



United States
Department of
Agriculture

Forest
Service

April 2006



Draft Environmental Impact Statement

Upper Strawberry Allotments Grazing EIS

Heber Ranger District
Uinta National Forest
Wasatch County, Utah



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**Upper Strawberry Allotments
Draft Environmental Impact Statement
Wasatch County, Utah**

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Abstract: The Heber Ranger District of the Uinta National Forest has prepared this Draft Environmental Impact Statement (DEIS) to disclose environmental effects of implementing grazing management standards on the Strawberry, West Daniels, and Twin Peaks Allotments. This DEIS was prepared in accordance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. The alternatives considered are: Proposed Action, Continuation of Current Management; and No Grazing.

Reviewers should provide the Forest Service with their comments during the review period of the DEIS. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decision-making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers' position and contentions. *Vermont Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519, 553 (1978). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement. *City of Angoon v. Hodel* (9th Circuit, 1986) and *Wisconsin Heritages, Inc. v. Harris*, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Comments on the draft environmental impact statement should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

Send Comments to: **Julie King, Deciding Official**
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Date Comments Must Be Received: **May 22, 2006**

SUMMARY

The Heber Ranger District of the Uinta National Forest has prepared this Draft Environmental Impact Statement (DEIS) to disclose environmental effects of implementing grazing management standards on the Strawberry, West Daniels, and Twin Peaks Allotments.

Affected Environment

The Project Area (Strawberry Allotment, West Daniels Allotment, and the Twin Peaks Allotment) is located approximately eight air miles south east of Heber City, Utah. The area includes 25,169 acres of National Forest System (NFS) lands administered by the Heber Ranger District of the Uinta National Forest (see map 1).

Purpose and Need for Action (need to discuss)

The purpose and need of this proposal is to comply with Public Law 104-19, Section 504(a) (Rescission Act); be responsive to a request by a permittee to consider a change in class of livestock; and to maintain or move towards desired conditions affected by domestic grazing.

Grazing is a suitable use of Forest Service Lands and is permissible through the Multiple Use Act of 1960, as amended. The allotments contain lands identified as suitable for domestic livestock grazing in the Uinta National Forest Plan and continued domestic livestock grazing is consistent with the goals, objectives, standards, and guidelines of the Forest Plan (2003a, p. 5-43 and 5-129).

It is Forest Service policy to make forage available to qualified livestock operators from lands suitable for grazing consistent with land management plans. (FSM 2203.1; 36 CFR 222.2(c)).

It is 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 resource for their livelihood (FSM 2202.1).

The Forest Plan, which directs the management of lands contained within this project area, has as one of its desired conditions to continue to permit livestock grazing activities on the Strawberry, Twin Peaks, and West Daniels allotments (2003a, p. 5-43 and 5-129).

Alternatives

Three alternatives were identified for detailed analysis in the DEIS based on Forest Service specialists input, public input, and resource needs. The alternatives analyzed are the Proposed Action, Continuation of Current Management, and No Grazing Alternative. Features common to all the alternatives are as follows:

- Annual inventory and treatment of noxious weeds within the project area.
- Implementation monitoring will be conducted to determine if standards and guidelines/best management practices were applied to management activities. Effectiveness monitoring will be conducted to assess if proposed standards and guidelines/best management practices move toward attainment of project objectives and desired conditions.

The **Proposed Action** would authorize livestock grazing use within the project area under updated management direction to achieve site-specific management objectives and move existing conditions toward desired conditions. Livestock grazing would be managed through adaptive management. The Strawberry Allotment livestock class would be converted from sheep to cattle. A portion of the strawberry allotment would be fenced off and closed to grazing and, in addition, a special management pasture would also be created within the allotment. The southern portion of the Twin Peaks Allotment (Mill B Unit) would be fenced and converted from sheep to cattle. West Daniels would continue to be grazed by cattle.

The **Continuation of Current Management Alternative** would continue existing management under existing Allotment Management Plans (AMPs), Annual Operating Instructions (AOIs), Term Grazing Permits, and relevant Forest Plan direction. The Strawberry Allotment and the Twin Peaks allotment in its entirety would continue to be grazed by Sheep. West Daniels would continue to be grazed by cattle.

The **No Grazing Alternative** would phase out livestock grazing on the Strawberry, West Daniels, and Twin Peaks allotments. New term grazing permits would not be issued as current permits expire. In ten years the project area would not provide any grazing for domestic livestock. Livestock grazing management would be the same as the Continuation of Current Management Alternative within the ten-year period until all livestock grazing was eliminated.

Decision to be Made

Based on the environmental analysis in this EIS, the District Ranger will decide whether to authorize livestock grazing on the project area's suitable rangelands under updated management direction, and if so, what changes need to be made to the respective allotment management plans in accordance with Forest Plan and desired conditions.

Table of Contents

Summary.....	ii
Chapter 1. Purpose of and Need for Action.....	1
Background.....	1
Purpose and Need for Action.....	1
Desired Conditions.....	1
Decision Framework	3
Public Involvement.....	3
Issues.....	3
Chapter 2. Alternatives including the Proposed Action.....	6
Alternatives Considered in Detail.....	6
Proposed Action.....	6
Continuation of Current Management.....	10
No Grazing.....	10
Chapter 3. Affected Environment and Environmental Consequences.....	11
Water Resources.....	11
Fisheries and Aquatic Habitat.....	22
Geology and Soils.....	40
Vegetation.....	45
Grazing.....	52
Wildlife Resources.....	56
Cultural Resources.....	68
Other Resources.....	76
Cumulative Effects.....	78
Consultation and Coordination	
Glossary and Acronyms	
References	
Appendix A: Monitoring Plan	
MAPS	
Current Management.....	5
Proposed Action.....	9
Water Resources.....	21
Grazing & Vegetation Cumulative Effects.....	93
Water Resources Cumulative Effects.....	94
Wildlife Cumulative Effects.....	95

CHAPTER 1. PURPOSE OF AND NEED FOR ACTION

Background _____

The Project Area (Strawberry Allotment, West Daniels Allotment, and the Twin Peaks Allotment - collectively referred to as the Upper Strawberry Allotments) is located approximately eight air miles south east of Heber City, Utah. The area includes 25,169 acres of National Forest Lands administered by the Heber Ranger District for the Uinta National Forest. (See Current Management Map)

As part of the 1995 Rescission Act and its implementing regulations (Public Law 104-19 Section 504(a)), Congress directed the Forest Service to issue term grazing permits where existing permits were due for expiration, and to provide management direction for the permits in compliance with NEPA, 2003 Uinta National Forest Land and Resource Management Plan (Forest Plan) direction, and other relevant laws and regulations. In accordance with the Rescission Act, the Forest Service prioritized those allotments that needed Allotment Management Plans (AMP).

Purpose and Need for Action _____

The purpose and need of this proposal is to comply with Public Law 104-19, Section 504(a) (Rescission Act); be responsive to a request by a permittee to consider a change in class of livestock; and to maintain or move towards desired conditions affected by domestic grazing.

Grazing is a suitable use of Forest Service Lands and is permissible through the Multiple Use Act of 1960, as amended. The allotments contain lands identified as suitable for domestic livestock grazing in the Uinta National Forest Plan and continued domestic livestock grazing is consistent with the goals, objectives, standards, and guidelines of the Forest Plan (2003a, p. 5-43 and 5-129).

It is Forest Service policy to make forage available to qualified livestock operators from lands suitable for grazing consistent with land management plans. (FSM 2203.1; 36 CFR 222.2(c)).

It is 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 resource for their livelihood (FSM 2202.1).

The Forest Plan, which directs the management of lands contained within this project area, has as one of its desired conditions to continue to permit livestock grazing activities on the Strawberry, Twin Peaks, and West Daniels allotments (2003a, p. 5-43 and 5-129).

Desired Conditions _____

Desired Conditions provide management goals and objectives for grazing use. Project monitoring will assess the effectiveness of management toward achieving these desired conditions over time. The following Desired Conditions have been established for this project:

Water Resources

WR1. Stream channels, floodplains, and associated vegetation are functioning properly relative to the landform (gradient, size, shape, roughness, confinement, sinuosity, and climate). Riparian areas filter sediments, protect stream banks, improve water quality, reduce flooding, recharge groundwater and maintain stream flow. These areas are covered by deep-rooted and other desirable, protective vegetation which provides adequate summer and winter thermal regulation. Generally, riparian areas are connected with aquatic and upland components. They provide food, water, cover, nesting areas, and protected pathways for aquatic and wildlife species.

WR2. Water quality within the analysis area meets the requirements of the Strawberry Reservoir (UDEQ, 2005) and Deer Creek Reservoir TMDL Studies (UDEQ, 2002). The TMDL Studies focus on management of Dissolved Oxygen, Total Phosphorous, and Temperature.

WR3. Riparian/wetland resources such as springs, seeps, bogs, and wet meadows defined in the 2003 UNF LRMP as Riparian Habitat Conservation Areas (RHCAs), both inventoried and uninventoried, will retain sufficient ground cover through the grazing season to minimize erosion and filter runoff.

Geology and Soils

GS1. Soil quality and long-term soil productivity are maintained or restored where adversely impaired, within the Twin Peaks, West Daniels, and Strawberry allotments.

GS2. Upland and hill slope soils have adequate ground cover, soil organic matter (litter), and large woody material to protect against accelerated erosion, thus lowering sediment delivery to riparian areas.

GS3. Soil hydrologic function and productivity in riparian areas is protected, promoting stream bank stability, regulating nutrient cycling, and preserving water quality by capturing and/or filtering overland flow, thus effectively lowering sediment and total phosphorous delivery to the stream.

Fisheries & Aquatic Resources

FA1. Aquatic habitat is sufficient to support all life stages of desirable aquatic and semi-aquatic species at levels appropriate to insure population viability.

Threatened, Endangered, and Sensitive Species

TES1. Livestock management will have no adverse effects on federally listed threatened, endangered, or sensitive plant, fish, or wildlife populations or species viability.

Vegetation

V1. There is a wide variety of vegetation communities with a full range of seral stages and age classes distributed across the allotments in mosaic patterns. The areas that are in early seral stage are a result of natural or planned events and after the event the trend is toward a mid or late seral stage.

V2. Tall forb vegetative communities are at or trending toward potential natural condition, as indicated by satisfactory soil cover and increases in density and diversity of desirable species.

V3. Sufficient current-year growth of willows to ensure maintenance or growth of existing willow communities, consistent with the wildlife desired condition WL1.

V4. Weed populations will be minimized and infestations will continue to be treated. Desirable vegetation continues to dominate the landscape.

V5. Tarweed dominated sites ecological trend is moving toward a later seral stage and will have an increased ground cover.

Wildlife Habitat

WL1. Sufficient current-year growth of willows to ensure maintenance or growth of existing willow communities. Willow communities provide crucial habitat for beavers (Management Indicator Species), migratory birds, moose, and many other wildlife species.

WL2. Sufficient cover of residual herbaceous and woody vegetation to provide for the forage, browse, and cover needs of native and desired non-native wildlife species.

WL3. Sufficient aspen regeneration to ensure maintenance of aspen stands as well as sufficient browse and cover for big game species.

Heritage

H1. Heritage sites are identified, and National Register eligible sites are protected from adverse effects to the features that make them historically important.

H2. Plants and areas associated with traditional uses that are culturally significant to American Indian Tribes are identified and the degree of effect to them by livestock grazing is assessed. They are protected from livestock grazing if this activity is compromising their potential utility to Tribes.

Decision Framework _____

The Heber District Ranger will decide whether to continue livestock grazing within the project area under proposed management direction and Desired Conditions incorporated in the Proposed Action for this project, and if so, what modifications need to be made to AMPs, annual operating instructions (AOIs), and grazing permits to achieve project objectives. Specific decisions include:

- What site-specific design features and resource thresholds are needed to guide grazing management toward meeting Forest Plan direction?
- Are current grazing use standards sufficient to meet identified desired conditions, and if not, what updated standards need to be implemented to meet the purpose and need for the project?
- How and under what circumstances should adaptive management be implemented in the project area?

Public Involvement _____

The Notice of Intent was published in the Federal Register on June 8, 2005. The agency also published a legal notice in the Provo Daily Herald on June 6, 2005. In addition, 111 scoping letters were mailed out to various federal, state, county, and local agencies, the Ute Indian Tribe, and interested publics. Five comment letters were received.

The interdisciplinary team developed a list of issues and concerns to address; the team also used the comments from the public and other agencies to formulate this list.

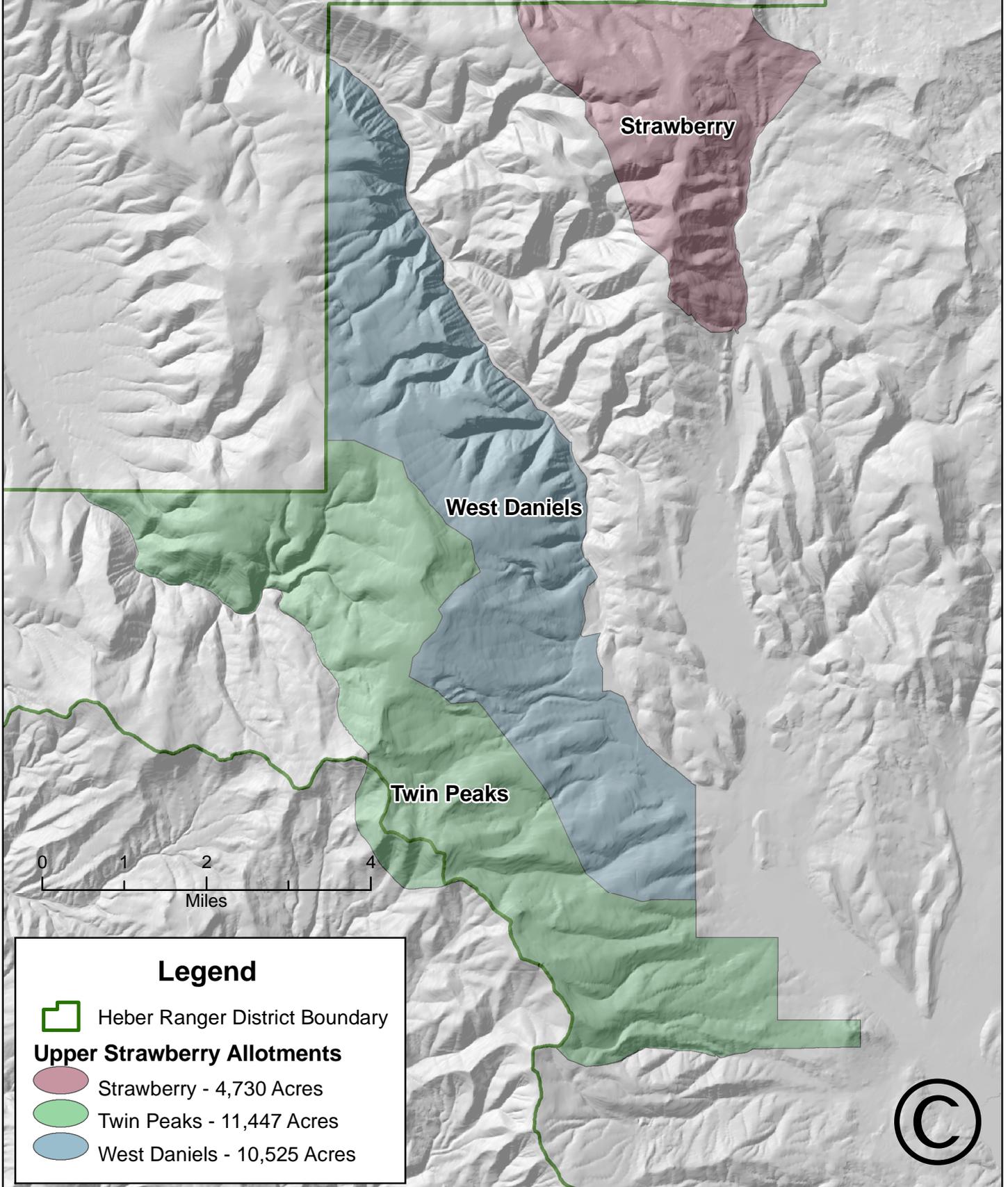
Issues

The Forest Service separated the issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)..." A list of non-significant issues and reasons regarding their categorization as non-significant may be found in the project record.

As for significant issues, the Forest Service identified the following issues during scoping:

- Analysis of the No Action/ No Grazing Alternatives and Current Management
- Economic viability for affected permittees
- Suitability for grazing
- Wildlife
- Concerns with water quality not meeting goals
- Soil productivity/erosion

Upper Strawberry Allotments Current Management



Legend

 Heber Ranger District Boundary

Upper Strawberry Allotments

 Strawberry - 4,730 Acres

 Twin Peaks - 11,447 Acres

 West Daniels - 10,525 Acres



CHAPTER 2. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

Alternatives Considered in Detail

Information from public scoping, including the significant issues identified for the project and field related resource information was used to formulate a reasonable range of alternatives. A reasonable range of alternatives to the proposed action was developed to 1) meet the purpose and need for the project, which includes meeting Standards and Guidelines of the Forest Plan and 2) consider a reasonable range of solutions for the significant issues. The interdisciplinary team analyzed three alternatives. The alternatives analyzed include the proposed action with mitigation measures, the continuation of current management, and the no grazing alternative.

Proposed Action

In order to meet the purpose and need for the project, the Heber Ranger District is proposing to authorize livestock grazing use within the project area under updated management direction to achieve site-specific management objectives and move existing conditions toward desired conditions. Livestock grazing would be managed through adaptive management. Adaptive management allows decisions focused on desired outcomes to be made with the best information available during implementation to achieve desired conditions. Both long-term and annual implementation monitoring and evaluation will be used to assess the effects of those decisions and to identify new information that may become available.

Strawberry Allotment

- The 1,280 acre area along the west side of Strawberry River to the ridge between Trail Hollow and Bellow's Hollow would be closed to grazing. Approximately 5 miles of fence would be constructed in conjunction with this activity.
- The livestock class would be converted from sheep to cattle.
- The upper 836 acres of the upper Strawberry River within the Strawberry Sheep Allotment would be fenced off to create the Trail Hollow Special Management Pasture to better manage livestock grazing and improve soils, vegetation, and water resources. Approximately 1.5 miles of fence would be constructed to separate the Special Management Pasture from the rest of the allotment.

West Daniels Allotment –

- Convert the southern two units (Jones Hollow and Sugar Springs, collectively referred to as “Mill A unit”) of the Twin Peaks Sheep Allotment, consisting of 4,058 acres to cattle and combine with the West Daniels Cattle Allotment. This will increase the West Daniels Cattle Allotment from approximately 10,524 acres to approximately 14,623 acres.
- Cattle would continue to be the livestock class on the West Daniels Allotment.

Twin Peaks Allotment

- The remaining 7,387 acres of the Twin Peaks allotment would continue to be a sheep allotment.

The Proposed Action incorporates the standards of the Forest Plan, specifically those related to grazing. Where the Forest Plan standard is being used as the threshold, the specific standard is not repeated in this document. Additional design features and resource thresholds have been developed as part of the proposed action. These design features and resource thresholds, in addition to the Forest Plan Standards, would be used as a tool of adaptive management to customize the grazing management system for the Upper Strawberry Allotments

Water Resources

- Livestock grazing impact to stream banks (bank alteration) will be measured at representative stream monitoring reaches to determine when livestock are moved from the unit. Specific standards for bank alteration will be developed for each management area/pasture. In the absence of a management area/pasture specific end of season standard, annual bank alteration is not to exceed 30%. In order to maintain or improve water quality and stream processes, the end of season bank alteration standard for Trail Hollow Special Management Pasture will be 15%.

Streambank stability ratings will be developed for each stream or management area/pasture based on representative stream monitoring reaches. The rating will be used to establish streambank alteration standards, determine streambank alteration standard effectiveness, and monitor long-term streambank stability trends in relation to Desired Conditions. Overall streambank stability will be monitored long-term using appropriate protocol.

- Grazing management within the Strawberry Watershed will be adjusted to achieve reductions of phosphorous recommended in the Strawberry Reservoir TMDL Study. The remaining streams within the project will be managed to meet Utah water quality rules and support their designated beneficial uses. Water quality will continue to be monitored according to the cooperative monitoring program with UDEQ. Annual and/or long-term monitoring of upland and hill slope ground cover, riparian area ground cover, and streambank stability/alteration will be conducted to determine need for adjustment in grazing management.

- Maintain a minimum ground cover requirement of 80% for 80% of the riparian/wetland resources as defined in the Forest Plan as Riparian Habitat Conservation Areas (RHCAs) for both inventoried and uninventoried wetlands. These ground cover requirements are based on Forest Plan S&W-4 Guideline for Class II RHCAs (USDA, 2003a).

Geology and Soils

- **Detrimental Soil Disturbance.** No more than 15 percent of the grazed portions of the Twin Peaks, West Daniels, and Strawberry allotments should have detrimentally disturbed soil after the completion of grazing. In other words, at least 85 percent of the Twin Peaks, West Daniels, and Strawberry allotments should be in a non-detrimentally disturbed condition.

- **Detrimental Soil Displacement.** Detrimental soil displacement includes the actively grazed areas of the Twin Peaks, West Daniels, and Strawberry allotments where 1 meter by 1 meter or larger area exhibits detrimentally displaced soil as described below:

- (a) The loss of either 5 cm or $\frac{1}{2}$ of humus enriched top soil (A horizon), whichever is less, or
- (b) The exceeding of the soil loss tolerance value for the specific soil type.

- **Effective Ground Cover.** The minimum effective ground cover (70% of potential), following the cessation of grazing disturbance in the actively grazed portions of the Twin Peaks, West Daniels, and Strawberry allotments, should be sufficient to prevent detrimental erosion. Detrimental erosion includes erosion rates that cause long-term productivity losses from the activity area or soil losses that are beyond those acceptable for the activity area. Minimum amounts of ground cover necessary to protect a soil from erosion are a function of soil properties, slope gradient and length, and soil erosivity (precipitation factor).
- The soils Desired Condition must take into consideration the UDEQ-Division of Water Quality TMDL requirements for phosphorus within the Strawberry Watershed while ensuring consistency with the Forest Plan, Region 4 Soil guidelines, and recommendations from the 2004 Strawberry Watershed Restoration Report.
- Soil quality and long-term soil productivity are maintained or restored where adversely impaired, within the Twin Peaks, West Daniels, and Strawberry allotments by complying with Regional Soil Quality Standards (Region 4, FSH 2509.18 – Soil Management Handbook, Chapter 2 – Soil Quality Monitoring, Section 2.2 – Soil Quality Standards).
- Upland and hill slope soils have adequate ground cover, soil organic matter (litter), and large woody material to protect against accelerated erosion, thus lowering sediment delivery to riparian areas.
- Soil hydrologic function and productivity in riparian areas is protected, promoting stream bank stability, regulating nutrient cycling, and preserving water quality by filtering overland flow, thus effectively lowering sediment and total phosphorous delivery to the stream.

Fisheries & Aquatic Habitat

- Adherence to water quality and soils indicators for adaptive management to ensure sufficient water quality and habitat conditions to support existing fisheries and maintain or enhance current populations.

Threatened, Endangered, and Sensitive Species

- Adherence to habitat, vegetation, and water quality indicators for adaptive management to meet the desired conditions will prevent management activities from contributing to the listing of additional species nor will these activities negatively impact listed species.

Vegetation

- There are no new noxious weed populations in or very near livestock handling facilities, or areas used by permittee for management of the allotment (camp sites, horse corrals, salt cabins, etc.)
- Utilization on tarweed sites 40% or less.

Wildlife Habitat

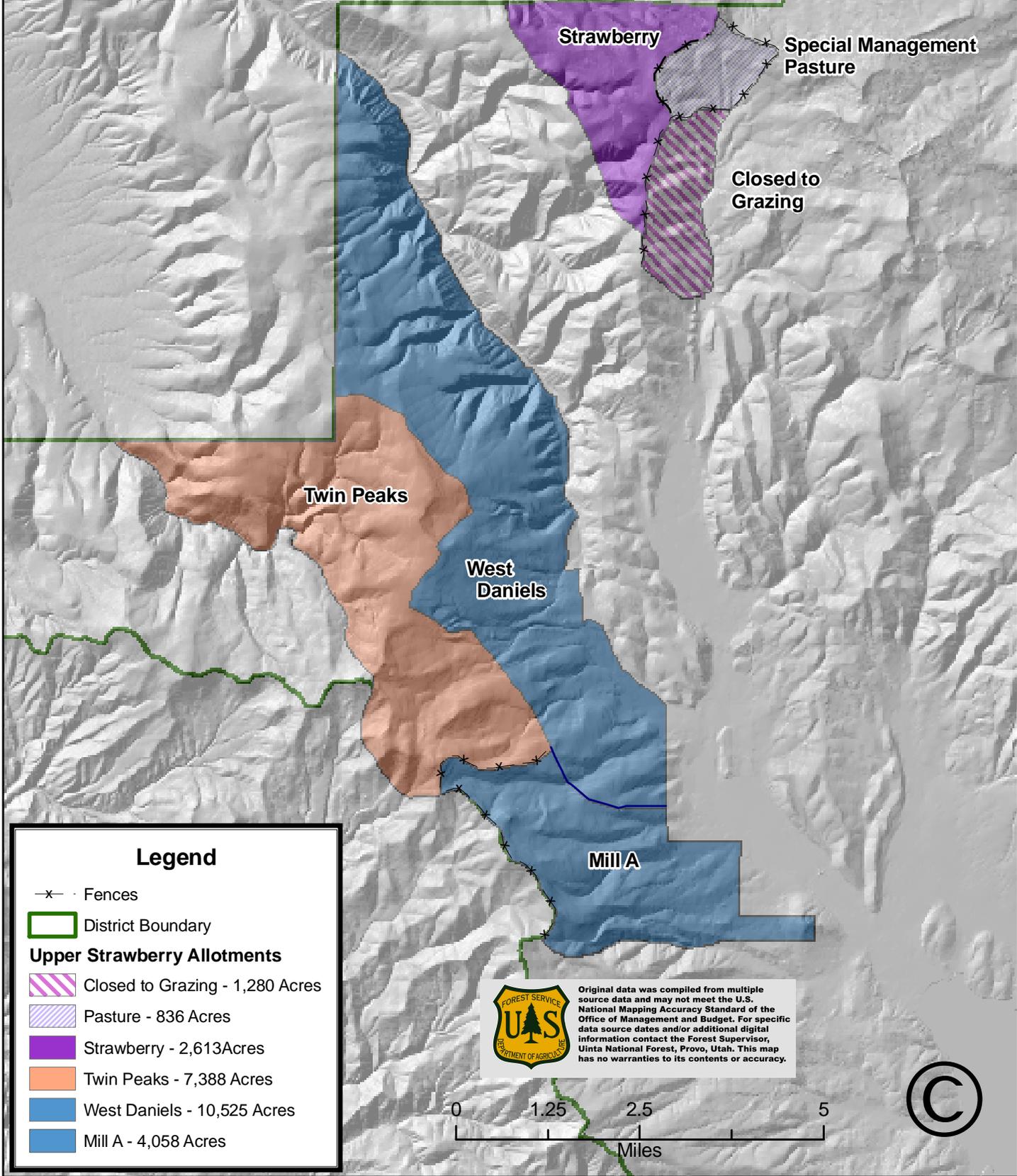
- Incidence of use on terminal leaders of aspen less than 5-feet tall will not exceed 30%.

Heritage

- Monitor sites for signs of livestock effects. In particular, monitor the Hogsback Salt Cabin for signs of rubbing or trampling by cattle. Request that permittees monitor their livestock movement near those sites.

- If there are any plant populations which are essential to Northern Ute traditional practices, these populations could be protected through herding, fencing, monitoring of those populations.

Upper Strawberry Allotments Proposed Action



Continuation of Current Management Alternative

The current management consists of:

West Daniels Allotment: One permittee is permitted to graze approximately 535 cow/calves from June 16 to October 15. This grazing is done using a rest/rotation grazing system. Resource protection nonuse has been authorized in 2004 and 2005 for this allotment due to the ongoing drought in the area. Additionally, in the fall of 2004 the permittee was issued a three year, 25 percent suspension because of permit violations.

Twin Peaks Allotment: One permittee is permitted to graze approximately 1240 ewes/lambs from June 26 to October 5. This grazing is done using a rest/rotation grazing system. Resource protection nonuse has been authorized for this allotment and the adjacent Wallsburg allotment due to the ongoing drought in the area allowing one herd to be authorized to graze on both allotments.

Strawberry Allotment: One permittee is permitted to graze approximately 1200 sheep from July 1 to September 30. This grazing is done using a rest/rotation grazing system. Resource protection nonuse has been authorized in 2004 and 2005 for this allotment due to the ongoing drought in the area. Annual Operating Plans could modify number of animals or season of use to address the year to year resource conditions.

See Current Management Map for the existing allotment boundaries.

No Grazing Alternative

Livestock grazing would be phased out within the Strawberry, West Daniels, and Twin Peaks Allotments. New term grazing permits would not be issued as current permits expire. In ten years this area would not provide grazing for domestic livestock. Livestock grazing management would be the same as the Continuation of current Management Alternative within the ten-year period until all livestock grazing was eliminated.

This alternative was developed to respond to the issues and concerns of those who believe that livestock grazing on National Forest Lands conflicts with other resources to the degree that total elimination of the livestock is needed to adequately resolve conflicts.

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Water Resources

Affected Environment

The Project Area of Analysis will be defined as the Twin Peaks, Strawberry, and West Daniels Allotments. These allotments are located within two major drainage basins – the Colorado River Basin and the Great Basin. Waters from the allotments on the east side of the Wasatch drain into the Colorado River Basin via Strawberry River (HUC# 14060004). The waters from these allotments drain into the Great Basin via the Provo River (HUC# 16020203) and Hobble Creek (HUC# 16020202). The allotments and their corresponding acreage according to 6th Level Hydrologic Unit Codes (HUCs) are listed in the following table (HUC Acres by Allotment).

Colorado River Basin

Surface water captured by the Strawberry River and Tributaries within the project analysis area flow into the Strawberry Reservoir. The Strawberry Reservoir is approximately 17,160 surface acres at full capacity and serves as the principal irrigation water collection and distribution facilities for the Central Utah Water Conservancy District. Water is delivered to and from the reservoir via a system of aqueducts, tunnels, ditches, and stream augmentations for use in the Uinta Basin and Wasatch Front. Further discussion of the Strawberry Reservoir and Central Utah Project is contained in the Strawberry Watershed Restoration Report (USDA, 2004), Strawberry Valley Assessment (USDA 1997), and the Strawberry Reservoir TMDL Report (UDEQ, 2005).

Historically, other diversions affected Strawberry Valley stream flows. The Daniels Creek Irrigation Company began diverting water out of the Strawberry River at Mill B in 1882, moving it by canal to the head of McGuire Canyon, where it flowed down into Daniels Creek and on to Heber Valley. This system was expanded in 1892 to include canals that took water out of both Willow and Bjorkman Creeks. A second canal system was completed in 1902 that took water from Little Hobble Creek tributaries and the Strawberry River on the northwest side of Strawberry Valley and moved it to the head of Daniels Canyon and then into Daniels Creek. The combined canal systems took about 2,900 acre-feet of water out of the Strawberry River system and dewatered portions of the river and the affected tributaries. The Little Hobble Creek canal system ceased operation in about 1979 (URMCC, 1996). The Strawberry system water diversions ended in 2001. Irrigation water from these systems was replaced by water from Jordanelle Reservoir.

Great Basin

Deer Creek Reservoir is located in Wasatch County, Utah on the Provo River. It serves residents of both Utah and Salt Lake Counties, providing a significant amount of drinking and irrigation water, as well as being a popular recreational area. The reservoir has two major inflows originating within the project area; Main Canyon Creek and Daniels Creek. The reservoir has a capacity of 152,700 acre-ft. Uses of water from Deer Creek Reservoir can be separated into three major categories: Municipal, Agricultural, and Recreational.

Municipal water users are the water districts located in Salt Lake and Utah Counties. These agencies provide safe drinking water to residents and industries through the region. The Central Utah Water Conservancy District, the Jordan Valley Water Conservancy District, the Metropolitan Water District of Salt Lake and Sandy, Metropolitan Water District of Orem City, and the Metropolitan Water District of Provo City treat and distribute water from the Provo River (UDEQ, 2002).

Precipitation

Elevations in the project area range from 10,091 feet at Bald Knoll in the Strawberry Allotment to approximately 7,600 feet in the Strawberry River watershed and 6,400 feet in the Provo River Watershed (GIS). Precipitation in the project area ranges from 20 to 36 inches per year, with the majority of the project area within the 28 – 32 inch per year range (AGRC). Approximately 70% of annual precipitation falls as snow between October and April, with the remainder occurring as rain from May to September (USDA, 2004). The Strawberry Allotment is located entirely within the 28 - 32 inch zone. Precipitation received by the West Daniels Allotment ranges from 36 inches on Strawberry Ridge to 24 inches at the Forest Boundary in Daniels Creek. Precipitation received in the Twin Peaks Allotment ranges from 36 inches on Strawberry Ridge to 24 inches in the Strawberry Valley and lower portion of Main Canyon Creek (AGRC).

Stream Resources

Streamflows in the project area are primarily influenced by snowmelt. Peak flows generally occur from mid-May to early June and gradually recede to base flows in mid to late August. Baseflows continue from this time until April, when temperatures begin to warm. Rainfall from summer storms are generally localized and result in peaks that can exceed snowmelt peaks (USDA, 2004).

Stream Bank Stability

Streambanks are morphological features of the stream channel and are created by erosion and deposition from streamflow forces. Streambanks are located between the streambed and the floodplain. They form above streambed where vegetation, roots, rocks, and other obstructions cause obstruction to capture/stabilize sediment. The size and shape of streambanks and channel are controlled by streamflow, substrate, and riparian vegetation.

Streambank erosion is identified as a major sediment source for streams within the Strawberry Valley and the project area. A survey of streambank stability and streambank erosion for the Strawberry Valley streams was completed in 2001 through 2002 for the Strawberry Watershed Restoration Report. The survey included GPS mapping the length and height of actively eroding streambanks. Erosion rates were calculated by multiplying the surveyed bank height and length by an estimated annual lateral migration rate (USDA, 2004).

From this survey, two segments from this effort are located within the project area of analysis. The Strawberry River from Mill B to Headwaters is located within the Strawberry Allotment. Of the 3.2 miles of stream surveyed, approximately 10% of the streambanks were found to be unstable. Streambank erosion from this reach contributes approximately 55 tons of sediment or 17 tons/mile per year. A portion of the Right Fork of Clyde Creek is located in the Twin Peaks Allotment. Of the 1.3 miles of stream surveyed, approximately 33% of the streambanks were found to be unstable. Streambank erosion from this reach contributes approximately 80 tons of sediment or 60 tons/mile per year.

The remaining streams within the project area do not have streambank stability data available. However, stream stability/bank erosion data from the Strawberry Watershed Restoration Report was compiled and analyzed to estimate general streambank conditions for grazed streams within the project area. Streambank stability surveys were analyzed for watershed or stream survey reaches within Strawberry Valley grazed either by sheep or cattle to quantitatively analyze impact of each class of stock. The analysis resulted in an average percentage of unstable streambanks across the Strawberry Watershed for both cattle and sheep. The average cattle-grazed watershed exhibits 20% unstable streambanks where the average sheep grazed stream exhibits 22.3% unstable streambanks. Statistically, there is no significant difference between streambank stability between sheep and cattle grazed streams analyzed. Further documentation of the streambank stability analysis is available in the Project Record - Hydrology Report.

Riparian Habitat Conservation Areas (RHCAs)

RHCAs are areas within watersheds where riparian-dependent resources receive primary emphasis and management activities are subject to specific standards and guidelines. RHCAs include traditional riparian corridors, wetlands, intermittent streams, and other areas that help maintain the integrity of aquatic ecosystems (USDA, 2003a).

Each perennial stream and waterbody within the project area of analysis is in one of three RHCA classes. Class I receives the highest level of protection (300 foot buffer). Class II receives a high level of protection (200 foot buffer). Class III receives a moderate level of protection (100 foot buffer).

Wetland Resources

Wetland functions are defined as a process or series of processes that take place within a wetland. These include the storage of water, transformation of nutrients, growth of living matter, and diversity of wetland plants, and they have value for the wetland itself, for surrounding ecosystems, and for people. They provide food, water, and shelter for fish, birds, and mammals, and serve as a breeding ground and nursery for numerous species. Many endangered plant and animal species are dependent on wetland habitats for their survival (USGS 2005).

Hydrologic functions are those related to the quantity of water that enters, is stored in, or leaves a wetland. These functions include such factors as the reduction of flow velocity, the role of wetlands as ground-water recharge or discharge areas, and the influence of wetlands on atmospheric processes. Water-quality functions include the trapping of sediment, pollution control, and the biochemical processes that take place as water enters, is stored in, or leaves a wetland (USGS, 2005).

Approximately 169 acres of wetlands delineated by US Fish & Wildlife Service and included in the National Wetlands Inventory are located within the Project Area. The NWI uses information on hydrology, hydrophytes, and hydric soils to delineate wetlands and deepwater habitats in accordance with national photographic, cartographic, and digitizing standards. The NWI has currently only delineated a portion of the wetlands occurring within the Project Area. The majority of the wetlands delineated in the NWI within the Project Area are associated with the Strawberry River and its tributaries.

In addition to these identified wetland resources, Uinta Forest Service Geographic Information System (GIS) includes coverages for springs and waterbodies (ponds & lakes) for the project area of analysis. Overall, the project area includes 11 emergent springs and 20 small waterbodies, totaling approximately 17 acres (Project Record - Hydrology Report).

