Appendix B – Allotment Capability and Suitability

Map 1: Davis Creek allotment

Map 2: Indian Creek allotment

Map 3: Perry Aiken allotment

Map 4: Trail Canyon allotment

APPENDIX B
White Mountain Group Allotment Analysis
Capability and Suitability

The approximate acreage and maps that display the areas capable and suitable for livestock grazing is provided in Appendix B.

Approximate acreage of areas mapped as capable and suitable for livestock grazing:

Allotment	Allotment Acreage	Capable Acres	Suitable Acres
Davis Creek	12,200	5,000	2,200
Indian Creek	16,000	4,500	2,700
Perry Aiken	28,500	5,300	2,000
Trail Canyon	27,300	15,400	4,400

Capability for grazing was determined through a GIS analysis using the following criteria:

- Areas with slopes of 35% or less (for cattle).
- Areas producing or having the potential to produce an average of 200 lbs. of forage/acre [CWHR vegetation type S (sparse cover) or P (open cover)].
- Areas with naturally resilient soils (not unstable or highly erodible soils).
- Areas accessible to livestock, without such factors as dense timber, rock, or other physical barriers.
- Areas within 1.5 miles of water or where the ability to provide water exists.

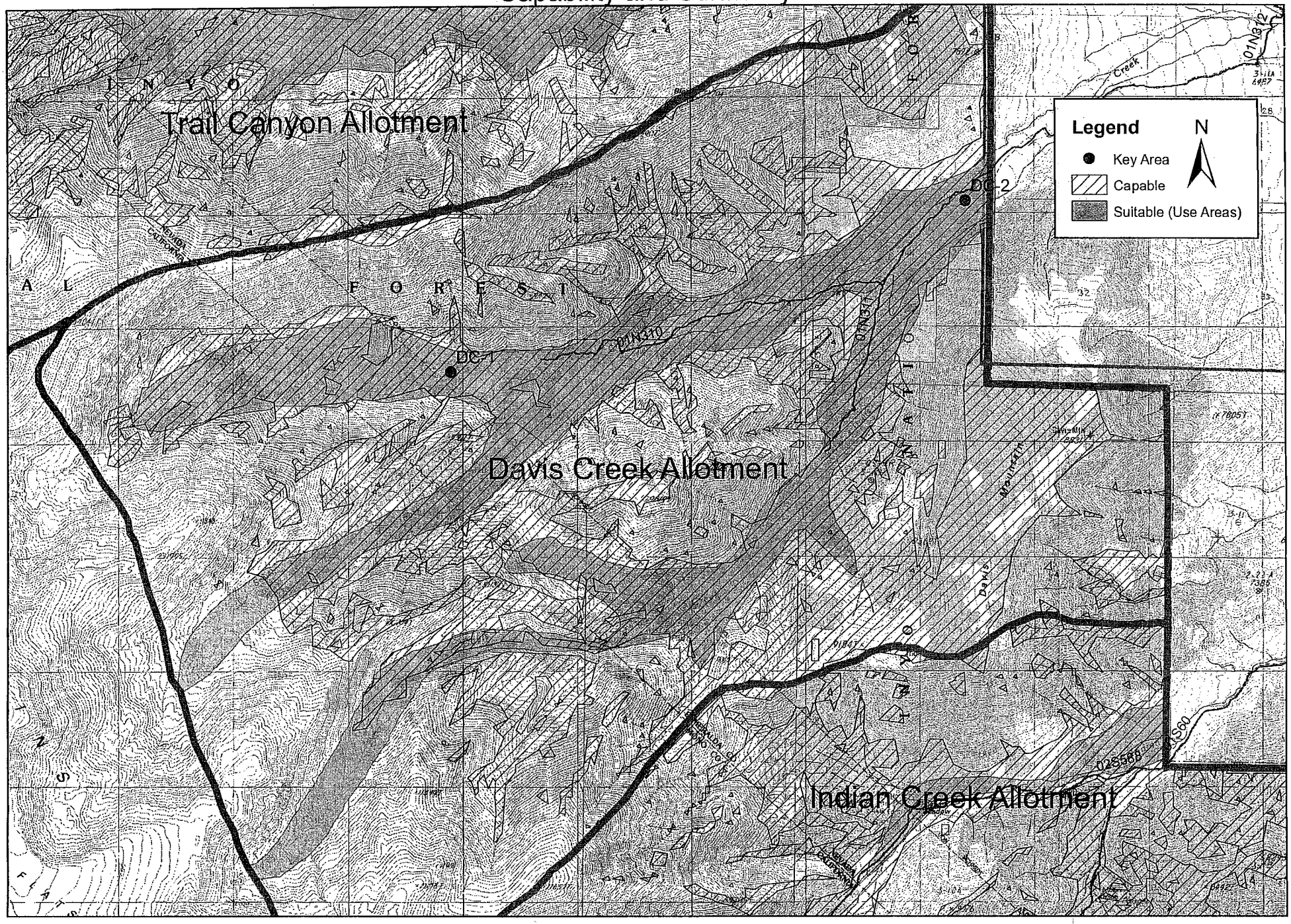
Capability was based on a GIS analysis, and is not necessarily indicative of the actual on-the-ground conditions. The forage production was based on the 1994 Soil Survey for the East Part of the Inyo National Forest. This soil survey is an Order 3 soil survey, which means that it is at a small scale, and does not differentiate small areas that may have higher productivity than the surrounding area, such as meadows in the White Mountain allotments. Therefore, it likely underestimates the capable acres in areas with many small meadows, and also explains why some areas that were not identified as capable through the GIS analysis were further determined to be suitable.

An assessment of suitability was determined to address whether livestock grazing is compatible with management direction for a management area's other uses and values. Cattle use areas that were mapped for past planning purposes were reviewed and updated by the IDT to determine suitability.

1:42,000

Davis Creek Allotment
Capability and Suitability

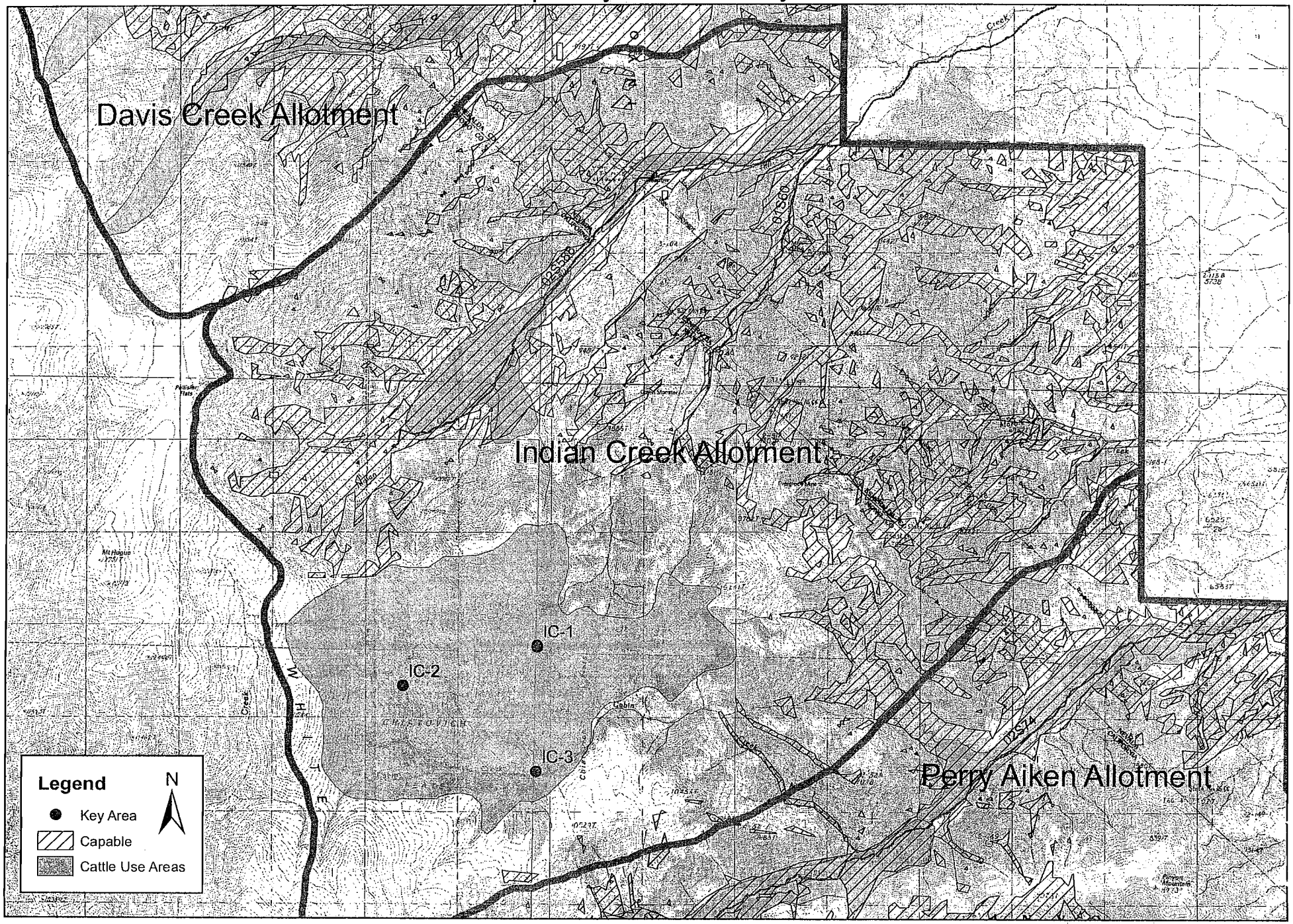
Appendix B - Map 1



1:52,000

Indian Creek Allotment
Capability and Suitability

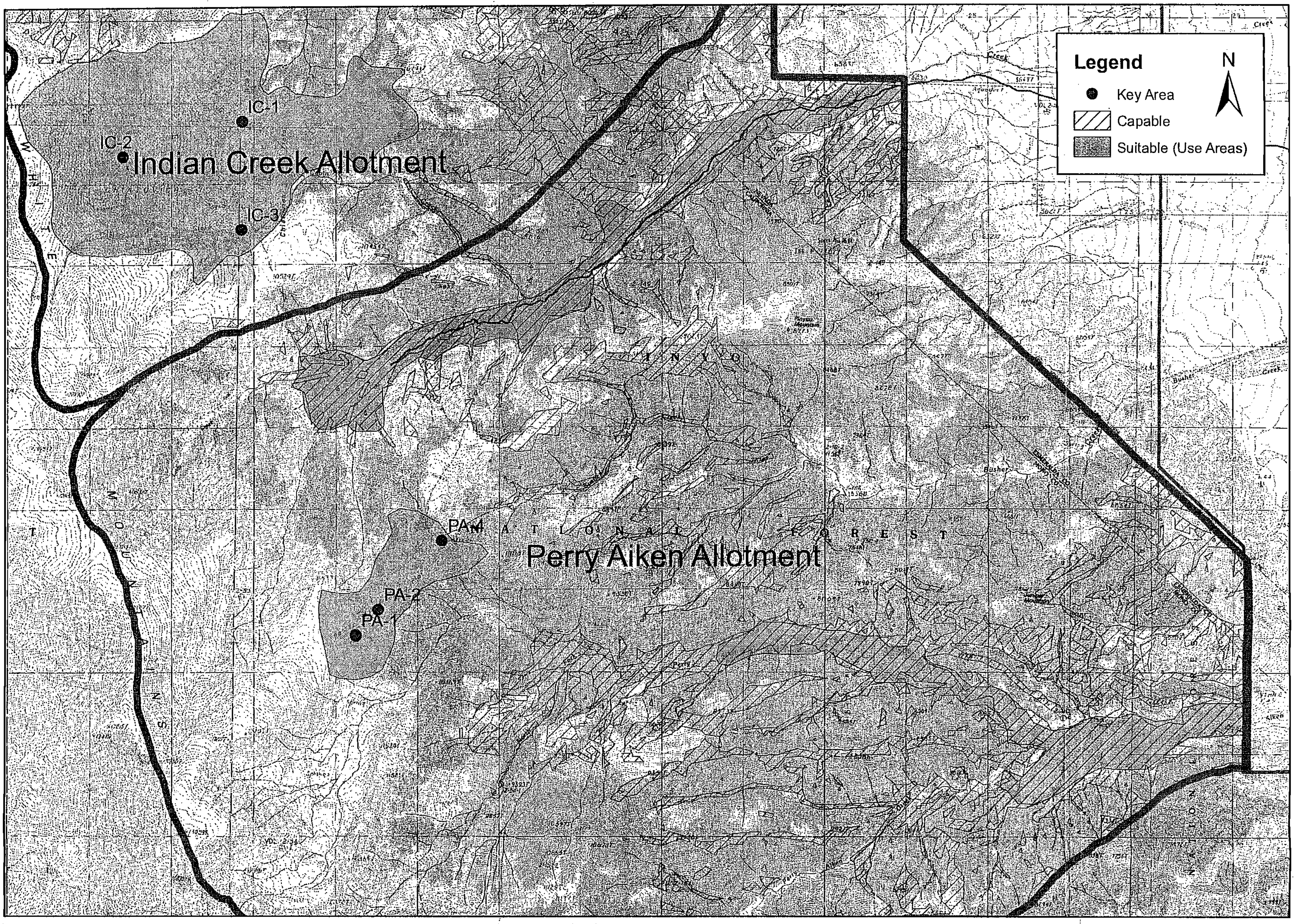
Appendix B - Map 2



Perry Aiken Allotment
Capability and Suitability

1:60,000

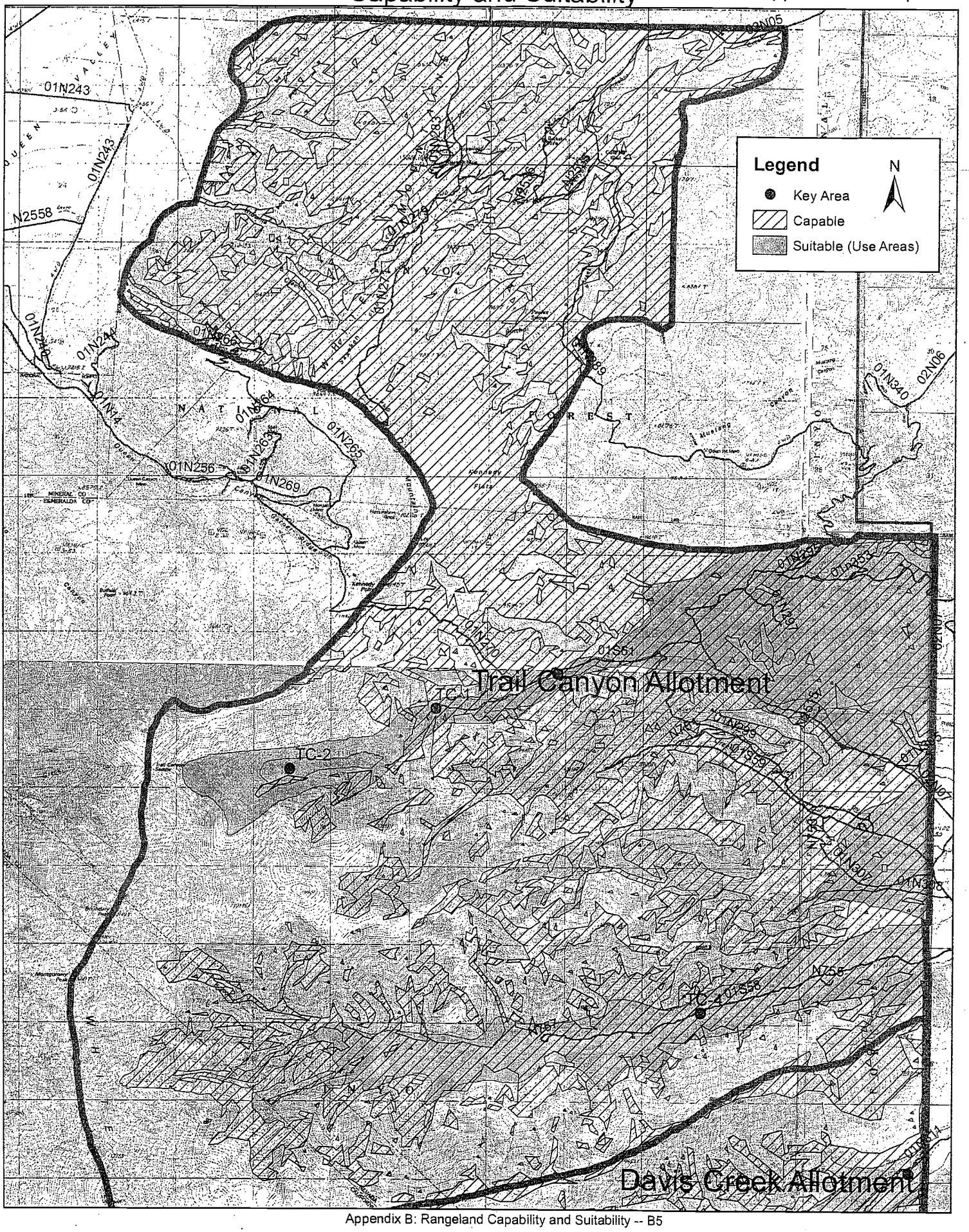
Appendix B - Map 3



Trail Canyon Allotment
Capability and Suitability

1:60,000

Appendix B - Map 4



Appendix C – Comparison of Existing and Proposed Grazing Management and Utilization Levels

Appendix C
Comparison of Existing and Proposed Utilization Levels (Table C-1) and Grazing Management (Table C-2)

Key to Table C-1:
[1] Current Allowable Use – Existing utilization levels under the current term grazing permits
[2] Proposed Allowable Use – Utilization levels under Alternative 2 (Proposed Action)
[3] Early – Early season use (pre-boot stage: before seed head is formed)
[4] Late – Late season use (after seed maturity)
[5] Utilization level modified from Amendment 6 standards to meet USFWS requirements for Paiute Cutthroat Trout
[6] Assume good vegetation condition until assessments are made.
BG = Bunchgrass
RG = Riparian Grass-likes

Increase in Early Season or Late Season Utilization
Decrease in Early Season or Late Season Utilization
No Change in Utilization

Key to Table C-2:
This table displays the differences between current and proposed specific design criteria for each allotment or a specific area or unit within an allotment.

In addition, the proposed action incorporates implementation monitoring and effectiveness monitoring that will trigger adaptive management options to be implemented if the grazing management prescriptions are not meeting objectives.

Table C-1. Comparison of current and proposed allowable use standards.

Allotment	Allowable Use Standards					
	Key Area		Current Management[1]		Proposed Management[2]	
	No.	Name	Early[3]	Late[4]	Early	Late
Davis Creek	DC-1	Upper Chiatovich	40% Carex, BG	30% Carex, BG	**5%, incidental use**	
	DC-2	Lower Chiatovich	50% Carex	40% Carex	**45% Carex**	
	DC-3	Chiatovich Upland	Not specified in current permit; new key area		50%[6]	
Indian Creek	IC-1	Chiatovich Flats Upland	40% BG		**20% BG**	
	IC-2	Chiatovich Flats Meadow	15% Carex		15% Carex	
	IC-3	Cabin Creek	40% Carex	35% Carex	**30% Carex[5]**	
	IC-4	Chiatovich Flats Sagebrush	Not specified in current permit; new key area		50%[6]	
Perry Aiken	PA-1	Perry Aiken Flat	5% RG		*20% Carex*	
	PA-2	Perry Aiken Flat Upland	40% BG		**15% BG**	
	PA-4	Busher Canyon Springs	5% RG, incidental use		*15% Carex*	
Trail Canyon	TC-1	Trail Creek Meadows, above roads end	30% Carex	20% Carex	*45% Carex*	*35% Carex*
	TC-2	Section 8 Springs	5% RG, incidental use	5% RG, incidental use		
	TC-3	Lower Trail Creek, below road's end	40% Carex	30% Carex		
	TC-4	Middle Creek	40% Carex	30% Carex	*50% Carex*	*40% Carex*

Table C-2. Comparison of current and proposed management actions; specific design criteria.

Allotment	Species Addressed	Unit or Specific Area of Allotment	Current Management	Proposed Management
Davis Creek	Sage Grouse	North and South Fork of Chiatovich Creek (BE Map 3)	No specific design criteria	Delay livestock grazing until after July 1st.
Indian Creek	Sage Grouse	Chiatovich Flat (BE Map 3)	No specific design criteria	Delay livestock grazing until after July 1st.
	Paiute Cutthroat Trout	Cabin Creek		Delay livestock grazing until after August 15th.
		Cabin Creek Unit		Rest from livestock grazing every other year.
Perry Aiken	Sage Grouse	Perry Aiken Flat (BE Map 3)	No specific design criteria	Delay livestock grazing until after July 1st.
Trail Canyon	Sage Grouse	Sagehen Flat and Kennedy Flat (BE Map 3)	No specific design criteria	Delay livestock grazing until after July 1st.

Appendix D – Summary of Vegetation and Watershed Condition Data (LRMP Amendment 6 and Proper Functioning Condition)

APPENDIX D
White Mountain Group Allotment Analysis
Summary of Vegetation and Watershed Condition Data
LRMP Amendment 6 and Proper Functioning Condition (PFC)

This appendix provides a summary of the vegetation and watershed conditions analyzed for the Davis Creek, Indian Creek, Perry Aiken, and Trail Canyon allotments. These data were gathered following direction provided in Amendment 6 of the Inyo National Forest Land and Resource Management Plan (LRMP). Site-specific data for each allotment were analyzed and summarized to show existing resource conditions and trends. This analysis used data from the following sources:

- Forest Service evaluations including Condition and Trend (C &T) transects, rooted frequency, range inspections, upland long-term trend studies, riparian Proper Functioning Condition (PFC), and photo points conducted from 1960's to 2008. The Forest Service Handbook 2209.21 (1969) describes the methodology and protocol used.
- Toe-Point upland inventory data.
- Inyo National Forest Amendment 6 Watershed Assessments.

Through establishing vegetation and watershed conditions allowable use standards and management actions can then be prescribed for each specific key area using Amendment 6 Appendices A and B. Vegetation conditions are assessed first and allowable use standards are determined by using the appropriate vegetation allowable use standard table: Carex-dominated (wet) meadow; Carex-grass-dominated (moist meadow); Desert shrub; Sagebrush/bunchgrass; Bitterbrush; Alpine meadow; Alpine dwarf shrub; Aspen; and Willow. After this process then watershed conditions are assessed and the Allowable Use adjustment Protocol (Appendix B) is used to determine any changes in allowable use standards or if other management actions are needed to address watershed conditions.

The vegetation and watershed conditions ratings help determine the need to change in livestock management for each key area. The allowable use standards and livestock management options as defined in Amendment 6 then address this need for change through management actions and help reach desired conditions for each allotment. Desired conditions are established through the standards and guidelines listed in the Inyo NF Land and Resource Management Plan (1988) and Sierra Nevada Forest Plan Amendment (2004)

The definitions for vegetation and watershed conditions, as summarized in the following tables, are as follows:

Vegetation data are rated as poor, fair, good, and excellent. For this analysis these terms are defined below and originate from the vegetation allowable use tables in Appendix A of Amendment 6 (See Figure 1).

- Poor condition- the lowest ratio of desired plants of total herbaceous;
- Fair condition- the second to lowest ratio of desired plants of total herbaceous;

- Good condition- the third to lowest ratio of desired plants of total herbaceous; and
- Excellent condition- the second highest and highest ratio of desired plants of total herbaceous.

Figure 1. Vegetation Condition and Vegetation Desired Condition Definitions using Vegetation Allowable Use Table from Appendix A of Amendment 6. Definitions applied to all Vegetation Allowable Use Tables.

Desired Condition Definition	Desired Plants Tallied Total Herbaceous	Grazing System SL	Grazing System OO	Vegetation Condition Definition
Desired Condition	68 68+	45	60 Early 45 Late	Excellent
	51-62 51+	45	45 Early 35 Late	
Not in Desired Condition	19-50 19+	25	35 Early 25 Late	Good
	7-34 16-85	15	25 Early 15 Late	Fair
	0-16 1-45	5	15 Early 10 Late	Poor

Desired condition for vegetation also follows the allowable use table and is defined as:

- Areas which fall within the top two rows are at desired condition; areas which fall in the third to fifth rows are not at desired condition. Desired condition has been defined this way through the ID team process and is guided by Amendment 6 (See Figure 1).

Watershed conditions are defined in Amendment 6 for riparian or upland vegetation types as Non-functional, Degraded, At-Risk, and Fully functional (these terms come directly from Appendix B in Amendment 6) for each of the following watershed characteristics:

Vegetation Type A (Riparian)

- Hummocks
- Rills and gullies
- Stream incisement
- Streambank stability
- Headcuts and nick points

Vegetation Type B (Upland)

- Soil movement
- Surface litter and/or rock
- Pedestalling
- Flow patterns
- Rills, gullies, and headcuts

Both Vegetation Types

- Surface mineral or organic layer thickness
- Compaction
- Bare ground due to disturbance

The overall watershed condition is then defined in Appendix B of Amendment 6 in the Allowable Use Adjustment Protocol Section (Appendix B – 2 and 3) for each vegetation type (riparian or upland). These conditions are rated as: Non-functional, Degraded, At-Risk, and Fully functional.

In this analysis, stream functional condition was determined using the Proper Functioning Condition (PFC) protocol (USDI 1998). The PFC protocol was developed by a multi-agency effort, and is a common rapid assessment method for stream condition. If there was a perennial stream at the key area, a PFC analysis was completed. PFC results are listed as functional ratings:

- Proper Functioning Condition (PFC)- able to withstand relatively high flow events without excessive erosion or destabilization
- Functional-At Risk (FAR)- high probability of degradation with a relatively high flow event
- Nonfunctional- lack the ability to withstand a relatively high flow event without degradation
- Unknown

Davis Creek Allotment

Key Area	Vegetation Type	Amendment 6				Proper Functioning Condition Results	Need for Action
		Vegetation Condition	Watershed Condition				
			Survey Year	Characteristic Ratings	Results		
DC-1 (Upper Chiatovich)	Wet Meadow	Good; slight departure from desired condition	2007	Surface mineral or organic thickness: Degraded Headcuts and nick points: Degraded Hummocks: Non-functional Rills and gullies and bare ground due to disturbance: Fair Compaction: Fully-Functional	Non-functional	FAR; trend not apparent	Maintain or improve vegetation conditions in Upper Chiatovich Creek meadow by maintaining or increasing desirable species numbers. [LRMP pg. 85-86, LRMP Amendment 6]. Improve watershed conditions on Upper Chiatovich Creek by allowing headcuts to heal and reducing the expansion of hummocks. [LRMP pg. 89-91/ LRMP Amendment 6].
DC-2 (Lower Chiatovich)	Wet Meadow	Key Area Not Established Before Analysis					Establish a new key area in the wet meadow on lower Chiatovich Creek meadows near Forest Boundary, and set allowable use standards at 45% until proper assessments are made.
DC-3 (Chiatovich Upland)	Upland	Key Area Not Established Before Analysis					Establish a new key area in the uplands surrounding DC-1 and set allowable use standards at 50% until proper assessments are made.

Indian Creek Allotment

Key Area	Vegetation Type	Amendment 6				Proper Functioning Condition Results	Need for Action
		Vegetation Condition	Watershed Condition				
			Survey Year	Characteristic Ratings	Results		
IC-1 (Chiatovich Flats Upland)	Alpine Dwarf Shrub	Good; slight departure from desired condition	2007	All characteristics in fully functional condition	Fully-Functional	No stream	Maintain or improve vegetation conditions at Chiatovich Flats Upland by maintaining or increasing desirable species numbers. [LRMP pg. 85-86, LRMP Amendment 6].
IC-2 (Chiatovich Flats Meadow)	Alpine Meadow	Excellent; At desired condition	2007	Surface mineral or organic thickness: Degraded Hummocks: Degraded Bare ground due to disturbance: Degraded Rills and Gullies, compaction, and headcuts and nick points: At-Risk	Degraded	FAR; Upward trend	Improve watershed and soil conditions in Chiatovich Flats and Cabin Creek Riparian areas by increasing ground cover, riparian vegetation, allowing headcuts to heal and reducing the expansion of hummocks. [LRMP pg. 89-91/ LRMP Amendment 6].
IC-3 (Cabin Creek)	Moist Meadow	Excellent; At desired condition	2007	Headcuts and Nick points: Degraded Surface mineral or organic layer thickness, hummocks, bare ground due to disturbance: At-Risk Rills and gullies and compaction: Fully-functional	At-Risk	PFC	
IC-4 (Chiatovich Flat Sagebrush)	Upland	Key Area Not Established Before Analysis					Establish a new key area in the uplands in Chiatovich Flat and set allowable use standards at 50% until proper assessments are made.

