



## Issue Development

### Assessment Strategy

An assessment strategy was developed based in part, on the process described in: “*Ecosystem Analysis at the Watershed Scale*” (USFS, 1995) and “*Community Culture and the Environment: A Guide to Understanding a Sense of Place*” (EPA, 2002).

The large size of the Upper Sevier River Basin necessitated that it be broken down into smaller “sub-basins.” The Upper Sevier Basin consists of two 4th field sub-basins (East Fork Sevier River and the Upper Sevier River Sub-basins). These two 4th field sub-basins are further broken down into smaller 5th field watersheds and 6th field subwatersheds. The Upper Sevier River Basin contains nine (9) 5th field watersheds and sixty-seven (67) 6th field subwatersheds (Fig. 3-1). (Also see Chapter 2). Maps and tables for each of the nine 5th level watersheds, describing vegetation, acreage, ownership, subwatersheds, roads,

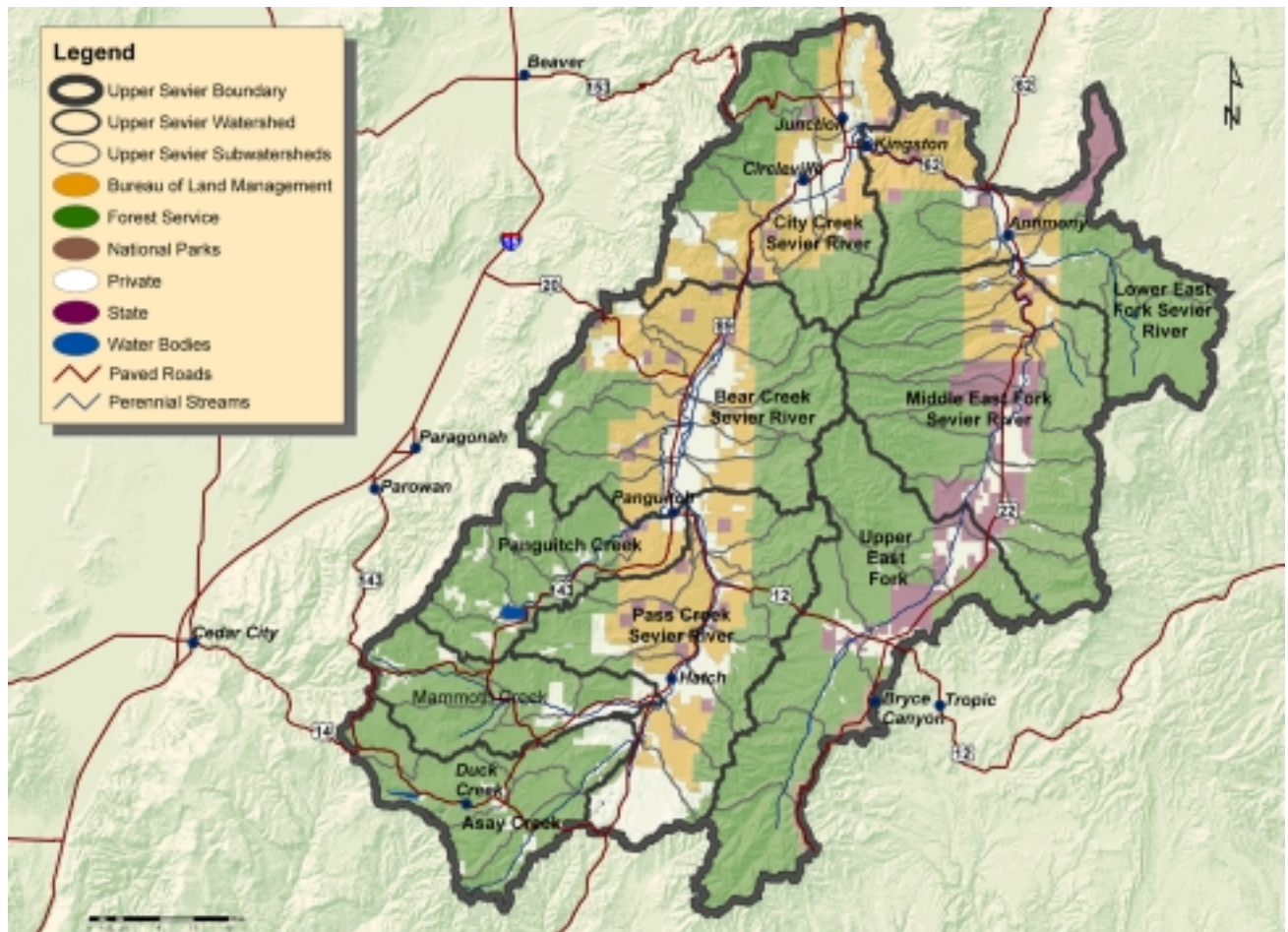


Fig. 3-1. The Upper Sevier River Basin, upon which this assessment is based, is a 1,324,899 acre area containing 9 watersheds and 67 subwatersheds.

streams and general conditions, are contained in Chapter 4, as an introduction to the 9 individual watershed discussions for each.

## Technical Advisory Committees (TACs)

Collaborative Technical Advisory Committee (TAC) meetings were held with state, federal agencies, local and county government officials and private landowners, beginning in 2000. Six TAC committees were formed to discuss issues within each watershed, related to: 1) Hydrology/Water Quality; 2) Agriculture; 3) Fire; 4) Human Uses; 5) Vegetation, and 6) Wildlife.

Technical Advisory Committee members were chosen based on their unique knowledge of the watershed, and as participants in collaborative development with the Upper Sevier River Community Watershed Project. Technical Advisory Members and watershed partners, to date, have included representatives from the following interests:

- Utah Association of Conservation Districts
- Upper Sevier Soil Conservation District
- USDA Forest Service Dixie National Forest
- Bureau of Land Management
- National Park Service
- Department of Environmental Quality, Division of Water Quality
- Utah Division of Wildlife Resources
- Natural Resource Conservation Service
- Color Country Resource Conservation & Development
- Farm Service Agency
- Utah State University Extension Service
- USDA Forest Service Rocky Mountain Research Station
- Paiute Tribe of Utah
- State of Utah Division of Forestry, Fire and State Lands
- Panguitch City
- Garfield County, Iron County, Kane County
- Southern Utah University
- Private Landowners
- Garfield County School District

## Characterization and Assessment of Watersheds and Subwatersheds

After the initial formation of TAC committees, issues were identified within each watershed as a foundation for the prioritizing of future analyses and projects. All six TACs identified and addressed issues related to specific resources within the Upper Sevier River Basin.