Strawberry Stream and Wetland Resources						
HUC - 6th Level	RHCAs (acres)			Streams (miles)		Wetlands (acres)
	Class I	Class II	Class III	Perennial	Intermittent	
Willow - Strawberry River HUC # 140600040101	0	0	164	4.12	0.00	21
Daniels Creek HUC # 160202030401	0	0	42	0.00	0.00	0
Center Creek HUC # 160202030303	0	0	36	0.00	0.00	0
Totals	0	0	242	4.12	0.00	21

West Daniels Stream and Wetland Resources						
HUC - 6th Level	RHCAs (acres)			Streams (miles)		Wetlands (acres)
	Class I	Class II	Class III	Perennial	Intermittent	
Willow - Strawberry River HUC # 140600040101	3	19	141	6.28	1.54	78
Clyde - Strawberry River HUC # 140600040102	0	0	7	0.00	0.00	0
Daniels Creek HUC # 160202030401	406	0	249	8.93	10.18	0
Totals	409	19	397	15.21	11.72	78

Mill B Pasture (West Daniels) Stream and Wetland Resources						
HUC - 6th Level	RHCAs (acres)			Streams (miles)		Wetlands (acres)
	Class I	Class II	Class III	Perennial	Intermittent	
Willow - Strawberry River HUC # 140600040101	0	0	18	0.00	1.45	9
Clyde - Strawberry River HUC # 140600040102	0	0	105	0.00	6.92	61
Totals	0	0	123	0.00	8.37	70

Twin Peaks Stream and Wetland Resources						
HUC - 6th Level	RHCAs (acres)			Streams (miles)		Wetlands (acres)
	Class I	Class II	Class III	Perennial	Intermittent	
Willow - Strawberry River HUC # 140600040101	0	0	64	1.52	0.00	
Headwaters R. Fk Hobble Creek HUC # 160202020402	0	0	4	0.00	0.00	
Daniels Creek HUC # 160202030401	0	0	2	0.00	0.00	
Upper Main Canyon Creek HUC # 160202030403	313	0	20	5.89	3.83	
Totals	313		90	7.41	3.83	0

Water Quality - Beneficial uses

Tributaries to the Provo River within the project area of analysis include Daniels Creek, Main Canyon, and Center Creek. The State of Utah classified these waters to support beneficial uses 1C, 2B, 3B, and 4¹.

The Strawberry River and Tributaries (Colorado River Basin) within the project area of analysis are classified by the State of Utah to support beneficial uses 1C, 2B, 3B, and 4. In addition to the State designated beneficial uses, Strawberry River and Tributaries within the project area of analysis are considered “High Quality Waters – Category 1” and are subject to the State of Utah’s Anti-Degradation Policy. The policy requires that existing high water quality be maintained and that new point-source discharges are prohibited. Control of non-point sources of pollution is required to the extent feasible through implementation of best management practices (USDA, 2004).

The project area does include a portion of the Hobble Creek 6th Level HUC. This area generally is comprised of headwater bowls and does not include any perennial stream reaches. However, the State of Utah classified waters within this watershed to support beneficial uses 2B, 3A, and 4.

Water Quality - Total Maximum Daily Load (TMDL) Studies

Waters in Utah that do not meet the water quality standards for their assigned beneficial uses are the focus of the Clean Water Act’s (CWA) Section 303 (d), which requires states to identify, develop, and implement plans to improve remaining impaired waters. The Total Maximum Daily Load (TMDL) process, which identifies pollution sources and allocates maximum pollution loadings where water quality goals are not being met, is the required methodology for addressing these listed waters.

The TMDL approach targets watersheds, addressing water quality in a site-specific way tailored to local conditions and objectives. It specifies the increment of water quality improvement required, allocates responsibility for this improvement incrementally among pollution sources, and provides a framework for remedial action. The TMDL process is coordinated with other CWA programs.

Waters within the project area are included within two established TMDLs for the Deer Creek and Strawberry Reservoirs. Although the reservoirs are outside of the project area, the TMDL Studies recommend maintaining existing water quality or reductions in pollutant loading levels in tributaries within the project area of analysis that flow into the reservoirs.

Deer Creek Reservoir TMDL Report

Provo River tributaries within the project area drain into the Deer Creek Reservoir. The reservoir was included on the 2000 State of Utah 303(d) List of Impaired Waters for Dissolved Oxygen, Temperature, and Total Phosphorous. The TMDL Report for Deer Creek Reservoir was completed in 2002 (UDEQ, 2002). In 2003, UDEQ removed the temperature impairment from the reservoir (UDEQ 2004a). The remaining pollutants, Dissolved Oxygen and Total Phosphorous, continue to be targeted for maintenance

¹ State of Utah Beneficial Use Classifications

Class 1C – Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water

Class 2B – Protected for secondary contact recreation such as boating, wading, or similar uses.

Class 3A – Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.

Class 3B – Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.

Class 4 – Protected for agricultural uses including irrigation of crops and stock watering.

or reduction in order to support the reservoir's beneficial uses. The TMDL Study also sets In-stream concentrations of 0.04 mg/L for Total Phosphorous and 0.025 mg/L for Total Dissolved Phosphorous for Provo River Tributaries within the project area. These tributaries include Daniels Creek, Center Creek, and Main Canyon Creek.

Strawberry Reservoir TMDL Report

The Strawberry Reservoir is included on the 2004 State of Utah 303(d) List of Impaired Waters for Total Phosphorous and Dissolved Oxygen. Water quality in the reservoir is currently partially supporting its coldwater fishery and improving, but not at a rate that would allow it to be removed in the near future from the 303 (d) List. As a result, the Strawberry Reservoir Total Maximum Daily Load (TMDL) Study was developed by the Utah Department of Environmental Quality (UDEQ) – Division of Water Quality (UDEQ, 2005). Current conditions and recent trends of the reservoir's water quality indicate that continuation of current and planned management practices will continue to improve quality and sustainability of the Strawberry Reservoir's Fishery. Two streams within the project area are targeted for reduction. The TMDL Study recommends a 75 pound reduction in annual total phosphorus loads (lbs / year) for the Strawberry River and a 5 pound reduction for Clyde Creek.

Water Quality – Existing Conditions

The Uinta National Forest cooperatively monitors the quality of waters within the Forest boundaries with the Utah Department of Environmental Quality – Division of Water Quality. This monitoring consists of four year rotational sampling of baseline sites throughout the Forest. This data and water quality data collected from other UDEQ Cooperators is compiled in the STORET database maintained by the EPA. Water quality monitoring data for sites within or immediately downstream of the project area are discussed below.

Site Analysis:

Colorado River Basin Water Quality Sampling Sites

STORET Site #4936680 is located on the Strawberry River immediately south and downstream of the Strawberry Allotment. The site was last sampled in 2004, and analysis of water quality parameters from 1990 through 2004 indicated stable to improving water quality. Total Phosphorous (TP) and Total Suspended Solids (TSS) remained stable, while measured Dissolved Oxygen levels are increasing (Cirrus, 2005). Exceedances of TP were recorded on four of the 2004 samples (USDA 2005f).

STORET Site #4936650 is located on the Strawberry River above the West-Side Road Crossing on ungrazed Strawberry Project lands. The site is also downstream of portions of the Twin Peaks/West Daniels Allotments. The site was last sampled in 2003 (USDA 2004a). Overall TP levels have been trending downward from 1997 through present. DO values from 2000 to present continue to improve, with the highest values recorded in 2003. Sampling from 2003 indicated in exceedances of State of Utah water quality standards for DO, and minor exceedances in temperature and pH (USDA 2004a, USDA 2003d).

STORET Site #4936620 is located on Clyde Creek, approximately 2.5 stream miles below the Twin Peaks Allotment. The majority of the contributing watershed above this sampling site is located within the Mud Creek Cattle Allotment. The site was last sampled in 2003. Overall TP levels have trended downward since 1997. DO, TSS, and other measured parameters have remained stable. The 2003 sampling indicated in one minor exceedance of TP and one in temperature (USDA 2004a).

Great Basin Water Quality Sampling Sites

STORET Site #5913550 is located on Daniels Creek at the Forest boundary. The contributing watershed above this sampling site includes portions of the Strawberry, West Daniels and East Daniels Allotments. Limited water quality data from 1981 through 2005 is available for this site. Overall, water quality parameters including TSS, Total Dissolved Phosphorous, Total Phosphorous, and DO are stable or improving. All other parameters are supporting designated beneficial uses. A single exceedance for phosphorous was recorded at this site between 2000 through 2005 (Cirrus 2005, STORET Data).

STORET Site #5913540 is located on Daniels Creek approximately 3.0 miles downstream of the Uinta National Forest boundary. The contributing watershed above this sampling site includes privately owned lands and portions of the Strawberry, West Daniels and East Daniels Allotments. Water quality data sporadically is available from the early 1990's through 2004. Overall TP levels continue to decrease from 1998 through 2004. Parameters pH, DO, and TSS have overall remained stable or improved (Cirrus 2005, STORET Data). Water quality sampling in 2004 indicated zero exceedances of Utah water quality standards or Deer Creek Reservoir TMDL recommendations (USDA 2005f).

STORET Site # 4996920 is located on Main Canyon Creek downstream of the Twin Peaks Allotment, and approximately 4 miles north of the Forest Boundary. Approximately 2870 acres (13.4%) of the watershed above the sampling point is located within the Twin Peaks Allotment. Another 4800 (22.5%) is comprised of the Wallsburg Sheep Allotment, administered by the Heber Ranger District. The remaining contributing watershed is comprised privately owned lands. Management activities on these lands include farming, ranching, and domestic housing. The Limited water quality data is available for this site from 1985 through 2005. (STORET) Water quality sampling from 1999 through 2005 indicated 2 exceedances of Utah water quality standards for TP.

STORET Site # 4996160 is located on Wardsworth Creek above the confluence with Right Fork of Hobble Creek. The sampling site is located downstream and to the southwest approximately 7 miles from the Twin Peaks Allotment. Approximately 460 acres (4.0%) of the watershed above the sampling point is located within the Twin Peaks Allotment. The remaining contributing watershed is comprised of the Hobble Creek Cattle Allotment managed by the Spanish Fork District of the Uinta National Forest. Limited water quality data is available from 1993 through 2000. Parameters including DO, TDS, TP, TSS are stable to improving (STORET Data). Water quality sampling during this period indicated two exceedances of Utah water quality standards for TP.

The portion of the Strawberry Allotment (~1200 acres) within the Center Creek 6th Level HUC is generally comprised of headwater bowls and does not include perennial stream reaches. Adequate water quality data is not available in the Center Creek watershed to analyze current conditions in regards to water quality. However, the topography, soils/geology, and vegetation types are comparable the remainder of the Strawberry Allotment located within the Daniels Creek and Strawberry – Willow Creek 6th Level HUCs. Consequently, it is assumed that water quality conditions would be similar to sampled results within these watersheds.

Environmental Consequences

Effects on Stream and Wetland Resources, Common to Grazing Alternatives

Livestock directly impact stream, riparian, and wetland resources in a number of ways. Grazing impacts include trampling, soil compaction, and loss of vegetative cover on both upland and riparian sites. Impacts are often greater in riparian zones because these areas are used preferentially because of the

availability of shade, water, and more succulent vegetation. Over-grazing reduces soil vegetative cover and contributes to increased runoff and erosion rates. Over longer periods of time, grazing can result in increased fine sediment loads from stream bank erosion, loss of riparian habitats by stream channel widening or degradation, and lowering of water tables through channel degradation (USDA, 2003b)

The following effects to water resources can occur when cattle over-graze or impact riparian areas: (1) Woody and hydric herbaceous vegetation along a stream can be reduced or eliminated; (2) streambanks can collapse due to livestock trampling; (3) without vegetation to slow water velocities, hold the soil, and retain moisture, erosion of streambanks can result; (4) the stream can become wider and shallower, and in some cases downcut; (5) the water table can drop; and (6) hydric, deeply rooted herbaceous vegetation can die out and be replaced by upland species with shallower roots and less ability to bind the soil. The resulting instability in water volume, increased summer water temperature, loss of pools and habitat adjacent and connected to streambanks, and increased substrate fine sediment within waterways (NOAA, 2004).

Proposed Action

Environmental Effects to Stream and Wetland Resources

Unstable streambanks were compared in cattle versus sheep grazed streams across the Strawberry Watershed. This analysis resulted in no statistical difference in streambank stability between cattle versus sheep grazing. The average percent of unstable streambanks for both classes of livestock were approximately 21%. The streams analyzed within the conversion area include two similar reaches on the Strawberry River. Prior to being fenced off from grazing, Mill B to Dock Flat was grazed by cattle and resulted of 21% unstable streambanks. Sheep grazing from Mill B to Headwaters resulted in 10% unstable streambanks.

Based on this analysis, no increases in unstable streambanks are anticipated following the conversion from sheep to cattle within the Strawberry and Twin Peaks allotments. However, monitoring of stream resources is required to ensure achievement or progress toward Desired Conditions. Under the Proposed Action, representative stream monitoring reaches will be established within portions of the Strawberry, West Daniels, and Twin Peaks allotments in order to monitor streambank stability, streambank alteration, and woody/herbaceous riparian species. Based on monitoring data on these stream reaches, administrative changes in grazing management, as necessary, will be made to ensure that riparian, stream, and floodplain function does not decline following conversion from sheep to cattle grazing.

Under the Proposed Action, portions of the Twin Peaks allotment within the Hobble Creek and Main Canyon HUCs would continue to be grazed by sheep. Impacts to stream and wetland resources would be monitored in the same way as the cattle allotments listed above.

Environmental Effects on Water Quality

Under the Proposed Action and associated mitigation measures, water quality for the Upper Strawberry River and Tributaries is expected to improve. The portion of Strawberry Allotment within the Strawberry Watershed is located within a belt of high phosphorous soil/geologic material. The closure to grazing of 1,300 acres adjacent to the Strawberry River will reduce sedimentation to Strawberry River through removal of livestock disturbance of vegetation, upland/riparian soils, and streambanks within this area. Following closure to cattle grazing after conversion, this reach of the Strawberry River will move toward desired conditions for stream channel and floodplain resources, reducing streambank related sedimentation by up to 17 tons per year (SWRR). The creation of the Trail Hollow Special Management Pasture and the Mill A Pasture will allow rangeland managers to closely manage

vegetation utilization, upland/riparian groundcover, and streambank alteration. These design features are expected to reduce sediment and phosphorous delivery to the Strawberry River, improve overall water quality, and work toward meeting recommended reductions of the Strawberry Reservoir TMDL Report.

Conversion of portions of the Strawberry and Twin Peaks Allotments from sheep to cattle grazing may result in long-term decreases in overall groundcover (Soils Section). Any decrease in vegetation cover increases the probability of increased upland erosion. However, with conversion as proposed, there will be less AUMs per acre, since this will effectively increase the size of the allotment from 10,524 acres to approximately 14,623 acres. With less AUMs per acre there should be less impact to the upland hill slope aspen vegetation, thus mitigating the increased potential for bare ground from cattle grazing. Bare ground may result in increased upland erosion, but increases in sediment yield to streams are dependent on the hillslopes' spatial proximity to streams or stream channels within the Project Area.

Grazing of sheep in the portions of the Twin Peaks allotment within the Main Canyon Creek 6th Level HUC would maintain the current level of AUMs per acre. Cattle grazing in the Daniels Creek 6th Level HUC would receive a decrease in AUMs per acre. Administrative changes in grazing management, as necessary, will be made to ensure that progress or achievement of Desired Conditions is attained. These design features are expected to reduce sediment and phosphorous delivery to the tributaries of the Deer Creek Reservoir, improve overall water quality, and work toward meeting recommended reductions of the Deer Creek Reservoir TMDL Report.

Under this alternative, sheep grazing in the portions of the Twin Creeks allotment within the Wardsworth Creek 6th Level HUC would maintain the current level of AUMs per acre. Administrative changes in grazing management, as necessary, will be made to ensure that progress or achievement of Desired Conditions is attained.

Continuation of Current Grazing Management

Environmental Effects to Stream and Wetland Resources

Sheep grazed streams exhibited generally the same percentage of unstable streambanks as cattle grazed streams in the Strawberry Valley. Under this alternative the entire Strawberry Allotment would remain open to sheep grazing. The current rate of streambank alteration from grazing would likely continue to occur on the Strawberry River from Mill B to Headwaters and within the Right Fork of Clyde Creek.

Under current grazing management, representative stream monitoring reaches will be established within the Twin Peaks, Strawberry, and West Daniels allotments. These reaches would be utilized to monitor streambank stability, streambank alteration, and woody/herbaceous riparian species. Based on monitoring data on these stream reaches, administrative changes in grazing management, as necessary, will be made to ensure that Allotments within the Project Area meet Desired Conditions and are consistent with the Forest Plan.

Environmental Effects on Water Quality

Current grazing management in the Project Area is resulting in minor exceedances of State Water Quality Standards (Hydrology Affected Environment). Sediment and phosphorous resulting from streambank erosion in Clyde Creek and on the Strawberry River from Mill B to Headwaters would continue to occur at present rates. Selection of this alternative would not achieve or work toward the recommended Total Phosphorous reductions of the Strawberry TMDL Study.

Grazing of sheep and cattle in the portions of the Twin Peaks and West Daniels allotments within the Main Canyon Creek and Daniels Creek 6th Level HUCs would continue. Administrative changes in grazing management, as necessary, will be made to ensure that progress or achievement of Desired Conditions is attained. These design features are expected to reduce sediment and phosphorous delivery to the tributaries of the Deer Creek Reservoir, improve overall water quality, and work toward meeting recommended reductions of the Deer Creek Reservoir TMDL Report.

Under this alternative, sheep grazing in the portions of the Twin Creeks allotment within the Wardsworth Creek 6th Level HUC would maintain the current level of AUMs per acre. Administrative changes in grazing management, as necessary, will be made to ensure that progress or achievement of Desired Conditions is attained.

No Grazing Alternative

Environmental Effects to Stream and Wetland Resources

The no grazing alternative would most likely result in the greatest improvement to streams and wetland resources within the project area. The greatest improvement to these resources would include establishment of stabilizing woody/herbaceous vegetation and increases in streambank stability. The rate of improvement would be dependent on the existing condition of the stream or riparian resources. Restoring stream/floodplain function in highly degraded or incised streams would recover at a slower rate than streams or wetlands in proper functioning condition or better.

Environmental Effects on Water Quality

Upland sediment production would be reduced as a result of decreased bare soils, increased vegetation/litter cover, and decreased overall soil erosion potential. Stream, riparian area, and wetland functions including establishment of woody/herbaceous riparian species, streambank stabilization, sediment filtration, flood reduction, and maintenance of streamflows would continue to improve without the impact from livestock. These functions would reduce sediment delivery to streams and wetlands, improving water quality above existing conditions throughout the project area.

Water Resources

STORET
#5913550

STORET
#4936680

STORET
#4936650

STORET
#4936620

Center Creek HUC

Strawberry Allotment

Daniels Creek HUC

Willow Creek - Strawberry River HUC

West Daniels Allotment

Twin Peaks Allotment

Upper Main Creek HUC

Clyde Creek - Strawberry River HUC

Headwaters - Right Fork Hubble Creek HUC

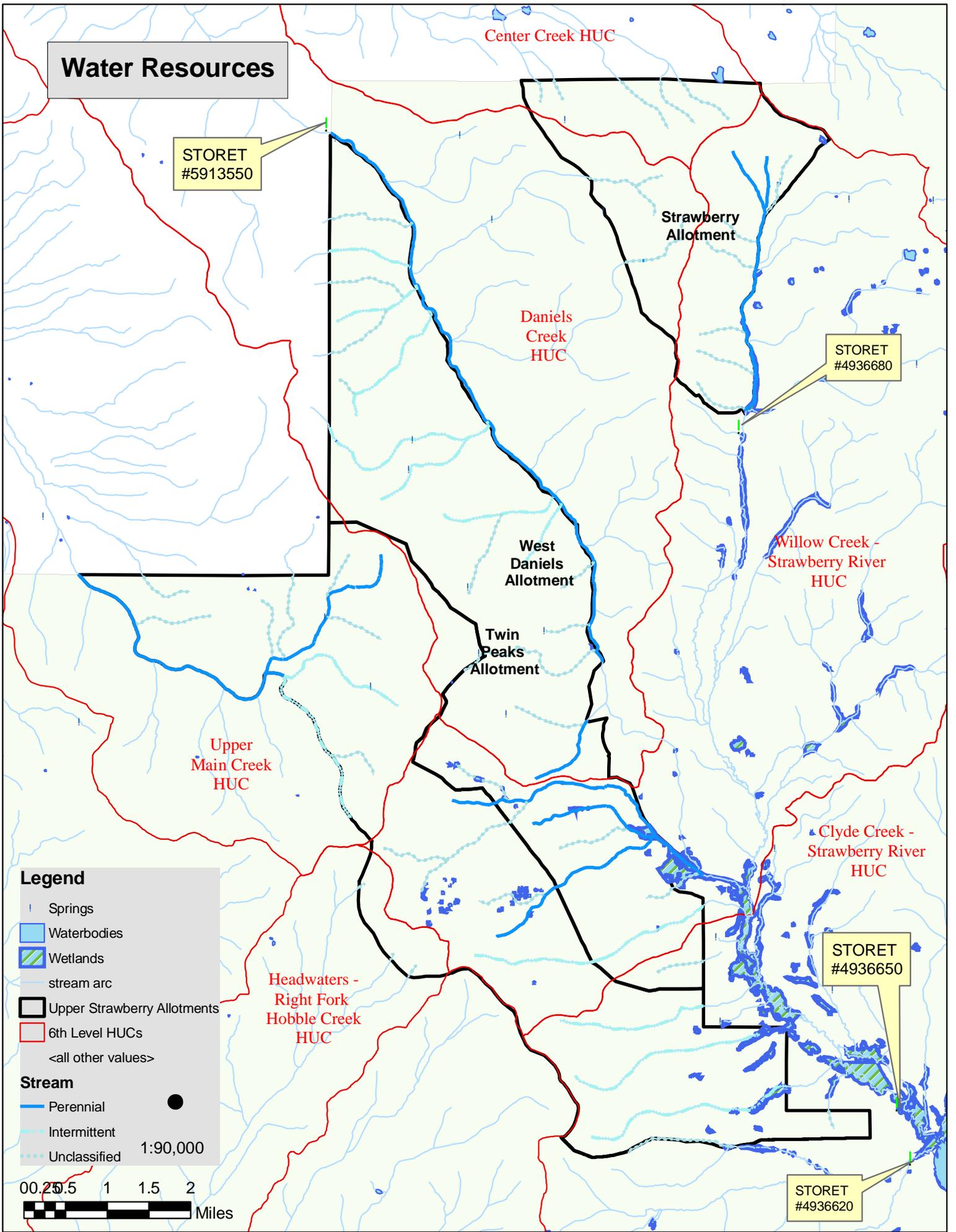
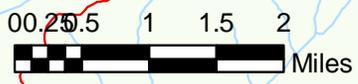
Legend

- Springs
- Waterbodies
- Wetlands
- stream arc
- Upper Strawberry Allotments
- 6th Level HUCs
- <all other values>

Stream

- Perennial
- Intermittent
- Unclassified

1:90,000



Fisheries and Aquatic Habitat

Affected Environment

The area of analysis for fisheries and aquatic habitat includes the upper Strawberry River, Murdock Hollow, Clyde Creek, and Little Hobble Creek drainages located within Strawberry Reservoir Management Area; the Main Canyon and Daniels Creek drainages located in the Deer Creek Reservoir Management Area; and the Wardsworth Creek drainage located in the Hobble Creek Management Area of the Uinta National Forest.

Bonneville cutthroat trout (*Oncorhynchus clarki utah*) and Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*) are identified as aquatic Management Indicator Species (MIS) for the Uinta National Forest and listed as a United States Forest Service (USFS) Region 4 (USDA, 2003b) and State of Utah sensitive species. As aquatic MIS for the Uinta National Forest, sample populations of Bonneville cutthroat trout (BCT) and Colorado River cutthroat trout (CRCT) and their habitat are monitored to identify trends and changes in the status of BCT and CRCT populations and their habitat relative to land management actions on the Forest. Population data are collected for sample set of the streams containing either conservation or persistence populations of BCT and/or CRCT as identified in the *Conservation Agreement and Strategy for BCT in the State of Utah* (UDNR 1997a); the *Conservation Agreement and Strategy for CRCT in the State of Utah* (UDNR 1997b); and the *Land and Resource Management Plan for the Uinta National Forest* (USDA 2003a). These data include information that can be used to determine the distribution, abundance, and condition of BCT and CRCT populations on the Forest. Specific sampling protocols for fish populations on the Uinta National Forest are detailed in the *Cutthroat Trout Monitoring Plan and Protocols for the Uinta National Forest* (Smith and Lyman 2004a).

The project area is located within the Northeastern Geographic Unit (GU) for CRCT and the Northern Bonneville GU for BCT. Streams in the Northeastern GU were historically inhabited by CRCT. The construction of Strawberry Reservoir fragmented and isolated headwater populations of CRCT, and subsequent fisheries enhancement activities during the 1990s and the introduction of non-native fish species is believed to have eliminated any remnant genetically pure CRCT populations within the project area. However, the Bear Lake strain of BCT has been introduced into the Northeastern GU and naturalized populations occur in the upper Strawberry River, Little Hobble Creek, Murdock Hollow, and Clyde Creek drainages. In order to fully assess potential impacts of the proposed project on fisheries and aquatic resources within the project area, these non-native BCT populations will be used as the focus of this analysis for the Northeastern GU while native BCT populations will be used within the Northern Bonneville GU which includes the Main Canyon Creek, Daniels Creek, and Wardsworth Creek drainages.

Because native populations of aquatic MIS for the Uinta National Forest no longer occur within the upper Strawberry River, Little Hobble Creek, Murdock Hollow, and Clyde Creek drainages, the USFS does not conduct fish population surveys in these drainages as part of the Forest-wide MIS monitoring program (Smith and Lyman 2004a). However, the USFS does conduct fish habitat and population monitoring surveys for watersheds on the Forest in which significant land management activities and/or projects have been identified and this information is available for these drainages.

Strawberry Reservoir Management Area

The Strawberry Reservoir Management Area is located in Wasatch County, Utah. The natural boundaries of the Strawberry Reservoir watershed, along with the Forest boundary on the east, are the boundaries for this Management Area. A small portion of the Uintah and Ouray Ute Indian Reservation borders the area near Soldier Creek arm of Strawberry Reservoir.

Yearly precipitation in the management area varies from approximately 19 inches near Strawberry Reservoir to over 30 inches at higher elevations. Water for livestock and irrigation are the biggest water uses within the management area. Water from the area is also used for domestic, power, and storage purposes. The Management Area is a part of north central Utah's upper Strawberry River system and part of the Colorado River system, flowing into the Duchesne River, which is a tributary to the Green River, which ultimately flows into the Colorado River. There are about 132 miles of perennial streams and 235 miles of intermittent streams found within this management area.

Historical water diversions, overgrazing, elimination of riparian species through herbicide spraying, trapping of beaver, and removal of beaver dams have all caused detrimental impacts to the hydrology and fluvial geomorphology of the Strawberry Valley rivers and streams in the past. The system is recovering slowly as upland, riparian, and stream channel conditions are still not at their desired future condition. Grazing has been eliminated on the Strawberry Project lands, though the State of Utah continues to trap beaver in the valley.

Watersheds located in the Strawberry Reservoir Management Area that are part of this analysis include the upper Strawberry River, Murdock Hollow, Clyde Creek, and Little Hobble Creek drainages.

Upper Strawberry River Drainage

The upper Strawberry River drainage is located within the Northeastern GU for Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*) and streams in the watershed were historically inhabited by Colorado River cutthroat trout. Colorado River cutthroat trout (CRCT) are a USFS Region 4 and State of Utah listed sensitive species and conservation agreements between the USFS and UDWR have been developed for this species. The construction of Strawberry Reservoir fragmented and isolated headwater populations of CRCT, and subsequent fisheries enhancement activities during the 1990s and the introduction of non-native fish species is believed to have eliminated any remnant genetically pure CRCT populations within the Strawberry River drainage. Consequently, no conservation or persistence populations for CRCT have been identified within the Strawberry River drainage.

Fish Populations

The Bear Lake strain of BCT has been introduced into the upper Strawberry River drainage and populations occur within a number of the stream systems within the watershed. Bonneville cutthroat trout are a USFS Region 4 and State of Utah listed sensitive species and conservation agreements between the USFS and the UDWR have been developed for this species; however, no conservation or persistence populations for BCT have been identified within the upper Strawberry River watershed.

Other native fish species present within the upper Strawberry River drainage include mottled sculpin (*Cottus bairdi*), mountain sucker (*Catostomus platyrhynchus*), Utah sucker (*Catostomus ardens*), redbelt shiner (*Richardsonius balteatus*), and speckled dace (*Rinichthys osculus yarrowi*). Although thought to be present in the upper Strawberry River drainage prior to the 1990 Rotenone treatment of the Strawberry River watershed, leatherside chub (*Gila copei*) and Utah chub (*Gila atraria*) are no longer found in the drainage (Sigler and Sigler 1996) (Smith 2005a)

In addition to Bonneville cutthroat trout, rainbow trout (*Oncorhynchus mykiss*) are present in the Strawberry River drainage. Other non-native fish species that occur within the watershed include Kokanee salmon (*Oncorhynchus nerka*). Sterile rainbow trout are currently stocked by the UDWR to supplement popular recreational fisheries in some locations within the management area, while hatchery operations by the UDWR on the Strawberry River support popular recreational fisheries for both cutthroat trout and kokanee in Strawberry Reservoir. (Smith 2005a)

Amphibians

The distribution of amphibian species within the Strawberry River drainage is not well documented, though the boreal toad (*Bufo boreas boreas*) has been documented to occur within the management area. Results from the Utah GAP Analysis (USDI 1997) indicate that the management area contains critical value habitat for boreal chorus frog (*Pseudacris maculate*), boreal toad, Great Basin spadefoot toad (*Spea intermontana*), Great Plains toad (*Bufo cognatus*), northern leopard frog (*Rana pipiens brachycephala*), tiger salamander (*Ambystoma tigrinum*), and Woodhouse's toad (*Bufo woodhousii*). (Smith 2005a)

Rare Aquatic Invertebrates

The distribution of aquatic macro-invertebrates considered by the UDWR to be rare or imperiled is not well documented. Observations of these species on the Forest are sporadic and in many cases relatively outdated. Although one species of rare aquatic snail, the glossy valvata (*Valvata humeralis*), has been documented to occur within the management area there are no records of this species being observed within the Strawberry River drainage (NatureServe 2005). (Smith 2005a)

Threatened, Endangered, and Sensitive (TES) Species

The Bear Lake strain of BCT is the only TES aquatic species known to inhabit the Strawberry River drainage (USDA 2003b). This species was introduced into the watershed following the Rotenone treatment of the Strawberry Reservoir system during the 1990s. Because native populations of aquatic MIS for the Uinta National Forest no longer occur within the Strawberry River drainage, the USFS does not conduct fish population surveys in the drainage as part of the MIS monitoring program (Smith and Lyman 2004a). However, the USFS does conduct fish habitat and population monitoring surveys for watersheds on the Forest in which significant land management activities and/or projects have been identified and this information is available for the Strawberry River drainage.

Fish populations in Strawberry River drainage are assessed using Habitat Quality Index (HQI) modeling techniques (Binns 1982) and standard electrofishing multiple pass removal depletion protocols (Ricker 1975). These surveys currently span the time period between 1985 through 2005 and are cataloged for reference and review in *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith and Smith 2005). Specific sampling protocols for fish populations on the Uinta National Forest are detailed in the *Cutthroat Trout Monitoring Plan and Protocols for the Uinta National Forest* (Smith and Lyman 2004a).

Fish population data for the Strawberry River include information collected during fish population surveys conducted by the UDWR during 1997 and the USFS during 2003, 2004, and 2005. Fisheries surveys conducted by the UDWR indicate that BCT densities averaged 1.25 fish/m and ranged from 0.57 fish/m in station 2-4 to 1.80 fish/m in station 3-6 during 1997 (Wilson et. al. 2004). Fisheries surveys conducted by the USFS during 2003 indicate that densities of BCT averaged 0.39 fish/m and ranged from 0.60 fish/m in station 3-6 to 0.18 fish/m in station 4-8. During the 2004 surveys, estimates

of BCT averaged 0.60 fish/m and ranged from 0.83 fish/m in station 3-6 to 0.37 fish/m in station 4-8. During the 2005 surveys, estimates of BCT averaged 1.35 fish/m and ranged from 0.94 fish/m in station 3-6 to 1.76 fish/m in station 4-8. (Smith 2005a)

During the period between 1997 and 2004, population data using the abundance of BCT within the upper Strawberry River show no statistically significant change in the overall abundance of cutthroat trout during the period between 1997 and 2004 ($P < 0.05$; $r^2 = 0.44$). Fish population data show that for the time period between 1997 and 2005, fish densities for the upper Strawberry River averaged 0.90 fish/m and ranged from an average of 0.39 fish/m during 2003 to an average of 1.35 fish/m during 2005. However, these data do show an increase in the densities of fish observed within the sample stations over the time period between 2003 and 2005 were fish densities increased from an average of 0.39 fish/m during 2003 to an average of 1.35 fish/m during 2005. (Smith 2005a)

During the period between 2003 and 2005, population data using indices of overall condition (K Factor) for BCT within the upper Strawberry River show a statistically significant increase in the overall condition of cutthroat trout during this time period ($P < 0.20$; $r^2 = 0.83$). The overall condition of cutthroat trout in the drainage has historically averaged .99 and ranges from an average of .92 during 2003 to an average of 1.10 during 2005. (Smith 2005a)

Additional information used in this review relative to the status of BCT populations in the Strawberry River drainage is available in *Bonneville Cutthroat Trout Populations of the Uinta National Forest* (Smith 2004a) and *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith and Smith 2005).

Aquatic Habitat

Existing habitat data for the Strawberry River drainage consists of Habitat Quality Index (HQI) surveys conducted by UDWR during 1985, 1997, and 2002 (Binns 1982) and R1/R4 habitat surveys (Overton et al. 1997) and Habitat Suitability Index (HSI) surveys (Hickman and Raleigh 1982) conducted by the USFS during 2003, 2004, and 2005. Additional surveys, using other habitat survey protocols, used in this analysis are cataloged for reference and review in *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith and Smith 2005). Specific sampling protocols for fish habitat on the Uinta National Forest are detailed in the *Cutthroat Trout Habitat Monitoring Plan and Protocols for the Uinta National Forest* (Smith and Lyman 2004b).

Results of the 2005 R1/R4 and HSI surveys indicate that the habitat suitability for cutthroat trout in the upper Strawberry River is good with a combined HSI score of 0.84. Habitat Suitability Index scores for the upper Strawberry River have historically averaged 0.90 and ranged from 0.84 during 2005 to 0.94 during 2004. Currently the most limiting habitat factor identified for the upper Strawberry River is the amount of available pool habitat and overall pool quality with HSI scores of 0.61 and 0.45 respectively. (Smith 2005a)

After review of the available habitat survey information, it is concluded that aquatic habitat in the Strawberry River is sufficient to support existing populations of fish and other aquatic species at their present levels.

Additional information used in this review relative to the life history and habitat requirements of cutthroat trout and aquatic habitat conditions on the Uinta National Forest is available in *Bonneville Cutthroat Trout Populations of the Uinta National Forest* (Smith 2004a).

Murdock Hollow Drainage

The Murdock Hollow drainage is located within the Northeastern GU for Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*). Streams in the watershed were historically inhabited by Colorado River cutthroat trout. Colorado River cutthroat trout (CRCT) are a USFS Region 4 and State of Utah listed sensitive species and conservation agreements between the USFS and UDWR have been developed for this species. The construction of Strawberry Reservoir fragmented and isolated headwater populations of CRCT, and subsequent fisheries enhancement activities during the 1990s and the introduction of non-native fish species is believed to have eliminated any remnant genetically pure CRCT populations within the Murdock Hollow drainage. Consequently, no conservation or persistence populations for CRCT have been identified within the Murdock Hollow drainage.

Fish Populations

The Bear Lake strain of BCT has been introduced into the Strawberry River drainage and populations occur within a number of the stream systems including Murdock Hollow. Bonneville cutthroat trout are a USFS Region 4 and State of Utah listed sensitive species and conservation agreements between the USFS and the UDWR have been developed for this species; however, no conservation or persistence populations for BCT have been identified within the Murdock Hollow watershed. Other native fish species believed to be present within the drainage include mottled sculpin (*Cottus bairdi*) and speckled dace (*Rinichthys osculus yarrowi*) (Sigler and Sigler 1996).

In addition to Bonneville cutthroat trout, rainbow trout (*Oncorhynchus mykiss*) have the potential to be present in the Murdock Hollow drainage. Other non-native fish species that may potentially occur within the watershed include Kokanee salmon (*Oncorhynchus nerka*). Sterile rainbow trout are currently stocked by the UDWR to supplement popular recreational fisheries in some locations within the management area, while hatchery operations by the UDWR on the Strawberry River support popular recreational fisheries for both cutthroat trout and kokanee in Strawberry Reservoir. (Smith 2005b)

Rare Aquatic Invertebrates

The distribution of aquatic macro-invertebrates considered by the UDWR to be rare or imperiled is not well documented. Observations of these species on the Forest are sporadic and in many cases relatively outdated. Although one species of rare aquatic snail, the glossy valvata (*Valvata humeralis*), has been documented to occur within the management area there are no records of this species being observed within the Murdock Hollow drainage (NatureServe 2005). (Smith 2005b)

Threatened, Endangered, and Sensitive (TES) Species

The Bear Lake strain of BCT is the only TES aquatic species known to inhabit the Murdock Hollow drainage (USDA 2003b). This species was introduced into the watershed following the Rotenone treatment of the Strawberry Reservoir system during the 1990s. Because native populations of aquatic MIS for the Uinta National Forest no longer occur within the Murdock Hollow drainage, the USFS does not conduct fish population surveys in the drainage as part of the MIS monitoring program (Smith and Lyman 2004a). However, the USFS does conduct fish habitat and population monitoring surveys for watersheds on the Forest in which significant land management activities and/or projects have been identified and this information is available for the Murdock Hollow drainage.