Perry Aiken Allotment

Key Area	Vegetation Type	Amendment 6				Proper Functioning Condition Results	Need for Action
		Vegetation Condition	Watershed Condition				
			Survey Year	Characteristic Ratings	Results		
PA-1 (Perry Aiken Flat)	Alpine Meadow	Excellent; At desired condition	2007	All characteristics rated as At-Risk	At-Risk	Ephemeral stream	Improve watershed and soil conditions in Perry Aiken Flat alpine meadows by increasing vegetation cover on meadows and ephemeral channels. [LRMP pg. 89-91/ LRMP Amendment 6].
PA-2 (Perry Aiken Flat Uplands)	Alpine Dwarf Shrub	Fair; Not at desired condition	2007	Seven characteristics in Fully functional condition Soil movement: At-Risk	Fully-functional	No stream	Improve vegetation conditions at Perry Aiken Flat uplands by increasing the number of desirable species. [LRMP pg. 85-86, LRMP Amendment 6].
PA-3&4 (Busher Canyon Springs)	Alpine Meadow	Excellent; At desired condition	2007	Surface mineral or organic layer thickness: Degraded Hummocks: Degraded Compaction: Degraded Rills and gullies and headcuts and nick points: At-Risk Bare ground due to disturbance: Fully-functional	Degraded	FAR Upward trend	Reduce expansion of hummocking in Busher Canyon Springs [LRMP pg. 89-91/ LRMP Amendment 6].

Trail Canyon Allotment

Key Area	Vegetation Type	Amendment 6				Proper Functioning Condition Results	Need for Action
		Vegetation Condition	Watershed Condition				
			Survey Year	Characteristic Ratings	Results		
TC-1 (Trail Meadows above roads end)	Moist Meadow	Excellent; At desired condition	2007	Surface mineral or organic layer thickness: At-Risk Hummocks: At-Risk Compaction: At-Risk Bare ground due to disturbance: At-Risk Rills and gullies and headcuts and nick points: Fully-functional	At-Risk	PFC	Improve watershed and soil conditions in Trail Creek above roads end and section 8 springs area by reducing soil disturbance/compaction and hummocking. [LRMP pg. 89-91/ LRMP Amendment 6].
TC-2 (Section 8 Springs)	Moist Meadow	Excellent; At desired condition	2007	Hummocks: Degraded Compaction: At-Risk All other characteristics in Fully functional condition	At-Risk	PFC	
TC-3 (Lower Trail Creek, below roads end)	Moist Meadow	Excellent; At desired condition	2007	Compaction: At-Risk All other characteristics in Fully-functional condition	Fully-functional	PFC	
TC-4 (Middle Creek)	Wet Meadow	Excellent; At desired condition	2007	All characteristics in Fully-functional condition	Fully-functional	No stream	

Appendix E – Response to Comments

Appendix E
White Mountain Group Allotment Analysis
Response to Comments

Legal Notice published in the Inyo Register on June 24, 2010
30-day comment period ended July 26, 2010

Commenter 1:

Western Watersheds Project: *Comment letter dated and emailed to Jennifer Ebert on July 20, 2010.*

Comment 1: The EA fails to adequately define and explain the purpose and need for the proposed action. The Forest has not even documented that there is a demand for continued grazing on each of these four allotments and therefore that there is any "need" at all.

Where consistent with other multiple use goals and objectives, there is congressional intent to allow grazing on suitable lands (*Multiple Use and Sustained Yield Act of 1960, Wilderness Act of 1964, Forest and Rangeland Renewable Resources Planning Act of 1974, Federal Land Management and Policy Act of 1976, National Forest Management Act of 1976*). Where consistent with the goals, objectives, standards and guideline of the Forest Plan and its amendments, it is the Forest Service policy to make forage from lands suitable for grazing available to qualified livestock operators (*FSM 2202.1, FSM 2203.1, 36CFR 222.2 ©*).

Comment 2: The NEPA document should present the environmental impacts of the proposed action in comparative form thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public.

The EA may discuss the impacts (direct, indirect, and cumulative) of alternatives in a comparative description or describe the impacts of each alternative separately (36 CFR 220.7(b)(3)(iv)).

Comment 3: The Forest has failed to provide basic information in the EA relevant to recent grazing on the four allotments. Without the description of current management, the public cannot determine the efficacy of the so called "constrained flexibility" provided by any proposed adaptive management.

The EA provides relevant information on the history and current status of the four allotments under the Background and Description of Allotments sections (EA pgs. 4-10). Some information was added to the EA for clarification, particularly related to the status of the Indian Creek and Perry Aiken Allotments. Indian Creek and Perry Aiken allotments have recently undergone a period of non-use due to a combination of resource protection and permittee non-use. The Desired Condition section (EA pgs. 11-16) describes the desired condition, existing condition, and need for action for each of the four allotments. In addition, Appendix B in the EA contains maps that show capable and suitable areas for cattle grazing; Appendix C describes the difference between the current management and the proposed action, specifically related to the comparison between existing utilization levels and proposed utilization levels; and Appendix D summarizes the existing vegetation and watershed condition.

The Rangeland Management Report (Robson and Goehring 2010) also provides relevant background information on the history and current status of these allotments.

Comment 4: According to the Hydrology and Soils specialist report, recent overutilization has occurred on Davis Creek and many of the four allotments' meadows and watersheds are degraded in cases to the point of being non-functional. Despite this, the proposed action is to authorize exactly the same number of cattle and same number of AUMs as currently permitted.

See response to Comment 6. In addition, the proposed action includes an adaptive management approach, setting the parameters of what is allowed, but did not specify a fixed number of livestock (FSH 2209.13, Chapter 90, Section 92.23 and 92.23b). Table 4 from the preliminary EA displayed the existing permitted cattle numbers and maximum Animal Unit Months (AUMs). This table was removed from the proposed action section of the Final EA to reduce confusion. Maximum AUMs have been identified for each grazing allotment, however the number of livestock would be allocated in annual operating instructions based on forage availability, as described in the proposed action alternative on page 23 of the EA.

Comment 5: The Ranger District must determine the capability and suitability of these allotments given the current circumstances and needs to establish if sustained grazing is possible on any parts of these allotments.

The capability and suitability of these allotments to provide livestock grazing is provided in Appendix B of the EA. Capability was mapped based on a GIS analysis. Cattle use areas that were mapped for past planning purposes were reviewed and updated by the IDT to determine suitability.

Comment 6: The larger meadows (presumably the cattle high use areas) on all four allotments show significant, severe site-specific problems associated with livestock grazing including hummocking, gullies, thin sod, and soil compaction. The Forest must propose actions to remedy these problems on these important public lands that are consistent with LRMP objectives, standards, and guidelines. This includes full compliance with LRMP Amendment 6 which requires nonfunctional watershed areas be rested until they recover.

Only one key area was found to have a non-functional watershed condition as defined by LRMP Amendment 6. Key area DC-1 (Upper Chiatovich) in the Davis Creek Allotment was determined to be in good vegetation condition, but in non-functional watershed condition. Two categories ('surface mineral or organic layer thickness' and 'headcuts and nickpoints') were rated as degraded, and one (hummocks) was rated as non-functional. The original proposed action proposed to implement a rest rotation strategy and reduced utilization level (35% allowable use). However, after further review, a minor change to the proposed action was made, which would "rest the Upper Chiatovich area until the area moves out of the overall non-functional watershed condition, as defined by LRMP Amendment 6". (EA page 26)

In other areas where watershed conditions were determined to be "degraded", utilization levels were adjusted (decreased). The proposed action also incorporates an adaptive management strategy that allows specific actions, such as rest rotation, deferred rotation grazing systems (to name a few), or other site specific actions to be implemented to address improvement in watershed condition where it is currently not meeting standards. The Hydrology and Soils Input specialist report (Lutrick 2010) discloses the site specific watershed conditions and effects from implementation of the proposed action alternative. A summary of the effects analysis for hydrological resources is summarized in the EA, pages 41-56. In addition, Appendix D in the EA summarizes the watershed condition and the associated "need for action". As stated throughout section 3.5.3 (pgs. 52-56) of the EA, and pages 20-31 of the "Hydrology and Soils Input for the White Mountain Allotment EA" (Lutrick, 2010), the changes in management are expected to lead to improvement in watershed condition where it is currently not meeting standards.

Comment 7: The Forest needs to consider the cumulative impacts of the proposed adaptive management options.

The effects analysis considers the potential effects of all actions described under the proposed action alternative, including the adaptive management options that are specified in the EA on page 28 (Table 9).

The specialist reports, Biological Evaluations and Biological Assessments all considered the cumulative impacts of the proposed adaptive management actions in their analysis (Robson and Goehring 2010, Lutrick 2010, Murphy 2010, Murphy 2010b, Murphy 2010c, Murphy and Sims 2010, Sims 2009, Sims 2009b, Murphy and Sims 2010, Weis 2010, Weis 2010b, Elliot 2010, Robson 2009). These effects were also noted in the Environmental Consequences section of the EA, Chapter 3, Range Conditions (pages 40-41), Hydrological Resources (pages 54-56), Wildlife and Aquatics (pages 57-60, 65-68, 70-71), Plants and Noxious Weeds (pages 73-74), Cultural Resources (pages 75-76), Wilderness (pages 80-81), and Socio-Economics (pages 82-83).

Comment 8: The Botany report fails to provide useful information on the current status of the known rare plant occurrences and does not indicate any new populations. The report includes no determination of trends or viability. The Botany report fails to analyze the effects of the proposed action on rare plants and vegetation outside meadows.

Plant species considered include those on the Inyo National Forest Sensitive Plant list that are known to occur or have potential habitat within the four allotments (Botany Biological Evaluation, page 3). The Forest Sensitive Plant GIS information as well as the California Natural Diversity Database (CNDDB) was used to develop the list of those considered. The Botany Biological Evaluation is used for analysis of effects to Forest Service sensitive species only. Analysis of effects to Watch List plants known from the project area was added to the EA (pg. 73).

Effects of the proposed action and determinations to both riparian and upland sensitive species are disclosed in the Botany Biological Evaluation pages 11-13 and EA page 72. An analysis of effects on Inyo NF Watch List species was added to the Plants and Noxious Weeds section of Chapter 3 of the EA, page 73.

Comment 9: The Forest has not conducted any surveys for Wong's springsnail on the project site, and does not provide any data on Forest-wide availability and population trends for Wong's springsnail. The EA fails to consider impacts from livestock grazing and grazing water developments in the cumulative effects analysis.

Surveys were completed in August of 2010 to determine the presence of springsnails in potential habitat up to 7,800 feet. No snails or suitable habitat was located within these areas. An addendum to the original Biological Evaluation was completed to reflect this new information (Sims, 2010), and is also summarized in the EA on page 69.

Comment 10: The environmental review should use best available science to analyze all direct, indirect, and cumulative impacts to the White Mountains bighorn sheep population from livestock including competition for food resources and water, behavioral changes (Brown et. al. 2010), disease, and impacts of range improvements such as fences and water developments. The Forest must also address the LRMP recommendations, particularly the directive to exclude portions of Perry Aiken Flat from cattle grazing.

Desert bighorn sheep are not a Forest Service Pacific Southwest Region sensitive species (USDA Forest Service Pacific Southwest Region Sensitive Species List updated October 15, 2007). As

stated in Forest Service Manual direction (FSM 2672.4) sensitive species need to be analyzed under NEPA. Other species may be included in the analysis if determined to be an issue through public scoping or in the ID team process. Due to this species being identified in public scoping an analysis for all alternatives was summarized in the White Mountain Grazing Allotment Analysis EA (page 70-71) and in the Wildlife Specialist Report (Murphy, 2010b pages 6, 7, 17, and 18).

Current livestock grazing has been excluded from the headwaters of the North Fork of the Perry Aiken Creek where suitable bighorn habitat occurs. This area would continue to be excluded from livestock grazing under the proposed action (EA page 71 and Murphy 2010c pages 17 and 18 and Map 3 page 25).

Comment 11: The BA for Paiute Cutthroat trout provides no quantitative estimate of the relationship between the utilization standards for riparian vegetation that will supposedly be monitored and the impacts of cattle on the streambanks and sedimentation. The Forest has no evidence that fish populations have recovered or are stable, and it presents no data showing that the proposed action will not result in renewed deleterious streambank trampling or increased sedimentation. The Forest cannot conclude that these impacts are less than significant and must complete an EIS for grazing on Indian Creek Allotment.

The utilization standards identified in the Biological Assessment are standard levels that have been accepted and used by the US Fish and Wildlife Service. In consultation with the U.S. Fish and Wildlife Service (USFWS), a Biological Opinion (BO) was issued that concurred with the determination in the Biological Assessment (File No. 84320-2010-F-0088). The USFWS concluded that "After reviewing the current status of PCT, the environmental baseline for the action area, the anticipated direct and indirect effects of the proposed action, and the cumulative effects, it is the Service's BO that the renewal of the term grazing permit for the Indian Creek Allotment and specifically the utilization and streambank disturbance thresholds set for the Cabin Creek Unit, as proposed, is not likely to jeopardize the continued existence of the threatened PCT. No critical habitat has been designated for PCT; therefore, none will be adversely modified or destroyed (USDI 2010). These utilization standards, as used in other locations on the Forest, have shown to move vegetation resources in an upward trend within sensitive species habitat (Interim Report on Condition and Trend of Meadows and Streambanks, Golden Trout Wilderness, February 17, 2010). These positive changes are related to the standards that are very similar, and even higher, than the 30% utilization and 10% streambank trampling that is allowed for Cabin Creek. Healthy vegetated banks have been shown to reduce sedimentation in stream channels. Also, PCT populations were shown to increase in Cabin Creek, as identified in the Revised Recovery Plan, during the time when streambank trampling standards were 20%.

Under condition of the Biological Opinion, monitoring of Cabin Creek will occur at least two times a year to ensure that trampling and forage utilization standards are not exceeded, which will ensure that deleterious trampling will not occur. In accordance with Section 7 of the Endangered Species Act, the USFWS issued a Biological Opinion that allows for a certain amount of "Take" to occur with the activity proposed. In the situation of Cabin Creek, the BO allows for Take up to the equivalent of 10% streambank trampling and 30% utilization on sedges (Carex species).

The Final EA incorporates this information in the analysis of effects on Paiute cutthroat trout, pages 57-58 and within the Biological Assessment for the Paiute Cutthroat Trout within the Indian Creek Grazing Allotment (Sims, 2009).

Comment 12: The EA's analysis of impacts to Bi-State Sage Grouse is inadequate. To comply with NEPA's hard look requirement, the Forest must use quantitative data to analyze how livestock grazing in the project area has impacted sage grouse in the past, and how the proposed action is likely to impact sage grouse. The EA and supporting documents provides no quantitative data on the project area's sage grouse population and provides no quantitative estimate of impacts to the population. The Forest should determine the size of the sage grouse population and quantify the extent of the impacts.

As explained in the Biological Evaluation (Murphy, 2010) in Occurrence within Project Area section (pages 20-21), specific population and occurrence data for the White Mountain Population Management Unit is largely unknown. This is due to the lack of access to sage grouse habitats, especially during the breeding season. All known location and occurrence data was cited in the BE in section Occurrence within Project Area (pages 20-21). The BE acknowledges the lack of population data and the analysis assumes that all suitable habitat is occupied (Murphy, 2010). The Nevada Department of Wildlife (NDOW) and the California Department of Fish and Game (CDFG) were contacted to acquire the most recent population data for this area; this information is included in the analysis (Murphy, 2010, page 21).

The analysis described all direct, indirect, and cumulative effects and the determination for sage grouse was that re-issuance of the White Mountain Grazing Allotment permits **may impact** individual sage grouse, but would **not result in a trend towards federal listing or loss of viability** (Murphy, 2010, page 41 and Final EA page 66-67). This determination was reached based on the following factors: 1) Portions of allotments suitable for sage grouse nesting would not be authorized to graze until after July 1st, when sage grouse have completed the breeding and nesting season for this area; 2) All meadow systems would have an established allowable use standard based on current conditions or conditions after adaptive management monitoring; 3) Utilization standards would continue to allow for suitable cover needed during the nesting and wintering seasons; and 4) Key areas would be established within sage grouse habitats in the Chiatovich Flat and North Fork of Chiatovich Creek areas to determine current conditions of upland vegetation and allowable use standards would be implemented for these key areas based on Amendment 6.

The analysis compared impacts from current livestock grazing management to impacts from the proposed action and no action alternatives (Murphy, 2010, pages 29-38). This analysis was summarized in the EA (pages 60-67).

The INF received positive comments from the Nevada Department of Wildlife in regards to the proposed action. "The Department believes due diligence has been given to wildlife resources in the EA. Specifically, we believe appropriate and reasonable grazing management strategies for Greater Sage-grouse considerations have been incorporated into the EA. We look forward to their inclusion in the forthcoming decision record." (NDOW comment letter dated July 22, 2010).

Comment 13: The EA's analysis of impacts to White Mountains pika is inadequate, is not based on surveys, and is conclusory. The NEPA documents need to discuss the status of the White Mountains pika, and should review the direct, indirect, and cumulative effects of the proposed action on the pika and their habitat.

White Mountains pika is not a Forest Service Pacific Southwest Region sensitive species (USDA Forest Service Pacific Southwest Region Sensitive Species List updated October 15, 2007). As stated in Forest Service Manual (FSM 2672.4) sensitive species need to be analyzed under NEPA. Other species may be included in the analysis if determined to be an issue through public scoping

or in the ID team process. Due to this species being identified in public scoping an analysis for all alternatives was described in the Wildlife Specialist Report (Murphy, 2010b pages 7, 8, 18-20).

Comment 14: The EA includes no analysis of impacts to wild horses and the management of the HMA.

The White Mountain Wild Horse Management Area Summary Report includes an analysis of impacts from livestock grazing on wild horses (Murphy, 2010c page 5 and 6). This report states that livestock grazing impacts are minimal as this herd has been present within this area with livestock since the development of the Wild Horse Management Plan. The overall health of the herd is good to excellent due to the presence of suitable forage. Furthermore the herd's numbers have increased since the last gather to over the recommended herd number (Murphy, 2010c pages 5 and 6).

Comment 15: The Forest provided no inventory and maps of habitat types on these allotments including all stream and riparian areas, soil types, plant communities and habitats.

Each of the specialist reports describe the surveys and inventories that were used in the analysis, and maps that were used in the analysis can be found in the project file. The Rangeland Management Report (Robson and Goehring 2010), Hydrology and Soils Input specialist report (Lutrick 2010), Biological Evaluations and Assessments (Murphy 2010, Sims 2009, Sims 2009b, Sims 2010, and Weis 2010), and Wildlife specialist reports (Murphy 2010b) each provide information on habitat types and existing condition related to their respective resource. This information is summarized by resource area in the EA in Chapter 3, pages 32-74. In addition, Appendix D of the EA provides a summary of the vegetation and watershed condition data that was used to identify the "need for action" and to develop the proposed action alternative.

Comments specific to aspen are addressed in Comment 16. The allotments do include bristlecone pine forest (approximately 2,400 acres, mostly above 10,000 feet in elevation), however forage is scarce and it is unlikely that cattle use is occurring within or would have any effect on bristlecone pine forest.

Comment 16: The EA claims that an aspen risk assessment was conducted but it was not mentioned in the various reports. The EA provides a description of the desired conditions, but does not provide basic information such as the current number and extent of aspen groves in the project area.

More information regarding the aspen condition assessment data was added to the EA pages 33, 34, and 35 in the Range Conditions section, Chapter 3. No impacts were noted to aspen stands from livestock grazing within these areas.

Comment 17: Authorizing grazing on the Perry Aiken and Indian Creek Allotments is inconsistent with both the Congressional Grazing Guidelines and with FSM 2323.24. These two allotments have not been grazed by livestock since 2000; almost a decade prior to the 2009 designation of the White Mountains Wilderness.

The White Mountains Wilderness was designated through the Omnibus Public Land Management Act of 2009 and specifies that: "Grazing of livestock and the maintenance of existing facilities relating to grazing in wilderness areas or wilderness additions designated by this subtitle, if established before the date of enactment of this Act, shall be permitted to continue in accordance with—(1) section 4(d)(4) of the Wilderness Act (16 U.S.C. 1133(d)(4); and (2) the guidelines set forth in Appendix A of the report of the Committee on Interior and Insular Affairs of the House of Representatives accompanying H.R. 2570 of the 101st Congress (H. Rept. 101-405)."

Although the Perry Aiken and Indian Creek allotments were vacant at the time of the area's wilderness designation, there had been no previous decision to discontinue grazing. Grazing was established within these allotments prior to the designation of the White Mountains Wilderness, and has been established since prior to the creation of the Inyo National Forest.

Comment 18: The NEPA documents should include an inventory of cultural and historic resources on each allotment. The EA does not break down the cultural sites by allotment nor does it provide any kind of description of what the cultural resources are or what the impacts are that they have experienced. The Forest cannot knowingly allow cultural resource sites that may be NRHP-eligible to be neglected but must mitigate the grazing impacts it has identified.

A total of 52 previously recorded cultural sites were found within all four allotments (Cultural Report R2007050401275 page 16). Eight new sites were found and recorded as part this grazing analysis; one prehistoric site, five historic sites and two sites with both prehistoric and historic components (R20090450401275). In the Perry Aiken Allotment no new sites were found and no sites were identified within high use grazing areas (R20090450401275). In the Trail Canyon Allotment five sites are located within high use areas; four prehistoric sites and one site with both prehistoric and historic components. Three sites are recommended for annual site monitoring as a standard resource protection measure. In the Indian Creek Allotment six new sites were identified and recorded within high use areas; one prehistoric site and five historic sites. Of these, two are recommended for annual site condition monitoring as a standard resource protection measure. One new site was identified within a high use area in the Davis Creek Allotment. This site is not at risk from continued grazing. In summary a total of 12 sites were identified within high use grazing areas within all four allotments. None of these sites have been evaluated for the National Register of Historic Places. Five of these sites are recommended for annual site condition monitoring because the effects to these sites from grazing were ambiguous during the analysis. If any adverse effects are found during site monitoring then standard resource protection measures such as fencing will be implemented. (EA pages 74-76)

Commenter 2:

Lahontan Regional Water Quality Control Board: *Comment letter dated and emailed to Jennifer Ebert on July 23, 2010.*

Comment 19: The EA does not adequately analyze whether the proposed action will comply with standards contained in the Basin Plan. There is a significant likelihood that the Basin Plan's objectives for bacteria will be violated by the proposed action.

The "Hydrology and Soils Input for the White Mountain Allotment EA" (Lutrick [2010] - included by reference in the EA) includes a description of the beneficial uses and water quality objectives in the 1995 Lahontan Regional Water Quality Board Basin Plan on pages 6 through 8. Because the allotments all have some portion within California's Lahontan Region and some portion within Nevada, effects to beneficial uses for both areas were analyzed. Methods used to analyze water quality effects, including existing quantitative data, and observations of effects to beneficial uses in the field, are discussed on page 8. Current water quality conditions are included on pages 10-11, 13, 15-16, 18, and 20 and in Appendix A. Effects of the proposed action on water quality are included in pages 22-31.

The EA summarized water quality in terms of the Nevada Administration Code because it includes the quantitative water quality results for the streams in these allotments. These samples were taken in Nevada, and therefore water in those areas must meet only Nevada water quality standards.

Management measures for controlling non-point source pollution are included in Appendix B of the "Hydrology and Soils Input for the White Mountain Allotment EA" (Lutrick, 2010 – included by reference in the EA). These are the Region 5 Forest Service Range Best Management Practices (BMPs) designed to meet water quality objectives within the State of California. The BMPs are "within the guidelines of the Water Quality Control Board (Basin Plans) developed by the nine RWQCB in the State" (Forest Service, 2000)

Results for fecal coliform measurements from the infrequent water quality monitoring by Nevada Department of Conservation and Natural Resources (NDCNR) were used as one of the methods for predicting post-project water quality, but not as the only methods. The explanation of locations of sampling and California vs. Nevada water quality standards has been amended in the 2010 Hydrology and Soil Input (Lutrick, 2010). Because the samples were only taken yearly or every other year, and only once in each year, and because results varied so widely, they were not considered to be repeatable results, are were not used as the sole predictor for future condition. Appendix A of Lutrick (2010) shows the results for NDCNR water quality testing. All testing was completed within the state of Nevada. The commenter focused on the result in Chiatovich Creek, which showed 230 cfu/100 ml, 20 cfu/100 ml, and 70 cfu/100 ml in 2001, 2004, and 2005, respectively. The Chiatovich Creek watershed is about 90% in Nevada, and the samples were taken at the highway, 11 miles downstream from the California border. Only the headwaters of the creek are in California. While qualitative water quality in the California portion of Chiatovich Creek is unknown, there is no reason to believe that water quality is the same in the creek's headwaters and 11 miles downstream. Because two of the three results met Nevada's water quality standards for fecal coliform, is unknown whether the creek usually meets the standards or not. As stated in the Hydrology and Soils Input (Lutrick, 2010), other methods were used to determine whether beneficial uses were being affected.

The other creek that was tested for quantitative water quality where there is regular grazing is Trail Creek. One fecal coliform and two ammonia samples were taken in Trail Creek from 2003 to 2005. None of Trail Creek's watershed is in California. None of the samples detected any of these pollutants. While these are just once-a-year grab samples, they suggest that there is not a concern with overall water quality in Trail Creek, one of the two the most heavily grazed canyons in this allotment. The other three creeks with water quality testing found varying results. All had at least one result with no detection. The results are not conclusive, since they were only taken once in each year, and results were varied, but do not indicate widespread or persistent fecal coliform levels. As explained on page 11 of the Hydrology and Soils Input, "a 2006 report rated water quality in Chiatovich, Indian, Leidy and Perry Aiken Creeks as 'good', meaning that beneficial uses are being met." (report results accessed on http://oaspub.epa.gov/tmdl/w305b_report_v6.huc?p_ huc=16060010&p_state=NV&p_cycle=2006).

Therefore, overall, water quality effects from current cattle grazing were not found to be substantial, and with the proposed action reducing utilization in some areas, implementing a rest-rotation system between allotments, and monitoring of BMP implementation, it is expected that the currently good water quality will improve.

Comment 20: Given the degraded watershed conditions and water quality in the project area, a more concrete plan to restore hydrologic function and water quality is warranted.

The purpose and need (section 1.3, EA pages 10-11) and desired condition (section 1.4, EA pages 11-16) sections of the EA includes a description of the existing conditions, desired conditions, and the need for action. Many of these actions, as shown in Table 3, were taken to improve current watershed conditions as required by the Inyo National Forest Amendment 6 protocol. As stated throughout section 3.5.3 (pgs. 52-56) of the EA, and pages 20-31 of the "Hydrology and Soils Input for the White Mountain Allotment EA" (Lutrick, 2010 – included by reference in the

EA), the changes in management were analyzed, and are expected to lead to improvement in watershed condition where it is currently not meeting standards.

Comment 21: The Forest Service should carefully consider additional alternatives and management measures that would result in timely watershed recovery, including continued rest for degraded areas until recovery is evident.

See response to Comment 20. As stated throughout section 3.5.3 (pgs. 52-56) of the EA, and pages 20-31 of the "Hydrology and Soils Input for the White Mountain Allotment EA" (Lutrick, 2010 – included by reference in the EA), the changes in management were analyzed, and are expected to lead to improvement in watershed condition where it is currently not meeting standards.

Comment 22: The proposed action proposes to resume/continue grazing in the Cabin Creek watershed, including PCT habitat. The proposed action should include objective, measurable milestones for the recovery of riparian zones and other watershed conditions, especially within occupied PCT habitats; and specific actions to be triggered, with mandatory timelines, if performance milestones are not met.