In some cases, the same issue may have been addressed from more than one technical advisory committee (*Ex: Noxious Weeds - addressed by vegetation committee and agriculture committee*). Throughout this assessment, it was not uncommon for several groups to address and/or identify similar resource issues that may be association to one particular problem (*Ex. Sagebrush/grassland - wildlife concern, hydrology concern, fire concern, agriculture concern, vegetation concern*), further strengthening the need for rehabilitation for that particular issue.

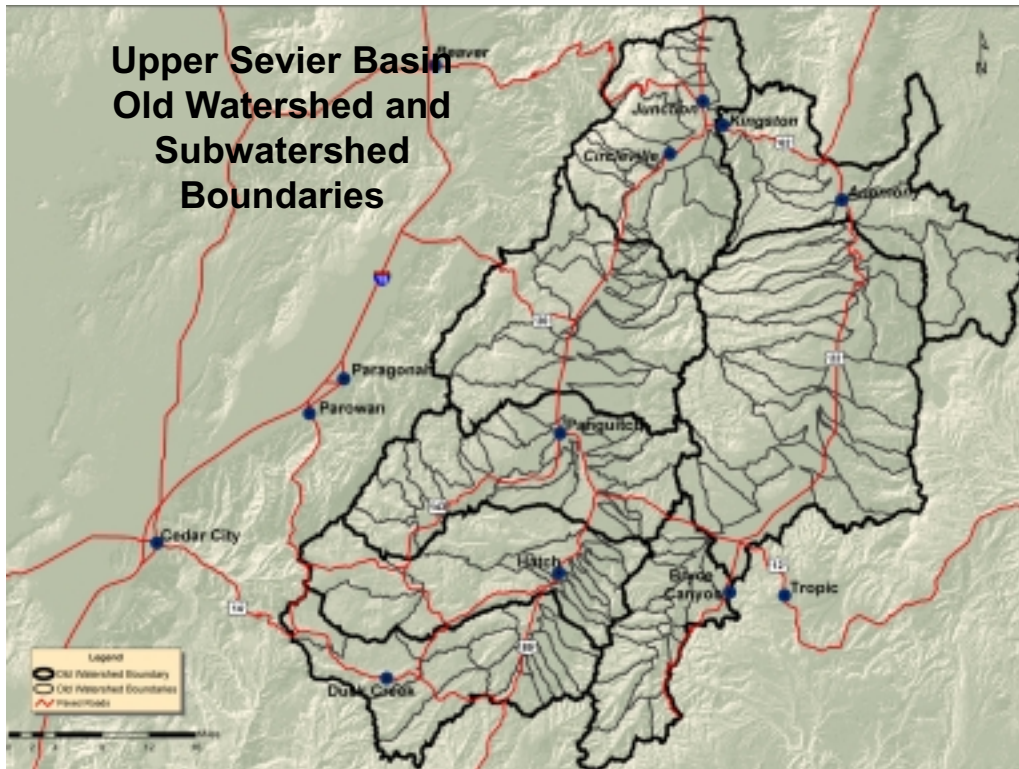


Fig. 3-2. Original projects and assessments for the Upper Sevier Basin were based on old watershed and subwatershed boundaries.

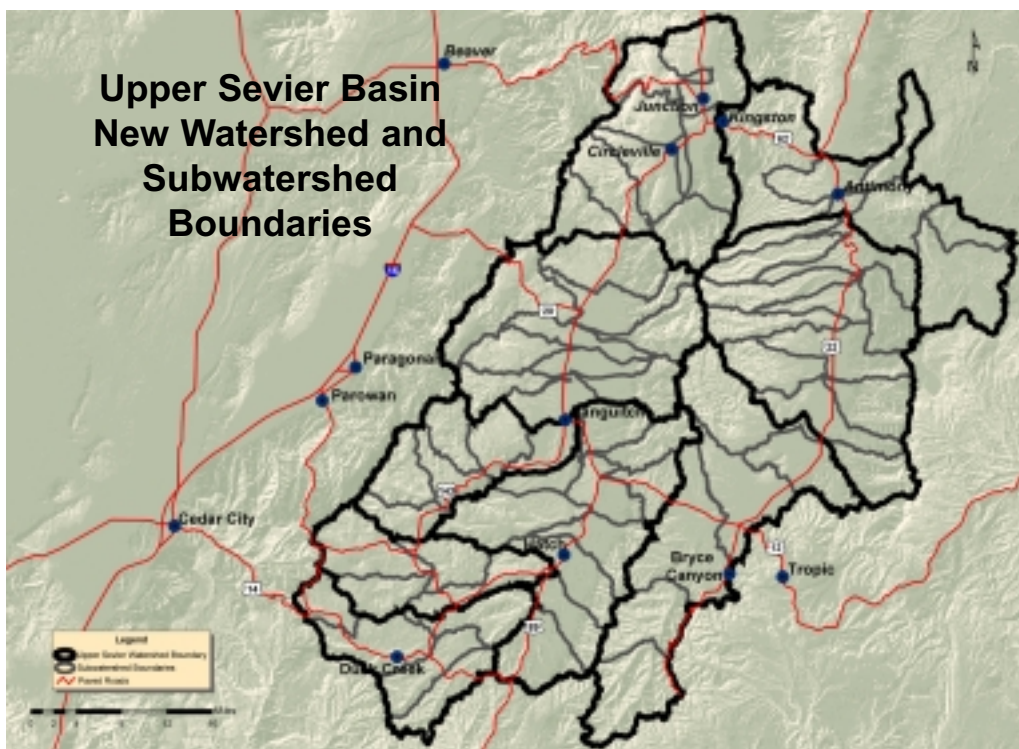


Fig. 3-3. Watershed and subwatershed boundaries for the current Upper Sevier Assessment are based on current USGS mapping standards. The current boundaries represent 9 watersheds and 67 subwatersheds.