Fish populations in the Murdock Hollow drainage are assessed using standard electrofishing multiple pass removal depletion protocols (Ricker 1975). These surveys were conducted during 2005 and are cataloged for reference and review in *Fisheries and Aquatic Resources Data of the Uinta National*

Forest (Smith and Smith 2005). Specific sampling protocol for fish populations on the Uinta National Forest is detailed in the *Cutthroat Trout Monitoring Plan and Protocols for the Uinta National Forest* (Smith and Lyman 2004a).

Fish population data for Murdock Hollow includes information collected during electrofishing surveys conducted by the USFS which indicate an estimated density of 0.45 fish/m for BCT during 2005. Fish population data using indices of overall condition (K Factor) for BCT within the Murdock Hollow drainage were not obtained during the 2005 surveys as all fish collected were < 100 mm in length. (Smith 2005b)

Additional information used in this review relative to the status of BCT populations in the Murdock Hollow drainage is available in *Bonneville Cutthroat Trout Populations of the Uinta National Forest* (Smith 2004a) and *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith and Smith 2005).

Aquatic Habitat

Existing habitat data for Murdock Hollow consists of R1/R4 habitat surveys (Overton et al. 1997) and Habitat Suitability Index (HSI) surveys (Hickman and Raleigh 1982) conducted by the USFS during 2005. Additional surveys, using other habitat survey protocols, used in this analysis are cataloged for reference and review in *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith and Smith 2005). Specific sampling protocols for fish habitat on the Uinta National Forest are detailed in the *Cutthroat Trout Habitat Monitoring Plan and Protocols for the Uinta National Forest* (Smith and Lyman 2004b).

Results of the 2005 R1/R4 and HSI surveys indicate that the habitat suitability for cutthroat trout in the Murdock Hollow drainage was good with a combined HSI score of 0.73. Currently the most limiting habitat factor identified for the drainage is habitat (thalweg) depth and overall pool quality with HSI scores of 0.12 and 0.30 respectively. (Smith 2005b)

After review of the available habitat survey information, it is concluded that aquatic habitat in Murdock Hollow is sufficient to support existing populations of fish and other aquatic species at their present levels.

Additional information used in this review relative to the life history and habitat requirements of cutthroat trout and aquatic habitat conditions on the Uinta National Forest is available in *Bonneville Cutthroat Trout Populations of the Uinta National Forest* (Smith 2004a).

Clyde Creek Drainage

The Clyde Creek drainage is located within the Northeastern GU for Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*). Streams in the watershed were historically inhabited by Colorado River cutthroat trout. Colorado River cutthroat trout (CRCT) are a USFS Region 4 and State of Utah listed sensitive species and conservation agreements between the USFS and UDWR have been developed for this species. The construction of Strawberry Reservoir fragmented and isolated headwater populations of CRCT, and subsequent fisheries enhancement activities during the 1990s and the introduction of non-native fish species is believed to have eliminated any remnant genetically pure CRCT populations within the Clyde Creek drainage. Consequently, no conservation or persistence populations for CRCT have been identified within the Clyde Creek drainage.

Fish Populations

The Bear Lake strain of BCT have been introduced into the Strawberry River drainage and populations occur within a number of the stream systems including Clyde Creek. Bonneville cutthroat trout are a USFS Region 4 and State of Utah listed sensitive species and conservation agreements between the USFS and the UDWR have been developed for this species; however, no conservation or persistence populations for BCT have been identified within the Clyde Creek watershed.

Other native fish species present within the Clyde Creek drainage include mottled sculpin (*Cottus bairdi*), mountain sucker (*Catostomus platyrhynchus*), Utah sucker (*Catostomus ardens*), redbside shiner (*Richardsonius balteatus*), and speckled dace (*Rinichthys osculus yarrowi*). Although thought to be present in the Clyde Creek drainage prior to the 1990 Rotenone treatment of the Strawberry River watershed, leatherside chub (*Gila copei*) and Utah chub (*Gila atraria*) are no longer found in the drainage. (Sigler and Sigler 1996).

In addition to Bonneville cutthroat trout, rainbow trout (*Oncorhynchus mykiss*) have been observed in the Clyde Creek drainage. Other non-native fish species that may potentially occur within the watershed include Kokanee salmon (*Oncorhynchus nerka*). Sterile rainbow trout are currently stocked by the UDWR to supplement popular recreational fisheries in some locations within the management area, while hatchery operations by the UDWR on the Strawberry River support popular recreational fisheries for both cutthroat trout and Kokanee in Strawberry Reservoir.

Rare Aquatic Invertebrates

The distribution of aquatic macro-invertebrates considered by the UDWR to be rare or imperiled is not well documented. Observations of these species on the Forest are sporadic and in many cases relatively outdated. Although one species of rare aquatic snail, the glossy valvata (*Valvata humeralis*), has been documented to occur within the management area there are no records of this species being observed within the Clyde Creek drainage (NatureServe 2005). (Smith 2005c)

Threatened, Endangered, and Sensitive (TES) Species

The Bear Lake strain of BCT are the only TES aquatic species known to inhabit the Clyde Creek drainage (USDA 2003b). This species was introduced into the watershed following the Rotenone treatment of the Strawberry Reservoir system during the 1990s. Because native populations of aquatic MIS for the Uinta National Forest no longer occur within the Clyde Creek drainage, the USFS does not conduct fish population surveys in the drainage as part of the MIS monitoring program (Smith and Lyman 2004a). However, the USFS does conduct fish habitat and population monitoring surveys for watersheds on the Forest in which significant land management activities and/or projects have been identified and this information is available for the Clyde Creek drainage.

Fish populations in the Clyde Creek drainage are assessed using Habitat Quality Index (HQI) modeling techniques (Binns 1982), standard electrofishing multiple pass removal depletion protocols (Ricker 1975), and snorkel count survey protocols (Thurow 1994). These surveys currently span the time period between 1973 and 2005 and are cataloged for reference and review in *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith and Smith 2005). Specific sampling protocol for fish populations on the Uinta National Forest is detailed in the *Cutthroat Trout Monitoring Plan and Protocols for the Uinta National Forest* (Smith and Lyman 2004a).

Fish population data for Clyde Creek include information collected during fish population surveys conducted by the UDWR during 1998 and USFS during 2005. Electrofishing surveys conducted by the

UDWR indicate an estimated density of 1.97 fish/m for BCT during 1998 (Wilson et. al. 2004). Snorkel count surveys conducted by the USFS during 2005 estimated cutthroat trout densities in lower Clyde Creek to be 1.26 fish/m. Although cutthroat trout population data for Clyde Creek show an apparent decrease in fish abundance over this time period the data are not sufficient to determine statistically significant changes. (Smith 2005c)

Fish population data using indices of overall condition (K Factor) for BCT within the Clyde Creek drainage were not obtained during the 1998 and 2005 surveys. (Smith 2005c)

Additional information used in this review relative to the status of BCT populations in the Clyde Creek drainage are available in *Bonneville Cutthroat Trout Populations of the Uinta National Forest* (Smith 2004a) and *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith and Smith 2005).

Aquatic Habitat

Existing habitat data for Clyde Creek consists of R1/R4 habitat surveys (Overton et al. 1997) and Habitat Suitability Index (HSI) surveys (Hickman and Raleigh 1982) conducted by the USFS during 2005. Additional surveys, using other habitat survey protocols, used in this analysis are cataloged for reference and review in *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith and Smith 2005). Specific sampling protocols for fish habitat on the Uinta National Forest are detailed in the *Cutthroat Trout Habitat Monitoring Plan and Protocols for the Uinta National Forest* (Smith and Lyman 2004b).

Results of the 2005 R1/R4 and HSI surveys indicate that the habitat suitability for cutthroat trout in Clyde Creek was good with a combined HSI score of 0.74. Currently the most limiting habitat factor identified for the Clyde Creek drainage is the amount of available pool habitat and overall pool quality with HSI scores of 0.56 and 0.30 respectively. (Smith 2005c)

After review of the available habitat survey information, it is concluded that aquatic habitat in Clyde Creek is sufficient to support existing populations of fish and other aquatic species at their present levels.

Additional information used in this review relative to the life history and habitat requirements of cutthroat trout and aquatic habitat conditions on the Uinta National Forest is available in *Bonneville Cutthroat Trout Populations of the Uinta National Forest* (Smith 2004a).

Little Hobble Creek Drainage

The Little Hobble Creek drainage is located within the Northeastern GU for Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*). Streams in the watershed were historically inhabited by Colorado River cutthroat trout. Colorado River cutthroat trout (CRCT) are a USFS Region 4 and State of Utah listed sensitive species and conservation agreements between the USFS and UDWR have been developed for this species. The construction of Strawberry Reservoir fragmented and isolated headwater populations of CRCT, and subsequent fisheries enhancement activities during the 1990s and the introduction of non-native fish species is believed to have eliminated any remnant genetically pure CRCT populations within the Little Hobble Creek drainage. Consequently, no conservation or persistence populations for CRCT have been identified within the Little Hobble Creek drainage.

Fish Populations

The Bear Lake strain of BCT have been introduced into the Strawberry River drainage and populations occur within a number of the stream systems including Little Hobble Creek. Bonneville cutthroat trout are a USFS Region 4 and State of Utah listed sensitive species and conservation agreements between the USFS and the UDWR have been developed for this species; however, no conservation or persistence populations for BCT have been identified within the Little Hobble Creek watershed.

Other native fish species present within the Little Hobble Creek drainage include mottled sculpin (*Cottus bairdi*), mountain sucker (*Catostomus platyrhynchus*), Utah sucker (*Catostomus ardens*), redbreast shiner (*Richardsonius balteatus*), and speckled dace (*Rinichthys osculus yarrowi*). Although thought to be present in the Little Hobble Creek drainage prior to the 1990 Rotenone treatment of the Strawberry River watershed, leatherside chub (*Gila copei*) and Utah chub (*Gila atraria*) are no longer found in the drainage. (Sigler and Sigler 1996).

In addition to Bonneville cutthroat trout, rainbow trout (*Oncorhynchus mykiss*) have been observed in the Little Hobble Creek drainage. Other non-native fish species that may potentially occur within the watershed include Kokanee salmon (*Oncorhynchus nerka*). Sterile rainbow trout are currently stocked by the UDWR to supplement popular recreational fisheries in some locations within the management area, while hatchery operations by the UDWR on the Strawberry River support popular recreational fisheries for both cutthroat trout and kokanee in Strawberry Reservoir.

Rare Aquatic Invertebrates

The distribution of aquatic macro-invertebrates considered by the UDWR to be rare or imperiled is not well documented. Observations of these species on the Forest are sporadic and in many cases relatively outdated. However, one species of rare aquatic snail, the glossy valvata (*Valvata humeralis*), has been documented to occur within the management area. However, there are no records of this species being observed within the Little Hobble Creek drainage (NatureServe 2005). (Smith 2005d)

Threatened, Endangered, and Sensitive (TES) Species

The Bear Lake strain of BCT are the only TES aquatic species known to inhabit the Little Hobble Creek drainage (USDA 2003b). This species was introduced into the watershed following the Rotenone treatment of the Strawberry Reservoir system during the 1990s. Because native populations of aquatic MIS for the Uinta National Forest no longer occur within the Little Hobble Creek drainage, the USFS does not conduct fish population surveys in the drainage as part of the MIS monitoring program (Smith and Lyman 2004a). However, the USFS does conduct fish habitat and population monitoring surveys for watersheds on the Forest in which significant land management activities and/or projects have been identified and this information is available for the Little Hobble Creek drainage.

Fish populations in Little Hobble Creek drainage are assessed using Habitat Quality Index (HQI) modeling techniques (Binns 1982), standard electrofishing multiple pass removal depletion protocols (Ricker 1975), and snorkel count survey protocols (Thurow 1994). These surveys currently span the time period between 1998 and 2005 and are cataloged for reference and review in *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith and Smith 2005). Specific sampling protocols for fish populations on the Uinta National Forest are detailed in the *Cutthroat Trout Monitoring Plan and Protocols for the Uinta National Forest* (Smith and Lyman 2004a).

Fish population data for Little Hobble Creek include information collected during fish population surveys conducted by the UDWR during 1998 and USFS during 2004 and 2005. Electrofishing surveys

conducted by the UDWR found BCT densities of 1.85 fish/m during 1998 (Wilson et. al. 2004). Snorkel count surveys conducted by the USFS during 2004 and 2005 indicate that cutthroat trout densities in lower Little Hobble Creek averaged 1.03 fish/m and ranged from 0.81 fish/m during 2004 to 1.24 fish/m during 2005. Although these data show an apparent 65 percent increase in estimated cutthroat trout densities between 2004 and 2005 the data are not sufficient to determine statistically significant changes over this time period. (Smith 2005d)

Fish population data using indices of overall condition (K Factor) for BCT within the Little Hobble Creek drainage were not obtained during the surveys. (Smith 2005d)

Additional information used in this review relative to the status of BCT populations in the Little Hobble Creek drainage are available in *Bonneville Cutthroat Trout Populations of the Uinta National Forest* (Smith 2004a) and *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith and Smith 2005).

Aquatic Habitat

Existing habitat data for Little Hobble Creek consists of R1/R4 habitat surveys (Overton et al. 1997) and Habitat Suitability Index (HSI) surveys (Hickman and Raleigh 1982) conducted by the USFS during 2004 and 2005. Additional surveys, using other habitat survey protocols, used in this analysis are cataloged for reference and review in *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith and Smith 2005). Specific sampling protocols for fish habitat on the Uinta National Forest are detailed in the *Cutthroat Trout Habitat Monitoring Plan and Protocols for the Uinta National Forest* (Smith and Lyman 2004b).

Results of the 2005 R1/R4 and HSI surveys indicate that the habitat suitability for cutthroat trout in Little Hobble Creek was good with a combined HSI score of 0.84 with the most limiting habitat factor identified as percent fines < 3 mm in riffle-run habitat with an HSI score of 0.55. Habitat Suitability Index scores for Little Hobble Creek have historically averaged 0.89 and ranged from 0.84 during 2005 to 0.94 during 2004. Although current HSI scores show a decline in habitat suitability for the drainage since the 2004 surveys the data are not sufficient to determine a statistically significant change in overall habitat quality. (Smith 2005d)

After review of the available habitat survey information, it is concluded that aquatic habitat in Little Hobble Creek is sufficient to support existing populations of fish and other aquatic species at their existing levels.

Additional information used in this review relative to the life history and habitat requirements of cutthroat trout and aquatic habitat conditions on the Uinta National Forest is available in *Bonneville Cutthroat Trout Populations of the Uinta National Forest* (Smith 2004a).

Deer Creek Reservoir Management Area

The Deer Creek Reservoir Management Area is bounded by the Uinta National Forest boundary on the north and by the natural boundaries of the Deer Creek Reservoir watershed. Less than 20 percent of the total watershed area is within the proclaimed boundary of the Uinta National Forest. The majority of the balance of the watershed is in private ownership. Precipitation at Deer Creek Reservoir averages between 16 and 20 inches per year, while the mountains in the management area average in excess of 30 inches annually. (USDA 2003a)

The management area is a watershed for several small communities, the largest of which is Heber City with a population of approximately 5,610. Deer Creek Reservoir lies within state lands in the northern portion of the watershed. This reservoir is a major storage facility providing culinary water to over a million people in Utah and Salt Lake Counties. (USDA 2003a)

The main stem channel of the Provo River is located near the northern and western border of the watershed outside of the National Forest boundary. In the recent past, portions of the Main Canyon channel of the Provo River have not had perennial flow; however, the Central Utah Project Completion Act directed minimum perennial flows between Jordanelle and Deer Creek Reservoirs following the completion of Jordanelle Reservoir. The Provo River below Deer Creek Reservoir, just outside of the northwest corner of the management area, is managed as a blue ribbon sport fishery and is stocked with non-native fish species. The tributaries are perennial in the lower reaches near the Provo River, except where dewatered by irrigation diversions. Tributaries become intermittent to ephemeral in upper reaches. All areas of the watershed drain into Deer Creek Reservoir. All tributaries from Heber and South Kamas Valleys drain into the Provo River. Tributaries from Round Valley drain directly into Deer Creek Reservoir. There are approximately 38 miles of perennial and 69 miles of intermittent streams within the management area on National Forest System lands. Water uses from the management area include stock water, domestic, irrigation, and storage. (USDA 2003a)

Watersheds located in the Deer Creek Reservoir Management Area that are part of this analysis include the Main Canyon Creek and Daniels Creek drainages.

Main Canyon Creek Drainage

The Main Canyon Creek drainage is located within the Northern Bonneville Geographic Unit for BCT. Bonneville cutthroat trout are a USFS Region 4 and State of Utah listed sensitive species. Conservation agreements with the Utah Division of Wildlife Resources (UDWR) have been developed for this species (UDNR 1997a; 2000a).

Fish Populations

The population of BCT within the Main Canyon Creek drainage has not been identified as either a persistence and/or conservation population in the *Conservation Agreement and Strategy for BCT in the State of Utah* (UDNR 1997a). Other native fish species present within the drainage include mottled sculpin (*Cottus bairdi*), mountain sucker (*Catostomus platyrhynchus*), redbside shiner (*Richardsonius balteatus*), and Utah chub (*Gila atraria*) (Sigler and Sigler 1996). Non-native German Brown Trout (*Salmo Trutta*) and rainbow trout (*Oncorhynchus mykiss*) have been introduced into and still occupy suitable habitat within the drainage. Both German brown trout and rainbow trout present a risk to the recovery and future viability of cutthroat trout populations throughout the drainage.

The Main Canyon Creek drainage is also located within the identified historic range for leatherside chub, a native species that is a State of Utah listed sensitive species. The life history and habitat requirements of this species are poorly understood and its current distribution and abundance is not well known, however, observations of leatherside chub have not been reported for the drainage. (Sigler and Sigler 1996)

Rare Aquatic Invertebrates

The distribution of aquatic macroinvertebrates considered by the UDWR to be rare or imperiled is not well documented. Observations of these species on the Forest are sporadic and in many cases relatively

outdated. However, no observations of state listed rare or imperiled aquatic macroinvertebrates have been reported for the Deer Creek Management Area. (Smith 2005e)

Threatened, Endangered, and Sensitive (TES) Species

Bonneville cutthroat trout is the only TES aquatic species known to currently inhabit the Main Canyon Creek drainage. Although the Main Canyon Creek drainage is located within the historic range of the Utah valvata snail (*Valvata utahensis*), the species is believed to have been extirpated from Utah and does not occur within the drainage (NatureServe 2005). The drainage is also outside the historic range of Colorado River cutthroat trout (*Oncorhynchus pleuriticus*) and June sucker (*Chasmistes liorus*) and these species are currently not found in the area.

Fish populations in Strawberry River drainage are assessed using Habitat Quality Index (HQI) modeling techniques (Binns 1982), standard electrofishing multiple pass removal depletion protocols (Ricker 1975), and snorkel count survey protocols (Thurow 1994). These surveys currently span the time period between 1996 through 2005 and are cataloged for reference and review in *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith and Smith 2005). Specific sampling protocols for fish populations on the Uinta National Forest are detailed in the *Cutthroat Trout Monitoring Plan and Protocols for the Uinta National Forest* (Smith and Lyman 2004a).

Fish population data for Main Canyon Creek include information collected during fish population surveys conducted by the UDWR during 1996 and USFS during 2005. Electrofishing surveys were conducted by UDWR at three locations on Main Canyon Creek during 1996 – lower Main Canyon Creek, Brumley Fork, and Glen Cabin Creek where BCT densities were estimated to be 1.23 fish/m, 1.11 fish/m, and 0.79 fish/m respectively (Wiley 1997). Snorkel count surveys conducted by the USFS during 2005 estimated cutthroat trout densities in Main Canyon Creek near the confluence with Glen Cabin Creek to be 1.06 fish/m. (Smith 2005e)

Population data, using indices of overall condition (K Factor) for BCT within the Main Canyon Creek drainage is not available for the period between 1996 and 2005 because condition data for BCT were not obtained during the surveys. (Smith 2005e)

Additional information used in this review relative to the status of BCT populations in the Main Canyon Creek drainage is available in *Bonneville Cutthroat Trout Populations of the Uinta National Forest* (Smith 2004) and *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith and Smith 2005).

Aquatic Habitat

Existing habitat data for the Main Canyon Creek drainage consists of R1/R4 habitat surveys (Overton et al. 1997) and Habitat Suitability Index (HSI) surveys (Hickman and Raleigh 1982) conducted by the USFS during 2005. Additional surveys, using other habitat survey protocols, used in this analysis are cataloged for reference and review in *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith and Smith 2005). Specific sampling protocols for fish habitat on the Uinta National Forest are detailed in the *Cutthroat Trout Habitat Monitoring Plan and Protocols for the Uinta National Forest* (Smith and Lyman 2004b).

Results of the 2005 R1/R4 and HSI surveys indicate that the habitat suitability for cutthroat trout in the Main Canyon Creek drainage is good with a combined HSI score of 0.79. Currently the most limiting habitat factor identified for the Main Canyon Creek drainage is overall pool quality with an HSI score of

0.60. After review of the available habitat survey information, it is concluded that aquatic habitat in the Main Canyon Creek drainage is sufficient to support existing populations of fish and other aquatic species at their present levels. (Smith 2005e)

Additional information used in this review relative to the life history and habitat requirements of cutthroat trout and aquatic habitat conditions on the Uinta National Forest is available in *Bonneville Cutthroat Trout Populations of the Uinta National Forest* (Smith 2004).

Daniels Creek Drainage

The Daniels Creek drainage is located within the Northern Bonneville Geographic Unit for BCT. Bonneville cutthroat trout are a USFS Region 4 and State of Utah listed sensitive species. Conservation agreements with the Utah Division of Wildlife Resources (UDWR) have been developed for this species (UDNR 1997a; 2000a).

Fish Populations

The population of BCT within the Daniels Creek drainage has not been identified as either a persistence or conservation population in the *Conservation Agreement and Strategy for BCT in the State of Utah* (UDNR 1997a). Other native fish species present within the drainage include mottled sculpin (*Cottus bairdi*), mountain sucker (*Catostomus platyrhynchus*), redbelt shiner (*Richardsonius balteatus*), and Utah chub (*Gila atraria*) (Sigler and Sigler 1996). Non-native German Brown Trout (*Salmo Trutta*) and rainbow trout (*Oncorhynchus mykiss*) have been introduced into and still occupy suitable habitat within the drainage. Both German brown trout and rainbow trout present a risk to the recovery and future viability of cutthroat trout populations throughout the drainage.

The Daniels Creek drainage is also located within the identified historic range for leatherside chub, a native species that is a State of Utah listed sensitive species. The life history and habitat requirements of this species are poorly understood and its current distribution and abundance is not well known, however, observations of leatherside chub have not been reported for the drainage. (Sigler and Sigler 1996)

Rare Aquatic Invertebrates

The distribution of aquatic macroinvertebrates considered by the UDWR to be rare or imperiled is not well documented. Observations of these species on the Forest are sporadic and in many cases relatively outdated. However, no observations of state listed rare or imperiled aquatic macroinvertebrates have been reported for the Deer Creek Management Area (NatureServe 2005). (Smith 2005f)

Threatened, Endangered, and Sensitive (TES) Species

Bonneville cutthroat trout is the only TES aquatic species known to currently inhabit the Daniels Creek drainage. Although the Daniels Creek drainage is located within the historic range of the Utah valvata snail (*Valvata utahensis*), the species is believed to have been extirpated from Utah and does not occur within the drainage (NatureServe 2005). The drainage is also outside the historic range of Colorado River cutthroat trout (*Oncorhynchus pleuriticus*) and June sucker (*Chasmistes liorus*) and these species are currently not found in the area.

Fish population and habitat monitoring data for the Daniels Creek include information collected during fish population surveys conducted by the USFS during 2005 as well as habitat information collected during R1/R4 and HSI surveys also conducted by the USFS during 2005 (Smith and Smith 2005).

Fish population data for Daniels Creek include information collected during fish population surveys conducted by the USFS during 2005. Electrofishing surveys indicate that cutthroat trout densities in Daniels Creek averaged 0.49 fish/m. (Smith 2005f)

Fish population data using indices of overall condition (K Factor) for BCT within the Daniels Creek drainage show that during 2005 the average overall condition of cutthroat trout in the drainage was 0.99. (Smith 2005f)

Additional information used in this review relative to the status of BCT populations in the Daniels Creek drainage is available in *Bonneville Cutthroat Trout Populations of the Uinta National Forest* (Smith 2004a) and *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith and Smith 2005).

Aquatic Habitat

Existing habitat data for the Daniels Creek drainage consists of R1/R4 habitat surveys (Overton et al. 1997) and Habitat Suitability Index (HSI) surveys (Hickman and Raleigh 1982) conducted by the USFS during 2005. Additional surveys, using other habitat survey protocols, used in this analysis are cataloged for reference and review in *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith and Smith 2005). Specific sampling protocols for fish habitat on the Uinta National Forest are detailed in the *Cutthroat Trout Habitat Monitoring Plan and Protocols for the Uinta National Forest* (Smith and Lyman 2004b).

Results of the 2005 R1/R4 and HSI surveys indicate that the habitat suitability for cutthroat trout in the Daniels Creek drainage is very good with a combined HSI score of 0.91. Currently the most limiting habitat factor identified for the Daniels Creek drainage is overall pool quality with an HSI score of 0.60. After review of the available habitat survey information, it is concluded that aquatic habitat in the Daniels Creek drainage is sufficient to support existing populations of fish and other aquatic species at their present levels. (Smith 2005f)

Additional information used in this review relative to the life history and habitat requirements of cutthroat trout and aquatic habitat conditions on the Uinta National Forest is available in *Bonneville Cutthroat Trout Populations of the Uinta National Forest* (Smith 2004a).

Hobble Creek Management Area

The Hobble Creek Management Area lies within the Overthrust Mountains Geographic Area, and is located in Utah County. The management area includes the Left and Right Forks of Hobble Creek, Wardsworth Creek and Whiting Canyon, a smaller drainage, all draining into Utah Lake. Precipitation ranges from 15 to 20 inches at lower elevations and exceeds 30 inches in higher headwater areas. Most of this precipitation falls as snow during the winter. High intensity, short duration summer thunderstorms are common from July through September. (USDA 2003a)

There are approximately 232 miles of streams within the management area: approximately 31 miles are classified as perennial and 201 miles are classified as intermittent. The major streams within the management area include the Left and Right Forks of Hobble Creek, Wardsworth Creek, and Bartholomew and Whittemore Canyons. (USDA 2003a)

Water from the management area is used for stock and well water, irrigation, domestic uses, power, and municipalities. The management area provides municipal water for Springville City from the Bartholomew and Spring Canyon areas. Whiting Canyon provides municipal water for the city of

Mapleton. Bartholomew Canyon has been Federal Energy Regulatory Commission (FERC) relicensed. Riparian Habitat Conservation Area (RHCA) within the management area consists of 29 miles of Class I and 203 miles of Class III RHCA. (USDA 2003a)

Watersheds located in the Hobble Creek Management Area that are part of this analysis include the Wardsworth Creek drainage.

Wardsworth Creek Drainage

The Wardsworth Creek drainage is located within the Northern Bonneville Geographic Unit for BCT. Bonneville cutthroat trout are a USFS Region 4 and State of Utah listed sensitive species. Conservation agreements with the Utah Division of Wildlife Resources (UDWR) have been developed for this species (UDNR 1997a; 2000a).

Fish Populations

The population of BCT within the Wardsworth Creek drainage has been identified as a persistence population in the *Conservation Agreement and Strategy for BCT in the State of Utah* (UDNR 1997a). Other native fish species believed to be present within the drainage include mottled sculpin (*Cottus bairdi*), mountain sucker (*Catostomus platyrhynchus*), redbelt shiner (*Richardsonius balteatus*), and Utah chub (*Gila atraria*) (Sigler and Sigler 1996).

The Wardsworth Creek drainage is located within the identified historic range for leatherside chub, a native species that is a State of Utah listed sensitive species. The life history and habitat requirements of this species are poorly understood and its current distribution and abundance is not well known, however, observations of leatherside chub have not been reported for the drainage. (Sigler and Sigler 1996)

Non-native German brown trout (*Salmo Trutta*), Eastern brook trout (*Salvelinus fontinalis*), and rainbow trout (*Oncorhynchus mykiss*) have been introduced into and still occupy suitable habitat within the drainage. German brown trout, Eastern brook, and rainbow trout present a risk to the recovery and future viability of cutthroat trout populations throughout the drainage.

Rare Aquatic Invertebrates

The distribution of aquatic macroinvertebrates considered by the UDWR to be rare or imperiled is not well documented. Observations of these species on the Forest are sporadic and in many cases relatively outdated. However, three species, coarse rams-horn (*Planorbella binneyi*), creeping ancyliid (*Ferrissia rivularis*), and taiga bluet (*Coenagrion resolutum*) have been documented on the Forest or in waters immediately adjacent to the Forest and have the potential to be present within the management area (NatureServe 2005). (Smith 2005g)

Threatened, Endangered, and Sensitive (TES) Species

Bonneville cutthroat trout is the only TES aquatic species known to currently inhabit the Wardsworth Creek drainage. Although the Wardsworth Creek drainage is located within the historic range of the Utah valvata snail (*Valvata utahensis*), the species is believed to have been extirpated from Utah and does not occur within the drainage (NatureServe 2005). The drainage is also outside the historic range of Colorado River cutthroat trout (*Oncorhynchus pleuriticus*) and June sucker (*Chasmistes liorus*) and these species are currently not found in the area.

Fish population monitoring data for the Wardsworth Creek drainage includes information collected during electrofishing surveys conducted by the USFS during 2004 and 2005 (Smith and Smith 2005). Results of these surveys indicate that there are populations of Bonneville cutthroat trout, German brown trout, and Eastern brook trout within the drainage. Estimates indicate that when combined the densities of the salmonid population has historically averaged 0.71 fish/m and ranged from 0.46 fish/m during 2005 to 0.95 fish/m during 2004. Estimates using indices of overall condition (K Factor) show that the condition of the salmonid population in the drainage has historically averaged 1.09 and ranged from 1.04 during 2005 to 1.13 during 2004. (Smith 2005g)

Of the salmonid populations within the Wardsworth Creek drainage, German brown trout are the most numerous with densities that have historically averaged 0.39 fish/m and ranged from 0.23 fish/m during 2005 to 0.54 fish/m during 2004. Estimates using indices of overall condition (K Factor) show that the condition of the brown trout population in the drainage has historically averaged 1.09 and ranged from 1.07 during 2005 to 1.10 during 2004. (Smith 2005g)

The second most numerous salmonid in the Wardsworth Creek drainage is Eastern brook trout with estimated densities that have historically averaged 0.25 fish/m and ranged from 0.12 fish/m during 2005 to 0.38 fish/m during 2004. Estimates using indices of overall condition (K Factor) show that the condition of the brook trout population in the drainage has historically averaged 1.14 and ranged from 1.06 during 2005 to 1.22 during 2004. (Smith 2005g)

Bonneville cutthroat trout are the least numerous salmonid in the Wardsworth Creek drainage with estimated densities that have historically averaged 0.10 fish/m and ranged from 0.08 fish/m during 2004 to 0.11 fish/m during 2005. Estimates using indices of overall condition (K Factor) show that the condition of the cutthroat trout population in the drainage has historically averaged 1.02 and ranged from 0.98 during 2005 to 1.05 during 2004. (Smith 2005g)

Additional information used in this review relative to the status of BCT populations in the Wardsworth Creek drainage is available in *Bonneville Cutthroat Trout Populations of the Uinta National Forest* (Smith 2004a) and *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith and Smith 2005).

Aquatic Habitat

Existing habitat data for the Wardsworth Creek drainage consists of R1/R4 habitat surveys (Overton et al. 1997) conducted by the USFS during 2004 and 2005 as well as Habitat Suitability Index (HSI) surveys (Hickman and Raleigh 1982) conducted by the USFS during 2005. Additional surveys, using other habitat survey protocols, used in this analysis are cataloged for reference and review in *Fisheries and Aquatic Resources Data of the Uinta National Forest* (Smith and Smith 2005). Specific sampling protocols for fish habitat on the Uinta National Forest are detailed in the *Cutthroat Trout Habitat Monitoring Plan and Protocols for the Uinta National Forest* (Smith and Lyman 2004b).

Results of the 2005 R1/R4 and HSI surveys indicate that the habitat suitability for cutthroat trout in the Wardsworth Creek drainage is very good with a combined HSI score of 0.87. Currently habitat suitability is lowest for the juvenile life stage with a combined HSI score of 0.82. The most limiting habitat factors identified for the Wardsworth Creek drainage are overall pool quality and percent fines < 3 mm in riffle-run habitat with HSI scores of 0.60 and 0.64 respectively. (Smith 2005g)

After review of the available habitat survey information, it is concluded that aquatic habitat in the Wardsworth Creek drainage is sufficient to support existing populations of fish and other aquatic species at their present levels.

Additional information used in this review relative to the life history and habitat requirements of cutthroat trout and aquatic habitat conditions on the Uinta National Forest is available in *Bonneville Cutthroat Trout Populations of the Uinta National Forest* (Smith 2004a).

Environmental Consequences

The generalized effects of livestock grazing on fisheries and aquatic resources are detailed in the FEIS for the Uinta National Forest Land and Resource Management Plan (USDA 2003b) and *Effects of Livestock Grazing on Salmonid Populations and Habitat* (Smith 2005h). Effects specific to the proposed project are further detailed in *Upper Strawberry Allotment – Environmental Effects for Fisheries and Aquatic Resources* (Smith 2005j).

Proposed Action

In general, sheep prefer to graze in uplands and on slopes and tend to impact streambanks less than cattle. Unstable streambanks were compared in cattle versus sheep grazed streams across the Strawberry Watershed. This analysis resulted in no statistical difference in streambank stability between cattle versus sheep grazing. The average percent of unstable streambanks for both classes of livestock were approximately 21%. However, combining Mill B Pasture with West Daniels Cattle Allotment would increase the number of grazable acres per AUM, effectively decreasing livestock density throughout this portion of the project area. It is anticipated that this alternative will also result in improved livestock dispersal and flexibility in grazing management to meet desired conditions and Forest Plan consistency. (Project Record – Hydrology Report)

Under the proposed action, representative stream monitoring reaches will be established within portions of the Twin Peaks, Strawberry, and West Daniels allotments that would be converted to cattle in order to monitor streambank stability, streambank alteration, and woody/herbaceous riparian species. Based on monitoring data on these stream reaches, administrative changes in grazing management, as necessary, will be made to ensure that riparian, stream, and floodplain function does not decline following conversion from sheep to cattle grazing. (Project Record – Hydrology Report)

Under this alternative, aquatic habitat in the Upper Strawberry River is expected to improve. The closure of 1,300 acres adjacent to the Strawberry River will reduce sedimentation to Strawberry River through removal of livestock disturbance of vegetation, upland/riparian soils, and streambanks within this area. Following closure to grazing, this reach of the Strawberry River will move more rapidly toward desired conditions for stream channel and floodplain, reducing streambank related sedimentation by up to 17 tons per year (Project Record – Hydrology Report). The creation of the Trail Hollow Special Management Pasture and the Mill B Pasture will allow rangeland managers to closely manage vegetation utilization, upland/riparian groundcover, and streambank alteration. These design features are expected to reduce sediment delivery to the Strawberry River. (Project Record – Hydrology Report)

Through implementation of this alternative, there is a potential to increase habitat suitability for fish and other aquatic organisms. This improvement would be in the form of enhanced riparian vegetation health, stream channel stability, and decreased levels of sedimentation. It is anticipated that increased

aquatic habitat suitability would result in enhanced population viability, abundance, and diversity for fishes and other aquatic organisms within the action area.

Continuation of Current Grazing Management

Sheep grazed streams exhibited generally the same percentage of unstable streambanks as cattle grazed streams in the Strawberry Valley. Under this alternative the entire Strawberry Allotment would remain open to sheep grazing. The current rate of streambank alteration from grazing would likely continue to occur on the Strawberry River from Mill B to Headwaters and within the Right Fork of Clyde Creek.

Under current grazing management, representative stream monitoring reaches will be established within the Twin Peaks, Strawberry, and West Daniels allotments. These reaches would be utilized to monitor streambank stability, streambank alteration, and woody/herbaceous riparian species. Based on monitoring data on these stream reaches, administrative changes in grazing management, as necessary, will be made to ensure that Allotments within the Project Area meet Desired Conditions and are consistent with the Forest Plan. (Project Record - Hydrology Report)

Under this alternative, representative stream monitoring reaches will be established within portions of the Twin Peaks, Strawberry, and West Daniels allotments that would be converted to cattle in order to monitor streambank stability, streambank alteration, and woody/herbaceous riparian species. Based on monitoring data on these stream reaches, administrative changes in grazing management, as necessary, will be made to ensure that Allotments within the project area meet identified desired conditions and are consistent with the Forest Plan. (Project Record - Hydrology Report)

Current grazing management in the project area is resulting in minor exceedances of State Water Quality Standards (Hydrology Affected Environment). Sediment and phosphorous resulting from streambank erosion in Clyde Creek and on the Strawberry River from Mill B to Headwaters would continue to occur at present rates or, through administrative changes as necessary, improve.

