APPENDIX E

BIOLOGICAL EVALUATION FOR

SENSITIVE VERTEBRATE SPECIES

FOR THE

RE-ISSUANCE OF TERM GRAZING PERMITS ON EIGHT CATTLE ALLOTMENTS
BEAVER MOUNTAIN TUSHAR RANGE

ON THE

BEAVER RANGER DISTRICT

FISHLAKE NATIONAL FOREST

Prepared By: /s/ Mark T. Madsen **Date: 6/14/2004**
Mark Madsen, Forest Botanist, Dixie National Forest

Approved By: /s/ Ronald L. Rodriguez **Date: 6/18/2004**
Ron Rodriguez, Wildlife and Rare Plant Program Leader, Dixie and Fishlake National Forests

I. INTRODUCTION

This Biological Assessment (BA) analyzes the potential effects of the proposed action to re-issue term grazing permits on 8 cattle allotments administered by the Beaver Ranger District to the sensitive vertebrate species known or suspected to occur on the Fishlake National Forest (see Table 1). The purpose of this biological evaluation is to make a determination regarding the effects of the proposed action on the status of these species. Table 1 indicates the suitability of the analysis area for these sensitive vertebrate species and the justification for eliminating those species with unsuitable habitat from further evaluation.

Table 1. Suitability of habitat for regionally sensitive vertebrate species. Habitat characteristics for each of the following species was reviewed and based on information found within Rodriguez (2004) and Spahr et al. (1991).

SPECIES	SUITABILITY OF HABITAT FOR SENSITIVE VERTEBRATE SPECIES	
	SUITABLE	HABITAT UNSUITABLE BASED ON THE FOLLOWING
Spotted Bat *Euderma maculatum*	X	
Townsend's Big-eared Bat *Corynorhinus townsendii*	X	
Northern Goshawk *Accipiter gentilis*	X	
Flammulated Owl *Otus flammeolus*	X	
Three-toed Woodpecker *Picoides tridactylus*	X	
Peregrine Falcon *Falco peregrinus anatum*	X	
Greater Sage Grouse *Centrocercus urophasianus*	X	
Pygmy Rabbit *Brachylagus idahoensis*	X	
Colorado River Cutthroat Trout *Oncorhynchus clarki pleuriticus*	X	
Bonneville Cutthroat Trout *Oncorhynchus clarki utah*	X	

II. CURRENT MANAGEMENT DIRECTION

Current Policy as stated in Forest Service Manual 2670.3 as amended on June 23,1995 (WO Amendment 2600-95-7 – USDA Forest Service 1995) includes the following direction:

1. Assist States in achieving their goals for conservation of endemic species.

2. As part of the National Environmental Policy Act process, review programs and activities, through a biological evaluation, to determine their potential effect on sensitive species.

3. Avoid or minimize impacts to species whose viability has been identified as a concern.

4. If impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole. (The line officer, with project approval authority, makes the decision to allow or disallow impact, but the decision must not result in loss of species viability or create significant trends toward Federal listing.)

5. Establish management objectives in cooperation with the States when projects on National Forest System lands may have a significant effect on sensitive species population numbers or distributions. Establish objectives for Federal candidate species, in cooperation with the FWS or NMFS and the States.

The Forest Service follows a two-tier planning process. The first tier, the Fishlake Land and Resource Management Plan (Forest Plan); the second, the site-specific project planning level that is represented by the Environmental Assessment (EA).

The Forest Plan was prepared in accordance with the National Forest Management Act of 1976, the regulations at 36 CFR 219, and the National Environmental Policy Act of 1979, and was approved in June of 1986.

A goal documented in the Fishlake National Forest Land and Resource Management Plan (USDA Forest Service1986) is to "identify and improve habitat for sensitive, threatened and endangered species including participation in recovery efforts for both plants and animals".

III. DESCRIPTION OF THE PROPOSED ACTION

The proposed action is to reissue 10-year term grazing permits to continue authorizing cattle grazing, on eight allotments within the Beaver Mountain Tushar Range analysis area. Implementation of existing Allotment Management Plans (AMPs) would prescribe the manner by which livestock operations would be conducted and would**:**

1. Continue livestock grazing with current permitted numbers and seasons of use.
2. Revise allotment management plans to incorporate objectives and action plans to maintain or achieve desired conditions.
3. Maintain the existing inventory of structural range improvements, allowing maintenance and/or reconstruction when necessary.
4. Through appropriate re-treatment, maintain moderately high forage production levels on vegetation type-conversion sites where it is economically practical.
5. Cooperate with permittees in improving rangeland stewardship and compliance with forage utilization standards, management prescriptions, and livestock accountability.
6. Emphasize rangeland monitoring to assess the effectiveness of objectives and action plans in achieving desired conditions.

This proposed action does not intend to address changes in cattle numbers or grazing seasons. The underlying principle of the proposed action is that adherence to site-specific resource use standards,

designed to meet desired conditions, mitigate the need to address capacity and stocking rates. The number and class of livestock, season of use, and grazing system required to meet desired conditions is a permit administration decision, not a NEPA decision.

None of the project allotments require new structural range improvements (fences or water developments) for cattle management. The proposed action does include provision for maintenance of existing structural and non-structural range improvements. Vegetation type-conversions (sagebrush and pinion-juniper to grass/forb types) would be subject to periodic maintenance on the North-Indian Creek, Marysvale, Circleville, Ten Mile, Cottonwood, South Beaver, and Pine Creek/Sulphurdale Allotments. Maintenance of existing structural range improvements would include 113 miles of fences, 27 cattle guards, 48 developed springs, 48 stock ponds, 29 miles of pipeline, and 60 watering troughs. Noxious weed infestations would require treatment on all of the allotments except Ten Mile, Junction, and Cottonwood, where no noxious weeds are currently inventoried.

The following management requirement would be mandatory for the Re-issuance of Term Grazing Permits on Eight Cattle Allotments within the Tushar Mountain Range: Birch Creek West Drainage - yearly maintenance of the livestock exclosures prior to livestock turnout, monitoring during the grazing season to ensure exclosures are functioning and that standards are not being exceeded on portions of the stream outside of the exclosures, and a end of season evaluation of the grazing season on whether the exclosures were effective and standards were met on Birch Creek West.

The allotments are located in portions of Beaver, Iron, Garfield, Piute, or Millard Counties in west-central Utah along the eastern edge of the Basin and Range province. The location of these allotments within the analysis area is displayed on the vicinity maps on pages *i* and *ii*. The decision associated with this proposal and analysis will determine where livestock can graze, when grazing will occur and what specific guidelines will be established to regulate the timing, intensity, and duration of grazing.

TABLE 1-1
ALLOTMENT INVENTORIES

Beaver Ranger District					
Allotment	**Acres**	**Livestock Class**	**Permitted Number**	**Season Of Use**	**Grazing System**
North-Indian Creek	34,858	Cow-calf pairs	640	7/21-9/30	Deferred Rotation
Marysvale	6,338	Cow-calf pairs	147	6/1-9/30	Rest Rotation
Ten Mile	12,620	Cow-calf pairs	200	6/11-10/10	Rest Rotation
Circleville	38,019	Cow-calf pairs	359	6/1-10/15	Rest Rotation
Pine Creek/Sulphurdale	29,537	Cow-calf pairs	600	6/16-9/30	Rest Rotation
Junction	6,172	Cow-calf pairs	35	11/1-2/15	Winter
South Beaver	45,596	Cow-calf pairs	520	6/1-10/15	Rest Rotation
Cottonwood	500	Cow-calf pairs	30	6/1-7/31	Seasonal Deferred

The proposal focuses on authorization of cattle grazing at proper use under prescribed utilization levels identified in the Forest Plan and implemented through an Allotment Management Plan, which is incorporated under the terms and conditions of the grazing permit. Satisfactory rangeland management and livestock permitting requires prescribed levels of AMP development, management implementation, monitoring, permit administration, rangeland inventory, analysis, and compliance inspection. The critical element influencing effects of grazing is the implementation, monitoring, and enforcement of management prescriptions, including forage utilization standards.

Forage utilization criteria for upland and riparian areas are currently incorporated in Part 3 of the grazing permit and prescribe allowable use levels for both upland and riparian sites. The prescription for riparian areas is a uniform 4" stubble height. Reaching the 4" stubble height triggers the time to move livestock, either between units or off the allotment. This criteria allows no manipulation to plan use of expected regrowth—once the 4" stubble height is reached, livestock are moved, without the opportunity for twice-over use. Allowable upland forage utilization ranges from 40-60 percent on grass/forb types. Livestock are moved to the next pasture or removed from the allotment when any utilization threshold (upland forage utilization, streambank alteration, riparian forage utilization, riparian vegetation stubble height, or riparian woody browse utilization) is reached. Livestock are moved when a shift in preference from herbaceous to woody species is noted. Meeting or exceeding one of these threshold levels initiates a move of livestock (either to the next pasture or off the allotment). See Table 1-2.

TABLE 1-2		
Maximum Allowable Forage Use Criteria		
Vegetation Type	**Stubble Height/Use**	**Comments**
Riparian Hydric Species	4"	Triggers the time to move livestock between units or off the allotment
Riparian Emphasis Management Areas	6"	Triggers the time to move livestock between units or off the allotment
Non-hydric Sod-Forming Grass Species in Riparian Areas	1 ½ "	Primarily Kentucky bluegrass--Triggers the time to move livestock between units or off the allotment
Wheatgrass Seedings	60%	Management option to exceed 60% use to maintain healthy seedings
Riparian/Upland Browse Sprouts and Young-Aged Plants	≤40%	# of current year's available twigs removed
Riparian/Upland Mature Browse	≤50%	# of current year's available twigs removed
Upland Grass/Forb	40-60% of key species; varies by grazing sys & desired condition	% of current year's growth
Riparian Ground Cover	Maintain ground cover of at least 70% within riparian areas	

The proposal also focuses on the use of existing AMP's to prescribe the manner by which livestock operations would be conducted. The current AMP's are old and even though changes to grazing strategies, boundaries, and permitted numbers have been refined over time through administrative procedures, revisions may be necessary to ensure proper use of the resource and to evaluate progress toward meeting desired conditions through attainment of interim resource management objectives.

