Eagle River Watershed Plan

1996
Eagle River Watershed Plan

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Eagle River Watershed Plan

Summary

PLAN PURPOSE AND CONTENT

The Eagle River Watershed Plan outlines a collaborative, local philosophy for protecting and improving water quantity, water quality, wildlife habitat and recreational opportunities, and promoting compatible land use practices. The decision to initiate the Plan was based on a common belief among local jurisdictions that the Eagle River and its tributaries are essential to our quality of life. This plan defines actions that can be taken to ensure that the attributes of the watershed are protected and enhanced through the years to come.

Development of the Plan involved many people representing a broad range of interests and expertise. Through that process, issues of concern were identified that became the foundation of the Plan goals. The recommended actions for achieving those goals are a combination of educational, voluntary and regulatory suggestions. Each jurisdiction has the option for choosing which actions to implement but there are many opportunities for partnerships and cooperative efforts.

The public participation phase of the planning process indicated there is sincere interest among local citizens about the watershed, particularly the Eagle River. Many believe that the watershed is in an acceptable condition now but has the potential to degrade as the local and regional population grows and subsequent demands for water quantity, developed land and recreation use increase. There is a strong desire to know more about the individual issues of water supply and demand, water quality status, wildlife habitat status, development of recreational opportunities, and compatible land use practices that also consider the rights of private property owners.

In response to the desire for increased knowledge and improved understanding, background information is presented in the Plan on each of the different watershed components—water quantity, water quality, wildlife, recreation and land use. This Plan strives to be a single source of basic information on the watershed for use by local citizens and decision makers.

PLAN GOALS — SUMMARIZED

1. Improve the community’s understanding, interest, and leadership in watershed issues.

2. Develop cooperative land use planning philosophies and tools.

3. Determine and provide optimum water quantity and quality.

4. Protect or restore open space and sensitive areas.

5. Protect and improve recreational opportunities.
RECOMMENDED FIRST STEPS

The recommended actions that can be taken to implement this Plan and meet the above goals are comprehensively listed in Chapter 3: Plan implementation as well as in each topic chapter. The following stand out as recommended first steps:

1. Establish the Eagle River Watershed Committee to Oversee Plan Implementation—a group consisting of citizens and local governments representatives, including elected officials, needs to direct this effort. Citizens provide insight and expertise, local government provides structure and staff support.

2. Develop a Public Education Program about Watershed Issues—an important key to the success of this plan is to keep the community interested and involved.

3. Create Annual Work Programs to Identify Priority Actions—select a project from each category, identify costs and responsibilities, and secure funding. First year project examples include: an access improvement project, creation of a recreation map, a habitat improvement project, regulatory review, a water quality monitoring project and determining optimum water quantity flows.
Chapter 1

Introduction

PROFILE OF THE EAGLE RIVER WATERSHED

The Eagle River watershed covers a drainage area of approximately 970 square miles and has an average annual water flow of 415,000 acre feet. Elevations in the watershed range from 6,100 feet at Dotsero to 14,003 at the summit of Mount of the Holy Cross.

The Eagle River originates near the southeastern border of Eagle County at Tennessee Pass and flows northwest and then west for about 77 miles to its confluence with the Colorado River at Dotsero, 6 miles west of Gypsum.

Homestake, Cross, Gore, Brush and Gypsum Creeks are the largest of the hundreds of Eagle River tributary streams. There are approximately 120 natural lakes and 8 reservoirs in the watershed. The Eagle River watershed provides water supply for the majority of Eagle County's population and to several front range communities.

Approximately 98% of the watershed land area is located in Eagle County. The remaining 2% is located in Pitkin County in the Homestake Reservoir area. Approximately 75% percent of the land in the watershed is public land managed by the U.S. Forest Service and Bureau of Land Management.

PURPOSE AND USE OF THE EAGLE RIVER WATERSHED PLAN

The purpose of the Eagle River Watershed Plan is to outline a collaborative, local philosophy for protecting and improving water quantity, water quality, wildlife habitat and recreational opportunities, and promoting compatible land use practices.

This plan is a source of information and a statement of cooperative direction that is intended to be useful to the general public and local governmental entities for setting priorities and planning projects, and in making decisions regarding the future of the Eagle River watershed. Many of the Plan recommendations are dependent on educational efforts by the local governments and agencies to promote voluntary actions and improved awareness.

This Plan is not a regulatory document. The Plan does include recommendations for possible policy and/or regulatory revision related to the rivers and creeks. Generally, implementation of all regulatory recommendations and suggestions, such as river and creek buffers, will be up to the discretion of each jurisdiction and will require tailoring to meet the needs of each entity. Proper regulatory adoption procedures will also need to be followed.
GEOGRAPHIC SCOPE OF THE PLAN

The Eagle River Watershed Plan addresses the entire Eagle River watershed which includes the Eagle River, all of its tributary streams and the headwater lakes and springs. This holistic, integrated approach reflects a local, regional and national desire to understand the “big-picture” of how watersheds function and respond to human impacts.

A COMMON VISION FOR THE WATERSHED

Through the planning process, a vision has emerged for the future of the Eagle River watershed. It is difficult to envision what this region, and more specifically the Eagle River watershed, will be like 100 years from now, but our vision should extend at least 20 to 50 years into the future.

The vision for the watershed is of:

...a network of clear, mountain streams and a river that provides good quality water in ample quantity for a self-sustaining, healthy fish population and efficient use by humans;

...open space and greenbelts along the river and streams that buffer the waterways from human land use impacts, and preserve the riparian areas that provide critical wildlife habitat and scenic vistas;

...land uses that respect the riparian and aquatic ecosystems and complement the scenic character of the waterways;

...appropriate, non-disruptive and well-designed access to the river for passive and active recreation;

...an appreciation and respect from the residents of the watershed for the extraordinary resource that we share.

The vision is achievable. Many elements are in place currently, but will require diligence to cope with change and growth. Other elements of the vision need to be developed. In order to achieve the vision, it is essential that all citizens in the Eagle River watershed come to a common understanding that the river and tributaries are a critical component of our quality of lives and that it will require the cooperation and commitment of many to realize and sustain the vision.

PLANNING PROCESS BACKGROUND

The Eagle River Watershed Plan (originally the Eagle River Management Plan) was initiated by local governments after protection of the Eagle River was identified as a top community concern through town and County master planning forums and surveys. The perception among local citizens and community leaders was that the Eagle River and its tributaries are a tremendous asset that has been frequently overlooked or degraded in terms of water quality and quantity, adjacent land use impacts, aesthetic quality, recreation and habitat values.

Participants in the planning process have included citizens at-large, land owners, rafting, fishing and other special interest groups, representatives of all the Towns in the watershed, and State and Federal government agencies. A complete list of participants is located in Appendix A.
RELATIONSHIP TO OTHER PLANS

Most of the comprehensive planning documents adopted by the Town and County governments include goals and policies regarding the Eagle River and its tributaries. This Plan expands on those goals and policies, giving more specific direction. It does not replace those plans but is intended to supplement them.

This plan should be revised as necessary to reflect the changing needs and priorities of the watershed and citizens. A review after five years of implementation is suggested, or sooner if determined necessary.

OTHER WATER PLANNING AND ADVOCACY EFFORTS

Northwest Colorado Council of Government’s 208 Plan Update and Water Quality and Quantity Program, the Colorado River Headwaters Forum and the Eagle River Assembly are all current efforts to formulate solutions to the many water quality and quantity issues faced in the watershed and the region. Additional information on each of these efforts is located in Appendix C.

ORGANIZATION OF THE PLAN

The Plan is organized into chapters, each addressing a specific topic identified through the planning process: Goals, Plan Implementation, Water Quantity, Water Quality, Wildlife, Recreation, and Land Use.

Each Chapter includes discussion on: Issues identified during the process, Background to create an understanding of the issues, and Objectives and Recommended Actions that should take place to implement the goals of the plan.

It is not possible to entirely separate each issue because of the inherent relationships within the watershed. For example, water quantity affects water quality, quantity and quality affects wildlife habitat, land use affects quantity and quality and so on. Overlap between topics exists because of these relationships, and in many cases, illuminates which actions are of greatest priority because several issues can be addressed by taking a specific action.
Chapter 2

Eagle River Watershed Plan Goals

These goals represent the ideals and results towards which the Plan is directed. They are statements of purpose that specify, on a general level, what the Plan effort is intended to accomplish.

1. **Improve the community’s and decision maker’s understanding and interest in the watershed issues** of water quantity and quality, wildlife habitat, recreation opportunities and land use impacts.

2. **Develop cooperative land use planning philosophies and tools** for effective protection of watershed attributes.

3. **Determine and provide optimum water quantity and quality** to maintain a healthy and naturally self-sustaining trout population as an indicator species of a healthy aquatic environment and for a quality fishing experience.

4. **Protect or restore open space and sensitive areas** such as springs, wetlands, floodplains, riparian zones, critical habitat and other geographic features that are associated with the watershed.

5. **Protect and improve recreational opportunities**, such as fishing and boating, which exist along the Eagle River and its tributaries.
Chapter 3
Implementation

3.1 BACKGROUND

The implementation of this plan is expected to take place over several years and will require the commitment of all local officials and citizens and the direct guidance of a specific entity. This plan is intended to be integrated into the work programs of the participating local governments, agencies and special interest groups where appropriate.

3.2 RECOMMENDED ACTIONS

1. Establish an Eagle River Watershed Committee

Since this Plan covers several jurisdictions and has involved a number of people, it is essential that a committed, cohesive group of people monitor and facilitate implementation of the Plan.

A. Committee Membership: A maximum of 15 members is recommended in order to maintain effectiveness. Citizens, landowners, local government appointed and elected officials and staff, and local water and sanitation districts should be the central members of the committee. Participants should also include, as necessary, representatives of the Colorado Division of Wildlife, Colorado State Water Quality Control Division, Natural Resource Conservation Service, US Army Corps of Engineer, US Fish and Wildlife Service, US Forest Service, Bureau of Land Management, Environmental Protection Agency, major water rights holders and others. The involvement of local government helps add structure and permanence to the effort.

B. Committee Protocol: The group should meet on a regular and continuing basis, for a minimum of five years following completion of this document. The Committee’s role would be advisory, not regulatory. Recommendations of the Committee could be acted on by local, state and federal agencies.

Representatives from local governments would be responsible for reporting the progress of plan implementation to their elected and appointed officials to seek direction and establish commitment.

C. Committee Purpose:

1. Oversee the Continued Implementation of the Watershed Plan, Including Prioritization of Actions:
Following assembly of the Committee, an annual and two to five year work program would be developed and updated each year. That work program would include actions selected from the Plan that, through consensus, are determined to be of the highest priority for implementation. The work program should include actions/projects from
Committee activities should include:
- Developing work programs
- Developing and completing projects
- Developing/implementing an information/education program
- Compiling and assessing data
- Coordinating enforcement efforts
- Arranging alternative and partnership funding
- Making application for grant funding
- Assisting local officials with identifying impacts on watershed
- Coordinating and assisting with policy or regulatory review/revisions
- Coordinating information sharing
- Coordinating water quality, wildlife and recreation monitoring
- Coordinating revisions to the Plan as necessary

2. Generate and Provide Information/Education on the Eagle River Watershed for “Decision Makers” (Towns, County, Water Districts, etc.) and the General Public: An Education/Information program is essential to the successful protection of the river and tributary streams, and in turn the watershed as a whole. **Tools that can be used include:**

- **Special events** e.g. Eagle River Festival, clean-ups, etc.
- **Volunteer activities** e.g. high school kids to help with bank stabilization/enhancement projects, monitoring, etc.

- **An annual “State of the River” report** for public information. Sample topics: ways that citizens can report water quality concerns (e.g. illegal dumping, erosion control problems, fish kills, etc.); activities which impact the watershed waters, riparian and sensitive areas and how those activities can be modified to lessen or eliminate the impact (e.g. State 305 B Clean Water Act report and program); access point information; historical information, etc.; and what realtors, builders, developers and citizens should know about regulations that protect the river and tributaries.

- **Promotion of water quality programs** which have been developed for schools

- **Preparation of maps** of recreation areas and sensitive areas and distribution to general public (see Recreation and Land Use chapter)

- **Publicity in local media** on a regular basis (e.g. at least every six months) to inform local citizens about watershed issues, actions, events

- **Progress reports** every six months for presentation to the local elected and appointed officials of the towns and the county

- **An inventory of reference information** such as aerial photos of the Eagle River watershed for use in planning and management of the watershed; local, State and Federal (BLM, USFS, etc.) regulations and enforcement procedure as they relate to land
use and water features; inventory of all information and studies related to the Eagle River; and updates to the list of all relevant funding sources.

2. Develop a Prioritized Action Plan and Annual Work Program

All actions recommended by the Plan are comprehensively listed below. These actions are not yet listed in priority order but will need to be generally prioritized as part of the work plan preparation previously recommended. The Plan is a dynamic document and priorities are subject to change because of evolving conditions in the watershed. By preparing annual work programs, changing priorities can be accommodated.

Priority should be given to those projects that: 1) are critical situations in need of attention before a situation further degrades, or 2) are immediate windows of opportunity that may be lost, or 3) can be implemented for minimal cost relative to the benefits achieved, or 4) will respond or resolve several issues simultaneously by taking action.

The following items should be also addressed in the selection of priorities and the annual work programs:

- **Consultation** with appropriate “Decision Makers”
- Estimates of Probable **Cost and Time**
- **Funding** Source(s)
- Identification of who will **Coordinate and Participate** in the project and specific roles

3.3. COMPREHENSIVE LIST OF RECOMMENDED ACTIONS BY CHAPTER

**IMPLEMENTATION**

Recommended Actions

- Establish an **Eagle River Watershed Committee** (pg. 11)
- Generate and Provide **Information/Education** (pg. 12)
- Develop a **Prioritized Action Plan and Annual Work Programs** (pg. 13)

**WATER QUANTITY**

Recommended Actions

- Determine **Optimal Instream Flows** (pg. 23)
- Determine **Water Supply Thresholds** (pg. 23)
- Utilize the **Colorado River Decision Support System** (pg. 23)
- Obtain **Water Plan Review Assistance** (pg. 24)
- Review/Develop Master Plan **Policies Specific to Water Issues of Supply, Demand and Capacity** (pg. 24)
- Adopt a **Local Position on Augmentation Plans** (pg. 24)
- Encourage **Consolidation of Special Districts** (pg. 25)
- Work with **Front Range Communities** (pg. 25)
- Implement **Water Conservation Measures** (pg. 26)
- Investigate **Growth Management Tools** (pg. 26)
- Investigate **Storage and Engineering Solutions** (pg. 27)
WATER QUALITY
Recommended Actions

- Inventory and Coordinate Water Quality Monitoring Efforts (pg. 33)
- Apply for Water Quality Program Funding (pg. 33)
- Determine Local Water Quality Plan Needs and Draft a Model Plan (pg. 33)
- Develop Public Information Program about Local Water Quality (pg. 34)
- Develop Wellhead Protection Programs to Protect Drinking Water (pg. 34)
- Implement Appropriate Best Management Practices (pg. 34)

WILDLIFE
Recommended Actions

- Implement Measures to Protect and Improve Water Quantity and Quality (pg. 46)
- Implement Habitat Improvement Projects (pg. 47)
- Support Efforts to Prevent Spread of Infectious Disease to Local Fish Populations (pg. 47)
- Review/Revise Fishing Bag Limits and Regulations (pg. 47)
- Review/Revise Drainage and Transportation Regulations (pg. 48)
- Inventory Riparian Zones and Habitat Boundaries (pg. 48)
- Acquire Riparian Lands (pg. 48)
- Implement Stream Buffer Standards (pg. 48)
- Preserve Wildlife Corridors to Riparian Areas (pg. 48)
- Develop or Improve Appropriate Access (pg. 48)
- Request Mitigation Trust Funds (pg. 48)
- Manage Noxious Weeds in Riparian Areas (pg. 49)
- Manage Livestock in Riparian Areas (pg. 49)
- Restrict Access into and Monitor and Provide Buffer Zones for Critical Wildlife Areas (pg. 49)
- Designate Watchable Wildlife Sites (pg. 49)

RECREATION
Recommended Actions

- Cooperatively Initiate Recreation Carrying Capacity Study (pg. 56)
- Cooperatively Study Fishery Conditions (pg. 56)
- Develop Recreational Maps for Public (pg. 57)
- Review/Revise Fishing and Boating Regulations (pg. 57)
- Improve Existing Public Access Points (pg. 58)
- Create Appropriate, New Public Access Points (pg. 58)
- Implement River Access Improvement Guidelines (pg. 59)
- Preserve or Create Access through Land Development where Appropriate (pg. 59)

LAND USE
Recommended Actions:

- Create Comprehensive Watershed Maps (pg. 71)
- Develop Master Plans for each of the Tributary Valleys (pg. 72)
- Implement a Cooperative Enforcement Program of Existing Regulations (pg. 72)
- Revise River/Creek Setbacks for Consistency and Sensitive Lands Protection (pg. 72)
- Locate Compatible Land Uses Adjacent to Rivers and Streams (pg. 74)
- Develop River/Creekfront Design Standards (pg. 75)
- Analyze Ability to Supply Adequate Water (pg. 75)
- Analyze Golf Course and Ski Area Proposals (pg. 75)
- Develop a Model Sensitive Lands Overlay Zone (pg. 75)
- Improve Local Authority on 35 Acre Exemptions (pg. 77)
- Protect Riparian Lands as Highest Open Space Priority (pg. 78)
- Jointly Pursue Open Space Funds (pg. 78)
- Guarantee Open Space as Perpetual (pg. 78)
- Maintain Public Lands as Open Space (pg. 78)
- Develop Parks, Trails and Access Sites Adjacent to Waterways where Appropriate (pg. 78)
- Support Local Ranching Activities (pg. 78)
Chapter 4

Water Quantity

4.1 OVERVIEW OF WATER QUANTITY ISSUES AND OBJECTIVES

Several water quantity issues and concerns were identified and discussed during the planning process:

Water Quantity Issues:

- Lack of Water Supply Information and Education
- Lack of Cooperative Water and Land Use Planning between Water Districts and Local Land Use "Decision Makers"
- Increasing Water Supply Demands and Impacts
- Instream Flow Deficits
- Optimal Flow Unidentified

In response to the identified issues and concerns, and in support of the goals for the Plan, the following objectives were developed:

Water Quantity Objectives:

1. Improve Water Quantity Information and Availability of Information for Local "Decision Makers" and Citizens
2. Develop Cooperative Land Use and Water Planning Policies that Address Future Growth, Water Supply and Stream Flow Protection
3. Eliminate Instream Flow Deficits

4.2 BACKGROUND

In Colorado and in other western states, water quantity has been one of the most important issues for growth. Competition for water has been intense between front range and west slope water users as well as between western states. Where ample water and water rights exist, communities, recreation, and agriculture have flourished. While water rights and trans-basin diversions have always been a issue in Eagle County, it has only recently been realized that human water demand in Eagle County may exceed the supply constraints. Water supply issues also affect natural and recreational resources associated with the watershed.

Stream Flow Characteristics

Stream flow can be measured as cubic feet per second (CFS) or as stream discharge measured in acre feet (see glossary for definitions).

An acre foot is approximately the area of a football field with 1 foot of standing water. An acre foot is considered to be an average quantity of water a family of four needs in one year (per Colorado Water Education Foundation).

Discharge of the Eagle River, as historically measured at a stream gauge below Gypsum Creek, averages about 415,000 acre feet per year. Most of this stream flow occurs in a short period in response to melting snowpack. About 75 percent of the average annual flow of the Eagle River occurs during the three months of May, June, and July.
Instream Flow Characteristics

Instream flow amounts are determined by the Colorado Division of Wildlife and Colorado Water Conservation Board (CWCB). Instream flow standards are intended to "preserve the natural environment to a reasonable degree" (CRS 37 92 102(3)). Instream flows are identified by determining the flow necessary to sustain aquatic life. Table 1 summarizes instream flow standards during different times of the year along the Eagle River.

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<th>Eagle River Section</th>
<th>Instream Flow (CFS) Standard</th>
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<td>SUMMER</td>
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<td>Cross Creek to Gore Creek</td>
<td>50</td>
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<td>110</td>
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<tr>
<td>Brush Creek to Colorado River</td>
<td>130</td>
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NOTE: Summer = May 1 through September 30; Winter = October 1 through April 30

Existing Water Storage Facilities

Dams and reservoirs are typically constructed for flood control and to capture a portion of the spring runoff so that water can be stored for release during drier periods of the year. There are six water storage facilities in the Eagle River Basin:

1. **Homestake**: The largest reservoir is Homestake Reservoir which is located high in the headwaters of the Eagle on U.S.F.S. land southeast of Red Cliff. Homestake reservoir delivers approximately 28,000 acre feet per year to the cities of Aurora and Colorado Springs. Its storage capacity is 43,000 acre feet. Recently, a three year agreement was signed between Aurora and a group of local water provider districts that calls for the release of 300 acre feet of water from the Homestake Reservoir to augment flows in the Eagle River during dry periods.