Based on review of existing fish population and habitat monitoring data, current aquatic habitat conditions within the action area are sufficient to support existing populations of fish and aquatic organisms at their present levels. Continuation of the existing grazing management strategy would not inhibit nor would it significantly enhance the continued viability of existing populations of aquatic species and/or their habitat.

No Grazing Alternative

The no grazing alternative would most likely result in the greatest improvement to streams and wetland resources within the project area. The rate of improvement would be dependent on the existing condition of the stream or riparian resources. Establishment of stabilizing vegetation, improving streambank stability, and restoring stream/floodplain function in highly degraded or incised streams would recover at a slower rate than streams or wetlands in proper functioning condition or better.

Upland sediment production would be reduced as a result of decreased bare soils, increased vegetation/litter cover, and decreased overall soil erosion potential. Stream, riparian area, and wetland functions including establishment of woody/herbaceous riparian species, streambank stabilization, sediment filtration, flood reduction, and maintenance of streamflows would continue to improve without the impact from livestock. These functions would reduce sediment delivery to streams and wetlands,

improving water quality above existing conditions throughout the project area. (Project Record - Hydrology Report)

Associated improvements to the stream channel and riparian areas would it turn result in increased aquatic habitat suitability. Increased aquatic habitat suitability, for all life stages and species of fishes and aquatic organisms, would result in enhanced population viability as well as increased population abundance and diversity in areas currently most severely affected by grazing activities.

Geology and Soils

Affected Environment

The dominant geologic formations in the Project Area are the Duchesne, Uinta, and Green River Formations. These formations are primarily non-marine sedimentary rocks deposited during the Oligocene to Paleocene Geologic Periods (~66 to 24 million years ago). The Duchesne and Uinta Formations generally consist of beds of siltstone, shale, sandstone, and conglomerate. The Green River Formation generally includes inter-bedded sandstone, limestone, shale, and siltstone. Soils derived from these formations tend to be highly erodable and variable in composition and texture (SWRR pg 168).

The headwaters of Strawberry River and Co-Op Creek also include the Permian Kirkman Limestone and the Pennsylvanian-Permian Park City Formations. These formations are significant due to phosphate-rich layers within the stratum. Phosphorous naturally binds to soils and fine sediment, so high sediment loads may produce elevated phosphorous levels in streams that flow through these formations (SWRR pg 168).

Three separate soil surveys cover the upper Strawberry allotment project area:

1. Hobble Creek-Diamond Fork LSI Soil Survey, NRCS Soil Survey of Heber Valley Area, and the NRCS Soil Survey of Strawberry Valley. More in-depth discussion of soils and related attributes are included in the Soils Specialist Report for this project.

Upland Hill slope Bare Ground Analysis

Bare ground analysis was performed within each of the Strawberry watershed grazing allotments during the 2002 growing season. Study results are published in the Strawberry Watershed Restoration Report (USDA Forest Service, April 2004). Upland bare ground was analyzed using the nested frequency method for two vegetation types, aspen and sagebrush within each of the allotments.

The following table summarizes the overall main effects of grazing type versus bare ground. Statistically, there are differences in bare ground impacts between no-grazing versus cattle grazing, and between cattle versus sheep grazing, with cattle grazing resulting in higher amounts of bare ground. There are no statistical differences between no-grazing impacts and sheep grazing impacts.

Percent Bare Soil – Statistical Summary for Kind of Grazing.

Grazing Type	Number of Samples	Sample Mean % Bare Ground (± 90% Confidence Interval)
Cattle	23	25.1 ± 4.1

Grazing Type	Number of Samples	Sample Mean % Bare Ground (± 90% Confidence Interval)
Sheep	84	19.1 ± 1.8
None	23	13.8 ± 4.3

The following table summarizes the overall main effects of vegetation type versus bare ground. Statistically, there are differences in bare ground between aspen and sagebrush, with sagebrush having a higher occurrence of bare ground overall.

Percent Bare Soil – Statistical Summary for Type of Vegetation.

Vegetation Type	Number of Samples	Sample Mean % Bare Ground (± 90% Confidence Interval)
Aspen	69	15.7 ± 2.2
Sagebrush	61	23.3 ± 2.2

The following table summarizes the crossed effects on bare ground between grazing type versus vegetation type. Statistically, the following differences occur:

- Sagebrush has a higher occurrence of bare ground than aspen.
- Sheep grazed sagebrush has a higher occurrence of bare ground than sheep grazed aspen.
- Both sheep and cattle grazed aspen have a higher occurrence of bare ground than no-grazed aspen.

There are no statistical differences in bare ground resulting from the following:

- Cattle grazed aspen versus cattle grazed sagebrush.
- No-grazed sagebrush versus sheep and/or cattle grazed sagebrush.
- Cattle grazed aspen versus sheep grazed aspen.
- Cattle grazed sagebrush versus sheep grazed sagebrush.

Percent Bare Soil – Statistical Summary for Grazing by Vegetation

Grazing Type	% Bare Ground Sample Mean (± 90% C.I.)	
	Aspen	Sagebrush
Cattle	23.0 ± 5.8	27.9 ± 6.5
Sheep	15.7 ± 2.4	23.5 ± 2.5
None	4.9 ± 3.1	19.4 ± 5.7

US Forest Service Region IV Rangeland Inventory and Assessment

In 1997 a Memorandum of Understanding was executed by the US Forest Service, Bureau of Land Management, and the Natural Resource Conservation Service to standardize rangeland health assessment on public and private rangelands. Recommendations are given for Properly Functioning Conditions (PFC) of Intermountain Region rangelands as defined by ground cover. Ground cover includes vegetation, litter, rock (> 3/4 –inch), moss/lichens, and cryptogams (Region IV standard).

Ground cover is a rangeland attribute that generally relates to rangeland health. Proper functioning rangeland watersheds at any scale correlate to a protective ground cover that provides for basic functionality which is defined as sustaining the watershed components to provide for stability and recoverability of physical components.

Strawberry watershed rangeland conditions are within the Intermountain Region recommendations for aspen and sagebrush as shown in the following table, except for PNC in sagebrush. Sheep grazing means for the watershed are at the mid-point for both aspen and sage/grass. Cattle grazing means are slightly above PFC for sage/grass and slightly below PFC recommendations for aspen, but the mean confidence intervals are well within the PFC recommendations. Based on the Strawberry study, the no-grazing mean for aspen at Strawberry is within the PNC; however, the Strawberry study found the no-grazing mean for sage/grass at 81% cover versus the recommended PNC value of 88%. The Region IV standards are general recommendations for these vegetation types across the entire Intermountain region; therefore, some adjustment is necessary to fit the local environment within the grazing proposals. Therefore, for the Strawberry watershed, the PNC for sage/grass should be adjusted to 81% rather than Region IV’s PNC value of 88%.

Vegetation Cover Type	Region IV Recommendations % Cover	Strawberry Study (± 90% C.I.) % Cover
ASPEN		
PFC	80	77.0 ± 5.8 ⁽¹⁾
Mid	85	84.3 ± 2.4 ⁽²⁾
PNC	95	95.1 ± 3.1 ⁽³⁾
SAGE/GRASS		
PFC	70	72.1 ± 6.5 ⁽¹⁾
Mid	75	76.5 ± 2.5 ⁽²⁾
PNC	88	80.6 ± 5.7 ⁽³⁾

- (1) Cattle grazing mean within vegetation type
- (2) Sheep grazing mean within vegetation type
- (3) No grazing mean by vegetation within vegetation type

Upland Trend Data

Under current management, trend data for the Upper Strawberry allotments are shown in the following table. Upland trend data for range conditions in Strawberry watershed grazing allotments show that range trends for vegetation and ground cover are stable for 3 sites, up for one site, and down for 3 sites.

Upland Trend Data

Allotment	Trend Study Site	Vegetation	Year	Bare Ground %	Soil Trend	Geographic Location
Strawberry	Hogsback	Grass/forb	2002	22%	N/A	Upper elevations In Center Creek
Strawberry	Hogsback Exclosure	Grass/forb	2001	15% (8% in 1999)	Stable	Upper elevations In Center Creek
Strawberry	Strawberry	Grass/forb	2001	43% (34% in 1996)	Down	Upper elevations In Daniels Canyon
Twin Peaks	Jones Hollow	Aspen	2002	37% (44% in 1996)	Up	Strawberry Watershed
Twin Peaks	Buck Springs	Aspen/tall forb	1999	35% (26% in 1996)	Down	Strawberry Watershed

Allotment	Trend Study Site	Vegetation	Year	Bare Ground %	Soil Trend	Geographic Location
West Daniels	Snowcourse	Mountain brush/Sagebrush	2002	19% (22% in 1995)	Stable	Strawberry Watershed
West Daniels	Parker Canyon	Sagebrush	2002	40%	Down	Lower elevations In Daniels Canyon
West Daniels	Shingle Hollow	Aspen	2002	25% (29 in 1996)	Stable	Upper elevations In Daniels Canyon

Comparison between range trend data to the 2004 Strawberry Watershed Report requires understanding the differences between both studies. Upland trend data represent long term monitoring and are site specific. Some range study plots originally may have been installed to monitor problem areas and therefore may not be an accurate representation of the entire allotment. Data reported for the 2004 Strawberry watershed report are statistical means representing many study plots with sampling done in the 2002 growing season. The study was designed to represent differences in grazing types across the entire watershed with no implication towards trend. Unlike the range trend monitoring sites, the Strawberry Watershed Report monitoring sites were located randomly within a sample stratum with no bias regarding condition or trend.

Environmental Consequences

Proposed Action

The generalized effects of livestock grazing on geology and soils are detailed in the FEIS for the Uinta National Forest 2003 Land and Resource Management Plan (USDA 2003b) Current livestock grazing conditions for ground cover within Strawberry watershed allotments are within Region IV’s PFC and PNC for aspen and sage/grass vegetation communities. Management practices for minimizing bare ground, reducing soil erosion rates, and lowering sediment delivery to Strawberry River are included as part of the Proposed Action. Therefore, the proposed action would reduce overall grazing impacts when compared to grazing impacts under the current management plan.

Both the Strawberry and Deer Creek Reservoirs have Total Maximum Daily Load (TMDL) limits for maintaining existing water quality or reducing pollutant loading levels in tributaries within the project area of analysis that flow into the reservoirs. The Strawberry TMDL calls for no overall increase in total phosphorus amount, but requires a reduction in total phosphorus for tributaries and streams within the Strawberry Watershed to make up allocations for Future Sources and a Margin of Safety for phosphorus. The Deer Creek TMDL sets in-stream concentrations of 0.04 mg/L for Total Phosphorous. Total phosphorus inputs follow the sedimentation rates within the watershed. Any increase in sedimentation rates results in an increase in total phosphorus input. The proposed action helps meet the TMDL requirements for phosphorus by minimizing bare ground and increasing overall ground cover. Increased ground cover should reduce soil erosion and sediment delivery to drainages, thus helping decrease phosphorus delivery to Strawberry Reservoir.

West Daniels, Twin Peaks Allotments: With conversion of sheep grazing to cattle grazing in the southern two units of the Twin Peaks Allotment and combination with the West Daniel’s Allotment, there will be less AUMs per acre, since this will effectively increase the size of the West Daniels allotment from 10,524 acres to approximately 14,623 acres. Overall within the Strawberry watershed allotments, there is a greater incidence of bare ground from cattle grazing versus sheep grazing. However, with less AUMs per acre there should be less impact to upland hill slope vegetation, thus mitigating the increased potential for bare ground from cattle grazing. Long-term trend studies within

the West Daniel's allotment show either a downward trend or a stable trend for bare ground under historical and current grazing management practices. With less AUM's per acre there should be minimal potential increase in soil erosion and less impact on soil productivity with a corresponding improvement in long-term range trend.

Twin Peaks Allotment: The upper two-thirds of the Twin Peaks Allotment will remain under sheep grazing. Since there is no statistical difference in the amount of bare ground between no-grazing versus sheep grazing under current management practices within the Strawberry watershed and sheep grazing areas within aspen and sage/grass are at the mid point between PFC and PNC per Region IV's rangeland recommendations, the impact of continual sheep grazing overall should have minimal impact on bare ground and therefore minimal potential increase in soil erosion and impacts on soil productivity.

Strawberry Allotment: Overall, within the Strawberry watershed allotments, there is a greater incidence of bare ground from cattle grazing versus sheep grazing. Therefore, under current management practices and with conversion of sheep grazing to cattle grazing in the Strawberry Allotment there would be an increased potential for bare ground occurrence. However, there are several management changes proposed with this conversion: first, closing the 1,280 acre area along the west side of Strawberry River, and second, the 836 acre special management pasture for improving soils, vegetation, and water resources. With these management changes, overall grazing impacts should be significantly reduced for the allotment as a whole with a corresponding significant reduction in bare ground potential from reduced grazing pressure. There would still be a potential for increased bare ground in the actively grazed areas outside the closed and special management pasture areas. The application of mitigation measures and adherence to grazing standard criteria should help limit or prohibit the extent and intensity of potential increases in bare ground. Thus no significant adverse impact to soil productivity should occur.

Continuation of Current Management Alternative

Overall, within the Strawberry watershed allotments, there is a greater incidence of bare ground from cattle grazing versus sheep grazing. However, the Strawberry watershed rangeland conditions are within the Intermountain Region rangeland recommendations. Sheep grazing conditions are at the mid-point for both aspen and sage/grass. Cattle grazing conditions are within the PFC recommendations.

Under current management, trend studies are mixed. Grass/forb areas within the Strawberry allotment have a downward soil trend for cover. Aspen sites within the Twin Peaks allotment show both upward and downward trends. Sagebrush sites within the West Daniels allotment show both stable and downward trends, while the aspen site shows a stable trend for soil cover.

Based on trend study results and rangeland recommendation comparison results, the status quo for rangeland conditions under current management practices should continue under the current management alternative. Given existing conditions, future monitoring may dictate changes in livestock management to help avoid any detrimental soil disturbance and/or any significant reductions in soil productivity. The existing permits and Allotment Management Plans (AMPs) allow allotment management actions to be taken if trend studies show a continual downward trend for vegetative ground cover. Management changes could include a change in grazing patterns, timing, and/or grazing use patterns.

No Grazing Alternative

The no-grazing alternative will move rangeland conditions toward PNC and protect the soil resources from livestock grazing impacts. Currently, the Strawberry watershed rangeland conditions are within the Intermountain Region rangeland recommendations; that is, sheep grazing conditions are at the mid-point for both aspen and sage/grass and cattle grazing conditions are within the PFC recommendations. The rate at which rangeland conditions move toward PNC under this alternative is unknown, and is somewhat dependant on climate cycles and other use impacts on the watershed (e.g., recreation). However, based on the Strawberry Project Lands and its 13 year rest period from livestock grazing, rangeland conditions should be well within PFC and approaching PNC in approximately the same time frame.

Vegetation

Affected Environment

Upland Vegetation Communities

The project area is dominated by aspen vegetation types, containing varying amounts of spruce and fir also. Twin Peaks and West Daniels allotments are almost completely aspen. All the allotments contain scattered and small but important acreages of tall forb vegetation.

	West Daniels	Twin Peaks	Strawberry	Total
Vegetation Type	Acres	Acres	Acres	Acres
Bare ground	5	0	0	5
Grass	22	18	607	647
Sage/grass	486	438	76	1000
Sage/forb	0	0	15	15
Forb	43	451	10	504
Mt Brush	1295	737	117	2149
Riparian	126	737	100	367
Conifer	939	2100	398	3437
Aspen	7607	7561	3406	18577
	10525	11446	4729	26700

There are 18,577 acres classified as one of the aspen vegetation types in the three allotments. Aspen types make up the majority of the suitable range in the three allotments.

Common understory vegetation under aspen in the allotments include young trees of subalpine fir and Engelmann spruce, shrubs like snowberry (*Symphoricarpos*), aspen sprouts, and herbaceous species like needlegrasses (*Stipa* sp.), blue wild rye (*Elymus glaucus*), sedges (*Carex praegracilis* and others), wild pea (*Lathyrus* sp.), and mountain brome (*Bromus carinatus*).

There are about 3,437 acres dominated by a conifer overstory in the three allotments. Dominant conifer species include subalpine fir, Engelmann spruce, Douglas fir and white fir. In general, the conifer dominated areas do not support high levels of shrubs or herbaceous understories compared to other vegetation types. The combination of dense yearlong shade from the trees and heavy duff deposits limit understory habitat. Common understory species found under conifers include shrubs like snowberry,

creeping berberis (*B. repens*), ninebark (*Physocarpus malvaceus*), serviceberry (*Amelanchier alnifolia*), mountain lover (*Pachystima myrsinites*), chokecherry (*Prunus virginiana*), blueberries (*Vaccinium* spp.) and rose (*Rosa nutkana*). Herbaceous species include sedges (*Carex geyeri* and others), false solomon's seal (*Smilacina* sp.), columbine (*Aquilegia coerulea*), arnica (*Arnica cordifolia*), aster (*Aster engelmannii*), sweetroot (*Osmorhiza* spp.), meadowrue (*Thalictrum fendleri*) and wild pea (*Lathyrus* spp.).

There are approximately 2,150 acres of vegetation dominated by one or several upland shrubby species that are not sagebrush in the three allotments, particularly in the West Daniels allotment. Many of the stands are dominated by Gambel oak, bigtooth maple or both, some are dominated by snowberry, while others have no obvious dominant among several species or have some less common species as the dominant, such as curlleaf mountain mahogany.

In general, brush species are used mostly in fall and winter by browsing animals. Maple is used moderately by browsing wildlife, less by livestock. Oak and snowberry are less palatable to both animal classes, and can be poisonous to stock if too much is eaten. Mountain mahogany is among the most palatable upland browse species in the project area for both wildlife and livestock. Many of the brush stands are dense enough and cast enough litter to greatly inhibit growth of herbaceous understories.

Herbaceous species found among mountain brush include forbs like bedstraw (*Galium* spp.), balsamroot and mulesears (*Balsamorhiza* and *Wyethia* spp.), waterleaf (*Hydrophyllum capitatum*), fawnlily (*Erythronium grandiflorum*), asters (*Aster* spp.), thistles (*Cirsium* spp.), groundsels (*Senecio* spp.), wild peas and vetches (*Lathyrus* and *Vicia* spp.) and buckwheats (*Eriogonum* spp.) Grasses include slender and bluebunch wheatgrasses (*Elymus trachycaulus* and *Pseudoroegneria spicata*), bluegrasses (*Poa sandbergii*, *P. pratensis*, etc.), Letterman's needlegrass (*Stipa lettermannii*), bromes (*B. carinatus*, *B. inermis*).

Of the approximately 26,700 acres encompassed by the grazing allotments being analyzed, vegetation inventories show approximately 504 acres classified as "forb", and another 15 acres listed as "sage-forb". No vegetative condition transects have been located within any of the tall forb areas in the allotments under analysis, though ocular estimates show some of the remaining sites in low-seral stages.

Perennial forb-dominated vegetative communities are relatively rare on the landscape. They are a grouping of several sites ranging from dry, somewhat rocky and sloping to moist/wet and fairly flat, joined in being dominated by forbs mostly between 16 and 48 inches tall, and in the high diversity of plant species that comprise the late-seral communities. They often provide wildflower-rich photo opportunities favored by recreationists.

Common tall forb species in sites close to potential natural community are diverse, and include (from wetter sites to drier): tall bluebells (*Mertensia* spp.), tall larkspur (*Delphinium occidentale*), sweet cicely (*Osmorhiza occidentalis*), sticky geranium (*G. viscosissimum*), Indian paintbrushes (*Castilleja* spp.), showy and other stickseeds (*Hackelia* spp.), horsemint (*Agastache urticifolia*), lupines (*L.* spp.), Louisiana sage (*Artemisia ludoviciana*), showy goldeneye (*Viguiera multiflora*), yarrow (*Achillea millefolium*), groundsels (*Senecio* spp.), asters (*Aster* spp.), penstemons (*Penstemon* spp.) and sedges/grasses (*Carex* spp., *Melica*, *Bromus carinatus*, wheatgrasses, needlegrasses, junegrass and Sandberg's bluegrass). Shrubs like snowberry, currants, and sagebrush species are also commonly present in low densities.

As tall forb sites were degraded their species tended to shift to a few grazing resistant species such as bluebells, western coneflower (*Rudbeckia occidentalis*) or tarweed (*Madia glomerata*), dryland grasses, plus increased bare ground. Many historically known sites have actually disappeared (Sub-Regional PFC, 1998, page WM-39).

About 1,000 acres in the three allotments are classified as sagebrush/grass vegetation. The sagebrush species involved are mostly mountain big sage (*Artemisia tridentata* var. *vaseyana*), with some silver sage (*A. cana*) or subalpine big sage (*A. tridentata* ssp. *spiciformis*) in places. Other shrubs are snowberry, bitterbrush (*Purshia tridentata*) or green rabbitbrush (*Chrysothamnus viscidiflorus*). Grasses tend to be slender wheatgrass (*Elymus trachycaulus*), Idaho fescue (*Festuca idahoensis*), mountain brome (*B. carinatus*), bluebunch wheatgrass (*Pseudoroegneria spicata*), great basin wildrye (*Elymus cinereus*), oniongrass (*Melica bulbosa*), and Geyer sedge (*Carex geeyeri*). Forbs are quite varied, and can include balsamroots and wyethias (*Balsamorhiza* spp. and *Wyethia* spp.), silver lupine (*L. argenteus*), and flaxflower (*Linanthastrum nuttallii*).

Of federally listed threatened and endangered plant species, the only one with any potential habitat for occurring within the allotments is Ute ladies'-tresses orchid, which is known from saturated riparian or meadow sites below 6800 feet elevation (Atwood, 1991). The only such areas below 6800 feet in the project area are along the lower reaches of the Daniels Creek drainage. Daniels Creek is a tributary of the Provo River in Wasatch County, where three small populations of the orchid were found on private land. Daniels Creek was surveyed for the orchid in 1992 and 1994, but none were found (Nelson, ca.1994).

Of the six Forest Service Intermountain Region Sensitive plant species possible for the Uinta National Forest, none are totally excluded from occurring somewhere in the allotments by elevation or vegetation type. No sensitive species have been found in the allotments to date.

Three of the six sensitive species are plants of steep, rocky sites that are rarely impacted to any degree by livestock grazing: Barneby woody aster, Garrett bladderpod and Wasatch jamesia. Garrett's bladderpod has been recorded from the Strawberry management area (USDA 2003a), but not from these allotments. However, large amounts of allotment acreages are above the 8900 feet minimum threshold for this species. The other two species are more likely to be found below that elevation. Neither has been found in the area of the allotments or their management areas.

Rockcress draba occurs in tundra, moist soils or talus at high elevation, above 9400 feet (Welsh et al. 1993). All the allotments except possibly the West Daniels have land above that elevation.

In August 2003, 100 acres were surveyed throughout the five allotments that include the current project area, looking for wet meadow and riparian habitat suitable for dainty moonwort (Van Keuren, 2003). Meadows were selected for the plant surveys because they are part of the key livestock areas that tend to receive the most livestock use, unlike the bulk of upland acres. No moonwort plants were found in the surveys, but moonworts can be so small and cryptic that even the visited meadows cannot be said not to contain any of these plants. In December 2003 the slender moonwort was added to the R4 Sensitive Species list. This species seems to have a wider range of adaptability than dainty moonwort (Natureserve, 1994). Besides wet meadows, it has been found in dense aspen-fir overstory in Utah (Farrar, 2004). Each of the allotments has large acreages above 8800 feet, which is the elevation above which all known Utah dainty and slender moonwort collections have been made. As noted above, livestock use, especially from cattle, tends to be concentrated in meadows, sunnier riparian areas, tall

forb sites and some parts of aspen types, and be much less concentrated in areas with conifer overstories, steeper slopes or dry sites away from water. Of these criteria, the major intersection of concentrated livestock use and sensitive plant habitat is wet to moist meadows.

Riparian Vegetation Communities

There are 367 acres classified as one of the riparian vegetation types in the three allotments. This is likely an undercount of riparian land, because of the narrow linear nature of the riparian areas leads to their incorporation into larger adjacent vegetation types. There are four documented types of riparian vegetation communities in the three allotments: herbaceous riparian, willow/birch riparian, tree-dominated riparian and silver sage-dominated riparian. Another riparian type that is probably present in small patches but not documented is the wet meadow type. Where patches of this type exist, they are most likely lumped in with herbaceous or willow/birch types.

Herbaceous riparian sites are characterized by a mosaic of meadow grasses, sedges and forbs taking advantage of various microsites of water tables and other conditions. One very noticeable species in such sites is the large and luxuriant corn lily, *Veratrum californicum*.

Willow/birch riparian sites on these allotments are dominated by one or more of several willow species, with an herbaceous understory. Taller willow species include Geyer willow (*Salix geyeri*), Drummond willow (*S. drummondii*), Booth willow (*S. boothii*), whiplash willow (*S. lucida*), graybark willow (*S. eriocephala*), and coyote willow (*S. exigua*). There are also low groundcover willows in generally higher-elevation meadows, including *S. glauca*, and *S. wolfii*. Grasses, sedges and forbs are similar to those occurring in herbaceous-dominated sites.

Tree-dominated riparian in these allotments involve mostly subalpine fir (*Abies lasiocarpa*), and Engelmann spruce (*Picea engelmannii*), with some Douglas-fir (*Pseudotsuga menziesii*), Colorado blue spruce (*Picea pungens*), aspen (*Populus tremuloides*) and black cottonwood (*Populus angustifolia*).

There is generally a middle canopy layer, made up of shrubs such as red-osier dogwood (*Cornus sericea*), whitestem gooseberry or gooseberry currant (*Ribes inerme* and *R. montigenum*), rose (*Rosa sp.*), snowberry (*Symphoricarpos oreophilus*), serviceberry (*Amelanchier alnifolia*), black twinberry (*Lonicera involucrata*) and chokecherry (*Prunus virginiana*). Herbaceous understories can be sparse to fairly dense, depending on the level of overstory competition. Species include forbs like false solomon's seal (*Smilacina stellata*), strawberry (*Fragaria virginiana*), strange daisy (*Erigeron peregrinus*), meadowrue (*Thalictrum fendleri*), baneberry (*Actaea rubra*), bedstraw (*Galium triflorum*), Richardson's geranium (*Geranium richardsonii*), monkshood (*Aconitum columbianum*) and bluebells (*Mertensia sp.*). Grasses or sedges can be scarce, and include blue wildrye (*Elymus glaucus*), mountain brome (*B. carinatus*), and bluejoint reedgrass (*Calamagrostis canadensis*).

Silver sage-dominated riparian areas have an overstory of silver sage (*Artemisia cana*), perhaps with some widely scattered willows mixed in. The understory is dominated by grasses and sedges, notably Kentucky bluegrass (*Poa pratensis*), sheep fescue (*Festuca ovina*), shortbeak sedge (*Carex praegracilis*), wiregrass (*Juncus balticus*), needlegrasses (*Stipa lettermannii* and *S. nelsonii*), along with groundsels (*Senecio sp.*) meadow penstemons (*P. procerus* or *P. rydbergii*), yarrow (*Achillea millefolium*), clover (*Trifolium longipes* and others), and dandelion (*Taraxacum officinale*).

Weeds can be found in all the riparian area types. It mostly involves extensive but relatively sparse infestations of Canada thistle.

Noxious Weeds

The 2003 Forest Plan noted the presence of Canada thistle and musk thistle in the Deer Creek Management Area (entirely within one or more of the allotments), and those two species plus whitetop, spotted knapweed, and an occasional tamarisk in the Strawberry management area.

Livestock and allotment management activities have the potential to spread weed seeds farther and to introduce new species, mostly by the vehicles and trailers involved, but also by the livestock themselves. Weeds prefer sunny areas, which generally include the major foraging areas for the livestock. Therefore, uncontrolled weed invasions could have a major effect on the allotments to support livestock by supplanting native edible vegetation.

Environmental Consequences

Proposed Action

Upland Vegetation Communities

The generalized effects of livestock grazing on non-forested vegetation are detailed in the FEIS for the Uinta National Forest 2003 Land and Resource Management Plan (USDA 2003b). The likely effects upon upland vegetation of implementing the proposed actions will vary by location. Approximately 1,280 acres of upland vegetation near protected riparian zones would be excluded from livestock grazing. Impacts to closed areas would be the same as the impacts described under the No Grazing Alternative. In addition, 836 acres will be fenced off to create a special management pasture to reduce livestock use in the area.

Mill A Unit (approximately 4,058 acres) would be converted from sheep to cattle. These areas of upland vegetation are likely to see slightly decreased levels of stock occupancy, with associated decreases in forage use and plant damage from trampling. This is because cattle naturally prefer occupying riparian areas more than do sheep (USU 2004). The degree to which the occupancy and impacts decrease will depend on how well the permittees and Forest Service manage the allotments to keep the levels within those mandated by the Forest Plan, including keeping the cattle using the upland areas and not over-concentrating in riparian areas and favored tall forb and other upland areas.

Livestock grazing effects on Barneby woody aster, Garrett bladderpod and Wasatch jamesia are likely to be minimal to none under any form of proper management. Cattle generally avoid the steep rocky areas these species prefer. Sheep may make a little more use of these areas than cattle and have greater potential to heavily graze small forbs like the aster and bladderpod, but under proper management the sheep would not be staying in any one area long enough to graze a plant more than once.

Livestock grazing effects on rockcress draba are likely to be minimal, mostly because of the high elevation the plant prefers. Sheep are more likely to encounter draba than are cattle, being better adapted to high elevation. Under proper management the sheep would not be staying in any one area long enough to graze a plant more than once. And the Proposed Action reduces the area being grazed by sheep and increasing the area grazed by cattle, which in general will reduce grazing pressure in the high elevation uplands that might contain rockcress draba.

Livestock grazing effects on moonworts can vary between minimal and low, depending on livestock species, habitat type and other considerations, but is unlikely to be a threat to the viability of the population (Hoefflerle 2000, Johnson-Groh 2000). Neither of the two moonwort populations known on

the Uinta National Forest show noticeable adverse effects from livestock (sheep and cattle) grazing or occupancy under current management of their allotments. The large dainty moonwort population in Silver Meadow of Heber R. D. occurs within a sheep allotment, with the meadow itself supposed to receive herding to keep sheep use to a minimum. The other population of moonworts has no more than about 20 above ground plants, under a willow beside a cow trail in a moist meadow, and it is possible the compacted soil of the trail has some limitation on the population. Neither population has shown signs of livestock grazing on the moonworts themselves.

Meadow populations of moonworts are more likely to have livestock effects than upland populations, especially upland populations occurring under dense tree or shrub canopies. That is because meadows are concentration areas for livestock, especially cattle, while dense forests have little attraction for either livestock species. A forest with reasonably dense forage understory would receive low to moderate cattle impacts (Strawberry and West Daniels Allotments) and moderate to possibly high sheep impacts (Twin Peaks Allotment), depending on site and management. For the moonworts the more important impacts are likely to be trampling rather than grazing, because the plants' average height is around ½ inch tall, too small to have much biomass removed. Also, the leaf and spore bodies are not required for a moonwort to survive (Hoefflerle, 2000).

Riparian Vegetation Communities

The likely effects upon riparian vegetation of implementing the proposed actions will vary by location. Some areas containing riparian areas would be excluded from livestock grazing.

Mill A, portion of Twin Peaks, and Strawberry Allotment exclusive of the closed area would shift from sheep use to cattle use. Those areas' riparian zones are likely to see increased levels of stock occupancy, with associated increases in riparian forage use and plant damage from trampling. This is because cattle naturally prefer occupying riparian areas more than do sheep (USU 2004). However, the proposed action has design features and resource thresholds in addition to Forest Plan standards to minimize impacts. (USDA 2003a: pages 3-26, 3-27).

For both types of livestock, use on willows increases later in the grazing season, since willows maintain their nutritive value after frost and dying foliage reduces the value of herbaceous forage (USDA Forest Service 1937). Cattle tend to congregate in riparian areas at a greater extent than sheep, therefore, would be more likely to browse willow more than sheep. The Proposed Action's desired conditions and resource triggers, in addition to the Forest Plan standards would be used. Rest and deferred grazing rotation systems developed in the AOIs would mitigate grazing pressure on individual plants over the years over the majority of an allotment, by ensuring the livestock are not in a given pasture at the same season every year (this may not apply in small pastures used for gathering in fall. That situation is where the allowable use limits for woody species found in the LMP would be the major protection for willows and other woody riparian species.)

Noxious Weeds

There would be no noticeable direct or indirect effects on weed populations. Canada thistle, the major area weed, is a rhizomatous perennial with airborne seeds, which is not especially palatable and so is not currently under noticeable grazing pressure. It is not dependent on livestock for starting or maintaining populations. It is present in about the same sparse levels in areas of the Strawberry watershed which are not being grazed by livestock.

Continuation of Current Management Alternative

Current management is leading to levels of upland vegetation biomass removal in line with Land Management Plan guidelines. This is because livestock herbaceous grazing use is being monitored in the three allotments, and corrective action is being taken by the Forest Service if overuse is detected. Livestock management will not change under current livestock management. Rest and deferred grazing rotation systems used under the current management mitigate grazing pressure on individual plants over the years over the majority of an allotment, by ensuring the livestock are not in a given pasture at the same season every year (this may not apply in small pastures used for gathering in fall. That situation is where the allowable use limits for woody species found in the LMP would be the major protection for willows and other woody riparian species.)

There would be no noticeable direct or indirect effects on weed populations. Canada thistle, the major riparian area weed, is a rhizomatous perennial with airborne seeds, which is not especially palatable and so is not currently under noticeable grazing pressure. It is not dependent on livestock for starting or maintaining populations. It is present in about the same sparse levels in areas of the Strawberry watershed which are not being grazed by livestock. Musk thistle, knapweeds, tamarisk and whitetop, also found in the LMP management areas involved, are similar to Canada thistle in being relatively unpalatable to livestock and not dependant on livestock for initiation or increase of populations. Livestock grazing in levels heavy enough to expose or extensively disturb bare soil could contribute to favorable weed seed establishment. Under management complying with the Uinta LMP, such disturbances would be extremely limited in extent, such as a small portion of a sheep bedground or a favored cattle access route to a stream with vertical banks.

Maintaining current livestock grazing would have minimal effects on the TES plant species most likely to occur on the analyzed allotments. See the discussion under the Proposed Alternative Effects above for a more detailed discussion.

As noted in the discussion for the Proposed Action alternative, both sheep and cattle browse willows, and probably to a comparable extent. Both species also make use of herbaceous riparian forage. Current management is leading to levels of riparian biomass removal in line with Land Management Plan guidelines, at least in the herbaceous layer.

No Grazing Alternative

Eliminating livestock grazing in the three allotments would remove varying amounts of current grazing and trampling pressure in the allotments' upland areas. Given that current livestock grazing use levels are no more than those authorized under the Land Management Plan, eliminating livestock grazing would still create an increase in herbaceous and palatable woody vegetation left on site. Also likely would be a slight increase in plant vigor and plant ground cover in the heaviest grazed areas, leading to slightly increased forage biomass over a period of one to several years. The species most likely to be included would be those preferred by cattle or sheep as forage, but not as much preferred by elk or other large wildlife. Such species could include the more palatable native grasses and tall forbs, willows and other riparian species. Aspen sprouts could show a lesser increase, because they are preferred by a wide range of ungulate wildlife as well as livestock, but the combined browsing pressure would be reduced.

Eliminating livestock grazing would have minimal effects on the TES plant species most likely to occur on the analyzed allotments. See the discussion under the Proposed Alternative Effects above for more details.

Eliminating livestock grazing in the three allotments would remove varying amounts of current grazing and trampling pressure in the allotments' riparian areas, particularly in the West Daniels allotment which is grazed by cattle. Sheep are less likely to spend time in riparian areas of their own wills (USU 2004); there would be an increase of at least one to several years in herbaceous and palatable woody vegetation left on site.

There would be no noticeable direct or indirect effects on weed populations. Canada thistle, the major riparian area weed, is a rhizomatous perennial with airborne seeds, which is not especially palatable and so is not currently under noticeable grazing pressure. It is not dependent on livestock for starting or maintaining populations. It is present in about the same sparse levels in areas of the Strawberry watershed which are not being grazed by livestock.

Grazing

Affected Environment

Strawberry Allotment

In the early 1900's the Strawberry Allotment was part of a common use allotment which used the Daniels Canyon as a turn out point every year. As a result livestock migrated up the side canyons and ended up on the Strawberry allotment early in the spring. This constant early use resulted in many of the areas being overgrazed. Many of the open ridge tops and aspen types became dominated with undesirable species such as western cone flower and tarweed. The abundance and dominance of the undesirable species has decreased over the years as the allotment was converted to two sheep allotments with an on date of July 1 and a grazing rotation was implemented. Since then the two sheep allotments were reduced to one sheep allotment. The present permittee has taken resource protection non use the last few years while the area has been in a drought. (Historical information from Strawberry Allotment Folder on file at the Heber Ranger District)

The Strawberry nested frequency study which was established in 1988 is located on an open ridge top with a high abundance of tarweed. This study was reread in 1996 and indicates that there is an upward trend in vegetation due to an increase in desirable grasses, but there has been a decrease in desirable forbs. The trend for soil is downward. The study was reread in 2001 which was during an ongoing drought in the region. The 2001 reread indicates a decrease in grasses, an increase in annual forbs, a decrease in perennial forbs, a decrease in vegetative ground cover and an increase in pavement.

The Hogsback nested frequency study was established in 2002. Though this is a new study and can not compare to previous readings, the apparent trend for vegetation is stable as indicated by healthy stands of desirable grasses having a relative good seed set for a drought year. Forb composition is variable with viola (*viola spp*) and chickweed (*Cerastium beerianum*) being the most prevalent. Shrubs make up less than 1 percent of the vegetation on the site and are lightly to moderately hedged but have good recruitment. Apparent soil trend is stable to downward as indicated by some puddling around large rocks and some soil movement. Ground cover is approximately 76 percent vegetation and litter with 3 percent as rock and pavement. Bare soil makes up the other 21 percent.