TABLE 1-3
ALLOTMENT AMP REVISION NEEDS ANALYSIS

Allotment	AMP Year	TEPS Fish Present	Elk Critical Habitat	Potential Elk Conflicts	Fragile Riparian Areas	Noxious Weeds Present (Acres)	Current Capacity Partly Dependant On Vegetation Treatments
North Indian	1981	X	No		X	518	X
Marysvale	1994		No	X	X	288	X
Ten Mile	1975	X	No		X		X
Circleville	1985	X	No		X	97	X
Pine Creek/Sulphurdale	1986	X	No	X	X	2431	X
Junction	1978		No		X		
South Beaver	1987	X	No	X	X	71	X
Cottonwood	1987		No	X	X		X

Proposed management actions common to all eight allotments included in AMP revisions are:

1. Implement allotment specific objectives that will direct livestock management to either maintain desired conditions or improve rangelands to desired conditions within prescribed timeframes.
2. Authorize management of livestock and construction or maintenance of improvements that will eliminate or minimize conflicts between livestock and other uses and result in meeting objectives.
3. Develop action plans to meet resource goals, objectives, and management requirements for a wide array of rangeland resources and uses concurrent with livestock grazing.
4. Incorporate Forest Plan standards and guidelines (as amended) for forage utilization and riparian area management.
5. Develop a monitoring plan that describes a measurable means of determining whether goals and objectives are being met.

IV. CUMULATIVE EFFECTS AREA

The cumulative effects area for sensitive vertebrate species includes the entire Beaver Ranger District (see attached Map 2 – District Boundary). This area was selected on the basis of continuity and adjacency with habitats on the Fishlake National Forest for the species being analyzed. Cumulative effects will be based on species' use during spring, summer and fall time periods. Where winter use areas are known, they will be addressed.

V. DESCRIPTION OF AFFECTED SPECIES

Information concerning life histories, suitable habitats, threats, and ecology of the sensitive vertebrate species that are known or suspected to occur on the Fishlake National Forest can be found within the *Life History and Analysis of Endangered, Threatened, Candidate, Sensitive, and Management Indicator Species of the Fishlake National Forest, Version 3.0* (Rodriguez 2004). This paper is located in the Dixie National Forest Supervisor's Office in Cedar City, UT.

VI. EFFECTS OF THE PROPOSED ACTION

The proposal focuses on authorization of cattle grazing at proper use under prescribed utilization levels identified in the Fishlake Forest Plan (USDA 1986) and described in the proposed action. Within this Biological Evaluation, effects of the proposed action (grazing at proper use levels) are disclosed. The Dixie National Forest developed a comprehensive literature review of the effects of livestock grazing of natural resources in 1995 (USDA 1995). This was prepared as a reference document for reviewing accumulated research literature describing the effects of livestock grazing at proper use and no grazing. The proper use criteria referenced in this Dixie 1995 document are similar (with some alterations) to the proper use criteria outlined in this proposed action. The wildlife habitats found on the Dixie National Forest (analyzed in the 1995 document) and in the analysis area for this project are also similar. Therefore, this document was reviewed to help assess general effects of grazing at proper use to wildlife species and wildlife habitats.

Direct, indirect, and cumulative effects common to all sensitive vertebrate species (spotted bat, Townsend's Big-eared bat, Northern goshawk, flammulated owl, three-toed woodpecker, peregrine falcon, greater sage grouse, pygmy rabbit, Bonneville cutthroat trout, and Colorado River cutthroat trout) analyzed in this biological evaluation have been disclosed in the following two subheadings. Additional effects, if any, relevant to each species has been disclosed under the species headings in this section. This was done because many of the effects of implementing this proposed action were common to all species analyzed.

Direct and Indirect Effects Common to All Sensitive Vertebrate Species and/or Habitats Analyzed in this Biological Evaluation

Changes in riparian vegetation and the introduction of noxious weeds from permitting cattle grazing may also have effects to aquatic systems that provide habitats for aquatic species and sensitive terrestrial species that use these habitats. Flow reduction of streams and springs within watersheds and centralizing the water into stock ponds and troughs also may effect watershed effectiveness. This may further reduce the availability of suitable water sources for sensitive vertebrate species.

The Beaver River Watershed Assessment completed in 2002-2003 for the Beaver River Watershed includes the Pine Creek/Sulphurdale, North Indian, and South Beaver Allotments. These allotments comprise approximately 110,000 acres which equates to 63% of the project area. The Beaver River Watershed Assessment (hereafter referred to as BRWA) describes, in detail, existing condition of various ecological resources on the landscape. The BRWA documents major vegetation changes in certain cover types. Much of this change can be attributed to wildfire suppression. However, the BRWA also attributes some of this vegetation change to grazing by domestic livestock and wildlife. The BRWA concludes that vegetation changes that have occurred over the past 150 years has substantially reduced the carrying capacity for grazing and browsing ungulates (hooved mammals), and perhaps may be partially responsible for concentrating use in riparian areas. As a result, the BRWA concludes that proper use thresholds for bank stability, riparian stubble heights, or browse use are typically exceeded before upland slopes are fully utilized. "The grazing indices suggest that some watersheds and streams may be incurring

excess use even if upland slopes are not being adversely affected" (BRWA 2002-2003). This statement suggests that riparian areas may be more heavily impacted by current grazing management practices than the uplands in some areas. Several smaller watersheds within the Greater Beaver River Watershed area (includes part of the analysis area) document overstocking rates in reference to livestock stocking rates in comparison to suitable watershed area and AUM stocking in comparison to riparian AUM production (BRWA 2002-2003). This would indicate that current grazing management practices may be exceeding watershed and riparian capabilities in some areas.

Fishlake National Forest Level II Riparian Inventories were completed in 2003 for the west side of the Beaver Ranger District (2003 Level II Riparian Inventory in draft). These inventories support the BRWA conclusion and document problems with current grazing management, overgrazing, and/or heavy grazing on Little North Creek, Pine Creek, North Wildcat Creek, Wildcat Creek, North Fork of North Creek, Pole Creek, South Fork of North Creek, South Birch Creek, and Big Twist Creek. These creeks all occur on the Pine Creek/Sulphur Beds, North-Indian Creek, and South Beaver Allotments within the analysis area. The Level II Riparian Inventory summarizes its' conclusion for the Big Twist Creek Area (South Beaver Allotment):

"The conditions seen on these watersheds do not meet the objectives of healthy watersheds and riparian systems. This is primarily due to livestock and recreation management, which can be changed for the betterment for the land...There has been such deterioration in plant production that the amount of forage currently growing on these rangelands does not sustain the stocking rates."

These inventories document overutilization in these streamcourses. This overutilization is a direct result of non-compliance with the proper use criteria. When proper use criteria are not adhered to, as documented by these Riparian Level II Inventories, resource damage occurs. When adequate vegetation monitoring is not performed on the ground and livestock is not removed, proper use thresholds are crossed. Strict adherence to the proper use criteria, as outlined in this proposed action, would protect riparian areas from the kind of degradation described above. The maximum allowable forage use criteria described in Table 1-2 of the proposed action outlines an upland grass/forb utilization of 40-60% and maintaining ground cover of at least 70% in riparian areas. Under this proposed action, there would still be reduced vegetation but within recoverable limits. Current year's growth would be retained at 40% or greater on upland sites and riparian species would be retained at 1 1/2"- 6" depending on management area and/or species. Riparian areas would retain a minimum of 70% ground cover. Riparian upland browse would be retained at a minimum of 40-50% depending on age class. These proper use criteria would retain the character and proper functioning condition of healthy riparian areas and improve conditions in unhealthy riparian areas like those described above.

These riparian habitats often provide suitable habitat (i.e. foraging, nesting, roosting, or breeding) that may be affected by re-issuing term grazing permits in these 8 allotments on the Beaver Ranger District. Therefore, this proposed action may impact these sensitive

vertebrate individuals and/or their habitat but is not likely to cause a trend to federal listing or a loss of viability.

Cumulative Effects Common to All Sensitive Vertebrate Species and/or Habitats Analyzed in this Biological Evaluation

Past, present, and reasonably foreseeable activities within the cumulative effects area include private land ownership (subdivision construction activities), grazing, recreation, timber and thinning operations, reforestation and seeding of burned areas, chaining, seeding of native and non-native species, fire suppression, natural and prescribed fire, pesticide application, noxious weed control, and other special uses such as mining, hydroelectric operations, firewood and post cutting, municipal water developments, and irrigation diversion. Recreation-related activities include hunting, camping, day/picnic use, hiking, horseback riding, all-terrain vehicle (ATV & OHV) use, and campground/roads/trails maintenance and development.

Reissuing grazing permits in combination with chaining, seeding, fires, timber operations, irrigation diversion/development, and noxious weed control have and continue to alter riparian and upland vegetation composition and densities, which may reduce potentially suitable habitat for these sensitive vertebrate species and their prey in some cases and create habitat in others. Maintenance of vegetation-type conversions as specified in the proposed action may increase forage and cover potential for some small mammal species in pinyon-juniper and sagebrush cover types. However, the proposed action of re-issuing grazing permits would then reduce the forage and cover available in these conversions to these species. Re-issuance of grazing permits in combination with timber/thinning operations, fire suppression/wildfire/prescribed fire, firewood and post cutting, and mining have affected watershed capabilities and stream corridors (BRWA 2002-2003) from increased erosion and changes in vegetation. Re-issuing grazing permits in combination with recreational activities and recreational infrastructure (roads, trails, structures, and campground development) may contribute to sensitive vertebrate species habitat fragmentation, habitat loss, creation of travel corridors, air pollution, audio and visual disturbance, and other disturbances caused by wildlife/public interactions. Also, increased erosion from grazing in combination with recreational activities may cause sediment loss and further degradation of riparian aquatic systems.
Strict adherence to proper use criteria for grazing, as outlined in the proposed action, would mitigate some of these impacts by maintaining vegetation diversity, composition, structure, and density.