2. **Climax Reservoirs**: Climax Mine has two private reservoirs in the Eagle River watershed, Eagle Park and Robinson Reservoir, which together have a 6,000 acre foot capacity and were built for industrial purposes at the mine, tailings impoundment and distilling. The Eagle Park Reservoir is currently being reclaimed and could be available for augmenting flows in the Eagle River watershed.

3. **Black Lakes**: Black Lakes are located on the west side of Vail Pass. Black Lakes 1 & 2 Reservoirs were constructed by the Colorado Division of Wildlife are used for recreation and augmenting flows in the Eagle River watershed (specifically Gore Creek). The two lakes have a total capacity of 300 acre feet, a portion of which is available for augmentation.

4. **Nottingham Lake**: Nottingham Lake is located within Town of Avon and has a 100 acre feet storage capacity. The major use of the lake is recreation.

5. **Sylvan Lake**: In November of 1994, the Town of Eagle and the Colorado Department of Natural Resources signed
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4. **Nottingham Lake:** Nottingham Lake is located within Town of Avon and has a 100 acre feet storage capacity. The major use of the lake is recreation.

5. **Sylvan Lake:** In November of 1994, the Town of Eagle and the Colorado Department of Natural Resources signed
an agreement to utilize Sylvan Lake to provide storage for the Town of Eagle. Sylvan Lake holds 511 acre feet.

6. **Lede Reservoir**: This is a private reservoir on U.S.F.S land south of Gypsum. It was constructed for agricultural uses but some water is leased to Gypsum. The reservoir holds 375 acre feet and it is also used for public recreation.

**Water Rights**

Since the Eagle River headwaters are in the Rocky Mountains, water availability is very dependent on precipitation, particularly snowfall. The ability to use the water for a consumptive use is dictated by water rights.

A very simplified explanation of water rights is that water users must acquire water rights to use water when there is no available unallocated water. Water rights have a quantity associated with the right and a priority date (the year the right was decreed). Water users with the oldest or most senior water rights have the first priority for water during dry periods when there is not enough water to meet all demands.

The most senior rights and the largest water right holders in the upper Colorado River are the Shoshone Power Plant and farmers in the Grand Junction area (referred to as the Cameo Call). When the Eagle and Colorado rivers are low, these water users have the first priority for water usage during these times. This affects how much water can be diverted or used in the Eagle River during low flows.

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**Water Usage**

In the Eagle River there are two major uses of water:

a) Trans-Basin Use  

b) In-Basin Use

Both types of users are affected by the available water and the water rights in the basin. The map following this chapter is a map of the Eagle River watershed that displays municipal diversions (in- and trans-basin) and where water is returned from waste water treatment facilities (in-basin).

**Trans-Basin Use**

Trans-Basin Use involves transporting water from one watershed to another via diversion systems. There are four diversions that take water out of the Eagle River watershed and transport it to certain front range cities. These diversions include the:

1. Wurtz Ditch *(City of Pueblo)*  
2. Ewing Ditch *(City of Pueblo)*  
3. Columbine Ditch *(City of Pueblo)*  
4. Homestake I Project *(Cities of Aurora and Colorado Springs)*

Together these diversions transport approximately 34,000 acre feet of water to the front range each year. Trans-basin uses result in a 100% consumption of water since none of the 34,000 acre feet is returned to the Eagle River watershed. Diversion points are depicted on the map accompanying this chapter.

**Timing of Trans-Basin Diversions**

*It is important to note when out-of-basin diversions occur in relation to stream flow in the Eagle River.* Figure 1. depicts stream flow for an average year and a dry year. Trans-basin diversions occur during the spring melt-off when flows are at their highest and can not legally occur during low flow periods because of the existing senior water rights on the Colorado River and instream flow rights at
the point of diversion. This basically reduces the intensity of spring melt flows and does not affect in-basin uses. It should be noted that high spring flows are important for “flushing” sediment out of the river in order to maintain optimal aquatic habitat (Calow, 1992). However it has not yet been determined how much of a “flushing” effect is needed to maintain optimal habitat for aquatic life in the Eagle River.

**Figure 1. Conceptual Diagram of Eagle River Stream Flow**

**In-Basin (local) Use**

In-basin water use consists of all water uses that take water from the watershed for use within the watershed. In-basin water users in Eagle County divert water from the Eagle and it’s tributaries but unlike trans-basin users, they typically return a significant portion of the water diverted back to the Eagle River watershed. Therefore, it is critical to look at where, when, and how much water is divert-
ed and where, when and how much water is returned to the Eagle River. The following is a description of in-basin water users and typical return flows:

1. **Domestic** users take water out, treat it, provide it for homes, and businesses, treat it at a waste water treatment facility (typically down river from the diversion), and then return approximately 90% of the water originally diverted. However, it should be acknowledged that there can be a significant depletion in stream flow between the points where water is diverted and returned at a waste water treatment plant. Highest level of in-basin use typically occurs in the winter due to the tourism industry and when water flows are lowest.

2. **Snowmaking** usually takes water from the river in October, November and December when flows are typically lowest. Approximately 80% of the water is returned during the spring melt when flow is high and the rest is lost to evaporation.

3. **Golf Courses** also divert water for irrigation. A well managed golf course uses water efficiently in that they only divert what is needed to maintain the turf. However, well managed golf courses are considered to be 100% consumptive because there is typically no measurable return flow. In other words, the water applied to a well managed golf course is used by the grass and is lost to evaporation with no measurable water running back into the watershed.

4. **Agricultural** users in Eagle County take water out at established diversion points through irrigation systems to grow feed for livestock. Return flows can vary significantly depending on the quality of the irrigation system but can range up to 50%, with the rest being lost to evaporation, plant use and deep percolation. Agricultural return flows can be valuable in augmenting late summer flows through the slow (relative to surface run off) lateral percolation of water from irrigated fields to streams. Although domestic water usage may be more efficient than agriculture, agricultural land can have a significant benefit to return flows during the later part of the summer when natural stream flows are low. The relative consumptive use of irrigation and domestic use is a critical issue in Eagle County and must be examined more fully as agricultural uses diminish in the watershed.

**In-Basin Water Management**
Within the watershed there are several entities that manage supply and distribution, according to their particular water rights. The majority of these entities were specifically created in response to a specific land development project with the exception of the town-owned and operated systems. Nearly every district has a board of directors that oversees operation:

- Arrowhead Metro Water District
- Beaver Creek Metro Water District
- Bellyache Ridge Metro Water District
- Berry Creek Metro Water District
- Eagle-Vail Metro Water District
- Edwards Metro Water District
- Lake Creek Meadows Water District
- Squaw Creek Metro Water District
- Upper Eagle Regional Water Authority
- Upper Eagle Valley Consolidated Sanitation District
- Vail Valley Consolidated Water District
- Town of Minturn
- Town of Red Cliff
- Town of Avon Town of Eagle
- Town of Gypsum

*UEVCS D manages water and sanitation for all of the listed districts and the sanitation for the Towns of Minturn and Avon.
Water Deficits

Stream flows have been below minimum instream flow standards during the late summer and winter during dry years. The frequency and duration of minimum instream flow deficits (depending on the location on the Eagle River) varies from once every 1 to 5 years.

<table>
<thead>
<tr>
<th>Section of Eagle River</th>
<th>Instream Flow Standard—Summer/Winter</th>
<th>Estimated Frequency of Flow shortage—Summer</th>
<th>Estimated Frequency of Flow shortage—Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross Creek to Gore Creek</td>
<td>50/20 cfs</td>
<td>1 in 5-10 years</td>
<td>1 in 10 years</td>
</tr>
<tr>
<td>Gore Creek to Beaver Creek</td>
<td>85/35 cfs</td>
<td>1 in 5-10 years</td>
<td>1 in 5-10 years</td>
</tr>
<tr>
<td>Beaver Creek to Lake Creek</td>
<td>85/35 cfs</td>
<td>1 in 2 years</td>
<td>1 in 5-10 years</td>
</tr>
<tr>
<td>Lake Creek to Brush Creek</td>
<td>110/45 cfs</td>
<td>1 in 5-10 years</td>
<td>1 in 5-10 years</td>
</tr>
<tr>
<td>Brush Creek to Colorado River</td>
<td>130/50 cfs</td>
<td>1 in 5-10 years</td>
<td>May not occur</td>
</tr>
</tbody>
</table>

NOTE: A shortage is assumed to occur when stream flow is less than the instream flow standard for a period exceeding several consecutive days. (Source: Eagle River Assembly, Phase I Report, 1994)

Fish “kills” have been recorded by the Colorado Division of Wildlife when flows have been above instream flows perhaps indicating that minimum flows may not be adequate to protect trout populations throughout the length of the Eagle River. It should also be noted that historic flows dropped below minimum instream flow standards on portions of the Eagle River before there were either in-basin or trans-basin diversions. This would suggest that there may have always been stress on trout populations during natural low flow periods. Additional biological monitoring is needed to determine the relationship between water quantity/quality and biological indicators.

It is estimated by the Eagle River Assembly (1994) that to increase stream flow to minimum instream flow levels, an additional 3,300 to 4,000 acre feet of water needs to be stored and released into the Eagle River during dry times of the year, typically late summer and early winter. The same report estimates that 5,200 to 6,500 acre feet may be needed to increase stream flow ensure minimum instream flow as the County approaches “build out” of developments approved as of 1994. A separate report commissioned by Eagle County estimates that in July 1996 there are approximately 11,000 units unbuilt but approved indicated that the demand for water is sure to increase.
4.3. WATER QUANTITY OBJECTIVES AND RECOMMENDED ACTIONS

4.3.1 OBJECTIVE: Improve Water Quantity and Stream Flow Information and Availability of Information for Local “Decision Makers” and Citizens

Local understanding of water quantity needs to be increased, especially in relation to new and proposed growth. Water authorities and governmental (“decision makers”) entities need to work closely together to ensure water management is congruent with planned development in the basin.

Recommended Actions

1. DETERMINE OPTIMAL INSTREAM FLOWS

The public and officials expressed concern regarding the adequacy of instream flow standards set by the Colorado Water Conservation Board (CWCB). The issue was raised that optimum flows be identified that maintain a healthy and naturally self sustaining trout population. This flow standard should be based on biologically defensible criteria and should be used as a target (goal) flow and should include flushing flow data.

As a priority of the Eagle River Watershed Committee (see Implementation, Chapter 3), establish a cooperative effort between the Division of Wildlife, CWCB, recreationists, water users/providers and governing entities to determine an optimal flow for the Eagle River and tributaries that has defensible criteria. This optimal flow should then be used as a target flow when reviewing projects that may affect water resources. The Eagle River Management Committee could initiate the effort, in cooperation with other on going water planning groups. This effort should also include a complete study of water use in the watershed by identifying major water consumers in the watershed, consumptive use, actual supply, and estimated projected demand for the entire watershed. The Committee along with area water users may want to request changes to instream flow standards from the CWCB, the legal authority, based on the analysis done to determine optimal flows. This study must include recommendations on how to reach optimal flows.

2. DETERMINE WATER SUPPLY THRESHOLDS

Local land use planning and water planning efforts must identify critical thresholds for growth. For instance, a Waste Water Treatment Plan has a capacity to treat the water of a certain number of households before needing to be upgraded. Critical thresholds should be identified in planning efforts and the consequences of exceeding thresholds should be clearly identified to decision makers. In order to understand fully thresholds, this action must include a comprehensive study of the amount of water in the watershed, the amount that is appropriated through water rights, the amount that is developed (being used) or is planned to be developed (i.e. front range rights), and the future needs of the watershed.

3. UTILIZE THE COLORADO RIVER DECISION SUPPORT SYSTEM

Utilize the Colorado River Decision Support System to make informed decisions related to water quantity. This is a state sponsored computerized system that has stream flow information and
modeling capabilities to allow water planners to make informed decisions on water development projects. This system is planned to be available in 1996 or 1997.

4. OBTAIN WATER PLAN REVIEW ASSISTANCE

County and applicable towns should collectively contract with a water analysis consultant on an as needed basis to review proposed water plans for proposed development, to augment review services currently provided for some projects by the Colorado Division of Water Resources.

4.3.2. OBJECTIVE: Develop Cooperative Land Use and Water Planning Policies that Address Future Growth, Water Supply and Stream Flow Protection

During the citizen participation process for this plan, major concerns came to light that 1) growth in the watershed should be based on water availability and other natural and man made thresholds, and 2) current rates of growth can not be supported without degrading aquatic habitat, recreation, and the aesthetic value of the Eagle River and its major tributaries unless steps are taken to reduce water demand or increase water supply.

Recommended Actions:

1. REVIEW/DEVELOP MASTER PLAN POLICIES SPECIFIC TO WATER ISSUES OF SUPPLY, DEMAND AND CAPACITY

The County and Towns should act on the citizen recommendation (obtained through public input) that planning efforts (e.g. Eagle County Master Plan, Town Master Plans) should provide specific recommendations for directing growth and development based on critical natural and man made thresholds, particularly water availability. For example the Eagle River Assembly Phase I Report indicates that if build out (maximum development based on current zoning) occurs in the Eagle River watershed that the frequency of instream deficits will increase. Planning efforts providing guidance for future growth should recognize and specifically address that there are three basic alternatives to manage new growth from a water quantity viewpoint:

1) *Increase capacity for growth*: Water management techniques (water storage, conservation, pump back systems) must be implemented;

2) *Don’t increase capacity for growth*: permit development only if it does not significantly degrade stream flows or aquatic habitat or if a significant public benefit is achieved (i.e. affordable housing);

3) *Take no action*: Take no action to manage water resources and no action to manage growth. This will result in increased stream flow deficits and aquatic habitat will be degraded.

The critical issue is that decision makers and the public understand the consequences of a policy direction.

2. ADOPT A LOCAL POSITION ON AUGMENTATION PLANS

Colorado water law allows “water augmentation” as a means to allow diversion of water by a “junior” (younger) water right when this junior right would otherwise be out of priority and unable to divert water. An augmentation plan
typically replaces (or augments) the amount of water consumed from the stream source by a junior water right with water from a reservoir, or with water previously used for another purpose such as irrigation. By replacing the amount of water consumed, the amount of water available to senior downstream water rights (such as the Shoshone and Cameo water rights on the Colorado River) is not diminished.

In the Eagle River Watershed, augmentation is most commonly filed for from Green Mountain Reservoir in the Blue River watershed in Summit County. An augmentation plan filed on Green Mountain Reservoir grants the legal right to withdraw water from the Eagle River watershed and replenish with water that flows into the Colorado River rather than the Eagle River. This technique, while legal, deprives the Eagle River of water flow and consequently affects the frequency of instream flow deficits, the dilution factors for water quality, aquatic habitat and other aspects.

Local entities should adopt the position that water augmentation plans must directly benefit the instream flows in the Eagle River watershed and urge legal decision makers and CWCB to support that local position. Additionally, local development approvals should be made on the condition that deliverable water exists which does not reduce instream flows at any time of the year. Discussions with the CWCB on water augmentation plans could help develop local criteria for development approval.

This Plan does recognize that water law in Colorado is administered by the Water Courts of Colorado and that all recommendations of the Plan need to fall within the legal framework of those laws while they are in effect. This recommended action must be explored further to determine the legal feasibility of implementation.

3. ENCOURAGE CONSOLIDATION OF SPECIAL DISTRICTS

Encourage consolidation of Special Districts where there is an economic benefit to consolidation and service levels can be maintained or enhanced. Through the development process, discourage the proliferation of small service districts. Discourage the creation of new districts when services are available from an existing district.

4. WORK WITH FRONT RANGE COMMUNITIES

Area water interests should continue dialogue with the front range communities so that there is clear communication on any proposed diversion projects and use of conditional water rights. This proactive approach may eliminate conflicts and costly legal proceedings in regard to diversion proposals.

4.3.3. OBJECTIVE: Eliminate Instream Flow Deficits

Stream flows currently drop below minimum instream flow standards due to natural cycles and human influences. As the county continues to develop, such deficits will likely increase in frequency. The recommended approach to addressing the stream flow issue is to first determine the optimal flow of water needed in the Eagle River and its tributaries during different times of the year, and evaluate the following recommended actions to determine the best local approach to obtain an optimal flow while still complying with Colorado Water Law.
Recommended Actions:

1. IMPLEMENT WATER CONSERVATION MEASURES

Every effort should be taken to first implement conservation measures to encourage responsible use of local water resources. Significant information exists from the water authorities on water usage which could aid in creating a conservation program. Several of the water districts in Eagle County have already implemented water conservation programs to address capacity issues with water delivery and treatment. Local entities should build on this success and determine how to implement and expand water conservation throughout the Eagle River watershed. Conservation efforts can be fashioned so that they conserve water and preserve water rights. For example, water saved through conservation can be donated to the CWCB for a specified period and retrieved later when needed to accommodate future growth. More information on the issue of water conservation is being compiled by the Bureau of Reclamation to look at issues such as instream flows and other items. That is titled Guidelines and Criteria for Evaluating Water Conservation Plans. Several specific ideas to examine in improving water conservation efforts include:

a) providing water audits on buildings and residences so that cost effective conservation measures can be suggested to property owners.

b) develop educational materials to improve water conservation on irrigation and golf courses.

c) encourage the use of "recycled" or "gray water" (i.e. domestically used but untreated water) systems for landscaping and golf course irrigation. Incentives for these type of systems are usually rising cost and availability of raw or treated water supply.

d) determine whether County and local building codes should be modified to require water conservation devices.

e) cost-share with water authorities to hire a water conservation specialist to assist residential, commercial, and agricultural water users to improve conservation techniques.

f) encourage appropriate users to use recycled water where feasible.

g) reduce amount of water intensive landscaping and eliminate wasteful irrigation practices at public buildings and grounds.

2. INVESTIGATE GROWTH MANAGEMENT TOOLS

Growth management tools can balance the rate of growth with natural and man made carrying capacities and community values. The following are recommended methods to investigate:

a) Evaluate all proposals involving water use (development, upzoning, snowmaking operations, etc.) on whether they contribute to minimum instream flow deficits (or optimal flow, when established). Area decision makers should be informed during the development review process if the project is expected to create deficits without adequate mitigation (e.g. “wet water” delivered to the Eagle River) so that decisions can be made with
a full understanding of the impacts and benefits.

b) Buy development rights or property through local open space funds to reduce the rate of in-basin water consumption

c) Grant water taps or building permits in increments based on estimated water supply thresholds (e.g., wastewater treatment capacity or point at which diversions increase the frequency of instream flow deficits) or adopted land use policies for growth.

3. INVESTIGATE STORAGE AND ENGINEERING SOLUTIONS

Investigate the following storage and engineering solutions to reduce the frequency of stream flow deficits and augment supply:

a) It is recognized that some form of storage may be needed to protect and enhance stream flows during low flow periods. A reservoir or several small reservoirs could provide additional water storage for the Eagle River watershed. A reservoir proposal would need to carefully evaluate the environmental impacts (positive and negative), evaluate hydrologic impacts to the Eagle River, examine the socio-economic pros and cons, and provide a long term solution for water usage in the Eagle River watershed. The cost for a reservoir ranges from $1,500 to $8,000 per acre foot of yield (release) and can take a considerable amount of time to design, receive permits and build. Reservoir development must be addressed through specific proposals that are subject to the appropriate federal, state and local governmental processes at the time they are formally proposed. Reservoirs may also have potential recreational benefits.

b) Pump back systems, such as between Dowd Junction and Vail, can help increase flows in between diversion and return flow points. While useful in specific areas, they are not a watershed wide solution for improving flows. Environmental impacts to air quality and from increased water temperatures would need to be addressed with any proposal.

c) Return flows for domestic use should be located in close proximity to diversions.

d) When legally possible, require consumptive uses such as golf course and snow making operations to incorporate on-site storage to mitigate the impacts of their seasonal withdrawals.
Eagle River Watershed
Water Quantity Issues

Legend
- State of Colorado
- Forest Service
- Bureau of Land Management
- Private Land
- Municipal/District Diversions
- Treated Wastewater Returns
- Snowmaking Diversions
- Storage
- Instream Flow Deficits (other deficits periodically occur on tributaries)

Notes:
1) Date of Map—February, 1996
2) Raw water irrigation ditches and municipal wells not shown
5.1 OVERVIEW OF WATER QUALITY ISSUES AND OBJECTIVES

Several water quality issues and concerns were identified and discussed during the planning process:

Water Quality Issues
- Water Quality Monitoring and Funding Not Coordinated
- Public Information and Education Lacking
- Runoff Associated with Land Use/Water Quality Impacts Increasing
- Drinking Water Quality Protection Needs to be Maintained
- Water Quality Linkage to Water Quantity Critical
- Water Augmentation Plans and Instream Flow Needs Conflict

In response to the identified issues and concerns, and in support of the goals for the Plan, the following objectives and recommended implementation actions were developed:

Water Quality Objectives
1. Coordinate Water Quality Programs
2. Create Stronger Linkage Between Water Quality and Water Quantity Planning
3. Minimize Water Quality Impacts from Runoff Associated with Various Land Uses

5.2 BACKGROUND

Based on citizen comments through public meetings, written material, and surveys, the public perceives many threats to the river. Generally speaking, water quality in the Eagle River and its tributaries meet or exceed the state water quality standards for agricultural and domestic uses, the protection of aquatic life and recreation uses. However, water quality in certain segments of the Eagle River is negatively impacted by natural causes as well as human activities including: agricultural practices, construction activities, hazardous materials spills, mining, road sanding, recreation, urban stormwater and snowmelt runoff, water diversions, and wastewater treatment plant discharge.