In March 2002, watershed and subwatershed boundaries were re-mapped to be compatible with national USGS mapping standards. This re-mapping provided slightly large geographical areas in which to work, creating the nine watersheds (8 previous) and 67 subwatersheds (128 previous) upon which this assessment and plan is based (Fig. 3-2, 3-3). In addition, while the original assessment provided a basis for understanding watershed characteristics and the dominant processes within the subwatersheds, the magnitude of information, number of issues identified and different documentation methods made prioritizing and project planning difficult.

## **Goal and Objective Statements**

From January through April 2003, following the re-mapping of watershed boundaries, each TAC committee members drafted goals and objectives for 1) Hydrology/Water Quality; 2) Agriculture; 3) Fire; 4) Human Uses; 5) Vegetation, and 6) Wildlife. Specific goal and objective statements were used by each TAC committee to further determine and prioritize issues within each watershed and subwatershed.

Specific goals and objectives identified by each TAC are as follows:

### **Hydrology/Water Quality**

#### **Goal:**

Maintain or improve water quality and quantity for local needs while providing for the needs of recreation, fish and wildlife.

#### **Objectives:**

- Increase the presence of appropriate herbaceous plants and multiple age class distribution of appropriate woody plant species along the Upper Sevier River.
- Restore streams to their proper hydraulic and channel geometry (pattern, profile, cross section dimensions).
- Stabilize eroding streambanks and install in-stream cover and structures
- Establish woody riparian vegetation where needed.
- Decrease presence of sediment and Manage upland vegetation to decrease sediment flow into the Upper Sevier River.
- Work with private landowners to identify opportunities and solicit funding for water quality improvement projects.

### **Agriculture**

#### **Goal:**

- Maintain ranching and agricultural as sustainable economic, cultural and lifestyle components of the Upper Sevier Watershed.

#### **Objectives:**

- Address potential and real conflicts between wildlife management goals and private land use.
- Work cooperatively to address potential and real competition between livestock and wildlife on public lands.
- Work cooperatively with landowners and partners to address and control noxious weeds on public and private lands. Where applicable, use best management practices for resource management to help improve range, crop, pasture, aquatic habitat and riparian vegetation.
- Work cooperatively with private landowners and irrigation companies to improve irrigation

infrastructure and irrigation efficiency.

## Fire and Fuels

### **Goal:**

Continue to protect private property while using fire to improve forest and rangeland health

### **Objectives:**

- Implement defensible fire space zones around Wildland Urban Interface (WUI) areas.
- Use necessary tools to move vegetation communities closer to desired conditions.
- Provide education to communities at risk about the role of fire to ecosystem health.

## Human Uses

### **Goal:**

Provide for a wide variety of human uses while preventing degradation to the environment.

### **Objectives:**

- Provide public access while ensuring that roads and trails do not degrade the environment
- Provide a wide variety of quality recreational opportunities (dispersed and developed) throughout the watershed, while protecting riparian areas.
- Encourage developments to use innovative and alternative wastewater treatment systems.
- Encourage the state to evaluate innovative and alternative wastewater systems for use with shallow soils and to incorporate reuse.
- Encourage Utah Geologic Survey to complete additional mapping in the Upper Sevier Basin to help understand the groundwater system.
- Recommend that subdivision plans are not approved until all options of decentralized wastewater treatment plants are considered.
- Provide more overseeing of subdivision wastewater feasibility studies and individual on-site soil and percolation tests.
- Recommend additional overseeing of certified soil testers.
- Recommend continued water quality studies/monitoring in areas of high human use (e.g. subdivisions).

## Vegetation

### **Goal:**

Maintain and restore desired vegetation that is resilient and sustainable.

*Members of the Hydrology/Water Quality Technical Advisory Committee meet to discuss key issues within the Upper Sevier River watersheds and subwatersheds..*



**Objectives:**

- Maintain or restore upland vegetation communities of pinyon/juniper and sagebrush/grass to provide for the needs of domestic livestock and wildlife.
- Use necessary tools to move vegetation communities closer to desired conditions.
- Recognize noxious weed invasion as a serious threat to agricultural and wild land areas, and implement integrated pest management strategies as necessary in all watersheds.
- Increase representation of aspen to more closely reflect desired conditions.

**Species and Habitat****Goal:**

Provide suitable habitat for a diversity of wildlife species.

**Objectives:**

- Decrease the amount of P/J encroachment into areas historically dominated by big sagebrush, grass and forb communities.
- Maintain a mosaic of sagebrush, grassland and woodland that provides habitat for big game, migratory birds, sensitive species and other high interest wildlife species.
- Maintain and improve critical big game winter ranges.
- Provide and protect quality fishery habitat that is capable of sustaining abundant trout and native fish populations.
- Restore riparian vegetation along the Sevier River and East Fork Sevier River, and associated tributaries.
- Use Best Management Practices for livestock management to help protect restored aquatic habitat and riparian vegetation.
- Provide quality recreational and angling opportunities throughout the watershed.

**Issue Development**

Based on stated goals and objectives, each TAC committee developed issues pertinent to the Upper Sevier River Basin. Overall, 63 issues were chosen as criterion upon which to rank watersheds and subwatersheds. All nine watersheds were addressed separately, by all six technical advisory committees. All 67 subwatersheds were ranked for all issues chosen by the TAC committees, based on a scale of High (H), Medium (M), Low (L) and Not Applicable (NA). Specific criterion and justification for H, M, L and NA rankings are explained below.

General guidelines were provided for each TAC committee in formulating issue rankings:

- Rely on existing data and local knowledge of watershed characteristics.
- Use ecosystem management principles
- Determine prioritization of all issues for future analysis
- Focus on assessing landscape conditions

**Issue Rankings**

Priority rankings (H, L, M, NA) for all 63 resource issues were determined based on these guidelines and other criterion established by individual TAC committees. Tables with all 63 resource issues for each of the 9 watersheds are contained in Chapter 4. A brief discussion and justification for rankings for all 63 key issues follows:

## **Fire**

### ***Communities at Risk***

A high level of growth within wildland urban interface areas has placed more citizens and property “at-risk” to wildland fire. In addition, ecosystem health problems across the watershed necessitate that increased public awareness, as well as reducing hazardous fuels and restoring fire to communities and watersheds is essential. Those communities included in the Federal Register, 2001, in conjunction with the National Fire Plan, received high ratings during the issue identification process for the watershed.