Therefore, this proposed action in combination with these past, present, and reasonably foreseeable activities listed above may impact these sensitive vertebrate individuals and/or their habitats but are not likely to cause a trend to federal listing or a loss of viability.

Spotted bat and Townsend's Big-eared bat

<u>Existing Condition</u>

The spotted and Townsend's Big-eared bats will be evaluated for effects in tandem because of their similarity in life history and habitat requirements. The spotted bat is only suspected to occur on the Fishlake National Forest. The Townsend's Big-eared bat is only known to occur in abandoned mines of the Fillmore Ranger District outside of the proposed action analysis area. Abandoned mine bat surveys were completed in 1994 and 1996 within analysis area. Neither of these sensitive bats were found during any of these surveys. Neither of these bats are known to occur within the analysis area or anywhere on the Beaver Ranger District (Rodriguez 2004). However, potentially suitable roosting and foraging bat habitat does occur within the analysis area.

Direct and Indirect Effects

Since neither of these bat species are known to occur within the analysis area or on the Beaver Ranger District, direct and indirect effects to individuals would not occur as a result of this proposed action. Direct and indirect effects to potentially suitable habitat would be limited. Since these bats require caves, mines, rock crevices, abandoned buildings, and other largely undisturbed places, effects to potential roosting habitat from this proposed action would be minimal, if any. Grazing cattle would not disturb these areas because of their inaccessability to grazing livestock. Ecological resources in these inaccessible potential roosting sites would not be disturbed. However, foraging habitat and prey species (insects) may be affected by the re-issuance of term grazing permits in these 8 allotments.

Both of these bats are insectivorous. The Townsend's Big-eared bats diet is comprised largely of moths (Rodriguez 2004). The spotted bat usually feeds on larger insect such as Lepidoptera and grasshoppers. This prey base population could possibly be affected by changes in the riparian aquatic corridors and upland vegetation. Sediment loading into the stream from increased erosion (i.e. compaction from trampling), percent of stream shading (i.e. understory vegetation loss), and increased organic matter (i.e. cattle manure), forage reduction, vegetational composition change, and vegetation conversions are just a few factors that may alter the composition and density of various insect populations. Some types of insects may increase while others decline.

Therefore, this proposed action may impact spotted bat and Townsend's Big-eared bat individuals and/or their habitat but is not likely to cause a trend to federal listing or a loss of viability.

Cumulative Effects

The Abandoned Mine Closures Project on the Beaver Ranger District that occurred in the late 1990's and early 2000's eliminated numerous potentially suitable roosting sites for these bats throughout the cumulative effects area. Re-isssuance of term grazing permits on these 8 allotments may affect potentially suitable foraging habitat for these bats but will not affect potentially suitable roosting habitat. Therefore, this proposed action in combination with the specific past action listed above may impact these spotted bat and Townsend's Big-eared bat individuals and/or their habitats but are not likely to cause a trend to federal listing or a loss of viability.

Northern Goshawk

Existing Condition

There are 14 known goshawk territories on the Fishlake National Forest (Rodriguez 2004). Region 4 protocol Northern goshawk surveys have been conducted in 2002 and 2003 in much of the Beaver River Watershed and in other various parts of the analysis area. There are only three confirmed goshawk territories found on the Beaver Ranger District. Two of these territories are located within the Beaver River Watershed. These three nests occur on the North Beaver, South Beaver, and Circleville Allotments. The South Beaver and Circleville Allotments fall within the scope of this proposed action. Further observation records of the northern goshawk have also been documented on the North-Indian Creek and the Pine Creek-Sulphur Beds Allotments. There is, however, suitable goshawk nesting habitat on all of the 8 allotments within the proposed action area.

Direct and Indirect Effects

Direct effects to goshawk territories and nesting habitat may occur as a result of the proposed action, but these impacts would be minimal in closed conifer forests. Studies of nesting habitat show that goshawks nest in older age forest with variable tree species and high percent canopy closure (Rodriguez 2004). Studies on habitat characteristics at goshawk nest sites have reported average canopy closure measurements ranging from 60% to 94% (Rodriguez 2004). Understory forage production for livestock use drops considerably in closed canopy conifer. The livestock will not often be present foraging in closed canopy conifer forest because of the general lack of available forage. Open meadows, aspen, sagebrush, oakbrush, mahogany, and other cover types where more livestock forage is available will be visted more frequently by livestock.

Many of the goshawk nests in Utah do occur in aspen stands. The Beaver River Watershed Assessment (BRWA) references a study on the response to aspen restoration treatments near the Beaver River Watershed in part of the analysis area. Thirty three sites were surveyed to monitor the success of aspen regeneration following a variety of treatments. This study states : “In most cases, sites fenced to preclude all cattle and wildlife browsing produced the greatest number of aspen suckers compared to adjacent, unfenced, or cattle-excluded sites...it is also important for terminal shoots of the young aspen to grow beyond the reach of browsing ungulates before treatments can be deemed successful. Further analysis showed that under low densities of elk, deer, and cattle, their cumulative utilization may ultimately doom restoration efforts to failure unless relief from excessive browsing can be guaranteed.” This research would indicate that re-issuing term grazing permits for these 8 allotments may have an impact on aspen vegetation types in some areas. A decline in aspen resulting from the proposed action may impact goshawk nesting habitat over a long period of time. However, strict adherence to proper use criteria (a minimum of 40-50% on upland browse species such as aspen), as specified in the proposed action would alleviate some of this impact on aspen within the analysis area.

Furthermore, it has been documented by Reynolds et al. 1992 that livestock grazing may affect forage and cover recources for goshawk prey. Implementation of the proposed action may affect

habitat for some selected mammalian and avian prey species. These effects would however be dependent upon other factors, and not just ungulate use on grasses forbs and shrubs. Other factors such as precipitaion can be an important influence on goshawk prey. As riparian and upland vegetative health and vigor changes (BRWA), resulting from the proposed action, habitat for goshawk prey may fluctuate. At proper use grazing levels, these effects would be minimized within the analysis area.

Therefore, this proposed action may impact northern goshawk individuals and/or their habitat but is not likely to cause a trend to federal listing or a loss of viability.

Cumulative Effects

This proposed action in combination with past, present, and reasonably forseeable future actions may effect habitat conditions for some goshawk prey species. Past actions have had various effects to vegetation across the cumulative effects area. In most areas where livestock grazing was permitted in riparian habitat, horizontal and vertical structure has been significantly altered and structure is minimal. Past actions such as timber harvest and thinning has led to a decline of habitat quality and quantity, through the loss of nesting and foraging habitat, as well as decreased habitat for prey species. Past, present, and reasonably forseeable livestock grazing may impact the goshawk and their prey. Therefore, this proposed action in combination with past, present, and reasonably forseeable future actions may impact Northern goshawk individuals and/or their habitats but are not likely to cause a trend to federal listing or a loss of viability.

Flammulated Owl

Existing Condition

The flammulated owl is known to occur on the Beaver Ranger District within the analysis area. Surveys performed in 2003 for this species revealed presence on the North-Indian Creek Allotment, the South Beaver Allotment, and the Circleville Allotment. Flammulated owls appear to be associated with mature pine and mixed conifer habitat types (Rodriguez 2004). Potentially suitable habitat occurs throughout the the analysis area.

Direct and Indirect Effects

Direct effects of the proposed action to flammulated owl individuals would be minimal. Flammulated owls are nocturnal obligate cavity nesters that nest in the hollows of trees and perform much of their foraging at night. Having grazing livestock, that are most active during the day, in their nesting and foraging areas would not cause direct conflicts with the flammulated owl individuals. However, indirect effects to individuals from fluctuations in insect populations and effects to potentially suitable habitat may affect this species.

Flammulated owls are almost exclusively insectivorous. They feed on small to medium-sized insects such as moths, beetles, caterpillars, crickets, spiders, and other arachnids (Rodriguez 2004). This prey base population could possibly be affected by changes in the riparian aquatic corridors

and upland vegetation. Sediment loading into the stream from increased erosion (i.e. compaction from trampling), percent of stream shading (i.e. understory vegetation loss), and increased organic matter (i.e. cattle manure), forage reduction, vegetational composition change, and vegetation conversions are just a few factors that may alter the composition and density of various insect populations. Some types of insects may increase while others decline.

Therefore, this proposed action may impact flammulated owl individuals and/or their habitat but is not likely to cause a trend to federal listing or a loss of viability.

Cumulative Effects

This proposed action in combination with past, present and reasonably forseeable future actions may cause changes in riparian and upland health and vigor. As the vertical and horizontal vegetation diversity of riparian and upland areas change, insect populations, distribution, and species diversity would fluctuate. This may alter prey species for the flammulated owl in the small riparian areas that occur within openings in the forested landscape where these owls forage. Past actions have had long-term effects to vegetation across the analysis area. In most areas where grazing was permitted in riparian and uplands, habitat conditions vary as to their suitabilty for prey species for flammulated owls. Therefore, this proposed action in combination with past, present, and reasonably forseeable future actions may impact flammualted owl individuals and/or their habitats but are not likely to cause a trend to federal listing or a loss of viability.

Three-toed Woodpecker

Existing Condition

The three-toed woodpecker is known to occur on the Beaver Ranger District within the analysis area. There have been numerous surveys, studies, detections, and nest locations of three-toed woodpeckers which show ample presence of this species in the Engelmann spruce and mixed conifer vegetation types within the Beaver River Watershed. Three-toed woodpecker habitat consists of northern coniferous and mixed forest types located at elevations up to 9,000 feet and composed of Engelmann spruce, sub-alpine fir, Douglas fir, grand fir, ponderosa pine, tamarack, and lodgepole pine. This species is attracted to areas where there are numerous dead trees due to fire, insect epidemic, blow-down, or other die-off (Rodriguez 2004). There is potentially suitable habitat scattered throughout the analysis area at higher elevations (i.e. 8,000 + feet).