The Hogsback enclosure was established in 1945 on a tarweed flat along the south side of the Hogsback road (Forest Service road #094). The fence around the enclosure was originally a log worm fence and

deteriorated until a lay down net wire fence was constructed a couple of years prior to 1968. It is assumed as the log worm fence deteriorated that there became some light grazing in the area but livestock grazing has been excluded since 1968. An old time permittee states that the Forest Service seeded the area after the fence was constructed which seems to be substantiated by photos taken after the establishment of the exclosure. The vegetation trend inside the exclosure seems to be stable to upward with a little tendency to an increase in forbs and more brae ground but not considered to be significant. There are a few shrubs within the exclosure with some new seedlings becoming established. There was light to moderate wildlife use on these shrubs.

The Strawberry allotment was in full resource protection non use during the 2002, 2003, 2004 and 2005 grazing season. The grazing that did occur on the allotment was in small, localized spots where a few unauthorized cattle from the East Daniels allotment, trespass cattle from the adjacent private land and wildlife congregated. The unpermitted livestock grazing was addressed by the owners shortly after being notified of the situation and the overall use was light on these areas. The inspection for the 2003 grazing season mentions more foliage was removed by grasshoppers than by ungulates.

West Daniels Allotment

The West Daniels allotment prior to 1950 included the Old Adamson Sheep Allotment, which became the Buck Springs and Sugar Springs Allotment which at present is the southern $\frac{3}{4}$ of the Twin Peaks allotment. This allotment prior to 1950 ran 710 head of cattle from 20 May to 31 October and 2,745 sheep from 1 July to 30 September. In 1945 an additional band of sheep was allowed to graze from Parker to Lodgepole Campground for ten days. Prior to 1941 a band of 1,000 to 1,450 head of sheep grazed the West Daniels slopes from 20 June to 30 September.

The allotment has been exclusive cattle range since 1957. A private land permit was issued to the West Daniels Cattle Association and was used in conjunction with the Forest land becoming a part of the Parker/Roberson unit. On May 9, 1958, a cooperative agreement was signed which limited the combined Forest land and private land to 695 head of cattle from 6 June to 15 September, not to exceed 2,080 cow months on Forest Service administered land.

In 2001 The West Daniels Association permit was split into individual permits and the private land permit terminated. As a result there were 3 permittees permitted to graze 535 head of cows with calves from 16 June to 15 October. Since then the number of permittees has diminished to one. The present permittee uses this allotment as part of his summer pasture for the cattle portion of his operation. (Historical information from West Daniels Allotment Folder on file at the Heber Ranger District)

The Shingle Hollow nested Frequency Transect for the West Daniels Allotment was established in 1996 and reread in 2002. The study indicates that there is a stable trend in vegetation with an increase in desirable grasses, essentially no change in forbs, and virtually no change in the frequency of snowberry. Ground cover is about the same as before with a decrease in litter but a corresponding increase in vegetation. Some of the browse species show signs of moderate hedging but appear to have good growth and reproduction. This study was read in the fourth year of a drought yet vegetation looks just as healthy as that in the 1996 photos.

The Parker nested frequency transect for the West Daniels allotment was established on adjacent private land because the private land was being used under a private land permit and was considered to be representative of the vegetation type of both private and Forest Service administered land. This study was relocated in 2002 to a similar site within the Forest boundary. Although this study can not be

compared to the previous study it was determined that the apparent trend for soil was downward. Ground cover is around 55 to 60 percent but soil movement is detectable, surface rock fragments are loose and appear to be moving down slope. Vegetation trend is stable to upward with both grasses and shrubs being vigorous. Shrubs are not being heavily browsed. Range condition is considered to be fair.

The West Daniels Snowcourse nested frequency study was established in 1989. The study was reread in 2002. The study indicates that overall the grass component is about the same in 1995. The forbs seem to be increasing particularly some of the less desirable species. Most shrubs species showed moderate increase in frequency. Ground cover (about 60 to 70 percent) is about the same as in 1995. Apparent trend for this site is stable. The good ground cover, increased diversity and vigorous shrubs and grasses are counter balanced by the increase in several undesirable forbs. The study site appears to be representative of the surrounding area.

The riparian study on Little Hobble Creek was established in 1987. The study was reread in 1996. In 2002 the study was found to be impractical to read. There were too many flooded areas (water backed up because of beaver dams) and no single stream channel. Some photos were retaken but trend or condition determinations were not feasible.

Use on the West Daniels Allotment has varied over the last few years due to change from an association to individual permits, change in permittees and the drought. Due to the drought in 2003 the cattle were removed from the allotment early so as not to exceed grazing standards. In 2004 resource protection was approved and only a portion of the permitted livestock was grazed on the allotment. Full number resource protection nonuse was taken in 2005. Overall, utilization standards have been met with areas adjacent to water and trail ways being used the heaviest.

Twin Peaks Allotment

The area within the existing Twin Peaks Allotment is that portion of the old West Daniels Allotment that was converted to sheep. In the 1950s the sheep were segregated out from the cattle and the boundaries of the sheep allotment have changed several times. The Circle Springs, Twin Peaks and Dole Knoll Allotments were created during the segregation of the cattle. These allotments were then changed to the Buck Spring Allotment and the Sugar Springs Allotment. Then in the early 1990's these two allotments were combined. A small portion of the Buck Spring Allotment was put into the Wallsburg Allotment and the rest was made into the existing Twin Peaks Allotment. In 2003 the portion of the old Buck Spring Allotment that has been added to the Wallsburg Allotment was put back into the Twin Peaks Allotment to facilitate better management. With the exception of the last change from Wallsburg Allotment to the Twin Peaks Allotment, each change in boundary brought a reduction in number and a more intensive grazing strategy. The present permittee uses this allotment as part of his summer pasture for the sheep portion of his operation. (Historical information taken from the Twin Peaks, Buck Spring and Sugar Spring Allotment Folder on file at the Heber District office)

The Jones Hollow nested frequency study on the Twin Peaks Allotment which was established in 1990. The 2001 reading of this study indicates that grasses and forbs have increased and the aspen component has remained the same. Choke cherry which started to become dominant in the previous reading (1996) stayed about the same as did the snowberry. Early seral plants dominate the areas and it appears aspen seedlings are having a hard time getting established. Ground cover of vegetation, rock and pavement increased while litter decreased for a total ground cover of approximately 61 percent.

The riparian study when established in 1996 was within the Wallsburg S&G Allotment, but due to a recent boundary change a portion of it is now within the Twin Peaks Allotment and has not been reread. At the establishment of the study the area was considered to be in early seral ecological stage.

The Buck Spring nested frequency study is located approximately ½ mile south of Buck Spring a short distance to the east from the Murdock Road (Forest Service road #053). The study was established in 1991 and last read in 1999. The trend at that time was thought to be slightly up for both ground cover and vegetation. This study has not been reread because it is located in an aspen stand which is part of a timber harvest.

The Twin Peaks Allotment has been grazed in conjunction with the Wallsburg Allotment so the one herd has been grazing two allotments. This has resulted in less grazing pressure especially during the last few years of drought. As a result grazing has been within the standards and some areas have had little use.

Grazing Capability and Suitability for the Upper Strawberry Allotments

Capability is defined in the FEIS for the 2003 Uinta Forest Plan as the “potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices at a given level of management intensity. Capability depends upon current conditions and site conditions such as climate, slope, landform, soils, and geology, as well as the application of management practices, such as protection from insects, and disease.” (USDA 2003b, Glossary-4; also see page B-45). Suitability is defined in FEIS for the 2003 Uinta Forest Plan as the “appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the preceding alternative uses. An area of land may be suitable for more than one management practice.” (USDA 2003b, Glossary-31; also see page B-45). The January 5, 2005, Federal Register notice approving the regulations implementing the National Forest Management Act (Forest Planning regulations) further addresses suitability:

“Suitability of areas is the identification of the general suitability of an area in an NFS unit for a variety of uses. Areas may be identified as generally suitable for uses that are compatible with desired conditions and objectives for that area. The identification of an area as generally suitable for a use or uses is neither a commitment nor a decision approving activities and uses.” (FR Vol. 70, No. 3, page 1026)

The 2003 Uinta National Forest Land and Resource Management Plan included a programmatic analysis of grazing capability and suitability (2003b, pages B-45 thru B-53), and this analysis identified some lands within these Twin Peaks, Strawberry, and West Daniels Allotments as suitable for livestock grazing (USDA 2003b; pages 5-43 and 5-129). Based on current uses and a programmatic analysis using the criteria and process described in Appendix B (pages B-45 to B-53) to the FEIS for the Forest Plan, the 3 allotments contain about 18,996 acres capable and suitable for livestock grazing.

Environmental Consequences

Proposed Action

The permittee for the West Daniels Allotment is also the permittee for the Twin Peaks Allotment. His operation involves both sheep and cattle. The permittee has worked with the Forest Service in running fewer numbers or shorter season on both the Twin Peaks Allotment and the West Daniels Allotment to compensate for the drought conditions the last few years. Implementation of the proposed action will

allow him to restock his operation in accordance with the needed management and make necessary adjustments to continue his year round is operation.

The permittee for the Strawberry Allotment also reduced his operations during the drought. Implementation of the proposed action will allow the permittee to change his operation to cattle and run his operation in accordance with needed management. Recently, economics have favored cattle.

Continuation of Current Management Alternative

Implementation of the currant management will allow the permittee of the West Daniels and Twin Peaks allotments to maintain his existing year round operation and restock accordingly.

Implementation of the currant management will permit the Strawberry Allotment permittee run his operation in accordance with needed management and restock accordingly. In recent years, profitability of the sheep/wool industry has declined. Permittee feels continued grazing of sheep may negatively affect profitability of their operation in comparison with the proposed action.

No Grazing Alternative

Eliminating livestock grazing form the Twin Peaks and West Daniels allotment would eliminate the grazing permit for those allotments and the permittee would need to either find new pastures for the summer or reduce the overall feasibility of his operation

Eliminating livestock grazing from the Strawberry Allotment would eliminate the grazing permit for that allotment and the permittee would need to reduce the overall feasibility of his operation or find new rangelands for his livestock to graze on.

Wildlife Resources

It would be impossible to analyze the effects of the Proposed Action and alternatives on all wildlife species present within the project area (project area is defined by the boundaries of the Twin Peaks, West Daniels, and Strawberry grazing allotments). This analysis focuses on species for which population status is a concern and species most likely to be affected by action alternatives. Species groups analyzed were 1) species listed under the Endangered Species Act, 2) Uinta National Forest Management Indicator Species, 3) Forest Service Sensitive species, 4) amphibians, 5) migratory birds, 6) big game species, and 7) predators.

Affected Environment

Species Listed Under the Endangered Species Act

The U.S. Fish and Wildlife Service has determined that the following wildlife species classified under the Endangered Species Act potentially occur in Wasatch County: bald eagle (Threatened) and Canada lynx (Threatened) (USDI Fish and Wildlife Services2006). Western yellow-billed cuckoo is classified as a candidate for listing under the Endangered Species Act and also potentially occurs in Wasatch County. Information on the status of these species on the Uinta National Forest is found in Appendix F of the Final Environmental Impact Statement (FEIS) for the 2003 Forest Plan (USDA 2003b: FEIS Appendices pages F-67 to F-86). The bald eagle and western yellow-billed cuckoo are primarily found in lowland riparian habitat in Utah (Parrish et al. 2002: pages 6, 145 to 150), which is characterized as riparian habitat below approximately 5,500 feet elevation (Parrish et al. 2002:page 183). The project

area contains no lowland riparian habitat; elevations within the project area range from approximately 6,400 to 10,000 feet. It is assumed that the project area contains no suitable habitat for bald eagles or western yellow-billed cuckoos.

Canada lynx inhabit high-elevation conifer forests in the Rocky Mountain region and feed on snowshoe hares, red squirrels and other small mammals, and forest grouse. Lynx typically den under logs, stumps, rocks, or thick patches of live vegetation. Average home range size for lynx in southern boreal forests is approximately 58 square miles (37,000 acres) for males and 28 square miles (18,000 acres) for females (Aubry et al. 2000:page 384). Individual lynx are known to travel hundreds of miles. Mowat et al. (2000:page 291) found 15 documented straight-line dispersal distances of >310 miles and one documented dispersal distance of 682 miles in the literature. There are currently no known breeding populations of Canada lynx in Utah, although a number of historical records are known from the Uinta Mountains. Surveys for lynx were conducted on the Uinta National Forest in 1999, 2000, and 2001, but none was detected (USDA 2003b:FEIS Appendices for Forest Plan page F83). Lynx that were translocated to Colorado have been found in Utah in recent years, and two of these individuals traveled through the Uinta National Forest in 2004. The Uinta National Forest has two Lynx Analysis Units (LAUs), located to the northeast of the project area in the Upper Provo River and West Fork Duchesne River watersheds (Wildlife Map). Areas outside of LAUs in Utah and Wasatch Counties that contain suitable lynx habitat are considered lynx travel corridor. Canada lynx prey (e.g., snowshoe hares, red squirrels, and ruffed grouse), or their sign, were commonly observed in the project area during wildlife surveys in 2003, 2004, and 2005.

Management Indicator Species

There are three terrestrial wildlife Management Indicator Species on the Uinta National Forest: northern goshawk, American three-toed woodpecker, and American beaver. Information on the status of these species on the Uinta National Forest is found in Appendix B and Appendix F of the FEIS for the 2003 Forest Plan (2003b: FEIS Appendices for Forest Plan: pages B-37 to B-41 and F-67 to F-86).

Northern goshawks occur in most forested vegetation types on the Uinta National Forest. On the Uinta National Forest, goshawks typically nest in dense, mature stands of aspen, conifer, or aspen/conifer mixed stands. They prey on a wide variety of small mammals and birds. Only one historic goshawk nest site is known to occur within the project area. A historic nest site from the Buck Springs goshawk territory is located within the southeast portion of West Daniels cattle allotment, but annual surveys have failed to detect an active nest in 2001 through 2005. The Uinta National Forest annually monitors territory occupancy of goshawks across the Forest (USDA Forest Service 2005e: State of the Forest Report pages 1 to 2). Six of 13 (46%) territories monitored were occupied in 2001, 9 of 14 (64%) in 2002, 5 of 14 (36%) in 2003, 6 of 15 (40%) in 2004, and 10 of 16 (63%) in 2005. These data provide no evidence that goshawk territory occupancy has been declining across the Forest in recent years.

Three-toed woodpeckers are known to occur in spruce/fir, Douglas-fir, and lodgepole pine forest types on the Uinta National Forest. They nest in cavities in dead or dying conifers and primarily feed on beetle larvae and spiders. Inventory and monitoring data on this species is summarized each year in the State of the Forest Report (USDA Forest Service 2005e: State of the Forest Report pages 4 to 6). The Uinta National Forest conducted extensive Forest-wide surveys of three-toed woodpeckers in 2004 and 2005, and three-toed woodpeckers were detected within the project area (USDA Forest Service 2005a :2005 Three-toed Woodpecker Monitoring Report). Forest-wide surveys indicate that three-toed woodpeckers are currently relatively common in mature to old conifer forest stands on the Uinta

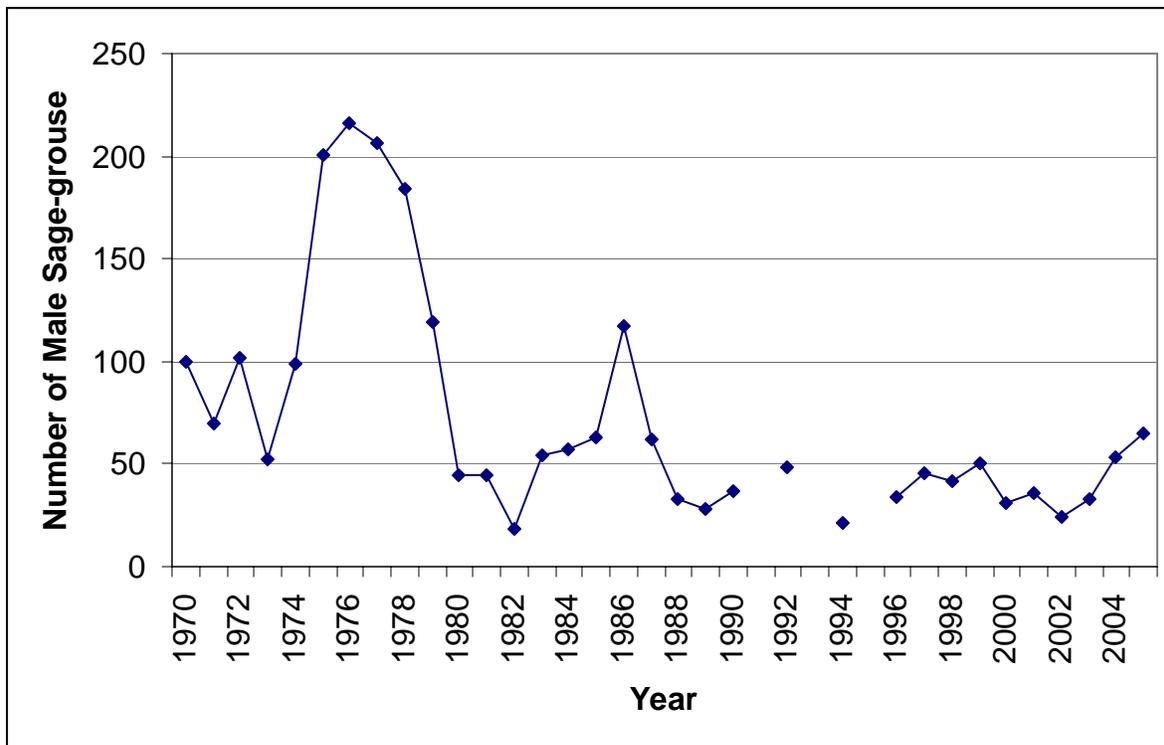
National Forest, especially in areas with beetle activity. Three-toed woodpeckers were detected at 14 of 43 (33%) randomly located survey stations in 2004 and at 17 of 42 (40%) survey stations in 2005.

Beavers are found in riparian habitats where there are sufficient stream flow and food resources. On the Uinta National Forest, beavers primarily feed on riparian and aquatic herbaceous vegetation and deciduous woody plants such as willows, aspen, alder, and cottonwoods. Inventory and monitoring data on this species is summarized each year in the State of the Forest Report (USDA Forest Service 2005e: State of the Forest Report pages 2 to 4). The Uinta National Forest conducted extensive Forest-wide surveys of beaver colonies in 2004 and 2005 (USDA Forest Service 2005b:2005 Beaver Monitoring Report). The density of active beaver colonies across the Forest in 2005 was 0.42 colonies/mile², similar to 2004 data (colonies are family groups of beavers consisting of a pair of adults, young of the year, and subadults from the previous year). The project area was surveyed for beavers, and areas with active and inactive beaver colonies are identified on the Wildlife Map. Most of the currently active beaver colonies within the project area are along the upper Strawberry River, Daniels Creek, and Hobble Creek (Wildlife Map).

Forest Service Sensitive Species

Forest Service sensitive species evaluated in this document are those listed for the Uinta National Forest in the list of *Intermountain Region Proposed, Endangered, Threatened, and Sensitive Species* (USDA Forest Service 2003c:Regional TES list). Forest Service sensitive wildlife species considered for this analysis were Columbia spotted frog, greater sage-grouse, peregrine falcon, northern goshawk, flammulated owl, American three-toed woodpecker, spotted bat, Townsend's big-eared bat, and fisher. Information on the status of these species on the Uinta National Forest is found in Appendix F of the FEIS for the 2003 Forest Plan (USDA 2003b:FEIS Appendices for Forest Plan pages F-67 to F-86). Northern goshawk and American three-toed woodpecker are also classified as Management Indicator Species and were discussed above. Columbia spotted frogs are discussed in the Amphibians section below. Of the other Forest Service Sensitive species listed above, species that are known to occur or that are assumed to occur within the project area for the purposes of this analysis are greater sage-grouse, flammulated owl, spotted bat, and Townsend's big-eared bat. Peregrine falcons typically occur in open habitats in close proximity to cliffs or other suitable nesting habitat and concentrations of avian prey (USDA 2003b: FEIS Appendices for Forest Plan page F-78). No such habitat exists within the project area, and peregrine falcons are not known to occur within or near the project area. The fisher is not known to occur in Utah (NatureServe 2006a).

A population of greater sage-grouse occurs in Strawberry Valley, and a small amount of mapped sage-grouse habitat overlaps the West Daniels Cattle Allotment and the Twin Peaks Sheep Allotment (Wildlife Map). The Strawberry Valley sage-grouse population declined from an estimated 3,500 birds during the late 1930s to less than 200 birds by 2003 (USDA 2004, pages 154 to 159 for a thorough review of factors that have affected this population). In 2003, Utah Division of Wildlife Resources and Brigham Young University began augmenting the native Strawberry Valley population by translocating sage-grouse into the valley (Baxter and Flinders 2005), and the population has grown considerably in recent years (Sage-grouse population graph). A total of 40,193 acres of mapped sage-grouse range occurs within the Strawberry Reservoir Management Area (Wildlife Map). Of this, 452 acres, or 1.1% of the 40,193 acres of mapped sage-grouse range within the Strawberry Reservoir Management Area, occurs within the West Daniels allotment (138 acres) and Twin Peaks allotment (314 acres).



Sage Grouse Population Graph: Numbers of male greater sage-grouse counted on leks in Strawberry Valley. Data was obtained from Utah Division of Wildlife Resources and Brigham Young University.

The flammulated owl is a neotropical migrant known to occur on the Uinta National Forest. Flammulated owls are associated with open forest structures and primarily feed on flying insects (McCallum 1994:page 40). They nest in cavities and have been found nesting in cavities in aspen trees on the Uinta National Forest. There are no known detections of flammulated owls within the project area, but for the purposes of this analysis, it is assumed that flammulated owls occur within the project area because of the presence of suitable forested habitat.

Little is known about the distribution and abundance patterns of bats on the Uinta National Forest. Information on the ecology and distribution of spotted bats and Townsend's big-eared bats is described in USDA 2003b: FEIS Appendices for Forest Plan pages F-84 to F-85). Bats commonly roost in caves, mines, or abandoned buildings, and these features do not occur within the project area. Townsend's big-eared bats also roost in tree cavities and spotted bats roost in rock crevices and these habitat features do occur in the project area. Although neither species has been recorded within the project area, the project area contains suitable foraging habitat and for the purposes of this analysis, both species are assumed to potentially occur in the project area.

Amphibians

Amphibian surveys were conducted within the project area during the summers of 2004 and 2005. The only amphibian species detected within the project area were tiger salamander and western chorus frog. No Columbia spotted frogs (Forest Service sensitive) or boreal toads were found in the project area. The nearest known populations of Columbia spotted frogs, which has a NatureServe conservation ranking of S1 (Critically Imperiled) in Utah (NatureServe 2006b), are located along the Provo River below Jordanelle Reservoir and above the reservoir near Woodland. A single boreal toad was found during the summer of 2005 at a beaver pond within the Mill B sheep allotment just east of the Strawberry

allotment. The boreal toad, a subspecies of western toad, is classified as a Species of Concern by the state of Utah and was identified as a species of concern on the Uinta National Forest during a viability assessment completed during the Forest Plan revision process (USDA 2003b:FEIS Appendices for Forest Plan pages F67 to F68). Personnel from the Central Region UDWR native aquatics section have conducted surveys for boreal toads in recent years in Strawberry Valley, American Fork Canyon, Provo Canyon, Big Cotton Canyon, and Little Cottonwood Canyon but have only found boreal toads in Strawberry Valley near Strawberry Reservoir approximately 2 to 4 miles south of the project area.

Migratory Birds

A wide variety of bird species occurs within the project area because of the wide variety forested and non-forested habitats present. Utah Partners in Flight Priority species that are known to occur or potentially occur within the project area are greater sage-grouse (discussed above), American three-toed woodpecker (discussed above), Brewer's sparrow, and broad-tailed hummingbird (Parrish et al. 2002:page 52). Brewer's sparrow has a NatureServe conservation ranking of S4S5 (Apparently Secure/Secure) (NatureServe 2006c), and broad-tailed hummingbird has a NatureServe conservation ranking of S3 (Vulnerable) (NatureServe 2006d) (BBS 2006). Trend analyses of Breeding Bird Survey data indicates that Brewer's sparrow has a statistically significant negative population trend (Trend Estimate = -2.59, P = 0.01) and that broad-tailed hummingbird has a statistically non-significant negative population trend (Trend Estimate = -2.16, P = 0.12) across Utah during the past 20 years (Breeding Bird Survey 2006a, 2006b). Brewer's sparrows occur in sagebrush habitats, and broad-tailed hummingbirds occur in a wider variety of habitats but are commonly found in riparian habitats. Brewer's sparrows and broad-tailed hummingbirds are regularly detected on the Heber Mountain Breeding Bird Survey (BBS) route, which is located near the project area (Wildlife Map). Numbers of bird species detected along the Heber Mountain BBS route ranged between 51 and 59 species between 1996 and 2005 (2005 BBS). Brown-headed cowbirds occur in the project area. This species is a conservation concern because it is a brood parasite (lays its eggs in the nests of other songbirds for the host parents to raise) that can negatively affect reproductive success of host bird species.

Big Game Species

Big game hunting is a significant recreational activity on the Uinta National Forest. Elk, mule deer, and moose occur within the project area. Most of the project area is considered big game summer range. A small portion of the Twin Peak allotment in the upper Main Canyon Creek drainage is classified by Utah Division of Wildlife Resources as elk winter range, as is the area just east of the West Daniels allotment in the Daniels Creek drainage (Wildlife Map). In mountainous areas of northern Utah, winter range is considered the primary habitat factor limiting mule deer and elk populations, and summer range is not typically considered limiting. Elk that occur within the project area are part of Elk Herd Unit #17 (Wasatch Mountains Unit). These elk winter in the Heber Valley area, which has a population objective of 1,000 elk during winter (Utah Division of Wildlife Resources 1998). Estimated winter herd size was 1,279 elk in 1999, 2,011 in 2002, and 1,273 in 2005 (Utah Division of Wildlife Resources 2005).

Predators

Predators are discussed here because predator control to reduce livestock depredation is a connected action to livestock grazing on federal lands. Primary wildlife species that depredate livestock on the Uinta National Forest are coyote, black bear, and mountain lion. Bobcats rarely depredate cattle or sheep. Coyotes are not protected under state law, but black bears and mountain lions are. Under state law, livestock owners or their immediate family members or regular employees can kill black bears or mountain lions that are harassing or attacking their livestock. Under state law, no distinction is made on this depredation policy between private land or a grazing allotment on public land. Livestock permittees

on Forest Service grazing allotments can also contact USDA Animal and Plant Health Inspection Service (APHIS) Wildlife Services if their livestock has been depredated, and Wildlife Services can use lethal control on predators after confirming the depredation. Wildlife Services attempts to target offending individual animals in cases of black bear or mountain lion depredation.

APHIS Wildlife Services is the agency with the authority and expertise under the Animal Damage Control Act for providing animal damage management services. Wildlife Services conducts animal damage management, provides expertise and technical assistance on issues related to animal damage management, conducts animal damage management research, and complies with NEPA requirements related to animal damage management. No decisions regarding predator management will be made as part of this EIS.

In northern Utah, sheep are much more vulnerable to predation than cattle. The coyote is the most common predator, although in some areas where black bears are common, black bears depredate sheep and are thus subjected to lethal control measures. Mountain lions rarely depredate livestock on the Uinta National Forest, and thus lethal control on mountain lions to reduce livestock depredation on the Forest is rare. Utah Division of Wildlife Resources accounts for livestock depredation mortality on black bears and mountain lions when determining the annual number of bear and mountain lion sport hunting permits to issue (i.e., if large numbers of black bears are killed because of livestock depredation, numbers of sport hunting permits for bears would be reduced in that area the following year).

Environmental Consequences

Section 6 of the 1976 National Forest Management Act directs the Forest Service to provide for diversity of plant and animal communities. The 2003 Forest Plan for the Uinta National Forest provides the following direction: “Ecosystems on the Forest provide and maintain viable and well-distributed populations of flora and fauna.” (USDA 2003b: Forest Plan page 2-5). In evaluating environmental effects of the Proposed Action and alternatives on wildlife species, a determination was first made on whether alternatives would likely have a positive, neutral, or negative effect on individuals or habitat for species evaluated. In accordance with direction provided in the 2003 Forest Plan cited above, a determination was then made on whether the Proposed Action and alternatives would likely affect the population viability of species evaluated. For purposes of this analysis, a viable population is defined as one containing sufficient numbers and distribution of individuals to ensure persistence of the population over some relatively long temporal interval (see Gilpin and Soule 1986:page 20). Individuals within populations interact at widely varying spatial scales depending on species, but for the purposes of this analysis, potential effects on population viability are analyzed at the spatial scale of the Uinta National Forest.

Common to Proposed Action and Current Management Alternatives (Action Alternatives)

Species Listed Under the Endangered Species Act

It is assumed that bald eagles and western yellow-billed cuckoos are not present within the project area (see Affected Environment section for rationale for this assumption) and therefore, would not be affected by any of the alternatives. Although there are currently no known breeding populations of Canada lynx in Utah and the project area is not located within a Lynx Analysis Unit, for the purpose of this analysis it is assumed that Canada lynx could occur within the project area. Suitable lynx habitat occurs within the project area and would be affected by implementation of action alternatives. Lynx habitat would be affected because livestock grazing affects the structure and composition of ground- and shrub-level vegetation layers, and these vegetation layers provide habitat for lynx prey species (e.g., snowshoe hares, ruffed and blue grouse). Effects would vary by prey species. However, net effects of

action alternatives on habitat of lynx prey species would likely be negative (i.e., habitat for more prey species would be negatively affected than positively affected) compared to the No Grazing alternative because livestock grazing would continue to annually reduce cover and forage availability for various prey species. There are no known populations of lynx in Utah, so implementation of either action alternative would not affect population viability of lynx.

Management Indicator Species

Goshawks are assumed to occur within the project area. A historic goshawk nest site is located within the West Daniels cattle allotment, even though annual surveys have failed to locate an active nest in this area during 2001, 2002, 2003, 2004, and 2005. Surveys have shown that beavers occur within the project area (Wildlife Map). Habitat for goshawks and beavers would be affected under the action alternatives. Goshawk habitat would be affected because livestock grazing affects the structure and composition of ground- and shrub-level vegetation layers, and these vegetation layers provide habitat for goshawk prey species (e.g., ground squirrels and other small mammals, ruffed and blue grouse). Livestock grazing would have a negligible effect on habitat for red squirrels, and red squirrels are an important prey species of goshawks on the Uinta National Forest. Effects would vary by prey species. However, net effects of the action alternatives on habitat for goshawk prey species would likely be negative compared to the No Grazing alternative because livestock grazing would continue to annually reduce cover and food availability for various prey species. Effects of the action alternatives on beaver habitat would be negative because both cattle and sheep readily browse willows, aspen suckers, and riparian herbaceous vegetation, all of which are sources of food for beavers. Although effects of action alternatives on goshawk and beaver habitat would be negative, implementation of either action alternative would likely not affect population viability of goshawks or beavers on the Uinta National Forest because 1) survey data show that both species occur in many other locations across the Forest outside of the project area (USDA Forest Service 2005e: State of the Forest Report, 2005b:2005 Beaver Monitoring Report); 2) the project area covers only 3.0% of the 897,390 acres administered by the Uinta National Forest; 3) the project area was historically grazed at much greater intensities than at present, so the action alternatives would not result in any significant new effects on goshawk or beaver habitat; and 4) livestock grazing standards and guidelines in the 2003 Forest Plan are designed to reduce negative environmental effects of livestock grazing. Effects of action alternatives on three-toed woodpeckers would primarily be neutral because livestock grazing would not measurably affect dead or dying conifers, which are the key habitat features for three-toed woodpeckers. Implementation of either action alternative would therefore not affect population viability of three-toed woodpeckers on the Uinta National Forest.

Forest Service Sensitive Species

Peregrine falcons and fishers do not occur in the project area (see Affected Environment section) and therefore would not be affected by any of the alternatives. Surveys were not conducted for flammulated owls, spotted bats, and Townsend's big-eared bats, but for the purpose of this analysis, it is assumed that each of these species occurs within the project area. Livestock grazing would not affect nesting habitat for flammulated owls or roosting habitat for spotted bats or Townsend's big-eared bats. Each of these three species forages on flying insects, and the total abundance and composition of flying insects could be indirectly affected to some degree as a result of livestock grazing effects on vegetation cover and composition. These effects on total abundance and composition of flying insects are unknown but not likely to be significant under grazing levels authorized under either action alternative. Livestock grazing is not listed as a threat for any of these three species (NatureServe 2006e, 2006f, 2006g). It is assumed that effects on habitat for these three species would be neutral. Implementation of the Proposed Action

or the Current Management alternative is unlikely to affect population viability of flammulated owls, spotted bats, or Townsend's big-eared bats on the Uinta National Forest.

Throughout their range, sage-grouse occur on lands grazed by livestock. Although sage-grouse populations are potentially impacted by overgrazing, maintenance of suitable sage-grouse habitat and livestock grazing are not considered incompatible (Connelly and Braun 1997, Beck and Mitchell 2000). Greater sage-grouse occur near the project area in Strawberry Valley and may occasionally occur on the eastern edge of West Daniels and Twin Peaks allotments. Sage-grouse habitat would be affected under the action alternatives because livestock grazing affects the structure and composition of the ground- and shrub-level vegetation, and these vegetation layers provide forage and cover for sage-grouse. Because greater sage-grouse is a ground-nesting species, nest destruction caused by livestock trampling is a potential impact. A more likely impact, however, is the potential impact of reduced cover of herbaceous vegetation caused by livestock grazing on nest concealment and likelihood of nest predation (Gregg et al. 1994, DeLong et al. 1995). It is assumed that implementation of either action alternative would negatively affect sage-grouse habitat because livestock grazing would continue to annually reduce cover and food availability for sage-grouse. However, implementation of either the Proposed Action or Current Management alternative would likely not affect population viability of sage-grouse on the Uinta National Forest because 1) only 1.1 % of mapped sage-grouse range in Strawberry Valley would be affected; 2) the scientific literature indicates that the maintenance of suitable sage-grouse habitat and livestock grazing are not incompatible; 3) the project area was historically grazed at much greater intensities than at present, so the action alternatives would not result in any significant new impacts on sage-grouse habitat; and 4) livestock grazing standards and guidelines in the 2003 Forest Plan are designed to reduce negative environmental effects of livestock grazing.

Amphibians

Tiger salamanders and western chorus frogs are known to occur within the project area. Boreal toads have not been found in the project area, although they have been found near the project area in wetlands similar to those found in the project area. Columbia spotted frogs are unlikely to occur in the project area (see Affected Environment section). Each of these species of amphibian is a pond breeder, requiring ponds or other wetlands with little or no flow in which to deposit eggs and for larvae to develop. In addition to occurring within the water body during certain seasons and parts of the day, subadults and adults of each of these species also occur along the edge of the edge of the water body or in riparian habitat near the water body for foraging and other activities. Potential effects of livestock grazing on amphibian populations include 1) direct mortality of individuals due to livestock trampling; 2) effects of livestock use on water quality; 3) effects of livestock use on pond and stream banks; and 4) effects of livestock grazing on riparian vegetation. In addition to direct mortality of individuals, livestock trampling can alter bank shape and stream channel morphology and thus cover for amphibians. Excessive livestock use along streams can result in wider channels with shallower water and fewer vertical and overhanging banks (Platts 1991). Livestock grazing results in reduced herbaceous riparian vegetation which can result in reduced cover for amphibians and can affect the abundance and composition of riparian arthropod communities. Most of these potential effects are negative, so it is assumed that implementation of the Proposed Action or the Current Management alternative would negatively affect amphibian habitat compared to the No Grazing Alternative. Although effects of action alternatives on amphibian habitat would be negative, implementation of either action alternative would likely not affect population viability of tiger salamanders or western chorus frogs (the only amphibian species known to occur within the project area) on the Uinta National Forest because 1) surveys conducted by the Uinta National Forest and Utah Division of Wildlife Resources show that both species are commonly found in wetlands across the Forest outside of the project area; 2) the project area covers

only 3.0% of the 897,390 acres administered by the Uinta National Forest; 3) the project area was historically grazed at much greater intensities than at present, so the action alternatives would not result in any significant new effects on habitat for either species; and 4) livestock grazing standards and guidelines in the 2003 Forest Plan are designed to reduce negative environmental effects of livestock grazing. There are no known populations of boreal toad within the project area, so implementation of either action alternative is not likely to affect population viability of this species. If any boreal toad population is found within the project area in the future, breeding habitat would be protected according to Guideline WL&G-17 (USDA 2003a: page 3-13), which directs the Forest to protect occupied boreal toad breeding habitat.

Migratory Birds

Livestock grazing can affect bird populations and habitat in several ways. Grazing reduces ground- and shrub-level vegetation, which affects food availability and cover for birds that utilize these vegetation layers. For most bird species that utilize these vegetation layers, grazing effects are negative because reduced vegetation results in reduced cover. Habitat for certain ground-foraging bird species that prefer open conditions may be positively affected by livestock grazing (e.g., killdeer, American robin, Brewer's blackbird, and brown-headed cowbird), but these species are common and not at risk of loss of population viability. Potential habitat impacts to riparian areas is especially important because so many bird species inhabit riparian areas in Utah and the Intermountain West. Potential livestock grazing impacts on willows is important because many bird species on the Uinta National Forest forage or nest in riparian willow communities (see discussion below under Proposed Action). Another potential impact of livestock grazing on bird populations is reduced nest success resulting from livestock trampling or reduced vegetation cover around nests. Ground-nesting bird species are most vulnerable to these potential impacts (e.g., ruffed grouse, blue grouse, greater sage-grouse, killdeer, spotted sandpiper, dark-eyed junco). Timing of livestock turnout affects risks to ground-nesting birds due to trampling or reduction in nest cover. Most of the nesting activity of birds within the project area occurs during May, June, and July.