### ***Fuel Conditions***

Fuel conditions within the Upper Sevier Watershed were rated according to the current fire regime class descriptions (USDA, FS, 2002). However, to standardize issue ratings for the entire watershed, Condition Classes were translated to: Condition Class 1 – (L)ow, Condition Class 2 - (M)oderate, Condition Class 3 - (H)igh, where the Condition Class rating, indicates the degree of departure from historical fire regimes (Appendix C).

Fire and Fuels is currently being addressed as one of the four issues/concerns in the Forest Service’s collaborative approach to land management (Bosworth, 2003).

## **Human Uses**

### ***Development and Effects to Ground/Surface Water***

As development of land and water resources continues, it is apparent that development of either ground water or surface water may have long-term affects connected to other ground and surface water. While long-term development of surface water can affect riparian zones and associated wild-life and vegetation habitats, groundwater development and associated water saturation can increase nutrient concentrations and affect water temperature and oxygen levels, further impacting natural ecosystems. Those areas where human activities are high, and in particular where subdivisions are reliant on septic systems, were rated as high.

### ***Development and Impacts to Adjacent Lands***

As the desire to recreate and live in more forested/wildland areas increases, fragmentation of plant and animals habitats is of concern. In addition, recreational impacts to bordering lands may also disrupt ecological processes and reduce the availability of habitats for some wildlife species.

Changes in plant and animal communities caused by increased roads and introduction of nonnative plant and animal species are also a concern in developed areas.

Development is expected to increase, especially in areas adjacent to forested lands or within private forested land. Recognizing that forested areas are attractive because they offer a “sense of place,” and serve as a place to solidify family and traditional values, as well as provide valuable habitat, this issue must be addressed to ensure long-term social/biological compatibility. Those areas where habitat fragmentation and/or human uses may impact forested areas were ranked as high.

### ***Access Management***

Wildland areas previously undisturbed because of limited access are being encroached upon as more and more recreationists look to outdoor recreation and OHV use. The National Survey on Recreation and the Environment (1999-2001) reports that 17.5% of the population (36.3 million people over age 16) partici-

pated in off-highway driving, ATV or motorcycle use (Cordell, 2000). Moreover, Cordell (1999) reports a 43.8% increase in OHV use and a 34.8% increase in snowmobile use between 1982-83 and 1994-95. Ninety-five percent of the population participates in some kind of outdoor activity (USDAFS, 2000, Strategic Plan).

Impacts from off-highway vehicle use include noxious weed dispersal, fragmented habitats, soil compaction and increased erosion. In addition, user conflicts may occur between motorized and non-motorized recreationists. Those areas where the magnitude of off-highway access has the potential to disrupt natural processes/habitats, and where user conflicts may occur, were rated as high.

### ***Developed and Dispersed Recreation***

On National Forest lands alone the number of outdoor recreation visitors grew 18 times between 1946 to 2000. (Bosworth, 2003). Current predictions are that by 2100, 579 million Americans (more than double today's number) will recreate on forested lands.

As campgrounds become overcrowded and limit vehicle access, the use of dispersed and user-created sites increase. Unmanaged recreation damages riparian areas, fragments habitats and increases introduction of exotic species into recreation, agricultural and forested areas. Those areas where dispersed campsite concentrations were impacting surrounding habitats and/or where developed campsites needed long-term monitoring/improvements, were rated as high.

Unmanaged recreation is currently being addressed as one of the four issues/concerns in the Forest Service's collaborative approach to land management (Bosworth, 2003).

## **Vegetation Composition**

Vegetative conditions within the watershed were assessed in January 2000. The assessment identified the major vegetation types within the watershed, as well as describe the Proper Functioning Condition (PFC) and Desired Future Condition (DFC). This assessment concurs to that report. Those areas furthest removed from PFC were rated as high. Following is a brief description of the overall assessment for those vegetation types rated. Detailed narratives for highest priority issues are contained in Chapter 4.

### ***Sagebrush/Grass***

Most sagebrush communities are currently outside a balanced range of structural classes, and occur as mature plants in sites with more than 15% sagebrush cover and less than 20% bare mineral soil exposed. Sagebrush communities tend to be dominated by older plants. These conditions have significantly increased within the assessment area in the last 100 years due to grazing and fire exclusion. Some areas with deeper soils and a sagebrush component that have burned over the past 10-20 years have converted to rabbitbrush. Soil stability and productivity may also be negatively affected by the loss of understory vegetation. Many valley bottoms are incised due to downcutting, lowering water tables and resulting in establishment of xeric species.

### ***Aspen***

Very few aspen clones are stable within the watershed. Those that appear to be stable generally occur on the northern portions of the watershed in more mesic sites surrounded by sagebrush. The majority of aspen clones within the watershed are currently at risk to conifer encroachment (spruce-fir, mixed conifer or ponderosa pine).

### ***Grassland - Meadow***

Continued encroachment of conifer into meadow areas is a concern within the watershed. Small mammals and insects inhabit these meadow communities and are important food source for numerous other mammal and avian species. In addition, those meadows associated with forest edge are important habitat components for numerous big game species.

### ***Mixed Conifer - Mountain Fir***

Fire exclusion has allowed much of this forest community to advance to later successional stages, favoring more shade-tolerant vegetation. Structural changes have occurred as well, creating multi-canopied stands that are more susceptible to stand replacement fire.

### ***Oak - Mahogany - Mountain Shrub***

This habitat type is scattered within the Upper Sevier Watershed primarily in the northern portion. The mountain shrub complex comprises a small amount of the Upper Sevier Watershed and most of this community type has been replaced by pinyon-juniper. This community provides good soil protection which is lost when it is invaded by other species, especially pinyon-juniper.

### ***Pinyon - Juniper***

Pinyon-juniper has increased approximately 150 to 250 percent over historical levels. The majority of stands have moved to mid-aged, mature and old structural stages. In historic sagebrush/grassland communities, decreased ground cover has resulted in inter-canopy erosion, since there is little understory vegetation to help retain the soil in these stands. Fire regimes and grazing have also played a role in vegetation composition change, diminishing value as wildlife habitat.

