risk in some streams that non-native trout could get past a fish barrier or be illegally planted, however. Competition with brook and brown trout likely

occurred in the past, but is not currently a factor in established renovated populations of Colorado River cutthroat trout in the Southern GMU. Whirling disease has been documented in Southern GMU Colorado River cutthroat trout waters. A study is being conducted in UM Creek to document their resistance to whirling disease. Preliminary results indicated some reproduction was occurring in whirling disease positive areas, but surveys in 2006 found missing age classes that may indicate increasing effects from whirling disease as the population numbers rebuild.

Probably the second greatest impact in the past to Southern GMU Colorado River cutthroat trout waters was habitat degradation from heavy grazing, timber management, low standard roads, etc. Land management has improved in recent years, and while some Colorado River cutthroat trout watersheds do still have habitat impacts, these have not been enough to threaten the persistence of any of the populations. Actions are being undertaken by the Fremont River Ranger District to address habitat concerns on UM Creek to improve habitat quality on this stream.

Inadequate (harvest/fishing) regulation may have been a factor in the past, but is not considered a current threat. Over-utilization was not known to be a factor in Colorado River cutthroat trout declines or the current situation. Current Colorado River cutthroat trout streams do not have excessive recreational fishing pressure that would impact the populations. Natural localized flood events, compounded by degraded habitat less able to withstand floods, impacted some Colorado River cutthroat trout habitat. Socio-political factors are still factors reducing recovery potential, and could increase if Colorado River cutthroat trout are ever listed as a threatened species.

The overall impact of these factors, especially hybridization due to past/historic stocking of nonnative trout, was that Colorado River cutthroat trout were reduced to very few miles of known historic stream habitat in the Southern GMU by the 1970s. Their distribution has expanded dramatically since the late 1990s through renovation treatments and reintroductions, so that by 2002 there are now 2 pure populations occupying 20+ miles of stream habitat on the Fishlake National Forest portion of the Southern GMU (Hepworth et al. 2002). In addition, habitat management and protection has improved with the fencing of some creeks, grazing exclosures, and designation of habitat as "fish management emphasis" in management plans. Recovery work on the Dixie National Forest has reintroduced Colorado River cutthroat trout to several streams, as well as developed a broodstock source for new reintroductions.

Summary

Since the proposed project will either maintain, slightly improve, or improve Bonneville and Colorado River cutthroat trout habitat on the Fishlake National Forest there will be no reversal in the recent trend of increasing distribution, occupied stream miles, and numbers of populations of Bonneville and Colorado River cutthroat trout within their respective Southern GMU boundaries.