Brown-headed cowbirds occur within the project area. Breeding Bird Survey (BBS) results indicate that numbers of cowbirds detected ranged from 0 to 6 between 1996 and 2005 along the nearby Heber Mountain BBS route (Route 85206). Research indicates that cowbird numbers can increase in areas where concentrated livestock activity (e.g., corrals) result in disturbed bare soil (Verner and Ritter, 1983). No new corrals would be created under the Proposed Action and the Current Management alternative, and utilization standards should ensure that areas of disturbed bare soil are minimized.

Livestock grazing likely positively affects habitat for certain bird species and negatively affects habitat for other species. Implementation of the Proposed Action or the Current Management alternative would likely not affect population viability of any migratory bird species on the Uinta National Forest because 1) the project area covers only 3.0% of the 897,390 acres administered by the Uinta National Forest, and there are no bird species whose range is known to be restricted to the project area; 2) the project area was historically grazed at much greater intensities than at present, so the action alternatives would not result in any significant new impacts on migratory bird habitat; and 3) livestock grazing standards and guidelines in the 2003 Forest Plan are designed to reduce negative environmental effects of livestock grazing.

Big Game Species

Elk, mule deer, and moose occur within the project area. Because of dietary overlap between big game species and livestock, livestock grazing reduces forage and browse available for elk, mule deer, and

moose. Livestock grazing also reduces vegetation cover available for big game fawning and calving habitat. Effects of livestock grazing on big game habitat are therefore primarily negative. Although effects of livestock grazing on big game habitat are primarily negative, implementation of the Proposed Action or Current Management alternative would likely not affect population viability of elk, mule deer, or moose on the Uinta National Forest because 1) populations of big game species in mountainous areas of northern Utah are limited more by winter range than summer range, and only a small portion of the Twin Peaks allotment is considered elk or deer winter range; 2) big game populations are influenced greatly by state hunting policies, which are outside of the control of the Forest Service; 3) the project area was historically grazed at much greater intensities than at present, so the action alternatives would not result in any significant new impacts on big game habitat; and 4) livestock grazing standards and guidelines in the 2003 Forest Plan are designed to reduce negative environmental effects of livestock grazing, including impacts to big game winter range.

Predators

Predators that depredate sheep or cattle on Uinta National Forest grazing allotments are coyote, black bear, and mountain lion. Compared to the No Grazing alternative, action alternatives would result in more incidences of lethal predator control of coyotes, black bears, and mountain lions. Although effects of action alternatives on predators would be negative, implementation of the Proposed Action or the Current Management alternative would likely not affect population viability of any predator species on the Uinta National Forest because 1) sport hunting mortality on black bears and mountain lions, which is regulated by Utah Division of Wildlife Resources, is considerably greater than depredation-related mortality; 2) the project area covers only 3.0% of the 897,390 acres administered by the Uinta National Forest, and each of these predators is known to occur in various locations across the Forest outside of the project area; 3) numbers of known predators killed on grazing allotments on the Uinta National Forest annually are small; and 4) predator control to reduce livestock depredation likely occurred at greater intensities historically, so predator control associated with action alternatives would not result in significant new impacts.

Proposed Action

Cattle typically spend a disproportionate amount of time foraging and resting in riparian areas compared to upland areas during summer and fall on western rangelands (e.g., Marlow and Pogacnik 1986, Platts 1991, Kovalchik and Elmore 1992, Hann et al. 1997:pages 767 to 773). Cattle grazing has historically resulted in substantial degradation of aquatic and riparian environmental conditions on western rangelands (e.g., Chaney et al. 1990, Platts 1991, Elmore and Kauffman 1994, Fleischner 1994, Hann et al. 1997). Under typical grazing practices on western rangelands, sheep spend less time grazing and resting in riparian areas than do cattle (e.g., Platts 1981, Platts 1991, Hann et al. 1997). Therefore, for the purposes of this analysis, it is assumed that cattle grazing has greater potential negative effects on habitat for riparian-associated and riparian-dependent wildlife species than does sheep grazing. Of the wildlife species analyzed in this document and known or assumed to occur within the project area, ones most closely associated with riparian habitats are amphibians, beaver, greater sage-grouse (riparian habitats provide important brood-rearing habitat), and various species of migratory birds. Riparian areas provide habitat for a large portion of biodiversity on western rangelands (e.g., Parrish et al. 2002), and many other wildlife species associated with riparian habitats but not analyzed in this document are known or assumed to occur within the project area.

Total acres grazed by cattle within the project area would increase by 71% from 10,525 acres under the Current Management alternative to 18,032 acres under the Proposed Action (see table below). Miles of stream calculated from the Uinta National Forest's GIS stream coverage was used as an index of the

amount of riparian habitat within each unit throughout the project area. Acres of riparian habitat conservation area (RHCA) grazed by cattle within the project area would increase by 43% from approximately 567 acres grazed by cattle under the Current Management alternative to 810 acres under the Proposed Action (see second table below). Because cattle grazing has greater potential negative effects on riparian wildlife habitat than sheep grazing, the proposed action would have greater potential negative effects on riparian wildlife habitat within these areas that would be converted from sheep grazing to cattle grazing under the Proposed Action. The potential negative effects resulting from conversion from sheep grazing to cattle grazing would be offset to some degree by two factors. First, adding the Mill A unit to the West Daniels cattle allotment without increasing permitted livestock use on West Daniels under the Proposed Action would allow better management of cattle distribution within the 10,525-acre West Daniels cattle allotment compared to the Current Management alternative. Second, under the Proposed Action, negative effects caused by livestock grazing would be removed from 1,280 acres within the Strawberry allotment closure unit.

Acres grazed by cattle and sheep under the Current Management alternative and Proposed Action

Allotment	Acres Grazed			
	Current Management		Proposed Action	
	Cattle	Sheep	Cattle	Sheep
Twin Peaks	0	11,446	4,058	7,388
West Daniels	10,525	0	10,525	0
Strawberry	0	4,729	3,449	0
Total	10,525	16,175	18,032	7,388

Acres of Riparian Habitat Conservation Area (RHCA) grazed by cattle and sheep under the Current Management alternative & Proposed Action

Allotment	Acres of RHCA Grazed			
	Current Management		Proposed Action	
	Cattle	Sheep	Cattle	Sheep
Twin Peaks	0	432	140	292
West Daniels	567	0	567	0
Strawberry	0	211	103	0
Total	567	643	810	292

The primary sources of food and construction material for beavers within the project area are willows and aspen. Beavers also eat herbaceous riparian vegetation during the summer, but willows and aspen provide the crucial food sources needed to survive during winter. Under the assumption that cattle grazing has greater potential impacts on willows than sheep grazing because cattle graze in riparian habitats where willows occur more than sheep, habitat for beavers would be adversely affected to a greater degree under the Proposed Action than under the Current Management alternative within riparian portions of the 7,507 acres that would be converted from sheep grazing to cattle grazing. Adding the Mill A unit to the West Daniels cattle allotment without increasing grazable acres and would allow better management of cattle distribution within the West Daniels allotment and lead to reduced riparian impacts, habitat for beavers would potentially be improved by some degree within 10,525 acres of the West Daniels allotment under the Proposed Action.

Beaver ponds provide key breeding habitat for amphibian species on the Uinta National Forest, including tiger salamanders, western chorus frogs, and boreal toads. Therefore, potential effects of the Proposed Action on habitat for beavers also affects habitat for amphibians. Because cattle grazing has greater potential impacts on riparian habitat than sheep grazing, habitat for amphibian species would be adversely affected to a greater degree under the Proposed Action than under the Current Management alternative within riparian portions of the 7,507 acres that would be converted from sheep grazing to cattle grazing. In addition, amphibians are more likely to suffer direct mortality due to livestock trampling than other species analyzed in this document, so amphibians would be exposed to a higher probability of trampling mortality within the 7,507 acres that would be converted from sheep grazing to cattle grazing.

Because riparian habitats provide important brood-rearing habitat for sage-grouse and that cattle grazing has greater potential negative effects on riparian habitat than sheep grazing, potential adverse effects on sage-grouse brood-rearing habitat would be greater under the Proposed Action than under the Current Management alternative because 314 acres of mapped sage-grouse range in the Mill A unit would be converted from sheep to cattle grazing under the Proposed Action (Wildlife Map). This potential effect would be small, however, because the area of mapped sage-grouse range in the Mill A unit represents less than 1% of the total area of mapped sage-grouse range in the Strawberry Reservoir Management Area. A potential effect on such a small portion of sage-grouse range would have no population-level effect on the Strawberry Valley sage-grouse population. There have been no detections of radio-transmitted sage-grouse within these areas, as well as the rest of the project area, since 2003 and sage-grouse detections within these areas between 1999 and 2003 were rare (Rick Baxter, personal communication).

Migratory bird species associated with riparian habitats and known or assumed to occur within the project area include mallard, spotted sandpiper, sora, willow flycatcher, red-naped sapsucker, broad-tailed hummingbird, yellow warbler, Wilson's warbler, fox sparrow, Lincoln's sparrow, white-crowned sparrow. Willows provide a crucial habitat component for most of these species, providing cover, foraging habitat, and nesting habitat. Because cattle grazing has greater potential impacts on willows than sheep grazing, habitat for these riparian-associated bird species would potentially be adversely affected within riparian portions of the 7,507 acres that would be converted from sheep grazing to cattle grazing under the Proposed Action. Adding the Mill A unit to the West Daniels cattle allotment would increase the grazable acres and will allow better management of cattle distribution within West Daniels and lead to reduced riparian impacts, habitat for these riparian bird species would potentially be improved by some degree within 10,525 acres of the West Daniels allotment under the Proposed Action.

On the Uinta National Forest, predator control is more common on sheep allotments than on cattle allotments because sheep are more vulnerable than cattle to the types of predators that occur locally. Therefore, fewer predators would likely be killed as a result of predator management under the Proposed Action than under the Current Management alternative because 7,507 acres of land would be converted from sheep grazing to cattle grazing under the Proposed Action.

Under the assumption that livestock grazing negatively affects rather than positively affects habitat for most wildlife species, the Proposed Action would result in improved habitat for most wildlife species within the 1,280 acres that would be closed to all grazing in the southern portion of the Strawberry allotment compared to the Current Management alternative.

A total of about 11.4 miles of fence would be constructed under the Proposed Action. Approximately 4.9 miles of this total would be standard barbed wire fence (fencing around Mill A unit of Twin Peaks allotment), and approximately 6.5 miles would be a combination of buck-and-pole fence and barbed wire fence (closure unit and special use management unit in Strawberry allotment). Fences can cause mortality and impede movements of certain large-bodied mammals such as pronghorn. However, both types of fence that would be constructed are designed to facilitate movement of wildlife, and large-bodied mammals occurring in the project area (mule deer, elk, and moose) are adept at jumping these fence types. Fence construction would unlikely have any substantial negative effects on wildlife in the project area.

Current Management Alternative

Based on assumptions stated above, implementation of the Current Management alternative would result in 1) better habitat conditions for wildlife species within riparian portions of the 7,507 acres that would be converted from sheep to cattle grazing under the Proposed Action; 2) worse wildlife habitat conditions within the 10,525-acre West Daniels allotment compared to the Proposed Action; 3) worse wildlife habitat conditions within the 1,280-acre portion of the Strawberry allotment that would be closed under the Proposed Action; and 4) greater frequency of lethal control on coyotes, black bears, and mountain lions within the 16,175 acres that would be grazed by sheep compared to 7,388 acres that would be grazed by sheep under the Proposed Action (Table a).

No Grazing Alternative

Based on assumptions stated above and compared to the action alternatives, implementation of the No Grazing alternative would result in improved habitat conditions for most wildlife species evaluated above, as well as many other wildlife species not evaluated above. Riparian areas provide habitat for a diverse array of wildlife species, and riparian habitats have been shown to improve substantially following removal of livestock grazing (e.g., Platts 1991, Fleischner 1994, Hann et al. 1997, pages 767 to 773).

Cultural Resources

Affected Environment

The affect of grazing under updated management direction on heritage resources is being analyzed under two desired conditions which are both based directly on Forest Plan Goals and Objectives (FLMP 2-17). Under the first, heritage sites are identified and National Register eligible sites are protected from adverse effects to the features that make them historically important. The second desired condition is that plants and areas associated with traditional uses that are culturally significant to American Indian Tribes are identified and the degree of effect to them by livestock grazing is assessed. They are protected from livestock grazing if this activity is compromising their potential utility to Tribes. The potential effects of these will be discussed separately, as they involve two different sets of data and analyses.

Heritage Sites

The Strawberry Valley area has been used by American Indians for at least the last 8,000 years, as an area to hunt, fish, gather plants, hold social and religious gatherings, and as a travel route between the Wasatch Front and Uintah Basin. Use would have largely been seasonal due to the severe winters in the area. The archaeological sites that resulted from those activities are generally artifact scatters. Historically, the area was an important fishing and social gathering area for the Northern Ute Indians.

Most of the three allotments were also part of the first Uintah and Ouray Ute Indian Reservation, created in 1861 for the Ute who were displaced from much of the rest of Utah and northwestern Colorado.

Routine European American use of the area began while Strawberry Valley was still part of the Uintah and Ouray Reservation, and consisted of livestock grazing. After the reservation boundaries were significantly reduced in 1905, this portion of the former reservation was either added to the Uinta National Forest or made part of the Strawberry Project. This ambitious project was the first large-scale reclamation project in this portion of the U.S., and included Strawberry Reservoir and a tunnel to convey water through the Strawberry Ridge to the Diamond Fork watershed, through which the water flowed to Utah Valley.

An unusual feature of the Strawberry Project was that 57,000 acres of land immediately around the reservoir were used by the Strawberry Water User's Association (the original proponents and beneficiaries of the project) to raise money to cover the cost of the dam and other project features. They charged fees for grazing, hunting preserves, and recreation camps until 1973, when the cost of the project was repaid. The original Strawberry Reservoir was significantly enlarged in the 1970's by the Bureau of Reclamation, and the Project Lands were conveyed to the Forest Service in 1989 for long-term management. Since that time, the management focus in these valley-bottom lands has been watershed restoration and recreation, and they are excluded from livestock grazing.

Since 1906, grazing has continued to be a significant focus of use in the overall project area. The Daniels Irrigation System of canals, which moved water from the Strawberry River, Willow Creek, Hobble Creek, Murdock Hollow and Point of Pines to Daniels Creek, was also an important early use of the area. Some logging occurred in all three allotments during the historic era, as well. Other activities include hunting and fishing, Forest Service management, and the Central Utah Project. The archaeological sites that have resulted from these activities include canal systems, artifact scatters, sawmills, Forest Service guard stations, and grazing-related cabins, corrals, storage buildings, spring developments, and troughs.

About 2,123 acres of heritage resource inventory has been conducted within the three allotments involved in this analysis. That represents about .08 % of the total project area. These past inventories have been done in a variety of topographic settings within the allotments. However, a large percentage of these inventories have been done around springs and other water sources, which could be expected to have a higher likelihood of containing sites. Just one spring in the area has been found to have an associated archaeological site. Only six sites total were found during these previous inventories, which is a very low site density. This is due in large part to the fact that a high proportion of each allotment contains slopes over 30%. Such steep slopes in this area rarely contain sites of any kind. This suggests that even with significantly expanded inventories within the three allotments, few additional sites would be found.

A five-step process was identified in order to analyze the potential effect of continued livestock grazing on both known and undocumented (yet to be found) sites in the area. First, the potential effect of grazing on the six previously recorded sites was identified. Of these sites, only one is eligible for the National Register of Historic Places. The old Historic Hub Guard Station (UN-345) is located within the Forest Service Hub Administrative Site where it is excluded from grazing.

The second step was for the District Rangeland Management Specialist to identify the areas within each allotment that received the most intensive use. He did this based on his experience in administering

these grazing permits. This identified those areas within each allotment where the potential for grazing to affect sites was higher than the rest of the allotment. Many of these high use areas are near water sources; they are generally on ridge tops, but sometimes extend down onto adjacent steep slopes.

The third step was to compare these high-use areas to the areas that had already been surveyed for cultural resources. This step was designed to identify if there were gaps in our understandings of potential effects within high use areas. Nine out of 16 high use areas had already received some measure of archaeological inventory. These high use areas occur on both relatively level and very steep slopes.

The fourth step was to conduct inventories in the high use areas that had not been adequately surveyed in the past, and which also had the potential to contain sites on relatively level terrain. One unit in each of the three allotments was selected for additional survey. A total of 139 acres of new inventory was completed in three areas with the highest probability of containing sites.

Only one new site was identified in the course of these additional inventories. 42WA 378 (UN-531) is a small front-gabled "salt" cabin built in about 1935 to store stacks of salt and other livestock grazing equipment. The cabin is part of the grazing operations of the Strawberry Sheep and Goat Allotment. It is the oldest of its type remaining on the Uinta National Forest, and as such is an important representation of twentieth century livestock grazing practices. It is eligible for the National Register, for its association with the livestock industry in Wasatch County.

The process of evaluating the potential effects of fence construction involved walking all proposed fence lines in a corridor 100 feet (30 meters) wide. This corridor is wide enough to find any sites which might be affected by both direct effects from fence construction and potential indirect effects from cattle trailing near the fences.

Only one site of any kind was found within the fence right-of-ways. 42WA 381 (UN-573) is a small historic site associated with the original Uintah-Ouray Ute Indian Reservation boundary. It is not eligible for the National Register of Historic Places.

Traditional Plant Use

One of the ways in which Northern Utes maintain their ties with Strawberry Valley today is through plant collection. A series of plants of interest to Northern Ute traditional practitioners were identified during a field trip to Strawberry Valley in 1998 (Loosle 1998). These include a variety of plants, some of which are not common within the current boundary of the Uintah-Ouray Ute Indian Reservation to the east. Some past and current plant gathering is known for the valley in general by Northern Utes (Loosle 1998); these activities are not currently widespread. However, they are an important part of some practitioners' activities.

The extent of future use of these plants by American Indians is unknown, but projected to continue to be relatively low. Few of these plants are tied to economically important activities such as basket making, and most medicinal and ceremonial uses do not require large quantities of the plants.

The focus on Northern Ute plant use in this area is due to the fact that this area was part of the area occupied by the ancestors of today's Utes, both in ancient and historic times. Northern Ute traditional practitioners have a demonstrated history of interest in, and use of, the area. This does not preclude the possibility that individual members of other Tribes are also collecting plants in the area; however, this

use has not yet been identified, nor tied to the cultural practices of a Tribe as a whole. Hopefully, actions taken to identify and protect key plants or gathering areas important to the Northern Utes will also favor the potential plant gathering activities of other individual Tribal members or Tribes who may choose to utilize plants in the area in the future.

There is only one known plant gathering location in Strawberry Valley that is used fairly regularly by Northern Ute practitioners, and it is not within the three allotments under analysis here. Plant gathering by traditional practitioners may be occurring in Daniels Canyon. There is no known traditional Northern Ute plant gathering occurring in the upper parts of Main Canyon or the head of Wardsworth Creek on the Twin Peaks Allotment. Both of these areas are difficult to access.

The potential effects of grazing on the utility of these plants identified by the Northern Utes can be addressed by considering their general abundance in the Valley and the degree to which they are potentially affected by livestock grazing. The Ute practitioners regard all of Strawberry Valley as a potential source for plant material. As a result, we will address the general distribution of plants within the specific allotments, but will also consider the distribution of plants in Strawberry Valley and adjacent Daniel's Canyon.

The ability of American Indian traditional practitioners to use plants is affected by the degree to which the plants are distributed in across the landscape, the abundance of plants within individual plant patches, and the ability to access those plants (primarily along roads). For example, a plant that occurs in most drainages in Strawberry Valley, is relatively abundant where it does occur, and is near a number of different roads is much easier to collect than a plant that occurs only in a few drainages, is not abundant even when it is found, and is far away from roads.

Plants are also differentially affected by livestock (and other wild herbivore) grazing. Some plants are not palatable; others are favored primarily by either cattle or sheep, and others are palatable only during certain stages of their growth (such as aspen saplings).

Strawberry Valley in general is dominated by aspen and sagebrush vegetation types (at 39% and 34% of the total area, respectively; USDA Forest Service, Uinta National Forest 2004:172). The three allotments, in particular, are characterized by broad areas of relatively repetitive plant populations (see Vegetation section of this chapter). For example, almost 70% of the three allotments are covered with the aspen vegetation type; 13% are conifer; and the other 17% is a mixture of other community types. None of the allotments contain plant communities or particular plant types that do not occur elsewhere in Strawberry Valley. The Daniels Canyon area contains a higher proportion of the mountain brush vegetation type, but none of the plants of interest to the Northern Utes occur exclusively in that type.

The following table lists the plants of interest identified in 1998 and summarizes what is currently known about their distribution, abundance, and utilization by livestock within Strawberry Valley as a whole. It also notes whether or not each plant type is known to occur within the Strawberry, West Daniels, and Twin Peaks Allotments.

Plant Name	Vegetation Community ¹	Distribution within its Vegetation Community ²	Abundance ²	Use by livestock ³	Known in these allotments? ²
Bluebells (<i>Mertensia ciliata</i>)	Tall Forb, Riparian	Widespread	Moderate	Sheep like it; fair use	Yes

or <i>M. arizonica</i>):				by cattle	
Spring Beauty or Indian Potato (<i>Claytonia lanceolata</i>)	Sage, Tall Forb, Mountain Brush, Conifer	Moderate	Moderate	Palatable to both sheep and cattle	Yes
Wild Onions (<i>Allium acuminatum</i> [taper tip onion] and <i>A. brevistylum</i> [shortstyle onion])	Sage, Tall Forb	Moderate	Moderate	Highly palatable to both cattle and sheep	Yes
Yampa (<i>Perideridia gairdeneri</i>):	Sage	Moderate	Moderate	Highly palatable to both cattle and sheep	Unknown
Sweetanise or Western sweet cicely (<i>Osmorhiza occidentalis</i>):	Conifer, Tall Forb	Moderate	High	Highly palatable to both cattle and sheep	Yes
Bear Root (<i>Ligusticum porteri</i> or <i>L. filicium</i>)	Tall Forb	Low	Low	Highly palatable to sheep; fair use by cattle	Unknown
Camas (<i>Camassia guamasti</i>)	Meadow	Low	Low	Fair use by both cattle and sheep in the spring	Unknown
Various willows	Riparian	Widespread	Moderate	Palatable to both cattle and sheep, but used more by cattle	Yes
Tarweed (<i>Madia glomerata</i>)	Tall Forb, Sage	Moderate	Moderate	Unpalatable to both sheep and cattle	Yes
Horsemint or Indian Perfume (<i>Agastache urticifolia</i>)	Tall Forb	Widespread	High	Widely eaten by both cattle and sheep; preferred by sheep	Yes
Elderberries (<i>Sambucus</i> spp.) and other berry-producing shrubs	Aspen, Conifer, Tall Forb, Riparian	Widespread	High	Browsed by both cattle and sheep	Yes
Yarrow (<i>Achillea millefolium</i>)	Tall Forb	Widespread	Moderate	Poor to fair use by cattle and sheep, depending on location	Yes

Sagebrush (<i>Artemisia</i> spp.)	Sage	Widespread	High	Grazed lightly and seasonally by both	Yes
Wild strawberries (<i>Fragaria</i> sp.)	Riparian	Widespread	Moderate	Rarely eaten by either cattle or sheep	Yes
Aspen (<i>Populus tremuloides</i>)	Aspen	Widespread	High	Grazed by both sheep and cattle, especially small trees and in the fall	Yes
Dandelion (<i>Agoseris</i> sp. or <i>Taxicum</i> spp.)	Riparian	Widespread	Moderate	Grazed by both; favored by sheep	Yes

^{1/} See Vegetation section in this chapter.

^{2/} Source: 2210 Range Management Planning Trend Studies and field observations of Forest Service personnel.

^{3/} Source: USDA Forest Service, 1937. *Range Plant Handbook*

Environmental Consequences

Effects Common to Grazing Alternatives

Heritage Sites

The generalized effects of livestock grazing on heritage resources are detailed in the FEIS for the Uinta National Forest 2003 Land and Resource Management Plan (Forest Plan FEIS) Livestock grazing would continue to possibly affect any currently undocumented archaeological sites or historic buildings that occur within all three allotments. Since site densities in all three areas are relatively low, the potential for these effects to occur is also low.

Specific potential effects to archaeological sites by livestock grazing include moving and breaking surface artifacts, churning buried deposits up to 30 plus centimeters (depending on soil types), and erosion of soil features due to loss of vegetative cover (usually caused by over-grazing), obscuring site features and artifacts under thick layers of manure, etc.. Potential effects to standing features or historic buildings include cattle knocking over cabin walls, both cattle and sheep trampling site features (such as cabin floors), etc.

These effects are generally greater in areas where the livestock congregate, rather in areas where livestock use is more evenly and thinly distributed. These higher use areas include trailing areas for both cattle and sheep. However, other areas of concentration can be different for sheep and cattle. Sheep tend to congregate in bedding areas (used at night or at mid-day on hot days), salting locations, and water sources. Cattle tend to congregate along streams, at water sources, salting locations, and under shady trees (especially near water). These behaviors by both sheep and cattle can be reduced by the presence of herders, who can move the animals.

Potential effects to sites from fence construction include direct damage to both surface and subsurface deposits through the digging of fence posts. Indirect effects include the tendency of cattle to trail along the edges of fence lines, leading to trampling of artifacts and erosion of archaeological deposits.

Effects of grazing on heritage resources are also described on page 3-424 of the Forest Plan EIS.

Traditional Plant Use

Livestock grazing can affect traditional plants directly through forage use and indirectly through soil compaction and soil loss. Most of the plants of interest to the Northern Ute Tribe are grazed by livestock to one degree or another. The only plant which is not grazed is tarweed.

Most of the plants used as forage also have widespread distribution and moderate to high abundance within the allotments. These include bluebells, sweetanise, willows, horsemint, berry-producing shrubs, yarrow, sagebrush, wild strawberries, aspen, and dandelion. As a result, despite years of recent livestock grazing within all three allotments, no negative affects to the ability of traditional plant users to find plants are known from livestock grazing. Only bear root has less than moderate abundance, but it is still abundant enough to be available to traditional users.

Under both grazing alternatives, conformity to Forest Plant Standards and Guidelines and Best Management Practices for vegetation, water, and soil resources would enhance the long-term availability of these plants of interest as identified by the Northern Utes.

Proposed Action

Heritage Sites

West Daniels Allotment: There are no known National Register eligible archaeological sites or historic buildings in this Allotment which might be affected by continued grazing. Addition of a portion of the Twin Peaks Allotment (converted to cattle) to this Allotment would not create a significantly different kind of potential effect to undocumented sites.

Twin Peaks: There are no previously recorded sites of any kind in this allotment.

Strawberry Allotment: Closure of 1,280 acres of this Allotment to grazing would greatly reduce the possibility of sites in this area being affected in any way by grazing. The mitigation measures proposed for the Trail Hollow Special Management Area would create lower intensity grazing on 836 acres. As a result, the potential effects to any sites which might occur in that area would be lessened.

The single known site in the project area which is both eligible for the National Register and is in an area open to grazing is within this Allotment. 42WA 378 was created as a storage structure for sheep salt. However, it is no longer actively used by the Allotment's permittee. Conversion of this Allotment from sheep to cattle might make this structure slightly more vulnerable to effects from livestock, since cattle are more likely to rub against it or trample soils around it.

One site is near one of the proposed fences for the special management pasture, but 42WA 381 is not eligible for the National Register of Historic Places. Nonetheless, no direct or indirect effects will occur to it because the fence alignment will be shifted slightly away from the site.

Continuation of Current Management

West Daniels Allotment: There are no known National Register eligible archaeological sites or historic buildings in this Allotment which might be affected by continued livestock grazing under current management.

Twin Peaks: There are no previously recorded sites of any kind in the allotment.

Strawberry Allotment: The single known site in the project area which is both eligible for the National Register and is in an area open to grazing is within this allotment. 42WA 378 was created as a storage structure for sheep salt. The Allotment's current permittee would probably continue not to use the structure. It is possible that a potential new permittee might start using it again. The potential effect of sheep trampling or bedding within the structure would continue to be only slight.

No Grazing Alternative

Any potential effects to any sites from livestock grazing within the three allotments would be eliminated. This would include the single known National Register eligible site within the project area (42WA 378), as well as any currently undocumented sites that exist within the allotments.

Traditional Plant Use

Proposed Action

West Daniels Allotment: Addition of a portion of the Twin Peaks Allotment (converted to cattle) to the West Daniels Allotment could result in more impacts to plants in riparian areas, both from use of the plants for forage and from trampling. Plants of interest that occur primarily in riparian areas are willows, wild strawberries, and dandelions; both willows and dandelions are more likely to be directly affected as forage plants. However, both are also relatively abundant and so the ability of traditional plant users to use these plant types would not be compromised. Wild Strawberries have a widespread distribution and are rarely eaten by either cattle or sheep.

Twin Peaks: Any potential effects to plants of interest to the Northern Utes by sheep grazing would continue on the part of the allotment not incorporated into the West Daniels Allotment.

Strawberry Allotment: Closure of 1,280 acres of this Allotment to grazing would greatly reduce the possibility of plants of interest in this area being affected in any way by livestock grazing. This would create the only large area of primarily aspen, tall forb and conifer plant populations in the Strawberry Valley area that is excluded from livestock grazing. In addition, creation of the 836 acre Trail Hollow Special Management Area would reduce the intensity of grazing on plants in that area.

Conversion of this allotment from sheep to cattle could result in more impacts to plants in riparian areas, both from use of the plants for forage and from trampling. Plants of interest that occur primarily in riparian areas are willows, wild strawberries, and dandelions. Both willows and dandelions are more likely to be directly affected as forage plants, but both are also relatively abundant. As a result, cattle grazing would not reduce populations to the point that their potential use to traditional practitioners would be compromised.

Continuation of Current Management

Any existing affects to traditional plants would continue in all three allotments. If the use of specific plants of interest to the Northern Utes was found to be compromised by livestock grazing, current

management would allow corrective actions to be taken to protect those plants from over-use by livestock.

No Grazing Alternative

Any potential effects to any plant populations from livestock grazing would be eliminated. This could lead to some increases in the distribution and abundance of most plants of interest to the Northern Utes that occur within the three allotments.

Since several of these plants occur in the tall forb vegetation type, their distribution and abundance may have been strongly affected by the heavy overgrazing and soil loss of about a hundred years ago that reduced the extent of that type throughout the Wasatch Range.

Other Resources

Affected Environment

The Project Area is within the Strawberry Management Area and Deer Creek Reservoir Management Area. A small portion along the western boundary of Twin Peaks Allotment is within the Hobble Creek Management Area. The Visual Quality Objectives are Modified and Partial Retention. The management prescriptions within these areas include:

- 3.1 Aquatic, Terrestrial, and Hydrologic Resources
- 3.2 Watershed Emphasis
- 4.5 Developed Recreation
- 5.1 Forested Ecosystems – Limited Development
- 5.2 Forest Ecosystems – Vegetation Management
- 7.0 Wildland Urban Interface
- 8.1 Mineral Development
- 8.2 Utility Corridor/Communication Sites

There is a small corridor along the eastern boundary of West Daniels along highway 40 that is Retention. The Recreation Opportunity Spectrum is Roaded Natural and Semi-Primitive Motorized. The same corridor that has a VQO of Retention has a ROS of Roaded Modified.

The Lodgepole campground is the only developed recreation site near the Project Area. There is dispersed camping along Hogsback Road (FR #094), Circle-Main Canyon Road (FR#046), Murdock-Bench (FR#503), and Strawberry Ridge (FR#135). There are few special use permits within the allotment. There is ongoing activity at the Daniel's Summit summer homes, US Highway use and maintenance, Forest Road use and maintenance.

There have been no recorded fires in the Strawberry or West Daniels Allotments. There was a 180 acres fire in 1964 on the Twin Peaks Allotments. There have not been any Forest Service fuels reduction treatments on the allotments. There has been approximately 883 acres associated with timber sales on the southern portion of the Twin Peaks Allotment, approximately 258 acres within the West Daniels Allotment, and no timber sales within the Strawberry Allotment. Fuelwood has been gathered on the Heber District for decades, in 2004 the District sold 413 fuelwood gathering permits involving 1081 cords of dead and down wood district-wide. There are not records distinguishing how much of the wood came from within the Project Area. Other forest product permits include seed collecting; approximately 25 tons of seed was collected in 2004 District-wide.

Environmental Consequences

Proposed Action

Approximately 11 miles of fence would be constructed under the proposed action to create the special management pasture and to close part of the Strawberry allotment to grazing. The generalized effects of livestock grazing on recreation are detailed in the FEIS for the Uinta National Forest 2003 Land and Resource Management Plan (USDA 2003b). Livestock grazing and fence construction are comparable with the VQOs.

Continuation of Current Management

Under current management, sheep would remain on the Strawberry and Mill A Unit, therefore, the fences would not need to be constructed under this alternative. The generalized effects of livestock grazing on recreation, are detailed in the FEIS for the Uinta National Forest 2003 Land and Resource Management Plan (USDA 2003b) Livestock grazing is comparable with the VQOs.

No Grazing

Under the no grazing alternative, no fences would be constructed or any other range improvement projects. There would be no direct or indirect effects to recreation, fire/fuels, or the visual quality objectives.

Cumulative Effects

Overview

Heber Valley was first settled in 1859. Within one or two years, sheep were grazing in Strawberry Valley and by 1872 construction had started on the first diversion of water from Strawberry Valley into Daniel's Creek and Heber Valley. In the mid-1860s disputes arose between the Mormon settlers and the Utes over grazing in Strawberry Valley. In 1861, the Uintah and Ouray Indian reservation was authorized by President Lincoln in the Uinta Basin, including Strawberry Valley. In 1905, parts of the reservation were officially opened (by Congress) to white settlement, greatly reducing its size.

The Reclamation Act of 1905 authorized the construction of a dam and reservoir on the Strawberry River as part of a project to deliver irrigation water to farmers in Utah County. Construction of the dam began in 1912 and was not completed until 1922. As originally constructed, the reservoir contained a maximum of 283,000 acre-ft of water and covered about 8,800 surface acres. One acre-foot is the equivalent of 1 foot of water over an area of 1 acre; this equals 43,560 cubic feet or 326,000 gallons. In 1973 a new dam was constructed near Soldier Creek that enlarged the reservoir to a capacity of 1,106,500 acre-ft and a surface area of 17,160 acres. The U.S. Bureau of Reclamation was responsible for its construction as part of the larger Central Utah Project to deliver irrigation water to farmers in southern Utah County. Beginning in 1915, an average of 61,500 acre-ft of water was transferred from Strawberry Reservoir through the Strawberry Tunnel to the Spanish Fork River via Diamond Fork and Sixth Water Creeks. The Indian Creek Ditch was constructed before 1912 so that water from tributary streams in the south end of the valley, including Trail Hollow, Chipman Creek, Indian Creek, Squaw Creek and Horse Creek, could be conveyed into the reservoir. Stream channels below the interception ditch were more or less completely dewatered.

Beginning in 1934 and until 1983, the Currant Creek feeder canal imported water from upper Currant Creek to the head of Co-Op Creek. For the years in which records are available (1949-1983), the Currant Creek Canal delivered an average of 4,275 acre-ft of water to Co-Op Creek. Water was exported out of the valley through the Hobble Creek and Strawberry-Willow Creek Diversion's into Daniel's Creek for use in Heber Valley. Together these canals diverted an average of 2,900 acre-ft of water from Hobble Creek, upper Strawberry River, Bjorkman Hollow and Willow Creek. Roughly 70% of the diverted water was from the Strawberry River and the remainder from the three smaller streams. The Daniel's diversions resulted in the dewatering of nearly 5 miles of Willow Creek, more than 2 miles of Bjorkman Hollow, 2 miles of Hobble Creek, and roughly 16 miles on the Strawberry River. In response to the dewatering, riparian areas on all 4 streams were greatly reduced. Some of the water diverted from the streams was often lost to canal seepage before it reached Daniel's Creek. In total, the flow of 9 of 33 valley streams have been modified by diversions or have had their flows augmented through trans-basin diversions.

Strawberry Reservoir has become the central feature of the Bonneville Unit of the Central Utah Project, a system of diversions, dams and aqueducts that will eventually convey more than 100,000 acre-ft of water from the Uinta Basin to the cities along the Wasatch Front, in addition to the 61,000 acre-ft already conveyed to Utah County. The reservoir has also become the most popular recreational fishery in Utah. Twice the reservoir has been treated with rotenone to remove undesirable fish species, once in 1961 and again in 1990. Following the 1990 rotenone treatment, native Colorado cutthroat trout were replaced with Bear Lake cutthroat trout (a strain of Bonneville cutthroat). Kokanee salmon and sterile rainbow trout were added to the fishery in order to enhance recreational fishing opportunities.

Beginning in the 1980's, the Bureau of Reclamation formed several Task Groups to address resource concerns in Strawberry Valley, including, range, wildlife, water quality, and fish habitat conditions. The input from the task groups and a restoration plan prepared simultaneously by the Uinta National Forest, resulted in several years of work stabilizing stream banks, implementing measures intended to restore riparian and fish habitat in valley streams, and the cessation of grazing on the Project Lands in 1990 until stream and riparian conditions are restored. At the same time, roads were identified for closure or reconstruction and grazing systems on Forest Service lands was altered in an attempt to improve the fishery.