Most of the development in the watershed (as in most mountainous areas) occurs along valley bottoms in fairly close proximity to water features. As the watershed becomes more developed, specific actions to protect water quality will be necessary. Improving water quality in degraded areas of the watershed will require even more effort.

Examples of Eagle River and Tributary Water Quality Issues

Dissolved Solids, Salt Concentrations, Nutrients
A study sponsored by the Town of Vail found that in Gore Creek, dissolved solids, conduc-
tivity, and nutrient concentrations have gotten worse between 1979 and 1991, due to development in the Vail area. The table below lists some of the parameters that have increased thereby decreasing water quality.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>1979</th>
<th>1991</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolved Solids (milligrams per liter)</td>
<td>178</td>
<td>192</td>
<td>+8%</td>
</tr>
<tr>
<td>Salt Concentrations (conductivity measured in microhms)</td>
<td>270</td>
<td>305</td>
<td>+13%</td>
</tr>
<tr>
<td>Nutrients (ex. Phosphorus in milligrams per liter)</td>
<td>0.18</td>
<td>0.26</td>
<td>+44%</td>
</tr>
</tbody>
</table>

These trends are most likely also occurring around all the urbanizing areas of the Eagle River watershed. Further degradation of water quality from stormwater runoff could occur in all areas subject to development unless mitigating steps are taken.

**Metals**

Although metal concentrations in the Eagle River downstream of the Eagle Mine have significantly improved, fish and aquatic insects are still impacted by mine discharges as far down as Edwards. For example, the water quality standard for zinc to protect aquatic life is approximately 0.12 milligrams per liter (mg/l), while levels in the Eagle River below Cross Creek were as high as 0.52 mg/l on February 21, 1995.

**Increased Temperature**

Lower in the Eagle River, from Edwards to Wolcott, and from Eagle to Gypsum, fish have died periodically of furunculosis, as documented by the Colorado Division of Wildlife. This and other diseases have impacts of such magnitude only when the fish are already stressed due to due to poor water quality, increased water temperature (caused for example by low water levels or part loss of stream side shading), and habitat disturbance and destruction.

**Natural Sediments**

A significant source of sediment, which smothers aquatic life and reduces habitat, comes from the Milk, Alkali, and Ute Creek drainages. This is due to the highly erosive soils and steep slopes which are easily washed into the creeks during spring snowmelt and runoff from rain storms. This area (approximately 63 square miles) is also estimated to contribute 2,600 tons of salt to the Colorado River each year.

**Land Use Impacts on Water Quality**

**Nutrients** (i.e. nitrogen and phosphorus) increases promote algal blooms which are unsightly and can lead to fish kills because of reduced oxygen leading to suffocation. Trout are extremely sensitive to un-ionized ammonia (one form of nitrogen), and will die when exposed to levels above 0.02 mg/l. Nutrient sources include lawn fertilizers, septic systems, and eroding soils. There are numerous mitigating measures which can be used to reduce nutrient inputs to water bodies, including: better education on application of fertilizers; erosion control techniques; stormwater quality improvement projects; land use setbacks; protection of wetlands; and septic system inspection and maintenance.

*Increases in sediment* in the water increase turbidity, increase water treatment costs,
smother aquatic insects which serve as fish food, destroy fish spawning areas, and decrease oxygen concentrations. Increased turbidity also decreases the ability of fish to find prey, further stressing them. Sediment comes from construction sites, paved road sanding and unpaved soil runoff, grazing, agricultural and logging activities, and naturally erosive soils. Sediment loads to the streams can be reduced by erosion control practices, maintenance of a healthy riparian area, decreased road sanding through the use of alternative de-icers and increased street sweeping, maintenance of stormwater runoff at historical rates, stream bank stabilization, etc.

Many metals, petroleum products, and pesticides are toxic to aquatic life. High metals concentrations in drinking water are also a health risk and water treatment costs escalate when metals removal is necessary. These pollutants can enter the aquatic environment from urban land uses through stormwater runoff. Metal pollutants in stormwater include zinc, cadmium, chromium, copper, nickel, and lead. It was estimated in the previously cited Vail study that approximately 1,700 pounds of zinc enter Gore Creek from the Vail area (the non-urban "background" contribution was 12 pounds). These stormwater metals come mainly from vehicles, but also come from litter and other sources. Mine drainage and natural deposits of highly mineralized soils also contribute to the metals found in the Eagle River.

5.3 WATER QUALITY OBJECTIVES AND RECOMMENDED ACTIONS

5.3.1 OBJECTIVE: Coordinate Water Quality Programs

Recommended Actions

1. INVENTORY AND COORDINATE WATER QUALITY MONITORING EFFORTS

Coordinate individual agencies’ water quality monitoring to identify purposes and long term goals, areas for potential cooperation between agencies, and other monitoring efforts. Organization is needed to assess existing water quality and trends throughout the watershed. A mechanism needs to be established in Eagle County for continued watershed quality planning and management. All state regulatory changes pending or contemplated could be monitored through this program.

2. APPLY FOR WATER QUALITY PROGRAM FUNDING

Funding for water quality monitoring and water quality improvement projects are available (e.g. EPA 318 funds), but limited, and coordinated efforts and planning will make for more effective utilization of existing funds.

3. DETERMINE LOCAL WATER QUALITY PLAN NEEDS AND DRAFT A MODEL PLAN

Some communities currently have municipal stormwater management plans (Avon, Vail). Other communities should be evaluated to determine the necessity of producing similar or possi-
bly expanded plans to correct existing problems or in anticipation of future growth. This action could involve the creation of a model ordinance or plan that each community customizes to meet their needs. The Avon and Vail ordinances could be used as examples. The Northwest Colorado Council of Governments (NWCCOG) Quantity and Quality Program is also an important resource for this action. The model plan or analysis should include information on standards, public education, an inventory of existing local and regional programs, and applicable state and federal regulations. By adopting similar water quality plans on a local level, there is also greater likelihood that mitigation and enforcement will be dealt with consistently.

4. DEVELOP PUBLIC INFORMATION PROGRAM ABOUT LOCAL WATER QUALITY

The public should be better informed on water quality issues in the watershed particularly regarding drinking water, how different land uses impact water quality, what individuals can do to protect/enhance water quality, who are major consumers of water and potential major polluters.

Information on water quality could be disseminated in several ways such as the “State of the Water” report that is described in Chapter 3: Implementation.

5. DEVELOP WELLHEAD PROTECTION PROGRAMS TO PROTECT DRINKING WATER

As a preventative measure, develop a wellhead protection program to protect drinking water quality from pollution of the water source. The State of Colorado Department of Public Health and Environment administers a voluntary program for wellhead protection programs that local communities can implement to protect their groundwater and surface water resources.

5.3.2. OBJECTIVE: Create Stronger Linkage Between Water Quality and Water Quantity Planning

In-basin water quantity is limited, and further depletions will impact in-stream water quality, therefore water quantity “enhancement” actions should be implemented.

Recommended Action

1. See Chapter 4: Water Quantity for specific actions related to improving water quantity in the watershed.

5.3.3. OBJECTIVE: Minimize Water Quality Impacts from Runoff Associated with Various Land Uses

Recommended Actions

1. IMPLEMENT APPROPRIATE BEST MANAGEMENT PRACTICES (BMPs)

Water quality impacts from various land uses can be minimized through the use of “Best Management Practices” (BMPs). Appropriate BMPs can be implemented throughout the Eagle River watershed to reduce the water quality impacts associated with increasing urbanization. It should be stressed that natural approaches such as maintaining vegetative cover and maintaining the riparian vegetation are usually more effective and less costly than structural improvements.
BMP recommendations should be looked upon as a list of “tools,” each of which can be used to address specific issues or sites. They should not be expected to be appropriate or work in all circumstances and may be either short-term or long-term actions. Implementation can either be voluntary, or through local planning and zoning processes, local regulations, and development of water quality projects.

The following list describes BMPs that address the items such as
- Water Quality Management and Monitoring,
- Household and Citizen Involvement,
- Development and Construction,
- Transportation and Parking Lots,
- Individual Sewage Disposal Systems,
- Gravel Mining,
- Agricultural Uses,
- Logging,
- Recreation

Many of the following BMPs are the same or similar to recommendations found in other Plan chapters but are included to illustrate the relationship of water quality to land use, water quantity, etc.

**Suggested Water Quality Management and Monitoring BMPs:**

1. Develop municipal stormwater management plans. The Town of Vail has a plan which could be used as a model for communities in the watershed.

2. Monitor storage of toxic materials throughout the basin by local emergency service and environmental health agencies.

3. Identify and research physical stream enhancement projects (stream-side tree planting, in-stream aeration structures, stream side sediment control structures, stream bank erosion control, stream channel modification, etc.) for implementation on private or public lands.

4. Ensure that analysis of potential water development projects consider water quality standards, particularly in regards to stream flows and wastewater discharges.

5. Require runoff filters and drainage plans to be in continually working order, e.g. Vail parking structures, church parking lots, the airport, etc., and make semi-annual inspection as part of enforcement plan outlined in Chapter 6: Land Use.

6. Locally track the activities at the Eagle Mine Superfund site, including mine seepage and possibility of blow-out. Request a semi-annual community briefing by the EPA and State on the status of the clean-up which should continue until the area has been declared reclaimed. Water quality monitoring has shown that the Eagle Mine and other mines still contribute pollutants to the watershed. Information on the clean-up status is available from the Colorado Department of Public Health and Environment.

7. Trade lands, obtain easements or work with land trust and governmental agencies to obtain appropriate riparian areas, in order to better manage and protect them. A prioritized acquisition list would be a useful tool.

8. Develop wetlands protection program to enhance existing regulations. This would include language related to the draining of wetlands and potentially the identification of the important wetlands within the watershed.

9. Educate appropriate industrial and commercial businesses about the new “Minimal Discharge General Permit” issued by the Colorado Water Quality Control Division.

10. Investigate methods for cooling wastewater before it enters the river so as not to adversely affect river water temperatures and the aquatic environment.
Suggested Household BMPs:

1. Pass and enforce pet waste ordinances in urban areas.

2. Provide a convenient mechanism for citizens to dispose of household hazardous materials in an environmentally sound manner.

3. Develop a Public Information Program that addresses the impact on water quality from the misuse of fertilizers and pesticides (see Chapter 3: Plan Implementation).

Suggested Development and Construction BMPs:

1. Enforce erosion and sediment control requirements for construction sites. Performance bonds, a common method, are proposed as a means of ensuring that erosion control plans are implemented. Erosion and sediment control plans should include but not be limited to:
   - Disturbance management and revegetation plan
   - Timing of disturbance
   - Area controls (limiting area of disturbance at any one time)
   - Soil stabilization during disturbance
   - Site monitoring and maintenance during disturbance
   - Post disturbance monitoring

2. Ensure that developers obtain and comply with state requirement for Stormwater Permits for construction activities on areas greater than 5 acres in size. It is recommended that local governments exceed state standards and require permits for areas under 5 acres, particularly if a public project.

3. Discourage soil disturbance on slopes greater than 20-25 degrees. Revegetation and site reclamation on steeper slopes is usually not or moderately successful. If soil disturbance is allowed, require a mitigation plan to minimize soil losses and a bond to ensure revegetation success.

4. Encourage jurisdictions to consider regulations for adequate riparian area "Buffer Zone" requirements. Within "Buffer Zone" do not allow: soil disturbance, vegetative disturbance (other than minimal pruning of shrubs), lawn mowing, fertilizers and pesticides (with the exception of weed management where necessary). Include residential, commercial, golf course, recreational areas (see Chapter 8: Land Use).

5. Encourage storm water detention and water quality enhancement facilities for all developments and include maintenance provisions.

6. Encourage use of constructed wetlands to enhance stormwater and snowmelt runoff water quality, particularly in conjunction with public facilities or public works projects.

7. Prohibit direct discharge of stormwater from developed areas to lakes, streams and wetlands. Require stormwater runoff be treated (detention ponds, constructed wetlands, infiltration, grassy swales, etc.) prior to discharging to streams or river.

8. Reduce the amount of impervious surfaces to ensure groundwater recharge and decrease flooding concerns. Encourage disconnecting impervious surfaces to allow groundwater recharge and vegetative filtering.

9. Encourage the use of grass swales and porous pavement where appropriate.

10. Encourage stormwater infiltration facilities where appropriate due to impervious surface concerns.

11. Require that developments maintain pre-development hydrologic conditions through engineering solutions.

12. Encourage cluster development (easier to provide stormwater quality improvement).

13. Discourage industrial uses or commercial land uses that involve hazardous materials from land adjacent the river or streams.
14. **Golf Courses should include a manual of water quality best management practices** in their submittal for approvals. Golf courses must include features to prevent run-off into adjacent water features through the use of berms, retention, filters, groundwater recharge, etc. Review of plans for golf courses may necessitate a fee for outside professional evaluation of the BMP and drainage plan. Fees could also be assessed by the town of county to hire annual inspection services of the golf course management activity unless local governmental time and expertise is available (see Chapter 8: Land Use).

15. Encourage the **preservation of natural drainage ways**.

16. Require development plans to address proper **weed and pest controls** particularly when adjacent to agricultural land uses and riparian zones.

17. Create a **field booklet** for construction details related to BMPs. Same details could also be attached to plans.

**Suggested Transportation and Parking Lot BMPs:**

1. Discourage/relocate public/private snow storage areas from land adjacent to water features and install sedimentation or filtration systems at snow storage sites.

2. **Apply the local building setback to parking lots** as well and require a drainage plan that prevents direct runoff into water features such as streams and wetlands.

3. Discourage **construction of new roads** along water sources such as creeks and river. Discourage widening of existing roads unless a drainage plan can be developed that deflects drainage away from the adjacent water feature.

4. With CDOT, Southern Pacific Railroad, County and towns, review transportation practices to determine which ones **contribute to non-point source pollution** and can be locally/regionally altered. Some of these areas might include Vail Pass, the railroad area in Minturn, the interchanges in Vail, drainage culverts and bridges throughout the county.

5. **Seek assistance from CDOT, county and municipalities** for testing of alternative, more environmentally sound practices on selected sections of road in Eagle County.

6. Examine need for **road sand collection program**.

**Suggested Individual Sewage Disposal System Administration BMPs:**

1. Address impacts of septic system impacts to ground and surface water quality by:
   - Increasing **minimum size standard** for eligible lots for septic and increase minimum standard for **distance from streams or wetlands**
   - Septic design engineers must **prove that groundwater and adjacent surface water** will not be impacted
   - Encourage the logical extension of **sewer lines**. Clarify distances for required connection to existing sewer service lines or thresholds for when a public sanitary sewer is required
   - Establish a **wellhead protection program** in the County Land Use Regulations
   - Insert requirement for **maintenance** of individual sewage disposal systems (septic systems) into local septic regulations.

**Suggested Gravel Mining BMPs:**

1. To support state laws and provide local policy direction, implement specific gravel mining standards that could include:
   - Limits on **percentage of site disturbance**
• No disturbance of wetland/riparian vegetation areas or any other identified sensitive area, without proper mitigation
• Buffers from river
• On-site detention
• Limits on life span
• Acceptable levels of traffic impact and mitigation
• Reclamation plans to completely restore native vegetation (or better) that include supplemental irrigation for plant establishment

2. Enforce wastewater discharge permits for gravel mining operations and encourage citizen reporting of potential violations (see Public Information and Education 3.2.2).

3. Encourage gravel retrieval along the Eagle River or tributary valleys in areas where development that will require site disturbance is approved or expected and acceptable.

Suggested Agricultural Uses of Public or Private Land BMPs:

1. Work with farmers and ranchers to determine if agriculture is impacting any particular location along Eagle County streams (Ag. is exempt from nationwide permit process) and develop a list of possible stream or bank enhancement projects that could be pursued with willing landowners. To inventory impacts of agriculture on water features, convene meeting with all area ranchers to discuss problems with riparian impacts and what help they need to control those impacts. Initiate as joint effort with NRCS, BLM and USFS.

2. Manage livestock grazing on public land that features highly erosive soils, such as Milk, Ute, Muddy and Alkali Creek drainages, to maintain or improve vegetative cover on the uplands and riparian areas.

3. Decisions as to limitations and management of agricultural chemicals should be based on preparation of carefully designed pest control and nutrient management plans reflecting integrated approaches to pest control and detailed soil testing and plant analyses. Work with the Natural Resource Conservation Service and Soil Conservation District to develop appropriate vegetative management plans. This is appropriate for all land uses.

4. Encourage grazing practices that prevent livestock from concentrating in riparian areas which have been degraded. Promote livestock watering projects outside of riparian areas through grant proposals. Encourage limited livestock access to degraded riparian areas and encourage projects designed to minimize water quality impacts.

5. Review impacts of agricultural practices on water quality in local areas under USFS and BLM jurisdiction. Work with USFS and BLM to revise/develop standards for water quality protection (and provide proper enforcement mechanisms) in their management documents.

6. Encourage appropriate “setbacks” from streams and wetlands to allow vegetative filtering of sediment, fertilizers, fecal material, etc. in return flows and stormwater runoff.

7. Develop guidelines for determination of proper livestock use and carrying capacity for all proposed developments that will allow livestock (typically horses).

Suggested Logging on Public or Private Land BMPs:

1. Work with the local Forest Service Ranger District to encourage Best Management Practices during timber harvesting to reduce potential for erosion and improve, public information process. Specific recommended actions include:
   • Review of current erosion control methods for maximum effectiveness
   • Possible revision of those erosion control methods
• Review of necessity for road building or other timbering associated activities or practices that reduce the forest cover and cause erosion
• Development of a public information process that includes posting the timber sale with informative signs that describe the action being taken and reasons why (i.e. bark beetle kill, etc.) and distribution of information to local media for public information
• Review possibility for road closures in areas not actively being used and impacting water quality
• Review of stream side and wetland setbacks requirements in order to protect riparian vegetation and promote vegetative filtering of sediment, fertilizers, fecal material, etc. in stormwater runoff
• Work with USFS and BLM to revise/develop standards for water quality protection (and provide proper enforcement mechanisms) in their management documents

Suggested Recreation BMPs
(see also Chapter 7: Recreation)

1. Keep constructed trails out of riparian areas, but if area is heavily used, provide a developed trail to concentrate impacts.

2. Provide toilets and trash receptacles in areas of high recreation use (e.g. parking areas to serve adjacent streams, boat launch areas, high fishing use areas).

3. Develop, implement, where necessary, travel management restrictions on public land off-road areas where erosive soils are present (USFS, BLM). Enforcement of these restrictions is also necessary.

4. Review public access areas for site hardening and erosion due to overuse or poor access. Develop program for appropriate site improvements.
Eagle River Watershed
Water Quality Impact Areas

Legend
- State of Colorado
- Forest Service
- Bureau of Land Management
- Private Land
- Water Diversions
- Treated Wastewater Returns
- Golf Courses
- Road/Rail
- Urban Non-Point System
- Riparian Disturbance
- Mining
- Agricultural
- Recreation

Notes:
1) Areas highlighted are approximations and do not represent exact boundaries.
2) Levels of impact vary.
3) Date of map—March, 1996
Chapter 6
Wildlife

6.1. OVERVIEW OF WILDLIFE ISSUES AND OBJECTIVES

Several wildlife issues and concerns were identified and discussed during the planning process:

Wildlife Issues

- Possibly insufficient instream flows for fish and wildlife
- Maintenance of quality aquatic habitat
- Poor water quality due to pollutants and sediment
- Diminishing riparian habitat
- Lack of wildlife solitude during critical times

In response to the identified issues and concerns, and in support of the goals for the Plan, the following objectives were developed:

Wildlife Objectives

1. Improve Aquatic Habitat and Productivity of the Fishery
2. Maintain and Increase Riparian Habitat
3. Minimize Wildlife Disturbance during Critical Times of the Year

6.2. BACKGROUND

Public Opinion

In a statistically valid survey done in 1993, Eagle County asked a question, “What makes the quality of life so high in Eagle County?” One of the top reasons people said that they enjoyed living in the area was because of the abundance and visibility of wildlife. A majority of the wildlife in the Eagle Valley use the habitat associated with the Eagle River or one of its tributaries, at least some time of the year.