The Proposed Action and the Environmental Analysis is not the vehicle for identifying objectives or milestones for recovery of PCT habitats. The Revised Recovery Plan for the Paiute Cutthroat Trout is the document that addresses recovery actions for this species. The Recovery Plan gives direction for the implementation of a grazing strategy that will protect occupied habitat. Through the development of grazing management prescriptions for the Indian Creek allotment, specific design criteria were incorporated to ensure the continued protection of the occupied Paiute cutthroat trout habitat that allows for cattle grazing while meeting recovery objectives in the 2004 Revised Recovery Plan for the Paiute Cutthroat Trout. The proposed utilization standards, trampling standards, and rest every other year from grazing will reduce the overall effects of intensive, season-long grazing within this watershed and throughout the allotment. It is anticipated that vegetation, watershed, and fish habitat resources will continue to move in an upward trend with the implementation of the proposed action. These standards were approved by the Fish and Wildlife Service in the Biological Opinion File No. 84320-2010-F-0088 dated June 1, 2010.

Comment 23: The grazing strategies and options do not constitute true "adaptive management". Adaptive management requires key steps such as designing and implementing management measures and monitoring in accordance with the principles of scientific experimentation. The management actions and monitoring are vague and provides no assurance that management measures will be applied in a timely manner. There is a need for measurable milestones for recovery of degraded areas, and specific actions to be triggered when milestones are not achieved.

The proposed action outlines an adaptive management strategy that builds in the flexibility to respond to changed conditions or management actions (design criteria) that are not effectively meeting or moving toward the desired objectives. Through an interdisciplinary process, the IDT identified desired conditions, design criteria, and adaptive options that would be available to make adjustments in management if monitoring indicated that adaptive changes are needed. This adaptive management strategy follows direction outlined in FSH 2209.13, 92.23b and "A Practical Approach to Adaptive Management, With a Specific Focus on Livestock Management NEPA Based Decisions" guidance document (Quimby 2001).

The IDT established a monitoring plan (EA pgs. 28-30) to evaluate if the design criteria are being implemented as planned (implementation monitoring) and in the longer term, if management is meeting or moving toward the established desired condition objectives (effectiveness

monitoring). The monitoring plan includes measuring vegetation and watershed condition through established protocols. The data collected from these established protocols was used to describe the existing condition, and was the basis for developing the design criteria and adaptive options by comparing the difference between the desired condition and the existing condition. The monitoring plan was reviewed by the IDT, and it was determined that the monitoring prescribed will provide the information needed to determine if adaptive management changes should be made and to guide the direction that those changes take. Implementation will be an interdisciplinary effort, and ongoing evaluations and adaptive changes (if needed) will occur as part of permit administration.

Comment 24: The EA mischaracterizes and over-relies on "proper functioning condition" (PFC). "The PFC is a subjective, qualitative assessment that at most provides "clues" about the status of one aspect of riparian ecosystems: physical function (National Riparian Service Team, 1997). PFC was not designed and cannot be used as a sole methodology for assessing the health of aquatic or terrestrial systems (ibid.). The PFC was never intended to replace quantitative assessments, and it is not designed to address desired condition (USFS 1997)." The types of monitoring measures that actually do address compliance with water quality standards or desired watershed condition are either lacking in the EA or mentioned in passing, with little or no specificity.

The PFC method is a "qualitative method for assessment the condition of riparian-wetland areas" (USDI BLM, 1998). As described on page 6 of "Hydrology and Soils Input for the White Mountain Allotment EA" (Lutrick, 2010), the PFC method was used in this analysis to describe "stream functional condition", not for analysis of water quality, overall watershed condition, or vegetation condition.

The PFC assessment was not the sole methodology used for assessing the health of aquatic or terrestrial systems in this analysis. Methods used for assessing stream functional condition, meadow hydrologic function, and water quality are described on pages 5-7 of "Hydrology and Soils Input for the White Mountain Allotment EA" (Lutrick, 2010 – included by reference in the EA). Methods included data collection, both quantitative and qualitative, using the Inyo National Forest Amendment #6 protocol, searching for any existing quantitative water quality data, field observations of cattle presence in or near water and observation of beneficial uses, as well as the PFC assessment. Current vegetation condition was quantitatively measured using the Amendment #6 protocol are included in the Range Report in the project files.

Literature Cited

Nevada Department of Wildlife. 2010. Comments on Draft Environmental Assessment for the White Mountain Group Allotment Analysis. Letter dated July 22, 2010.

Quimby, Chuck. 2001. A Practical Approach to Adaptive Management, With a Specific Focus on Livestock Management NEPA Based Decision. USDA Forest Service, Rocky Mountain Region.

USDA Forest Service, 2000. Water Quality Management for Forest System Lands in California: Best Management Practices. Forest Service Pacific Southwest Region. September, 2000.

USDI BLM (US Department of the Interior Bureau of Land Management) 1998. A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas. Technical Reference 1737-15.

USDA Forest Service, Manual Direction. 2009. FSM 2672.4 Biological Evaluations-Supplemental Document Effective Date July 24, 2009.

USDA Forest Service Pacific Southwest Region Sensitive Species List updated October 15, 2007.

United States Department of Agriculture

Forest Service

Pacific Southwest Region

Decision Notice
and
Finding of No Significant Impact
White Mountain Group Grazing Allotment Analysis
Environmental Assessment

Inyo National Forest

White Mountain Ranger District
Mono County, CA; Esmeralda County, NV

Decision and Rationale

I have reviewed the 2010 Environmental Assessment (EA) for the White Mountain Group Allotment Analysis prepared by the Inyo National Forest. It discloses and discusses the environmental effects of two alternatives for managing livestock grazing on the following four grazing allotments. These include: Trail Canyon, Davis Creek, Indian Creek and Perry Aiken allotments. The allotments are located southeast of Highway 6, to west of the town of Dyer, Nevada; and from the crest of the White Mountains to Fish Lake Valley. The legal location is as follows: T.1N., R.32E.; T.1N., R.33E.; T.1S., R.32E.; T.1S., R.33E.; T.2S., R.33E.; T.2S., R.34E.; T.3S., R.33E., T.3S., R.34E.; T.4S., R.33E. MDB&M (general location map on page 6 of the EA, and more detailed maps by allotment can be found in Appendix A of the EA).
The 2010 White Mountain Group Allotment Analysis EA is available for public review at the White Mountain Ranger District Office, 798 North Main Street, Bishop, California 93514.
Based on the analysis described in the EA, I have decided to adopt **Alternative 2, Proposed Action.** This decision includes the actions described under Alternative 2 in the EA (pgs. 22-30), Implementation of this decision would begin during the 2011 grazing season. I find that the Proposed Action (Alternative 2) best meets the purpose and need to permit livestock grazing in the four grazing allotments while implementing the management actions that are necessary to achieve healthy ecological conditions. My decision was made after fully considering the physical, biological, economic and social effects of the alternatives analyzed in detail in the Environmental Assessment, and the site-specific specialist reports. These include, but are not limited to the range management report, hydrology and soils effects report, biological evaluations (BEs) and biological assessments (BAs) for aquatic and terrestrial wildlife species and sensitive plants, USFWS biological opinion (BO) for Paiute cutthroat trout, management indicator species report, noxious weed risk assessment, heritage resources assessment, and other documentation found in the project file.

EXHIBIT 3

The following are my reasons for selecting Alternative 2:

- Alternative 2 best meets the purpose of issuing term grazing permits to authorize livestock grazing on the Davis Creek, Indian Creek, Perry Aiken, and Trail Canyon Allotments while implementing the management actions that are necessary to achieve healthy ecological conditions, in accordance with the Inyo National Forest Land and Resource Management Plan (LRMP), and applicable laws, regulations, and policies. Alternative 2 best meets Forest Service policy to continue contributions to the economic and social well being of people by providing opportunities for economic diversity and by promoting stability for communities that depend on range resources for their livelihood *(FSM 2202.1)*.

- Alternative 2 applies Standards and Guidelines, including forage utilization levels that are consistent with the Inyo National Forest LRMP Amendment 6 (1995) and the Sierra Nevada Forest Plan Amendment (2004). By implementing these standards and guidelines, Alternative 2 will move the allotments toward desired ecological conditions. Based upon the analysis in the EA, I believe that implementation of Alternative 2 will result in improvements in vegetative and watershed conditions on these allotments, moving them toward desired conditions.

- Alternative 2 is expected to improve watershed and soil conditions where the watershed condition was rated as "degraded" or "non-functional". Implementation of site specific actions, such as rest of the one key area that was found to have a non-functional watershed condition (DC-1, Upper Chiatovich), as well as the implementation of adaptive management options, such as grazing management techniques to keep livestock distributed as evenly as possible is expected to lead to improvement in watershed condition.

- Alternative 2 will maintain or improve habitat conditions and minimize the potential for disturbance to the Paiute cutthroat trout. Through adjustments in utilization and streambank trampling standards, and resting the Cabin Creek unit every other year habitat conditions are expected to be maintained or continue to improve. By not allowing cattle to enter Cabin Creek until after August 15, this should reduce the potential for direct trampling of small larval fish.

- Alternative 2 will maintain or improve habitat conditions and minimize the potential for disturbance to greater sage grouse. For example, Alternative 2 delays the start of grazing within suitable sage grouse nesting habitat until after July 1 to reduce disturbance during the breeding season. Alternative 2 also establishes two key areas within upland vegetation types, specifically within sage grouse habitats. Alternative 2 also includes allowable use standards and grazing management techniques to keep livestock distributed as evenly as possible as part of maintaining suitable sage grouse habitat.

- Heritage resources will be protected by actions taken in Alternative 2, including for example, continued monitoring to reduce the potential for adverse affects to cultural resources.

- Alternative 2 implements a monitoring plan to ensure that grazing activity is implemented as designed, and to determine if the management practices applied are being effective in moving toward or maintaining desired condition and meeting resource

objectives. The monitoring plan will provide information to determine if any adjustments through adaptive management are needed to meet standards and guidelines and move toward the desired conditions.

Alternatives Considered

Alternative 1 (No Grazing) – was considered but not selected because it does not meet the purpose to authorize livestock grazing on the four allotments in accordance with the Inyo National Forest Land and Resource Management Plan (LRMP), and in compliance with applicable laws, regulations, and policies. Alternative 1 does not meet Congressional intent or Forest Service policy to provide grazing on National Forest lands where grazing is a suitable use, and in compliance with other laws and regulations. It is the Forest Service policy to make forage available to qualified livestock operators from lands suitable for grazing consistent with the Forest LRMP (FSM 2203.1; 36 CFR 222.2(c)).

Public Involvement

The project has been listed in the Inyo National Forest Schedule of Proposed Actions (SOPA) since April 2008. The scoping notice was sent to 13 interested parties in a letter dated February 2, 2009, including representatives of tribal organizations. A display advertisement announcing project scoping was published in the Forest's paper of record, the *Inyo Register*, on February 7, 2009. The proposed action was posted on the Inyo National Forest website on February 6, 2009. Four letters were received in response to scoping, two of which provided specific comments on the proposed action. Western Watersheds Project provided comments related to NEPA procedures (i.e. level of NEPA analysis and range of alternatives) and identified specific resource issues that should be addressed. The Nevada Department of Wildlife provided comments specifically related to Greater Sage Grouse and grazing management considerations. After analysis of the comments, it was determined that there were no significant issues. A summary of the comments received during public scoping is provided in the project file.

A preliminary EA (June 2010) was mailed to interested parties and a legal notice requesting comment on the preliminary EA was published in the *Inyo Register* on June 24, 2010. Comments were received from three organizations/agencies, including Western Watersheds Projects, Lahontan Regional Water Quality Control Board, and Nevada Department of Wildlife. Each of these comments was received prior to the end of the 30-day comment period. In response to these comments, some clarification was needed and minor changes were made to the EA, including the addition of Appendix B (maps displaying capable and suitable acres), Appendix C (comparison between existing and proposed utilization levels and grazing management), and Appendix D (summary of vegetation and watershed data). Minor changes were made to the proposed action to reduce confusion and provide clarification. Specialist reports and other documentation in the project file was reviewed and updated in response to public comments. Responses to the public comments can be found in Appendix E, and within the project file.

Finding of No Significant Impact

I have determined that this project is not a major Federal action that would significantly affect the quality of the human environment. Therefore, an Environmental Impact Statement is not required. This determination was made considering the following factors:

1. Beneficial and adverse impacts.

Design criteria and management requirements designed to reduce the potential for adverse impacts were incorporated into the proposed action (ie. standards and guidelines outlined in the Inyo National Forest LRMP (USDA Forest Service 1988), as amended by Forest Plan Amendment 6, Forest-wide Range Utilization Standards (USDA Forest Service 1995) and the Sierra Nevada Forest Plan Amendment (USDA Forest Service 2004). These design criteria and management requirements would minimize or eliminate the potential for adverse impacts caused by livestock grazing activities.

All analyses prepared in support of this document considered both beneficial and adverse effects of the proposed action alternative; however, beneficial effects were not used to offset or compensate for adverse effects in the analyses. None of the potential effects of Alternative 2 would be significant, even when considered separately from the beneficial effects that occur in conjunction with those effects. (EA pgs. 31-83, 84, Appendix E Comment 4-14,18, 20-22)

2. The degree to which the Proposed Action affects public health or safety.

None of the alternatives considered would have an effect upon public health and safety. Livestock grazing has occurred in this area since at least the 1850s. There are no known reports of unacceptable effects to public health and safety as a result of livestock grazing within these allotments. (EA page 84)

3. Unique characteristics of the geographic area.

There are no parklands, prime farmlands, wild and scenic rivers, or ecologically critical areas within the project area.

The four allotments occur within the Boundary Peak Wilderness (Nevada Wilderness Protection Act of 1989) and White Mountains Wilderness (Omnibus Public Lands Management Act of 2009). The potential effects from livestock grazing were evaluated based on the four qualities of wilderness character (EA section 3.9). It was determined that livestock use in the area when examined in relationship to the four primary qualities of wilderness character, indicates that some factors are affected more than others, but all factors collectively and individually meet the requirement of the Wilderness Act to preserve wilderness character. (EA pgs. 78-81, 84)

The allotments contain meadows, springs, and riparian features that would classify as wetlands. Based on the environmental analysis completed for hydrology, range, wildlife, and botany, the proposed action would not have a significant adverse effect to riparian values. The design criteria in the proposed action alternative, including reduced forage utilization levels and limitations on the amount of bank disturbance, would ensure a lack of significant effects to wetlands. (EA pgs. 52-56, 85, Appendix E Comment 4, 6, 20, and 21)

The protection of cultural resources has been incorporated into the proposed action, and would follow the stipulations in the Programmatic Agreement (PA) among the USDA, Forest Service, and the Advisory Council on Historic Preservation, Regarding Rangeland Management Activities on National Forest System Lands (June 26, 1995); the Memorandum of Understanding among the USDA Forest Service, Pacific Southwest Region, California State Historic Preservation Officer, and the Nevada State Historic Preservation Officer regarding Rangeland Management Activities, 1996 (MOU); and the Rangeland Heritage Resources Management Activities, Inyo National Forest, California and Nevada, 1997 (INF Supplemental). Details regarding the field surveys and management recommendations for heritage resources sites and features are contained in the Heritage Resource Report (Elliott 2010; HRR# R2007-05-04-01275). By following the recommendations outlined in this report, including the use of standard protection measures, it was determined that there would be no adverse effects to cultural resources from implementing this project. (EA pgs. 74-76, 85, Appendix E Comment 18)

4. The degree to which the effects on the quality of the human environment are likely to be highly controversial.

The proposed project follows the management direction in the Inyo National Forest Land and Resource Management Plan (USDA Forest Service 1988), as amended by Forest Plan Amendment 6, Forest-wide Range Utilization Standards (USDA Forest Service 1995) and the Sierra Nevada Forest Plan Amendment (USDA Forest Service 2004). The proposed action was developed by comparing existing conditions with desired conditions. Potential adverse effects have been minimized or eliminated to the point where there are few effects to draw controversy. Public involvement efforts did not reveal any significant issues or any other significant controversies regarding environmental effects of this proposal. Based on comments from the public (EA pgs. 18-19 and Appendix E) and the analysis of effects from the ID Team (EA pgs. 31-83), there are not significant effects expected to the quality of the human environment from implementing the proposed action alternative. (EA pg. 85)

5. Degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

The proposed action (Alternative 2) follows the management direction in the Inyo National Forest Land and Resource Management Plan (USDA Forest Service 1988), as amended by Forest Plan Amendment 6, Forest-wide Range Utilization Standards (USDA Forest Service 1995) and the Sierra Nevada Forest Plan Amendment (USDA Forest Service 2004). It implements management requirements designed to reduce the potential for adverse effects and has incorporated utilization standards for the grazing of domestic livestock that would accelerate the restoration and improvement of degraded range sites and maintain those sites currently in good condition.

Local expertise in implementation of grazing activities minimizes the chance of highly uncertain effects or effects which involve unique or unknown risks. Livestock grazing has occurred in the White Mountains for more than a century and on the allotments within the White Mountain Grazing allotments analysis area for nearly as long. Many of the grazing practices used decades ago are no longer used due to a better understanding of range conditions, the needs of livestock, and effects of grazing on resource values. Rangeland health on the Inyo National Forest has continued to improve over time. Proposed activities are routine in nature, employing standard practices and protection measures; and their effects are generally well known. (EA pg. 85-86)

6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

Implementation of the proposed action (Alternative 2) would not establish a precedent for future actions, nor would it represent a decision in principle about a future consideration for other allotments. Any future decisions would require a site-specific analysis to consider all relevant scientific and site-specific information available at that time. These activities are in accordance with the best available science to manage grazing activities at this time. (EA pg. 86)

7. Whether this action is related to other actions with individually insignificant but cumulatively significant impacts

A cumulative effect is the consequence on the environment that results from the incremental effect of the action when added to the effects of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes the other actions and regardless of land ownership on which the actions occur. A cumulative effects analysis was completed separately for each resource area. These effects were disclosed in the Environmental Consequences section of the EA, Chapter 3, Range Conditions (EA pgs. 40-41), Hydrologic Resources (EA pgs. 54-56), Wildlife and Aquatics (EA pgs. 57-60, 65-68, 70-71), Plants and Noxious Weeds (EA pgs. 73-74), Cultural Resources (EA pgs. 75-76), Wilderness (EA pgs. 80-81), and Socio-Economics (EA pgs. 82-83). None of the resource specialists found the potential for significant adverse cumulative effects. (EA pg. 86, Appendix E Comment 7)

8. The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

It was determined that there would be no adverse effect to cultural resources from implementing Alternative 2 (HRR R2007-05-04-01275). Alternative 2 does not adversely affect districts, sites, highways, structures, or objects listed in, or eligible for listing in the National Register of Historic Places, nor would it cause loss or destruction of any significant cultural or historical resources. Protection of heritage resources in the area was incorporated into the proposed action alternative through such measures as implementing monitoring and standard resource protection measures. (EA pgs. 74-76, 86-87, Appendix E Comment 18)

9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

There is one federally listed threatened or endangered aquatic wildlife species known to occur within the project area; the Paiute cutthroat trout (threatened). A refuge population of the threatened Paiute cutthroat trout occurs in Cabin Creek, within the Indian Creek allotment. There is no critical habitat identified within the analysis area; however, Cabin Creek is identified within the Revised Paiute Cutthroat Trout Recovery Plan (2004) as habitat for this species. Based on analysis documented in the biological assessment, it was determined that the

implementation of continued grazing on the Indian Creek allotment may affect and is likely to adversely affect individuals of Paiute cutthroat trout by potential direct trampling of gravels that may contain alevin (small larval fish) and the potential for higher than baseline sediment input that may settle between gravel, reducing spawning habitat. The potential for direct trampling is low for the late-season use proposed; however, if cattle enter the area in an earlier month, the potential is greater that some alevin-occupied gravel would be trampled. However, because of heavily armored streambanks from willow and rocky substrate in the steeper portions of the stream, a majority of the stream cannot be accessed by cattle, which limits the potential trampling of gravels to a few crossing areas. It was also determined that the proposed action may affect, but is not likely to adversely affect Paiute cutthroat trout populations in Cabin Creek, which is based on previous population data that show an increase in fish numbers even during historic heavy grazing use within the Cabin Creek watershed and along the stream. Through the development of grazing management prescriptions for the Cabin Creek unit of the Indian Creek allotment, specific design criteria were incorporated to ensure the continued protection of the occupied Paiute cutthroat trout habitat that allows for cattle grazing while meeting recovery objectives in the 2004 Revised Recovery Plan for the Paiute Cutthroat Trout. The proposed utilization standards, trampling standards, and rest every other year from grazing will reduce the overall effects of intensive, season-long grazing within this watershed and throughout the allotment. It is anticipated that vegetation, watershed, and fish habitat resources will continue to move in an upward trend with the implementation of the proposed action. In consultation with the U.S. Fish and Wildlife Service (USFWS), a Biological Opinion (BO) was issued that concurred with the determination in the Biological Assessment (File No. 84320-2010-F-0088; USDI Fish and Wildlife Service 2010). (EA pgs. 57-58, 87-89, Appendix E Comment 11 and 22)

No federally listed threatened or endangered plant species have potential habitat (including critical habitat) or occur within or adjacent to the project area. (EA pg. 72)

10. Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

Alternative 2 would not threaten a violation of Federal, State, or local law, or requirements imposed for the protection of the environment. The proposed action is consistent with the National Environmental Policy Act (NEPA), National Forest Management Act (NFMA), Endangered Species Act (ESA), Clean Water Act, National Historic Preservation Act (NHPA), the Wilderness Act of 1964, Nevada Wilderness Protection Act of 1989, and Omnibus Public Land Management Act of 2009. The proposed action is fully consistent with the Inyo National Forest Land and Resource Management Plan (LRMP; 1988), as amended by Inyo National Forest LRMP Amendment 6, Forestwide Range Utilization Standards (1995), and the Sierra Nevada Forest Plan Amendment (2004). (EA pg. 88)

Administrative Review or Appeal Opportunities

This decision is subject to appeal under 36 CFR 215 by those individuals or organizations that submitted comments during the 30-day comment period provided pursuant to 36 CFR 215.6. The appeal must be filed (regular mail, fax, email, hand-delivery, or express delivery) with the Appeal Deciding Officer: Jim Upchurch, Forest Supervisor, 351 Pacu Lane, Suite 200, Bishop, CA 93514; fax 760-873-2486. For hand-delivered appeals, office hours are 8:00 AM to 4:30 PM, Monday through Friday, excluding holidays. Emailed appeals must be submitted in plain text (.txt), rich text (.rtf), or Word (.doc) formats to appeals-pacificsouthwest-inyo@fs.fed.us.. In

cases where no identifiable name is attached to an electronic message, a verification of identity will be required. A scanned signature is one way to provide verification.

Appeals, including attachments, must be filed within 45 days from the publication date of the notice of decision in the *Inyo Register*, the newspaper of record. The publication date in the newspaper of record is the exclusive means for calculating the appeal period for this decision. Those wishing to appeal should not rely upon dates or timeframe information provided by any other source. The regulations prohibit extending the length of the appeal period. Appeals received after the 45-day appeal period will not be considered. Only individuals or organizations who submitted substantive comments or otherwise expressed interest during the comment period specified under 36 CFR 215.6 may appeal this decision (36 CFR 215.13). The notice of appeal must meet the appeal content requirements at 36 CFR 215.14.

Pursuant to 36 CFR 251 Subpart C, the permittees may choose to appeal this decision by submitting a written notice of appeal that meets the content requirements of 36 CFR 251.90. The notice of appeal must be postmarked or received by the Appeal Reviewing Officer within 45 days of the date on this notification letter. The notice of appeal must be filed with: Jim Upchurch, Forest Supervisor, Inyo National Forest, 351 Pacu Lane, Suite 200, Bishop, CA 93514. A copy of the notice of appeal must also be filed simultaneously with: Margaret Wood, District Ranger, Inyo National Forest, White Mountain Ranger District, 798 North Main Street, Bishop, CA 93514.

Implementation Date

If no appeals are filed within the 45-day time period, implementation of the decision may begin on, but not before, the 5th business day following the close of the appeal filing period. When appeals are filed, implementation may occur on, but not before, the 15th business day following the date of the last appeal disposition (36 CFR 215.9).

Contact Information

For further information, contact Margaret Wood, District Ranger, White Mountain Ranger Station, 798 North Main Street, Bishop, CA 93514; (760) 876-6227.

Margaret M. Wood

MARGARET WOOD
District Ranger
Responsible Official

9/21/2010
DATE

Appendix E
White Mountain Group Allotment Analysis
Response to Comments

Legal Notice published in the Inyo Register on June 24, 2010
30-day comment period ended July 26, 2010

Commenter 1:

Western Watersheds Project: *Comment letter dated and emailed to Jennifer Ebert on July 20, 2010.*

Comment 1: The EA fails to adequately define and explain the purpose and need for the proposed action. The Forest has not even documented that there is a demand for continued grazing on each of these four allotments and therefore that there is any "need" at all.

Where consistent with other multiple use goals and objectives, there is congressional intent to allow grazing on suitable lands (*Multiple Use and Sustained Yield Act of 1960, Wilderness Act of 1964, Forest and Rangeland Renewable Resources Planning Act of 1974, Federal Land Management and Policy Act of 1976, National Forest Management Act of 1976*). Where consistent with the goals, objectives, standards and guideline of the Forest Plan and its amendments, it is the Forest Service policy to make forage from lands suitable for grazing available to qualified livestock operators (*FSM 2202.1, FSM 2203.1, 36CFR 222.2 ©*).

Comment 2: The NEPA document should present the environmental impacts of the proposed action in comparative form thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public.

The EA may discuss the impacts (direct, indirect, and cumulative) of alternatives in a comparative description or describe the impacts of each alternative separately (36 CFR 220.7(b)(3)(iv)).

Comment 3: The Forest has failed to provide basic information in the EA relevant to recent grazing on the four allotments. Without the description of current management, the public cannot determine the efficacy of the so called "constrained flexibility" provided by any proposed adaptive management.

The EA provides relevant information on the history and current status of the four allotments under the Background and Description of Allotments sections (EA pgs. 4-10). Some information was added to the EA for clarification, particularly related to the status of the Indian Creek and Perry Aiken Allotments. Indian Creek and Perry Aiken allotments have recently undergone a period of non-use due to a combination of resource protection and permittee non-use. The Desired Condition section (EA pgs. 11-16) describes the desired condition, existing condition, and need for action for each of the four allotments. In addition, Appendix B in the EA contains maps that show capable and suitable areas for cattle grazing; Appendix C describes the difference between the current management and the proposed action, specifically related to the comparison between existing utilization levels and proposed utilization levels; and Appendix D summarizes the existing vegetation and watershed condition.

The Rangeland Management Report (Robson and Goehring 2010) also provides relevant background information on the history and current status of these allotments.

Comment 4: According to the Hydrology and Soils specialist report, recent overutilization has occurred on Davis Creek and many of the four allotments' meadows and watersheds are degraded in cases to the point of being non-functional. Despite this, the proposed action is to authorize exactly the same number of cattle and same number of AUMs as currently permitted.

See response to Comment 6. In addition, the proposed action includes an adaptive management approach, setting the parameters of what is allowed, but did not specify a fixed number of livestock (FSH 2209.13, Chapter 90, Section 92.23 and 92.23b). Table 4 from the preliminary EA displayed the existing permitted cattle numbers and maximum Animal Unit Months (AUMs). This table was removed from the proposed action section of the Final EA to reduce confusion. Maximum AUMs have been identified for each grazing allotment, however the number of livestock would be allocated in annual operating instructions based on forage availability, as described in the proposed action alternative on page 23 of the EA.

Comment 5: The Ranger District must determine the capability and suitability of these allotments given the current circumstances and needs to establish if sustained grazing is possible on any parts of these allotments.

The capability and suitability of these allotments to provide livestock grazing is provided in Appendix B of the EA. Capability was mapped based on a GIS analysis. Cattle use areas that were mapped for past planning purposes were reviewed and updated by the IDT to determine suitability.

Comment 6: The larger meadows (presumably the cattle high use areas) on all four allotments show significant, severe site-specific problems associated with livestock grazing including hummocking, gullies, thin sod, and soil compaction. The Forest must propose actions to remedy these problems on these important public lands that are consistent with LRMP objectives, standards, and guidelines. This includes full compliance with LRMP Amendment 6 which requires nonfunctional watershed areas be rested until they recover.