Direct and Indirect Effects

Direct effects of the proposed action to three-toed woodpecker individuals would be minimal in coniferous forest vegetation types. Three-toed woodpecker habitat requirements on the Beaver Ranger District are higher elevation spruce-fir, mixed conifer, and aspen vegetation types with snags available for foraging. Three-toed woodpeckers are largely dependent on down logs, snags, and stumps for feeding and nesting opportunities. Down logs, snags, and stumps would not be affected by livestock grazing.

Understory forage production for livestock use drops considerably in closed canopy conifer. The livestock will not often be present foraging in closed canopy conifer forest because of the general lack of available forage. Open meadows, aspen, sagebrush, oakbrush, mahogany, and other cover types where more livestock forage is available will be visted more frequently by livestock. Direct conflicts between three-toed woodpeckers and grazing livestock would not occur.

There are nest locations and detection records of the three-toed woodpecker in aspen stands. The Beaver River Watershed Assessment (BRWA) references a study on the response to aspen restoration treatments near the Beaver River Watershed in part of the analysis area. Thirty three sites were surveyed to monitor the success of aspen regeneration following a variety of treatments. This sudy states : "In most cases, sites fenced to preclude all cattle and wildlife browsing produced the greatest number of aspen suckers compared to adjacent, unfenced, or cattle-excluded sites...it is also important for terminal shoots of the young aspen to grow beyond the reach of browsing ungulates before treatments can be deemed successful. Further analysis showed that under low densities of elk, deer, and cattle, their cumulative utilization may ultimately doom restoration efforts to failure unless relief from excessive browsing can be guaranteed." This research would indicate that re-issuing term grazing permits for these 8 allotments may have an impact on aspen vegetation types in some areas. A decline in aspen resulting from the proposed action may impact three-toed woodpecker habitat in some areas over a long period of time. However, strict adherence to proper use criteria (a minimum of 40-50% on upland browse species such as aspen), as specified in the proposed action would alleviate some of this impact on aspen within the analysis area.

Three-toed woodpeckers feed on wood-boring insect larvae, beetles, moth larvae and ocassionally sap at sapsucker pits. They are major predators of spruce bark beetle and may contribute to its control (Rodriguez 2004). This prey base population could possibly be affected by changes in the riparian aquatic corridors and upland vegetation. Sediment loading into the stream from increased erosion (i.e. compaction from trampling), percent of stream shading (i.e. understory vegetation loss), and increased organic matter (i.e. cattle manure), forage reduction, vegetational composition change, and vegetation conversions are just a few factors that may alter the composition and density of various insect populations. Some types of insects may increase while others decline.

Therefore, this proposed action may impact three-toed woodpecker individuals and/or their habitat but is not likely to cause a trend to federal listing or a loss of viability.

Cumulative Effects

Refer to "Cumulative Effects Common to All Sensitive Vertebrate Species and/or Habitats Analyzed in this Biological Evaluation" at the beginning of this section.

Peregrine Falcon

Existing Condition

Peregrine falcons are known to occur on the Beaver Ranger District within the analysis area. There is one known peregrine falcon territory (not active for several years) on the North-Indian

Creek Allotment. There have also been sightings of peregrine falcons on the South Beaver Allotment, Cottonwood Allotment, and the Joe Lott Fish Creek Allotment. Of these, the North-Indian Creek Allotment and the South Beaver Allotment fall within the scope of the proposed action. Potentially suitable nesting and foraging habitat occur throughout the analysis area. Their presence is suspected on all allotments within the analysis area.

Direct and Indirect Effects

Suitable habitat for peregrine falcons may be divided into three parts: 1) cliff or substrata upon which nesting occurs, 2) surrounding territory that serve as hunting sites, and 3) migration and wintering areas (Rodriguez 2004). Most peregrine eyries (nest sites) in Utah are situated on high ledges on mountain cliff faces and river gorges. As a result, direct and indirect effects to peregrine falcon nesting habitat would not occur from this proposed action. Direct conflicts between grazing livestock and nesting peregrine falcons would not occur.

Direct and indirect effects to foraging, migration, and wintering habitat may occur as a result of implementing this proposed action. Prey species include primarily small to medium-sized terrestrial birds and waterfowl that are normally found within 10 miles of the eyrie (Rodriguez 2004). Implementation of the proposed action may affect habitat for some selected mammalian and avian prey species. These effects would however be dependent upon other factors, and not just ungulate use on grasses forbs and shrubs. Other factors such as precipitaion can be an important influence on peregrine falcon prey. As riparian and upland vegetative health and vigor changes (BRWA), resulting from the proposed action, habitat for peregrine falcon prey may fluctuate.

Peregrines are most susceptible to disturbance during the courtship and nest establishment period (March – mid May) with susceptibility decreasing as the young are raised (Rodriguez 2004). Under current grazing strategies (as described in this proposed action) livestock would not be present in the analysis area during this susceptible period for peregrines. Therefore, disturbance from grazing livestock within foraging areas would be minimized.

This proposed action may impact peregrine falcon individuals and/or their habitat but is not likely to cause a trend to federal listing or a loss of viability.

Cumulative Effects

Refer to “Cumulative Effects Common to All Sensitive Vertebrate Species and/or Habitats Analyzed in this Biological Evaluation” at the beginning of this section.

Greater Sage Grouse

Existing Condition

There are known populations of sage grouse on the Richfield and Loa Ranger Districts of the Fishlake National Forest. These sage grouse are known to use the area from spring through winter

with one documented lek. There are currently no known populations of sage grouse on the Beaver Ranger District within the analysis area. In 1983, there were historic observation records of sage grouse in the Rocky Pond area of the South Beaver Allotment (within analysis area). However, there have been no sightings since then. Sage grouse are solely dependent on sagebrush dominated habitats (Rodriguez 2004). Potentially suitable habitat for sage grouse does exist on sagebrush-dominated cover types scattered throughout the analysis area.

Direct and Indirect Effects

Since sage grouse are not known to be present in the analysis area, effects to sage grouse individuals would not occur from this proposed action. However, potentially suitable habitat may be affected by the implementation of this proposed action. Maintenance of range improvements and vegetation conversions may contribute to effects on potentially suitable sage grouse habitat. Reduction of forage and cover by the re-issuance of term grazing permits may contribute to sage grouse lek habitat. Open areas such as swales, irrigated fields, meadows, burns, roadsides, and areas of low, sparse sagebrush cover are used as leks. Leks are usually surrounded by areas with 20-50% sagebrush cover, with sagebrush no more than 1 foot (Rodriguez 2004). Sage grouse use sagebrush and perennial bunchgrasses for food. Reduction of this type of forage through livestock grazing may affect the food base of the sage grouse. This may, in turn, reduce the overall productivity on a given site.

Range improvements such as existing fences, watering troughs, ponds, and spring/seep developments may alter sage grouse movement or provide free water for sage grouse use. Sage grouse do not require open water for day-to-day survival if succulent vegetation is available but, they will utilize free water if it is available.

Forage and cover reduction through this proposed action also may affect sage grouse nesting success. Nest success is related to herbaceous cover near the nest site. Lack of adequate nesting and brooding cover may account for high juvenile losses in many regions (Rodriguez 2004). Taller, denser, herbaceous cover apparently reduces nest predation and increases early brood survival (Rodriguez 2004). However, strict adherence to proper use criteria, as provided for in this proposed action, would retain stubble heights on upland sites (where sage grouse occur) of a minimum of 40%. This would prevent overutilization of herbaceous cover and alleviate some of this impact to nesting success.

Maintenance of vegetation conversions (as described in this proposed action) can imprve potentially suitable habitat in some cases and cause it to decline in others. Vegetation conversions from an original disclimax pinyon-juniper cover type to early seral grass and subsequent late seral sagebrush may create potential habitat for sage grouse. Vegetation conversion from sagebrush to early seral or monocultured grass may eliminate potential habitat for sage grouse.

Sage grouse have declined primarily because of loss of habitat due to overgrazing, elimination of sagebrush, and land development (Rodriguez 2004). Therefore, this proposed action may impact sage grouse individuals and/or their habitat but is not likely to cause a trend to federal listing or a loss of viability.

Cumulative Effects

A past, present, and reasonably forseeable action that may effect potentially suitable sage grouse habitat in combination with this proposed action is chaining maintenance in pinyon-juniper disclimax cover types. Juniper encroachment into previously chained areas (vegetation conversions) is slowly converting these cover types back to their original pinyon-juniper community. Past, present, and future hand and mechanical treatments including Dixie Harrow, Brush Hog, hand thinning, and others will improve potentially suitable sage grouse habitat within the analysis area. These treatments, in combination with the proposed action, in decadent sagebrush cover types may reduce nesting success by reducing cover values and/or improve sagebrush diversity and subsequent forage value for the sage grouse.

Therefore, this proposed action in combination with past, present, and reasonably forseeable future actions as specified above may impact sage grouse individuals and/or their habitats but are not likely to cause a trend to federal listing or a loss of viability.

Pygmy Rabbit

Existing Condition

There are two documented sightings of the pygmy rabbit on the Fishlake National Forest. One was on the Richfield Ranger District and the other was on the Loa Ranger District. To date, this species has no recorded presence on the Beaver Ranger District within the analysis area. However, little is known about presence of this species on the Fishlake National Forest. There has never been formal surveys done by the Fishlake National Forest to ascertain this species' presence in the analysis area. Potentially suitable habitat for the pygmy rabbit are areas of deep soils with tall, dense sagebrush, which they use for cover and food (Rodriguez 2004). There is potentially suitable habitat scattered throughout the analysis area.

Direct and Indirect Effects

Reduction of forage and cover resulting from this proposed action may directly affect the pygmy rabbit and/or its habitat. Pygmy rabbits are seldom found in areas of sparse vegetative cover and seem to be reluctant to cross open space (Rodriguez 2004). A reduction of forage and cover may reduce the pygmy rabbits' ability to forage and feed productively. It may also increase the risk of predation to pygmy rabbits. However, strict adherence to proper use criteria, as provided for in this proposed action, would retain stubble heights on upland sites (where pygmy rabbits occur) of a minimum of 40%. This would prevent overutilization of herbaceous cover and alleviate some of this impact to pygmy rabbit forage and cover availability. Disturbance caused by permitting livestock use on these allotments may affect how much time the pygmy rabbit spends outside of its burrow foraging. Reduction of foraging time will equate to a reduction in feeding and overall productivity.