Eagle River Watershed Habitat Attributes

The Eagle River basin is a fairly unique river system. Of river systems in northern industrialized nations less than 25% of the major river systems flow freely. The Colorado River is the most affected system in North America. The Colorado’s waters have been manipulated by damming and diverting and have caused “highly fragmented” populations of species living in and around the river (Dynesius and Nilsson, 1994). In-stream manipulations are not the only cause of fragmentation. Manipulations of the habitat surrounding the rivers also create impacts.

The area influenced by the high water table including the banks of the river and the adjacent vegetation are defined as riparian ecosystems. Riparian ecosystems constitute
one of the most limited (in terms of land area covered) yet species rich ecosystems in Colorado. This ecosystem serves a variety of functions including water storage, aquifer recharge and discharge, streambank protection, biological filters, and aid in reducing flood water impacts, and as an area used for many recreational activities. Of Colorado’s approximately 1000 species of wildlife, over 500 of these utilize or occupy riparian ecosystems (Colorado Division of Wildlife, 1992). In Eagle County, an inventory has shown that at least 250 species are currently residing or utilizing the riparian areas. The riparian areas along the Eagle River provide important wildlife habitats, migration corridors, breeding, nesting, fawning, and calving areas.

Riparian ecosystems are one of the most important and sensitive of all habitat types. Eagle County lands are comprised of 80.3% state and federal public lands and 19.7% private holdings (Eagle County Master Plan, 1994). It is estimated that 90% of riparian ecosystems adjacent to the Eagle River are on privately owned property.

Habitat Loss or Degradation

75% of the animal, fish and bird species in the Colorado River basin, of which the Eagle River watershed is a part, are listed as being either federal or state government as endangered, threatened or at risk. In Colorado, 1.7% of mule deer range per year is eliminated (Walmo, et al, 1981), and in Eagle County, estimates are that up to 40% of deer winter range has been eliminated. Most of this lost habitat has been adjacent to the Eagle River or tributaries. Development, industry, agriculture, and recreation have all contributed to the loss of riparian and floodplain areas or reduced water quantity and quality.

- Housing developments are often found directly adjacent to riparian areas. These sites are sought after for aesthetics and tranquility. Also these low lying areas are usually adjacent to transportation and utility corridors.

- Along with the development of property comes the development of roads, for every mile of Interstate (e.g. I-70) built 45 acres of land are used, for every mile of rural highway (e.g. Highway 6) 12 acres of land are used and for every rural mile of road built (e.g. county roads) 7 acres of land are used (Walmo, et al, 1981).

- Industry in the form of mining and manufacturing has also impacted the Eagle River. The Eagle mine in Gilman has been and continues to be a source of heavy metal discharge into the river. Viacom International, Inc. monies are being used to clean up the site and rectify the problem of the discharges with some degree of success. Superfund monies have been used to determine environmental impacts to the river, and negotiate additional clean-up requirements.

- Agricultural water rights, even though they are adjudicated and on a state priority based system can at times severely deplete the river’s tributaries because of the consumptive nature and traditional style of irrigating by flooding fields. Flood irrigation often has a positive effect on late summer stream flows because the un-consumed irrigation water often percolates into the streams later in the growing season. Livestock use riparian areas for feeding, resting, and as travel lanes, thus increasing the impacts to soil and vegetation (Behnke, R. J. 1978).

- Recreation impacts may be more subtle and less understood but include littering, soil compaction, loss of vegetative
cover, recreation site development that results in loss of habitat, disruption, harassment of wildlife, and human waste disposal.

Wildlife Use Patterns

Some species of wildlife use the riparian area year round, these include mammals, amphibians, reptiles, crustaceans, birds, invertebrates, and fish. Other wildlife may use the area only seasonally for a variety of purposes such as migrating from their summer/fall range to wintering areas, or for breeding and rearing their young, as the Great Blue Herons do at the rookery located across the river from Eagle River Estates in Gypsum. Bald Eagles, Golden Eagles and many other raptors use the area for wintering, roosting and hunting areas.

Elk and deer usually calve and fawn within 400 feet of free flowing water usually on slopes with heavy vegetation, on the edge of an ecotone with a wide open field of view (Thomas, J.W. et al.,1982). In the Eagle Valley these areas are usually on or near the tributaries of the Eagle River.

Other wildlife that have been sighted in the riparian areas of the Eagle River include Greater Sandhill Cranes, moose, White Pelicans, Trumpeter Swans, Whooping Cranes, otter, beaver, mink, fox, weasel, marmots, rabbits, squirrels, muskrats and many species of songbirds. A complete list of wildlife using the watershed riparian areas is available at Division of Wildlife offices (Colorado Division of Wildlife,1982).

Fishery Characteristics

The Eagle River is and has been a good cold water fishery but is not considered a “great” fishery. There are a number of reasons why the river does not excel in fish productivity.

- Historically and presently there are times of the year when the river is running below minimum in-stream flows. This can cause a variety of problems for a fishery, including increasing water temperatures, which in turn stresses the fish, making them susceptible to diseases and parasites. During the past few years the Eagle River has had fish die-offs (or “fish kills”) during the low water times, most typically in the during the summer. The cause of the die-offs has been diagnosed as the disease furunculosis. Furunculosis is a fungus infecting fish during times of stress. The low flow rates during the winter create a problem of limiting over-wintering habitat for the fish. The Eagle River does not have abundant, deep pools where fish can survive the winter.

- There is also a problem with sedimentation during the spring run-offs or after a strong rainstorm (“gully washers”) The sediment during the spring buries any eggs that may have been laid thus preventing hatching. The sediment also covers potential spawning areas and many invertebrates thus restricting reproduction and decreasing food supplies. Drainages including Milk, Muddy, Alkali and Ute creeks are the main problem areas. The geological make-up of these areas, with unstable sparsely vegetated soils, steep slopes, and highly erosive soils are the major cause for of the sedimentation. Where the banks of the river in areas are without vegetation erosion adds to the sedimentation problem.

- Pollution from heavy metals plays a part in poor fish productivity in the upper Eagle River below Gilman. Runoff from golf courses, parking areas, roads, adjacent lands may greatly impact fish productivity and survival.
• **Diversions and culverts** also can impair a fishery by creating barriers to fish movements and migrations.

The Eagle River has been *stocked* with Rainbow and Cutthroat trout at several locations to supplement or replace natural reproduction of the fishery. Rainbow and Brown trout are the two dominant trout species found in the river. Brook and Cutthroat trout are also present as are several types of suckers, chubs, whitefish and sculpin. Many of the privately owned ponds (e.g. reclaimed gravel pits) next to the river are now stocked with a variety of species including large and small mouth bass, sunfish, perch, and catfish. These other species may impact the long term survivability of the trout.

Gore Creek is currently rated as a “Gold Medal” fishery below Red Sandstone Creek. The designation requires a certain level of fish productivity within a given area. Considering the obstacles noted above regarding the river, it remains to be seen if the Eagle River can achieve and maintain that status. It certainly is a worthwhile target and ties into the objective of improving the fishery outlined below.

6.3 **WILDLIFE OBJECTIVES AND RECOMMENDED ACTIONS**

6.3.1. **OBJECTIVE: Improve Aquatic Habitat and Productivity of the Fishery**

**Recommended Actions**
(Also see Water Quantity and Water Quality chapters)

1. **IMPLEMENT MEASURES TO PROTECT AND IMPROVE WATER QUALITY AND QUANTITY**

Most of the following actions are also described in Chapter 4: Water Quantity and Chapter 5: Water Quality. They are listed again here to illustrate how critical water quantity and quality are to a healthy aquatic habitat and cold-water fishery.

1. **Determine and Maintain Optimum Water Flow Levels:** Instream flows fall below minimum levels at certain times of the year. The minimum flows established by the Colorado Water Conservation Board may not be sufficient to maintain the fishery during certain times of the year. Optimum stream flows need to be identified and management plans made to match the target amounts. The first course of action is to work with the CWCB and the CDOW to evaluate the local minimum stream flow calculations to determine the defensibility and adequacy based on scientific principles, then determine if minimum flows are appropriate or require adjustment to more accurately reflect the natural hydrological cycle. Identify all major and minor water user's in the watershed, note diversions and consumptive uses.

2. **Implement Engineering Solutions:** Promote engineering solutions which increase the flexibility of a sharing/distributing water among various providers and provide water augmentation during low flow periods of the year.

3. **Acquire Water Rights:** Purchase or enter other agreements for water rights to ensure optimum flows.

4. **Implement Town and Water District Conservation Programs**

5. **Require “Wet Water” for Development:** Require that all development proposals prove avail-
ability of water rights and water supply (without dependence on augmentation) rather than avail-
ability of water rights only.

6. **Monitor Water Flows:** Request that appropriate agencies place additional gauges on the river to
determine flows. Local entities could cost share.

7. **Monitor Water Quality:** Regularly monitor the river and tributaries for pollutants and contaminants and
temperature.

8. **Control Urban Run-Off:** Develop and implement local policies and regulations to control urban run-off
and prevent direct drainage into rivers, streams, and riparian areas.

9. **Continue Mine Clean-Up:** Monitor continued clean-up of the Eagle mine in Gilman to determine if pollutants (heavy metals) are con-
tinuing to decrease.

10. **Develop Convenient Household Toxic Waste Disposal Sites:** Provide an area where residents can dump household toxic materi-
als (motor oils, paints, etc.).

11. **Manage Natural Sediments Loads:** Specifically implement (res-
urrect) a program to control the sediment load from the Milk,
Muddy and Alkali drainages that may include: sediment catch basins or other sediment catching
structure; revegetation of the areas where soil and topography allow; monitor grazing to determine
impacts on vegetative structure and soil stability; limitations on off-road vehicle use to lessen soil disturbance.

2. **IMPLEMENT HABITAT IMPROVEMENT PROJECTS**

Projects could be jointly undertaken by the CDOW, towns, county, and the local fishing organizations. Habitat improve-
ments could include:

- Bank stabilization with willows or other native vegetation that will provide cover, thermal protection, and a source of food to the fishery
- Placement of structures or larger rocks in the water for cover and hiding may be beneficial assuming the armoring of the riverbed is not disturbed
- Placement of gravel beds for spawning
- Plant native vegetation along the river and in the adjacent uplands to serve as a natural biological filter and a sediment trap
- Erosion control, river channel modification, drop structure coordi-
nation between local agencies
- Ensuring that culvert installation will allow for the free movement of fish will all be beneficial

3. **SUPPORT EFFORTS TO PREVENT SPREAD OF INFECTIOUS DISEASE TO LOCAL FISH POPULATIONS**

Whirling Disease is currently an issue in Colorado waters. Every effort should be
made locally to control the spread of the disease into the Eagle River watershed.
This may include lobbying the appropri-
ate state officials to not stock local waters with infected fish, participation in monitoring and other activities.

4. **REVIEW/REVISE FISHING BAG LIMITS AND REGULATIONS**

If fishing use of the Eagle River contin-
ues to increase and the fishery cannot support the increased pressure, revising
5. REVIEW/REVISE DRAINAGE AND TRANSPORTATION REGULATIONS

Ensure that local and state drainage and transportation standards are “wildlife friendly” for river and creek valleys. For example, culverts can become a barrier to fish passage. An inventory of existing problem areas needs to be completed as the initial phase of this project.

6.3.2 OBJECTIVE: Maintain and Increase Riparian Habitat

Recommended Actions:
(see also Water Quality, Recreation and Land Use chapters)

1. INVENTORY RIPARIAN ZONES AND HABITAT BOUNDARIES

Conduct an inventory of all riparian, wetland and floodplain zones of the Eagle River and the tributaries to determine the habitat type and variety, condition and productivity, need for revegetation and/or stabilization. First priority would be the main stem of the Eagle and then the major tributaries facing the potential for the most development pressure. Include a standard for revegetation and stabilization in the study. Site specific analysis would be necessary in all cases dealing with riparian zone protection.

2. ACQUIRE RIPARIAN LANDS

Trade and/or purchase lands to acquire riparian areas.

3. IMPLEMENT STREAM BUFFER STANDARDS

For development, require a river or creek “buffer zone” where vegetation and soil must remain undisturbed and intact to protect the riparian habitat. Enhancement of the native vegetation should occur if historic use has degraded the riparian habitat. Work with private developers to create developments that have the least impacts on the riparian habitat (such as clustering housing) and set aside riparian areas as open space. (see Chapter 8: Land Use).

4. PRESERVE WILDLIFE CORRIDORS TO RIPARIAN AREAS

As part of development, require that wildlife corridors to riparian areas be maintained as open space and that the natural vegetation in the corridors remains unchanged and undisturbed.

5. DEVELOP OR IMPROVE APPROPRIATE ACCESS

Identify areas for development of access, ingress, and egress points which will minimize impacts to the riparian habitat.

6. IMPLEMENT HABITAT IMPROVEMENT PROJECTS

See recommended actions under 6.3.1.2. above.

7. REQUEST MITIGATION TRUST FUNDS

Mitigation trust funds should be pursued through development as a method of obtaining funds to purchase riparian habitat. The funds should be based on a local formula.
8. MANAGE NOXIOUS WEEDS IN RIPARIAN AREAS

Identify riparian areas that have noxious weed encroachments and administer management.

9. MANAGE LIVESTOCK IN RIPARIAN AREAS

Ranchers should use best management practices to allow livestock to obtain water but fence livestock out of riparian areas where disturbance is occurring, and to promote restoration.

6.3.3 OBJECTIVE: Minimize Wildlife Disturbance During Critical Times of the Year

Recommended Actions:

1. RESTRICT ACCESS INTO AND MONITOR CRITICAL WILDLIFE AREAS

Restrict or prohibit human use in critical habitats during critical times of the year (e.g. seasonal closures on areas being used by elk for calving, closures on areas where sage grouse are strutting, etc.). CDOW and the USFS can advise local regulators of private land and the regional managers of the public lands about the areas of concern. Actions could be implemented through public education and signs, physical closures and monitoring by volunteers or wildlife staff. Restrictions for critical areas may require partial or complete closure for a specified period of time (e.g. May 1 to June 1 or from 3 p.m. to 5 p.m. daily) and to all or some uses (e.g. bikes, foot travel), and all or some types of travel (depending on the area (e.g. foot only, vehicle only, etc.). Monitor sites to see if restrictions are negating the impacts of the human activities.

2. PROVIDE BUFFER ZONES FOR CRITICAL AREAS

Provide a “buffer zone” between human land development, recreation, etc. and wildlife activities. Buffer zones can be a vegetative barrier between wildlife and humans or in some cases simply leaving enough distance between humans and wildlife. Viewing of wildlife should be done from the perimeter of the buffer zone. This can be implemented by local governments as setbacks or open space and by federal agencies through use restrictions and education.

3. DESIGNATE WATCHABLE WILDLIFE SITES

Designate watchable wildlife sites to promote awareness and respect for wildlife.
Chapter 7
Recreation

7.1 OVERVIEW OF RECREATION ISSUES AND OBJECTIVES

Several recreation issues and concerns were identified and discussed during the planning process, including:

Recreation Issues
- Dramatic Increases in Use and Areas of Overcrowding
- Identification of a Finite Carrying Capacity
- Protection of Recreational Quality Experience
- Fisheries Protection
- Trespass on Private Land
- Appropriate Access and Amount
- Economic Importance of Eagle River Watershed Recreation

In response to the identified issues and concerns, and in support of the purpose, vision and goals of the Plan, the following objectives were developed:

Recreation Objectives
1. Determine Recreational Carrying Capacity or Limits of Acceptable Change
2. Determine the Condition of the Fishery
3. Review and Improve Existing Fishing and Boating Regulations and Information
4. Improve and Create Appropriate Public Access for Recreation

7.2 BACKGROUND

The Eagle River and its tributaries support a wide range of recreational opportunities and the number of residents and visitors taking advantage of these opportunities increases dramatically each year. The Eagle River watershed has become a premier year round resort area, as well as an increasingly desirable place to live for those who enjoy the recreational amenities. The Eagle River experiences the most use of all the waterways in the watershed, providing “close to home” recreation options for local residents, business opportunity for local fishing and boating guide companies and a range of activities for the visitor to choose from.

Recreational Activities

Fishing, rafting, and kayaking are the most popular activities on the Eagle River and it’s major tributary Gore Creek, but many other activities near or adjacent to local creeks and the river are enjoyed by local residents and visitors such as hiking, biking, wildlife watching, camping, hunting, cross country and downhill skiing, golf, rock climbing, sledding, snowmobiling, picnicking, jeeping, horseback riding, and berry picking.

Use Levels and Quality of Experience

Overuse for recreation is one of the primary issues facing the Eagle River watershed. During the public participation process for
this plan, most people indicated that they felt the River is not too crowded yet, but has the potential in the future.

With sound management and determination of an appropriate “carrying capacity”, we can avoid the types of problems facing other heavily used rivers in Colorado. Carrying capacity is defined as “the number (amount) and type of use an area can accommodate without altering either the environment or the user’s experience beyond a degree of change deemed acceptable by the management objective.” A careful balance must be found between management and another public concern, that of potential “over-regulation” of recreation uses.

To a large degree, the feeling and perception of solitude is often an essential aspect of a quality recreational experience. This is particularly true for fishing, hiking, wildlife viewing, rafting, and kayaking. The Eagle River Corridor from Minturn to Gypsum is becoming increasingly urban, particularly in the Vail-Avon-Edwards area. This makes the sense of solitude and the perception of over-crowding worse.

The areas which are still rural in nature also tend to be largely private, with access granted by permission only. As a result, the few areas that are on public lands tend to be overused. The CDOW leases some significant tracts for fishing access, however there is no guarantee that these areas will remain available in the future, as some of the leases are not in perpetuity.

Conflicts between recreational uses along the river are minimal at this time, especially since most rafting and kayaking occurs in the early summer when the river is too high and muddy for good fishing. Inevitably, though, as use by all recreational activities increases, so does the potential for conflicts.

**Fishing**

Fishing on the Eagle River and its tributaries has seen dramatic growth over the past few years. The style of fishing is also changing as fly fishing grows in popularity, and with it, the increased use of guides and commercial outfitters. The general growth and accompanying development in Eagle County along the river corridor has also had an impact on the quality of fishing. Conflicts between commercial guides and individuals are increasing, as are other problems involving fishing style (bait vs. fly fishing), bag limits and enforcement, catch and release fishing and the quality of the aquatic habitat.

It is important to note, that the CDOW considers the Eagle River to be only “good” fishing, not “great” (See Chapter 6: Wildlife for information). For this reason some of the management strategies used on “Gold Medal” fisheries are not appropriate in this area, with the exception of Gore Creek between Red Sandstone and the Eagle River. Another important consideration is the way people fish. The CDOW found in a survey of 400 fisherman statewide, 50% use a combination of flies, lures and bait, 25% use bait only, 13% use flies and lures only, and only 12% use flies only. Although these numbers are probably different in Eagle County because of local interest and clientele utilizing guide services, it is safe to assume that a significant number of fishermen along the Eagle and its tributaries enjoy fishing with bait and lures, as well as flies.

**Appropriate Public Access**

As recreational use of the river and its tributaries grows, increased and improved public access will be needed. Recreational use should be encouraged at improved existing or new access points to alleviate pressure on the few well known and heavily used sites while also being sensitive to the riparian and
aquatic environment and to the needs and rights of the adjacent private land owners.

Most of the land adjacent to the Eagle River is privately owned. On the River and the tributaries, public access generally occurs where there is adjacent public land. On private lands, public access for recreation use of the River and its tributaries has been granted through some private developments but in other cases, public access has been eliminated or impaired by development or by the increase in use of what used to be access points that were always private but allowed some use until it become a problem because of overuse or abuse. Improving existing access sites, or creating new ones where possible, is intended to reduce the amount of trespass incidents in addition to generally dispersing use.

Recreation Use Statistics

The BLM monitors river floater user days each year between Minturn and Gypsum, and the statistics below help illustrate one aspect of the tremendous recreation growth on the Eagle River. The figures in the following table illustrate the commercial recreation use of the Eagle River by permitted fishing and rafting companies and as well as private use (which is harder to determine accurately). These figures clearly show that recreation use of the Eagle River has increased dramatically in recent years.

<table>
<thead>
<tr>
<th>Year</th>
<th>Permitted Commercial Outfitters</th>
<th>Commercial Use</th>
<th>Private Use</th>
<th>Total Use</th>
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<tbody>
<tr>
<td>1988</td>
<td>7</td>
<td>2,945</td>
<td>440</td>
<td>3,385</td>
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<td>1989</td>
<td>10</td>
<td>3,453</td>
<td>520</td>
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<td>14</td>
<td>8,734</td>
<td>1,310</td>
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<td>1994*</td>
<td>25</td>
<td>7,182</td>
<td>1,100</td>
<td>8,282</td>
</tr>
</tbody>
</table>

*1994 was a “low water” year, 1993 was a “high water” year.

Economic Impacts of Eagle River Watershed Recreation

The economic impact of rafting in the community can be estimated using the results of a 1991 survey done by the Colorado River Outfitters Association (CROA). The study estimates $168 was spent on average by each person per raft day. This number includes the secondary economic impact of rafting such as lodging, transportation, clothing, and dining costs. Using the above figures, this means approximately $1,300,000 spent by people rafting on the Eagle River in 1991 during the approximate six week long rafting season. Rafting revenues statewide have been growing at an average 12.7% per year and activity on the Eagle River seems to be testimony to that growth as it is among the eight most popular commercial river runs in the state.