### ***Ponderosa Pine***

The majority of the ponderosa pine community within the watershed has been harvested, especially on slopes less than 30 to 40 percent. Early timber harvest activities focused mainly on removing larger diameter trees. In previously harvested areas, ponderosa pine stands have changed from “park-like” stands, dominated by large clumped trees, to much denser stands, dominated by smaller diameter, uniform sized trees. Only infrequent, scattered, large diameter pine remain in most of these areas. In areas where timber harvest has been light, but mainly due to the lack of fire, increased regeneration in the understory has created multi-canopied stands that are more susceptible to stand replacement fire.

### ***Spruce - Fir***

The loss of the mature spruce component from a recent spruce beetle infestation will likely increase representation of aspen and subalpine fir within the watershed. Subalpine fir and white fir are affected by root rots and insects, including fir engraver and western balsam bark beetle. Subalpine fir is currently replacing late seral aspen stands and modifying species diversity within this vegetation type. There is little indication of recent natural fire interaction in the spruce dominated areas.

Douglas-fir dwarf mistletoe, infects approximately 10-20 percent of the Douglas-fir trees. Other dwarf mistletoes infect ponderosa pine, limber pine, bristlecone pine, and white fir, but to a more limited extent.

### ***Tall Forb***

Many of the tall forb plant communities within the Upper Sevier Watershed have been lost. A few communities are becoming re-established, at a slow rate, in areas where livestock grazing has been

removed. Continued encroachment into these areas can result in the loss of meadow areas and impact riparian and streamflow regimes. Less than 10 percent of the original acreage remains and restoration is often impractical.

### **Noxious Weeds**

Invasive noxious weeds have been described as a “...raging biological wildfire.” (Dewey, 1995). In many areas weeds have become difficult to control and are spreading rapidly. Noxious weed invasion may cause enormous economic losses to agriculture and irreparable ecological damage to wildland areas. Rangelands, forests, wilderness areas, national parks, recreational sites and wildlife management areas are all at risk to noxious weed invasion.

Current noxious weeds within the watershed include Canada thistle, Dalmation toadflax, Musk thistle, spotted knapweed, scotch thistle, whitetop, and Russian knapweed.

Corridors where noxious weed invasion continues to increase and areas where noxious weeds are already established were ranked as high.

Invasive species is currently being addressed as one of the four issues/concerns in the Forest Service’s collaborative approach to land management (Bosworth, 2003).

### **Species and Habitat**

(Habitat fragmentation is currently being addressed as one of the four issues/concerns in the Forest Service’s collaborative approach to land management (Bosworth, 2003)).

Many of the species descriptions used in this part of the narrative are derived from the U.S. Forest Service white paper, “*Life History and Analysis of Endangered, Threatened, Candidate, Sensitive, and Management Indicator Species of the Dixie National Forest*” (Rodriguez, et. al., 2004).

### **Priorities for Enhancement or Protection of:**

#### ***Southwestern Willow Flycatcher Habitat***

Although included in the initial Upper Sevier River Assessment, recent surveys have concluded that the Southwestern Willow Flycatcher, a species listed under the Endangered Species Act of 1973 (as amended) as endangered, does not occur within the watershed.

#### ***Utah Prairie Dog Habitat***

Utah prairie dog (*Cynomys parvidens*) was accorded “endangered” status under the Endangered species Act of 1973, as amended, but was down-listed to “threatened” species status in 1984. Current declines have been attributed to habitat loss to urban development or pastureland, long-term over-grazing (contributing to lack of vegetative diversity from increasing shrubs), and fire suppression (preventing maintenance of large grassland patches). Habitats lacking vegetative diversity, and suitable and existing habitats needing treatment or protection were rated high.

#### ***Bald Eagle Habitat***

The bald eagle (*Haliaeetus leucocephalus*) was listed as threatened under the Endangered Species Act of 1973, as amended. Population declines are attributed to habitat loss, mortality (shooting, trauma, poisoning, disease, electrocution from powerlines, etc.) and reduced reproduction (environ-

mental contaminants) (USFWS, 1983). Since no bald eagle nests have been documented in the Upper Sevier Basin, habitat loss (removal of cottonwood galleries, housing development and woodcutting) along water bodies for roosting is the primary concern. Fall, winter and spring roosting habitats were rated high where use occurs and is being impacted by loss of roost trees and human influences.

### **Spotted Bat Habitat**

Spotted bat (*Euderma maculatum*), is currently listed as a state sensitive species in Utah, and is included on the U.S. Forest Service Regional Forester's Sensitive Species list. Factors contributing to declines in populations include loss of suitable roost sites and human disturbance. In addition, human disturbances to hibernacula from cave exploration and bat banding have been found to cause significant declines in bat populations and is a concern in the Upper Sevier River Basin. Other factors attributed to declines in bat species include application of pesticides, which reduces food supply and subjects them to contaminated prey, and declines in healthy riparian areas which are important for drinking water as well as habitat for insects for this species of bat. Roosting sites and foraging areas (ponds, riparian areas) that are at risk or in need of improvement were rated high.

### **Townsend's Big-eared Bat Habitat**

Townsend's Big-eared bat (*Corynorhinus townsendii*) is currently listed as a state sensitive species in Utah, and is included on the U.S. Forest Service Regional Forester's Sensitive Species list. A low reproductive rate, limited availability of roost sites, and human disturbance limit species populations. Roosting sites and foraging areas that are at risk or in need of improvement were rated high. Important foraging habitat includes ponds and riparian areas. Primary roosting sites include caves and lava tubes.

### **Flammulated Owl Habitat**

Flammulated Owl (*Otus flammeolus*) is currently listed as a state sensitive species in Utah, and is included on the U.S. Forest Service Regional Forester's Sensitive Species list. Limiting factors for flammulated owls in the Upper Sevier Basin include a decrease in large diameter snags in which to nest, and an increase in forest stand densities. Past harvest of mature forests and availability of snags for nesting have reduced existing habitat, while woodcutting, facilitated by easy and abundant access, has decreased snags needed for nesting. An increase in conifer understories and subsequent closed understory canopies due to fire suppression have reduced open stands needed for foraging. Habitats were rated high where snag numbers are low, thickets are lacking or too abundant, aspen stands are being lost to conifers, and grasses, forbs, and shrubs are low (habitat for the insects on which they feed).

