

Purpose Of and Need for Action



CHAPTER 1

Purpose of and Need for Action

1.1 INTRODUCTION

SELECTION

The eligibility and suitability of 99.5 miles of the North Fork of the South Platte River and segments of the South Platte River mainstem in Colorado are being studied to determine if they should be recommended for addition to the National Wild and Scenic Rivers System (National System). All of the South Platte River study corridor and most of the North Fork study corridor lie within the boundaries of the Pike National Forest (National Forest). Both areas, however, include many private and local government inholdings, and a 6.6-mile stretch along the North Fork lies just outside the National Forest boundary. This section is mostly in private ownership but includes some public lands managed by the Denver Board of Water Commissioners (Denver Water) and Jefferson County Open Space.

Because the rivers were identified by the USDA Forest Service (Forest Service) for study, the eligible segments are recognized as study rivers under the provisions found in section 5(d)(1) of the Wild and Scenic Rivers Act of 1968 (Public Law [P.L.] 90-542 et seq.) (WSRA) (Appendix F). This section of the WSRA requires that all Federal agencies consider potential national wild, scenic, and recreational river areas in all planning for the use and development of water and related land resources. *Forest Service Manual* 1924 states, “consideration of the potential wild and scenic rivers is an inherent part of the ongoing land and resource management planning process.”

If any portions of the study rivers were found eligible and suitable, a recommendation for designation would be forwarded to Congress, along with this document. Congress then would determine if the recommended river(s) or river segment(s) should be added to the National System.

THE STUDY AREA

The river segments identified for study total 99.5 miles and are located in Douglas, Jefferson, Park, and Teller Counties, in Colorado. The study river corridors are mostly National Forest System lands administered by the Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, but also include private inholdings and lands managed by Denver Water and Jefferson County.

TIMING

In 1984, the *Land and Resource Management Plan for the Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands* (Forest Plan) found that a 26.8-mile segment of the South Platte River, from Elevenmile Dam to the high water line of Cheesman Reservoir, was eligible for potential addition to the National System. At that time, the lower North Fork of the South Platte, below Bailey, Colorado, and the South Platte mainstem from Cheesman Reservoir downstream to its confluence with the North Fork were being evaluated for potential reservoir development by the U.S. Army Corps of Engineers in the *Two Forks Metropolitan Denver Water Supply Environmental Impact Statement* (U.S. Army Corps of Engineers, 1988).

The environmental impact statement (EIS) dealt with the Two Forks Dam and reservoir proposal, a water supply project proposed by the Denver Board of Water Commissioners and the Metropolitan Water Providers to help meet the water supply needs of the Denver metropolitan area. The EIS was finished in March 1988 and recommended construction of a dam on the South Platte River, approximately 1 mile downstream from its confluence with the North Fork. The proposed reservoir would have a surface area of about 7,300 acres and would provide a storage capacity of 1,100,000 acre-feet. After several years of meetings and review, the U.S. Environmental Protection Agency (EPA) issued a Recommendation Determination in 1990 to prohibit construction of the Two Forks Dam and reservoir pursuant to section 404(c) of the Clean Water Act (EPA, 1990). Eight suburban water districts appealed EPA's decision. On June 5, 1996, U.S. District Judge Richard Matsch dismissed the appeal. The judge ruled that EPA had not "acted capriciously and arbitrarily" in blocking construction of the dam because of its impact on the environment. The judge also ruled that the eight suburban water districts did not have legal standing to proceed with the case without support of the Denver Water Board.

The Forest Service has no position on the Two Forks Dam and Reservoir proposal or subsequent legal decisions. However, its interpretation of section 5(d)(1) of the WSRA is that a Wild and Scenic Rivers assessment would have to occur prior to any decision that would allow construction of a containment structure. In other words, the *Metropolitan Denver Water Supply EIS* was not sufficient to meet the intent of the WSRA defined above.

In 1989, Congress appropriated \$75,000 for the Forest Service to study the recreation potential of the South Platte River from Elevenmile Dam to the high water line of Strontia Springs Reservoir. The Forest Service felt that this could be best accomplished as a Wild and Scenic River study and included the entire North Fork. This document is the result.