Maintenance of vegetation conversions (specified in this proposed action) may also have effects on pygmy rabbit disturbance and potentially suitable habitat. Maintenance through the use of Dixie Harrow, Brush Hogs, hand thinning, and others may cause destruction of underground burrows. These mechanical treatments may also cause alterations in the tall, decadent nature of sagebrush needed by the pygmy rabbit. While this may provide more vegetation diversity (more early seral grasses) for pygmy rabbit feeding, it may also result in a sagebrush structure that doesn't provide enough cover for the pygmy rabbit. Therefore, this proposed action may impact pygmy rabbit individuals and/or their habitat but is not likely to cause a trend to federal listing or a loss of viability.

Cumulative Effects

A past, present, and reasonably forseeable action that may effect pygmy rabbits and/or their habitat in combination with this proposed action is chaining maintenance in pinyon-juniper disclimax cover types. Juniper encroachment into previously chained areas (vegetation conversions) is slowly converting these cover types back to their original pinyon-juniper community. Past, present, and future hand and mechanical treatments including Dixie Harrow, Brush Hog, hand thinning, and others may effect pygmy rabbits and their habitats within the analysis area. These treatments, in combination with the proposed action, in decadent sagebrush cover types may damage underground burrows and reduce cover values for the pygmy. It may also improve habitat by increasing forage diversity.

Therefore, this proposed action in combination with past, present, and reasonably foreseeable future actions as specified above may impact pygmy rabbit individuals and/or their habitats but are not likely to cause a trend to federal listing or a loss of viability.

Colorado River Cutthroat & Bonneville Cutthroat Trout
(This portion of the Biological Evaluation regarding Colorado River and Bonneville Cutthroat Trout was provided by Jim Whelan, Fisheries Biologist on the Fishlake National Forest on 6-1-2004)

Species Information

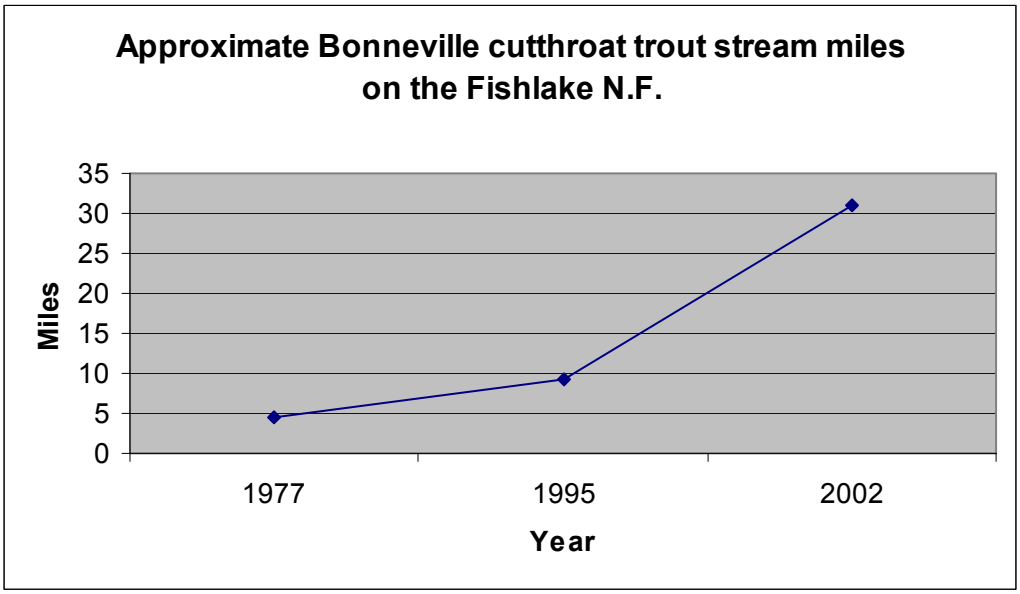
Bonneville cutthroat trout (BCT) are a unique subspecies of the western cutthroat trout complex, native to pluvial Lake Bonneville, which covered parts of Utah, Idaho, Nevada, and Wyoming up to 10,000 years ago. With desiccation of Lake Bonneville they became restricted to headwater streams and remnant lakes with suitable trout habitat. Bonneville cutthroat trout generally range in size from 2-9 inches in streams with lake populations reaching 30 inches. The back is yellow-brown to steel-gray with the sides lighter and the belly yellow to off-white. The tail, back, and the sides are marked with large, round spots. A bright red stripe or "cutthroat" mark is present under each side of the lower jaw. Bonneville cutthroat trout mainly eat insects, but larger sized fish also feed on small fish. Bonneville cutthroat trout spawn in spring from May-June. Young fish reach sexual maturity at 2-3 years (Rodriguez 2004, Spahr et al. 1991).

They require cool, clear water with an appropriate pool to riffle ratio and slow, deep water with vegetated streambanks for shade, bank stability, and cover. They prefer summer water temperature of about 55 degrees F, but can survive in water up to 70 degree F. Limitations to this species include loss of habitat from man-made causes such as water diversions, overgrazing of riparian areas, timber harvest and water pollution, although the greatest impact has been the loss of genetic purity as a result of hybridization and competition from non-native trout (Rodriguez 2004, Spahr et al. 1991).

Members of the Bonneville cutthroat trout technical team established by the Conservation Agreement put together a White Paper on the Proposed Aquatic Habitat Language for the Bonneville cutthroat trout Conservation Agreement Renewal, which was presented to the Technical Team at the March 23, 2004 meeting. While not yet finalized it represents a compilation of the best available science and research on cutthroat trout needs adapted for Bonneville cutthroat trout. It provides optimal habitat criteria for a variety of habitat variables such as percent fines, stream bottom embeddedness, percent stable stream banks, percent shade, large wood debris, pool frequencies, etc.

Bonneville cutthroat trout are considered a "high interest Management Indicator Species (MIS)" on the Fishlake National Forest. The Conservation Agreement and Strategy for Bonneville cutthroat trout in the State of Utah guides current recovery actions (Lentesch et al. 1997).

Chart 1: Bonneville cutthroat trout stream miles on the Fishlake N.F. (Hepworth et al. 2003)



Note: Does not include potential remnant populations that have not been genetically tested or remnant populations that have not yet been found.

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). The graph above shows the number of known stream miles of Bonneville cutthroat trout on the Fishlake N.F. from 1977-2002.

This figure increased slightly by 2004 as they become established into two streams with recent reintroductions. There are now known populations of pure strain Bonneville cutthroat trout inhabiting approximately 38 miles of stream habitat on the Fishlake National Forest (Rodriguez 2004). It should be noted that Bonneville cutthroat trout occupied streams still represent a small minority of the total stream miles on the Forest. Populations on the Beaver Ranger District include Pine Creek, North Fork of North Creek and its tributary Pole Creek, Briggs Creek, Birch Creek West, Birch Creek East, and Ten Mile Creek. These populations of Bonneville cutthroat trout occur in streams on the Circleville, Ten Mile, South Beaver, North-Indian Creek, and PineCreek/Sulphur Beds Allotments within the analysis area. Therefore, direct and indirect effects to Bonneville cutthroat trout may occur because they are present in the analysis area

The only known populations of Colorado River cutthroat trout on the Fishlake National Forest occur in streams on the Loa Ranger District (Rodriguez 2004). There are no Colorado River cutthroat trout known to occur within the analysis area. The analysis area is outside of the native range of the Colorado River cutthroat trout. Direct and indirect effects to Colorado River cutthroat trout individuals would not occur because they are not found in the analysis area. Normally streams outside of the native range of a species/sub-species are not considered for or counted for recovery objectives.

Existing Condition

Background information for Bonneville cutthroat trout biomass and aquatic macroinvertebrate BCI index levels is provided first, followed by more detailed descriptions of conditions by stream.

Biomass - The standing crop biomass of fish in Bonneville cutthroat trout streams can provide an index of the productivity of the stream, and repeated measurements over time can provide trend data. Table 1 shows the summarized data for the Fishlake N.F. from 1977-2002. Dashes represent no data or a stream that harbored other trout species. The 1994-95 data (and presumably the 1977 data) was taken using a single pass using an electroshocker, also counting fish that were known to be missed. The 2001-2002 data represents a population estimate developed from 2-pass data. It is likely that a 2-pass population estimate would be slightly higher than the one pass data counting known misses. In other words, if the actual biomass were static, one would expect that the 2002 data would have shown a slight increase. Note that information from Platts and McHenry (1988) and the UDWR indicate that 50-60 lbs/acre is an average biomass for streams on the Fishlake N.F. In general these BCT creeks are all considerably below average.

Table 1: Biomass (lbs/acre) trend of BCT in streams on the Fishlake N.F. (Hepworth et al. 2003)

Stream	**1977**	**1994-1995**	**2001-2002**
Birch Cr (W)	25.9	37.5	12.3
Briggs Cr	-	32.1	32.6
N.F.North Cr.	Unk.	32.1	31.2
Trib-Pole Cr.	-	-	0
Pine Cr.	-	24.1	23.8
Ten Mile Cr.	-	-	>0
Birch Cr. (E)	-	-	>0

Note: Does not include potential remnant populations that have not been genetically tested or remnant populations that have not yet been found.

Aquatic Macroinvertebrates - Many of the streams monitored for aquatic macroinvertebrates were BCT streams. Table 5 summarizes the results for BCT streams in relationship to the Forest Plan standard of a Biotic Condition Index (BCI) of 75 or above. The BCI compares the tolerance levels of aquatic macroinvertebrates in the sample to the predicted tolerance level given water quality and habitat conditions. The result is a percentage, similar to a test result. Sample BCI scores at or above the standard are shown in bold. Note that at the time of some of the monitoring dates either native cutthroat trout had not yet been reintroduced into the stream by the UDWR, or native cutthroat trout were not yet located in the drainage.