Similarly, the CDOW estimated sportsman expenditures on fishing in 1991 statewide to be $920,411,800 and it is accurate to assume that a portion of those dollars must have been spent in Eagle County. A 1989 CDOW study titled Colorado Wildlife Impact Model estimated direct fishing expenditures in Eagle County of $7,642,000. This figure does not reflect secondary expenditures. Current or complete figures for
commercial and private fishing activity in the watershed are not readily available but collection and analysis of that information is a recommended action.

7.3 RECREATION OBJECTIVES AND RECOMMENDED ACTIONS

7.3.1 OBJECTIVE: Determine Recreational Carrying Capacity to Protect Resources and Quality of the Recreational Experience

Recommended Actions

1. COOPERATIVELY INITIATE CARRYING CAPACITY STUDY

Determining the recreational Carrying Capacity is essential before any major management decisions regarding recreation are made. A cooperative effort between the BLM, USFS, CDOW, Eagle County, Towns, commercial boating and fishing outfitters, private users and private landowners should:

1. Study the current situation, monitoring use levels by all recreational activities.

2. Determine what recreational preferences are, and establish what impacts they may be having.

3. Establish the Carrying Capacity and Limits of Acceptable Change (LAC) appropriate within the watershed for public lands (federal, state, town, county) and the waterway. Impacts on private lands should also be studied. The carrying capacity should address the physical, ecological, and social capacities of the river and the existing recreational facilities. It is recommended that the agencies use LAC to determine the desirable conditions for the Eagle Watershed, and not base decisions on simply how much use the watershed can tolerate. (See References for USFS Manual for Establishing Limits of Acceptable Change and Glossary for further definition of Carrying Capacity).

4. Consider the economic impact of enforcing these limits when making a determination.

5. Create an interagency monitoring group that includes local citizens and recreation outfitters to accurately gauge recreation growth and recognize problems as they arise (also see Chapter 3: Implementation). The heavily used recreation section of the Arkansas River has been designated a State Park and is regulated through a cooperative system between state and federal agencies.

7.3.2 OBJECTIVE: Determine the Condition of the Fishery

Recommended Action

1. COOPERATIVELY STUDY FISHERY CONDITIONS

As stated above in “Carrying Capacity,” a detailed study of the exact condition of the fishery and limits of acceptable change must be done to assist management in making sound decisions. This study should occur prior to, or concurrently with, the above effort and examine the state of the fishery in terms of the aquatic wildlife and the impacts of increased fishing pressure, development and may include creel census, user surveys, fish counts, habitat inventories,
etc. After thresholds are set, fishing quality can be maintained largely by implementing recommended actions listed in the Water Quality, Quantity, Wildlife, and Land Use chapters.

7.3.3 OBJECTIVE: Review, Revise and Improve Existing Fishing and Boating Information and Regulations

Once the carrying capacity or limits of acceptable change have been established, restrictions on commercial rafting and fishing outfitters may have to be implemented by the BLM, USFS and CDOW.

Recommended Actions

1. DEVELOP RECREATIONAL MAPS FOR PUBLIC

Create a detailed recreation map or maps providing information in order to promote safety and understanding of the river and tributaries, and protect riparian areas and other sensitive environmental areas, disperse users and direct them to areas which can tolerate higher levels of use, reduce trespass, and ensure use of proper access points. The following topics should be addressed:

- River and Tributary Public Access for Fishing/Boating/General Use
- Navigation assistance and hazard identification
- Explanation of river ethics
- Identification of Sensitive Environmental Areas

The map(s) should be a cooperative effort between the agencies managing the land, private landowners and those promoting tourism, and distributed free or for a small fee (to cover costs) at information booths, hotels, shops, and access facilities. (also see Land Use chapter)

2. REVIEW/REVISE FISHING AND BOATING REGULATIONS

The Fishery Conditions Study should follow review of the current CDOW regulations governing the watershed. Improved environmental conditions in the aquatic and riparian habitats do not necessarily mean an improvement in recreational fishing. Stricter regulations may be required in some areas, where as other areas may be eased. Some portions of the Eagle River may need such designations as “fly fishing—catch and release only”, while allowing bait and spin fishing in other areas. The Arrowhead CDOW lease currently has this designation. The CDOW may also need to improve enforcement of bag limits and regulations.

Real restriction of commercial outfitters would involve a change in jurisdiction along the River, as commercial outfitters currently are not permitted by a government land management agency if they only use private land to launch and take-out. Private users could also be permitted to control amount of use and ensure a basic knowledge level. A “fee for use” could also be implemented for private use that could help fund management programs. Regulatory revisions or actions of any type should be carefully considered and should not be implemented without sound justification.

7.3.4 OBJECTIVE: Improve and Create Appropriate Public Access for Recreation

This purpose of this objective is to improve public access points that exist now and gradually add new access points, where appropriate, to accommodate growing demand. The objective is not to provide unlimited public access to every tributary and all along the
Eagle River. Many areas adjacent to the river and tributaries are privately owned and public access is not permitted, or there are riparian, wetlands or floodplain areas that are sensitive to disturbance and are not appropriate as public access sites.

Recommended Actions

1. IMPROVE EXISTING PUBLIC ACCESS SITES

This action would involve evaluation of all the existing access points available to the public to determine if they are meeting the demand for boat launching, fishing trails, parking, trash collection, etc. Improved and maintained facilities will help reduce the impression of overcrowding by reducing litter, reducing the amount of time that large groups are at a particular access points, and improve the overall recreation experience (existing access sites are shown on the map at the end of this chapter).

While there are several improved access sites, such as the BLM campground near Wolcott and the County Fairgrounds in Eagle, there are several locations, particularly along the Eagle River, where the public gains access to the river but there are no improvements to accommodate the use or the terms of use are not clear. Examples of this type of access point are the State Land Board properties at Dowd Junction (known as Cliffside or River Run) and at Squaw Creek. Some of the “un-official” access points may be appropriate for improvement and others may be unsuitable for access because of safety, trespass or environmental conflicts. The following inventory of access sites identifies several “un-official” access sites that are in need of improvement or in some cases, relocation.

In regards to public lands sites, particularly Colorado Division of Wildlife lease sites, it is recommended that short and long terms plans for the management and improvement of those leases be developed.

2. CREATE NEW AND APPROPRIATE PUBLIC ACCESS SITES

There are several areas where it would be desirable to create additional public access to the Eagle River and tributaries. For example, there are relatively few public access points available in the area between Vail and Edwards, which is the most densely populated portion of the watershed. As another example, establishment of a public access site for Gilman Gorge would reduce the trespass problems onto the Eagle Mine property. By creating appropriate new access points, recreators can be dispersed along the river and tributary corridors, thereby spreading out use pressure and improving the quality of the experience. Leases, easements and purchase when funds allow, should be pursued.

3. IMPLEMENT RIVER ACCESS IMPROVEMENT GUIDELINES

This action recommends improvement guidelines for both existing and new, proposed access sites, whether on private land with public access provided (i.e. a development) or on public land. The scale and applicability of these standards will vary.

1. Preserve site character, using environmentally sensitive site selection and facility construction techniques. While dispersion of access will ease crowding, within the access points themselves every effort should be made to concentrate and mitigate impacts. The riparian zone should be preserved using guidelines outlined in Chapter 6: Wildlife and
Recommended Actions

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Chapter 8: Land Use. Stabilize stream banks wherever possible with structures or re-vegetation.

2. Site selection and facilities should be designed for access by the physically challenged wherever possible. (See Yampa Valley Recreation Plan—Barrier Free Requirements referenced).

3. Provide appropriate road surfacing and parking at major river access points, while being sensitive to environmental impacts.

4. Provide restroom facilities at major river access points. Consider the use of composting/desiccating toilets. Maintain all facilities to meet health and safety standards.

5. Minimize existing navigation hazards to ensure safe and passable boat chutes. Developers and governmental agencies must consult with white water specialists before building or allowing structures in, under, or over the river.

6. Improved signing will help reduce trespass on private land and disperse users to public access points. The BLM currently has a minimal signs management strategy to control overuse of access sites, but this can be reconsidered.

8. Implement and enforce seasonal recreation closures, particularly on the tributaries, in areas where wildlife calving, spawning, erosion problems and trail or land restoration exist. (also see Chapter 6: Wildlife).

9. Set camp sites back from the river a minimum of 100', with 150' setback the optimal goal. Camping should only be allowed at designated sites along the Eagle River, and sites should be carefully monitored by the USFS and BLM and closed for repair revegetation as necessary.

10. Support implementation of local trails plans, particularly for segments that provide access to the river or tributaries. All trails should be constructed outside of the riparian zones or sensitive areas except where no other reasonable option exists in order to link segments together. If trails are constructed within the riparian corridor, do not pave or widen to over 3' in width. If an area is already heavily used, a trail should be developed to concentrate impacts.

11. All access points to the Eagle River and the tributaries should be monitored by agencies managing them to see that their “carrying capacities” are not being exceeded, and seek alternative access points or modifications before they become overused.

12. Guidelines for the management of sites should be followed by all managing entities: federal, state and local.

4. PRESERVE OR CREATE ACCESS THROUGH LAND DEVELOPMENT
(see also Chapter 8: Land Use)

Through the local development processes and where appropriate, request easements for public access to the river or tributary. Location and necessity of access in conjunction with land development needs to be carefully reviewed. Other items to consider:
1. Place easements where there would be minimal or no impact to riparian or sensitive areas.

2. The recommended easement width is 20' to 25' adjacent to the river, at least on one side, wherever possible, with the exception of sensitive areas and other areas identified as inappropriate for public use access.

3. Soft surface footpaths (no wider than 3 feet/no bicycles allowed) should be constructed as part of easement conditions to direct the impacts of foot traffic. Construction responsibility will need to be determined by the parties involved.

4. Connecting access of a width that accommodates the type of access permitted should be provided to the nearest public roadway or bike trail/path.

5. Easements should allow for travel on dry ground as opposed to an easement that lays entirely in the river or tributary.

6. Implement protective measures for buffers, design standards, etc. as suggested in Chapter 8: Land Use as an means of preserving/promoting quality recreation experiences.

7.4. INVENTORY OF ACCESS SITES AND RECOMMENDED ACTIONS

The following sites, both existing and proposed, are listed in general order of priority as either new sites that need to be established or as existing sites that need improvement.

Within this inventory, there are several opportunities for the towns, county, local commercial outfitters, and federal land management agencies to partnership and accomplish the shared goal of appropriate, improved public access.

This inventory is organized by geographic areas: Vail/Red Cliff/Minturn/Eagle-Vail, Avon/Edwards/Wolcott, Eagle/Gypsum/ Dotsero area.

Vail/Red Cliff/Minturn/Eagle-Vail

Dowd Chute—USFS building to Avon
The whitewater between Minturn and Avon is becoming very popular for rafting and kayaking. There are currently no adequate facilities to handle this use, which will increase dramatically in the future. The USFS is considering improving the boating access across from Meadow Mountain and is urged to make those improvements using all guidelines listed above (see River Access Improvement Guidelines).

One of the primary takeout points for Dowd Chute is at the entrance to the River Run Condominiums (Cliffside)—available for public use because it is on State Land Board land and is under a CDOW lease (continuation of this lease is not guaranteed in the future). This site is inadequate for heavy raft and kayak use, having very little parking, no boat ramp or restroom facilities. This site is also
the put-in site for boaters for the less challenging downstream stretch through Eagle-Vail and Avon.

An adequate access facility is essential in this area. Possible sites for developed boat access points are the State Department of Transportation land in Eagle-Vail, the CDOW leased land near River Run, under the I-70 bridge just past Eagle-Vail, and the US West Building at Stone Creek. There is also access to the river in Avon on Vail Associates land on the southwest side of “Bob” the Bridge. There is a road to the river, but no restroom or trash disposal facilities. It is also on private land with no guarantee of continued access availability in the future, therefore a developed site in the Avon area is also desirable.

Gilman Gorge
No public access currently exists in this area. The Gilman Gorge has the potential for providing a number of recreational opportunities such as advanced rafting and kayaking, rock climbing, fishing, hiking, picnicking and historic sites. Many public comments have concentrated on this area, as people know of the recreational value and have had to trespass to use this area.

Eagle County and the USFS should pursue acquiring access in and out of the Gilman Gorge for both land and on-water use from the private land owners (primarily the railroad and the mines). The optimal access points would be somewhere around both the Red Cliff Bridge and Tigiwon Road. Continuing efforts to clean up the river in this area should be monitored and encouraged.

Gore Creek: Ford Park-Confluence Park
During the citizen participation process, there was a comment that it would be nice to provide raft and kayak put in and takeout facilities at Ford Park. Most kayakers gain access to Gore Creek at the East Vail exit or on the golf course and take out downstream, generally where any bridge crosses the stream. A creek access in this area should be considered if funds become available, as there is adequate parking and fairly easy access to the creek. There is a new park site owned by the Town of Vail at the confluence of Gore Creek and the Eagle River that is being developed in conjunction with the Town of Vail bike path to Dowd Junction. This park site will function as a rest stop, provides access to the creek and river for fishing but will not feature a boat access area.

Eagle River Parks in Red Cliff, Minturn and Eagle-Vail
The Town of Red Cliff has conceptual plans to improve some land adjacent to the Eagle River for a picnic area and general access.

Minturn has constructed two riverside parks, one near the cemetery and one near Eagle Street. A town/regional open space park at the southern end of town at Bolt’s Lake adjacent to the Eagle River is being pursued. Due to its regional potential, there may be several potential improvements and partnerships opportunities at this proposed park site.

Another potential site for a river park is in the downtown area as part of the redevelopment of the Southern Pacific rail yard which is expected to occur eventually. Another location that could be improved to prevent misuse is the start of the Champion Whitewater Kayak course just north of the rallyard. In Eagle-Vail, the inventory of available site along the river is small but there are some parcels that are currently undeveloped that could be explored as possible access to the river for fishing, boating and the general enjoyment of area residents.
Avon/Edwards/Wolcott Area

Wolcott Bridge
This is another important access point to the Eagle River on BLM land for boating and fishing, above Trestle Rapids. It is also a dangerous place, with limited access between the river and Highway 6 across from the Wolcott Store. The BLM is looking into acquiring the current Colorado Department of Transportation site near the railroad trestle west of Wolcott. They hope to develop this site after the Department of Transportation moves out. The rest of the land in this area is privately owned, so this would be a good site to purchase land or acquire easement rights.

Lake Creek Apartments and the Squaw Creek State Land Board Parcel
Access along this considerable stretch of river is open to the public at this time and is important for many recreational activities. Public access was granted along the river as part of Lake Creek Apartments development. A bike path has been constructed separate from but parallel to the river for the length of the project. The Squaw Creek Waste Water Treatment plant provides a principal put in and take out point for boaters, and with the CDOW acquisition of the Squaw Creek Parcel lease approximately one and a half miles of river has been opened to the public for fishing and other recreational activities. The State Land Board owns the land downstream from the Treatment plant and the continuation of the CDOW lease is by no means certain. Eagle County has expressed an interest in purchasing this land for recreation and open space purposes and is trying to find funding for this purchase. Any improved/acquired access in this area is very desirable. The Squaw Creek stretch of water should be studied further a candidate for catch-and-release or “fly fishing only” status.

Eagle River Parks in Avon, Edwards and Wolcott
In Avon, a park along the river providing public access would complement the thriving town center that is being created. A trail along the river the length of Avon is proposed and would tie into the proposed County trails plan at either end of town. Pedestrian/bicycle access could be provided to a potential park via this trail.

In the Edwards area, potential community park sites include the State Rest Area or acquisition of one of the several private parcels that still remain in the area, such as the Brett Ranch. Berry Creek Ranch 5th filing provides considerable open space but has no access to the river. With the development of the Miller Ranch by the School District, opportunities may exist for a partnership to create a river park in the area of the school.

In Wolcott, all of the land in the “community center” is privately owned. Opportunities may exist for purchase or lease of a potential river park, possibly in conjunction with the Wolcott Bridge launch site discussed above. BLM lands upstream may offer another option for a community park site.

Edwards Area Easements
A 15’ public access easement was granted through Old Edwards Estates on the north side of the river. Public parking does not exist except for streets in the subdivision and this easement involves being off of the bank and in the water most of the season. The easement is not well known and crosses private lots.

Avon Area and Easements
A 50’ public access easement was granted through River Forge development east of Avon. It is a relatively short section of river and a relatively unknown easement but available to the public. Another access exists at
the McGrady acres subdivision west of Nottingham Ranch Road. The boat access site at “Bob” the bridge was previously described under Dowd Chutes. Access has been recently obtained through the development process cast and west of the bridge in the form of bicycle paths and a fisherman’s path at Canyon Run and Eagle Bend III. Additionally, several stretches of the river through the west portion of town have been obtained as flood easements and open space.

**Arrowhead and Miller Ranch**

Access to the stretch of river along the Arrowhead at Vail development is likely to improve since the public school district has purchased Miller Ranch for a school site and there is river frontage included in that parcel. Access is impaired somewhat by the railroad tracks but there may be opportunities to create safe access to the river front.

A public access easement exists along the Eagle River through portions of the Arrowhead development and is accessed via the “public park” at the west end of the development but is not well known. Arrowhead has designated this section of river “fly fishing only” through a lease with the CDOW that strictly stipulates limits on number of people, hours of use and requires a reservation. A connection from the Arrowhead park site and school property should be made.

Access in this area should be carefully planned (see River Site Management guidelines above) and considered monitored to prevent overuse.

**Beaver Creek**

The lower section of Beaver Creek is highly developed and recreation opportunities are primarily golf, hiking and biking. It is a high profile area, like Vail, and receives extensive recreational use. The upper part of Beaver Creek extends into the Holy Cross Wilderness area has potential for many recreational opportunities. Public access to this major tributary needs to be protected and possibly expanded.

**BLM Campground in Wolcott**

This site is west of Wolcott and has been recently improved by the BLM, providing a gravel parking area and restroom facilities. The site provides both takeout and put in access for boaters and access off the highway for fishing on BLM land. Unfortunately, trespass on Denver Water Board land to the east commonly occurs. It is also a favorite site for rock climbers, as is the railroad trestle area to the east (located on private land). Because it is already developed, it should be listed on the recreation map as a major recreation point, and monitored and improved as use is increased. Camping between the access road and the river is not permitted.

**BLM access sites between Edwards and Wolcott**

BLM river access sites in this area that should be monitored and improved if necessary to handle increased use include the Bellyache site and the Bocco Cabin Site. All BLM sites except Wolcott Campground should be day use only since these other sites lack facilities.

**Lake Creek and Squaw Creek**

Both of these tributaries flow through a considerable amount of private property which is being developed at this time. They are also valuable recreational corridors for hiking, biking and fishing and should be protected for continued public recreation uses wherever possible through improvement of facilities and appropriate access points.

**Ute, Alkali, Muddy and Milk Creeks**

These tributaries flow into the river from the north near Wolcott and the land along them
is a mix of private ranches, large acreage home sites, BLM and USFS property. The upper reaches of these tributaries are important areas for camping, hiking, hunting and wildlife watching. The headwaters of Milk and Alkali Creeks are within a BLM Wilderness Study Area which encompasses Castle Peak. There are numerous camp sites on the BLM and USFS properties, however none are developed campground areas. These areas should be monitored to determine need for future improvements.

Other Tributaries
The tributaries of McCoy and Buck Creeks (a USFS trailhead has been recently secured at Buck Creek), were identified during the public process as being threatened with elimination of public access and should be monitored.

Eagle/Gypsum/Dotsero

Eagle River Parks in Eagle, Gypsum and Dotsero
In Eagle, Chambers Park currently provides access to the Eagle River and as a highway rest area, is used by travelers as well as local residents. Access to the river is also possible at the Eagle County Fairgrounds in Eagle. Both of these sites provide parking, restroom and trash disposal facilities which are adequate at this time, but should be carefully monitored. Access for fishing and other activities exists at both sites and for about a mile downstream from the Fairgrounds on the north side of the river. Float trips for both fishing and for drifting along a relatively undeveloped stretch of the river can be attractive from this point. Through the current effort to master plan the Eagle County Fairgrounds, fishing, walking, and scenic viewing should be incorporated into the plan. Public input indicates that this area has tremendous potential, particularly in regard to the river access and scenery. An access easement along the river in east Eagle was recently obtained through development of the Eagle Villas apartment project. The project also includes a public park on the river. A soft footpath may be warranted along the waterline to concentrate impacts.

In Gypsum, there are no developed public access sites on the river currently within the Town of Gypsum. There are undeveloped parcels of land along the River through Gypsum that could be acquired to provide a Town Park that includes public access to the Eagle River. Gypsum Ponds State Wildlife Area provides an access site for Gypsum residents as do the Eagle River Estates easements, both described below.