### **Three-toed Woodpecker Habitat**

Three-toed Woodpecker (*Picoides tridactylus*) is currently listed as a state sensitive species in Utah, and is included on the U.S. Forest Service Regional Forester's Sensitive Species list. The current epidemic of spruce bark beetle is changing spruce-fir habitat for the three-toed woodpecker from old growth to a landscape of primarily dead trees. This woodpecker species responds numerically to beetle infestations and populations are currently high. Salvage logging, however, is removing this habitat. Aspen habitats are also important and are being lost by conifer encroachment. Habitats were rated high where spruce and aspen snags and woodpecker's primary food source (bark beetles) were at risk from timber harvest and other activities.

### **Northern Goshawk Habitat**

The Northern goshawk (*Accipiter gentiles*) is currently listed as a state sensitive species in Utah, and is included on the U.S. Forest Service Regional Forester's Sensitive Species list. The current epidemic of spruce beetle is changing spruce-fir habitat for the northern goshawk from old growth to a landscape of primarily dead trees. Although goshawks do nest in dead trees and dead stands, this habitat will gradually become unsuitable due to lack of canopy cover and falling dead trees. Lack of fire has increased understory stand densities, which are not favorable to goshawk foraging habitat. In addition, past logging practices have removed the large diameter trees, reducing nesting habitat. Habitats for northern goshawk were rated high where numbers of large mature trees with interlocking crowns are lacking or low, snags and down logs are lacking, stand densities are predominantly high, or disturbances to nesting are occurring.

### **Peregrine Falcon Habitat**

Peregrine Falcon (*Falco peregrinus anatum*) was formerly listed as an endangered species under the Endangered Species Act of 1973 as amended. It is currently listed as a state sensitive species in Utah, and is included on the U.S. Forest Service Regional Forester's Sensitive Species list. The primary concern for this species is human disturbance. Increasing human uses into peregrine falcon nesting habitats cause potential disturbances to young. A secondary issue is reduced riparian areas, which, in turn, reduces habitat for prey. Habitat conditions were rated high that included disturbance within one mile of a nesting cliff, and/or poor riparian conditions. Meadows and parklands in poor condition lacking grasses and forbs also contributed to high ratings for needed habitat improvements.

### **Sage Grouse Habitat**

Sage Grouse (*Centrocercus sp.*) populations have declined dramatically throughout their range, and within the Upper Sevier Basin. Historic records suggest that sage-grouse habitat was found in all 29 counties in Utah. Today, it is estimated that sage-grouse occupy only 50 percent of available habitat and are much less abundant (Utah Conservation Data Center, 2003). Habitat loss, fragmentation and degradation as well as conversion of sagebrush/grassland habitat into stands of exotic cheat grass through wildfire (suppression) are the primary causes of sage-grouse decline. Sage grouse habitats rated high are those with mature decadent sagebrush stands that lack an understory of grasses and forbs.

### **Mule Deer Habitat**

Mule deer (*Odocoileus hemionus*) are the most abundant big game species within the Upper Sevier Basin, and are found in many different habitats, including coniferous forest, desert shrubs, chaparral and sagebrush/grasslands. Deer are a high visibility species within the watershed, both from a perceived negative standpoint (potential competition for food with domestic cattle and sheep) and a perceived positive viewpoint (wildlife viewing, recreational hunting). Although deer populations respond rapidly to habitat management, habitat fragmentation, destruction of habitat from urban development, human disturbance and lack of healthy vegetation composition may impact deer numbers. Habitats ranked high for mule deer consisted mostly of winter ranges being lost to development, those areas having poor browse for winter feeding, and areas consisting of old decadent sagebrush or bitterbrush or pinyon-juniper encroachment. Areas with high road densities (two miles of road per square mile) are also considered high priority.

### **Rocky Mountain Elk Habitat**

Rocky Mountain Elk (*Cervus Canadensis*) is currently listed as a Management Indicator Species (MIS) on the Dixie National Forest, in-part because habitats required to maintain healthy populations of elk also ensure provision of habitat requirements for many other species. Mature stands of deciduous and conifer forest habitats, dense brush understory for escape and thermal cover, and uneven-

aged forest stands with old-growth, herbaceous openings, and water provide necessary habitat for elk. Habitats lacking healthy grasses and forbs, and loss of aspen stands to conifers were ranked high. Very high road densities and loss of habitat from development also contributed to higher ratings.

### **Pronghorn Habitat**

The pronghorn (*Antilocapra Americana*) is found in sagebrush/grassland habitats throughout the watershed. Pronghorn browse on shrubs, such as sagebrush, and grasses and forbs. Habitats lacking healthy grasses and forbs, as well as those lost to development or exhibiting poor sagebrush conditions and where sagebrush and grasslands have been lost to pinyon-juniper encroachment have been rated high.

### **Turkey Habitat**

Although historical and archeological evidence suggests that wild turkeys co-existed with Native Americans in Utah, populations of Merriam's Turkey (*Meleagris gallapavo merriami*), were first introduced in 1952, and Rio Grande (*Meleagris gallopavo intermedia*) in 1984. Public interest in wild turkeys, both from a consumptive and nonconsumptive standpoint has increased in recent years, and suitable habitat has been identified throughout the state. Habitats consisting of woody herbaceous species near water and open stands of ponderosa pine interspersed with aspen and grassy meadows, as well as sagebrush/grasslands are considered critical turkey habitat (UDWR CDC, 2003). Habitats ranked high included those lost to development, those exhibiting poor sagebrush conditions, and where sagebrush and grasslands have been lost to pinyon-juniper encroachment.

### **Brian Head Mountain Snail Habitat**

Known distribution of Brian Head Mountain Snail (*Oreohelix parowanensis*) is currently limited to a rock slide on the southwest slope of Brian Head, above timberline at approximately 11,000 feet. Detailed habitat information is lacking, but several live individuals have been located. Because of limited locality, this population is highly susceptible to development, occurring from ski resorts in the near vicinity. Brian Head mountain snail ratings were based on potential loss of habitat from human development and uses on Brian Head Peak.