Only one key area was found to have a non-functional watershed condition as defined by LRMP Amendment 6. Key area DC-1 (Upper Chiatovich) in the Davis Creek Allotment was determined to be in good vegetation condition, but in non-functional watershed condition. Two categories ('surface mineral or organic layer thickness' and 'headcuts and nickpoints') were rated as degraded, and one (hummocks) was rated as non-functional. The original proposed action proposed to implement a rest rotation strategy and reduced utilization level (35% allowable use). However, after further review, a minor change to the proposed action was made, which would "rest the Upper Chiatovich area until the area moves out of the overall non-functional watershed condition, as defined by LRMP Amendment 6". (EA page 26)

In other areas where watershed conditions were determined to be "degraded", utilization levels were adjusted (decreased). The proposed action also incorporates an adaptive management strategy that allows specific actions, such as rest rotation, deferred rotation grazing systems (to name a few), or other site specific actions to be implemented to address improvement in watershed condition where it is currently not meeting standards. The Hydrology and Soils Input specialist report (Lutrick 2010) discloses the site specific watershed conditions and effects from implementation of the proposed action alternative. A summary of the effects analysis for hydrological resources is summarized in the EA, pages 41-56. In addition, Appendix D in the EA summarizes the watershed condition and the associated "need for action". As stated throughout section 3.5.3 (pgs. 52-56) of the EA, and pages 20-31 of the "Hydrology and Soils Input for the White Mountain Allotment EA" (Lutrick, 2010), the changes in management are expected to lead to improvement in watershed condition where it is currently not meeting standards.

Comment 7: The Forest needs to consider the cumulative impacts of the proposed adaptive management options.

The effects analysis considers the potential effects of all actions described under the proposed action alternative, including the adaptive management options that are specified in the EA on page 28 (Table 9).

The specialist reports, Biological Evaluations and Biological Assessments all considered the cumulative impacts of the proposed adaptive management actions in their analysis (Robson and Goehring 2010, Lutrick 2010, Murphy 2010, Murphy 2010b, Murphy 2010c, Murphy and Sims 2010, Sims 2009, Sims 2009b, Murphy and Sims 2010, Weis 2010, Weis 2010b, Elliot 2010, Robson 2009). These effects were also noted in the Environmental Consequences section of the EA, Chapter 3, Range Conditions (pages 40-41), Hydrological Resources (pages 54-56), Wildlife and Aquatics (pages 57-60, 65-68, 70-71), Plants and Noxious Weeds (pages 73-74), Cultural Resources (pages 75-76), Wilderness (pages 80-81), and Socio-Economics (pages 82-83).

Comment 8: The Botany report fails to provide useful information on the current status of the known rare plant occurrences and does not indicate any new populations. The report includes no determination of trends or viability. The Botany report fails to analyze the effects of the proposed action on rare plants and vegetation outside meadows.

Plant species considered include those on the Inyo National Forest Sensitive Plant list that are known to occur or have potential habitat within the four allotments (Botany Biological Evaluation, page 3). The Forest Sensitive Plant GIS information as well as the California Natural Diversity Database (CNDDB) was used to develop the list of those considered. The Botany Biological Evaluation is used for analysis of effects to Forest Service sensitive species only. Analysis of effects to Watch List plants known from the project area was added to the EA (pg. 73).

Effects of the proposed action and determinations to both riparian and upland sensitive species are disclosed in the Botany Biological Evaluation pages 11-13 and EA page 72. An analysis of effects on Inyo NF Watch List species was added to the Plants and Noxious Weeds section of Chapter 3 of the EA, page 73.

Comment 9: The Forest has not conducted any surveys for Wong's springsnail on the project site, and does not provide any data on Forest-wide availability and population trends for Wong's springsnail. The EA fails to consider impacts from livestock grazing and grazing water developments in the cumulative effects analysis.

Surveys were completed in August of 2010 to determine the presence of springsnails in potential habitat up to 7,800 feet. No snails or suitable habitat was located within these areas. An addendum to the original Biological Evaluation was completed to reflect this new information (Sims, 2010), and is also summarized in the EA on page 69.

Comment 10: The environmental review should use best available science to analyze all direct, indirect, and cumulative impacts to the White Mountains bighorn sheep population from livestock including competition for food resources and water, behavioral changes (Brown et. al. 2010), disease, and impacts of range improvements such as fences and water developments. The Forest must also address the LRMP recommendations, particularly the directive to exclude portions of Perry Aiken Flat from cattle grazing.

Desert bighorn sheep are not a Forest Service Pacific Southwest Region sensitive species (USDA Forest Service Pacific Southwest Region Sensitive Species List updated October 15, 2007). As

stated in Forest Service Manual direction (FSM 2672.4) sensitive species need to be analyzed under NEPA. Other species may be included in the analysis if determined to be an issue through public scoping or in the ID team process. Due to this species being identified in public scoping an analysis for all alternatives was summarized in the White Mountain Grazing Allotment Analysis EA (page 70-71) and in the Wildlife Specialist Report (Murphy, 2010b pages 6, 7, 17, and 18).

Current livestock grazing has been excluded from the headwaters of the North Fork of the Perry-Aiken Creek where suitable bighorn habitat occurs. This area would continue to be excluded from livestock grazing under the proposed action (EA page 71 and Murphy 2010c pages 17 and 18 and Map 3 page 25).

Comment 11: The BA for Paiute Cutthroat trout provides no quantitative estimate of the relationship between the utilization standards for riparian vegetation that will supposedly be monitored and the impacts of cattle on the streambanks and sedimentation. The Forest has no evidence that fish populations have recovered or are stable, and it presents no data showing that the proposed action will not result in renewed deleterious streambank trampling or increased sedimentation. The Forest cannot conclude that these impacts are less than significant and must complete an EIS for grazing on Indian Creek Allotment.

The utilization standards identified in the Biological Assessment are standard levels that have been accepted and used by the US Fish and Wildlife Service. In consultation with the U.S. Fish and Wildlife Service (USFWS), a Biological Opinion (BO) was issued that concurred with the determination in the Biological Assessment (File No. 84320-2010-F-0088). The USFWS concluded that "After reviewing the current status of PCT, the environmental baseline for the action area, the anticipated direct and indirect effects of the proposed action, and the cumulative effects, it is the Service's BO that the renewal of the term grazing permit for the Indian Creek Allotment and specifically the utilization and streambank disturbance thresholds set for the Cabin Creek Unit, as proposed, is not likely to jeopardize the continued existence of the threatened PCT. No critical habitat has been designated for PCT; therefore, none will be adversely modified or destroyed (USDI 2010). These utilization standards, as used in other locations on the Forest, have shown to move vegetation resources in an upward trend within sensitive species habitat (Interim Report on Condition and Trend of Meadows and Streambanks, Golden Trout Wilderness, February 17, 2010). These positive changes are related to the standards that are very similar, and even higher, than the 30% utilization and 10% streambank trampling that is allowed for Cabin Creek. Healthy vegetated banks have been shown to reduce sedimentation in stream channels. Also, PCT populations were shown to increase in Cabin Creek, as identified in the Revised Recovery Plan, during the time when streambank trampling standards were 20%.

Under condition of the Biological Opinion, monitoring of Cabin Creek will occur at least two times a year to ensure that trampling and forage utilization standards are not exceeded, which will ensure that deleterious trampling will not occur. In accordance with Section 7 of the Endangered Species Act, the USFWS issued a Biological Opinion that allows for a certain amount of "Take" to occur with the activity proposed. In the situation of Cabin Creek, the BO allows for Take up to the equivalent of 10% streambank trampling and 30% utilization on sedges (Carex species).

The Final EA incorporates this information in the analysis of effects on Paiute cutthroat trout, pages 57-58 and within the Biological Assessment for the Paiute Cutthroat Trout within the Indian Creek Grazing Allotment (Sims, 2009).

Comment 12: The EA's analysis of impacts to Bi-State Sage Grouse is inadequate. To comply with NEPA's hard look requirement, the Forest must use quantitative data to analyze how livestock grazing in the project area has impacted sage grouse in the past, and how the proposed action is likely to impact sage grouse. The EA and supporting documents provides no quantitative data on the project area's sage grouse population and provides no quantitative estimate of impacts to the population. The Forest should determine the size of the sage grouse population and quantify the extent of the impacts.

As explained in the Biological Evaluation (Murphy, 2010) in Occurrence within Project Area section (pages 20-21), specific population and occurrence data for the White Mountain Population Management Unit is largely unknown. This is due to the lack of access to sage grouse habitats, especially during the breeding season. All known location and occurrence data was cited in the BE in section Occurrence within Project Area (pages 20-21). The BE acknowledges the lack of population data and the analysis assumes that all suitable habitat is occupied (Murphy, 2010). The Nevada Department of Wildlife (NDOW) and the California Department of Fish and Game (CDFG) were contacted to acquire the most recent population data for this area; this information is included in the analysis (Murphy, 2010, page 21).

The analysis described all direct, indirect, and cumulative effects and the determination for sage grouse was that re-issuance of the White Mountain Grazing Allotment permits **may impact** individual sage grouse, but would **not result in a trend towards federal listing or loss of viability** (Murphy, 2010, page 41 and Final EA page 66-67). This determination was reached based on the following factors: 1) Portions of allotments suitable for sage grouse nesting would not be authorized to graze until after July 1st, when sage grouse have completed the breeding and nesting season for this area; 2) All meadow systems would have an established allowable use standard based on current conditions or conditions after adaptive management monitoring; 3) Utilization standards would continue to allow for suitable cover needed during the nesting and wintering seasons; and 4) Key areas would be established within sage grouse habitats in the Chiatovich Flat and North Fork of Chiatovich Creek areas to determine current conditions of upland vegetation and allowable use standards would be implemented for these key areas based on Amendment 6.

The analysis compared impacts from current livestock grazing management to impacts from the proposed action and no action alternatives (Murphy, 2010, pages 29-38). This analysis was summarized in the EA (pages 60-67).

The INF received positive comments from the Nevada Department of Wildlife in regards to the proposed action. "The Department believes due diligence has been given to wildlife resources in the EA. Specifically, we believe appropriate and reasonable grazing management strategies for Greater Sage-grouse considerations have been incorporated into the EA. We look forward to their inclusion in the forthcoming decision record." (NDOW comment letter dated July 22, 2010).

Comment 13: The EA's analysis of impacts to White Mountains pika is inadequate, is not based on surveys, and is conclusory. The NEPA documents need to discuss the status of the White Mountains pika, and should review the direct, indirect, and cumulative effects of the proposed action on the pika and their habitat.

White Mountains pika is not a Forest Service Pacific Southwest Region sensitive species (USDA Forest Service Pacific Southwest Region Sensitive Species List updated October 15, 2007). As stated in Forest Service Manual (FSM 2672.4) sensitive species need to be analyzed under NEPA. Other species may be included in the analysis if determined to be an issue through public scoping

or in the ID team process. Due to this species being identified in public scoping an analysis for all alternatives was described in the Wildlife Specialist Report (Murphy, 2010b pages 7, 8, 18-20).

Comment 14: The EA includes no analysis of impacts to wild horses and the management of the HMA.

The White Mountain Wild Horse Management Area Summary Report includes an analysis of impacts from livestock grazing on wild horses (Murphy, 2010c page 5 and 6). This report states that livestock grazing impacts are minimal as this herd has been present within this area with livestock since the development of the Wild Horse Management Plan. The overall health of the herd is good to excellent due to the presence of suitable forage. Furthermore the herd's numbers have increased since the last gather to over the recommended herd number (Murphy, 2010c pages 5 and 6).

Comment 15: The Forest provided no inventory and maps of habitat types on these allotments including all stream and riparian areas, soil types, plant communities and habitats.

Each of the specialist reports describe the surveys and inventories that were used in the analysis, and maps that were used in the analysis can be found in the project file. The Rangeland Management Report (Robson and Goehring 2010), Hydrology and Soils Input specialist report (Lutrick 2010), Biological Evaluations and Assessments (Murphy 2010, Sims 2009, Sims 2009b, Sims 2010, and Weis 2010), and Wildlife specialist reports (Murphy 2010b) each provide information on habitat types and existing condition related to their respective resource. This information is summarized by resource area in the EA in Chapter 3, pages 32-74. In addition, Appendix D of the EA provides a summary of the vegetation and watershed condition data that was used to identify the "need for action" and to develop the proposed action alternative.

Comments specific to aspen are addressed in Comment 16. The allotments do include bristlecone pine forest (approximately 2,400 acres, mostly above 10,000 feet in elevation), however forage is scarce and it is unlikely that cattle use is occurring within or would have any effect on bristlecone pine forest.

Comment 16: The EA claims that an aspen risk assessment was conducted but it was not mentioned in the various reports. The EA provides a description of the desired conditions, but does not provide basic information such as the current number and extent of aspen groves in the project area.

More information regarding the aspen condition assessment data was added to the EA pages 33, 34, and 35 in the Range Conditions section, Chapter 3. No impacts were noted to aspen stands from livestock grazing within these areas.

Comment 17: Authorizing grazing on the Perry Aiken and Indian Creek Allotments is inconsistent with both the Congressional Grazing Guidelines and with FSM 2323.24. These two allotments have not been grazed by livestock since 2000; almost a decade prior to the 2009 designation of the White Mountains Wilderness.

The White Mountains Wilderness was designated through the Omnibus Public Land Management Act of 2009 and specifies that: "Grazing of livestock and the maintenance of existing facilities relating to grazing in wilderness areas or wilderness additions designated by this subtitle, if established before the date of enactment of this Act, shall be permitted to continue in accordance with—(1) section 4(d)(4) of the Wilderness Act (16 U.S.C. 1133(d)(4); and (2) the guidelines set forth in Appendix A of the report of the Committee on Interior and Insular Affairs of the House of Representatives accompanying H.R. 2570 of the 101st Congress (H. Rept. 101-405)."

Although the Perry Aiken and Indian Creek allotments were vacant at the time of the area's wilderness designation, there had been no previous decision to discontinue grazing. Grazing was established within these allotments prior to the designation of the White Mountains Wilderness, and has been established since prior to the creation of the Inyo National Forest.

Comment 18: The NEPA documents should include an inventory of cultural and historic resources on each allotment. The EA does not break down the cultural sites by allotment nor does it provide any kind of description of what the cultural resources are or what the impacts are that they have experienced. The Forest cannot knowingly allow cultural resource sites that may be NRHP-eligible to be neglected but must mitigate the grazing impacts it has identified.

A total of 52 previously recorded cultural sites were found within all four allotments (Cultural Report R2007050401275 page 16). Eight new sites were found and recorded as part this grazing analysis; one prehistoric site, five historic sites and two sites with both prehistoric and historic components (R20090450401275). In the Perry Aiken Allotment no new sites were found and no sites were identified within high use grazing areas (R20090450401275). In the Trail Canyon Allotment five sites are located within high use areas; four prehistoric sites and one site with both prehistoric and historic components. Three sites are recommended for annual site monitoring as a standard resource protection measure. In the Indian Creek Allotment six new sites were identified and recorded within high use areas; one prehistoric site and five historic sites. Of these, two are recommended for annual site condition monitoring as a standard resource protection measure. One new site was identified within a high use area in the Davis Creek Allotment. This site is not at risk from continued grazing. In summary a total of 12 sites were identified within high use grazing areas within all four allotments. None of these sites have been evaluated for the National Register of Historic Places. Five of these sites are recommended for annual site condition monitoring because the effects to these sites from grazing were ambiguous during the analysis. If any adverse effects are found during site monitoring then standard resource protection measures such as fencing will be implemented. (EA pages 74-76)

Commenter 2:

Lahontan Regional Water Quality Control Board: *Comment letter dated and emailed to Jennifer Ebert on July 23, 2010.*

Comment 19: The EA does not adequately analyze whether the proposed action will comply with standards contained in the Basin Plan. There is a significant likelihood that the Basin Plan's objectives for bacteria will be violated by the proposed action.

The "Hydrology and Soils Input for the White Mountain Allotment EA" (Lutrick [2010] - included by reference in the EA) includes a description of the beneficial uses and water quality objectives in the 1995 Lahontan Regional Water Quality Board Basin Plan on pages 6 through 8. Because the allotments all have some portion within California's Lahontan Region and some portion within Nevada, effects to beneficial uses for both areas were analyzed. Methods used to analyze water quality effects, including existing quantitative data, and observations of effects to beneficial uses in the field, are discussed on page 8. Current water quality conditions are included on pages 10-11, 13, 15-16, 18, and 20 and in Appendix A. Effects of the proposed action on water quality are included in pages 22-31.

The EA summarized water quality in terms of the Nevada Administration Code because it includes the quantitative water quality results for the streams in these allotments. These samples were taken in Nevada, and therefore water in those areas must meet only Nevada water quality standards.

Management measures for controlling non-point source pollution are included in Appendix B of the "Hydrology and Soils Input for the White Mountain Allotment EA" (Lutrick, 2010 – included by reference in the EA). These are the Region 5 Forest Service Range Best Management Practices (BMPs) designed to meet water quality objectives within the State of California. The BMPs are "within the guidelines of the Water Quality Control Board (Basin Plans) developed by the nine RWQCB in the State" (Forest Service, 2000)

Results for fecal coliform measurements from the infrequent water quality monitoring by Nevada Department of Conservation and Natural Resources (NDCNR) were used as one of the methods for predicting post-project water quality, but not as the only methods. The explanation of locations of sampling and California vs. Nevada water quality standards has been amended in the 2010 Hydrology and Soil Input (Lutrick, 2010). Because the samples were only taken yearly or every other year, and only once in each year, and because results varied so widely, they were not considered to be repeatable results, are were not used as the sole predictor for future condition. Appendix A of Lutrick (2010) shows the results for NDCNR water quality testing. All testing was completed within the state of Nevada. The commenter focused on the result in Chiatovich Creek, which showed 230 cfu/100 ml, 20 cfu/100 ml, and 70 cfu/100 ml in 2001, 2004, and 2005, respectively. The Chiatovich Creek watershed is about 90% in Nevada, and the samples were taken at the highway, 11 miles downstream from the California border. Only the headwaters of the creek are in California. While qualitative water quality in the California portion of Chiatovich Creek is unknown, there is no reason to believe that water quality is the same in the creek's headwaters and 11 miles downstream. Because two of the three results met Nevada's water quality standards for fecal coliform, is unknown whether the creek usually meets the standards or not. As stated in the Hydrology and Soils Input (Lutrick, 2010), other methods were used to determine whether beneficial uses were being affected.

The other creek that was tested for quantitative water quality where there is regular grazing is Trail Creek. One fecal coliform and two ammonia samples were taken in Trail Creek from 2003 to 2005. None of Trail Creek's watershed is in California. None of the samples detected any of these pollutants. While these are just once-a-year grab samples, they suggest that there is not a concern with overall water quality in Trail Creek, one of the two the most heavily grazed canyons in this allotment. The other three creeks with water quality testing found varying results. All had at least one result with no detection. The results are not conclusive, since they were only taken once in each year, and results were varied, but do not indicate widespread or persistent fecal coliform levels. As explained on page 11 of the Hydrology and Soils Input, "a 2006 report rated water quality in Chiatovich, Indian, Leidy and Perry Aiken Creeks as 'good', meaning that beneficial uses are being met." (report results accessed on http://oaspub.epa.gov/tmdl/w305b_report_v6.huc?p_huc=16060010&p_state=NV&p_cycle=2006).

Therefore, overall, water quality effects from current cattle grazing were not found to be substantial, and with the proposed action reducing utilization in some areas, implementing a rest-rotation system between allotments, and monitoring of BMP implementation, it is expected that the currently good water quality will improve.

Comment 20: Given the degraded watershed conditions and water quality in the project area, a more concrete plan to restore hydrologic function and water quality is warranted.

The purpose and need (section 1.3, EA pages 10-11) and desired condition (section 1.4, EA pages 11-16) sections of the EA includes a description of the existing conditions, desired conditions, and the need for action. Many of these actions, as shown in Table 3, were taken to improve current watershed conditions as required by the Inyo National Forest Amendment 6 protocol. As stated throughout section 3.5.3 (pgs. 52-56) of the EA, and pages 20-31 of the "Hydrology and Soils Input for the White Mountain Allotment EA" (Lutrick, 2010 – included by reference in the

EA), the changes in management were analyzed, and are expected to lead to improvement in watershed condition where it is currently not meeting standards.

Comment 21: The Forest Service should carefully consider additional alternatives and management measures that would result in timely watershed recovery, including continued rest for degraded areas until recovery is evident.

See response to Comment 20. As stated throughout section 3.5.3 (pgs. 52-56) of the EA, and pages 20-31 of the "Hydrology and Soils Input for the White Mountain Allotment EA" (Lutrick, 2010 – included by reference in the EA), the changes in management were analyzed, and are expected to lead to improvement in watershed condition where it is currently not meeting standards.

Comment 22: The proposed action proposes to resume/continue grazing in the Cabin Creek watershed, including PCT habitat. The proposed action should include objective, measurable milestones for the recovery of riparian zones and other watershed conditions, especially within occupied PCT habitats; and specific actions to be triggered, with mandatory timelines, if performance milestones are not met.

The Proposed Action and the Environmental Analysis is not the vehicle for identifying objectives or milestones for recovery of PCT habitats. The Revised Recovery Plan for the Paiute Cutthroat Trout is the document that addresses recovery actions for this species. The Recovery Plan gives direction for the implementation of a grazing strategy that will protect occupied habitat. Through the development of grazing management prescriptions for the Indian Creek allotment, specific design criteria were incorporated to ensure the continued protection of the occupied Paiute cutthroat trout habitat that allows for cattle grazing while meeting recovery objectives in the 2004 Revised Recovery Plan for the Paiute Cutthroat Trout. The proposed utilization standards, trampling standards, and rest every other year from grazing will reduce the overall effects of intensive, season-long grazing within this watershed and throughout the allotment. It is anticipated that vegetation, watershed, and fish habitat resources will continue to move in an upward trend with the implementation of the proposed action. These standards were approved by the Fish and Wildlife Service in the Biological Opinion File No. 84320-2010-F-0088 dated June 1, 2010.

Comment 23: The grazing strategies and options do not constitute true "adaptive management". Adaptive management requires key steps such as designing and implementing management measures and monitoring in accordance with the principles of scientific experimentation. The management actions and monitoring are vague and provides no assurance that management measures will be applied in a timely manner. There is a need for measurable milestones for recovery of degraded areas, and specific actions to be triggered when milestones are not achieved.

The proposed action outlines an adaptive management strategy that builds in the flexibility to respond to changed conditions or management actions (design criteria) that are not effectively meeting or moving toward the desired objectives. Through an interdisciplinary process, the IDT identified desired conditions, design criteria, and adaptive options that would be available to make adjustments in management if monitoring indicated that adaptive changes are needed. This adaptive management strategy follows direction outlined in FSH 2209.13, 92.23b and "A Practical Approach to Adaptive Management, With a Specific Focus on Livestock Management NEPA Based Decisions" guidance document (Quimby 2001).

The IDT established a monitoring plan (EA pgs. 28-30) to evaluate if the design criteria are being implemented as planned (implementation monitoring) and in the longer term, if management is meeting or moving toward the established desired condition objectives (effectiveness

monitoring). The monitoring plan includes measuring vegetation and watershed condition through established protocols. The data collected from these established protocols was used to describe the existing condition, and was the basis for developing the design criteria and adaptive options by comparing the difference between the desired condition and the existing condition. The monitoring plan was reviewed by the IDT, and it was determined that the monitoring prescribed will provide the information needed to determine if adaptive management changes should be made and to guide the direction that those changes take. Implementation will be an interdisciplinary effort, and ongoing evaluations and adaptive changes (if needed) will occur as part of permit administration.

Comment 24: The EA mischaracterizes and over-relies on "proper functioning condition" (PFC). "The PFC is a subjective, qualitative assessment that at most provides "clues" about the status of one aspect of riparian ecosystems: physical function (National Riparian Service Team, 1997). PFC was not designed and cannot be used as a sole methodology for assessing the health of aquatic or terrestrial systems (ibid.). The PFC was never intended to replace quantitative assessments, and it is not designed to address desired condition (USFS 1997)." The types of monitoring measures that actually do address compliance with water quality standards or desired watershed condition are either lacking in the EA or mentioned in passing, with little or no specificity.

The PFC method is a "qualitative method for assessment the condition of riparian-wetland areas" (USDI BLM, 1998). As described on page 6 of "Hydrology and Soils Input for the White Mountain Allotment EA" (Lutrick, 2010), the PFC method was used in this analysis to describe "stream functional condition", not for analysis of water quality, overall watershed condition, or vegetation condition.

The PFC assessment was not the sole methodology used for assessing the health of aquatic or terrestrial systems in this analysis. Methods used for assessing stream functional condition, meadow hydrologic function, and water quality are described on pages 5-7 of "Hydrology and Soils Input for the White Mountain Allotment EA" (Lutrick, 2010 – included by reference in the EA). Methods included data collection, both quantitative and qualitative, using the Inyo National Forest Amendment #6 protocol, searching for any existing quantitative water quality data, field observations of cattle presence in or near water and observation of beneficial uses, as well as the PFC assessment. Current vegetation condition was quantitatively measured using the Amendment #6 protocol are included in the Range Report in the project files.

Literature Cited

Nevada Department of Wildlife. 2010. Comments on Draft Environmental Assessment for the White Mountain Group Allotment Analysis. Letter dated July 22, 2010.

Quimby, Chuck. 2001. A Practical Approach to Adaptive Management, With a Specific Focus on Livestock Management NEPA Based Decision. USDA Forest Service, Rocky Mountain Region.

USDA Forest Service, 2000. Water Quality Management for Forest System Lands in California: Best Management Practices. Forest Service Pacific Southwest Region. September, 2000.

USDI BLM (US Department of the Interior Bureau of Land Management) 1998. A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas. Technical Reference 1737-15.

USDA Forest Service, Manual Direction. 2009. FSM 2672.4 Biological Evaluations-Supplemental Document Effective Date July 24, 2009.

USDA Forest Service Pacific Southwest Region Sensitive Species List updated October 15, 2007.

Hydrology and Soils Input for the White Mountains Allotment EA
Allotments: Trail Canyon, Davis Creek, Indian Creek and Perry Aiken
Erin Lutrick
June 2009 (updated on 9/2/10 in response to comments on the Draft EA)

/s/ Erin Lutrick _____ 6/10/09 (updated 9/15/10) _____
Signature **Date**

Affected Environment

Hydrologic Setting

Watershed Description
All of the four allotments are within watersheds that drain the east side of the White Mountains, along the California-Nevada border, except the northwestern 3,000 acres of the Trail Canyon Allotment, which drains the west side of the White Mountains. All allotments contain streams that are perennial in some reaches, and ephemeral in others. None of the streams have surface connectivity to a major water body, as they infiltrate into alluvial fans once they reach Fish Lake Valley, or in the case of the northwestern corner of the Trail Canyon Allotment, Benton Valley. Both Valleys are internally draining valleys that contain only ephemeral lakes and streams.

The streams that have some perennial segment in the Trail Canyon allotment are Trail Creek and Middle Creek to the East, and Brownie Creek draining to the west side of the Whites. In the Davis Creek Allotment, they are Chiatovich Creek and Davis Creek. In the Indian Creek Allotment they are Indian Creek and Cabin Creek, and in the Perry Aiken Allotment they are Leidy Creek and Perry Aiken Creek.

Most of the area, other than the northwestern most 3,000 acres of the Trail Canyon Allotment, is within the Fish Lake – Soda Springs Valleys Hydrologic Unit Code 4 (HUC4) watershed (Watershed #16060010). A HUC4 watershed is a watershed on the scale of greater than 250,000 acres. The northwestern 3,000 acres of the Trail Canyon Allotment is within the Crowley Lake HUC4, although there is no surface connectivity to Crowley Lake from any portion of this allotment.

HUC5 watersheds are smaller than HUC4 Watersheds, and each HUC4 watershed contains 2-10 HUC5 watersheds. HUC5 watersheds are generally between 40,000 and 250,000 acres. HUC6 watersheds are nested within each HUC5 watershed, and are generally between 10,000 and 40,000 acres. **Table 1** below shows the HUC4, 5 and 6 watersheds within each allotment.

EXHIBIT 4

Table 1. Watersheds within each allotment.