In Dotsero, there are several opportunities to create river parks both on the Eagle River and Colorado river as there are several undeveloped private parcels remaining in the area. There is a BLM site east of Dotsero that could be improved. Near the confluence of the Eagle and Colorado, there are several small lakes created by gravel mining in the area that could be turned into an amenity for the local and regional population as well as draw travelers from the interstate.

East of Eagle to Red Canyon
A Colorado Division of Wildlife fishing lease east of Eagle runs for approximately six miles along the north side of the river. People moving to fish south of the river centerline are trespassing on the Diamond S Ranch and trespass is frequent to get to the easement from Highway 6. Numerous pullouts exist along Highway 6 throughout this stretch to either access the fishing lease or BLM land near Red Canyon. Consolidation of access points and parking should be considered and an effort made to control trespass. There are no improved areas however, for restroom and trash disposal facilities, but they should be considered as use of this area increases. There is some private land which breaks up this stretch at about the mid-point and east of
the rock quarry. This is an area where development could jeopardize access to the river in the future and easements should be requested. The Canyonwoods subdivision at the edge of Red Canyon includes a 30’ access easement at the rear of each lot but it remains to be seen, as use increases, how private lot owners will accommodate use. This entire section of river will need continued monitoring and action.

**BLM access sites between Wolcott and Dotsero, including Gypsum Campground**

Sites in this area that should be monitored and improved if necessary to handle increased use include the Red Canyon site near Eagle, Community and Horse Pasture sites near Gypsum and the Lava Flow site near Dotsero. Day use only should be allowed at all BLM sites except Gypsum Campground. No camping should be allowed in Red Canyon on the BLM land on the north bank of the river because of sanitation problems per the BLM.

**Gypsum Ponds State Wildlife Area**

This is an important piece of the river for fishing, hunting and other recreational and wildlife activities. It is owned and maintained by the Division of Wildlife. No boat ramp will be developed at this site by the DOW.

**Gypsum Area Easements**

A public access easement is granted along the north bank of the river through the length of the Eagle Estates subdivision. Generally 20’ wide but travels through private lots where access sometimes inhibited. Informal access through Wallboard plant property to CDOW Gypsum Ponds wildlife area.

**Brush Creek and Gypsum Creek**

Both of these major tributaries traverse land that is largely rural and agricultural in nature while providing considerable recreational opportunities. The headwaters of both creeks lie in USFS land, while the lower stretches are largely private. The Sylvan Lake State Recreation Area is on West Brush south of Eagle. Fishing, hiking, biking, horseback riding, wildlife watching, camping and hunting are important in these areas and draw a considerable number of people from outside Eagle County for these activities. These are areas in which recreational opportunities could be jeopardized by development plans. They are the last major tributaries of the Eagle River which still have a pre-resort economy character and any development should take into consideration the potential effects on current recreational activities in balance with those that might be gained.

**Other Tributaries**

The tributaries of Eby, Salt and Bruce Creeks, located in this area, were identified during the public process as being threatened with elimination of public access and should be monitored.
Eagle River Watershed
Recreation Access

Legend
- State of Colorado
- Forest Service
- Bureau of Land Management
- Private Land
- USDA FS Trailhead
- BLM River Access
- CDOW River Access
- CDOW River Access on Private Land
- USDA FS River Access
- Town/County/State Access

Note:
1) Tributary access generally occurs where there is public land.
2) Date of Map—February, 1996

BLM Eagle River Access
1. "Lava Flow" access
2. "House Fauite" access
3. General "community" access
4. BLM campground west of Gypsum
5. "Dead Crow Rapid" access
6. "Red Canyon/Narrow Pit" access
7. BLM campground west of Gypsum
8. "Boozer" access
9. Vis Creek/ Eagle access
10. "Ellington" access

Public Use Access Easement or Leases on Private Land
1. Eagle River Edelweiss permanent easement
2. Eagle Village Apartments permanent easement
3. Red Rock Ranch permanent and temporary easements
4. Eagle Springs Golf Course limited easement
5. Lake Creek Apartments permanent easement and Squaw Creek Treatment Plant "oasis"
6. Old Edwards Estates permanent easement
7. The Reserve permanent trail easement near river
8. Arrowhead limited easement
9. Confluence permanent trail easement along river
10. River Forge permanent easement

Town/County/State Access
1. Eagle County Fairgrounds
2. Town of Eagle Chambers Park
3. State Land Board Eagle River/Squaw Creek confluence (mainly by CDOW)
4. CDOW Edwards Reservoir
5. Town of Avon Bob Bridge
6. CDOW I-70 bridge over Eagle River
7. State Land Board Bowd Junction (mainly by CDOW)
8. Town of Vail Ford Park
9. Booth Creek Access to Gore Creek
10. Ritter Creek Access to Gore Creek
11. Town of Minturn Eagle River Park (actually at 2)
Chapter 8

Land Use

8.1. **OVERVIEW OF LAND USE ISSUES AND OBJECTIVES**

Several land use issues and concerns were identified and discussed during the planning process:

**Land Use Issues**

- Inconsistent or ineffective regulations
- Public concern about approving more development than the water supply can accommodate
- Lack of coordination to improve access and protect open space or sensitive areas along the rivers and tributaries.

In response to the identified issues and concerns, and in support of the goals for the Plan, the following objectives were developed:

**Land Use Objectives**

1. Coordinate and Improve Watershed Planning and Planning Tools
2. Protect Sensitive Lands, Open Space and Appropriate Access

8.2 **BACKGROUND**

**Impacts of Land Use on the Watershed**

Human land use in the Eagle River watershed is the major influence on the overall health and condition of the watershed. Local and regional land uses have impacted 1) the quantity of water through human demand for residential, commercial and industrial development, 2) the quality of water through additions of chemical and organic substances to the water from direct sources such as mines and indirect sources such as urban run-off, 3) wildlife habitat that is adjacent to water features, and access to water sources that has been removed or blocked, 4) recreational opportunities that depend on a minimum quantity and quality of water or access availability, and 5) the aesthetic quality of the water features which are often obscured or encroached upon by land uses.

**Population Growth**

Through the early 1990's, Eagle County was ranked as the third fastest growing population in the state. In many ways, Eagle County is becoming an urban county. The bulk of the private land in the County is located in the river and tributary valley bottoms and the majority of the population lives along the Eagle River and its largest tributary Gore Creek. This presents an image of a very dense and developed area. Development to accommodate the needs and desires of the growing
population, both in Eagle County and on the front range, has affected the watershed in many ways, some of which were described above.

The following table illustrates the relatively rapid rate of growth in Eagle County.

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<th>% Change</th>
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<td>+25%</td>
</tr>
<tr>
<td>State</td>
<td>2,889,735</td>
<td>3,294,394</td>
<td>+12.3%</td>
<td>4,018,309</td>
<td>+11.7%</td>
</tr>
</tbody>
</table>

*Projected population and change.

Source: Colorado Division of Local Government, December 1994. Region pertains to the 1994 Smart Growth study by Talmey-Drake under contract to the State of Colorado. The Northwest Region is defined as the counties of Eagle, Clear Creek, Garfield, Gilpin, Grand, Jackson, Lake, Moffat, Park, Pitkin, Rio Blanco, Routt and Summit.

Land Use Patterns in the Watershed

Communities typically develop adjacent to waterways for a variety of reasons, including transportation, water supply for domestic, agricultural and industrial needs, and because of the appealing vegetation and scenery that usually is adjacent to rivers.

In the Eagle River watershed, all of the Towns are located along the Eagle River or it’s major tributaries. The land use pattern is very linear, responding to the rivers and streams that also generally define the route of the railroad line, the Interstate and Highway 6. The distances between communities are shrinking as development fills in the river and tributary valleys.

Common Goals but Inconsistent Regulations

Each town and the County have responded differently to the river over the years as demonstrated by the type of adjacent land uses that have been permitted and by the number and type of river or creekside amenities that have been provided. Steadily, the river system is gaining more recognition as a community asset and more attention is being focused on what types of adjacent land uses are appropriate and what type of amenities should be pursued. A common element in each of the Town Master Plans and the County Master Plan, is the identification of the Eagle River and it’s tributaries as a community asset that should be protected.

In terms of regulations, inconsistencies between town and County stream setback standards regulations were identified during the planning process, in addition to other ineffective or deficient land use practices and regulations. The following table illustrates the inconsistencies between Town and County development setback regulations from rivers and streams.
Table 6. Existing Town and County Stream Setbacks

<table>
<thead>
<tr>
<th>Town/City</th>
<th>Setback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Cliff</td>
<td>0’ or floodplain</td>
</tr>
<tr>
<td>Minturn</td>
<td>30’ from high water mark</td>
</tr>
<tr>
<td>Vail</td>
<td>50’ from center line of stream</td>
</tr>
<tr>
<td>Avon</td>
<td>30’ from high water mark</td>
</tr>
<tr>
<td>Eagle</td>
<td>50’ from high water mark</td>
</tr>
<tr>
<td>Gypsum</td>
<td>0’ or floodplain</td>
</tr>
<tr>
<td>Unincorporated Eagle County</td>
<td>50’ from high water mark</td>
</tr>
</tbody>
</table>

8.3 LAND USE OBJECTIVES AND RECOMMENDED ACTIONS

8.3.1 OBJECTIVE: Coordinate and Improve Watershed Planning and Planning Tools

During the planning process it was discovered that many citizens and government representatives felt they did not have: 1) a comprehensive understanding of the watershed system and the balance between human activities and the health of the watershed, 2) a comprehensive understanding or knowledge of all the pertinent state and federal agencies or regulations regarding watershed features, 3) enough information sharing occurring between local, state, and federal levels and coordinated administration of regulations and management plans, 4) information sources that present a comprehensive picture of the watershed resources; and 5) enforcement tools or personnel.

The establishment of an Eagle River Watershed Committee, as outlined in the implementation chapter is a key step toward coordinated planning for watershed issues.

Recommended Actions

1. CREATE COMPREHENSIVE WATERSHED MAPS

Create a set of maps that detail access, land uses, transportation features, sensitive and open lands as follows:

Land Uses:
- areas suitable for gravel extraction adjacent to river/stream
- areas where severe disturbance has been caused by grazing or other agricultural practices
- parcel boundaries
- parcel ownership
  - private and public open space
  - roads and trails
  - jurisdictional boundaries
  - federal lands under consideration for disposal or exchange (after the current Land Adjustment Processes that include public input are completed)
- zoning districts
- existing land uses
- existing densities
- golf courses
- existing and proposed snow dumps
- stormwater discharge areas
- existing and proposed irrigation structures
- point source and non-point source problem areas
- drop structures for aquatic habitat improvement
- distribution features of existing water systems (including storage and diversion points)
- hazardous irrigation structures or areas where debris exists in the river
- historic sites adjacent to river or streams

Sensitive and Open Lands:
- general areas of wetlands
- wildlife habitat/calving and nesting sites
- wellhead protection areas
• groundwater recharge areas
• headwaters
• tributaries
• riparian zones
• confluences
• floodplains
• geo-hazard areas
• areas of erosion that need attention
• soils, particularly identifying soils that present septic/wellhead conflicts
• shallow ground water areas
• topography
• greenbelt buffers for all areas for habitat linkage
• “Threatened and Endangered” species locations
• Potential “Watchable Wildlife” sites

Access:
• existing river and tributary access easements and terms of easement
• historical access points that are not perpetually guaranteed
• potential access points (particularly those that provide access to adjacent public lands or are near dense population areas)
• possible multiple use access sites (combined with parks), and necessary improvements necessary (restrooms, launch ramps, parking, signs, etc.)
• areas that should require a fee to help pay for management
• areas with limitations on commercial users
• vehicle restricted areas
• closures for wildlife benefits
• other sensitive areas to avoid

Transportation Features:
• culverts under roadways
• bridges
• railroads

2. DEVELOP MASTER PLANS FOR EACH OF THE TRIBUTARY VALLEYS

Each Master Plan should evaluate potential densities and carrying capacities based on natural elements and community desires for each. Refine the Eagle County Master Plan to include that same information on a future land use map.

3. IMPLEMENT A COOPERATIVE ENFORCEMENT PROGRAM OF EXISTING REGULATIONS

Organize an enforcement program that would take place over several months and involve all relevant jurisdictions to survey the river for 1) violations and potential problems that need to be corrected by the appropriate private party or owner (e.g. dumping, erosion, point source pollution, encroachment, etc.), 2) proper operation under terms of special use permits, and 3) illegal or expired uses. As part of the overall campaign to increase awareness and appreciation, clean-ups targeting specific debris and dumping problem areas should be organized.

4. REVISE RIVER/CREEK SETBACKS FOR CONSISTENCY AND SENSITIVE LANDS PROTECTION

Development setbacks are one tool for creating protective stream or river “buffers.” The concept has been successful in many communities throughout the United States to protect water quality, wildlife habitat and scenic community character, and to provide recreation opportunities. The concept generally involves leaving a strip of undeveloped land between a land use and the waterway. The width of a buffer may be uniform or vary to accommodate specific situations such as riparian areas, floodplains or existing land uses.
The following is presented as a suggested setback that each jurisdiction within the watershed could adopt. Each jurisdiction, if it chooses to adopt this buffer concept and recommended width, would need to consider how existing land uses that fall within the riparian, flood or buffer zone would best be treated.

**Suggested River and Live Stream Buffer Standard:**

Locate all structures, grading, paving and land disturbance outside of the riparian zone or 100 year floodplain of live rivers, streams or lakes, or 75 feet* measured horizontally from the high water, whichever is greater. In certain circumstances, a greater setback may be required to protect the riparian zone, floodplain or waterway.

All vegetation shall be left undisturbed in its natural state within the described protection zones. Permitted vegetative disturbance includes environmentally appropriate noxious weed control and enhancement of the area with appropriate riparian zone plantings (willows, cottonwoods, etc.).

Approved trails, recreation access sites, bridges, fences, irrigation and diversion structures, flood control and erosion devices may be constructed within the required setback if there will be little or no disturbance or disturbance can be mitigated. Underground utilities may be located in such protected areas upon approval (conditional, special, etc.) provided there is no alternative location for such utilities, there will be minimal or no disturbance and other pertinent approvals are obtained (e.g. Corps of Engineers).

**Possible variations or additions to the above:**

- Adopt a setback of 75 feet adjacent to the Eagle River and 50 feet adjacent to tributary streams. Riparian and floodplain widths would apply as the setback if greater than either the 75 feet or 50 feet distance.

- A more substantial setback should be considered for relatively dense or intensive land uses, such as apartment complexes, mobile home parks, commercial buildings and industrial uses, which may warrant an increased setback to buffer the more intensive water quality, access traffic, and view character impacts that may be associated with those uses. The exact setback would need to be based on an analysis of the site and development proposal.

- The above basic setback definition states that the distance is measured horizon-tally but each jurisdiction will want to evaluate if that is appropriate or special language needs to be developed to address steep banks.

- At minimum, protection of the riparian zone, 100 year floodplain boundary or 50 feet from the high water mark (a setback required currently by two local jurisdictions), whichever is greater, should be required in order to create consistent resource protection throughout the corridor.

- Irrigation ditches could, if desired, be incorporated into this suggested standard as well in that many irrigation ditches feature established riparian vegetation (e.g. cottonwood trees).
The Riparian Zone: Riparian zone is defined as the banks and adjacent vegetation influenced by the high water table. Plant types associated with riparian zone include but are not limited to cottonwoods, willows, alders, aspens, and chokecherry. The presence or absence of these plants does not always indicate a riparian community. Past land use practices may have degraded the vegetation to the point where it does not appear to have riparian characteristics but because of the high water table in the area a change in the land use can quickly restore the riparian community. Conversely, a few characteristic plants may not indicate a true riparian community. For this reason on-site analysis is needed to help make this determination. The agencies available to make these inspections include Colorado Division of Wildlife, Natural Resources Conservation Service, Corps of Engineers, Eagle County Environmental Health and other town or County staff with appropriate training. If disagreement about riparian boundaries occurs, on-site studies should be prepared with scientific analysis by expert sources. This definition of riparian was comprehensively compiled from CDOW, Natural Resources Conservation Service, USFS and US Army Corps of Engineers definitions of riparian zone.

5. LOCATE COMPATIBLE LAND USES ADJACENT TO RIVERS AND STREAMS

Land uses such as moderate intensity commercial, public services (e.g. treatment plants, town parks), low to high density housing may be compatible with the river and creeks as adjacent land uses within the boundaries of a town or community center (Wolcott, Edwards, etc). Low to moderate density residential development, open space and recreational uses may be appropriate both within a town, community center or in the unincorporated area outside of the towns. High intensity or heavy service commercial, large parking lots and industrial (except properly mitigated gravel resource pits) uses are not considered land uses compatible with the rivers and streams primarily because of visual character, water quality and riparian area impacts. Each local jurisdiction will need to refine what type of land uses are most appropriate adjacent to the river or creeks where developable land exists.
6. DEVELOP RIVER/CREEKFRT DESIGN STANDARDS

Implement guidelines or regulations to promote the design of development adjacent to the river that complements the scenic attributes of the river and does not impact water quality and habitat (e.g. Town of Avon has design guidelines for properties adjacent to the river in their Comprehensive Plan). Applicable design standards should be commensurate with the level of expected impact of the development type, including all residential (35 acre lots, minor subdivisions, apartments, etc.), commercial and industrial projects.

Suggested Design Standards:
- Cluster structures within developments and in relation to neighboring developments to provide views to the stream and riparian areas, provide open areas and to promote use by wildlife.
- Provide view corridors between clusters of buildings
- Provide areas of unrestricted views to the river/stream and riparian area without berms, utility structures, etc.
- Downlight all exterior light fixtures
- Focus design and site orientation towards the river
- If applying the minimum setback requirement, design building to step down in height in response to natural topography and limit the height of the side of building closest to river/stream to 35 feet
- Provide trails, soft or hard surface, to define/concentrate access to the river corridor by project occupants (or public, if applicable)
- Landscape using appropriate native plants

7. ANALYZE ABILITY TO SUPPLY ADEQUATE WATER

Perform a comprehensive analyses of all water consumptive uses to ensure that water quantity needs for the development do not exceed the local ability to provide for water (see also Water Quantity, Water Quality, and Wildlife chapters) and that there are not adverse impacts on the watershed.

8. ANALYZE GOLF COURSE AND SKI AREA PROPOSALS

Analyze golf courses and ski area proposals (in conjunction with required State and Federal processes) to ensure that:
- Water supply is available in addition to water rights;
- Minimum stream flow levels will not be affected;
- Augmentation plans will augment the Eagle River watershed;
- A “Best Management Practices” water and chemical use program has been developed and an enforcement method is proposed;
- System or site design includes physical features to prevent negative water quality impacts (berms, ponds, etc.);
- Land use development will not be accelerated beyond the carrying capacity of that particular area as established by pertinent comprehensive plans.
- Natural land features and vegetation are preserved

9. DEVELOP A MODEL SENSITIVE LANDS OVERLAY ZONE

Create a model "overlay" standard for protection of sensitive lands associated with the river and tributaries that can be adopted individually or cooperatively by the Towns and County.
Items to address include (see also item 10):
- A general inventory map of sensitive lands locations throughout the watershed as a tool to generally inform citizens and governmental decision makers about where sensitive lands are generally located in the watershed and to alert that further study may be needed. Sensitive lands include but are not limited to: wetland areas, floodplains, critical wildlife habitat, headwaters and tributaries, confluences and riparian zones, wellhead protection areas, aquifer recharge areas.
- A buffer zone between structures and officially defined wetlands so that structures are not located at the very edge of a wetlands and thereby compromise integrity of the wetlands.
- A buffer zone for protection of springs
- A zone of lower land use intensity adjacent to sensitive areas
- Standards for parking lots and other surfaces that promote runoff (see also Chapter 5: Water Quality)

10. REVIEW RELATED REGULATIONS (FLOODPLAIN, WETLAND, DRAINAGE) FOR EFFECTIVENESS AND POSSIBLE REVISION

Review floodplain, drainage, storm runoff, retention/detention, erosion control and HB 1041 regulations utilized by each jurisdiction and create common policy and standards that can be adopted individually or cooperatively by the Towns and County. Most of the floodplain regulations follow the standard model set forth by the Federal Emergency Management Agency. What does deviate is how each community interprets or enforces the standards. Drainage, storm runoff, retention and detention standards vary in each jurisdiction.

Determine which, if any, of the federal and state wetland or floodplain processes may warrant stricter control at a local level (e.g. Army Corps Nationwide Permits). Local controls cannot conflict or be weaker than those federal or state processes but in certain cases can be made stricter if local needs and desires dictate. This concept will require clear legal guidance and consultation with the appropriate federal and state agencies.

It may be possible for local entities to provide assistance to federal authorities for administration of pertinent regulations. There are 26 types of Nationwide Permits administered by the Army Corps of Engineers. There have been discussions with the Corps about training local government personnel to assist more often with administration of their programs.