### **Beaver Habitat**

American beaver (*Castor canadensis*) occurs throughout most of North America, and is associated with riparian areas. Historic high commercial values for pelts, and the species potential to be destructive to crops, trees, and irrigation systems, currently threaten remaining populations of beaver. However, their value as soil and water conservationists (by maintaining water tables and controlling flooding and erosion) makes them extremely important to properly functioning riparian ecosystems. Habitats include areas where woody plants, such as aspen, cottonwood, and willow occur, both for habitat and food. Areas lacking riparian shrubs and trees, and/or a variety of age classes in riparian trees and shrubs contributed to high ratings for beaver.

### **Boreal Toad Habitat**

Boreal Toad (*Bufo boreas boreas*) is currently listed as a sensitive species in Utah. It is found at higher elevation near springs, streams, meadows, ponds and wetlands, and is often associated with beaver ponds. Habitat loss and degradation, environmental contaminants and disease may be contributing to a decline of this species throughout the watershed. In recent years, this species has been noticeably absent or greatly reduced in numbers in areas previously occupied (DWR CDC, 2003). Boreal toad habitats that were rated high were those riparian areas lacking cover (overhanging vegetation and abundant streambank vegetation)

or where toads were at risk from trampling from large ungulates.

### ***Bonneville Cutthroat Trout Habitat***

Bonneville Cutthroat Trout (*Oncorhynchus clarki utah*) is one of three native subspecies of cutthroat trout inhabiting Utah waters, and was thought to have been eliminated or hybridized until its' discovery in 1975 in a 1-mile section of stream. Bonneville cutthroat trout have been restored throughout the state and currently occupy more than 75 miles of stream habitat throughout the watershed and surrounding areas (Rodriguez, 2002). Critical habitat and a pure strain population of Bonneville cutthroat were recently affected by the 2002 Sanford fire, and population recovery is expected to be long-term. Areas where hybridization, competition with nonnative salmonids, degradation of habitat from diversions, livestock grazing, road building, fire, mining and timber harvest activities and angling have occurred or may potentially occur were rated as high.

### ***Fisheries Habitat***

Recreational fishery opportunities occur throughout much of the watershed, as well as populations of non-recreational fish and amphibians. In recent years aquatic habitats have been negatively impacted as a result of various activities within the watershed. Increased erosion and subsequent sediment transport has reduced exposed gravels for native fish spawning, broadened stream channels, created shallower waters, reduced abundance and quality of pools and increased water temperatures. Streamside vegetation, food sources and cover have also declined. High ratings were given to those areas where sensitive fish populations occurred and/or suitable habitat existed for subsequent introduction of native fish species. Highly degraded areas in need of enhancement were also rated high.

## **Hydrology/Water Quality**

### ***Hydrology***

The Sevier River is one of the most utilized rivers in the United States. Diversion of water in the basin began in the early 1900's and continues today. Water is diverted at several points along the main stem, East Fork, and several of the smaller tributaries. Water is stored and released at Panguitch Lake, Tropic Reservoir and Otter Creek Reservoir.

Flow regimes in the Sevier River and the East Fork have changed dramatically during the past century due to diversions and water storage in reservoirs. Water is usually diverted and released from reservoirs during the irrigation months. The timing and magnitude of runoff events has been affected by reservoirs, diversions, road construction and urban development

High rankings were given to those areas where flow regimes have been altered from historic conditions and potential for restoration exists and/or to those areas that have documented water quality issues.

Individual categories rated:

- Dewatering and altered flow regimes
- Releases from Otter Creek Reservoir may be causing bank erosion along East Fork Sevier River
- Diversion of water from Castle Creek to Deer Creek has caused severe channel degradation
- Diversions along the Sevier River may be affecting sediment transport capacity and channel equilibrium
- Loss of riparian vegetation has resulted in reduced bank storage and summer streamflows

### ***Hillslope Processes***

Dominant hillslope processes include sheetwash and shallow rill erosion. Accelerated erosion occurs in areas where vegetation conditions have been removed from historic conditions. Historic grazing practices, urban development, fire suppression, road development and increased recreational use have contributed to accelerated erosion in upland areas. High rankings were used for those areas and activities having most impact within the particular subwatershed.

Individual categories rated:

- Accelerated erosion on high elevation meadows
- Accelerated erosion in pinyon-juniper and sagebrush stands
- Accelerated erosion associated with urban development
- Accelerated erosion associated with roads
- Rill and gully erosion on hillslopes
- Accelerated erosion associated with illegal ATV use

### ***Riparian Vegetation/ Habitat***

Riparian conditions within the watershed are diverse, and range from non-functioning to proper functioning condition. Although the trend is upward on most federal lands, it may be stagnant or slightly upward on private lands within the Upper Sevier Basin and adjacent to federal land areas.

Riparian areas of intermittent or perennial water are typically characterized by vegetation such as cottonwood, willow, river birch and grasses/forbs. Although these areas occupy only a small portion of the watershed, they are highly productive and heavily utilized by people and animals. Eighty-two percent of all Utah's birds use riparian areas for nesting, rearing young, migrating, and/or protection from Utah's harsh winters (PFC, DNF, 2000). Heavy use by humans and animals have eliminated or resulted in degraded riparian conditions in some areas. Roads, water diversions, timber harvest, grazing, trampling and agriculture development have influenced riparian areas, as well as encroachment of non-riparian plant species into riparian areas.

Riparian habitat loss and alteration throughout the western United States is estimated to be greater than 95 percent (Krueper 1992, as cited in Gardner, et. al., 1999). Channel erosion, dewatering, lowering of water tables, removal of beaver populations, increased water temperatures, concentrated runoff, and increased sediment transport are all problems associated with riparian degradation and are equally noted within the Upper Sevier Basin. Those areas where woody plant species and late seral herbaceous plant species are lacking along riparian corridors and/or where recruitment of woody plant species is limited, were given high priority ratings during the assessment.