HUC 4 Watershed	HUC5 Watershed	HUC6 Watershed	Allotment
Fish Lake – Soda Springs (#16060010)	Pinchot Creek	Upper Pinchot Creek	Trail Canyon
	Fish Lake Valley/ Rock Creek	Upper Rock Creek	Trail Canyon
		Chiatovich Creek	Trail Canyon
			Davis Creek
		Indian Creek	Davis Creek
			Indian Creek
		Indian Creek Fish Lake Valley/ Icehouse Canyon	Indian Creek
	Fish Lake	Leidy Creek	Indian Creek
			Perry Aiken
		Fish Lake	Perry Aiken
		Perry Aiken Creek	Perry Aiken
Crowley Lake (#18090102)	Queen Valley/ Benton Valley	Queen Valley	Trail Canyon

Watershed Setting

The allotments are generally within the same geologic, hydrological, soils, vegetative, and topographic setting. The description of watershed setting below applies to all allotments unless otherwise noted.

Elevations within the allotments range from about 7,000 to over 13,000 feet, from the eastern foothills to the crest of the White Mountains. However, elevations over about 12,000 feet rarely have vegetation and cattle likely do not use those portions of the allotments. Geology consists primarily of granitic and metavolcanic/metasedimentary rock, with some sedimentary rock and dolomite in the Perry Aiken Allotment and substantial rhyolite and andesite in the Trail Canyon Allotment. All allotments have substantial surficial bedrock.

Vegetation is generally similar in all allotments. The project area is generally comprised of desert shrub, pinyon-juniper woodland, dwarf alpine scrub, montane meadow, Jeffrey pine, and montane sandy areas (Soil Survey 1994). There is a relatively small amount of riparian vegetation. To determine the extent of riparian vegetation, I used air photos and 2006 field observations to map both woody and moist or wet meadow/non woody riparian vegetation.

Woody vegetation in this area consists of willow, aspen and cottonwood, with some wild rose, and meadow vegetation consists mainly of forbs, carex and juncus. In all four allotments combined, the total extent of mapped riparian vegetation is about 900 acres, or just over 1% of the allotment area of about 84,000 acres. Meadow vegetation accounts for about 185 acres (or 0.2% of the allotment), and woody riparian vegetation accounts for about 695 acres (or 0.8 of the allotments). The riparian areas are almost entirely along stream channels, in valley bottoms, although there are some alpine meadows in the upper elevation flats, either in depressions that hold water or have springs or seeps to feed them. **Table 2** below shows riparian vegetation extent by allotment.

Table 2. Riparian vegetation extent in each of the four analyzed White Mountain allotments, including the total acres and percent of allotment area for both meadow and woody riparian vegetation types. Data is from digitizing air photos, along with some ground truthing.

Riparian Vegetation in the White Mountain Allotments			
Meadow Vegetation - herbaceous			
Allotment	**Allotment Area (Acres)**	**Vegetation area (acres)**	**% as meadow veg.**
Davis Creek	11,458	69	0.61%
Indian Creek	16,976	47	0.28%
Perry Aiken	29,385	34	0.14%
Trail Canyon	27,450	31	0.11%
Total	85,269	182	0.21%
Woody riparian Vegetation - willows, aspen and cottonwood			
Allotment	**Allotment Area (Acres)**	**Vegetation area (acres)**	**% as woody riparian veg.**
Davis Creek	11,458	162	1.41%
Indian Creek	16,976	117	0.69%
Perry Aiken	29,385	183	0.62%
Trail Canyon	27,450	223	0.81%
Total	85,269	685	0.80%
Totals of both vegetation types	84,000	867	1.03%

Precipitation ranges from about seven inches in the eastern foothill portion of the allotments, to about 25 inches in the higher elevations. In the higher elevations, most of the precipitation falls as snow, with occasional summer thunderstorms and monsoonal precipitation from July through September. The White Mountains have an anomalous precipitation pattern for California mountains, because they receive more precipitation on the east slope rather than the west. This is because the White Mountains are in the rain shadow of the Sierra Nevada to the west, and receive some monsoonal rain from the east.

Soil Setting

Soils in this area are derived from a variety of parent material. The parent material includes granitoids, rhyolite, andesite, metasedimentary, and small amounts of sedimentary rock. Upland soils are weakly developed and have low productivity. Many meadows in high elevation flats in these allotments are too small to be included in the soil map units. They contain the most productive soils due to the high water table and nutrient content, and therefore the soil survey for this area (USFS, 1995) underestimates the acres with high enough productivity for grazing.

Region 5 has established Soil Quality Standards (SQS) to assess soil productivity. Key parameters include soil loss due to erosion (as evidenced by rills, gullies, and loss of topsoil), compaction (loss of porosity), and removal of large downed wood, sod, duff and litter. While general protocols exist for evaluating soil quality in timberlands, Region 5 has not yet established standard monitoring protocols for rangelands.

The Inyo National Forest has established criteria for evaluating soil and watershed condition of rangelands through Forest Plan Amendment #6 (Amendment 6 – Forest-wide Range Utilization Standards). Effects to soil function are components of the Amendment 6 protocol and data collection for this analysis followed this established protocol.

Past and current impacts to soil productivity include grazing by livestock and wild horses, and a relatively small areas of mining, roads, off-road vehicle use, and other recreational uses. Generally, soil is not degraded in these allotments, but in the few meadows where concentrated livestock grazing has occurred in the past, there tends to be loss of soil surface layer, hummocks, compaction, and increases in bare soil. Soil condition in individual meadows is discussed below.

Changes in soil productivity have occurred in some areas due to historic and on-going impacts such as gullying, headcutting and hummocking, and these may permanently change soil productivity potential. Evaluations and recommendations were made considering the existing soil productivity within the current potential of these systems, not past potentials.

Air Quality Setting

The only substantial air pollution that could be related to livestock grazing is PM_{10}, or particulate matter less than 10 microns in size. This can be created when dust is stirred up through livestock trailing or when cattle are transported to the site in vehicles. However, according to the Great Basin Unified Air Pollution Control District (http://www.gbuapcd.org/airqualityplans.htm) and the Federal Environment Protection Agency (http://www.epa.gov/oar/oaqps/greenbk/mappm10.html), none of the areas within the analysis area are classified as non-attainment for PM_{10}. Because the area is in attainment for PM_{10}, air quality will not be discussed further in this document, as it is not an issue in this area.

Hydrology and Soils Focus and Methods

This analysis focuses on key area hydrologic and soil function, stream functional condition and water quality. These are the three principal water and soil related desired conditions in the Forest Plan Direction (USDA Forest Service 2004).

Key Area Hydrologic and Soil Function

Amendment #6 to the Inyo National Forest land and Resource Management Plan (Forest Plan) establishes a protocol for assessing watershed condition in meadow and upland areas for vegetation and watershed condition. This method is known as key area hydrologic function analysis. Amendment #6 methods are used for and entire key area. Analysis is completed by an interdisciplinary team, using a combination of qualitative and quantitative methods. Results are representative of the entire unit of a similar vegetative type. The following characteristics (indicators) are used to evaluate key area condition. Taken together they represent the key area hydrologic and soil function.

Riparian Vegetation Types

- Sod or Surface Organic Layer
- Compaction
- Hummocks
- Rills & Gullies
- Headcuts and nickpoints
- Bare Ground due to disturbance

Upland Vegetation Types

- A-Horizon
- Mass Soil Movement
- Surface Litter and/or rock
- Flow Patterns
- Bare Ground due to disturbance.
- Pedastalling
- Compaction
- Rills &Gullies
- Headcuts &nickpoints

All of the above attributes taken together determine whether an area is hydrologically functional. A hydrologically functional area can withstand high flows or runoff without eroding, has streamcourses that remain connected to their floodplain, and have soil capable of absorbing rainfall or snowmelt. This Amendment 6 protocol was used at eleven key areas in 2007, nine of which were in meadow/riparian vegetation types and two in upland vegetation types. Results are shown in **Table 3**.

Stream Functional Condition

In this analysis, stream functional condition was determined using the Proper Functioning Condition (PFC) protocol (USDI 1998). The PFC protocol was developed by a multi-agency effort, and is a common rapid assessment method for stream condition. If there was a perennial stream at the key area, a PFC analysis was completed. An IDT completed PFC analysis at seven key areas in 2007.

Water quality

The Forest Plan requires "Water quality meets the goals of the Clean Water Act and the Safe Drinking Water Act; it is fishable, swimmable and suitable for drinking after normal treatment." Forest Service Region 5 has a management agency agreement with the state Water Quality Control board to apply best management practices to maintain and protect water quality on National Forest lands (USDA Forest Service 2000).

Methods for assessing water quality include determining beneficial uses of water in the assessment watersheds, assessing the risk and occurrence of potential pollutants and field assessment of indicators and/or measures of pollutants.

Beneficial Uses and Water Quality Objectives

Beneficial uses are the natural and human uses of surface water are defined in the State of California Water Quality Control Board Basin Plans, and by the Nevada Division of Environmental Protection in their Nevada Administration Code (NAC). These beneficial uses must be maintained. The designated beneficial uses for drainages on the East Side of the White Mountains in the Basin Plan (California, LRWQCB, 1995) and Nevada Administration Code (NAC 445A.118-445A.225) include the following:

- Municipal and Domestic Supply
- Agricultural Supply
- Industrial supply (Chiatovich, Leidy and Indian Creeks – Nevada only)
- Groundwater recharge
- Recreation 1- water contact recreation
- Non-contact water recreation
- Commercial and Sportfishing (California designation only)
- Cold Freshwater Habitat
- Wildlife Habitat (Nevada designation only)
- Rare, threatened or endangered species (California Designation only)
- Livestock watering (Nevada designation only)
- Hydroelectric

Region-wide numeric and narrative water quality objectives (WQOs) are established in the Basin Plan (LRWQCB, 1995) and Nevada NAC, and include the nutrient WQO's that apply to the project area. Relevant WQOs are presented below:

- Ammonia
- Biostimulatory Substances
- Dissolved Oxygen
- Taste and Odor
- Turbidity
- Fecal coliform
- E.coli
- Nitrogen

Chiatovich, Indian and Leidy Creeks have more restrictive WQOs in Nevada than do the other streams within this project area, including standards for ammonia, fecal coliform, nitrogen, and E.coli. This means that activities that could possibly affect these parameters, which includes livestock grazing, need to meet these more restrictive standards in these areas of Nevada.

Sediment – Field observations of livestock trampling in springs and stream reaches is a strong indicator that sediment is reaching the stream or spring channel. Cattle can cause physical impacts to streambanks that can result in stream sedimentation (Marlow 1985, Siekert 1985).

Bacteria and other pathogens – It is well established in the literature that fecal coliform, giardia, and other bacteria or pathogens can be introduced into water by cattle. Fecal coliform, while not harmful itself, is often used as an indicator of the presence of fecal matter, which can contain harmful pathogens. The Nevada Department of Conservation and Natural Resources completed annual quantitative water quality analysis from 2001 to 2005 in five streams draining the White Mountain allotments, which included fecal coliform measurements. These, along with presence of cattle in wet areas, are to estimate presence of bacteria and other pathogens.

Field investigation for these biological contaminants includes observing if cattle are present where waste products can enter water directly from defecation or urination, or indirectly from observing cattle trailing along, across or near streams. Presence is an indicator that serves as a surrogate for in-stream bacteria sampling. The threshold for determining if beneficial uses are maintained is whether or not receptors are adversely affected.

Nutrients – Cattle proximity to water can be used to detect the potential for nutrient enrichment. Waste products contain nitrogen, a biostimulatory substance, which may affect the trophic status of waters. Eutrophication can result from nutrient introduction if sufficient quantities are present. A field indicator is condition of aquatic features such as stream channels and springs. A degraded condition from livestock indicates that nutrients may be elevated. Gavingan (2005) completed a comprehensive study to characterize water quality conditions in Crowley Lake, assess the sources of nitrogen and phosphorus loading and determine where applicable water quality standards are met. Livestock grazing was evaluated as a potential nutrient source to Crowley Lake. The study looked at dry and irrigated pastures. They concluded that livestock grazing of irrigated pastures may cause small increases in nitrogen loading. Phosphorus loading was not increased. This study can be used as a surrogate for areas in this analysis.

There was some infrequent quantitative water quality analysis completed by the Nevada Department of Conservation and Natural Resources from 2001 to 2005 in five streams draining

the White Mountain allotments, which included ammonia (as nitrogen) measurements. These, along with presence of cattle in wet areas, are used to estimate presence of nutrients.

Risk Assessment

Water quality parameters with the most likely potential to be affected by the proposed action are sediment, bacteria and other pathogens and nutrients. Cattle waste products are known to introduce bacteria and other pathogens into water (Suk 1983, 1986), and can cause increased nutrient levels. Cattle can also cause physical impacts to streambanks that can result in stream sedimentation (Marlow 1985, Siekert et al. 1985). Water quality was sampled for laboratory by the Nevada Department of Conservation and natural resources in most of the streams draining the analysis area, but only a few times in the past ten years. Therefore, field methods such as observing the ability of cattle to reach surface water or observing where they were actually seen in or adjacent to surface water is also used here.

The degree to which, if at all, the above parameters affect beneficial uses of water is key to describing environmental effects of the proposed action. If there is some introduction of pollutants by grazing, this analysis determines whether the extent adversely affects the beneficial uses of the water.

Existing Condition

Key Area Hydrologic and Soil Function

The key area hydrologic and soil function analysis was completed using the Amendment 6 protocol. **Table 3** below shows the results of Amendment 6 and PFC evaluations completed in the field in 2007, and where available, results from 2000-2002. The 2000-2002 results were used to help determine trend and the effects of current grazing practices.

Table 3. Key area Amendment 6 and PFC results for all allotments. A dash indicates no data.

Key Area		Vegetation Type	Current Allowable Use**	Survey Year	Amendment 6 results (meadow hydrology and soils)	PFC results†	Comments
DC-1	*Upper Chiatovich*	Wet Meadow	40%E/30%L Carex sp.	2007	Non-functional	FAR trend not apparent	Major hummocking, reduced soil organic layer thickness, and active headcuts.
				2002	Non-functional	FAR downward trend	Major hummocking, reduced soil organic layer thickness, gullies and active headcuts.
DC-2*	*Lower Chiatovich*	Wet Meadow	50%E/40L% Carex sp.	none	-	-	
IC-1	*Chiatovich Flats Upland*	Alpine Dwarf Shrub	40%BG	2007	Fully functional	-	Little sign of use
				2001	Fully functional	-	

IC-2	***Chiatovich Flats Meadow***	Alpine Meadow	15% Carex	2007	Degraded	FAR upward trend	Hummocks, bare ground and reduced soil organic layer thickness.
				2001	Degraded	-	Hummocks, headcuts and reduced soil organic layer thickness.
IC-3	***Cabin Creek Riparian***	Moist Meadow	40%E/,35%L Carex	2007	At-risk	PFC	Headcutting, potential for movement.
				2001	Degraded	-	Thinned sod, hummocks, compaction, and bare ground.
PA-1	***Perry Aiken Flat***	Alpine Meadow	5% RG	2007	At-risk	-	Ephemeral channel only. All character-istics are in at-risk condition. None degraded.
				2000	Non-functional	-	Hummocks, bare ground, and thinned sod (possibly in different location than in 2007 – many small meadows in this area)
PA-2	***Perry Aiken Flat Uplands***	Alpine Dwarf Shrub	40%BG	2007	Fully Functional	-	
PA-3&4	***Busher Canyon springs***	Alpine Meadow	5% RG, incidental	2007	Degraded	FAR upward trend	Thinned sod, hummocks and soil compaction
				2000	Non-functional	-	Severe hummocks, some gullies and soil compaction.
TC-1	***Trail Creek Meadows above roads end***	Moist Meadow	30%E,20%L Carex spp.	2007	At-risk	PFC	All but two characteristics are in at-risk condition. None degraded.
TC-2	***Section 8 Springs***	Moist Meadow	5%E, 5%L RG	2007	At-risk	PFC	Hummocks
TC-3	***Lower Trail Creek, below roads end***	Moist Meadow	40%E, 30%L	2007	Fully Functional	PFC	
TC-4	***Middle Creek***	Wet Meadow	40%E, 30%L	2007	Fully Functional	-	

* DC = Davis Canyon Allotment, IC = Indian Creek Allotment, PA = Perry Aiken Allotment, TC = Trail Canyon Allotment

** RG=Riparian Grasslike, BG=Bunchgrass, E=Early Season, L=Late Season

† PFC = Proper functioning condition, FAR = Functional at-risk

As can be seen in Table 3, there is a range of meadow hydrology, soils and stream condition. In 2007, the most recent year of data collection, there was only one meadow, Key Area #1 in Davis Creek Allotment, that rated non-functional for meadow and soil hydrology (Amendment 6 protocol). Throughout the project area, the most prevalent detrimental effect to soils was hummocking. Many of the key areas are moist to wet meadows, and due to the small area capable of supporting grazing, the cattle have concentrated into the few meadows in these

allotments. These meadows often have a portion that remains wet year-round, such as surrounding a seep, and those areas are vulnerable to hummocking.

Section 1.4 of the EA (desired condition) shows the desired watershed condition and the need for change in those areas that are currently not meeting watershed condition. The proposed action was designed to address the need for change and move all portions of the allotments toward desired condition.

The current hydrologic and soil conditions are discussed by allotments below.

Stream Hydrologic Function

As shown in Table 3, there is a range of stream condition throughout the project area, but no streams were found to be non-functional. Although some meadows have heavy trampling and hummocking near the stream channel, they tend to remain in relatively good condition, likely because many of the stream channels have thick willow growth along them, and the cattle do not readily penetrate the willow thickets in these areas. Further, many of these streams, even within meadows, have rocky banks that help stabilize the streams, and many of these streams are small and spring-fed, which limits their high flows and does not produce great variation in flow.

The functional at-risk streams were usually rated that way because of small headcuts or a lack of vegetation with root strength capable of stabilizing streambanks. Some of the streams, especially in the high-altitude areas, may have limited vegetation due to dry conditions. It is difficult to determine whether past grazing practices, recent dry conditions or naturally sparse vegetation is the cause of low vegetation cover in high-altitude areas.

Water Quality

Water quality was quantitatively measured on five creeks (Chiatovich, Indian, Trail, Perry Aiken, Leidy) draining these allotments, mostly downstream of the allotment, and found to be mostly within standards. The heavily grazed areas (according to Inyo National Forest records) are Chiatovich Creek, Indian Creek and Trail Creek, with Leidy Creek having "medium" grazing levels. In the allotments that are currently stocked, cattle were observed crossing waterways and standing in water or in saturated soils, particularly within meadows. There is currently potential for increased nutrient, bacteria and other pathogens from direct deposition of manure into the water, or from manure washing from the adjacent wet land into the water. However, we did not observe any increased aquatic growth that could be one indicator of increased nutrients in any of these allotments. We drank water out of creeks within currently open allotments, using a standard backpacking water filter, and it tasted good and did not have an odor, although this one-time qualitative sample is not necessarily representative of long-term water quality.

Waters in all allotments flow from California into Nevada. There are different standards for water quality in Nevada and California, with California's generally being more stringent. There are some quantitative water quality data from samples collected in Nevada, downstream from high use grazing areas. There are not quantitative water quality data from California.

The Nevada Department of Conservation and Natural Resources took quantitative water quality samples for some parameters between 2001 and 2005 in five creeks draining the analysis area. Further, the US Environmental Protection Agency (EPA) has general water quality data on its water quality website (http://epadev.induscorp.com/epadevdb_tmdl_web/enviro_V6.wcontrol?p_id305b= NV10-CE-01_00) for four of the creeks, from 2006. Sample parameters included fecal coliform, temperature, dissolved oxygen, and ammonia (as nitrogen). All of these were grab samples, and not necessarily indicative of long-term water quality. All of the results, other than one fecal coliform sample from Chiatovich Creek in September of 2001, meet water quality standards for that water body in the state in which they were taken (from NAC 445A). See **Appendix A** of this document for water quality results. The Nevada fecal coliform standard for the creeks draining the east side of the Whites is 200 coliform forming units (cfu)/100 mL, and the sample in Chiatovich Creek had 230 cfu/100mL. This suggests that fecal coliform may be present in Chiatovich Creek, although it is unknown whether the fecal coliform was related to cattle or other animals, and whether that was a one-time occurrence or the creek regularly has fecal coliform levels. Results suggests that cattle could be contributing fecal coliform into streams in the Whites, but because all other fecal coliform samples (10 total in five creeks) had levels 70 cfu/100 mL or less, this data suggests that any fecal coliform input is not very widespread or constant through time. Further, a US EPA 2006 report (accessed on http://oaspub.epa.gov/tmdl/w305b_report_v6.huc?p_huc=16060010&p_state=NV&p_cycle=2006) rated water quality in Chiatovich, Indian, Leidy and Perry Aiken Creeks as "good", meaning that beneficial uses are being met.

In the same areas where cattle are currently grazing, there is some increased bare ground on stream banks, which allows for greater sedimentation into streams and local and short-term increases in turbidity. More site-specific water quality information will be discussed by allotment below.

Individual Allotment Existing Condition

Davis Creek Allotment

The Davis Creek Allotment has the highest percentage of riparian woody and meadow vegetation of any of the allotments (**Table 1**). Woody vegetation covers about 1.4% of the allotment area and meadow vegetation covers about 0.6% of the 11,500 acre allotment. The woody riparian vegetation lines about half of the length of the perennial streams, and there are two major meadows; Upper Chiatovich (Key Area #1) and Lower Chiatovich (proposed Key Area #2). These meadows are both heavily used by cattle, with recent grazing over the allowable utilization of 45-50%. Outside of those two meadows, there is some upland grazing and trailing, but the extent of use is not well known and is less than the two major meadows.

Key Area Hydrologic and Soil Function and Stream Hydrologic Function

There is one previously established key area in the Davis Creek allotment, and one more will be established in the future (**Figure 1**). The one existing key area is Upper Chiatovich Meadow (DC-1), which is along the North Fork of Chiatovich Creek, about one mile upstream from its confluence with the South Fork. As shown in **Table 4**, this key area was rated non-functional for meadow hydrology and soil condition (Amendment 6), and stream condition was rated Functional at-risk (FAR) with a non-apparent trend in 2007. In 2002, it was also rated as non-functional for meadow hydrology and soil condition, but the stream was rated FAR with a downward trend. From this comparison, it is assumed that while overall meadow condition did not change between 2002 and 2007, stream condition slightly improved.

Table 4. Results of key area meadow hydrology, soil condition, and stream condition (PFC) in the Davis Creek Allotment.

Key Area		Vegetation Type	Current Allowable Use**	Survey Year	Amendment 6 results (meadow hydrology and soils)	PFC results†	Comments
DC-1	***Upper Chiatovich***	Wet Meadow	40%E/30%L Carex sp.	2007	Non-functional	FAR trend not apparent	Major hummocking, reduced soil organic layer thickness, and active headcuts.
				2002	Non-functional	FAR downward trend	Major hummocking, reduced soil organic layer thickness, gullies and active headcuts.
DC-2*	***Lower Chiatovich***	Wet Meadow	50%E/40L% Carex sp.	none	-	-	Utilization measured in 2008 showed up to 80% utilization. No hydrologic condition surveys completed.

* DC = Davis Canyon Allotment, IC = Indian Creek Allotment, PA = Perry Aiken Allotment, TC = Trail Canyon Allotment

** RG=Riparian Grasslikes, BG=Bunchgrass, E=Early Season, L=Late Season

† PFC = Proper functioning condition, FAR = Functional at-risk

The main reasons for the non-functional rating is major hummocking throughout much of the wet portion of the meadow, as well as moderate to major loss of surface organic layer thickness and nickpoints and headcuts on small spring channels tributary to Chiatovich Creek. Although there are major hummocks, up to a foot high, overall the meadow was found to have minor soil compaction beyond the surface organic layer. Many of the headcuts in streams appeared to be vegetating, making them more stable and preventing rapid headcutting. Much of the stream channel is stable due to adequate vegetation cover and rocks, although some small areas have loss of vegetation and excessive erosion, leading to a FAR rating.

Although the meadow has major hummocking and some minor to moderate headcutting, as well as small areas that appear to have converted to sagebrush, it does not appear to have lost its water sources and the stream is not incised enough to prevent the meadow from receiving sufficient water. However, the hummocking is severe enough to have altered the vegetation on top of the hummocks, and those areas have drier vegetation than the non-hummocked meadow surface, indicating a change in hydrologic function of the hummocked areas.

Outside of Key Area #1, the condition of meadows or upland areas is unknown, because the rest of the allotment was not surveyed as part of data collection. The future Key Area #2, Lower Chiatovich Meadow, was analyzed for vegetation condition and utilization in 2008. Photos and descriptions indicate the meadow likely has some level of soil compaction, but the stream channels have dense willow cover and are mainly impacted only at cattle crossings. The meadow was previously irrigated, and is currently irrigated to a lesser degree, leading to natural meadow drying.

Water Quality

The Davis Creek allotment has been grazed in recent years, and during field data collection in July 2007, cattle were occupying Key Area #1 (upper Chiatovich), and were seen in wet areas and in the stream channel. Recent hoofprints were also seen on stream banks. All of these observations suggest that cattle spend sufficient time in or directly adjacent to stream channels that they are likely defecating directly in the water. It is assumed, based on the record in the literature, that the streams in Key Area #1 likely contain some amount of bacteria and other pathogens, as well as increased nutrients. However, no evidence of excessive nutrients, such as increased aquatic vegetative growth was observed. Three water quality samples were taken for fecal coliform in Chiatovich Creek, from 2001, 2004 and 2005. One, from September 2001, did not meet the 200 cfu/100 mL standard for Nevada (Appendix A). This sample was taken near the highway, which is about 11 miles downstream from the California border, so is likely not indicative of water quality in California. The other two samples had levels far below the Nevada standards, and in 2006, a report from the US EPA showed that water quality in Chiatovich Creek was "good", meaning beneficial uses were being protected (http://oaspub.epa.gov/tmdl/w305b_report_v6.huc?p_huc=16060010&p_state=NV&p_cycle=2006). This data suggests that there may be short-term increases in fecal coliform in Chiatovich Creek, but the extent and duration of that input is unknown and likely not constant.

There is likely a minor, local increase in sediment in Chiatovich Creek and tributaries within Key Area #1, due to stream bank trampling and some bare soil on the streambank. However, the streambank is mainly stable, with rock, willows and other vegetation stabilizing most of the streambank outside of a few small areas. Therefore, the increase in sediment is likely local and minor.

Outside of this one key area, the increase in sediment deposition to water is likely also local and minor. This allotment only has two substantial sized meadows where cattle congregate. It is assumed that streambanks in areas outside of these two meadows are not impacted as much as

within these two meadows, because other areas are not used as heavily. Since there is only minor and local increased sediment in the heavily used areas, it is assumed that the generally good willow cover in riparian areas throughout the remainder of the allotments, as well as rocky channels, prevents major increases in fine sedimentation in the Davis Creek Allotment.

Indian Creek Allotment

The Indian Creek Allotment has the second highest percentage of riparian woody and meadow vegetation of any of the allotments (**Table 1**), although they are all similar. Woody vegetation covers about 0.7% and meadow vegetation covers about 0.3% of the 11,500 acre allotment. The woody riparian vegetation lines less than half of the length of the perennial streams. There are two small meadows in the valley bottom of Indian Creek, neither of which are key areas and so were not visited during 2007 hydrology and soils data collection. Almost all of the other meadows in the allotments are small (less than 5 acres), and unlike the other allotments, many are not along streams, but are in low-lying areas of Chiatovich Flats, above 10,000 feet in elevation. The allotment has not been grazed since 2000, and therefore all of the hydrology and soils surveys completed in 2007 were after 7 years of rest.

Key Area Hydrologic and Soil Function and Stream Hydrologic Function

There are three key areas in the Indian Creek allotment, all of which were analyzed for soil and hydrologic condition in 2007 and 2001. They are all in the Chiatovich Flats area, at elevations over 10,000 feet. As **Table 5** shows, watershed conditions ranged from fully functional to degraded in the key areas. The Chiatovich Flat Upland (Key area 1) was in good soil and hydrology condition in 2001 and 2007.

Key Area #2, an alpine meadow in Chiatovich Flats, was rated as "degraded" using the Amendment 6 protocol, and the stream in the meadow was rated Functional at-risk with an upward trend. In 2001, Amendment 6 results also indicated a degraded condition. Surface organic layer thickness, hummocks, and bare ground were all in degraded condition, and rills, compaction and headcuts were all present in minor intensity and extent. This area appeared to be drying, although the cause is unknown. Hummocks in some wet areas and along the meadow margin were medium sized, and in some cases vegetation only occurred on top of the hummocks, with bare soil in between. Small headcuts were present along the lower stream and at the stream headwaters, between grassy swales and a defined stream channel. The stream appeared to have downcut in the past, and a new, lower, smaller floodplain appeared to have formed within that incised area. However, most of those areas are now vegetated, making them stable over much of the stream's length.