Many of the restoration measures implemented in 1984-85 and in the early 1990s were met with limited success and there has been a continued interest from the public to complete the work that was begun. In response to this interest, the Uinta National Forest helped establish the "Friends of Strawberry Valley," a collection of all interested users of the valley, as a watershed advisory council. The Forest identified Strawberry Valley as one of its two "priority watersheds" in need of restoration. A restoration project of the dry reach of Strawberry River is being planned.

The Uinta National Forest's available fire records go back to about 1964. Since that year there have been no recorded fires in the Strawberry or West Daniels allotments. There was a 180 acre fire in 1964 in the Twin Peaks allotment. In East Daniels allotment there was a 160 acre fire in 1993 and a 483 acre fire in 1996. There were very likely smaller lightning strikes or other fires that didn't get into the permanent records. Similarly, there have undoubtedly been many fires both natural and human caused in the cumulative effects area, for which there are no available records. In general, most of the burned acres were in vegetation communities other than aspen or mesic to wet meadows. The Uinta National Forest is in the preliminary stages of planning a prescribed burn in Jones Hollow (Mill A unit of the proposed Action) to reduce fire fuel loading and to regenerate aspen. This Project is still in the initial stages of development and will soon be sent to the public for their comments.

The Uinta's timber records date back to 1976. There were no sales within the Strawberry allotment. On Twin Peaks allotment, timber sales occurred in several units totaling 883 acres in the southern half of the allotment. There were 258 acres of timber sales in the West Daniels allotment, and 51 acres in Mill B allotment. On East Daniels allotment there were 141 acres involved. Almost all wood cutting would have been spruce and fir, and very little aspen. All these sales were described as having selective, uneven age cutting prescriptions, except for one described as a shelterwood prep cut (a "weeding out" of certain trees to enhance future seed production of trees selected for remaining as shelterwood seed trees). The Uinta National Forest is in the preliminary stages of planning a timber sale in the Telephone Hollow area on the ridge between the Daniels drainage and the Strawberry watershed.

Fuelwood has been gathered in the general area for decades. In 2004, Heber Ranger District sold 413 fuelwood gathering permits involving 1081 cords of dead and down wood district-wide. A fairly high percentage of the gathered fuelwood is estimated to come from the cumulative effects area, because it is forested and relatively close to popular recreation areas.

The Strawberry valley receives over 2 million visitors per year. The majority of that recreation use centers around the reservoir itself, but many visitors fish, hunt, drive, snowmobile and camp in dispersed locations throughout the allotments under analysis. Lodgepole campground is the only developed campground within the Upper Strawberry allotments. There are five developed camp areas around the north and west shores of Strawberry reservoir. There is a recreational residence tract at Bryant's Fork, west of the reservoir. There is dispersed, undeveloped recreation and camping throughout the Forest.

Commercial seed collectors collect up to about 25 tons per year of native grass, forb and shrub seed on the Heber Ranger District. Personal use fuel-wood is also collected off of the district. Noxious weed treatments by private land owners as well as the Forest Service has occurred and would continue.

There are a few small developed sites for cell phone repeaters. Other ongoing activities include Daniels Summit summer homes commercial land use, US Highway 40 use and maintenance, Forest Road use and maintenance, the Heber Ranger District also completed an aspen understory seeding of approximately 200 acres in 2004 and 2005 to increase groundcover and plant diversity.

The cumulative effects analysis area for **soils, rare plants, and noxious weeds** is the allotment boundaries for Strawberry, West Daniels and Twin Peaks Allotments. (see map1.

Soils

The cumulative effects for soils are summarized in the following table. The estimated amount of land with long-term soil commitments is anticipated to be around 170 acres for all alternatives. The short-term impacts are projected to range from 1,350 acres for the no-grazing alternative to 17,620 acres under the continuation of current management alternative. The Proposed grazing alternative has a savings of 320 acres less than the current management alternative. The total acres from long-term plus short-term impacts range from 1,520 acres for the no-grazing alternative to 17,790 acres for the continuation of current management alternative.

Indicator	Acres by Alternative*		
	Proposed	Continue Current	No Grazing
LONG-TERM SOIL COMMITMENT			
Classified FS Roads	90	90	90
Unclassified Roads	60	60	60
Trails	10	10	10
Administrative Site	10	10	10
Total Estimated Soil Commitment	170	170	170
% of Allotments' Project Area	0.64%	0.64%	0.64%
MAXIMUM SHORT-TERM EFFECTS			
Cattle Grazing ¹	11,650	6,690	0
Sheep Grazing ¹	4,300	9,580	0
Aspen Understory Seeding	200	200	200
Noxious Weeds	470	470	470
Timber Harvests	40	40	40
Dispersed Recreation	<10	<10	<10
Prescribed Burn High to Moderate Intensity ²	640	640	640
Total Short-Term Impacts	17,300	17,620	1,350
% of Allotments' Project Area	65%	66%	5.1%
TOTALS			
Total Long-Term Soil Commitment	170	170	170
Total Short-Term Impacts	17,300	17,620	1,350
Total Estimated Impacted Soils	17,470	17,790	1,520
% of Allotments' Project Area	65%	67%	5.7%

* Estimated acres rounded to nearest 10 acres.

¹ 100% suitable range grazing areas based on range analysis using slope and vegetation (see soils Fig. 7).

² High to moderate intensity burn in spruce/fir (≥60% canopy cover).

Through analysis of the Grazing Alternatives, the incorporated design features and resource thresholds, it is determined that these alternatives will make progress toward or achieve desired conditions for soil resources. Therefore, it is determined that there will be no direct or indirect cumulative effects to soil resources beyond existing conditions.

Through analysis of the No Grazing Alternative, it is determined that this alternative would not result in negative impact to soil resources. Therefore, it is determined that there will be no direct or indirect cumulative effects to soil resources within the analysis area.

Rare plants/noxious weeds

No rare plants were found within the cumulative effects analysis area. Therefore, there would not be any cumulative impact to rare plants under any of the alternatives. Noxious weeds would continue to be treated under all three alternatives. Livestock, both sheep and cattle, spread weed seeds. There would be a greater impact under the Proposed Action and Continuation of Management in comparison to the no grazing alternative. Under all three alternatives, weeds would continue to be treated.

Cumulative effects analysis area for **vegetation** and **grazing** is the three allotments as well as the adjacent Wallsburg Sheep allotment, Mill B Sheep allotment, East Daniels Cattle Allotment and adjacent private land grazed by the permittee. (see cumulative effects map for vegetation and grazing).

In addition to the projects listed above within the allotments, there was also a 100 acre fire on the Wallsburg allotment in 2000. Livestock grazing occurs within the entire vegetation and grazing cumulative effects area. There is elk winter range and sage grouse range within portions of the East Daniels Allotment, deer winter range on a portion of the Wallsburg allotment, and beaver colonies (one active and one inactive) within Mill B.

Grazing

The grazing on the Wallsburg and Mill B Sheep Allotments is authorized to the same permittee that grazes livestock on the Twin Peaks and West Daniels Allotments. This permittee also owns or has interest in the majority of the private land that borders the Wallsburg Twin Peaks and West Daniels Allotment. The Strawberry Allotment permittee owns the majority of the land the borders the Strawberry Allotment and presently leases this land to a permittee who grazes cattle on the East Daniels Allotment.

The Proposed action would change the grazing management on the Upper Strawberry Allotments; grazing would continue unchanged throughout the remainder of the cumulative effects analysis area. Under the Continuation of Current Management, grazing management in the cumulative effects area would not change except that the Strawberry permittee would need to graze sheep on his private land. The no grazing alternative would change the grazing management of the cumulative area because the Twin Peaks, West Daniels permittee would need more feed to round out his operation, thus putting more grazing pressure on his private land. The grazing management for the Strawberry permittee's private land would not change.

Vegetation

The generalized effects of livestock grazing on vegetation are detailed in the FEIS for the Uinta National Forest 2003 Land and Resource Management Plan (USDA 2003b). The proposed action, continuation of current management, or the no grazing alternative, in combination with the other past, current and

reasonably foreseeable uses will not have additional cumulative effects on upland, riparian, rare plant species, or noxious weeds.

Irregardless of the alternative, vegetation consumption by both livestock and wildlife would continue to occur on the surrounding private lands, Mill B, Wallsburg, and East Daniels allotments. In addition, the Aspen understory project would improve vegetation condition on 200 acres within the cumulative effects area.

The proposed action's design features and resource threshold would make progress toward or achieve desired conditions for vegetation resources. In addition, 1,280 acres of the Strawberry Allotment would be closed and an additional 836 acres within the special management pasture would have additional resource protection measures. Mill A would combine with West Daniels to provide additional forage base for cattle.

Continuation of current management would allow utilization until Forest Plan standards are met, irregardless of whether browse occurred from livestock or wildlife.

The no grazing alternative would have not have a cumulative impact once term grazing permits were phased out of the ten year period.

The cumulative effects for **fisheries and aquatic resources** and **water resources** are shared within the same area of analysis. This cumulative effects analysis area includes the 6th Level HUCs for Main Canyon, Daniels Creek, and Center Canyon within the Provo River Drainage. The analysis area within the Colorado River Basin includes the entire Willow Creek – Strawberry River 6th Level HUC and the Strawberry River drainage within the Clyde Creek – Strawberry River 6th Level HUC. The analysis area also includes the Wardsworth Creek 6th Level HUC within the Hobble Creek Drainage (Project Record – Hydrology Report, Map). Portions of the Deer Creek Reservoir, Strawberry Reservoir, and Hobble Creek Management Areas are included within the boundaries of these HUCs (refer to cumulative impacts map for water resources for HUC boundaries).

In addition to the land management activities listed above, the following activities are within the cumulative effects analysis area for Fisheries, Stream, Riparian, and Wetland Resources

Colorado River Basin – Strawberry Watershed

Several important changes occurred within the past 15 years in relation to the management of Strawberry Valley tributaries and adjacent lands. One significant change was the transfer of 56,775 acres of Strawberry Valley Management Lands from the BOR to the USFS during 1989. Prior to this action, these lands were managed by the Strawberry Water Users Association to emphasize water collection and livestock production. After the land transfer, the USFS amended its 1983 Land and Resource Management Plan to incorporate the Strawberry Valley Management Area Plan which focused on renewable resources and non-commodity use with an emphasis on wildlife and watershed values (USDA Forest Service 1990). This management adjustment removed all grazing, improved riparian habitat conditions, and reduced sediment loading to the streams on these lands. (Wilson et al. 2004)

The Strawberry Valley Irrigation Project was initially constructed during 1922 by the BOR. The main feature of the project was the 8,400 acre Strawberry Reservoir, which was designed to provide storage and delivery of water to the Bonneville Basin (Wasatch Front) via the Strawberry Tunnel (West Portal).

Enlargement of Strawberry Reservoir began in 1973 when the Soldier Creek Dam, located approximately eight miles downstream of the Strawberry Dam, was completed. The old Strawberry Dam and Indian Creek Dike were subsequently breached during 1985, and the original 283,000 acre-foot reservoir was enlarged to provide a maximum capacity of 1,106,500 acre-feet and a total surface area of about 17,164 acres. Strawberry Reservoir is an essential feature of the Bonneville Unit of the Central Utah Project. The reservoir functions as the major storage facility for about 135,000 acre feet of water diverted from the Uinta Basin through the Strawberry Aqueduct and Collection System. The Central Utah Water Conservancy District is currently the operating agent for the enlarged Strawberry Reservoir. (Wilson et al. 2004)

The Forest Service in cooperation with other agencies and groups has accomplished a variety of rehabilitation measures in the various tributary streams with most of the work occurring during 1984 and 1991-1995. These projects involved the placement of instream structures such as drop logs, vortex weirs, random boulder arrangements, spawning gravel enhancement, pool excavation, gully plugs, culvert placements, noxious weed treatments, seedings, and road relocation, resurfacing and closures. In addition, a number of bank stabilization projects were undertaken with logs, juniper revetments, willow plantings, and other vegetative enhancement. These projects met with varying degrees of success depending on the chosen rehabilitation measure and site specific characteristics and techniques.

The Heber Ranger District of the Uinta National Forest assembled a team during 2001 to collect comprehensive watershed and hydrologic data, and begin broad-based project planning for restoration work to be accomplished in Strawberry Valley. It was the intent of this team to build upon the 1997 Strawberry Valley Assessment by moving the assessment forward into the implementation phase. (Wilson et al. 2004).

During 2002, an instream habitat enhancement project was accomplished on the Strawberry River in the vicinity of the UDWR fish trap utilizing Habitat Council funding. This project focused on improving the operational efficiency of assorted fish trap structures and in promoting streambank stability in the reach between the intake structure and the electric fish barrier. Vertical banks were re-shaped, protected with root wads and coconut fiber matting, and re-vegetated (seeding and willow plantings). While it is too soon to evaluate the effectiveness of the project, this type of rehabilitation has proven very successful in other central Utah streams and riparian ecosystems (Wiley 2003) (Wilson et al. 2004).

In addition to the 2002 instream habitat improvement project, a similar project was developed and implemented in 2005 on a 1.3 mile reach of the Strawberry River below the UDWR fish trap station. Specific objectives of this project were to restore and maintain the natural dimension, pattern, and profile of the Strawberry River channel; improve upstream fish migration from the reservoir to the fish trap/egg taking station facilities; slope/stabilize eroding banks, re-seed banks and plant willow clumps to help riparian vegetation to re-establish to provide fish cover and reduce stream temperatures; and experiment with discouraging beaver access and colonization in this stream segment with fencing and other methods that would not harm any beaver (Smith 2005i). It is too soon to evaluate the extent to which the project objectives have been met; however, improvements in channel form and function as well as increases in fish habitat suitability have already been noted.

From 1996 through 2003, as part of the Wasatch County Water Efficiency Project and Daniels Replacement Project (WCWEP, 1996), the CUWCD, DOI-BOR, URMCC, and the Forest Service began restoration on the Daniels Irrigation Company diversion works. These works, including the Daniels Diversion on the Strawberry River, Big Reservoir on Mill B, Bjorkman Headcut, and the McGuire

headcut were abandoned and either removed or retained for historic interpretation. The project also called for headcut stabilization, modification of existing canals, diversion facilities, reservoirs, a tunnel and siphon, stream gages, and roads. In the fall of 2005, further stabilization of a headcut that developed during high spring runoff of that year. Work completed on this project included restoration of streamflows within the dry reach of the Strawberry River, spanning approximately from Bjorkman Hollow to Willow Creek. Restoration of this reach may include studies of groundwater-surface water interactions; streamflow restoration; channel, riparian and floodplain restoration. (WCWEP, 1996) – Wasatch County Water Efficiency Project and Daniel Replacement Project. Central Utah Water Conservancy District, Utah Reclamation and Conservation Commission, and Department of Interior-Bureau of Reclamation

The area of analysis also includes three vegetation management/salvage sale polygons that are not included in other Cumulative Effects Analysis Area discussions. Approximately 132 acres of the Clyde Creek II Salvage within the Strawberry River - Clyde Creek HUC was completed in 1971. Also, approximately 41 acres of aspen were treated in the Jones Hollow Clearcut in 1993.

Great Basin – Provo River Drainage

The Cumulative Effects within this drainage is comprised of a majority of private lands. Specifically, the Main Canyon, Daniels Creek, and Center Creek 6th Level HUC are include privately owned lands of 57%, 45%, 89%, consecutively. Land uses on the privately owned lands include agriculture, grazing, development and/or sub-division of private lands, and roads associated with these activities. Forest Service System lands within these HUCs generally lie within the upper 1/3 of the HUC.

The overall cumulative effects for fisheries and water resources in the portions of these HUCs administered by the Uinta National Forest results from the combined activities associated with past and current grazing activities; logging and timber management; construction and maintenance of roads and trails; development and maintenance of recreational facilities; irrigation and water withdrawal; fisheries and aquatic habitat restoration; wildfire and vegetation management. The combined effect these activities potentially affect erosion and sedimentation rates in analysis area. The extent of these activities on fisheries and water resources varies with proximity to the aquatic environment and intensity of the associated activities.

Hobble Creek Drainage

The grazing alternatives being analyzed comprise approximately 4 percent of the Wardsworth 6th Level HUC. This land is associated with the Twin Peaks allotment, and is located in an intermittent headwaters region of Wardsworth Creek. The overall cumulative effects for fisheries and water resources in the Wardsworth Creek HUC results from the combined activities associated with past and current grazing activities; logging and timber management; construction and maintenance of roads and trails; development and maintenance of recreational facilities; fisheries and aquatic habitat restoration; wildfire and vegetation management. Approximately 250 acres of the Timber Mountain Shelterwood Prep/Salvage Sale within this HUC was completed between years 1998-2000. The combined effect of these activities on fisheries and water resources varies with proximity to the aquatic environment and intensity of the associated activities.

Fisheries and Aquatic Resources

Strawberry Reservoir Management Area

The most significant cumulative effects for fisheries and aquatic resources, relative to the proposed project, are located within the Strawberry Reservoir Management Area which encompasses the Strawberry River watershed (Strawberry Project Lands) and is focused primarily on the Strawberry Reservoir and its associated fisheries.

Strawberry Reservoir has undergone a dramatic evolution in the course of its long history as one of the most important recreational fisheries in the state of Utah. The most significant recent developments include the enlargement of the reservoir during 1985; transfer of lands controlled by the Strawberry Water Users to the USFS in 1989; the completion of the most extensive rotenone treatment ever conducted during 1990 which included the tributaries; the implementation of a variety of rehabilitation measures for reservoir tributaries during 1984 and again in 1993-95 to improve habitat degraded by intensive livestock grazing; and the return of the upper Strawberry River flows from the Daniels diversion during 2002. (Wilson et al. 2004)

The UDWR accomplished an ambitious chemical reclamation project during 1990 to remove competing rough fish populations (i.e., Utah chub and Utah sucker) and rejuvenate the Valley's sport fishery. The treatment was 99 percent effective in removing these non-game fishes, and the sport fishery improved sufficiently to meet or exceed fishery objectives by as early as 1993. The treatment project also included the valley tributaries. There were some impacts to these tributaries in the form of beaver dam breaching and removal of some aquatic species. However, all native fish species except CRCT have subsequently been re-introduced, and the vast majority of macro invertebrates have returned to these streams and reaches. (Wilson et al. 2004)

Stream dwelling trout are intimately connected to their habitat, and the population status (abundance, condition, size, etc.) can be interpreted as a direct reflection of habitat condition. The tributaries feeding Strawberry Reservoir, particularly including upper Strawberry River, Little Hobble Creek, and Clyde Creek have suffered from heavy livestock grazing, chemical removal of willows, road system impacts, water diversions, stream alteration and channelization, channel degradation (downcutting), sedimentation and deposition of fines in spawning gravels, beaver dams, and invasion/expansion of rough fish populations over the past 80 years. As a result, the potential for salmonid production in nearly all of these streams has been negatively impacted. (Wilson et al. 2004)

Since these and other less dramatic actions can have profound impacts on fluvial fisheries habitat, it has been the undertaking of the UDWR and USFS to evaluate the cumulative effects of these changes on Strawberry Reservoir tributaries. One of the primary management goals for the Strawberry fishery is the production of 10 million salmonid fry from reservoir tributaries (Johnson 1987). To assist in the assessment of this goal, Habitat Quality Index (HQI) surveys were conducted in 1984/1985, 1997/1998, and again in 2002 to determine if significant improvements to aquatic habitat conditions in the tributary streams have occurred since the most recent management changes. Based on these HQI surveys, there appears to have been significant improvement in several habitat attributes between the 1984/85, 1997/98 and 2002 survey periods, the most noticeable of which are the reduction of eroding streambanks and substantial stream narrowing. These improvements are accentuated by the presence of greater trout

standing stocks in some tributary sections during 1997/98 when stream flows were near normal. The 2002 surveys were conducted during a fairly severe drought, and results of the HQI surveys were obviously influenced by the resulting low flows. (Wilson et al. 2004)

The 2002 surveys included two new stations to establish baseline data for additional stream reaches in response to the USFS development of a Strawberry Valley Watershed Rehabilitation Plan. In conjunction with and in addition to these HQI surveys, a number of fish population inventories were conducted to define game and nongame fish distribution and density. Nearly all inventoried streams contained young-of-the-year (YOY) cutthroat trout, and several held substantial numbers indicating excellent natural recruitment. During 1997, YOY trout densities in Section 4 of Indian Creek were estimated to be more than 14,000 fish per mile. (Wilson et al. 2004)

One of the primary objectives of the UDWR Strawberry Project is to promote natural reproduction of adfluvial cutthroat trout and kokanee salmon in Strawberry Reservoir tributaries. The goal that was established in the Environmental Assessment of Plans to Restore the Strawberry Valley Fishery (Johnson 1987) was a production of 10 million cutthroat fry per annum. While no specific goal was established for kokanee, the UDWR feels that significant contribution from natural recruitment is essential to the maintenance of a viable kokanee fishery as well. Efforts to support the establishment of a viable kokanee fishery include placement of fish passage structures on beaver dams in the upper Strawberry River to facilitate spawning migrations of kokanee into the upper reaches of the drainage.

Reservoir population modeling accomplished during the period 1993 to 2002 suggests that annual fry production in the tributaries has varied from 100,000 to over 6.0 million (Wilson and Ward, unpublished data). The data also suggest that natural recruitment accounts for a long-term average of 23 percent of the adult aged III+ and older cutthroat trout in Strawberry Reservoir. During 1997, nearly 60 percent of the III + and older cutthroat in the reservoir originated from natural sources (Wilson and Ward 2003). Despite the current potential for natural recruitment, it is apparent that salmonid production continues to be suppressed by poor habitat quality in some of the valley tributaries, particularly those in the Strawberry River system (Wilson et al. 2004). However, cutthroat trout population data within the upper Strawberry River drainage indicate no change in the overall abundance of cutthroat trout during the period between 1997 and 2004 (Smith 2005a).

Following review of the proposed project and potential effects of project implementation, it was determined that the greatest risk to fisheries and aquatic resources within the Strawberry Reservoir Management Area could potentially result from: upland soil compaction and vegetative composition shift, with associated increases in water runoff and soil erosion; declines in streambank vegetation and stability where livestock concentrate near water; a combination of upland erosion, loss of riparian canopies, and breakdown of streambanks which could potentially lower local water tables and cause stream channels to become wider and more shallow, warmer in summer but colder in winter; and a decrease in instream structure and increase in nutrients and bacterial populations.

However, implementation of the proposed project within the Strawberry Reservoir Management Area will not result in any additional cumulative effects to fisheries and aquatic resources because of the conservation measures, standards and guidelines that are identified to minimize project specific effects as part of the project proposal. In addition, the proposed lower levels of grazing intensity will result in a decrease in grazing related effects from levels that are currently present. Consequently, it is anticipated that the overall impact of this project will generally be beneficial for fisheries and will not result in any

long-term detrimental effects to existing aquatic resources beyond those that currently exist within the Management Area.

Therefore, it is determined that there will be no negative long-term impacts, direct, indirect, or cumulative effects to aquatic species or their habitat resulting from implementation of the proposed project.

Deer Creek Reservoir Management Area

Following review of the proposed project and potential effects of project implementation, it was determined that the greatest risk to fisheries and aquatic resources within the Deer Creek Reservoir Management Area could potentially result from: upland soil compaction and vegetative composition shift, with associated increases in water runoff and soil erosion; declines in streambank vegetation and stability where livestock concentrate near water; a combination of upland erosion, loss of riparian canopies, and breakdown of streambanks which could potentially lower local water tables and cause stream channels to become wider and more shallow, warmer in summer but colder in winter; and a decrease in instream structure and increase in nutrients and bacterial populations.

However, implementation of the proposed project within the Deer Creek Reservoir Management Area will not result in any additional cumulative effects to fisheries and aquatic resources because of the conservation measures, standards and guidelines that are identified to minimize project specific effects as part of the project proposal. In addition, the proposed lower levels of grazing intensity will result in a decrease in grazing related effects from levels that are currently present. Consequently, it is anticipated that the overall impact of this project will generally be beneficial for fisheries and will not result in any long-term detrimental effects to existing aquatic resources beyond those that currently exist within the Management Area.

Therefore, it is determined that there will be no negative long-term impacts, direct, indirect, or cumulative effects to aquatic species or their habitat resulting from implementation of the proposed project within the Deer Creek Reservoir Management Area.

Hobble Creek Management Area

Following review of the proposed project and potential effects of project implementation, it was determined that the greatest risk to fisheries and aquatic resources within the Hobble Creek Management Area could potentially result from: upland soil compaction and vegetative composition shift, with associated increases in water runoff and soil erosion; declines in streambank vegetation and stability where livestock concentrate near water; a combination of upland erosion, loss of riparian canopies, and breakdown of streambanks which could potentially lower local water tables and cause stream channels to become wider and more shallow, warmer in summer but colder in winter; and a decrease in instream structure and increase in nutrients and bacterial populations.

However, implementation of the proposed project within the Hobble Creek Management Area will not result in any additional cumulative effects to fisheries and aquatic resources because of the conservation measures, standards and guidelines that are identified to minimize project specific effects as part of the project proposal. In addition, the proposed lower levels of grazing intensity will result in a decrease in grazing related effects from levels that are currently present. Consequently, it is anticipated that the overall impact of this project will generally be beneficial for fisheries and will not result in any long-term detrimental effects to existing aquatic resources beyond those that currently exist within the Management Area.

Therefore, it is determined that there will be no negative long-term impacts, direct, indirect, or cumulative effects to aquatic species or their habitat resulting from implementation of the proposed project within the Hobble Creek Management Area.

Water Resources

Through analysis of the **Proposed Action**, the incorporated design features and resource thresholds, it is determined that these alternatives will make progress toward or achieve desired conditions for stream, riparian, or wetland resources (also refer to Soils – Cumulative Impacts). Similarly, incorporation of the Design Features and Resource Thresholds, supplemented by monitoring and adaptive management, will make progress toward or achieve the desired conditions and State Water Quality / TMDL requirements for waters for both alternatives within the analysis area. Therefore, it is determined that there will be no direct or indirect cumulative effects to these resources beyond existing conditions.

Through analysis of the **Continuation of Current Management Alternative**, it is determined that the current conditions for stream, riparian, or wetland resources would be maintained throughout the Great Basin and Colorado Basin portions of the project area (also refer to Soils – Cumulative Impacts). As result of not closing 1,300 acres of the Strawberry Allotment to grazing and creating the Trail Hollow Special Management Pasture, sediment and streambank erosion in the Strawberry Allotment would continue at current rates and would not achieve or work toward the recommended Total Phosphorous Reductions in the Strawberry TMDL Study. Water quality in the Provo River drainage would be maintained or improve. Water quality in the Hobble Creek drainage would be maintained or improve. In summary, selection of this alternative would result in no direct or indirect cumulative effects on stream, riparian, and wetland resources throughout the Cumulative Effects Analysis Area. However, this alternative would not achieve or work toward the recommended reductions of Total Phosphorous in the Strawberry TMDL Study.

Through analysis of the **No Grazing Alternative**, it is determined that this alternative would not result in negative impact to water quality, stream, riparian, or wetland resources. Therefore, it is determined that there will be no direct or indirect cumulative effects to these resources within the analysis area.

The cumulative effects analysis area for both **heritage sites** and **traditional plant use** is the same area that was analyzed for fisheries and aquatic resources and water resources cumulative effects.

Both of these resources have been affected by several past activities in the area. Chief among these is livestock grazing. The grazing that began in the 1860's as trespass on the Uintah and Ouray Ute Indian Reservation intensified in the 1870's and 1880's. Large numbers of livestock were grazed both legally (under lease agreements) and illegally until this portion of the reservation was removed in 1902. Grass was also cut as hay in the valley bottom beginning in the 1860's. The Upper Strawberry watershed (including these allotments) became part of the Uinta National Forest in 1906, and within about 10 years stock reductions began. These continued throughout the early to mid 1900's, until only a fraction of the number of livestock being grazed on the Forest in 1900 remained under permit. Overgrazing continued on the Strawberry Project lands directly around Strawberry Reservoir until the 1980's.

The general affect of this intensive over-grazing was direct damage to ancient American Indian site artifacts and features, and the indirect affect of soil loss, which included the sediments that make up archaeological sites. An unknown number of sites were damaged or destroyed as a result of this early grazing. An additional unknown number of both American Indian and European American sites were

damaged or destroyed by Forest Service reseeding projects in the 1940's through 1960's which sought to reestablish vegetation on some of the hardest hit areas. These actions occurred before the National Historic Preservation Act of 1966 regulations were established in the early 1970's.

The distribution and abundance of some traditional use plants were probably significantly reduced by early overgrazing. It is also possible that plant types were eliminated entirely in the area, particularly those in the tall forb vegetation type. The 1940-1960's reseeding projects also replaced some native vegetation with both native and non-native grasses, sweet clover, and alfalfa.

An unknown number of important ancient American Indian sites were probably buried by the waters of Strawberry Reservoir in 1912. Logging in the area also probably damaged sites, as did the development of roads that served the livestock grazers, loggers, reclamation workers, and travelers. Many of these roads parallel streams, which are areas that contain larger numbers of sites. These roads increased both in number and quality in the early to mid-1900s, and this also led to more recreational activity in the area. These activities affected sites through ground disturbance from dispersed camping and illegal off-road vehicle use, as well as other activities such as dismantling old cabins and corrals for firewood and illegal artifact collecting.

In summary, archaeological sites in both Strawberry Valley and Daniels Canyon have been damaged or destroyed by a variety of activities in the last 140 years. Chief among these have been overgrazing, road construction, the Strawberry Project and other water diversion projects, logging, and recreation. The most drastic of these affects happened between about 1880, when over-grazing intensified, and the 1970's, when historic preservation laws required that the effects of such activities be taken into account by land managers. As a result, the pace at which sites are adversely affected by specific projects or permitted activities has slowed significantly in the last 30 years.

As a result, the overall affect of the proposed action, as well as past, present, and foreseeable activities in the analysis area on heritage sites is that the activities of the moment will continue to potentially compromise the sites that mark the activities of the past. However, most of the lands within the Strawberry and Daniels watersheds are under Federal management, which means that known National Register eligible sites are monitored for condition, and specific projects are analyzed for their potential effect on heritage sites. Both the Proposed Action and Continuation of Current Management allow for changes in livestock management if unacceptable damage to sites from grazing or grazing management activities is found. However, the illegal actions of individuals recreating in the area remain the largest potential source of adverse effects to heritage sites in the area.

Historic period over-grazing is the activity in the last 140 years that has most extensively affected the ability of Northern Ute traditional practitioners to collect plants of interest in both Upper Strawberry Valley and Daniels Canyon by reducing the distribution and abundance of plants. Despite that, most of the plants of interest to today's practitioners are relatively widespread and abundant in the area, and the historic period road development has made plant gathering relatively easy. Some plants are more readily available outside of the three allotments. For example, yampa and willow are far more abundant in the sage and riparian communities in the bottom of Strawberry Valley than within the analysis area. They are also more accessible along valley bottom roads. Bear root occurs in a large patch in a drainage in lower Strawberry Valley, right along a road.

Most plants of interest do occur within the Strawberry, West Daniels, and Twin Peaks Allotments, and some are more abundant here than in the valley bottom since they occur in the tall forb vegetation type.

These plants include sweetanise, bear root, and horsemint. Only bear root is not both widespread and abundant in Upper Strawberry Valley and Daniels Canyon.

Cumulatively, the affect of the proposed action on the utility of traditional use plants of interest, as well as past, present, and foreseeable activities in the analysis area is that this activity will be able to continue relatively unchanged. Although traditional use plants may have been strongly affected by historic overgrazing, today overall plant populations in the area are relatively stable and the projected demand for these plants will not likely exceed supply. The proposed action includes excluding grazing from 1.277 acres of upland vegetation, including areas of tall forb. This vegetation type was the one in the area most reduced by historic period overgrazing, and it is an important source of some traditional use plants. This action would result in both upland and valley bottom (in Strawberry Project lands) vegetation communities being excluded from grazing in Strawberry Valley. This would mean that the potential effects of grazing would be eliminated for a portion of the full range of plants of interest to the Northern Utes.

Wildlife

Population dynamics of wildlife species operate at widely varying spatial scales. Populations of small, less mobile species function at smaller spatial scales, and populations of large, more mobile species function at larger spatial scales. The project area is defined by administrative boundaries, which are inappropriate for consideration of cumulative effects for most wildlife populations except the smallest, least mobile species (e.g., many species of small mammals). Watersheds were chosen to define the cumulative effects analysis area for wildlife species. 5th level hydrologic units are so large that they include areas distant and potentially dissimilar to the project area. Therefore, 6th level hydrologic units were chosen to define the cumulative effects analysis area. The analysis area was defined by all 6th level hydrologic units that overlapped the project area or were immediately adjacent to the project area (Wildlife Map). This cumulative effects analysis area for **wildlife** includes the following 6th level hydrologic units: Lake Creek, Center Creek, Daniels Creek, Upper Main Canyon Creek, Headwaters Right Fork of Hobble Creek, Upper Diamond Fork, Clyde Creek-Strawberry River, and Willow Creek-Strawberry River. In addition to the three grazing allotments defining the project area, two additional Forest Service grazing allotments are located within the cumulative effects analysis area: the East Daniels cattle allotment and the Mill B sheep allotment (Wildlife Map).

Willow Creek-Strawberry River and Clyde Creek-Strawberry River 6th level hydrologic units are located within the Strawberry Reservoir Management Area (described in USDA 2003a: pages 5-121 to 5-134). Portions of the Lake Creek, Daniels Creek, and Upper Main Canyon Creek 6th level hydrologic units within Uinta National Forest boundaries are located within the Deer Creek Reservoir Management Area (USDA 2003a: pages 5-37 to 5-47). The Headwaters Right Fork Hobble Creek 6th level hydrologic unit is located in the Hobble Creek Management Area (USDA 2003a: pages 5-62 to 5-73). The Upper Diamond Fork 6th level hydrologic unit is located in the Diamond Fork Management Area (USDA 2003a: pages 5-48 to 5-61).

Actions that have affected water and vegetation resources within the area encompassed by these watersheds are described in the Overview and Water Resources cumulative effects sections above. Factors that have most affected wildlife habitat conditions historically in this area include 1) loss of riparian habitats caused by water diversions and subsequent dewatering of stream channels; 2) loss of riparian habitats resulting from creation and expansion of Strawberry Reservoir; 3) degradation of riparian habitats caused by aerial spraying of 2,4-D from the mid 1960s to the mid 1980s to eradicate

willow communities; 4) degradation of riparian and upland habitats caused by livestock overgrazing during the late 1800s to mid 1900s; and 5) loss and degradation of riparian habitats caused by erosion and stream channel downcutting. Collectively, these factors resulted in the loss and degradation of large areas of riparian wildlife habitat within the cumulative effects analysis area. Wildlife species likely to have been affected most by the loss and degradation of aquatic and riparian habitats include amphibians, beavers and other riparian-associated mammals (e.g., American mink, northern river otter, long-tailed vole, water vole, muskrat, western jumping mouse), and riparian-associated bird species (e.g., mallard and other duck species, spotted sandpiper, sora, sandhill crane, sage-grouse, willow flycatcher, red-naped sapsucker, broad-tailed hummingbird, yellow warbler, Wilson's warbler, fox sparrow, Lincoln's sparrow, white-crowned sparrow).

There is a lack of historical information on population levels of most wildlife species within the cumulative effects analysis area. One species for which a significant population decline is documented is the Strawberry Valley greater sage-grouse population. Available information suggests that population size declined by approximately 90% between the late 1930s and 1970 (USDA Forest Service 2004: Strawberry Watershed Restoration Report, page 154). Anecdotal information suggests that numbers of sage-grouse declined substantially during the 1960s, the decade in which extensive aerial spraying of 2,4-D on willow communities began (USDA Forest Service 2004: Strawberry Watershed Restoration Report, page 155 to 156). Lynn Griner (1939) documented that Strawberry sage-grouse extensively used riparian habitats dominated by willows and silver sage. A variety of factors undoubtedly affected the Strawberry Valley sage-grouse population, but loss and degradation of riparian habitats caused by herbicide treatment of willow communities may have had a large impact on the population.

Little information is available on amphibian populations within the cumulative effects analysis area, but anecdotal information suggests that numbers of boreal toads in Strawberry Valley may have declined substantially between the 1960s and 1980s (USDA Forest Service 2004: Strawberry Restoration Plan pages 148 to 149). Historical records indicate that the boreal toad was previously widely distributed within and around the Uinta National Forest (USDA Forest Service 2004: Strawberry Restoration Plan page 148). Despite extensive survey efforts by personnel from Utah Division of Wildlife Resources and the Uinta National Forest in recent years, however, only small numbers of boreal toads have been found at a few sites in Strawberry Valley near the reservoir. Available information indicates that population viability of this species on the Uinta National Forest is at risk.