Individual categories rated:

- Lack of healthy composition of riparian vegetation, defined by the presence of late seral herbaceous plants and multiple age class distribution of appropriate woody plant species

### ***Water Quality***

Water quality is one of the most central issues in the management of natural systems in the 21st century. Adequate quantity and quality of water for endangered fish and other species, and for human consumption and use has been mandated under the Clean Water Act (CWA), Endangered Species Act (ESA) and numerous state and federal agency plans. Water quality is a major focus under the Upper Sevier Management Plan. Those areas where water quality standards are not being met, as well as those area where current conditions accelerate erosion and habitat degradation were

given highest ratings, and will continue to receive a great deal of focus in this plan.

Individual categories rated:

- Summer home development and associated impacts (i.e., ground/surface water contamination, erosion, recreation, etc.)
- Accelerated erosion, grazing management, recreation use, roads
- TMDL listed and potentially listed water bodies due to nutrients, sediment, phosphorous, habitat alteration, or temperature

### ***Channel Morphology***

The Upper Sevier Basin contains a wide variety of stream channel types, and are categorized based on Rosgen, 1996. Many channels in the watershed have incised (downcut) sometime in the past, but are evolving back to their previous morphology. Bank erosion has accelerated in portions of the watershed, resulting in higher width/depth ratios and headcuts on upstream ends.

Individual categories rated:

- Active channel adjustments (vertical or lateral)
  - Accelerated bank erosion
- Channelization

### **Agriculture**

Much of the Upper Sevier Basin has been utilized as pasture lands for cattle and sheep. Heavy past use was concentrated along the Sevier River/East Fork, with development into irrigated land beginning around 1864. The cold temperatures and short growing season limit the growth of many commercial crops in the watershed, and much of the agricultural industry has been centered around growing alfalfa hay, native grasses and small grain crops for use as winter livestock feed.

The Upper Sevier Soil Conservation District was organized in 1941 to help farmers and ranchers solve their soil and water conservation problems.

### ***Animal Feeding Operations (AFO)***

Animal Feeding Operations are defined as an area where animals are confined and fed for 45 days or more in one period and vegetation is not produced in the affected area. Agricultural operation runoff can have a direct effect on water quality, especially in proximity to water bodies and stream corridors. Those areas where animal feeding operations have been identified as having an impact on water quality (TMDL Analysis) were ranked as high.

### ***Water Conservation Concerns***

Irrigation companies in the watershed have converted furrow and flood irrigation to pressurized sprinkler systems. This conversion has increased irrigation efficiency and has helped to eliminate late season water shortages. Many more opportunities for improved water delivery systems are present in the watershed to lengthen water seasons and provide better plant and economic value. Those areas where better nutrient management is needed to control excessive leaching or runoff, and those areas where opportunities exist to put more surface water into area streams and allow for more stable down stream flows, less bank cutting and better water control delivery were ranked as high.

### **Pasture Management**

Pasture management is one means of producing more forage, reducing noxious weeds, improving riparian areas, maintaining plant diversity, and at the same time, producing healthier animals and increasing profits. Those areas where inadequate pasture management may be contributing to poor vegetative conditions, as well as affecting water quality, were ranked as high.

### **Wildlife Management on Private Lands**

As urban development continues within the watershed, deer, elk, prairie dogs and other wildlife are becoming more of a concern on private lands due to different management goals between landowners and wildlife managers. Competition between livestock and wildlife for forage on public lands, as well as wildlife depredation on private lands and concerns over Environmental Protection Agency listing of wildlife are issues frequently addressed by landowners.

Increased wildlife damage to agriculture over the last 30 years is well documented (Decker, 1991; Jonker et al., 1998; Drake, 2002). Based on survey results of random alfalfa growers within Utah, the reported \$350,000 annual loss of crops to wildlife represents 2.8% of the crop value. Expanding this sample figure to the 2.2 million tons of alfalfa harvested annually in Utah, this perceived loss amounts to \$4.4 million - 9 times the amount the Utah State Legislature annually appropriates (\$500,000) to reimburse crop owner depredation claims and expenses (Messmer, et. al. 1996).

Messmer, et. al. (1996) and Conover (1998) suggest incorporating strategies in management plans to adequately address wildlife damage concerns.

Areas within the watershed where privately-owned irrigated and dryland farms occur in tandem with special status wildlife populations were ranked as high.

## **Key Issue Descriptions**

After ranking all of the resource issues within each of the nine watersheds, each TAC group was asked to provide detailed information for two-to-three high priority issues (hereinafter referred to as “Key Issues”) for each watershed. Using a combination of narratives, maps and on-the-ground photos, each group identified these pertinent issue(s) and described current conditions, reference conditions and causes of change between current and reference conditions. Key issue narratives are also contained in Chapter 4, for each of the nine watersheds.

## **Key Issue Maps**

To further understand key issues, and where they occur, TAC groups highlighted key issues on a digital orthoquad (DOQ), a detailed map showing on-the-ground features such as vegetation and roads. Maps showing the key issues identified for each of the nine watersheds are also contained in Chapter 4.

*Note: These maps are not intended to be used in place of a site-specific analysis, or as an exact boundary where restoration projects should occur. They are simply included as a visual representation of overall conditions within the watershed, relationship of key issues to one another, and/or high priority areas where ecological and social conditions may overlap. This information should be used as a guide, in developing on-the-ground, site-specific projects and enhancement techniques.*

## Water Quality Studies

Chapter 5 provides a summary of the water quality assessment, issue identification, pollution load allocation and recommendations established in the Total Maximum Daily Load (TMDL) development for the Upper Sevier Basin.

### Steering Committee Recommendations

Using resource issue rankings, key issue designations and the current water quality assessment and TMDL study from Department of Water Quality, four focus areas were identified within the Upper Sevier Basin. Steering Committee approval for focus area projects and opportunities was received during May, 2004. Focus area projects and opportunities are contained in Chapter 6. While these priority focus areas (Sevier River-1, Sevier River-2, Sevier River-3 and East Fork Sevier River-4) represent only a small portion of the watershed, they contain a variety of project opportunities, for all partners engaged in watershed restoration. The Upper Sevier Community Watershed Project will place continued emphasis in these areas, while still utilizing the information contained elsewhere in this document to help identify and solicit funding for other enhancement opportunities as they occur, throughout the watershed.

*Dawn Elkington, part of the GIS support staff for the Upper Sevier Management Plan and Assessment digitizes TAC committee map drawings for inclusion in the final management plan.*