The functional-at-risk rating for the stream was due mainly to a few active headcuts, sagebrush encroaching onto floodplain, and erosion in the upper reaches of the stream in dry areas along the channel. While it is possible that the drying of the streambanks is due to climate change or a dry 2007, it still renders the stream unable to withstand high flows without erosion, making it functional at-risk using the PFC protocol.

Key Area #3 is along Cabin Creek, adjacent to Chiatovich Flat. In 2007, the soil and hydrology rating was "at-risk" in this key area, an improvement from the 2001 rating of "degraded". A comparison of photographs between 2001 and 2007 shows this improvement as well. There are some small inactive headcuts that have the potential for movement with decreased vegetation cover or very high flows. There are also minor hummocks and bare ground in some locations. Photos show increased vegetative cover and streambank stability between 2001 and 2007. The stream, while having local increased erosion, has sufficient willow cover and complexity to be in proper functioning condition. The area along Cabin Creek, within and outside of this key area, is mainly willow, with a few small meadow areas. These meadow areas are often wet and have steep banks that are vulnerable to increased bare soil and reduced stability from trampling by cattle.

Table 4. Results of key area meadow hydrology, soil condition, and stream condition (PFC) in the Davis Creek Allotment.

Key Area		Vegetation Type	Current Allowable Use**	Survey Year	Amendment 6 results (meadow hydrology and soils)	PFC results†	Comments
IC-1	***Chiatovich Flats Upland***	Alpine Dwarf Shrub	40%BG	2007	Fully functional	-	Little sign of use
				2001	Fully functional	-	
IC-2	***Chiatovich Flats Meadow***	Alpine Meadow	15% Carex	2007	Degraded	FAR upward trend	Hummocks, bare ground and reduced soil organic layer thickness.
				2001	Degraded	-	Hummocks, headcuts and reduced soil organic layer thickness.
IC-3	***Cabin Creek Riparian***	Moist Meadow	40%E/,35%L Carex	2007	At-risk	PFC	Headcutting, potential for movement.
				2001	Degraded	-	Thinned sod, hummocks, compaction, and bare ground.

Water Quality

The Indian Creek Allotment likely has fine sedimentation slightly increased over natural levels in the Cabin Creek area, but this is likely small enough not to be measurable. There are only a few known local segments of stream erosion that are likely contributing very minor amounts of fine sediment into streams. In 2007, there was no evidence of increased sediment in Cabin Creek or other stream channels, and any increase is likely to small to be measured on a watershed-wide or even stream reach scale.

The levels of nutrients, bacteria and other pathogens is likely near natural levels. The area has not been grazed since 2001, and according to literature, most bacteria and other pathogens are lost within 100 days of manure deposition. Nutrients last longer, with about 50% of organic nitrogen remaining in dry manure after two years, but very slow and little release in subsequent years. Since manure has not been deposited in this allotment in 9 years, it is unlikely that it is still releasing measurable quantities of nutrients, bacteria or other pathogens.

In 2004 and 2005, fecal coliform samples were taken in Indian and Leidy Creeks, the two main creeks draining the Indian Creek Allotment. Three of these samples resulted in a no detect for fecal coliform, and one contained 10 cfu/mL. These data suggest that fecal coliform is not a pollutant of concern.

Perry Aiken Allotment

The Perry Aiken Allotment has a low relative area of meadow vegetation, with only 0.14% of the total allotment area as meadow (**Table 1**). These meadows are almost all located in alpine areas above 10,000 feet, and are associated with springs, seeps or depressions. Unlike other allotments in the analysis area, there are no major meadows along the valley bottoms. There is a similar percentage of woody riparian vegetation in this allotment as the others, growing in a narrow strip along most perennial streams. This allotment has not been grazed since 2000.

Key Area Hydrologic and Soil Function and Stream Hydrologic Function

There are four key areas in the Perry Aiken Allotment, all within the Perry Aiken Flat area. Key areas PA-3 and PA-4 were combined for analysis, because they are adjacent to each other and are in the same condition. **Table 5** shows that, in 2007, key area meadow hydrology and soil condition ranged from fully functional to degraded in the Perry Aiken Allotment.

Table 5. Results of key area meadow hydrology, soil condition, and stream condition (PFC) in the Perry Aiken Allotment.

Key Area		Vegetation Type	Current Allowable Use**	Survey Year	Amendment 6 results (meadow hydrology and soils)	PFC results†	Comments
PA-1	***Perry Aiken Flat***	Alpine Meadow	5% RG	2007	At-risk	-	All characteristics are in at-risk condition. None degraded. Ephemeral channel only, no PFC.
				2000	Non-functional	-	Hummocks, bare ground, and thinned sod (possibly in different location than in 2007 – many small meadows in this area)

PA-2	***Perry Aiken Flat Uplands***	Alpine Dwarf Shrub	40%BG	2007	Fully functional	-	
PA-3&4	***Busher Canyon springs***	Alpine Meadow	5% RG, incidental	2007	Degraded	FAR upward trend	Thinned sod, hummocks and soil compaction
				2000	Non-functional	-	Severe hummocks, some gullies and soil compaction.

Key area PA-1 encompasses numerous small alpine meadows in Perry Aiken Flat. It is uncertain whether the same area was analyzed in 2000 and 2007, because there are numerous small meadows in Perry Aiken Flat, in varying condition, and there is no map of the area surveyed in 2000. In 2007, meadow hydrology and soil condition was "at-risk" using the Amendment 6 protocol. In 2001, it was found to be "non-functional". Again, it is uncertain whether the analysis was completed at the same location as in 2007. Almost all characteristics analyzed using the Amendment 6 protocol had some minor departure from desired condition. There are small areas of bare soil, a few gullies in ephemeral channels that are mostly revegetating, and small hummocked areas around wet spring heads. There are only ephemeral streams and swales in this key area, so a PFC analysis was not completed.

Key area PA-2 is in an upland area, with no stream or other water source. It was analyzed for soil condition in 2007, and found to be in fully functional condition, with all Amendment 6 characteristics within normal range for an upland, high elevation site.

The most notable characteristic of Key Areas PA-3 and PA-4 is their steepness, with a gradient near 30% in the steepest section (determined using topographic maps). The steepness increases their vulnerability to erosion. These meadows are severely hummocked (hummocks up to one foot high) over almost their entire extent, and are fed by springs at the top of the slope. In 2007, the meadows were rated as having degraded hydrologic and soil function, mainly due to the hummocking and loss of surface organic layer. These hummocks have shrubs growing on top, and non-woody grasses and forbs growing between the hummocks and on the sides. There are areas on the edge and within the meadow that appear to have young sage encroaching. The reason that this area was not rated non-functional was that most of the meadow, including the hummocks and stream banks, are well-vegetated and are at low risk of erosion. However, the hydrology of these meadows is altered by the large hummocks, which alter water storage, infiltration of rain and snowmelt, surface runoff patterns, and stream bank morphology of the spring fed channels. The stream appears to have past incision, but is mostly well-armored with rocks, although there is at a few small active headcuts in each meadow.

In 2000, these key areas were rated as non-functional for meadow hydrologic and soil function, suggesting that there has been some improvement over time. In 2000, the analysis team found that there was rill erosion occurring between hummocks, and that there was sod missing along streambanks. This suggests that vegetation cover has increased since 2000, increasing meadow stability. This allotment was not grazed between 2000 and 2007.

The stream was rated functional at-risk with an upward trend. It was assumed to have an upward trend because although there is evidence of past incision and headcutting, most of the banks are very well vegetated, and the stream appears to be stabilizing. There is a non-functioning water trough located about 100 yards south of Key Area #4, that, when working, likely allowed cattle to drink from the trough rather than trampling the springhead and stream attempting to drink.

Water Quality

Water quality in the Perry Aiken allotment is likely very similar to the Indian Creek allotment, because it has not been grazed since 2000, and has similar high elevation meadows with minor erosion. Therefore, water quality is likely good, with slight increases in sedimentation at a very local scale, and no increased nutrient, bacteria or other pathogen levels. Perry Aiken Creek, one of the two major streams draining this allotment, was sampled for fecal coliform 2004 and 2005. Results were no fecal coliform detected, and 40 cfu/100mL, meeting the standard of less than or equal to 200 cfu/100mL. This indicates that in recent years, fecal coliform is not a pollutant of concern in Perry Aiken Creek. However, these are only two grab samples and do not indicate long-term water quality or water quality outside of Perry Aiken Creek.

There are only a few known local segments of stream erosion that are likely contributing very minor amounts of fine sediment into streams. In 2007, there was no evidence of increased sediment in the spring channels within the key areas, and it is likely that outside of key areas, the sedimentation is the same or less.

Trail Canyon Allotment

The Trail Canyon Allotment is the northernmost allotment of the four analyzed here. It is the only allotment that partially drains to the west of the White Mountains. The two main drainages in the allotment, Trail Creek and Middle Creek, drain east into Fish Lake Valley, though like the rest of the allotments, they have no surface connectivity to a downstream water body but infiltrate into alluvial fans. The key areas are all in the valley bottom of these two creeks. The allotment has the lowest percentage of land area as meadows, at 0.11%, and woody riparian vegetation covering about 0.8% of the allotment. The meadows in this allotment are in creek floodplains or in the headwaters of the creeks, in steeper terrain. None of the steeper, higher elevation meadows were visited as part of this analysis.

Key Area Hydrologic and Soil Function and Stream Hydrologic Function

All four of the key areas in the Trail Canyon Allotment were rated "at-risk" or "fully functional" for meadow hydrologic and soil function in 2007 (**Table 6**). All streams were in proper functioning condition.

Key Area TC-1 is located in a moist meadow, just beyond the trailhead parking lot. The meadow was rated as "at-risk" for soil and hydrologic characterists. There is increased bare soil in the area, which appears to be related mostly to rodents, as well as generally dry soil. The stream was

rated at PFC. There are old headcuts, and the stream was previously incised and has very low sinuosity, and there are existing headcut stabilization structures in the meadow and downstream. These headcut structures appear to be stable, and have effectively prevented further upstream movement of headcuts and allowed vegetation to further stabilize the stream banks. Although there are minor departures from desired condition for almost all soil and hydrologic characteristics, there are no major departures.

Table 6. Results of key area meadow hydrology, soil condition, and stream condition (PFC) in the Trail Canyon Allotment.

Key Area		Vegetation Type	Current Allowable Use**	Survey Year	Amendment 6 results (meadow hydrology and soils)	PFC results †	Comments
TC-1	***Trail Creek Meadows above roads end***	Moist Meadow	30%E,20%L Carex spp.	2007	At-risk	PFC	All but two characteristics are in at-risk condition. None degraded.
TC-2	***Section 8 Springs***	Moist Meadow	5%E, 5%L RG	2007	At-risk	PFC	Hummocks
TC-3	***Lower Trail Creek, below road's end***	Moist Meadow	40%E, 30%L	2007	Fully functional	PFC	
TC-4	***Middle Creek***	Wet Meadow	40%E, 30%L	2007	Fully functional	-	No stream in meadow

Key area TC-2 was also rated "at-risk" for hydrologic and soil condition. Most characteristics were at desired condition, except for hummocks in many wet and moist areas. There is corresponding severe compaction in portions of the meadow, but only over small areas. Despite the hummocks and soil compaction, the good vegetative cover allows the meadow and streambank to withstand high flows without erosion.

Key area TC-3 is a moist meadow that was found to have fully functional hydrologic and soil condition. There is some soil compaction in flat portions of the meadow, partially due to vehicles being driven and parked on the meadow. There is one cattle trail crossing of the stream in the meadow, but most of the stream has dense willow cover that prevents cattle from accessing the channel.

Key area TC-4 is the only key area in Middle Canyon. It is one of the two meadows in Middle Canyon. Key area TC-4 was found to be in fully functional soil and hydrologic condition. It is almost certain that the TC-4 that was analyzed for soil and hydrologic condition was not the correct area that has been surveyed in the past. However, the data will be reported for the area that was actually analyzed. The meadow hydrology and soil condition were rated "fully functional", and there is no stream in the meadow. There was some minor hummocking around the edges of the meadow, but other than that, all characteristics were in fully functional condition.

Water Quality

The Trail Canyon allotment has been grazed in recent years, and during field data collection in July 2007, cattle were occupying Key Areas #1, 2 and 3, and were seen in wet areas and in the stream channel. Recent hoofprints were also seen on stream banks. These observations suggest that cattle spend sufficient time in or directly adjacent to stream channels to defecate directly in water. However, the use at the time of the visit was less than in the Davis Creek allotment, suggesting that there could be fewer water quality impacts. It is assumed, based on the record in the literature, that the streams in the key areas likely contain bacteria and other pathogens, as well as increased nutrients. However, no evidence of excessive nutrients, such as increased aquatic vegetative growth, was observed. One fecal coliform and two ammonia samples were taken in Trail Creek from 2003 to 2005. None of the samples detected any of these pollutants. While these are just once-a-year grab samples, they suggest that there may not be persist overall water quality degradation in Trail Creek, one of the two the most heavily grazed canyons in this allotment. However, conclusions cannot be made from two grab samples. There is no quantitative water quality data for Middle Creek.

There is likely a very minor increase in sediment in Trail Creek and tributaries within Key Areas #1, 2 and 3, due to local and minor observed stream bank trampling and some bare soil on the streambank. However, the streambanks are mainly stable, with rock, willows and other vegetation stabilizing most of the streambank outside of a few small areas. Therefore, the increase in sediment is likely local and very minor.

Environmental Consequences

This section includes the direct, indirect and cumulative effects analysis of both alternatives; No Action and the Proposed Action. The analysis for the proposed action direct, indirect and cumulative effects considers the adaptive management strategies outlined in the proposed action.

Davis Creek Allotment

Alternative #1 – No Action

Direct and Indirect Effects

Under the No Action alternatives, there would be no grazing in the Davis Creek Allotment. Within meadows, the hydrologic and soil condition would improve in the short and long-term, and stream channel condition would likely also improve. Water quality would slightly improve, although because it is likely only mildly degraded in local areas with current grazing, cessation of that grazing could not only cause minor and local improvements in water quality.

In Key Area #1 (Upper Chiatovich), the no action alternative should result in increased hydrologic and soil function in the meadow, as well as improved stream functional condition. There should be little change in water quality, because it currently likely has only minor and

local degradation, but that degradation should improve within a year. Although the meadow was rated non-functional for hydrologic and soil conditions, it is not severely incised and does retain potential for major recovery. Hydrologic and soil condition of the meadow should improve because litter would remain in the meadow and soil compaction would no longer occur, allowing for eventual build-up of more organic soil within the meadow. There should also be stabilization of the headcuts in Chiatovich Creek and its tributaries in less than five years, as trampling ceases and vegetation grows back on streambanks. This would allow a more stable stream channel that would better resist erosion during high flows.

The hummocks, which are currently causing altered surface flow patterns and ability to absorb and store water, may not recover for decades or longer. There is little to no literature about recovery of hummocks, and whether the land surface eventually levels out over time. In the nearby allotments that are not grazed, hummocks remained the same size after seven years without grazing. It is likely that the hummocks in wet portions of Key Area #1 would eventually disappear without grazing, but the time frame is unknown and assumed to be on the multi-decade or centuries scale. Because this key area is wet over much of its area, recovery will likely be more quick than in a drier area, because soils form more rapidly in wet areas.

Cumulative Effects

The No Action alternative will not have cumulative watershed effects in the Davis Creek Allotment, because there will be no grazing and therefore only gradual recovery of site specific conditions that will not show effects at the watershed scale.

Cumulative watershed effects (CWE) are most appropriately analyzed for this assessment at a level smaller than HUC6, because the HUC6 watersheds usually incorporate more than one stream, and those streams usually have no surface hydrologic connectivity downstream. Therefore, smaller watersheds were delineated for this assessment, incorporating one perennial stream system in each watershed. These are comparable to 7th level HUCs, although 7th level HUCs are not delineated for the Inyo National Forest. The two 7th level watersheds in this allotment are Chiatovich Creek (North and South Fork) and Davis Creek. The magnitude of effects from each watershed will be analyzed in context with other past, present and reasonably foreseeable management actions.

Ground disturbance from grazing that could affect watershed hydrologic function occupies a very small portion of all of the 7th level HUC watersheds in this assessment. It occurs almost entirely at areas of cattle concentrations, which in the Davis Creek Allotment are two large meadows containing perennial streams, Upper and Lower Chiatovich (Key Area #1 and future Key Area #2). Cattle forage in other areas, but the ground disturbance is generally dispersed and not hydrologically connected to streams. Cattle rarely concentrate along streambanks outside of meadows because of higher stream and slope gradients, lack of forage, and particularly in this area, dense willow vegetation that makes access to the stream channel difficult.

In the Chiatovich Creek watershed, meadows occupy about 4% of the perennial stream length and a much smaller percent of the total (perennial, intermittent and ephemeral) stream length. In the Davis Creek watershed, meadows occupy about 3% of the stream length. Because this stream length of disturbance is so small, ground disturbance from cattle grazing in meadows is a site rather than a watershed scale issue. Under the No Action alternative, the direct and indirect effects would be slight, local improvement in soil and hydrologic condition in the two major meadows, and a very slight reduction in stream bank trampling. Streams are currently in relatively good condition, so although they would receive no trampling under this alternative, there could only be a very local, minor improvement in stream condition. Under current management, sedimentation and other water quality impacts are minor and local, there is little or no downstream cumulative effect. Further, no cumulative watershed effects, such as major headcutting on the main stem, or poor water quality, were observed in the field.

Even though disturbance by cattle occurs over too small an extent of the watershed to cause cumulative watershed effects, other activities in the watershed were reviewed to understand the context of grazing. Past and ongoing activities include sheep and cattle grazing, mining, recreation, and, in the lower portion of the Chiatovich Creek watershed, downstream of Forest Service land, housing development. There is no evidence that recreation activities are widespread enough in the Chiatovich and Davis Creek watersheds to affect water quality or other hydrologic or soil attributes, as it is limited mainly to vehicle use along one road in each watershed. Mining has occurred generally away from water sources, and there are no known water quality or other watershed-related effects from past mining in this watershed. The housing development occurs along about 2 miles of lower Chiatovich Creek, and does have the potential to affect stream flow, stream morphology and water quality downstream from Forest Service land. However, because direct and indirect effects of the No Action alternative are so local and minor, and would improve conditions, this action would not add to cumulative effects to the Chiatovich Creek watershed.

Alternative #2 – Proposed Action

Direct and Indirect Effects

Under the proposed action alternative, grazing would continue in the Davis Creek Allotment, using a rest-rotation system in Key Area #1 (Upper Chiatovich Meadow). The proposed action should allow for some minor improvement in meadow hydrologic and soil conditions relative to current condition in the short and long-term, and stream channel condition would likely also slightly improve. Water quality would likely remain the same, although because it is likely only mildly degraded in local areas with current grazing, there would continue to be no detrimental effects to beneficial uses. Analysis for the proposed action assumes that Best Management Practices (BMPs) described in Appendix B of this document are followed.

The hydrologic and soil improvement should mostly be in Key Area #1, because it is the only area known to have non-functional or degraded hydrology and soil condition, and it is the location that will have a major change in management under the proposed action. Key Area #1 will be discussed in more detail in the next paragraph. Future Key Area #2 (Lower Chiatovich

Meadow) has an unknown current soil and hydrologic condition, but with utilization reduced to 45% maximum (with current grazing usually greater than that), there should be some minor improvement in soil compaction. The rest of the allotment is mainly upland and although it was not extensively surveyed, is assumed to have little to no hydrologic alternation. That should continue in the future because the proposed action should not alter upland grazing.

Key Area #1 is the only location in the allotment known to have non-functional hydrologic and soil condition. With resting until the area moves out of the overall non-functional watershed condition category, this key area should have some reduced compaction and increased litter cover and organic layer thickness. The hummocks, which are currently causing altered surface flow patterns and ability to absorb and store water, may not recover under the proposed action. There is little to no literature about recovery of hummocks, and whether the land surface eventually levels out over time. In the nearby allotments that are not grazed, hummocks remain after seven years without grazing, and judging from photos in 2000 versus those in 2007, their size has not changed. It is likely that the hummocks in wet portions of Key Area #1 would continue in their current state, even with grazing reduced, or even if grazing was eliminated (as in the No Action alternative). Therefore, with limited grazing, the hummocks will likely show little change over time, similar to the No Action alternative.

There are a few wet areas within Key Area #1 that have extensive trampling, while most wet areas have hummocking. One of these is at one of the tributary headwaters. This area is a relatively steep seep area, with some current trampling and hummocking. Even with reduced use, this area is vulnerable to trampling and alteration of hydrologic function. If the proposed action prevents concentrations of cattle in this area, then the seep will likely revegetate and be more resilient to erosion in the future. If not, trampling and erosion would continue. However, if the area was fenced using the adaptive management framework, and that would allow for a more rapid increased vegetative cover and resiliency to erosion.

Cumulative effects

Under the Proposed Action, cumulative effects would be almost the same as under Alternative #1. This is because, as stated above in the No Action alternative analysis, the hydrology, soil and stream impacts from Alternative 2 would mainly be local, at one to two meadows. These local impacts, while they may remain moderately detrimental, are not widespread enough to translate to watershed-wide cumulative effects. Further, stream bank disturbance should continue to be minor and local under the proposed action alternative, allowing streams to remain resilient to high flows without degrading. Currently, there are no watershed-wide cumulative effects evident in the Chiatovich and Davis Creek watersheds, and under the proposed action, which reduces utilization and prescribes rest-rotation for the one meadow in non-functional condition, there should continue to be no cumulative watershed effects.

Indian Creek Allotment

Alternative #1 – No Action

Direct and Indirect Effects

The No Action Alternative would result in no grazing in any of the allotments. The Indian Creek allotment would have some minor improvement in some small areas. However, because current impacts are local and in most cases moderate, and widespread changes will therefore not occur, the overall condition should remain similar to the current condition.

The hydrologic and soil functioning condition should improve most in the Chiatovich Flats area, in the high altitude meadow areas, although recovery is likely to be slow. Key Area #2, Chiatovich Flat Meadow, was rated in degraded functional condition in 2007, seven years after the last cattle grazing. This high elevation, relatively dry area has a slow recovery time due to short growing seasons and slow soil development. Therefore, bare soil and reduced organic layer thickness remains, and may take many years to revegetate. Hummocking, as discussed in the Davis Creek Allotment discussion, are unlikely to disappear for decades. Therefore, hummocks should remain under Alternative #1.

Key Area #1, and upland site, shows that there are few to no impacts to uplands in this allotment, suggesting that uplands should remain in the same as their current fully functional condition.

Key Area #3, along Cabin Creek, should continue to show recovery, with a reduction in compaction and bare soil. This area improved from "degraded" to "at-risk" hydrologic and soil condition from 2000 to 2007 without grazing, and improvement should continue under Alternative #1.
Fully functional soil and hydrologic condition would likely be reached within 5-10 years. Streambanks would continue to revegetate and the stream continue to stabilize, continuing the upward stream condition.

Water quality would likely not change under Alternative #1, remaining good throughout the allotment. There would be no input of cattle manure, and the current local, minor sediment input would decrease over time.

Cumulative Effects

The No Action alternative will not have cumulative watershed effects in the Indian Creek Allotment, because there will be no grazing and therefore only gradual recovery of site specific conditions that will not have direct or indirect effects at the watershed scale.

Ground disturbance from grazing that could affect watershed hydrologic function occupied a very small portion of all of the 7th level HUC watersheds in this assessment before 2001. Grazing occurs almost entirely at areas of cattle concentrations, which in the Indian Creek Allotment were Chiatovich Flat and Cabin Creek, and small meadows along Indian Creek. Cattle foraged in other areas, but the ground disturbance is generally dispersed and not hydrologically connected to streams. Cattle rarely concentrate along streambanks outside of meadows because of higher

stream and slope gradients, lack of forage, and dense willow vegetation that makes access to the stream channel difficult.

In the Indian Creek watershed, meadows occupy about 4.5% of the perennial stream length and a much smaller percent of the total (perennial, intermittent and ephemeral) stream length. In the Leidy Creek watershed, meadows occupy about 7% of the stream length. Because this stream length of disturbance is so small, ground disturbance from past cattle grazing in meadows is a site rather than a watershed scale issue. Under the No Action alternative, the direct and indirect effects would be slight, local improvement in soil and hydrologic condition in Chiatovich Flat and along Cabin Creek meadows, and a very slight reduction in stream bank trampling. Streams are currently in relatively good condition, so although they would receive no trampling under this alternative, there could only be a very local, minor improvement in stream condition. Under current management, sedimentation and other water quality impacts are minor and local, there is little or no downstream cumulative effect. Further, no cumulative watershed effects, such as major headcutting on the main stem, or poor water quality, were observed in the field.

Even though disturbance by cattle occurs over too small an extent of the watershed to cause cumulative watershed effects, other activities in the watershed were reviewed to understand the context of grazing. Past and ongoing activities include sheep and cattle grazing, mining, and recreation. There is no evidence that recreation activities are widespread enough in the Indian and Leidy Creek watersheds to affect water quality or other hydrologic or soil attributes, as it is limited mainly to vehicle use along one road in each watershed. Mining has occurred generally away from water sources, and there are no known water quality or other watershed-related effects from past mining in this watershed. Therefore, there are no known cumulative watershed effects from other actions.

Alternative #2 – Proposed Action

Direct and Indirect Effects

Implementation of Alternative #2 would allow for continued grazing on the Indian Creek Allotment, with only light grazing (15% utilization) in the high elevation Chiatovich Flat meadows. This action would likely allow for an upward trend in soil and hydrologic condition of key areas in the allotment, although the improvement would likely be slower and less complete than under Alternative #1.

Upland areas would see no change because with current use, there is no measurable hydrologic or soil alteration. With resumed grazing, upland areas should continue to have only minor reduction in litter and therefore slightly more bare soil.

Key Area #2, Chiatovich Flat Meadow, will likely show some gradual, long-term decrease in headcuts and increase in soil organic layer thickness, even slower than under Alternative #1. Grazing would be at low levels in this high elevation area, and adaptive management strategies would be used to meet watershed desired condition if the low utilization levels are not sufficient.

This should prevent any measurable increase in bare soil, and should allow for a gradual increase in vegetative cover in wet areas, stabilizing headcuts and allowing for some litter to remain on the meadow surface. However, this key area has a short growing season, and very slow soil development, so any improvement in condition will be in the long-term, on the scale of decades.

Key Area #3, Cabin Creek Riparian areas, will likely also show some minor improvement in soil, hydrologic and stream channel condition under Alternative 2 relative to the current condition. This area is relatively wet, and although it is vulnerable to trampling, with 30% utilization and 10% allowable streambank trampling, vegetative cover should be allowed to continue increasing, stabilizing the few headcuts and reducing the area of bare ground. Again, this process would be slow, because there would be continued trampling and compaction, and at this high elevation, vegetative growth is relatively slow.

Water quality should continue to be good, with only minor, local increases in nutrients, sediment and bacteria and other pathogens. When present, cattle will be in wet areas enough to deposit manure in or near surface water, and that manure can be carried into streams. However, the scattered nature of grazing areas and the past evidence of good water quality, it is assumed that water quality will continue to have only minor, local degradation that continues to meet beneficial uses.

Cumulative Effects

Under the Proposed Action, cumulative effects would be almost the same as under Alternative #1. This is because, as stated above in the No Action alternative analysis, the hydrology, soil and stream impacts from Alternative 2 would mainly be local, at a few small meadows. These local impacts, while they may remain moderately detrimental, are not widespread enough to translate to watershed-wide cumulative effects. Further, stream bank disturbance should continue to be minor and local under the proposed action alternative, allowing streams to remain resilient to high flows without degrading. Currently, there are no watershed-wide cumulative effects evident in the Indian Creek or Cabin/Leidy Creek watersheds, and under the proposed action, which prescribes rest-rotation for the entire allotment, there should continue to be no cumulative watershed effects.

Perry Aiken Allotment

Alternative #1 – No Action

Direct and Indirect Effects

Under the No Action alternative, there would likely be some long-term, minor improvement in locally degraded watershed condition in the Perry Aiken Allotment, but on a watershed scale, there would be very little change.