Suggested Actions and Policies Specific to Wetlands:

1. Generally delineate wetlands on a map for information purposes. That action would need to be done in consultation with the appropriate regulating agencies and has been successfully undertaken in other Colorado locations such as Crested Butte and Boulder. Public input specifically identified wetlands that need protection on Lake, Squaw, Brush, Gore, Homestake, Cross Creek and on Eagle River near Edwards, Avon and Wolcott. Riparian zones on Buck and Gore Creek were also identified.

2. Development adjacent to wetlands should incorporate a wetlands buffer of a sufficient width as determined by federal permitting agency,
or local government with agency technical guidance. This policy recognizes that wetlands integrity must be preserved in order to protect its value for flood damage prevention, erosion control, water quality filtering, wildlife habitat and recreation opportunities. (Several technical sources recommend that wetland buffers are essential to maintaining the integrity of the wetlands. See References.)

3. Preserve existing and established wetlands in the Eagle River watershed as opposed to creating new wetlands or contributing to wetlands "banks" outside of or elsewhere in the County. If mitigation is allowed by the Federal permitting agencies, work with those agencies to require that the replacement wetlands be in place prior to removal of the original wetlands. Replacement wetlands should be of equal or greater acreage (2 acres for every 1 acre removed suggested by Vail Town Council), have equal or better filtering values, and occur on-site or at the closest possible area in the watershed to help offset impacts.

**Suggested Actions and Policies Specific to Floodplains:**

1. Pursue funds from the Federal Emergency Management Agency, Army Corps or Bureau of Reclamation and Colorado Water Conservation Board to complete flood mapping for the Eagle River and major tributaries in the watershed, including mapping for mud and debris flows.

2. Discourage (or prohibit) development, encroachment or alteration of the lands associated with the river and tributaries that can be classified as 100 year floodplain or federally qualified wetlands. Exceptions to this provision are approved trails, bridges, fences, irrigation structures, flood control, erosion devices and recreation activities that cause little or no disturbance. Underground utilities may be located in such protected area with review approval as determined by the agency provided there is no alternative location for such utilities and there is minimal disturbance of vegetation or landscape features associated with the use.

3. Require that the 100 year floodplain be mapped on all development proposals adjacent to a water feature and possible impacts on the water feature be addressed.

4. Prohibit building projections or appurtenances (decks) into the riparian zone, wetland or floodplain.

5. Encourage all Towns and County to take part in the community flood rating system.

6. Prohibit alteration of river or stream channels unless approved by pertinent agencies as an enhancement project (e.g. aquatic habitat improvement, drop structures, irrigation structures, bridges).

**11. IMPROVE LOCAL AUTHORITY ON 35 ACRE EXEMPTIONS**

Implement local review policies of parcels of land up to 70 acres in size to ensure stream setbacks, protection of sensitive areas, erosion control, etc. Review the 35 acre subdivision exemption laws and well permit parcel size for effectiveness in protecting watershed resources.
8.3.2 OBJECTIVE: Protect Adjacent Sensitive Areas, Open Space and Appropriate Access

Recommended Actions

1. **PROTECT RIPARIAN LANDS AS HIGHEST OPEN SPACE PRIORITY**
   
   Establish riparian areas as highest priority to protect in federal, state, county or town acquisitions by trade, purchase, annexation agreements, easement, etc.

2. **JOINTLY PURSUE OPEN SPACE FUNDS**
   
   Pool Town and County Open Space Funds to acquire riparian corridors and other sensitive lands as permanent open space. Develop partnerships with State, Federal and private entities with similar riparian and sensitive lands preservation goals.

3. **GUARANTEE OPEN SPACE AS PERPETUAL**
   
   Ensure that lands set aside as open space through development or governmental purchase remain open space perpetually through plat or deed restrictions, zoning or granting of conservation easements to government or non-profit partners.

4. **MAINTAIN PUBLIC LANDS AS OPEN SPACE**
   
   With agency approval, rezone public lands to open space on zoning maps including State Land Board, Division of Wildlife, USFS, BLM and other appropriate lands. Additionally, revise town and County open space maps to identify which public lands are most important to preserve as open space perpetually to provide guidance to federal and state land management agencies considering local land exchange or sale proposals. Land trades can increase the amount of developable land which may not be beneficial to the health of the watershed.

5. **DEVELOP PARKS AND TRAILS**
   
   Develop parks and trails adjacent to the river or tributaries where environmentally appropriate (see Chapter 7: Recreation).

6. **SUPPORT LOCAL RANCHING ACTIVITIES**
   
   Locally develop policies, standards, taxing structures, incentives, funding and other means of encouraging ranching and appropriate agricultural uses to continue as a means of preserving open space adjacent to the river and tributaries.
The following people were instrumental in the development of the Eagle River Watershed Plan. Levels of participation varied but all of these people's efforts, whether it be attending a public meeting, writing a comment letter or drafting a plan chapter, were equally important in the evolution of this Plan.

**Elected Officials**
- Avon Town Council
- Eagle Town Board
- Gypsum Town Council
- Minturn Town Council
- Red Cliff Town Council
- Vail Town Council
- Eagle County Board of County Commissioners

**Town and County Planning Commissions**
- Avon Planning Commission
- Eagle Planning Commission
- Gypsum Planning Commission
- Minturn Planning Commission
- Red Cliff Planning Commission
- Vail Planning and Environmental Commission
- Eagle and Colorado Valley Planning Commission (Eagle County)

**Citizens and Other Interested Parties**
- Art Aplanalp for Selby Sullivan
- Kim Andree
- Avon Beaver Creek Resort Association
- Darryl Bangert, Lakota Guides
- Allen Best, *Vail Valley Times*
- David Bishop
- Neil Bland
- Scott Bluhm
- Ron Brown
- Don Byers
- Byron Brown, Vail Consolidated Water District
- Greg Caretto, Nova Guides
- Jessica Davidson, *Vail Valley Times*
- Lesley Davies
- Richard Delia
- Nancy Decker
- Larry Delpit
- Tyler Doggett
- Frank Doll
- Diana Donovan
- Ed Dreager, Upper Eagle Valley Regional Water Authority et al
- Amy Dressel Martin, *Vail Daily*
- Eagle County Cattlemen's Association
- Kate Ellis
- David Faulkenberg
- Harold Feder
- Brian and Kate Fratzke
- Robert Freilich for Adam's Rib
- Dennis Gelvin, Upper Eagle Regional Water Authority et al
- Libby Hart, Upper Eagle Regional Water Authority et al
- Rick Sackbauer, Vail Valley Consolidated Water District
- Ron Hedrick
- Zander Higbie
- Lia Holden
- Homestead Homeowners Association
- Andy Hood, *Vail Daily*
- Michael Hoy
- Mary Hughson Brown
- Kathryn Hunt
- Peter Jamar, Jamar & Associates
Jeb Jennings
Tom Johnson
George Jouflas
Jan Jouflas
James Jouflas
John Jouflas
Chris Jouflas
Connie Jouflas
Andy Johnson
Bruce Keep
Terrill Knight, Knight Planning Services
Susie Kincade
Roger Landing
Miriam Lunde
Michael Landreth
Siegmunb Langegger
Kim Langmaid, Vail Nature Center
Cynthia Lepthian
Denise Lipp
Glen Lokay, Vail Fishing Guides
Bill Lorah, Wright Water Engineers for
  Adam’s Rib
Joe Macy, Vail Associates
Sue Mattison, Timberline Tours
Mike Metcalf
Pat Maher
Debbie Marquez, Raftmeister
Doug Maxfield
Jenny Maxfield
Rick MacCutcheon
Christy McEwen
Robert McKenzie
Eric Moser, Gorsuch Fishing Guides
Marka Moser
Helko Mues
Dick Neal
Chupa Nelson
Ken Neubecker, Trout Unlimited
Terry Nolan
Chris Offut
Chuck Ogiby, Vail Valley Consolidated Water
  District
Jim Olson
Steve Onorofskie
Dick Osterweil
Bill Perry, Fly Fishing Outfitters
Amy Phillips
Gordon Pierce

Bill Post for Piney Valley Ranches Trust
Jim Potter
Teresa Rice, Natural Resources Law Center,
  University of Colorado Law School
Jim Roberts
Nancy Rondeau
Lori Russell
Linn Schorr
Clark Shively
Mike Sliper
Soil Conservation District Members
Alex Stack
Steve Gordon, Southern Pacific Railroad
Larry Stone
Tim Stortzum
Scott Taylor
Paul Testwuide, Vail Associates and Vail
  Valley Consolidated Water District
Cliff Thompson, Vail Valley Times
Patricia Tiek/Eagle River Environmental and
  Business Alliance
Paul Tillinghast
Caroline Tremblay
Melvin Trumble
Charlie Wick, Adam’s Rib
Bill Williams
Nancy Zawada

Town and County Staff
Russ Forrest, Town of Vail, Environmental
  Planner
Mary Holden, Town of Avon, Town Planner
Mike Matzko, Town of Avon, Community
  Development Director
Bill James, Town of Avon, Town Manager
Richard Dangl, Town of Minturn, Town
  Manager
Cal Thomas, Town of Red Cliff, Town
  Manager
Joe Forinash, Town of Eagle, Assistant Town
  Manager
Willy Powell, Town of Eagle, Town Manager
Jeff Shroll, Town of Gypsum, Town Manager
Ellie Caryl, Eagle County, Planner
Ray Merry, Eagle County, Environmental
  Health Division Manager
Sid Fox, Eagle County, Planning Division
  Manager
Keith Montag, Eagle County, Community Development Director
Stacy Desormy, Eagle County, Planning Division Administrative Technician
John Althoff, Eagle County, Project Engineer
George Roussos, Eagle County, County Engineer
Larry Metternick, Eagle County, Former County Engineer
Don Fessler, Eagle County, Road and Bridge Manager
Lloyd Powers, Eagle County, Surveyor
Tom Girard, Cooperative Extension Service
Joe Winstead, Cooperative Extension Service
Jim Fritz, Eagle County, County Attorney
Bob Loeffer, Eagle County, Assistant County Attorney

State, Regional, or City Agency Representatives
Bill Heicher, Division of Wildlife, Wildlife Officer
Bill Andree, Division of Wildlife, Wildlife Officer
Craig Westcoatt, Division of Wildlife, Wildlife Officer
Jay Skinner, Division of Wildlife, Senior Water Resources Specialist
Allen Czencush, Division of Wildlife, Wildlife Officer
Brian Hyde, Colorado Water Conservation Board, Floodplain Management
Bill McEwen, Division of Water Resources, Division 5, District 37 Water Commissioner
Jim Chubrillo, Colorado Department of Public Health and Environment
Bill Nelson, Colorado Department of Transportation
Larry Abbott, Colorado Department of Transportation
T.J. Smith, Colorado Department of Transportation
Dick Parachini, Colorado Department of Public Health and Environment/Water Quality Division
Chris Ford, Colorado State Parks, State Trails Division

Bob Wiig, Colorado State Parks, Sylvan Lake
Robert Kistner, Colorado Office of Emergency Management Commissioners, Colorado State Land Board
Robert Ray, Northwest Colorado Council of Governments, Water Quality Director
Rich Howard, Northwest Colorado Council of Governments, Quantity/Quality Program
Kevin Lindahl, Northwest Colorado Council of Governments, Quantity/Quality Program
Chris Treese, Colorado River Water Conservation District and Eagle River Assembly
Doug Kemper, Aurora Department of Water Resources and Eagle River Assembly
Larry Brown, Aurora Department of Water Resources and Eagle River Assembly Commissioners, City of Denver Water Board

Federal Agency Representatives
Kay Salazar, National Park Service, Rivers, Trails and Conservation Assistance Program
Mike Mottice, Bureau of Land Management
Francisco Mendoza, Bureau of Land Management
Jay Thompson, Bureau of Land Management
Kathy Hardy, U.S. Forest Service, Holy Cross District
Rick Olson, Natural Resources Conservation Service
Mike Claffey, U.S. Army Corps of Engineers
Virginia Motoyama, Federal Emergency Management Agency
Karen Hamilton, Environmental Protection Agency
Keith Rose, US Fish and Wildlife Service
Bob Norman, US Bureau of Reclamation
Appendix B

The Planning Process

The Eagle River Watershed Plan (formerly the Eagle River Management Plan) was initiated by local governments after protection of the Eagle River was identified as a top community concern through town and county master planning forums and surveys. The perception among local citizens and community leaders was that the Eagle River is a tremendous asset that had been overlooked or degraded in terms of water quality, quantity, adjacent land use impacts, aesthetic quality, recreation and habitat values. Eagle County, Gypsum, Eagle, Avon, Minturn, Red Cliff, Vail, CDOW, BLM and USFS jointly applied for and received a grant of professional planning assistance from the National Park Service Rivers, Trails and Conservation Assistance Program which served as a catalyst for the planning effort to begin.

Other key events include:

- The Eagle River Watershed Plan officially kicked off in January 1994 with a meeting of representatives from the towns in the watershed, local representatives of state and federal agencies, regional representatives, special interest groups and citizens.
- The group continued to meet monthly through May 1994 with membership growing to include more interested citizens and agencies.
- In order to develop the plan, several goals for the planning process where established:
  1. Examine present environmental, social and economic issues of the Eagle River Watershed.
  2. Establish common citizen, inter-agency and inter-governmental goals.
  3. Determine public interests, concerns and desired future condition of the Eagle River Watershed.
  4. Examine current management and regulatory tools and compare to the issues, concerns and desired future condition.
  5. Develop a plan that can used be as a guideline by all involved agencies and governments and accepted by the public that includes recommend regulatory, policy and incentive tools.
- June through October 1994, five sub-committees met to discuss their assigned topics—wildlife, water quantity, water quality, land use and recreation.
- During that same period, additional public input was pursued with a mailed questionnaire and two public meetings (summary of comments received available from Eagle County Planning Division).
- Using this information and the draft chapters the subcommittees compiled, the committee met to review a rough draft in November and December.
- The first official draft for public review was released in January, 1995.
- Public meetings were held during the months of February and March, 1995 in each Town during Planning Commission and Town Council meetings and at the County Planning Commission and County Commissioner meetings. Additionally, an at-large public meeting was held in Edwards.
- Rewrite of the draft plan was begun in April by the “Committee” and was assigned to the Editing Sub-Committee to complete.
- The Final Draft of the plan was released for public review on August 8, 1995.
- The final version of the plan was completed in February, 1996.
Appendix C
Other Water Planning and Advocacy Efforts

Eagle River Assembly
In 1993, a consortium of front range and Eagle County major water rights holders and water providers convened to discuss common problems and solutions to water supply challenges. In 1994, the Assembly issued a draft report focused on resolving trans-basin and in-basin water supply issues and how to solve current deficits and meet future demand. The Eagle River Management Plan chapter on water quantity includes some of the factual flow and consumption data about the Eagle River water supply situation from that Eagle River Assembly report. The primary difference between the Eagle River Assembly and the Eagle River Management Plan is that the former is focused on water quantity and quality issues and the latter examines land use, wildlife habitat and recreation issues, as well as water quality and quantity.

1996 contact person:
Chris Treese
Colorado River Water Conservation District PO Box 1120
Glenwood Springs, CO 81602
(970) 945-8522

directing efforts to improved water quality in the region.

1996 contact person:
Robert Ray
Northwest Colorado Council of Governments PO Box 2308 Silverthorne, CO 80498 (970) 468-7050

NWCCOG Water Quality and Quantity (QQ) Program
As part of NWCCOG, the QQ program specifically works to protect local governmental authority to impose conditions on water diversion structures. QQ identifies, studies and helps resolve regional water issues. QQ provides advocacy on behalf of west slope water users quantity and quality positions to the state legislature.

1996 contact person:
Kevin Lindahl
NWCCOG/Lindahl & Associates PO Box 2100
Eagle, CO 81631

Northwest Colorado Council of Governments (NWCCOG) 208 Plan Update
NWCCOG is the designated regional water quality planning agency for Eagle, Grand, Jackson, Pitkin, Routt and Summit counties. NWCCOG is using the Eagle River Management Plan as the basis for developing the NWCCOG Eagle River watershed portion (specifically the non-point pollution source portion) of the regional water quality plan known as the 208 Plan). The 208 Plan is required by section 208 of the Federal Clean Water Act and is used for wastewater treatment plant site planning, local and federal water permitting issues, and

Colorado River Headwaters Forum (CRHF)
CRHF is a forum sponsored by the NWCCOG QQ program. CRHF was established to facilitate discussion of Colorado River headwater issues. The Group is composed of interested stakeholders from the region and meets on a quarterly basis to share information, data and views concerning water quality and quantity issues.

1996 contact person:
Kevin Lindahl
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Appendix D
Glossary

Sources of these definitions vary but in all cases the definitions are intended to be understandable to the lay-person rather than experts in the particular topic. For expanded definitions related to complex subjects such as State of Colorado water law and federal wetlands, please refer to the appropriate state or federal legislation or pertinent sources listed in the References appendix.

**Acre-Foot**—The volume of water required to cover one acre of land to a depth of one foot. An acre foot is equal to approximately 325,826 gallons. For example, the Nottingham Lake near Avon holds approximately 100 acre-feet of water.

**Adjacent To**—Meaning land that shares a property boundary with the river or a tributary or includes said water feature within its boundaries, at the time of The Eagle River Watershed Plan adoption/endorsement.

**Aquatic Habitat**—Habitat available for use by fish and other aquatic species. The area of usable habitat in a stream typically increases as stream flow increases, except when stream flow is very high and water velocity is greater than desirable.

**Augmentation**—A means to allow diversion of water by a junior water right when this junior right would otherwise be out of priority and unable to divert water. An augmentation plan typically replaces (or augments) the amount of water consumed by a junior water right with water from a reservoir, or with water previously used for another purpose such as irrigation. By replacing the amount of water consumed, the amount of water available to senior downstream water rights is not diminished. In the Eagle River Watershed, augmentation is most commonly filed for from Green Mountain Reservoir in the Blue River watershed in Summit County. See C.R.S. 37-92-103 for definition of augmentation plan under state statute.

**Baseflow**—The period of the year in which stream flow in rivers and streams is the lowest, typically from August through April. During this period, streamflow primarily results from ground water that is discharged to stream and rivers.

**Build out Conditions**—The population that is projected to occur with complete development assuming a development density comparable to existing conditions on all planned and platted sites. Actual build out could vary significantly, depending upon market conditions and land use approvals.

**Carrying Capacity**—The amount and type of use an area can accommodate without altering either the environment or the user’s experience beyond a degree of change deemed acceptable by the management objective. (see References for carrying capacity/limits of acceptable change literature)

**Cubic Foot per Second** or **cfs**—A rate of stream flow equal to one cubic foot of water (7.5 gallons) every second. One cfs
flowing for one day results in a volume of water equal to approximately two acre feet. The Eagle River near Gypsum typically flows about 100 to 200 cfs during the low flow winter months. During peak snowmelt the flow of the river near Gypsum often exceeds 3,000 cfs. The flow of Gore Creek at Vail is usually about 10 to 15 cfs during the winter months. Peak snowmelt stream flow of Gore Creek is often 900 cfs or greater.

Consumptive Water Use—That amount of water that is actually consumed by a given water use (a hay crop) and does not return to the stream.

Depletion—The use of water in a manner which makes it no longer available to other users in the same system. For example, immediately below a municipal diversion headgate, the stream depletion is equal to the amount of water diverted. Downstream of return flow from a municipal wastewater treatment plant, the depletion is equal to the amount of water actually consumed by the municipal use that is not returned to the stream.

Domestic Water Use—Water used for household purposes, and for lawn and garden irrigation in residential areas.

Erosive Soils—Local soils prone to slow permeability, rapid surface runoff and minimal vegetative cover due to soil characteristics (soil type example: Pierre shale, diabara formation and Benton shale.

Ground Water—Water sources found below the surface of the earth.

Instream Flow—The amount of stream flow in a stream or river that is recommended to maintain natural resource values such as fish habitat, recreation or water quality.

In-Basin Water Diversion—The diversion of water from the Eagle River Basin for use within the Eagle River watershed.

Instream Flow Water Standards—A minimum flow standard established by the Colorado Water Conservation Board in consultation with the Division of Wildlife, Division of Parks and Outdoor Recreation, and/or agencies of the U.S. Department of Agriculture and Department of the Interior that is intended to preserve the natural environment to a reasonable degree. (CRS 37 92 102(3)).

Non-Point Source Pollution—A source of pollution that has a diffuse origin and entrance point to the stream. For example, sediment erosion from a construction site or oil and grease washing off roads in a thunderstorm. In contrast, if water from diffuse sources is collected in a pipe and the pipe enters the river, it is a Point Source discharge.

Non-Structural Strategy—A water supply strategy, such as conservation, that does not involve the construction of a dam, reservoir or diversion facility.

Optimum Instream Flow—A flow amount which protects an instream flow value such as fish habitat, recreation, aesthetics, or water quality.

Point Source Pollution—Pollution that comes from a discreet or specified source such as industrial or municipal wastewater discharge.

Raw Water—Untreated surface or ground water.