Table 2: Aqauatic macroinvertebrate monitoring of BCT streams on the Beaver R.D.

Stream	Year											
	1987	1988	1989	1990	1993	1994	1995	1997	1998	1999	2000	2001
BirchCr(W)2									66	68		
BirchCr(W)1	**75/85**	74/**85**	**82**						63	69		
BirchCr(E)2												70
BirchCr(E)1												**76**
NforkNCr2									73	71		
NforkNCr1									68	68		
Pine Creek 2										71		
Pine Creek1									62	71		
TenMileupp											**81**	
TenMilelow											**94**	

Note: Stations that are at or above the Forest Plan standard are shown in **bold**. BCI data for the table is found in Mangum (various dates) and Vinson (various dates). These reports are on file at the Fishlake N.F. Supervisor's Office.

Pine Creek – Reintroduction – mixed stock. The majority of the fish bearing portion of this stream is on the National Forest, the lower portion is on private lands. The forest portion of this stream is in Management Area 4A – Fish Habitat Emphasis, although the upper-most portion is in Management Area 6B. This population has exhibited a relatively stable trend in occupied stream length of about 5.0 km (Hepworth et al. 2003, Hepworth et al. 1997). Multiplying estimated occupied stream length by average stream widths at sampled stations gives a rough idea of habitat area. The Pine Creek population occupies a very limited habitat of about 2.26 acres. It is important to realize that all water transported sediment produced in the much larger watershed is funneled into and through this restricted fisheries habitat. It is easy to see that it would take only a small increase in sediment production across a watershed to increase sediment levels in the stream.

Population estimates also show a relatively stable population which has ranged from about 453 fish/mile in 1988 to 366 fish/mile in 1994 after fish were removed for reintroduction into a broodstock reservoir to 414 fish/mile in 2001. Fish biomass (see Table 1 above) has also been relatively stable (Hepworth et al. 2003, Hepworth et al. 1997). Aquatic macroinvertebrate samples (see Table 2 above) were slightly below but near Forest Plan standards in 1999.

The portion of this stream on the National Forest had a riparian evaluation done in 2003. Stream stability rating was generally good. Forage trend [apparent trend from a one time observation] was observed to be down on about 20.7% of the riparian length and stable on 79.3% of the riparian length. Management recommendations were that "Better grazing management is needed to enable the stream and vegetation conditions to improve. Livestock grazing is lowering plant vigor and density , as well as altering species composition,…" (Petty 2003).

South Fork of Pine Creek only supports a fishery at the very bottom end, but riparian evalutions showed this fork to be impacted. Apparent trend was down on 94.5% of the creek and stable on 5.5% (Petty 2003).

Impacts include grazing and roads that may be impacting habitat and depressing this population. Pine Creek was visited by Forest fisheries personnel in 2001 and 2002. Based on observations made during these visits, limiting factors on Pine Creek are low flows, habitat problems such as excessive width to depth ratios, lack of overhanging banks, and limited pool size/number. The latter of these conditions are believed to be primarily due to livestock use. Exclosure maintenance has been conducted by the district in recent years. Sedimentation impacts are also occurring from the road, which crosses the creek in several places and parallels it for the majority of the fish occupied portion of the stream. Temperatures also appeared to be excessive on lower Pine Creek and in the lower portion of the South Fork of Pine Creek.

In summary, Pine Creek appears to be affected by the current drought with the effects exacerbated by ongoing land management activities.

North Fork of North Creek – Native remnant population that is slightly introgressed genetically. The Bonneville cutthroat trout bearing portion of this stream is entirely on the National Forest within Management Area 4A – Fish Habitat Emphasis. This population has exhibited a upward trend in occupied stream length from 3.2 km in 1994 to 12.3 km in 2001 due to the population rebuilding after treatment to eliminate nonnative trout (Hepworth et al. 2003, Hepworth et al. 1997). Multiplying estimated occupied stream length by average stream widths at sampled stations gives a rough idea of habitat area. The North Fork of North Creek population expanded from occupied a very limited habitat of about 3.3 acres in 1994 to 7.8 acres in 2001.

Population estimates also show a slight decline in the upper reaches from 344 fish/mile in 1994 to 280 fish/mile in 2002 but averaged 659 fish/mile in 2002 when all stations were considered. Fish biomass (see Table 1 above) has generally been static at sampled locations (Hepworth et al. 2003, Hepworth et al. 1997). Aquatic macroinvertebrate samples (see Table 2 above) from 1998-1999 had BCIs ranging from 68-73, near Forest Plan standards.

This stream had a riparian evaluation done in 2003. Stream stability rating was generally good but was rated poor in reaches A26-1 and A26-3 due to the road and livestock grazing. Grazing was noted to affect reaches A26-1 through 5. Forage trend was observed to be down on about 12% of the riparian length and stable on about 88% of the riparian length.. Management recommendations were that better livestock grazing management is needed to increase riparian vegetation vigor, total cover, and improve species composition, and that a riparian exclosure should be considered

on the lower portion of the creek for a riparian reference area (Petty 2003). Limiting factors were noted to be [a lack of] shade, the large substrate, and a lack of deep pools.

This is a cobblely drainage from flood events. Forest fisheries personnel have visited North Fork of North Creek from 1999-2002. The most interesting aspect of this creek is the readily apparent unbalanced pool to riffle ratio. This creek lacks quality pools and exhibits an abundance of large gravel/cobble riffles. This would seem to be a symptom of past watershed disturbance (including the 1983 and 1984 flooding) and loss of large riparian woody vegetation with root masses or boles that serve to stabilize stream banks and create pools, and livestock grazing. The road is also likely having an effect on the creek due to numerous ford type stream crossings and by reducing the amount of functioning riparian vegetation due to its close proximity to the creek. The artificial pool structures installed low in the creek seem to be beneficial.

One item to note is that the North Fork of North Creek population of BCT is protected by a constructed barrier habitat structure on the Forest. Recent testing shows that there is some genetic introgression problems in the lower portion of this population that may require additional action by the UDWR. To fully eliminate the potential for new genetic introgression problems, it will be necessary to renovate the South Fork of North Creek.

Pole Creek (North Fork of North Creek tributary) – re-introduction in the mid 1990's. The Pole Creek tributary was severely affected by the drought. Only two fish could be found in the drainage in 2002 due to low water flows. This population has probably been lost by now (Hepworth et al. 2003). This drainage may need to be considered ephemeral/temporary habitat, especially during dry cycles. It should be noted that temporary habitat is still important for trout populations.

This stream had a riparian evaluation done in 2003. Stream stability rating was generally good. Forage trend was observed to be down on about 14% of the riparian length and stable on about 86% of the riparian length. Management recommendations were that the lower half of this stream was overgrazed (Petty 2003).

Briggs Creek – re-introduction. The majority of the fish bearing portion of this stream is on the National Forest, the upper portion is on State administered lands. The forest portion of this stream is in Management Area 3A – nonmotorized recreation emphasis. This population has exhibited a stable trend in occupied stream length of .9 km (Hepworth et al. 2003, Hepworth et al. 1997). Multiplying estimated occupied stream length by average stream widths at sampled stations gives a rough idea of habitat area. The Briggs Creek population occupies a very limited habitat of about .38 acres in 1994 which declined slightly to .3 acres in 2002 due to decreased stream width.

Population number trend is unknown but the 2002 data was 217 fish/mile. Fish biomass (see Table 1 above) has been stable at about 32 lbs/acre between 1994 and 2002 (Hepworth et al. 2003, Hepworth et al. 1997). There are no aquatic macroinvertebrate samples data for Briggs Creek.

The portion of this stream on the National Forest had a riparian evaluation done in 2003. Stream stability rating was generally good. Forage trend was observed to be stable on 100% of the riparian length (Petty 2003).

In summary Briggs Creek has a stable population. Sampling in 2002 showed that Briggs Creek is a somewhat marginal creek due to its small size and low water flows. It has interesting water quality, with a deep rust color due to iron levels. Basic water quality parameters that were monitored (pH and conductivity) did not exhibit anything unusual but there may be other chemicals or metals that would be less than ideal. Due to its remote location, Briggs Creek did not appear to be impacted by land uses.

Birch Creek West – Pure strain native remnant population. The majority of the fish bearing portion of this stream is on the National Forest, the lower portion is on BLM administered lands. The forest portion of this stream is in Management Area 4A – Fish Habitat Emphasis. This population has exhibited a downward trend in occupied stream length from 6.8 km in 1994 to 5.6 km in 2001, probably due mainly to drought (Hepworth et al. 2003, Hepworth et al. 1997). Multiplying estimated occupied stream length by average stream widths at sampled stations gives a rough idea of habitat area. The Birch Creek West population occupied a very limited habitat of about 2.0 acres in 1994 which declined to 1.66 acres in 2001. It is important to realize that all water transported sediment produced in the much larger watershed is funneled into and through this restricted fisheries habitat. It is easy to see that it would take only a small increase in sediment production across a watershed to increase sediment levels in the stream.

Population estimates also show a dramatic decline from 259 fish/mile in 1980 to 256 fish/mile in 1994 to 80 fish/mile in 2001. Fish biomass (see Table 1 above) has also declined dramatically from 37.5 lbs/acre in 1994 to 12.3 lbs/acre in 2001 (Hepworth et al. 2003, Hepworth et al. 1997). Aquatic macroinvertebrate samples (see Table 2 above) have declined from above Forest Plan standards in the late 1980s to below in 1998-1999. Reasons for the apparent drop from the late 1980s higher BCI levels are unknown. Potential reasons are a buildup of fines after streambeds were flushed in the early 1980 floods, and drier long-term weather patterns in the 1990s that has concentrated livestock use along streambanks and reduced the number and duration of high flows that flush sediment.

The portion of this stream on the National Forest had a riparian evaluation done in 2003. Stream stability rating was generally good. Forage trend was observed to be down on about 46% of the riparian length, up on 14.8% of the riparian length, and stable on the remainder. Management recommendations were that "Better livestock grazing management is needed to increase riparian vegetation vigor, total cover, and improve species composition, or a riparian exclosure with water gaps should be considered for the entire creek,…" (Petty 2003). Noxious weeds were also noted on the stream during the inventory.