As in other areas throughout the West, beaver populations within and around the cumulative effects analysis area were significantly reduced by fur trappers during the 1800s (USDA Forest Service 2004: Strawberry Restoration Plan page 159 to 162). Fur trapping and trapping by ranchers and grazing permittees probably kept beaver populations low during the early 1990s. Widespread aerial herbicide spraying of willow communities in Strawberry Valley between the 1960s and 1980s must have negatively affected beaver habitat and populations because willows provide a crucial source of food and construction material for beavers within the analysis area, and willow communities were dramatically reduced in Strawberry Valley by aerial herbicide spraying during this time. With low trapping pressure resulting from low demand for beaver pelts and cessation of aerial herbicide spraying of willows, the distribution and abundance of beavers in Strawberry Valley may now be growing. However, lack of current occupancy by beavers in various areas within the cumulative effects analysis area despite evidence of past beaver occupancy is a cause for concern (USDA Forest Service 2004: Strawberry Restoration Plan page 163). Most of the currently active beaver colonies within the analysis area are restricted to larger streams with substantial willow communities such as along Daniels Creek, upper Strawberry River, Hobble Creek, and lower Willow Creek (Wildlife Map). There are several areas such

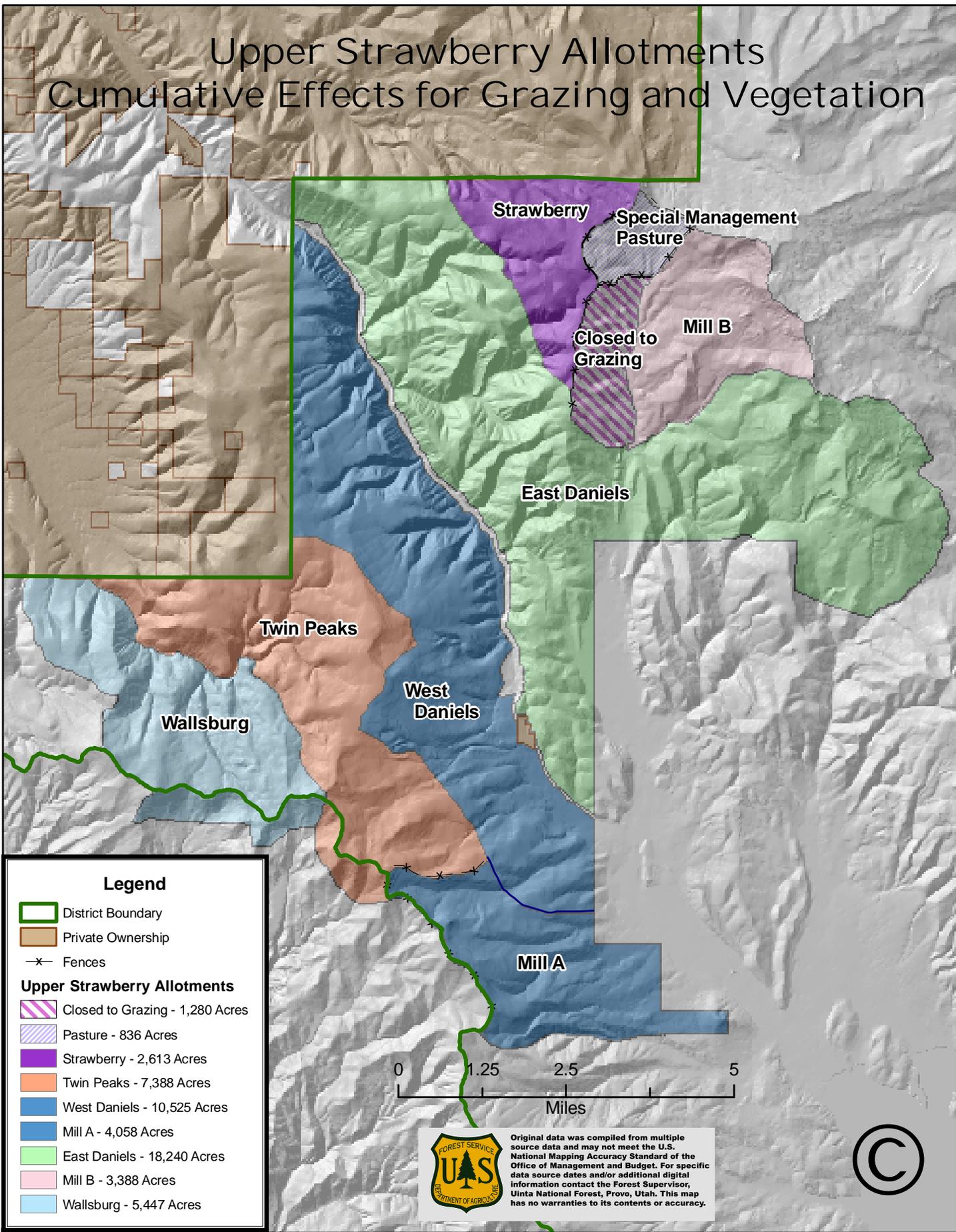
as Smith Basin and the headwaters of Willow Creek in the East Daniels cattle allotment and the headwaters of Hobble Creek in the West Daniels cattle allotment where only old, abandoned beaver colonies are present, and lack of suitable habitat currently precludes recolonization by beavers. Suitable habitat is lacking because there appears to be insufficient aspen and/or willow vegetation at these sites. Insufficient stream flow also may be a factor at some of these sites. One cause of reduced aspen cover at some of these sites is conifer encroachment. An example of heavy conifer encroachment can be seen around old beaver colony sites upstream of Harry's Reservoir in the West Daniels cattle allotment. Few willows also occur in this area. A complicating factor associated with conifer encroachment is that in addition to causing reduced aspen food resources for beavers, increased cover of conifers may lead to reduced stream flow (Bartos reference), and beavers need a certain level of reliable stream flow. Other examples of riparian areas where willow communities are diminished can be seen in Smith Basin and headwater tributaries of Willow Creek in the East Daniels cattle allotment. The presence of heavily browsed willows suggests that livestock grazing is at least partially the cause of the limited distribution of willow communities at some of these sites (USDA Forest Service 2004:Strawberry Watershed Restoration Report, page 163). Forest-wide beaver surveys indicate an association between willow cover and active beaver colonies: estimated willow cover was significantly less at inactive beaver colony sites than at active beaver colony sites (USDA Forest Service 2005b: 2005 Beaver Monitoring Report).

Cumulative effects were considered in making conclusions about the potential effects of the action alternatives on population viability of the various wildlife species evaluated in this analysis (see Environmental Consequences section above). Analysis of direct and indirect effects in the Environmental Consequences section indicates that effects of both action alternatives would negatively affect habitat for most wildlife species analyzed compared to the No Grazing alternative. The No Grazing alternative would lead to increased forage and cover and probably increased population abundance for a variety of species. However, as discussed above in the Environmental Consequences section, implementation of the Proposed Action or Current Management alternative would likely not cause loss of population viability of any of the species analyzed. See discussion of rationales for specific species in Environmental Consequences section, but in general, the rationale for this conclusion is that 1) wildlife species currently present within the cumulative effects analysis area have persisted through periods of severe livestock overgrazing during the late 1800s and early 1900s (or were locally extirpated and have subsequently recolonized areas within the project area), so it seems unlikely that continued grazing at intensities much reduced from historic grazing intensities would threaten the viability of species currently present; and 2) a variety of livestock grazing standards and guidelines in the 2003 Forest Plan and grazing monitoring should protect aquatic, riparian, and upland wildlife habitats from severe degradation.

Other Resources

The Visual Quality Objectives of modified and partial retention would be met by any of the three alternatives. The recreation opportunity spectrum would not be altered. Both developed and undeveloped recreation opportunities would continue and would not be affected by any of the alternatives. Fuelwood gathering, fuels reduction, projects and fire would continue and would not be affected by any of the alternatives.

Upper Strawberry Allotments Cumulative Effects for Grazing and Vegetation



Legend

- District Boundary
- Private Ownership
- Fences

Upper Strawberry Allotments

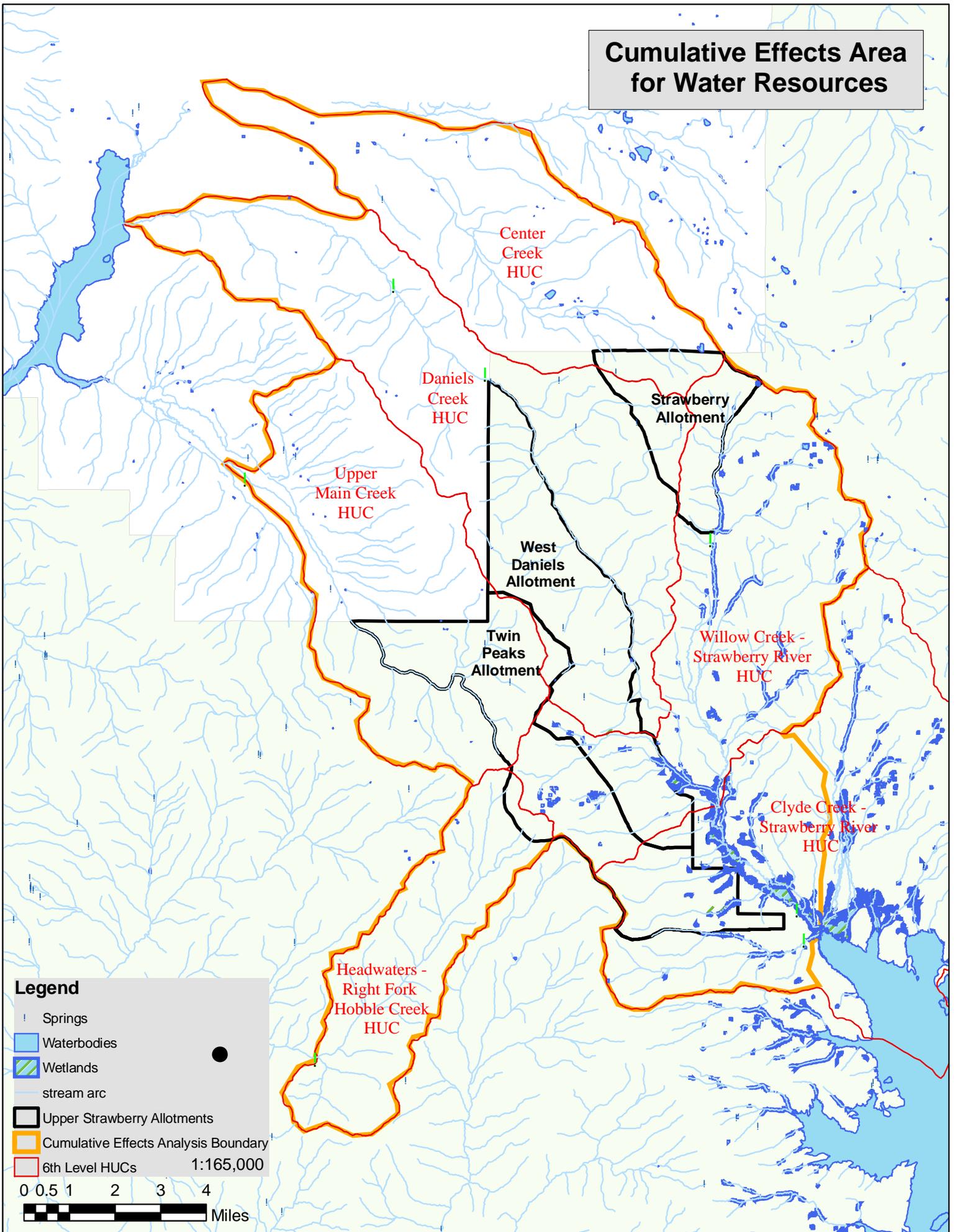
- Closed to Grazing - 1,280 Acres
- Pasture - 836 Acres
- Strawberry - 2,613 Acres
- Twin Peaks - 7,388 Acres
- West Daniels - 10,525 Acres
- Mill A - 4,058 Acres
- East Daniels - 18,240 Acres
- Mill B - 3,388 Acres
- Wallsburg - 5,447 Acres



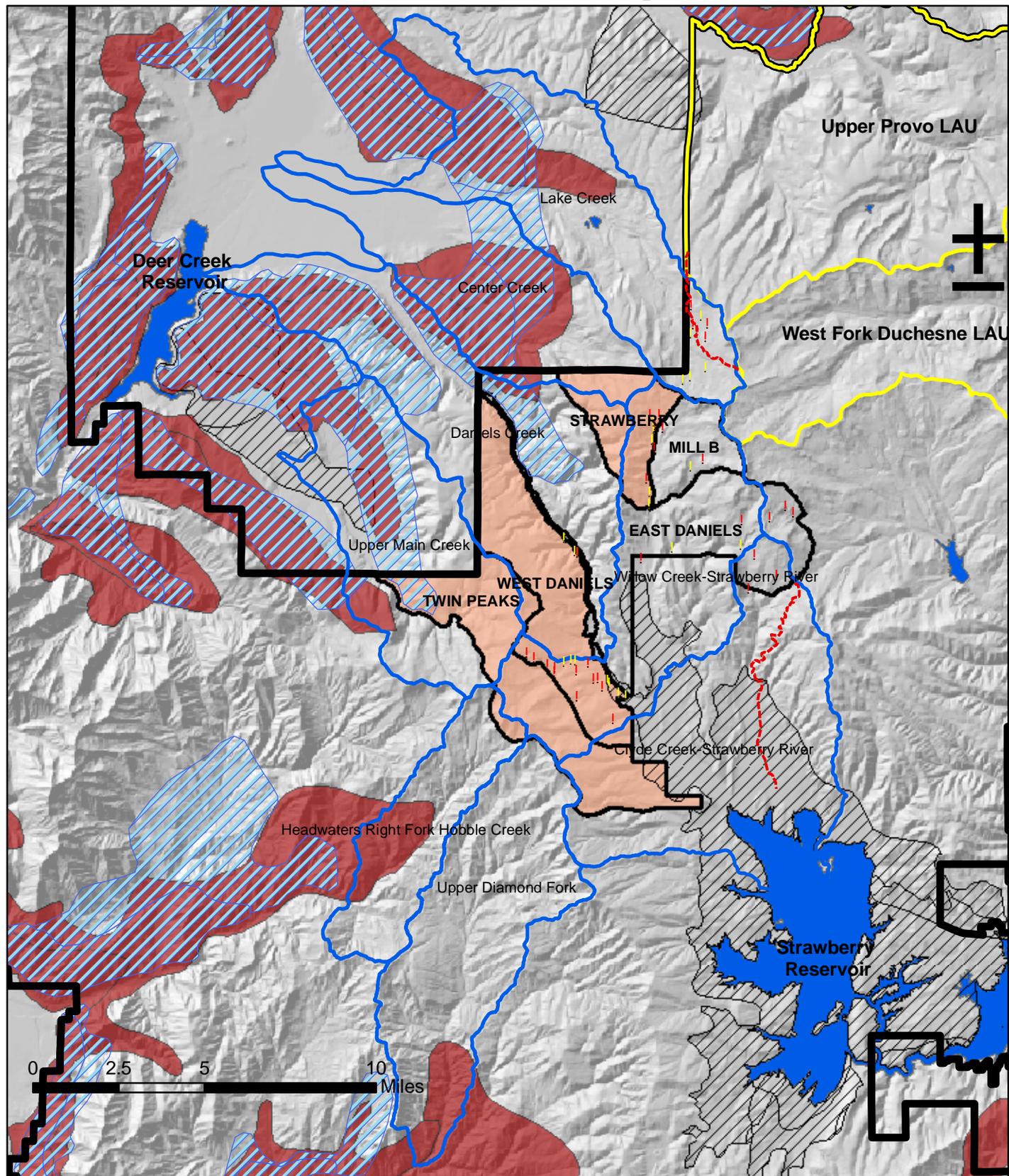
Original data was compiled from multiple source data and may not meet the U.S. National Mapping Accuracy Standard of the Office of Management and Budget. For specific data source dates and/or additional digital information contact the Forest Supervisor, Uinta National Forest, Provo, Utah. This map has no warranties to its contents or accuracy.



Cumulative Effects Area for Water Resources



Wildlife Map



0 2.5 5 10 Miles



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Distribution of the Environmental Impact Statement _____

This environmental impact statement has been distributed the following Federal agencies, federally recognized tribes, Sate and local governments, organizations, and individuals:

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GLOSSARY AND ACRONYMS

Adaptive Management- A type of natural resource management that implies making decisions as part of an on-going process. Monitoring the results of actions will provide a flow of information that may indicate the need to change a course of action. Scientific findings and the needs of society may also indicate the need to adapt resource management to new information.

Affected Environment- The natural environment that exists at the present time in an area being analyzed.

Allotment (Range Allotment)- The area designated for use by a prescribed number of livestock for a prescribed period of time. Though an entire Ranger District may be divided into allotments, all land will not be grazed, because other uses, such as recreation or tree plantings, may be more important at a given time.

AMP-Allotment Management Plan

Animal Unit Month (AUM) - The quantity of dry forage required by one mature cow (1,000 pounds or the equivalent) for one month based on a forage allowance of 26 pounds per day.

AOI-Annual Operating Instructions.

Bare Soil- Soil particles less than 1/8” in diameter

Bare Ground – The combination of bare soil and erosion pavement.

Benchmark – A permanent reference point, in range monitoring: it is used as a point where changes in vegetation through time are measured.

Beneficial Use(s) - Common uses or capabilities of lakes and streams which are officially designated by the State. In general, the categories relevant to forest streams address the needs of aquatic life, recreation, wildlife and aesthetics. Beneficial uses and their support are regulated under the authority of the federal Clean Water Act, but are administered by the states.

Best Management Practices (BMPs) - The set of practices that, when applied during implementation of a project, ensures that water-related beneficial uses are protected and that state water quality standards are met. BMPs can take several forms. Some are defined by state laws and regulations; others are defined by the forest interdisciplinary planning team for application forestwide, for application at the project level, and/or for application to specific management areas.

Biological Assessment - The legal record of findings for USDI Fish and Wildlife Service proposed, threatened, or endangered species.

Biological Evaluation - The legal record of finding for USFS Region 4 sensitive species.

Buffer - A land area that is designated to block or absorb unwanted impacts to the area beyond the buffer. Buffer strips along a creek can absorb sediment laden runoff from upland areas.

CEQ- Council on Environmental Quality

CFR- Code of Federal Regulations

Chemical Control - The use of pesticides and herbicides to control pests and undesirable plant species.

Composition - The proportions of various plant taxa in relation to the total on a given area. It may be expressed in terms of cover, density, or weight (syn. Species composition)

Cumulative Effects or Impacts - The impact on the environment that results from the incremental impact of an action when added to other past, present and reasonably foreseeable future actions regardless of what agency or person undertakes such other action. Cumulative effects or impacts can result from individually minor but collectively significant actions taking place over a period of time.

DEIS- Draft Environmental Impact Statement

desired future condition (DFC) - As used in the Forest Plan, the desired future condition of the forest describes what the forest will look like as Forest Plan management direction is implemented.

Detrimental Soil Disturbance - Detrimentally disturbed soil is soil that has been detrimentally displaced, compacted, puddled, or severely burned.

Dispersed Recreation - Recreation that does not occur in a developed recreation site, such as hunting, backpacking and scenic driving.

Ecosystem - A complete, interacting system of organisms considered together with their environment (for example: a marsh, a watershed, or a lake).

Effects - Physical, biological, social, and economic results (expected or experienced) resulting from natural events or management activities. Effects can be direct, indirect, and/or cumulative.

EIS-Environmental Impact Statement

Ephemeral Stream - Streams that flow only as the direct result of rainfall or snowmelt. In general streams that flow for less than 30 days at a time during the year.

Erosion - Erosion is the detachment and transport of individual soil particles, or aggregates of particles, by wind, water, or gravity. Management practices may increase the hazard of soil erosion when ground cover is removed and soil particles are detached.

a. Surface or particulate erosion occurs as the loss of soil by gravity (dry ravel), by wind, or by gravity and water, both raindrop splash and overland flow (rill and/or sheet erosion).

b. Mass wasting occurs when large masses of soil and/or rock fall, slide, or flow down a slope.

FEIS- Final Environmental Impact Statement

Forage - All browse and herbaceous foods that are available to grazing animals for food.

Forb - A broadleaf plant that has little or no woody material in it.

Functioning - Proper functioning condition (functioning): Riparian-wetland areas are functioning properly when adequate vegetation, landform or large woody debris is present to dissipate stream energy associated with high waterflows, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid floodplain development; improve flood-water retention and ground-water recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and support greater biodiversity. The functioning condition of riparian-wetland areas is a result of interaction among geology, soil, water, and vegetation.

FSH- Forest Service Handbook

FSM- Forest Service Manual

Functioning-at-Risk - Riparian-wetland areas that are in functional condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation.

Functioning-at-Risk Rangelands – Rangelands that have a reversible loss in capability and increase vulnerability to irreversible degradation based upon evaluation of current conditions and processes.

GIS (geographic information systems) - GIS is both a database designed to handle geographic data as well as a set of computer operations that can be used to analyze the data. In a sense, GIS can be thought of as a higher order map.

Ground Cover - Material covering the land surface. It may include live vegetation, standing dead vegetation, litter, cobble, gravel, stones and bedrock. Ground cover plus bare ground would total 100 percent of the area evaluated.

Ground Water - The supply of fresh water under the earth's surface in an aquifer or in the soil.

Habitat - A specific set of physical conditions that surround a single species, a group of species, or a large community. In wildlife management, the major components of habitat are considered to be food, water, cover, and living space.

Habitat Type - An aggregation of all land areas potentially capable of producing similar plant communities at climax. The collective area which one plant association occupies or will come to occupy as succession advances. The habitat type is defined and described on the basis of the vegetation and its associated environment.

Indirect Effects - Effects separated in time or space from the causative actions.

Inherent Stability - The amount of stream channel that would be stable under natural conditions. It takes into account the migration of streams across a landscape, native ungulate use, the natural distribution of peak flow events, and the interaction of soil and rooting characteristics of vegetative communities.

Interdisciplinary Team - A team of individuals with skills from different disciplines that focuses on the same task or project.

Interfluvium - The region of higher land between two rivers that are in the same drainage system

Intermittent Stream - A stream that flows only at certain times of the year when it receives water from streams or from some surface source, such as melting snow.

Invasive Species - A plant species moving into areas outside of its former range.

Invertebrate - Small animals that lack a backbone or spinal column. Spiders, insects, and worms are examples of invertebrates.

Irretrievable - Applies to losses of production, harvest or commitment of renewable natural resources. For example, some or all of the timber production from an area is irretrievably lost during the time an area is used as a winter sports site. If the use is changed, timber production can be resumed. The production lost is irretrievable, but the action is not irreversible.

Irreversible - Applies primarily to the use of nonrenewable resources, such as minerals or cultural resources, or to those factors that are renewable only over long time spans, such as soil productivity. Irreversible also includes loss of future options.

Issue - A point, matter or question of public discussion or interest to be addressed or decided through the planning process.

Preliminary issue is an issue identified early in the scoping phase and is sometimes referred to as a tentative issue.

Significant issue is an issue within the scope of the proposed action which is used to formulate alternatives in an Environmental Analysis (EA) or Environmental Impact Statement (EIS).

Key Area - A relatively small portion or a pasture or management unit selected because of its location, use or grazing value as a monitoring point for grazing use. It is assumed that key areas, if properly selected, will reflect the overall acceptability of current grazing management over the pasture or unit as a whole.

Microbiotic Crust - Thin crust of living organisms on or just below the soil, composed of lichens, mosses, algae, fungi, cyanobacteria, and bacteria.

MIS (management indicator species) - A wildlife species whose population indicate the health of the ecosystem in which it lives and, consequently, the effects of forest management activities to that ecosystem. MIS are selected by land management agencies.

Mitigate - Avoid or minimize impacts by limiting the degree or magnitude of the action and its implementation; to rectify the impact by repairing, rehabilitating, or restoring the affected environment; to reduce or eliminate the impact by preservation and maintenance operations during the life of the action.

Monitoring - An examination, on a sample basis, of management practices to determine how objectives have been met, and a determination of the effects of those management practices on the land and environment.

National Environmental Policy Act of 1969 (NEPA) - Public Law 91-190. Establishes environmental policy for the nation. Among other items, NEPA requires federal agencies to consider environmental values in decision-making processes.

National Environmental Policy Act (NEPA) process - An interdisciplinary process, mandated by the National Environmental Policy Act, which concentrates decision-making around issues, concerns, and alternatives, and the effects of those alternatives on the environment.

National Forest Management Act - A law passed in 1976 as amendments to the Forest and Rangeland Renewable Resources Planning Act, which requires the development of regional and forest plans and the preparation of regulations to guide that development.

National Forest System - All National Forest lands reserved or withdrawn from the public domain of the United States; all National Forest lands acquired through purchase, exchange, donation, or other means; the National Grasslands and land utilization projects administered under Title III of the Bankhead-Jones Farm Tenant Act (50 Stat. 525, 7 U.S.C. 1010-1012); and other lands, waters, or interests therein which are administered by the Forest Service or are designated for administration through the Forest Service as a part of the system.

Nonfunctioning - Riparian-wetland areas that clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and thus are not reducing erosion, improving water quality, etc., as listed under proper functioning condition. The absence of certain physical attributes such as a floodplain where one should be are indicators of nonfunctioning conditions.

Notice of Intent - A notice printed in the Federal Register announcing that an Environmental Impact Statement (EIS) will be prepared.

Noxious Weeds - A plant recognized by law as being especially undesirable, troublesome, and difficult to control.

OHV - Off highway vehicle

Perennial Stream - A stream that flows throughout the year and from source to mouth.

Permitted Grazing - Grazing on a National Forest range allotment under the terms of a grazing permit.

Permittee - A person or persons who utilize the National Forest System lands under a permit, usually a Special Use Permit or livestock grazing permit.

Policy - A guiding principle that is based on a specific decision or set of decisions.

Potential Natural Community (PNC) - The biotic community that would become established if all successful sequences were completed without interferences by humans under the present environmental conditions.

Project Record - More detailed documentation of an environmental analysis, usually located in files in the Forest Service District Office or the Forest Supervisor's Office.

Properly Functioning Condition (PFC)- The condition of a resource or ecosystem at any temporal or spatial scale when they are dynamic and resilient to disturbances to structure, composition and processes of their biological or physical components.

Proposal - Exists at the stage in the development of an action when an agency is actively preparing to make a decision on one or more alternative means of accomplishing a goal and the effects can be meaningfully evaluated.

Proposed Action - A proposal by the Forest Service to authorize, recommend or implement an action.

Purpose and Need - A statement which briefly specifies the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action.

Range (Rangeland) - Land on which the principle natural plant cover is composed of native grasses, forbs, and shrubs that area available as forage for big game and livestock.

Range Allotment - A designated area of land available for livestock grazing upon which a specified number and kind of livestock may be grazed under a range allotment management plan. It is the basic land unit used to facilitate management of the range resource on National Forest System lands and associated lands administered by the Forest Service.

Range Development - An activity or structure used to improve livestock distribution, rangeland conditions, or otherwise improve range management. Can be structural (fence, water development, etc.) or nonstructural (seeding, vegetation manipulation, etc.).

Range Management - The art and science of planning and directing range use intended to yield the sustained maximum animal production and perpetuation of the natural resources.

Regulations - Generally refers to the Code of Federal Regulations, Title 36, Chapter II, which covers management of the Forest Service.

Reservoir - A human-made basin used to collect and hold stock water. Generally with a sufficient summer water source to maintain a usable water supply throughout the year.

Restoration - Actions taken to modify an ecosystem in whole or in part to achieve a desired condition.

Riparian / Riparian Area - The banks and adjacent areas of water bodies, water courses, seeps, and springs whose waters provide soil moisture sufficiently in excess of that otherwise available locally, providing a more moist habitat than that of contiguous flood plains and uplands.

riparian ecosystems - (1) Those assemblages of plants, animals, and aquatic communities whose presence can be either directly or indirectly attributed to factors that are water-influenced or related. (2) Interacting system between aquatic and terrestrial situations, identified by soil characteristics, and distinctive vegetation that requires or tolerates free or unbound water.

Riparian Vegetation - Plant communities dependent upon the presence of free water near the ground surface (high water table).

Scoping - The on-going process to determine public opinion, receive comments and suggestions, and determine issues during the environmental analysis process. It may involve public meetings, telephone conversations or letters.

Season of Use - The season of the year when a resource is used by livestock, wildlife, or humans.

Sediment - Any material, carried in suspension by water, which will ultimately settle to the bottom of watercourses.

Sensitive Species - Those plant or animal species that merit concern due to declining populations or a reduction in habitat and as recognized by the Regional Forester.

Seral - A biotic community that is developmental; a transitory stage in an ecologic succession.

Seral Stages - The developmental stages of an ecological succession.

SHPO – State Historic Preservation Officer

Significance - As used in NEPA, requires consideration of both context and intensity.

Similar Actions - Actions, which when viewed with other reasonable foreseeable or proposed agency actions, have similarities that provide a basis for evaluating their environmental consequences together, such as timing or geography.

Soil Compaction - A physical change in soil properties that results in a decrease in porosity and increase in soil bulk density and soil strength.

Soil Conservation Practices - Soil conservation practices are mechanisms used to protect soil quality while managing for resource goals and objectives. They can be administrative, preventive or corrective measures. They are identified during

project planning and design. The R1/R4 FSH 2509.22, Soil and Water Conservation Practices Handbook contains a process for developing specific conservation practices for use on National Forests and Grasslands.

Soil Cover - The type of cover on the soil surface, i.e. live vegetation, litter, rock, pavement, exposed.

Soil Displacement - The movement of the forest floor (litter, duff, and humus layers) and surface soil from one place to another by mechanical forests such as a blade used in piling or windrowing. Mining of surface soil layers by discing, chopping, or bedding operation are not considered displacement.

Soil Productivity- Soil Productivity includes the inherent capacity of a soil under management to support the growth of specified plants, plant communities, or a sequence of plant communities. Soil productivity may be expressed in terms of volume or weight/unit area/year, percent plant cover, or other measures of biomass accumulation.

Soil Quality - Long term soil productivity and soil hydrologic function.

Special Use Permit - A permit issued to an individual or group by the USDA Forest Service for use of National Forest land for a special purpose. Examples might be a Boy Scout Jamboree or a mountain bike race.

Stability - The ability of the channel banks and bottom to resist the erosive powers of moving water. Inherent stability refers to the potential stability of a riparian system.

Stocking / Stocking Rate - The number of specific kinds and classes of livestock grazing or utilizing a unit of land for a specified time period.

Stream Channel - The defined bed and bank of a watercourse down which water travels.

Stream Order - A numbering scheme used to characterize the relative position of stream channels within a drainage. First-order streams are those which have no tributaries. Second-order streams are those which have as tributaries only first-order channels. Third-order streams are formed when two second-order channels come together. Stream order is used to analyze hydrologic response and fisheries.

Stream Type - Alpha-numeric identification given to reoccurring stream channel types based on measurable morphological features such as channel gradient, width/depth ratio, dominant particle size of bed and bank materials, entrenchment of channel and confinement of channel in valley, and landform features, soil erodibility, and stability.

Stream Width - The width of streams or rivers. Generally used to determine stream type, flood hazard, instream flows, and riparian management.

Streamflow - A measure of the volume of water passing a given point in a stream channel at a given point in time.

Streambank Alteration - Physical alteration of the streambank. As used in the Beaverhead Riparian Guidelines, the amount of damage caused by livestock during the current season. The overriding concept behind the measure is making sure that the integrity of the streambank remains. Most often, the best indicator of a reduction in bank integrity is the hoof prints of livestock along the bank/water interface.

Streambank Morphology - Form and structure of streambank which is that portion of the channel bank cross-section that controls the lateral movement of water. Includes channel dimensions, patterns, and profiles.

Structure - How the parts of ecosystems are arranged, both horizontally and vertically. These parts include vegetation patches, edge, fragmentation, canopy layers, snags, down wood, steep canyons, rocks in streams, and roads. For example, structure might reveal a pattern, mosaic or total randomness of vegetation

Succession - The natural replacement, in time, of one plant community with another. Conditions of the prior plant community (or successional stage) create conditions that are favorable for the establishment of the next stage.

Substrate - The particles making up the bottom of a stream channel.

Threatened and Endangered Species (TES) - Any species of the plant or animal kingdom at risk of extinction or whose viability is in doubt. Federal codes are defined as follows:

Endangered (E): Any species that is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta determined by the Secretary to constitute a pest whose protection under the Endangered Species Act would present an overwhelming and overriding risk to man.

Threatened (T): Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

TMDL-Total Maximum Daily Loads

Trailing - The practice among livestock producers of moving herds of livestock from one pasture to another by forcing the herd to follow a designated route used year after year, across public and private land and along public roadways.

Trend - The direction of change in ecological status of a plant community usually expressed as moving "toward", "away from", or "not apparent".

Uplands - Land at a higher elevation, in general, than the alluvial plain or low stream terrace; land above the foot slope zone of the hill slope continuum.

USDA- U.S. Department of Agriculture

USFWS – U.S. Fish and Wildlife Service

Utilization - The proportion of the current year's forage production that is consumed or destroyed by grazing animals. May refer either to a single species of forage, or to the vegetation as a whole.

Vegetative Community - A group of one or more populations of plants in common spatial arrangement with common nutritive and growth functions.

Vegetation Type - A plant community with distinguishable characteristics.

Viable Population - A number of individuals of a species sufficient to ensure the long-term existence of the species in natural, self-sustaining populations adequately distributed throughout their region.

Viability - The ability of a population or species to exist over the long-term in natural, self-sustaining populations distributed throughout their region.

Visual Resource - A part of the landscape important for its scenic quality. It may include a composite of terrain, geologic features, or vegetation.

Water Development - A water source developed by public land managers and permittees, meant to provide water to livestock, but which could also be used by wildlife.

Watershed - The total area above a given point on a stream that contributes water to the flow at that point.

Water Table - The upper surface of groundwater. Below it, the soil is saturated with water.

Water Uses - The status of water uses subject to State water laws that is used to determine the water uses and legal status of waters on the National Forests.

Water Yield - The run-off from a watershed, including groundwater outflow.

Wetlands - Areas that are permanently wet or are intermittently covered with water.

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Appendix A: Monitoring Plan

The following monitoring has been identified for the Upper Strawberry Allotments in addition to monitoring required by the 2003 Uinta National Forest Land and Resource Management Plan.

Ground Cover

- Ground cover will be monitored each year that the pasture is used by livestock.
- Monitoring will be accomplished in representative areas both in riparian and upland.
- Monitoring will consist of a pace transect of a least 100 steps with type of cover or bare ground being recorded. At least one transect will be in the area of a trend study.
- Livestock will be removed from the pasture when the standard is met.
- The ground cover trend as established by the trend studies for the area will be used to evaluate the effectiveness of the ground cover standards. The ground cover standards will be modified as needed to maintain a stable to upward trend. Ground cover is a major factor in water quality and ground cover standards will be modified as needed to maintain a stable to upward trend in water quality

Stream bank alteration

- Stream bank alteration will be monitored each year in the pastures that are used by livestock.
- Monitoring will be accomplished in representative areas.
- Monitoring will consist of stretching out a 100 foot tape along the stream edge and recording the amount of area disturbed by livestock and converting the amount of disturbed areas in to a percent. There will be at least on monitoring site within the riparian trend study area.
- Livestock will be removed from the pasture when the standard is met.
- The trend for bank stability will be determined when the representative riparian trend study completed and will be used to evaluate the effectiveness of the stream bank alteration standard. The stream bank alteration standard will be modified as needed to maintain a stable to upward trend in bank stability.

Riparian vegetation use

- Stubble height will be monitored each year that the pasture is used by livestock.
- Monitoring will be accomplished in representative areas in riparian areas.
- Monitoring will consist of a pace transect of a least 100 steps with height of the key species being recorded. At least one transect will be in the area of a trend study.
- Livestock will be removed from the pasture when the standard is met.
- The vegetation trend as established by the trend studies for the area will be used to evaluate the effectiveness of the stubble height standards. The stubble height standards will be modified as needed to maintain a stable to upward trend

Upland vegetation

- Utilization will be monitored each year that the pasture is used by livestock.
- Monitoring will be accomplished in representative areas in upland vegetation types.
- Monitoring will consist of a pace transect of a least 100 steps using grazed height verses ungrazed height regression curves to determine percent utilization. At least one transect will be in the area of a trend study.
- Livestock will be removed from the pasture when the standard is met.

- The upland vegetation trend as established by the trend studies for the area will be used to evaluate the effectiveness of the utilization standards. The utilization standards will be modified as needed to maintain a stable to upward trend

Willow vegetation

- Willow utilization will be monitored each year that the pasture is used by livestock.
- Monitoring will be accomplished in representative areas in riparian areas. Monitoring will consist of percent utilization of current year growth. At least one transect will be in the area of a trend study.
- Livestock will be removed from the pasture when the standard is met.
- The trend of the willow vegetation type will be determined as part of the riparian trend study and will be used to evaluate the effectiveness of the willow utilization standards. The willow utilization standards will be modified as needed to maintain a stable to upward trend.

Aspen vegetation

- Grazing on aspen regeneration will be monitored each year that the pasture is used by livestock.
- Monitoring will be accomplished in representative areas. Monitoring will consist of a pace transect of a least 100 steps with use of terminal leaders of aspen less than 5-feet tall being recorded and converted to percent of buds grazed. At least one transect will be in the area of a trend study.
- Livestock will be removed from the pasture when the standard is met.
- The aspen regeneration trend as established by the trend studies for the area will be used to evaluate the effectiveness of the aspen grazing standards. The aspen grazing standards will be modified as needed to maintain a stable to upward trend

Trend Studies

- Vegetation trend studies will be established in representative areas using standard Forest Service protocol. Riparian trend studies will be reread every 5 years and upland trend studies reread every 10 years.
- Beaver activity (number of active dams) will be recorded on representative reaches every five years to determine trend in beaver activity.
- A soil bridge will be included in each vegetation trend study to determine the trend of detrimental soil disturbance.
- TMDL and water quality will be measured at the existing sites at the existing intervals to determine trend in water quality. Ground cover, stream bank alteration, stubble height will be modified as needed to maintain a stable to upward trend in water quality.
- Ongoing wildlife and fish surveys will be used to determine trends in wildlife populations.

Heritage

- Monitor sites for signs of livestock effects. In particular, monitor the Hogsback Salt Cabin for signs of rubbing or trampling by cattle.