Return Flow—Water returned to the stream after being diverted and used for some “beneficial” use such as irrigation or domestic purposes. Usually return flows occur downstream of the point of diversion.
Riparian Zone—The banks and adjacent vegetation influenced by the high water table. Plant types associated with riparian zone include but are not limited to cottonwoods, willows, alders, aspens, and chokecherry. The presence or absence of these plants does not always indicate a riparian community. Past land use practices may have degraded the vegetation to the point where it does not appear to have riparian characteristics but because of the high water table in the area a change in the land use can quickly restore the riparian community. Conversely, a few characteristic plants may not indicate a true riparian community. For this reason on site analysis is needed to help make this determination. The agencies available to make these inspections include Colorado Division of Wildlife, Soil Conservation Service, Corps of Engineers, Eagle County Environmental Health and other town or County staff with appropriate training. Challenges to the on site studies should be based on scientific analysis from expert sources. This definition of riparian was comprehensively compiled from CDOW, NRCS (SCS), USFS, USAC, Colorado State University Range Science Department and Colorado Riparian Association definitions of riparian zone.

Sensitive Areas or Lands—Land or water areas that are sensitive because they could be irretrievably damaged or lost if they are not protected. Wetlands, riparian areas and steep hillsides are examples of sensitive lands that typically do not respond or recover well from disturbance, whether it be a single occurrence or collective.

Shoshone Call/Demand—The water demand associated with the Shoshone Hydroelectric Facility on the Colorado River in Glenwood Canyon. This is a senior water right that frequently limits upstream diversions in the Eagle River Basin.

Surface Water—Sources of water such as lakes, reservoirs, rivers, and streams found on the earth's surface.

Takings—Denial of all reasonable use of property, which is further defined by several U.S. and Colorado court cases.

Trans-Basin Diversion (or Out-of-Basin Diversion)—The diversion of water from the Eagle River Basin for use at locations outside of the Eagle River watershed.

Watershed—A geographic area in which all water drains to a common point or outlet such as a larger stream or river, a lake, an underlying aquifer, an estuary, or an ocean. A watershed is also referred to as a drainage basin. Watersheds exist in a variety of shapes and sizes which result from the influence of climate, rock and soil types.

Water Right—The legal right to use a specified amount of water. Water rights in Colorado are administered according to priority (first in time, first in right). An absolute water right is a right that has been historically applied to a beneficial use. A conditional water right is a right that has not yet been developed or used, but that retains its historical priority. Conditional rights are usually associated with water projects that require years of planning and construction (see also C.R.S. 37-92-103(6)). According to C.R.S. 37-92-103(12), a water right means a right to use in accordance with its priority, a certain portion of the waters of the state by reason of the appropriation of the same.

"Wet" Water—An informal expression that means someone may own authorized water rights ("paper water") but because the water supply is over-appropriated or the water source is inadequate, the actual water may not be available.
Wetlands—Per 33 C.F.R.Part 328.3(b); C.F.R.5230.3(t) 1986, wetlands are "those areas that are inundated or saturated by surface of ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas." This is the current definition used by the U.S. Army Corps of Engineers.

Wetlands Mitigation and Banking—Per federal wetlands regulations, if wetlands are disturbed or destroyed, an equal amount of wetland acres must be enhanced, restored or created, generally in the same watershed. Banking, where permitted by policy, allows purchase of wetland "credits" that are used to fund target wetland restoration projects that may or may not be in the same watershed.

List of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>BLM</td>
<td>Bureau of Land Management</td>
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<tr>
<td>BMPs</td>
<td>Best Management Practices</td>
</tr>
<tr>
<td>CDOD</td>
<td>Colorado Department of Health</td>
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<tr>
<td>CDOT</td>
<td>Colorado Department of Transportation</td>
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<tr>
<td>CDOW/DOW</td>
<td>Colorado Division of Wildlife</td>
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<tr>
<td>CWCB</td>
<td>Colorado Water Conservation Board</td>
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<tr>
<td>CWQCD</td>
<td>Colorado Water Quality Control Division</td>
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<tr>
<td>DWR</td>
<td>State of Colorado Department of Natural Resources, Div.of Water Resources</td>
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<tr>
<td>EPA</td>
<td>United States Environmental Protection Agency</td>
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<tr>
<td>ERA</td>
<td>Eagle River Assembly</td>
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<tr>
<td>LAC</td>
<td>Limits of Acceptable Change</td>
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<tr>
<td>NRCS</td>
<td>Natural Resources Conservation Service (formerly Soil Conservation Service)</td>
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<tr>
<td>NWCCOG</td>
<td>Northwest Colorado Council of Governments</td>
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<tr>
<td>UEVSD</td>
<td>Upper Eagle Valley Consolidated Sanitation District</td>
</tr>
<tr>
<td>USACE</td>
<td>United States Army Corps of Engineers</td>
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<tr>
<td>USFS</td>
<td>United States Forest Service</td>
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<tr>
<td>USFS</td>
<td>United States Fish and Wildlife Service</td>
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<tr>
<td>WWTF</td>
<td>Wastewater Treatment Facility (or plant)</td>
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</tbody>
</table>

Conversion Table

1 acre foot of water = 43,560 cubic feet or 325,581 gallons
1 cubic foot per second (cfs) = 450.0 gallons per minute
= 646,320.0 gallons per day
= 1.983 acre feet per 24 hours
= 59.5 acre feet for 30 days
= 724.0 acre feet per year
Appendix E

Studies Specific to the Eagle River Watershed

Water Quantity and Quality


Colorado Water Conservation Board and Triad, Gore Creek Hydrology Report, 1975

Colorado Water Conservation Board and Triad, Gore Creek Floodplain Information, 1975

Colorado Water Conservation Board and Triad, Gore Creek Floodplain Amendment, 1978

Colorado Water Conservation Board and Triad, Gore Creek 500 Year Recurrence Interval Floodplain, 1976

Colorado Water Conservation Board and Triad, Gore Creek Potential Flood Damage and Improvement Recommendations, 1975

Blatchly et al, Gore Creek Valley Water Resources Study, 1975

Gore Creek Valley Water Authority Committee, Preliminary Planning and Feasibility Study: Reuse of Municipal Waste Water Effluent, 1978


Gore Creek Valley Water Authority Committee et al, Gilman Mine Water Resource Study, 1978


Colorado Department of Transportation et al, I-70 in a Mountain Environment, Vail Pass, Colorado, 1987


Davis, Vail/Beaver Creek Winter Quality Research, 1980-1981


Schmueser Gordon Meyer, Eagle Sanitation District Wastewater Master Plan, 1994

Wildlife


Dames & Moore, Shocking Survey, Tagging and Population Movement Study, 1986

Colorado Division of Wildlife, Gore Creek Fish Shocking Results, 1985 and 1992

Colorado Division of Wildlife, Fishing Creel Census at Nottingham Lake and Wilmor Lake, 1985

Inter-Fluve, Inc., Fish Habitat Enhancement Plan for Portions of Gore Creek within the Town of Vail, 1985

Colorado Division of Wildlife, Elk Studies, Minturn Area, 1986-1990

Colorado Division of Wildlife, Elk Study, Adam’s Rib Recreation Area

Colorado Division of Wildlife, Elk Study, Beaver Creek, 1995—ongoing

Colorado Division of Wildlife, Schneider and Brown, Movements and Habitat Use by Sage Grouse in Eagle County, 1991

Colorado Division of Wildlife and Anderson, Lynx Survey of Vail Area, 1991

Colorado Division of Wildlife and Tom Andrews, Lynx Survey of Vail, Adams Rib, Burnt Mountain, 1992

Colorado Division of Wildlife, Bat Inventory at Gilman Mines, 1994-ongoing

Colorado Division of Wildlife, Schoep and S rubbs, Bighorn Sheep, Habitat, Movements and Population, Gore Range, Eagle County, 1990-1991

Colorado Division of Wildlife, Hess, Terrall and Hoover, Holy Cross Wilderness Bighorn Sheep Reintroduction Study, 1992-3

Colorado Division of Wildlife, Colorado Wildlife Impact Model, Fishing in Eagle County, 1989

S.M.Stoller Corporation, Ecological Investigations and Proposed Mitigation Plan, Adam’s Rib Recreational Area and Adam’s Rib Ranch, 1995 (several other studies specific to Adam’s Rib proposed development have been produced, contact Adam’s Rib or Eagle County)

Recreation and Land Use

Town of Red Cliff Draft Master Plan, 1995

Town of Minturn Community Plan, 1994

Minturn Parks and Recreation Plan, 1992

Town of Avon Comprehensive Plan, 1990

Town of Avon Recreation Master Plan, 1992

Town of Eagle Master Plan, 1985

Town of Gypsum Master Plan, 1995
Environmental Strategic Plan, Vail, Colorado, 1994

Town of Vail Land Use Plan

Town of Vail Recreational Trails Master Plan Report, 1999

Town of Vail Comprehensive Open Lands Plan, 1994

The Eagle County Recreation Task Force, Rosall Remmen Cares and Winstin, Parks and Recreation in Eagle County, An Action Plan, 1988

Eagle County Trails Plan, 1993

Eagle County Open Space Plan, 1979

Eagle County Master Plan, 1982

Draft Eagle County Master Plan, 1994

Eagle County Planning Survey, 1993

Wolcott Area Community Plan, 1992

Eagle County Airport Sub-Area Master Plan, 1986

Edwards Sub-Area Master Plan, 1985

Bureau of Land Management, Eagle River Recreation Management Area, Management Plan and Environmental Assessment, 1992


U.S. Department of Transportation, Federal Highway Administration, Colorado Department of Transportation, I-70/Main Interchange Improvements Environmental Assessment, 1987

Colorado Division of Wildlife, Colorado Mammal Distribution Latilong Study, 1982

Colorado State Trails Program, State Trails Master Plan, 1993 (includes Eagle County)


Knight and Hammock, Early Days on the Eagle, 1965
Appendix F

References

(and other pertinent resource materials. Also see list of Studies Specific to The Eagle River Watershed, Appendix E)

Water Quality and Quantity


Colorado Division of Water Resources, Bibliography, 1991

Colorado Forum, Upper Colorado River Basin and Colorado Water Interests, 1982

Corbridge, Special Water Districts—Challenge for the Future, 1983

Getches, Water Law...in a Nutshell, 1984


University of Colorado, Controlling Water Use—Unfinished Business of Quality


U.S. Geological Survey et al, Water Transfer Process, Volume 1


Young, Understanding Water Rights and Conflicts

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Colorado Division of Wildlife, 1991 Annual Report to the People of Colorado, 1992

Colorado Division of Wildlife, Colorado Mammal Distribution Latilong Study, 1982


Stoddart and Smith, Range Management, 1995


Walmo, Mule and Blacktail Deer of North America, 1981
Recreation

APA Colorado and Strugar, Outdoor Resources Training Program Manual, 1995

Colorado River Outfitters Association, CROA Newsletter—November 1994, Volume 2 Issue 1


Colorado State Trails Program, State Trails Master Plan, 1993


Yampa Valley Alliance, Yampa Valley Trails and Recreation Conceptual Plan and Appendix, 1992.

Riparian and Wetland

Castelle et al, Wetland Buffers: Use and Effectiveness, 1992


U.S. Department of Interior, Bureau of Land Management Publications: Riparian Area Management Procedures for Site Inventory, 1992; Riparian Area Management Process for Assessing Proper Functioning Condition, 1993; Riparian Area Management Inventory and Monitoring of Riparian Areas, 1989; Riparian Area Management Grazing Management in Riparian Areas, 1989; Riparian Area Management Greenline Riparian—Wetland Monitoring, 1993; Riparian Area Management The Use of Aerial Photography to Inventory and Monitor of Riparian Areas, 1987; Riparian Area Management A Selected Annotated Bibliography of Riparian Area Management, 1987; Riparian Communities An Annotated Bibliography of Ecosystem and Management Topics with Emphasis on the Intermountain West, 1990; Riparian-Wetland Initiative for the 1990s, 1991; Cows, Creeks and Cooperation, 1990;


River Systems and Multi-Objective Management

Association of Flood Plain Managers, Multi-Objective River Corridor Planning, 1989


City of Evanston, Uinta County, National Park Service, The Bear River Project Master Plan, Evanston, Wyoming, 1992
Land Use Policy and Growth


Talmey-Drake, *Colorado Looks at Growth—Northwest Region*, 1995
Appendix G

Potential Funding Sources
as of 1995

State or Regional Government Programs and Eligible Activities

Monetary Grants

Colorado Department of Transportation/ISTEA Enhancement Program: including but not limited to Pedestrian and Bicycle Trails, Scenic Beautification, Mitigation of Water Pollution Due to Highway Runoff, Historic Preservation incl. abandoned rail corridors.

Colorado Division of Parks and Outdoor Recreation/Colorado Greenway Project: Recreational Trails.

Colorado Division of Parks and Outdoor Recreation: Acquisition of Land, waters or development of outdoor recreation facilities.

Colorado Division of Wildlife/Fishing is Fun: Fishing Oriented Projects such as parking lots, paths, habitat improvements, easements, etc. Colorado Division of Wildlife/Watchable Wildlife: Interpretive displays, paths, equipment that facilitates viewing and appreciation of wildlife.

State Historical Society of Colorado/State Historical Fund: Acquisition and development of historic properties, education, survey and planning.

Colorado Department of Local Affairs/Colorado Initiatives: Technical Assistance of up to $5000 for community development projects.

Great Outdoors Colorado Trust Fund: Funds for open space, wildlife, parks, recreation, education and planning.

State Energy Impact Assistance Program: compensate for energy industry/mining impacts, trails have been funded.

Colorado State Forest/Forest Stewardship Incentive Program: Funding for riparian and wetland improvement, fisheries habitat and wildlife enhancement.

Other State and Regional Resources

State of Colorado University Programs:
Colorado State Extension Service, Colorado School of Mines, DU Colorado Center for Community Development at DU, DU Graduate School of Architecture and Planning, DU Graduate School of Public Affairs, CU Boulder Natural Resources Law Center, CU Boulder Center for American West, all have technical assistance/intern programs that may be interested in watershed related projects.

Colorado Department of Natural Resources
Colorado Department of Public Health and Environmental Quality
Colorado Department of Health
Colorado Department of Transportation
Northwest Colorado Council of Governments
Colorado Public Utilities Commission
Colorado Scenic and Historic Byway Commission
Private Foundations and Eligible Activities

Monetary Grants

El Pomar Foundation: Open to All Proposals

Frost Foundation: Development of Environmental and Educational programs

Gates Foundation: Supports conservation and outdoor recreation, parks and trails

Johnson Foundation: Supports education, youth, community projects

Kresge Foundation: Capital Projects for construction or purchase of real estate, equipment

Morrison Trust: Parks and Recreation construction

REI Environmental Grants: Preservation education

Boettcher Foundation: Capital projects or acquisition

Adolf Coors Foundation: Capital projects or acquisition

Quick Foundation: Conservation, Public Recreation, Education, Historic Preservation

Amoco Foundation: Community Involvement programs Anchutz Family Foundation: Community Cooperation programs

Arco Foundation: Environmental education and wildlife conservation

Cyprus Amax: Environmental Affairs

Wal-Mart Foundation: Environmental Affairs, Historic Preservation

Chevron Corporation: Environment and Conservation Education, Habitat Preservation

Other Private Funding, Technical Assistance or Information Resources

The Nature Conservancy, Trust for Public Lands, Colorado Open Lands, Colorado Coalition of Land Trusts, American Farmland Trust, National Land Trust Alliance/Open Space Preservation Assistance: Not grant making entities but may provide assistance in acquisitions of open space and conservation easements. May make emergency purchases of threatened open space or habitat on behalf of local governments/non-profits with reimbursement terms.

Colorado Trout Unlimited/Stream Improvement: Restructuring Streams, bank stabilization, erosion control and revegetation on public lands

Colorado Parks and Recreation Association Foundation/Tree Planting Program: Tree planting in parks or other public areas maintained by a public agency

Volunteers For Outdoor Colorado or Colorado Mountain Club: Provide volunteers for trail construction, maintain, wildlife habitat improvement, tree planting, riverway and riparian habitat restoration, boardwalk construction.

Ducks Unlimited Marsh Program: Protect and enhance waterfowl habitat

Local Volunteer Organizations, Youth Groups or Foundations

Colorado Center for Environmental Management

Colorado Wildlife Federation

Public Service Company of Colorado
Colorado Environmental Coalition
Colorado Historical Society Colorado/Eagle County Cattlemen's Association
Colorado Woolgrowers Association
Colorado Railroad Association Colorado Mining Association
Colorado Association/Local Association of Homebuilders, Colorado/Local Board of Realtors
Colorado Trail Foundation
Colorado Parks and Recreation Association
Colorado Counties, Inc.
Western Slope Club 20
American Association of Fundraising Councils
Community Resource Center (Colorado Grants Guide and Colorado Funding Report)
National Guide to Funding for Environmental and Animal Welfare
National Civic League
The Conservation Fund and American Greenways Program
Rails to Trails Conservancy
American Wildlands
The Audubon Society
National Recreation and Park Association
American Rivers
American Fisheries Society
American Recreation Coalition
American Water Resources Association Interstate Council on Water Policy
The Issak Walton League of America
River Network
River Watch Network
Soil and Water Conservation Society
National Association of State Floodplain, Wetlands and River Conservation Programs

Federal Government Programs and Eligible Activities

Monetary Grants or Technical Assistance Resources

U.S. Forest Service, U.S. Bureau of Land Management and National Park Service/Challenge-Cost Share Programs: Trails, outdoor recreation facilities, conservation of recreational, natural and cultural resources

U.S. Environmental Protection Agency Funds: Under Clean Water Act and Safe Drinking Water Act, several types of funds available for water quality, planning, wetlands, studies, community outreach

National Park Service/Rivers, Trails and Conservation Assistance Program: professional assistance to create community based conservation action for greenways, trails and river corridors

The following federal agencies may also be able provide funds and assistance for Eagle River Watershed Plan implementation:

Federal Emergency Management Agency
Federal Highway Administration

Interstate Commerce Commission
Office of Public Assistance
National Biological Service
Small Business Administration
U.S. Bureau of Reclamation
U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service
U.S. Geological Survey
Appendix H

Related Regulations

Federal Regulations

- National Environmental Policy Act of 1969—mandates assessment of environmental impact of any proposed federal action on lands or waters of the U.S.

- Clean Water Act of 1977—The objective is to restore and maintain the chemical, physical and biological integrity of US waters including wetlands. The act mandates a variety of water quality and wetland protection programs.

- Endangered Species Act of 1973

- River and Harbor Act of 1899

- Fish and Wildlife Coordination Act, 1977

Federal Agencies with Administrative Responsibility for Watershed Programs

- US Environmental Protection Agency administers the following regulatory programs: The EPA administers educational and regulatory programs designed to protect the environment and implement environmental laws. Programs include: pollution discharge permits e.g. wastewater, pesticide procedures, water quality planning and management through the non-point source, clean lakes, water quality standards and coastal zone programs, sole source aquifer protection, wetlands permits (with US Army Corps), hazardous wastes, monitoring, surveillance and research, drinking water standards, preparation of environmental assessments, technical assistance and overall regulatory and standards enforcement.


- US Bureau of Reclamation: Administers, constructs, oversees water supply discharge and facilities in western states

- US Department of the Interior, Fish and Wildlife Service: Enforcement of federal game and fish laws and cooperative administration of national wetlands program with U.S. EPA and Army Corps of Engineers
• **US Department of the Interior, Bureau of Land Management:** Oversight, management and monitoring of natural resources on federal BLM lands. Uses include livestock grazing, mineral extraction, recreation and game management.

• **Federal Emergency Management Agency:** Administers the National Flood Insurance Program in addition to other disaster prevention and relief programs.

• **US Department of Agriculture:** The USDA administers the following programs that may be applicable to the Eagle River Watershed: Small Watershed Program, Resource Conservation and Development Program, Natural Resources Conservation Service (Soil Conservation Service) for mapping, survey and analysis, Conservation Reserve Program to remove highly erodible land or other sensitive land from cultivation, Water Quality Incentives Program, Wetlands Reserve Program to restore drained wetlands, including purchase of wetlands easements from landowners, Cooperative River Basin Program, Water Bank Program for wetlands, Forestry Incentives Program, Cooperative Extension, National Forest System and Forest Service, State and Private Forest Stewardship Initiative, Rural Clean Water Program, Urban and Community Forestry Program, Emergency Conservation Program, Emergency Wetland Program for purchase of wetlands easements, Watershed Protection and Flood Prevention, FmHA Loans for flood prevention, irrigation, drainage, water quality management, sedimentation control, fish and wildlife development.

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**State Agencies with Watershed-Related Programs and Administrative Responsibilities**

- Colorado Department of Natural Resources: Division of Water Resources; Division of Wildlife; Colorado Water Conservation Board; Colorado State Land Board; Colorado State Parks

- Colorado Department of Public Health and Environment

- Colorado Department of Transportation

- Colorado Office of Emergency Management

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**Regional:**

- Northwest Colorado Council of Governments