Marginal stream habitat, drought, low stream flows, grazing, and lack of exclosure maintenance are all factors contributing to this decline. This population is one of only a few pure strain native remnant populations on the Fishlake National Forest. Replication for this population has occurred in Sam Stowe Creek (Fillmore Ranger District) and Briggs Creek (Beaver Ranger District) thereby

reducing the risk of genetic loss. This population is highly susceptible to decline. Regular exclosure maintenance and frequent monitoring of livestock use needs to be insured to prevent further population declines due to grazing.

Forest fisheries personnel have visited Birch Creek yearly from 1999 to 2002 for aquatic macro invertebrate sampling, fish population sampling, general observations, and placement and retrieving of temperature monitors. Based on these visits, the limiting factors on Birch Creek are low stream flows and poor quality pools (both due to the absence of flushing flows and increased sediment from bank damage areas). Much of the BCT habitat on the Forest within Birch Creek is within exclosures. These exclosures were found to be generally non-functional in 1999-2000. Some protection has allowed aspen regeneration in the past, but it appeared that enough use was occurring to allow aquatic impacts. The exclosures were maintained in 2001, and by 2002 the upper exclosure was again protecting the stream.

Above the exclosures there are two small water gaps, which are contributing sediment to the stream. Above this the stream is in a conifer overstory habitat for about 0.5 mile. This area had good looking pools and shading. Conifer shading has reduced riparian forage production in parts of this upper creek, but livestock use levels along the stream did not seem too excessive in 2001. Surveys in 2003, however, noted higher use levels and rated this reach as in downward trend. There is not an established fish population monitoring station in this reach.

High water temperatures are of concern on the lower habitat administered by the BLM despite the fact that it is in better condition. This is probably partially due to low elevation and low stream flows and thus high water heating with low thermal mass. This may be reducing trout numbers in these lower reaches.

To summarize, Birch Creek appears to have undergone a major decline in fish biomass and a slight reduction is stream occupied length due to effects of drought exacerbated by ongoing land management activities. An increase in land use administration and exclosure maintenance will be necessary to protect the remaining habitat. A future wet cycle may help restore habitat and the Bonneville cutthroat trout population.

Birch Creek East – re-introduced in 2001. This population has marginal stream habitat at best. It does not have an exclosure and receives livestock use. Forest fisheries personnel visited Birch Creek (E) in 2001. Based on these visits, the primary limiting factor on this creek is low flows and poor pool quality. The existing non-native brook trout population was extirpated by a wildfire and after fire effects in 1996. The stream was rested following the fire and looked good during summer 2001, although livestock use levels were high by late summer. A new user created ATV trail was found into the upper canyon (in a area closed to ATV use) in the fall of 2001, which diverted much of the stream flow down the trail, reducing channel flows available for fish and creating new erosion concerns. The district conducted barriers to close the trail to ATV use in 2002, which have been breeched in 2003. Spot electroshocking in the summer of 2003 verified survival of Bonneville cutthroat trout in the stream from the fall 2001 plant. Population monitoring will be conducted in the future on this population. Riparian evaluation is planned for summer 2004.

Ten Mile Creek – re-introduced 2002 from Deep Creek on the Dixie NF. This population has not been monitored since its reintroduction. This population is not generally impacted heavily by grazing except near Bumblebee Springs and some isolated open meadows downstream. Forest fisheries personnel have visited Ten Mile Creek in 2000, 2001, and 2002. Based on these visits, the primary limiting factor on this creek is low flows and poor pool quality. The best habitat is in the middle canyon, where flows are higher and there are quality pools. Habitat at the upper and lower portions of the creek is marginal. This is an interesting system that appears to occupy erosive coarse sand and small gravel soil types. The majority of the creek has downcut 5-7 feet and has lost its access to the floodplain. Much of the upper creek has a conifer (white fir) overstory with limited understory. Willows and herbaceous streambank vegetation such as *Carex* are limited. This is the one Forest creek where sulfates have been detected during field water chemistry sampling. The lower station was 150 mg/l. Despite these above concerns, aquatic macroinvertebrate samples were above standards. Ten Mile Creek is serving as refugia for this genetic stock until Deep Creek recovers from the Sanford Fire and they can be reintroduced. After fish are reintroduced to Deep Creek, this drainage should be looked at for riparian treatments to reduce conifers, increase willows and sedge vegetation, and help the stream restore a floodplain. Population monitoring and riparian evaluation is planned for summer 2004.

Direct and Indirect Effects

The Action Alternative includes livestock grazing and associated activities within current Forest Plan grazing standards and guidelines as outlined in the "Description of the Proposed Action" (Section III above).

Direct Effects

Direct effects to Bonneville cutthroat trout from the action alternative 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 livestock in the stream for watering or trailing across the creek. Other direct effects are very unlikely and would occur only from trampling of spawning eggs during herding operations or accidental introduction of toxic materials such as gasoline into the stream from an OHV upset during allotment operations.

Indirect Effects

Indirect effects to Bonneville cutthroat trout would be those effects that impact water quality. The primary potential for indirectly impacting fish, aquatic macroinvertebrates, or aquatic habitats would be from the introduction of fine sediment to the streams. Fine sediment can change the species composition, diversity, and abundance of macroinvertebrates 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, it can carry harmful nutrients and chemicals into the streams.

Watershed and riparian vulnerabilities caused by overstocking are documented in some areas of the Beaver River Watershed (BRWA) and in the 2003 Fishlake National Forest Level II Riparian Inventories. Some of these areas occur on the North-Indian Creek, Pine Creek/Sulphur Beds, and South Beaver Allotments within the same riparian areas where Bonneville cutthroat trout are known to occur. These populations may be impacted because these vulnerabilities indicate that current grazing management practices may be exceeding watershed and riparian capabilities. These aquatic riparian habitats provide suitable habitat for known Bonneville cutthroat trout populations that may be affected by re-issuing term grazing permits in these 8 allotments on the Beaver Ranger District.

The re-issuance of grazing permits on these 8 allotments may result in a reduction of vegetation (especially desirable species i.e. sedges, willows) along the stream channel. Alterations in riparian plant composition resulting from overuse (as described in the BWRA) may cause vegetation conversions to less desirable species such as Kentucky bluegrass and redtop. Continued overutilization and reduction of stubble heights may also change rooting depths that affect bank stability. A reduction in vegetation and an increased concentration of livestock use in these riparian areas would have several indirect effects on the aquatic habitat. These effects include damage to streambanks from trampling, soil compaction, and shearing which often leads to increased width/depth ratios and a loss of undercut banks. Undercut banks provide cover for Bonneville and Colorado cutthroat trout. Damage to streambanks also cause increased sediment in the stream that decrease pool volume and cover spawning gravels. Increased width/depth ratios and a loss of stabilizing vegetation such as willows could lead to changes in stream shading. Both of these factors contribute to increased water temperatures. Furthermore, increased organic matter in the stream from livestock manure and direct effects such as cattle trampling spawned eggs may impact Bonneville cutthroat trout individuals and potentially suitable habitat for both sensitive fish species.

These effects may cause changes to aquatic biota diversity in these habitats. Fluctuations in water temperature and macro-invertebrate composition and density may impact Bonneville cutthroat trout individuals feeding and spawning success. Bonneville cutthroat trout require relatively cool, well oxygenated, water and the presence of clean, well-sorted gravels with minimal fine sediments for successful spawning (Rodriguez 2004). These effects may also impact potentially suitable habitat spread throughout the analysis area.

The two Bonneville cutthroat trout populations most heavily impacted by the proposed action will be Pine Creek and Birch Creek West (personal comm. with Jim Whelan). Grazing (the proposed action) and roads in Pine Creek may be impacting habitat and depressing populations but are not likely causing a trend to federal listing or a loss of viability.

A combination of prolonged drought, low flows, marginal habitat, and grazing (proposed action) have caused the Birch Creek West population to decline substantially since 1994. Maintenance of range improvements (as provided for in this proposed action) will be critical on exclosures that exclude livestock from parts of this drainage where the Bonneville cutthroat trout occurs.

Riparian exclosures can serve to improve water quality in streams by protecting the shoreline from livestock grazing reducing sediment inputs and creating a vegetative buffer between grazed areas and the water to trap overland flow of sediment and nutrients. Small riparian exclosures exist on Pine Creek. A large percentage of Birch Creek West is within livestock exclosures. Maintenance levels were generally inadequate in the late 1990s and exclosures were only partially functional, but maintenance levels have increased in recent years.

Observations of riparian conditions by fisheries personnel and riparian contractors (see Petty 2003) are that riparian grazing standards were often exceeded on portions of these creeks. Coordinated and continued diligent effort to manage livestock appropriately and provide proper administration of livestock use so that grazing standards are met could result in reduced impacts from grazing compared to the current situation and a gradual improvement of habitat conditions on some portions of these streams.

Therefore, this proposed action may impact the Bonneville cutthroat trout individuals and/or their habitat but is not likely to cause a trend to federal listing or a loss of viability.

Direct and indirect effects to Colorado River cutthroat trout individuals would not occur because they are not found in the analysis area. Normally streams outside of the native range of a species/sub-species are not considered for or counted for recovery objectives.

Cumulative Effects

The cumulative effects analysis area for Bonneville cutthroat trout in the project area is the Beaver Ranger District or each BCT watershed from pour points upstream. Past, present, and reasonably foreseeable activities within the cumulative effects area include introduction of native and non-native fish species, fish stocking, private land ownership (subdivision construction activities), grazing, recreation, timber and thinning operations, reforestation and seeding of burned areas, chaining, seeding of native and non-native plant species, fire suppression, natural and prescribed fire, pesticide application, noxious weed control, and other special uses such as mining, hydroelectric operations, firewood and post cutting, municipal water developments, and irrigation diversion. Recreation-related activities include hunting, fishing, camping, day/picnic use, hiking, horseback riding, all-terrain vehicle (ATV & OHV) use, and campground/roads/trails maintenance and development. The introduction of non-native fish, fish diseases, stocking of hatchery fish, grazing, fires, fire management activities (drafting water from streams/lakes), timber/thinning operations, hydroelectric development, irrigation diversion/development, and noxious weed control has altered riparian and upland vegetation composition and densities and riparian environments, which has reduced habitat for Bonneville cutthroat trout in some cases.