There should continue to be slow recovery of soil and hydrologic conditions at Perry Aiken Flat, where Key Areas #1-4 are located. Key Area #1, Perry Aiken Flat alpine meadow, has a condition similar to many other small alpine meadows in the flat. With seven years rest from grazing, the soil and hydrologic condition improved from non-functional to "at-risk" (although it is possible that the analysis was not completed in the same small alpine meadow). Even if the analysis was completed in a different location, there was evidence of past alteration of stream function, such as headcuts that are vegetated and no longer active, that suggest that there has been recovery from a previously more degraded condition. This suggests that, while recovery may be slow in this relatively dry, high altitude area that soil and hydrologic recovery of areas with compaction, headcuts, bare soil, and potential for erosion will gradually improve over time under Alternative #1.

Upland areas, such as Perry Aiken Key Area #2, should remain in fully functional condition under the No Action Alternative. Under current conditions, with the last cattle grazing occurring in 2000, they are in fully functional soil and hydrologic condition, and with no grazing, they should remain in that same condition.

Key Areas #3 and 4, the steep meadows at the headwaters of Busher Creek, will likely never recover to their desired soil and hydrologic condition, although they should show gradual improvement over decades. These meadows are severely hummocked over most of their extent, and it is unknown whether these tall hummocks will disappear within decades or longer. However, they will continue to vegetate, and erosion will continue to be minor in these meadows due to good vegetative and litter cover. Soils will continue to de-compact, allowing for increased water holding capacity and infiltration.

Water quality will continue to be good in this allotment. While there is little water quality data available for this area, there are some records from 2004 and 2005 in Perry Aiken Creek that show that all water quality parameters measured meet water quality standards. Although these data are limited, they, along with field observations of clear water with no excess instream algal growth, suggest that water quality is good and would continue to be so in the absence of cattle under Alternative #1.

Cumulative Effects

Because there are no direct or indirect effects of the No Action Alternative, there will be no cumulative effects from this alternative.

Alternative #2 – Proposed Action

Direct and Indirect Effects

The proposed action would allow grazing within the Perry Aiken Allotment, with low utilization levels (15-20%) grazing in the high elevation Perry Aiken Flat area. This should allow for some minor recovery from the locally altered current conditions over a long-term period. The effects

should be similar to Alternative #1, but with a slower recovery of areas that are currently in "at-risk" or "degraded" hydrologic and soil condition.

Key Area #1, the alpine meadow in Perry Aiken Flat, should have minor improvement from the current "at-risk" condition, with minor increases in vegetative cover, minor reduction in compaction, and increased vegetative stabilization of headcuts and nick points. With only 15% allowable utilization, there should be some vegetative growth, allowing for litter build up and some decompaction of soil. However, because this area is high altitude and relatively dry, any recovery will be slow.

Uplands, such as Key Area #2, should remain in their current fully functional hydrologic and soil conditions. While grazing to 20% will result in slightly increased bare soil, nearby allotments that are currently stocked have upland areas in fully functional condition, indicating that the levels of grazing that would occur under Alternative #2 would not degrade soil and hydrologic conditions.

Key Areas #3 and 4 could show some minor degradation of soil and hydrologic condition under Alternative #2, although the effects would likely be very minor and local. Even with grazing occurring at low utilization levels, this area is vulnerable to increased bare soil and compaction due to its steepness and wet soil conditions. While the hummocks should not get larger or more prevalent under this alternative, any use of this area by cattle will likely cause sheared hummock edges, reducing soil cover and increasing the chance for erosion. However, with maximum 20% utilization, vegetation should have a chance to partially grow, reducing the potential for erosion or rilling.

Cumulative Effects

Under the Proposed Action, cumulative effects would be almost the same as under Alternative #1. This is because, as stated above in the Proposed Action alternative direct/indirect effects analysis, the hydrology, soil and stream impacts from Alternative 2 would mainly be local, at a few small high altitude meadows. These local impacts, while they may remain with only minor improved conditions, are not widespread enough to translate to watershed-wide cumulative effects. Further, stream bank disturbance should continue to be minor and local under the proposed action alternative, allowing streams to remain resilient to high flows without degrading. Currently, there are no watershed-wide cumulative effects evident in the Leidy, Busher or Perry Aiken Creek watersheds, and under the proposed action, there should continue to be no cumulative watershed effects.

Past actions include sheep and cattle grazing, mining, and recreation, and current and future actions include some possible continued mining and recreation. The effects of past grazing are discussed in the current conditions section, and have likely helped lead to current local degraded soil and hydrologic conditions in some areas. There is no evidence in this area that past mining or recreation have caused more than local soil compaction and bare soil with construction of roads and mines. Therefore, there would be no cumulative effects when combined with the minor, local effects of the proposed action.

Trail Canyon Allotment

Alternative #1 – No Action

Direct and Indirect Effects

Under the no action alternative, there would be no grazing. This could lead to local and minor improvements in soil and hydrologic condition, but because most of the area is in fully functional or at-risk condition currently, the change from current condition should be minor.

Key Areas #1 and 2 should have reduced soil compaction, increased vegetative cover, and increased organic layer thickness with no grazing. These characteristics all have minor departures from desired condition, and will likely recover relatively rapidly.

Key areas #3 and 4 were found to be in fully functional condition currently, and therefore removal of grazing should allow the areas to remain in fully functional condition.

Other areas throughout trail canyon, including other meadows in Middle Creek and Trail Canyon, should also have increased vegetative cover, increased organic layer thickness and reduced compaction. Overall, there should be minor, local improvements in soil and hydrologic conditions.

Cumulative Effects

Because there are no direct and indirect effects of the No Action Alternative, there will be no cumulative effects from this alternative.

Wild horses would continue to graze the area, which would mean that some grazing and stream bank trampling would continue.

Alternative #2 – Proposed Action

Direct and Indirect Effects

Under the proposed action, grazing would continue at the same utilization levels that have been prescribed in the past, with adaptive management options available if desired conditions for watershed conditions are not met. Therefore, the direct and indirect effects to soil and hydrologic conditions should be the same as under the current condition for the Trail Canyon Allotment.

All key areas would remain in a "fully functional" or "at-risk" watershed conditions, which does not require management changes.

Cumulative Effects

The Proposed action alternative should not have cumulative watershed effects in the Trail Canyon Allotment, because the current conditions are not contributing to cumulative watershed effects, and the proposed action is the same as recent grazing management.

Ground disturbance from grazing that could affect watershed hydrologic function occupies a very small portion of all of the 7th level HUC watersheds in this assessment area. Grazing occurs almost entirely at areas of cattle concentrations, which in the Trail Canyon Allotment are small meadows along Trail and Middle Creeks. Cattle foraged in other areas, but the ground disturbance is generally dispersed and not hydrologically connected to streams. Cattle rarely concentrate along streambanks outside of these meadows because of higher stream and slope gradients, lack of forage, and dense willow vegetation that makes access to the stream channel difficult.

In the Trail Creek watershed, meadows occupy about 6.5% of the perennial stream length and a much smaller percent of the total (perennial, intermittent and ephemeral) stream length. In the Middle Creek watershed, meadows occupy about 4% of the stream length. Because this stream length of disturbance is small, ground disturbance from past cattle grazing in meadows is a site rather than a watershed scale issue. Under the Proposed Action alternative, the direct and indirect effects would be slight, local, minor detrimental effects to soil and hydrologic condition in meadows along Trail and Middle Creeks. Streams are currently in relatively good condition, so although they would receive minor trampling under this alternative, there would only be a very local, minor degradation in stream condition. Under current management, sedimentation and other water quality impacts are minor and local, there is little or no downstream cumulative effect. Further, no cumulative watershed effects, such as major headcutting on the main stem, or poor water quality, were observed in the field.

Even though disturbance by cattle occurs over too small an extent of the watershed to cause cumulative watershed effects, other activities in the watershed were reviewed to understand the context of grazing. Past and ongoing activities include sheep and cattle grazing, wild horse grazing and travel, mining, and recreation. There is no evidence that recreation activities are widespread enough in the Trail and Middle Creek watersheds to affect water quality or other hydrologic or soil attributes, as it is limited mainly to vehicle use along one road in each watershed. Mining has occurred generally away from water sources, and there are no known water quality or other watershed-related effects from past mining in this watershed. Therefore, there are no known cumulative watershed effects from other actions. Wild horses are present in along Trail Creek, and they have many of the same effects as cattle grazing. The horses graze, removing vegetation, and trail during travel, and also trample stream banks and springs. Alternative 2 should not add to any cumulative effects from wild horses, because management in this action is based on on-the-ground conditions, not just cattle grazing effects. For example, the streambank trampling standard applies to all activities combined, including wild horses, wildlife, and cattle. Because cattle use is the one activity subject to management, whenever trampling or other effects near their threshold, no matter what the cause, the cattle will be removed or

otherwise managed. Therefore, the effects will be no different with wild horses and cattle combined.

There is a housing development that is currently being built along about 1.5 miles of lower Middle Creek, downstream from the Forest boundary and the Trail Canyon allotment. This development does have the potential to affect stream flow, stream morphology and water quality downstream from Forest Service land. However, because direct and indirect effects of the proposed action would be local and minor, this action would not add to these possible development-related effects in the Middle Creek watershed.

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Appendix A –
Quantitative Water Quality Results for Chiatovich, Indian, Leidy, Perry Aiken and Trail Creeks from 2001 to 2005, and water quality standards for Chiatovich, Indian and Leidy Creeks.

Water quality data collected by the Nevada Department of Conservation and Natural Resources, obtained on the website: http://www.epa.gov/storet/dw_home.html

Water Quality Parameter	Standard	Creek	Date	Result
Fecal Coliform	Mean ≤200 cfu/mL	Chiatovich (at highway, downstream of allotments)	9/17/01	**230 cfu/100 mL**
			6/22/04	20 cfu/100 mL
			7/7/05	70 cfu/100 mL
		Indian	6/21/04	Non-detect
			7/6/05	10 cfu/100 mL
		Leidy	6/21/04	Non-detect
			7/6/05	Non-detect
		Perry Aiken	6/22/04	Non-detect
			7/6/05	40 cfu/100mL
		Trail	7/7/05	Non-detect
Temperature	Nov.-Apr. : ≤13°C May-Jun. : ≤17°C Jul.-Oct.:≤23°C ΔT ≤2°C	Indian	4/9/03	10° C
			6/21/04	12.26° C
			7/6/05	12.1° C
		Leidy	4/9/03	9° C
			6/21/04	15.95° C
			7/6/05	14.45° C
		Perry Aiken	6/22/04	15.1° C
			7/6/05	16.82° C
		Trail	4/9/03	6° C
			6/28/04	7.5° C
			7/7/05	7.5° C
Dissolved Oxygen	Nov.-May: :≥6.0 Jun.-Oct. : ≥5.0	Indian	4/9/03	9.7 mg/L
			6/21/04	10.39 mg/L
			7/6/05	9.49 mg/L
		Leidy	4/9/03	10.8 mg/L
			6/21/04	9.74 mg/L
			7/6/05	12.9 mg/L
		Perry Aiken	6/22/04	10.97 mg/L
			7/6/05	12.6 mg/L
		Trail	4/9/03	14 mg/L
			7/7/05	9.56 mg/L
Ammonia (as nitrogen)	Depends on pH	Perry Aiken	6/22/04	Non-detect
			7/6/05	Non-detect
		Trail	4/9/03	Non-detect
			6/28/04	Non-detect

STANDARDS OF WATER QUALITY
Chiatovich, Indian and Leidy Creeks
From NAC 445A.171

PARAMETER	REQUIREMENTS TO MAINTAIN EXISTING HIGHER QUALITY	WATER QUALITY STANDARDS FOR BENEFICIAL USES	BENEFICIAL USES
Temperature °C- Maximum ΔT^a	 $\Delta T = 0°C$	Nov.-Apr. : ≤13°C May-Jun. : ≤17°C Jul.-Oct. : ≤23°C $\Delta T \leq 2°C$	Aquatic life[b] and recreation involving contact with the water.
pH Units	—	S.V. : 6.5 - 9.0 ΔpH : ±0.5 Max.	Recreation involving contact with the water,[b] propagation of wildlife,[b] aquatic life, irrigation, watering of livestock, municipal or domestic supply and industrial supply.
Total Phosphates (as P) - mg/l	A-Avg. : ≤.04 S.V. : ≤.06	A-Avg. : ≤0.1 —	Aquatic life,[b] recreation involving contact with the water,[b] municipal or domestic supply and recreation not involving contact with the water.
Nitrogen Species (N) - mg/l	Total Nitrogen A-Avg. : ≤.6 S.V. : ≤.8	Nitrate S.V. : ≤10 Nitrite S.V. : ≤.06	Municipal or domestic supply,[b] aquatic life,[b] recreation involving contact with the water, watering of livestock, propagation of wildlife and recreation not involving contact with the water.
Total Ammonia (as N) - mg/l	—	e	Aquatic life.[b]
d Dissolved Oxygen - mg/l	 — —	S.V. : Nov.-May : ≥6.0 Jun.-Oct. : ≥5.0	Aquatic life,[b] recreation involving contact with the water, propagation of wildlife, watering of livestock, municipal or domestic supply and recreation not involving contact with the water.
Suspended Solids - mg/l	 —	S.V. : ≤25	Aquatic life.[b]
Turbidity - NTU	—	S.V. : ≤10	Aquatic life[b] and municipal or domestic supply.
Color - PCU	—	c	Aquatic life[b] and municipal or domestic supply.
Total Dissolved Solids - mg/l	A-Avg. : ≤50 S.V. : ≤60	A-Avg. : ≤500 —	Municipal or domestic supply,[b] irrigation and watering of livestock.
Chlorides - mg/l	A-Avg. : ≤2 S.V. : ≤3	— S.V. : ≤250	Municipal or domestic supply,[b] propagation of wildlife, irrigation and watering of livestock.
Sulfate - mg/l	A-Avg. : ≤4 S.V. : ≤5	— S.V. : ≤250	Municipal or domestic supply.[b]
Sodium - SAR	A-Avg. : ≤1	A-Avg. : ≤8	Irrigation[b] and municipal or domestic supply.
Alkalinity (as $CaCO_3$) - mg/l	—	less than 25% change from natural conditions	Aquatic life[b] and propagation of wildlife.
Fecal Coliform- No./100ml	A.G.M. : ≤100 S.V. : ≤200	≤200/400[d]	Recreation involving contact with the water,[b] recreation not involving contact with the water, municipal or domestic supply, irrigation, propagation of wildlife and watering of livestock.
E. coli - No./100ml Annual Geometric Mean Single Value	 — —	 ≤126 ≤410	Recreation involving contact with the water[b] and recreation not involving contact with the water.

a. Maximum allowable increase in temperature above water temperature at the boundary of an approved mixing zone, but the increase must not cause a violation of the single value standard.
b. The most restrictive beneficial use.
c. Increase in color must not be more than 10 PCU above natural conditions.
d. Based on the minimum of not less than 5 samples taken over a 30-day period, the fecal coliform bacterial level may not exceed a geometric mean of 200 per 100ml nor may more than 10 percent of the total samples taken during any 30-day period exceed 400 per 100ml.
e. The ambient water quality criteria for ammonia are specified in NAC 445A.118.

Appendix B. Applicable Best Management Practices

Best Management Practices for Livestock Grazing Activities

From "Water Quality Management for Forest System Lands in California", Forest Service Region 5, September 2000

1. Range Analysis and Planning (PRACTICE: 8-1)

a. Objective: Safeguard water quality potentially affected by livestock grazing activities.

b. Explanation: An analysis of existing range condition and other resource values will be conducted by an IDT to evaluate the potential grazing capability on an allotment. Based on this Environmental Assessment and the Forest Land and Resource Management Plan (LRMP), the responsible Forest Officer in coordination with the permittee prepares a written Allotment Management Plan.

Allotment Management Plans include measures to protect other resource values, such as water quality, and to coordinate livestock grazing with other resource uses. Structural and non-structural range improvements will be specified in the plan when needed to improve the range resource or protect other resource values, such as water quality. Monitoring practices and locations are outlined in the plan to determine the effectiveness of LRMP standards and guidelines and trend toward desired conditions.

Annual operating instructions are issued to the permittee each year to implement the Allotment management Plan and to account for current allotment conditions and trends. The amount of livestock use is determined primarily by annual monitoring of compliance with LRMP standards and guidelines and other requirements developed through the environmental assessment. Allowable use is considered to be the use which maintains range productivity and soil and watershed stability.

c. Implementation: The District Ranger will be responsible for analysis of range allotments, determining the need for environmental evaluation and documentation and the preparation of Allotment Management plans.

The Forest Supervisor or District Ranger will approve the Allotment Management Plans. Allotment Management plans will be revised as outlined in the allotment schedule required under the Rescission Act of 1995 (PL 104-19, Section 504(A)).

Annual operating instructions will be prepared, or revised annually to allow for current allotment conditions and trends, and to incorporate direction in allotment management plans. The permittee carries out the plans under the immediate direction and supervision of the District Ranger, or the district Range Officer. Enforcement action will be taken where a permittee does no comply with

grazing permit requirements and conditions, and has not received approval to deviate from permit provisions.

2. Grazing Permit System (PRACTICE: 8-2)

a. Objective: Safeguard water quality potentially affected by livestock grazing activities.

b. Explanation: A grazing permit is used to authorize livestock grazing on NFS lands. The LRMP standards and guidelines, Allotment Management Plan and annual operation instructions are a part of the permit terms and conditions. Administration of the permit includes monitoring and enforcement of the permit terms and conditions. Routine field checks include:

1. Range readiness evaluations to assure that the soil is not too wet and that sufficient forage growth has occurred.
2. Stock checks to assure that only permitted livestock enter the allotment, the allotment is occupied only within the permitted time period, and use occurs only within the approved areas within the allotment.
3. Monitoring of standards and guidelines attainment which includes measuring forage utilization, riparian vegetation impacts, and condition of streambanks.

If during the course of monitoring and periodic assessments a problem is found in meeting the standards and guidelines on a consistent basis, a range of actions are available to solve the problem. Actions might include adjusted livestock numbers and/or season of use, installing fences and water developments, etc.

When there is intentional noncompliance with the terms and conditions of the permit, enforcement is necessary and will be applied as outlined in our Forest Service handbooks. Enforcement actions will be commensurate with the severity of violation. Actions can vary from a letter of warning, permit suspension or permit cancellation.

c. Implementation: Allotments will be administered by the District Ranger, assuring that permit provisions are carried out by the grazing permittee as required.

The Forest Supervisor or District Ranger will approve grazing permits and allotment management plans. Field checks and measurements will be made annually by the Forest Service. The permit will be modified, cancelled or suspended in whole or in part as needed to ensure proper use of the range resource and protection of other resources, such as water quality.

3. Rangeland Improvements (PRACTICE: 8-3)

a. Objective: Safeguard water quality potentially affected by livestock grazing activities.
b. Explanation: Rangeland improvements are generally designed to improve on the use of the range vegetation by livestock or provide protection to sensitive areas. They may consist of simply

providing protection to sensitive areas. They may consist of simply providing rest through rotation grazing, or fencing, or lighter grazing use by changing the season of use, or by adjusting the kind, class, or number of permitted livestock.

Other measures may include stream channel stabilization efforts such as riprapping, gully plugging, and planting, or mechanical treatments such as pitting, chiseling, or furrowing.

Water developments are often included in rangeland improvement projects. Improvement efforts will be designed to include range resources to produce at or near optimum potential for sustained forage production for livestock and to provide protection to the other resources.

c. Implementation: The District Ranger will assure that the permittee is involved as a cooperator in rangeland improvements and as appropriate, completes the work under Forest Service direction This work includes both construction and maintenance of improvements. Implementation may also be done by Forest Service crews, or contractors.

Range improvement needs will be recognized to the fullest extent possible in the range allotment planning process and will be scheduled for implementation in the allotment plan.

Results of watershed conditions assessments developed by an IDT will be used in development of range improvement treatments and programs.

ANNOTATED BIBLIOGRAPHY FOR ANALYSES OF RANGE WATER-QUALITY EFFECTS:

Selected references for use in Hydrology Reports

Prepared 10/15/2010

Barry Hill, Regional Hydrologist

BACKGROUND

The USFS has the responsibility to complete range NEPA according to the Recission Act Schedule established by Congress. Livestock grazing on public lands remains one of the most controversial and emotional issues we face on the national forests, and appeals and litigation may impede our progress in completing range NEPA. The responsibility of the forest IDT is to present credible allotment-specific information and relate that information to the available science to allow an accurate assessment of the alternative actions considered in the NEPA process. This annotated bibliography is provided to Forest IDTs that are preparing hydrology reports for range NEPA to help identify and use the "best available science" to determine the likely effects of alternatives on water quality.

This annotated bibliography includes only a small fraction of the available literature. A more complete list of references provided by the Regional Rangeland Program Manager is pasted at the end of this document, and a thorough literature review is provided in the attached 1999 Sierra Nevada Ecosystems Project report prepared by University of California scientists.

Livestock grazing has the potential to adversely affect water resources on national forest resources through consumption of browse species, trampling of soil, and deposition of wastes in and near streams. These actions can result in increased runoff and erosion, increased water temperatures, increased concentrations of nutrients and bacteria, and changes to stream morphology, which can in turn adversely affect beneficial uses of water.

The degree to which livestock grazing actually affects beneficial uses in any allotment depends both on site characteristics and the effectiveness of allotment management. This highlights the need for credible site-specific data in addition to consideration of the "best available science."

Range management on NFS lands is required by law to meet the provisions of the Clean Water Act. In California, compliance with the Clean Water Act is achieved through adherence to water-quality objectives of the Regional Water Quality Control Board basin plans. The available literature shows that management practices can greatly reduce adverse water-quality effects of livestock grazing. The range NEPA document should explicitly address the Best Management Practices that will be employed to protect water quality. Literature documenting the effectiveness or lack of effectiveness of various BMPs is summarized below. These references should be cited as appropriate in range NEPA documents.

Publication in a refereed journal does not necessarily guarantee that the conclusions of an article are fully supported by the data presented or the previous literature cited. The published literature on water-quality effects of livestock grazing includes some articles that have strong anti-grazing biases and

EXHIBIT 5

that make conclusions that are not fully supported by data (see attached review by UC scientists from the Sierra Nevada Ecosystems Project, 1999). I have highlighted a few articles with apparent anti-grazing biases below. Forest IDTs should look carefully at the literature cited in comments and appeals to determine its validity.

WATERSHED HYDROLOGY AND EROSION

A large body of literature exists on the effects of livestock grazing on infiltration, runoff, and erosion. Results have generally shown that grazing with high stocking rates and long seasons of use decreases infiltration, increases overland runoff, and increases surficial erosion. Less intense grazing has much less significant effects.

For range NEPA, cumulative watershed effects analysis will provide a broad assessment of potential effects. Site-specific data on channel conditions (SCI protocol) and hillslope infiltration rates are recommended. Results from the regional rangeland riparian monitoring project should be cited if any monitoring sites are located within allotment boundaries.

A review of all the available literature on this subject is not attempted here. Many review articles are available, including some that have a definite anti-grazing bias. Some of the more useful review articles are:

Jones, Allison, 2000, Effects of cattle grazing on North American arid ecosystems: a quantitative review: Western North American Naturalist 60(2): 155-164.

Kauffman, J.B., and Krueger, W.C., 1984, Livestock impacts on riparian ecosystems and streamside management implications...a review: Journal of Range Management 37(5):430-437.

Trimble, S. W., and Mendel, A.C., 1995, The cow as a geomorphic agent: Geomorphology 13: 233-253.

CHANNEL INCISION (GULLY EROSION, MEADOW INSTABILITY)

The role of livestock in initiating channel incision in alluvial valleys in the western United States is the subject of one of the longest lasting controversies in American geomorphology. The most famous geomorphologists of the past century have debated the issue fiercely, with no resolution. Although livestock grazing has probably contributed to channel incision in some and possibly many cases, the effects of grazing are very difficult to separate from those of other land uses such as construction of roads, railroads, and ditches, and climatic variability. Cattle have sufficient weight to compress meadow soils, which can destroy the natural meadow sod that protects meadows from erosion. On the other hand, most major gullies in the meadows of the Sierra Nevada did not develop until decades after livestock numbers peaked, suggesting that grazing was not necessarily the primary factor in channel incision.

For range NEPA, forest IDTs should review air photos, ground photos, range condition reports, and monitoring data to evaluate if current levels of grazing are causing initiation of gullies or headcut retreat.

Ratliff, R.D., 1985, Meadows in the Sierra Nevada of California: state of knowledge: USDA-Forest Service Pacific Southwest Forest and Range Experiment Station General Technical Report PSW-84, 52 pp.

Reviews scientific information relevant to Sierra Nevada meadows and attributes erosion to both natural processes and overgrazing.

Wood, S.H., 1975, Holocene stratigraphy and chronology of mountain meadows, Sierra Nevada, California: USDA-Forest Service Earth Surface Monograph 4, Pacific Southwest Region.

Documents the initiation of major gullies in meadows in the central and southern Sierra Nevada, showing that almost all gullies developed decades after peak livestock numbers.

Cooke, R.U., and Reeves, R.W., 1976, Arroyos and environmental changes in the American Southwest, Oxford University Press, 213 pp.

The study area used in this study includes meadows in southern and central coastal California, including some on national forests. Its importance is primarily in showing that channel incision of alluvial valley deposits cannot be clearly linked to livestock grazing, and may be related to a combination of factors, including grazing and other land uses, climate change, and intrinsic geomorphic thresholds. This book cites most of the early "classic" geomorphology literature on the "arroyo problem" that is essentially the same as the "meadow instability problem" on Sierra Nevada national forests.

BACTERIAL CONTAMINATION

This issue has been highlighted recently by media coverage. The Region, in response to adverse publicity, has initiated a study of fecal indicator bacteria in streams on national forest system lands. However, we will rarely have site-specific fecal indicator data for range NEPA. Therefore, forest IDTs should cite available data from our current study (results are currently available for some allotments on the STF) and previous studies (see publications listed below), report allotment-specific monitoring results for vegetative and fecal pat monitoring, and relate allotment-specific monitoring data to results of our current and previously published data. For example, the literature shows that vegetative buffer strips substantially reduce transport of bacteria to streams, so forest IDTs should report stubble height data and infer effectiveness in filtering bactera.

Buckhouse, J.G., and Gifford, G.F., 1976, Water quality implications of cattle grazing on a semiarid watershed in Southeastern Utah: Journal of Range Management 29(2):109-113.

No significant changes in total or fecal coliform production were observed when cattle were allowed to graze a rested pasture in Utah. Stocking rate was 0.5 AUM per hectare, or roughly 0.2 AUM/acre. Runoff was artificially generated from plots and sampled for TC and FC. Paper does not note whether a riparian zone was included in the pasture. Authors concluded that grazing at this level of use did not constitute a public health hazard.

Derlet, R.W., Carlson, J.R., and Noponen, M.N., 2004, Coliform and pathologic bacteria in Sierra Nevada National Forest wilderness area lakes and streams: Wilderness and Environmental Medicine 15: 245-249.

Derlet, R.W., and Carlson, J.R., 2006, Coliform bacteria in Sierra Nevada wilderness lakes and streams: what is the impact of backpackers, pack animals, and cattle?: Wilderness and Environmental Medicine 17: 15-20.

Derlet, R.W., Ger, K.A., Richards, J.R., and Carlson, J.R., 2008, Risk factors for coliform bacteria in backcountry lakes and streams in the Sierra Nevada mountains: a 5-year study: Wilderness and Environmental Medicine 19: 82-90.

The 3 studies listed above by Derlet and coauthors were highlighted in the news media and will be cited by many appellants. We have identified several significant concerns with sample site selection and characterization, sample collection and processing procedures, and data analysis. For example, some of the sites described in the articles as "heavily grazed" had been rested for years before the sampling dates. Given the high profile of these articles, Forest IDTs are encouraged to contact the Regional Range Program Leader and Hydrologist for assistance in dealing with comments on NEPA documents related to these articles.

Edwards, D.R., Coyne, M.S., Vendrell, P.F., Daniel, T.C., Moore, P.A., Jr., and Murdoch, J.F., 1997, Fecal coliform and streptococcus concentrations in runoff from grazed pastures in Northwest Arkansas: Journal of the American Water Resources Association 33(2):413-422.