Water manipulation, drought, hydroelectric/municipal water development, mining activities, fishing, introduction of non-native fish, fish stocking, and the accidental introduction of fish diseases within the cumulative effects area has likely affected these sensitive fish populations. A few drainages within the analysis area are infected with whirling disease (i.e. Beaver River). These kinds of fish diseases along with competition from non-native fish species and water manipulation are major factors affecting potentially suitable habitats for Bonneville cutthroat trout

populations. Water manipulation from the maintenance of range improvements (specified in the proposed action) may contribute to these major factors within the cumulative effects area. Other management activities listed above that contribute to erosion and sediment loading into streams (i.e. thinning/timber operations, mining, recreation, fire, etc.) may affect these sensitive fish species and/or habitat when coupled with this proposed action. Therefore, the effects of the past, present, and reasonably foreseeable activities listed above in combination with this proposed action may impact Bonneville cutthroat trout individuals and/or their habitats but is not likely to cause a trend toward federal listing or a loss of viability.

Reasonably foreseeable future activities – There are two classes of reasonably foreseeable future activities that are likely in the cumulative effects area for this project. First is an increased level of upland vegetation treatments to reduce fire fuel loading, sanitize spruce bark beetle infestations, salvage dying timber, and restore a more natural fire regime. These projects are part of the national Healthy Forests Initiative. Increased vegetation treatment levels could increase sedimentation impacts to these streams in the short-term, further reducing carrying capacity. Use of Best Management Practices (BMPs) should minimize impacts from these activities. The Forest Plan buffer of "special treatment" within 100 feet of a stream should further 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 Bonneville cutthroat trout reintroductions within the project area as a cooperative project between the Utah Division of Wildlife Resources and the Fishlake National Forest. Additional reintroduction work could put the Birch Creek West stock in much better habitat, reducing the risk to this genetic stock while at the same time facilitating necessary vegetation treatments in the Birch Creek watershed. In fact, 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.

Therefore, the effects of the past, present, and reasonably foreseeable activities listed above in combination with this proposed action may impact Bonneville cutthroat trout individuals and/or their habitats but is not likely to cause a trend toward federal listing or a loss of viability.

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 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 have lead to the loss of 4 Bonneville cutthroat trout populations in southern Utah in 2001-2002. 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. 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 indicate 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 the total population. Recent experience suggests that genetic risks are secondary concern compared to environmental stochastic processes. These processes can work together 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.

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. 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. Where local populations are isolated fisheries biologist must take the role of the dispersal and recolonization agent.]

Based on the above discussion, the Bonneville cutthroat trout streams within the project area have been individually rated using the professional opinion of James Whelan, 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 alternative – livestock grazing - affects primarily the growth and survival category rated as a deterministic risk. In other words, it affects one variable within the larger suite of risk elements, many of which are fixed regardless of the effects of this proposed action. The tables below describe the current management conditions. The no action alternative change is shown in blue. If the action alternative is selected and implemented as designed, conditions would be between current and no action conditions.

Pine 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---------*	X		
Isolation	Stochastic				X

*Effects from roads and trails would still impact the population.

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---------*	X		
Isolation	Stochastic				X**

*Effects from roads and trails would still impact the population.
**Potential to lower this risk with a future reintroduction project and elimination of a barrier.

Briggs Creek

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 likely due to a combination of habitat quality and environ stochastic events (drought).

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	X?		
Isolation	Stochastic				X

This stream was rested from grazing for 5 years from 1996-2001 following a wildfire, which allowed some riparian recovery. Therefore condition under the proposed action would likely be the same as the current condition (moderate level).

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

One of the major objectives of fisheries managers is to maintain each pure remnant genetic stock of Bonneville 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 cutthroat trout genetic stocks within the project area have been rated using the professional opinion of James Whelan, 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.

Pine Creek (mixed) Stock

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

North Fork of North Creek (somewhat introgressed) Stock

Population	Nature of Risk -	Risk of Local Population Extinction

Characteristics	Primary	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----------	X	

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

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 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. Again, there is a potential risk of future contamination, 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 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). 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 two very limited populations on the west side of the Pine Valley Mountains were lost due to drought, possibly exacerbated my management impacts. Plans are to reintroduce Bonneville cutthroat trout from replicant streams as soon as habitat conditions in affected streams allow. Hepworth et al. (2003) discusses the 2002 fire losses, recovery plans, and the need for dispersed replications of core populations.

Compliance With Management Direction

Management direction pertaining to Bonneville cutthroat trout is found in the Fishlake Forest Plan. The direction is for fisheries in general, but is also applicable to BCT management. Forest Plan goals pertaining to fisheries habitat are found on IV-3-4, general direction on IV-18 and standards and guidelines on IV-18-19.

Management Area Direction 4A - "Emphasis is on fish habitat improvement where aquatic habitat is below productive potential"(IV-85). This management prescription has general direction and standards and guidelines that are applicable to fisheries on IV-88.

Management Area Direction 6B – “Emphasis is on livestock grazing” (IV-109). This management prescription has general directions and guidelines applicable to Management Indicator Species on IV-112. While empahsis is on livestock grazing management should “maintain the environment”.

Management Area Direction 3A- “Emphasis is on providing nonmotorized recreation with development of other resources” (IV-73). This management prescription has limited direction and guidelines regarding fisheries.

The Fishlake National Forest Plan monitoring requirements for aquatic biota resources can be found in Table V-I (Forest Plan V-6). The table has two monitoring requirements for Management Indicator Species that apply to aquatic biota. The first activity is "a. Fish Bonneville Cutthroat Trout" via electroshocking and gill netting in 1 stream per year to see if they are meeting the standard of "No decrease attributed to management activities". The second aquatic MIS activity is "d. Macroinvertebrates" via stream sampling and lab counts [i.e. analysis] in 5 streams per year to see if they are meeting the standard of "BCI above 75". The table also lists "Habitat Condition Inventory", using the monitoring technique of "stream survey" to be done annually, but with no quantified number of streams or mileage requirement. The standard for this activity is "Meets prescribed standard". Note that these monitoring requirements are forest-wide.

The Conservation Agreement and Strategy for Bonneville cutthroat trout in the State of Utah provides general guidance for goals, objectives and management actions to reduce or eliminate threats to Bonneville cutthroat trout and eliminate the need for it to be listed as a threatened or endangered species under the Endangered Species Act of 1973, as amended. The Forest Service is a signatory of this document. The conservation objective for the Southern Bonneville General Management Unit (GMU) is:

> *Maintain 5 populations and 25 occupied stream miles and 73 surface acres of lentic water in the Sevier River drainage.

When implemented as designed the Action Alternatives will be consistent with the Forest Plan for Bonneville cutthroat trout. When implemented as designed streambank reaches that are above Forest Plan standards and guidelines are expected to remain within these standards, and reaches that are not currently within standards (lower watershed) should remain stable in the short-term and move towards meeting standards in the long-run.

Determination

The proposed action may impact Bonneville cutthroat trout individuals, but would not contribute to a trend towards federal listing *or a loss of population viability*. This determination is based on the following rationales:

Common to all streams (see additional for Birch Creek West) – grazing standards will be implemented and met on streams and riparian habitat, providing habitat maintenance and slow improvement of degraded areas.

Additional rationale for individual creeks listed below:

Pine Creek – population has been stable from the time period from 1994 to 2001, despite the drought. Habitat impacts appear to be constant.

North Fork of North Creek – population is expanding. One of the larger habitat areas and the potential for a large population size.

Briggs Creek – generally unaffected by management.

Birch Creek West – determination is based upon additional mandatory mitigation measures in the decision document including the following: yearly maintenance of the livestock exclosures prior to livestock turnout, monitoring during the grazing season to ensure exclosures are functioning and that standards are not being exceeded on portions of the stream outside of the

exclosures, and a end of season evaluation of the grazing season on whether the exclosures were effective and standards were met on Birch Creek West.
Birch Creek East – this is a marginal creek that may be prone to loss during drought periods. Given this, the Manning broodstock was used for reintroduction in case supplemental reintroductions would be needed.
Ten Mile Creek – tree cover, past downcutting, and steep mountainous terrain preclude livestock access to many areas of the creek.

VII. COMPLIANCE WITH MANAGEMENT DIRECTION

This biological evaluation process has served to review the effects of implementing the proposed action of the re-issuance of term grazing permits on eight cattle allotments, Beaver Mountain Tushar Range project on sensitive vertebrate species. Adverse impacts that may affect the viability of the species have been avoided.

VIII. DETERMINATION

As a result of this evaluation and requirements, it is our professional determination that implementation the proposed action of the re-issuance of term grazing permits on eight cattle allotments, Beaver Mountain Tushar Range project may impact spotted bat, Townsend's Big-eared bat, northern goshawk, flammulated owl, three-toed woodpecker, peregrine falcon, greater sage grouse, pygmy rabbit, 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. This proposed action will have no impact on the Colorado River cutthroat trout.

IX. MANAGEMENT REQUIREMENTS

The following management requirement would be mandatory for the Re-issuance of Term Grazing Permits on Eight Cattle Allotments within the Tushar Mountain Range:

1. Birch Creek West Drainage - yearly maintenance of the livestock exclosures prior to livestock turnout, monitoring during the grazing season to ensure exclosures are functioning and that standards are not being exceeded on portions of the stream outside of the exclosures, and a end of season evaluation of the grazing season on whether the exclosures were effective and standards were met on Birch Creek West.

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XI. CONTRIBUTORS

Mark Madsen, Forest Botanist, Dixie NF, Cedar City, UT
Ron Rodriguez, Wildlife & Rare Plant Program Manager, Dixie/Fishlake NF, Cedar City, UT
Jim Whelan, Fisheries Biologist, Fishlake NF, USFS/UDWR, Richfield, UT