No consistent relationships between fecal coliform or fecal streptococcus bacteria concentrations and the presence of cattle were found in a 3-year study of 4 pastures in Arkansas. Bacterial concentrations were determined in runoff from plots.

Hussey, M.R., Skinner, Q.D., and Adams, J.C., 1986, Changes in bacterial populations in Wyoming mountain streams after 10 years: Journal of Range Management 39(4):369-370.

Bacterial concentrations in streams in Wyoming remained relatively constant during a ten-year period with little change in land uses, which included livestock grazing.

Meays, C.L., Broersma, Klaas, Nordin, Rick, and Mazumder, Asit, 2005, Survival of Escherichia coli in beef cattle fecal pats under different levels of solar exposure: Rangeland Ecology and Management 58(3):279-283.

Time and solar radiation after deposition decreased levels of E. coli in cattle feces. E. coli populations decreased more rapidly in feces deposited in unshaded pastures. In these unshaded pastures, fecal concentrations dropped rapidly within 7 days of deposition and decreased to very low levels within 24 days.

Rockwell, G.L., and Honeywell, P.D., 2004, Water-quality data for selected stream sites in Bridgeport Valley, Mono County, California, April 2000 to June 2003: U.S. Geological Survey Data Series 89, 35 pp.

This study of water quality includes data on fecal coliform concentrations at sites within and downstream of grazing allotments on the Humboldt-Toiyabe NF in California. Very few samples were collected at the sites farthest upstream, and these all showed very low FC concentrations with no exceedance of Regional Board objectives. FC concentrations increased at sites farther downstream, but still on NFS lands. These downstream sites were generally downstream of campgrounds as well as allotments. FC concentrations at these sites sometimes exceeded the Lahontan Regional Board objective of 20 CFU/100 mL, but did not exceed the EPA recommended level of 200 CFU/100 mL necessary for protection of the recreational contact beneficial use. FC concentrations above 200 CFU/100 mL were frequently found farther downstream, below private pastures.

Sovelli, L.A., Vondracek, Bruce, Frost, Julia A., and Mumford, K.G., Impacts of rotational grazing and riparian buffers on physicochemical and biological characteristics of Southeastern Minnesota, USA, streams: Environmental Management 26(6): 629-641.

FC concentrations were higher under continuously grazed than rotationally grazed sites.

Tate, K.W., Atwill, E.R., George, M.R., McDougald, N.K., and Larsen, R.E., 2000, *Cryptosporidium parvum* transport from cattle fecal deposits on California rangelands: Journal of Range Management 53(3):295-299.

Oocysts of Cryptosporidium parvum, a protozoan pathogen, were found to be transported from cattle feces into overland runoff for distances of up to 1 m. Transport of oocysts was related to topographic slope. The study did not determine if oocysts are transported for distances greater than 1 m.

Tiedemann, A.R., Higgins, D.A., Quigley, T.M., Sanderson, H.R., and Marx, D.B., 1987, Responses of fecal coliform in streamwater to four grazing strategies: Journal of Range Management 40(4):322-329.

Results of this study show that the presence of cattle increased concentrations of FC. However, with the excepted of a fertilized, seeded, and thinned pasture, almost all FC concentrations were below the EPA standard of 200 CFS/100 mL, and all geometric mean concentrations fell below this standard. The study also showed that livestock distribution helped reduce FC concentrations, and that relatively high FC concentrations persisted through the winter after cattle were removed. This article was cited by Belsky and others (1999, see below) as evidence for increased risk for human health.

Tiedemann, A.R., Higgins, D.A., Quigley, T.M., Sanderson, H.R., and Bohn, C.C., 1988, Bacterial water quality responses to four grazing strategies—comparison with Oregon standards: Journal of Environmental Quality 17(3):492-498.

Concentrations of FC and FS were compared between 4 management strategies, which included no grazing, grazing without management for livestock distribution, grazing with management for livestock distribution, and grazing with management for livestock distribution and practices to increase forage (fertilization, seeding, and thinning). Concentrations of FC were lower under no grazing and grazing with management for livestock distribution than under grazing with management for livestock distribution and practices to increase forage. Differences between other strategies, including differences between

no grazing and the two grazing strategies that did not include fertilization, were not significant. The only violations of the Oregon water-quality standard, which is the same as the EPA standard for recreational contact waters and the Central Valley Regional Board objective (200 CFU/100 mL) occurred in pastures that were fertilized.

NUTRIENTS, SEDIMENT, WATER TEMPERATURE, AND AQUATIC BIOTA

Only a few of the many previous studies are listed below. Although livestock grazing has potential for increased nutrient and sediment concentrations and higher water temperatures, the actual impacts to aquatic biota and habitat are related both to site characteristics and grazing management.

Campbell, C.G., and Allen-Diaz, Barbara, 1997, Livestock grazing and riparian habitat water quality: an examination of oak woodland springs in the Sierra foothills of California: USDA Forest Service General Technical Report PSW-GTR-160, p. 339-346.

Intensity of grazing treatments was not significantly related to measured concentrations of nutrients, dissolved oxygen, water temperature, or pH. No bacterial data were collected in this study in the oak woodland Sierra Nevada foothills.

Lewis, D.J., Singer, M.J., Dahlgren, R.A., and Tate, K.W., 2006, Nitrate and sediment fluxes from a California rangeland watershed: Journal of Environmental Quality 35:2202-2211.

This study presents results of a long-term water-quality monitoring effort on rangelands in the northern Sierra Nevada foothills. No relationships between grazing strategies or stocking rates and water quality are described.

Matthews, K.R., 1996, Diel movement and habitat use of California golden trout in the Golden Trout Wilderness, California: Transactions of the American Fisheries Society 125: 78-86.

No differences in water temperature, trout home ranges, or trout movements were observed between stream reaches within and outside of cattle exclosures. This study was, however, cited by Belsky and others (1999, see below) as evidence for higher water temperatures and other adverse impacts on trout habitat.

WILDLIFE

Allen-Diaz, Barbara, and Jackson, R.D., 2005, Herbaceous responses to livestock grazing in California oak woodlands: a review for habitat improvement and conservation potential: USDA Forest Service General Technical Report PSW-GTR-195, 18 pp.

This report reviews grazing impacts on wildlife habitat in oak woodlands, and concludes that grazing can inprove habitat for species including burrowing owls and kit foxes.

MANAGEMENT STRATEGIES

The studies listed below indicate that standard BMPs, including water developments, salting, fencing, and herding, can be very effective in some circumstances for reducing impacts of livestock grazing. Some innovative techniques that have not been widely used to date include cattle training and selection. Note that some studies listed show that BMPs, including cattle exclusion, were not effective in protecting water quality.

Agouridis, C.T., Workman, S.R., Warner, R.C., and Jennings, G.D., 2005, Livestock grazing management impacts on stream water quality: a review: Journal of the American Water Resources Association, June 2005, p. 591-606.

This review concludes that little research is available to demonstrate effectiveness of most range BMPs. Most previous research has focused on cattle exclusion and fencing and very little information is available for potential benefits of other means of limiting impacts to water quality.

Huber, S.A., Judkins, M.B., Krysl, L.J., Svejcar, T.J., Hess, B.W., and Holcombe, D.W., 1995, Cattle grazing a riparian meadow: effects of low and moderate stocking density on nutrition, behavior,diet selection, and plant growth response: Journal of Animal Science 73:3752-3765.

Stocking rates on Sierra Nevada meadows during a drought year were inversely related to time spent by cattle in streamside areas within pastures.

Kauffman, J.B., and Krueger, W.C., 1984, Livestock impacts on riparian ecosystems and streamside management implications...a review: Journal of Range Management 37(5):430-437.

Intensive livestock management by permittees was found to be the most successful approach to riparian grazing on public lands.

Larsen, R.E., Miner, J.R., Buckhouse, J.C., and Moore, J.A., 1994, Water-quality benefits of having cattle manure deposited away from streams: Bioresource Technology 48: 1113-118.

Vegetative buffer strips as narrow as 0.6 m were effective in greatly reducing the transport of FC to streams from cattle manure piles. Bacterial loads were reduced by 95% by 2.13 m buffer strips, and 83% by 0.6 m buffer strips.

Miner, J.R., Buckhouse, J.C., Moore, J.A., 2010, Will a water trough reduce the amount of time hay-fed livestock spend in the stream (and therefore improve water quality)?: Rangelands 14(1):35-38.

The amount of time that hay-fed cattle spent in a stream in Central Oregon was reduced about 90% by the construction of a watering trough.

Nader, Glenn, Tate, K.W., Atwill, Robert, and Bushnell, James, 1998, Water quality effect of rangeland beef cattle excrement: Rangelands 20(5): 19-25.

Results of previous studies attempting to determine the significance of cattle as a pathogen source have been inconclusive. Range water quality can be effectively managed through adequate spatial distribution of cattle using techniques including salting, water developments, fencing, training, and cattle selection.

Ranganath, S.C., Hession, W.C., and Wynn, T.M., 2009, Livestock exclusion influences on riparian vegetation, channel morphology, and benthic macroinvertebrate assemblages: Journal of Soil and Water Conservation 64(1):33-42.

Livestock exclusion along short stream reaches in Southwestern Virginia resulted in improvements to stream geomorphology and riparian vegetation, but not macroinvertebrates. BMPs, when implemented over short reaches, did not appear to be effective in protecting or improving resources.

Sulak, Adriana, and Huntsinger, Lynn, 2007, Public lands grazing in California: untapped conservation potential for private lands?: Rangelands, June 2007, p. 9-12.

Public lands grazing is important in maintaining private rangelands in pastoral use rather than converting to urban development.

Tate, K.W., Atwill, E.R., McDougald, N.K., and George, M.R., 2003, Spatial and temporal patterns of cattle feces deposition on rangeland: Journal of Range Management 56: 432-438.

Fecal deposition by cattle in the southern foothills of the Sierra Nevada was found to be significantly influenced by livestock "attractants" (troughs, salt, etc.) and by topography and season. Fecal loading was higher on ridges than valley bottoms.

EXAMPLES OF PUBLISHED ARTICLES WITH APPARENT ANTI-GRAZING BIASES

Belsky, A.J., Matzke, A., and Uselman, S., 1999, Survey of livestock influences on stream and riparian ecosystems in the western United States: Journal of Soil and Water Conservation vol. 54, p. 419-431.

This review has a strongly anti-grazing bias, and makes conclusions that are not supported by the studies it cites. For example:

1. Tiedeman and others (1987; see above) is cited as evidence for increased risk to human health, when results from the Tiedemann study, with the exception of a fertilized pasture, fell below the EPA standard for recreational contact waters.
2. Matthews (1996; see above) is cited as evidence for increased water temperature as a result of grazing, when Matthews actually reports no significant difference in temperatures within and outside an exclosure.
3. Ponce and Lindquist (1990) are cited as evidence of decreased water storage resulting from grazing. This article discusses livestock grazing in a negative way, but offers no data or new evidence related to effects on water storage, and concludes that "Sound range management is a viable management strategy for baseflow augmentation (p. 264)."

4. Knapp and Matthews (1996; see below) is cited as evidence for lower groundwater tables and narrowing of riparian zone, which are not conclusions of the study.

Knapp, R.A., and Matthews, K.R., 1996, Livestock grazing, golden trout, and streams in the Golden Trout wilderness, California: impacts and management implications: North American Journal of Fisheries Management 16: 805-820.

This study, conducted with support and participation from PSW, is another example of anti-grazing conclusions that are not supported by the data presented. The major conclusion of the study is that "current levels of livestock grazing are degrading the stream and riparian components of the study meadows to the detriment of golden trout populations (p. 805)." The study results show that canopy shading, stream depth, bank-full heights, and stream widths differed between stream reaches in and out of exclosures on the Kern Plateau, Inyo N.F. However, the authors acknowledge that channel depths and widths may have been different before the exclosures were built. They offer no data to evaluate whether this was the case or not. The authors cite results that show lower fish densities and biomass per unit streambed area outside exclosures, but admit that fish densities and biomass per unit stream length were not consistently different between reaches in and out of exclosures and explain that the differing results are due to greater stream widths outside exclosures (which they acknowledged may have been wider before exclosure construction). These results do not support the conclusion that current grazing is negatively affecting trout populations, particularly in view of the finding that "the California golden trout populations in our study sites were among the densest ever reported for trout in the western United States (p. 818)..."

Kondolf, G.M., 1993, Lag in stream channel adjustment to livestock exclosure, White Mountains, California: Restoration Ecology 1(4): 226-230.

This study examined a stream channel on the Inyo NF where cattle had been excluded for 24 years. The study found that channel widths within and outside the exclosure were not significantly different. The study attributed the lack of a difference in channel widths to reduced infiltration, increased overland flow, and increased erosion in the watershed upstream of the exclosure, but did not present any evidence that these effects had actually occurred in this allotment. Neither did the study evaluate whether channel width had been increased above "natural" width prior to construction of the exclosure. Rather than conclude that the widths of channels protected from cattle are no different than widths of channels exposed to cattle, the study concluded that channel "recovery" would be possible only if cattle were eliminated from the entire watershed.

For a useful critique of studies that rely on cattle exclosures, including some review articles with anti-grazing biases, see:

Sarr, D.A., 2002, Riparian livestock exclosure research in the Western United States: a critique and some recommendations: Environmental Management 30(4):516-526.

Scientific literature that discusses the link between domestic livestock grazing and water quality, provided by Regional Range Program Manager Anne Yost:

1. Xunde L., E.R. Atwill, L.A. Dunbar, and K.W. Tate. 2010. Effect of daily temperature fluctuation during the cool season on the infectivity of *Cryptosporidium parvum*. Applied and Environmental Microbiology. 76:989-993.
2. Lewis, D.J., E.R. Atwill, M.S. Lennox, M.D.G. Pereira, W.A. Miller, P.A. Conrad, and K.W. Tate. 2009. Reducing Microbial Contamination in Storm Runoff from High Use Areas on California Coastal Dairies. Water Science and Technology. 60: 1731-1743.
3. Miller, W.A., D.J. Lewis, M.D.G. Pereira, M. Lennox, P.A. Conrad, K.W. Tate, and E.R. Atwill. 2008. Farm factors associated with reducing *Cryptosporidium* loading in storm runoff from dairies. J. Environmental Quality. 37:1875-1882.
4. Knox, A.K, R.A. Dahlgren, K.W. Tate, and E.R. Atwill. 2008. Efficacy of Flow-Through Wetlands to Retain Nutrient, Sediment, and Microbial Pollutants. J. Environmental Quality. 37:1837-1846.
5. Knox, A.K., K.W. Tate, R.A. Dahlgren, and E.R. Atwill. 2007. Management Reduces *E. coli* in Irrigated Pasture Runoff. California Agriculture. 61:159-165.
6. T. Harter, E.R. Atwill, L. Hou, B.M. Karle, K.W. Tate. 2007. Developing Risk Models of *Cryptosporidium* Transport in Soils from Vegetated, Tilted Soil Box Experiments. J. Environmental Quality. 37:245-258.
7. Hesson, S., D.S. Ahearn, R.A. Dahlgren, and K.W. Tate. 2006. Water Quality During Pulse Flood Flow Releases on the Mokelumne River, California. Regulated Rivers. 23:185-200.
8. D.J. Lewis, M.J. Singer, R.A. Dahlgren, and K.W. Tate. 2006. Nitrate and Sediment Fluxes from a California Rangeland Watershed. J. Environmental Quality. 35:2202-2211.
9. Searcy, K.E., A.I. Packman, E.R. Atwill, and T. Harter. 2006. Deposition of *Cryptosporidium* Oocysts in Streambeds. Applied and Environmental Microbiology. 72:1810-1816.
10. Tate, K.W., E.R. Atwill, J.W. Bartolome, and G.A. Nader. 2006. Significant *E. coli* Attenuation by Vegetative Buffers on Annual Grasslands. J. Environmental Quality. 35:795-805.
11. Atwill, E.R., K.W. Tate, M. Das Gracas C. Pereira, J.W. Bartolome, G.A. Nader. 2005. Efficacy of Natural Grass Buffers for Removal of *Cryptosporidium parvum* in Rangeland Runoff. J. Food Protection. 69:177-184.
12. Ahearn, D.S., R.W. Sheibley, R.A. Dahlgren, M. Anderson, J. Johnson, and K.W. Tate. 2005. Land Use and Land Cover Influence on Water Quality in the Last Free-Flowing River Draining the Western Sierra Nevada, California. J. Hydrology. 313:234-247.
13. Searcy, K.E., A.I. Packman, E.R. Atwill, and T. Harter. 2005. Association of *Cryptosporidium parvum* with Suspended Particles: Impact on Oocyst Sedimentation. Applied and Environmental Microbiology. 71:1072-1078.
14. X. Li, E. R. Atwill, L. A. Dunbar, T. Jones, J. Hook, and K.W. Tate. 2005. Seasonal Temperature Fluctuation Induces Rapid Inactivation of *Cryptosporidium parvum*. Environmental Science and Technology. 39:4484-4489.
15. Lewis, D.J., E.R. Atwill, M. S. Lennox, L. Hou, B. Karle, and K.W. Tate. 2005. Linking On-Farm Dairy Management Practices to Storm-Flow Fecal Coliform Loading for California Coastal Watersheds. Environmental Monitoring and Assessment. 107:407-425.
16. Tate, K.W., M. Das Gracas C. Pereira, and E.R. Atwill. 2004. Efficacy of Vegetated Buffer Strips for Retaining *Cryptosporidium parvum*. J. Environmental Quality. 33:2243-2251.
17. Atwill, E.R., R. Phillips,M. Das Gracas C. Pereira, Xunde Li, and B. McCowan. 2004. Seasonal Shedding of Multiple Cryptosporidium Genotypes in California Ground Squirrels (*Spermophilus beecheyi*). Applied and Environmental Microbiology. 70:6748-6752.
18. Tate, K.W., E.R. Atwill, N.K. McDougald, M.R. George. 2003. Spatial and Temporal Patterns of Cattle Feces Deposition on Rangeland. J. Range Management. 56:432-438.
19. Atwill, E.R., B. Hoar, M. das G.C. Pereira, K.W. Tate, F. Rulofson, and G. Nader. 2003. Improved Quantitative Estimates of Low Environmental Loading and Sporadic Periparturient Shedding of *Cryptosporidium parvum* in Adult Beef Cattle. Applied and Environmental Microbiology. 68:4604-4610.
20. Atwill, E.R., L. Hou, B.M. Karle, T. Harter, K.W. Tate, R.A. Dahlgren. 2002. Transport of *Cryptosporidium parvum* Oocysts through Vegetated Buffer Strips and Estimated Filtration Efficiency. Applied and Environmental Microbiology. 68:5517-5527
21. Atwill, E.R., S. Maldonado Camargo, R. Phillips, L. Herrera Alonso, K.W. Tate, W.A. Jensen, J. Bennet, S. Little, and T.P. Salmon. 2001. Quanitative Shedding of Two Genotypes of *Cryptosporidium parvum* in California Ground Squirrels. Applied and Environmental Microbiology. 67:2840-2843.

22. Hoar, B.R., E.R. Atwill, C. Elmi, and T.B. Farver. 2001. An examination of risk factors associated with beef cattle shedding pathogens of potential zoonotic concern. Epidemiology and Infection. 127:1:147-155
23. Tate, K.W., E.R. Atwill, M.R. George, N.K. McDougald, and R.E. Larsen. 2000. *Cryptosporidium parvum* Transport from Cattle Fecal Deposits on California Rangeland Watersheds. J. Range Management. 53:295-299.
24. Harter, T, S. Wagner, and E.R. Atwill. 2000. Colloid Transport and Filtration of *Cryptosporidium parvum* in Sandy Soils and Aquifer Sediments. Environmental Science and Technology. 34:62-70.
25. Atwill, E.R., E.M. Johnson, M.D.C Pereria. 1999. Association of herd composition, stocking rate, and duration of calving season with fecal shedding of *Cryptosporidium parvum* oocysts in beef herds. J. American Veterinary Medical Association. 215:1833-1838.
26. Tate, K.W., R.A. Dahlgren, M.J. Singer, B. Allen-Diaz, and E.R. Atwill. 1999. On California Rangeland Watersheds: Timing, Frequency of Sampling Affect Accuracy of Water Quality Monitoring. California Agriculture. 53:44-48.
27. Atwill, E.R., et al. 1999. Age, geographic, and temporal distribution of fecal shedding of *Cryptosporidium parvum* oocysts in cow-calf herds American J. Veterinary Research. 60:420 -425.
28. Barry, S.J., E.R. Atwill, K.W. Tate, T.S. Koopmann, J. Cullor, T. Huff. 1998. Developing and Implementing a HACCP-Based Program to Control *Cryptosporidium* and Other Waterborne Pathogens in Alameda Creek Watershed: A Case Study. Proceedings of American Water Works Association. Dallas, TX.
29. Bray, R.E., S.J. Wickler, E.A. Cogger E.R. Atwill, C. London, J.L. Gallino, and T.P. Anderson. 1998. Endoparasite infection and *Cryptosporidium/Giardia* in feral horses on public lands. J. Equine Veterinary Science. 18: 41-43

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March 10, 2011

Harold J. Singer
Executive Officer
Regional Water Quality Control Board
Lahontan Region
2501 Lake Tahoe Boulevard
South Lake Tahoe, CA 96150

RE: Investigative Order No. R6V-2011-0009

Dear Mr. Singer:

On February 9, 2011, the Regional Water Quality Control Board, Lahontan Region, issued Investigative Order No. R6V-2011-0009 to the United States Forest Service, Inyo National Forest (Forest Service). On behalf of the Forest Service, I request that the administrative record for this Order be prepared and delivered to the State Water Resources Control Board.

Sincerely,

Rose Miksovsky
Staff Attorney

EXHIBIT 6

Table 1. Mileage and driving time from Bishop to sample sites, from sample sites to Mammoth, and from Mammoth back to Bishop.

From the White Mountain Ranger District, Bishop to:	Distance	Driving Time
Chiatovich Rd, road's end	83 miles	2 hours
Indian Ck (Rd 1S60)	81 miles	2 hours
Leidy Ck (Rd 2S74)	84 miles	2 hours
Perry Aiken Ck (near Dyer)	84 miles	1.5 hours (little driving time spent off highway)
From road's end access points to Mammoth Community Water District (MCWD)		
Chiatovich Rd	96 miles	2.5 hours
Indian Ck	94 miles	2.75 hours
Leidy Ck	97 miles	2.5 hours
Perry Aiken	97 miles	2.25 hours
From MCWD to Bishop	43 miles	1 hour

Table 2. Approximate hiking distances and times from parked vehicle (road's end).

Approximate hike in/out from parked vehicle	Distance	Hiking Time (one way)	Comments
North Fork Chiatovich Ck	1.5 miles	1.5 hours	No trail, very steep, rough terrain
South Fork Chiatovich Ck	1 mile	2+ hours	No trail, extremely steep, rough terrain, very difficult access.
Davis Ck	2.5+ miles	3+ hours	No trail, extremely steep, rough terrain; extremely difficult access
Indian Creek	N/A	N/A	Accessible from road
Cabin Creek	5 miles	3+ hours	No trail, hike overland with several very steep sections
Leidy Ck	N/A	N/A	Accessible from road
Busher Ck	7 miles	4+ hours	Hike from road's end (near Dyer) along trail next to Leidy Creek. There appears to be a trail according to a topo map, but steep trail. Condition/existence

			of trail is unknown
Perry Aiken Ck	2.5 miles	2 hours	No trail, extremely steep, rough terrain; follow creek upstream.

Table 3. Total travel time, mileage, and days for 1 sample site.

Location	Total work day	Driving miles	# of days needed	Notes
North Fork Chiatovich Ck	10 hours	222	2	*per diem
South Fork Chiatovich Ck	11+ hours	222	2	*per diem
Davis Ck	13+ hours	222	2	*per diem
Indian Creek	7 hours	218	1	
Cabin Creek	12+ hours	218	2	*per diem
Leidy Ck	7 hours	224	1	
Busher Ck	14+ hours	224	2	*per diem
Perry Aiken Ck	10 hours	224	2	*per diem
Totals		1774	14	
This table is for one round of sampling. This would occur six times.				

Table 4. Summary of totals

Item	Total	Comments

EXHIBIT 9

Trips	48	(8 sites each sampled 6 times)
Days of Sampling	84	(14 days for one round of sampling X 6 times)
Days of planning/reporting	5	
Total miles	10644	(1774 miles for one round of sampling* 6 times)
Employees	2	More employees could be used, but this will result in a similar number of sampling days (i.e., 2 employees for 78 days vs. 4 employees for 39 days)

Table 5. Summary of expenses

Item	Daily cost	Days (or number)	Total	Comments
GS-5 wage	138	84	11592	
GS-9 wage	190	89	16910	
Per diem	46	72	3312	(for two people, 12 nights * 6 rounds of sampling)
Lab test	33	48	1584	
Vehicle	(.68/mile)	10644	7237.92	
Total			**$40,635.92**	

Title of Study:

Livestock Management and Waterborne Microbial Pollutants on US Forest Service Grazing Allotments

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with
Lea Kromschroeder, UC Davis: Anne Yost, US Forest Service, Region 5: Crispin Holland, US Forest Service, Stanislaus NF: Scott Oneto, UC Cooperative Extension

Summary of results to date by Erin Lutrick
March 8, 2011

These are the results so far for the overall Research Project. The study is not in the Lahontan Region, but in the Central Valley WQCB Region. The fecal coliform standard there is, "based on a minimum of not less than five samples for any 30-day period shall not exceed a geometric mean of 200/100 ml, nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 400/100 ml." But, the results are discussed here in terms of the 20 cfu/100 ml standard because we would need to compare results to the Lahontan standard for these results to be a proxy and show that monitoring is not necessary in the Whites Allotments.

This study was instigated by Region 5 of the Forest Service to better understand water quality effects from grazing on National Forest Land and relationship between BMPs and water quality. The purpose was to have good research that could be used to help determine effects on other allotments across the region. Therefore, this research negates the need to monitoring water quality on the Whites Allotments themselves.

The study is not complete, and data exist only for 2010 for fecal indicator bacteria in three allotments on the Stanislaus National Forest. There are two separate pieces of the study in these allotments. In the first, they sampled 16 sites above and below intensely grazed, irrigated meadows. They show that C. parvum and Salmonella were present in more locations above meadows than below (5 above and 3 below for C. parvum and 12 above versus 2 below for Salmonella). E. coli 0157:H7 was found at no sites above grazed meadows but 6 sites below. However, the concentration of E.coli 0157:H7 was below the standard in 4 of those 6 samples.

Fecal coliforms were measured in 3 allotments, one with no grazing and two that were grazed in 2010. Results showed that in the ungrazed allotment (Eagle Meadow), fecal coliform levels were less than 20 cfu/100 ml in all 14 sample sites in September. In August, six of the 14 sites had values over 20 cfu/100 ml, and none were over the Central Valley WQCB standard of 200 cfu/100 ml.

EXHIBIT 8

In the Bell Meadow Allotment, with was grazed by 80 cows from 7/15-9/30, levels were over 20 cfu/100 ml at six of eight sampling sites on 8/18/10, with none over 200 cfu/100 ml. On 9/15/10, one of nine samples was over 200 cfu/100 ml. This sample had 580 cfu/100 ml. It was not at a location of general open land grazing, but within a cattle gathering pasture where there is a 100 ft water gap in the fence. One mile downstream on the same date, the value was 1 cfu/100 ml, suggesting no downstream persistence. Nutrient levels at this site (Nitrogen and Phosphorous) were all below levels of EPA Concern.

(This data indicates that there is likely very little correlation between fecal coliform levels in California, and 11 miles downstream, in Nevada, in the White Mountains Davis Creek Allotment)

In the Herring Creek Allotment, which was grazed by 50 cows from 7/15-9/30, fecal coliform was measured at 16 sites on 8/18/10, and results were over 20 cfu/100 ml at 5 sites. No samples had over 200 cfu/100 ml. On 9/15/10, two of 17 sites had values over 20 cfu/100 ml, with the highest at 58.

This study only occurred for one year, but shows that presence of livestock does not automatically lead to elevated fecal coliform in streams. Importantly, it showed that even when there are elevated fecal coliform levels, they do not persist downstream.

More sampling will be done through 2011 to complete the study. The Forest Service Region 5 is using this study to help understand grazing water quality effects across the region, and we will be using these results for our allotment planning and analysis as a proxy for our own monitoring.