The Forest Service completed an eligibility study (Appendix C) of the 26.8-mile segment of the South Platte River from Elevenmile Dam to the backwaters of Cheesman Reservoir in 1984 as part of the Forest Plan. The plan found the entire 26.8-mile segment eligible for potential addition to the National System. In 1992, the Forest Service began an eligibility determination for the entire North Fork (50.1 miles) and for the South Platte River from Cheesman Dam to the backwaters of Strontia Springs Reservoir (22.6 miles). The preliminary eligibility determination, released in August 1995 and completed in June 1996, found that all 22.6 miles of the South Platte study corridor and the part of the North Fork downstream from the Berger property near Insmont (22.9 miles) were eligible for potential addition to the National System (Appendix D). It also found that the North Fork, upstream of Insmont, was not eligible for further consideration. These findings are summarized in Chapter 3 and explained in detail in Appendices C and D. The segments examined in the 1984 and 1996 eligibility studies are listed in table 1-1. Together, the two eligibility studies found a total of 72.3 miles—22.9 miles of the North Fork and 49.4 miles of the South Platte—eligible for potential addition to the National System. Other than the eligibility discussion in Chapter 3, the remainder of this document deals with the suitability of these 72.3 miles of eligible streams for addition to the National System. For the purposes of this analysis, the Forest Service has established a study area extending one-quarter mile from the ordinary high water mark on each side of the studied river segments.

OVERVIEW OF THE NATIONAL WILD AND SCENIC RIVERS ACT

The National Wild and Scenic Rivers Act (P.L. 90-542 et seq.) was passed in 1968 to balance river development with river protection.

**Table 1-1.—List of Study Segments Considered in the
1984 and 1996 Eligibility Studies**

Segment	Length (miles)	Description
A&B - South Platte River	16.4	From Elevenmile Dam (downstream from fence on Denver Water's special-use area) downstream to Beaver Creek (northernmost boundary of private land).
C1 - South Platte River	2.9	From Beaver Creek downstream to ¼ mile upstream of Hackett Gulch.
C2 - South Platte River	3.0	From ¼ mile upstream of Hackett Gulch downstream to ¼ mile downstream of Corral Creek.
C3 - South Platte River	4.5	From ¼ mile downstream of Corral Creek to high-water line of Cheesman Reservoir (upstream of the stream gage).
D - South Platte River	3.1	From Cheesman Dam (downstream of the stream gage weir) downstream to the Wigwam Club property (southern end).
E - South Platte River	19.5	From the Wigwam Club property (southern end) downstream to the high water line of Strontia Springs Reservoir (6029-foot contour).
F - North Fork of South Platte River	9.7	From its headwaters downstream to Kenosha Gulch, near Webster (also known as the Hall Valley).
G - North Fork of South Platte River	17.5	From Kenosha Gulch, near Webster, downstream to Insmont (upstream boundary of Berger property).
H1 - North Fork of South Platte River	1.5	From Insmont (upstream boundary of Berger property) downstream to Estabrook (downstream side of old stone house).
H2 - North Fork of South Platte River	4.9	From Estabrook (downstream side of old stone house) downstream to Cliffdale (the section line between sections 29 and 30 east of Cliffdale).
H3 - North Fork of South Platte River	16.5	From Cliffdale (the section line between sections 29 and 30 east of Cliffdale) downstream to within ¼ mile of the confluence with the South Platte River.
Total	99.5	

Table 1-2.—List of Study Segments Found Eligible and Included in Suitability Study

Segment	Length (miles)	Description
A&B - South Platte River	16.4	From Elevenmile Dam (downstream from fence on Denver Water's special-use area) downstream to Beaver Creek (northernmost boundary of private land).
C1 - South Platte River	2.9	From Beaver Creek downstream to ¼ mile upstream of Hackett Gulch.
C2 - South Platte River	3.0	From ¼ mile upstream of Hackett Gulch downstream to ¼ mile downstream of Corral Creek.
C3 - South Platte River	4.5	From ¼ mile downstream of Corral Creek to high-water line of Cheesman Reservoir (upstream of the stream gage).
D - South Platte River	3.1	From Cheesman Dam (downstream of the stream gage weir) downstream to the Wigwam Club property (southern end).
E - South Platte River	19.5	From the Wigwam Club property (southern end) downstream to the high water line of Strontia Springs Reservoir (6029-foot contour).
H1 - North Fork of South Platte River	1.5	From Insmont (upstream boundary of Berger property) downstream to Estabrook (downstream side of old stone house).
H2 - North Fork of South Platte River	4.9	From Estabrook (downstream side of old stone house) downstream to Cliffdale (the section line between sections 29 and 30 east of Cliffdale).
H3 - North Fork of South Platte River	16.5	From Cliffdale (the section line between sections 29 and 30 east of Cliffdale) downstream to within ¼ mile of the confluence with the South Platte River.
Total	72.3	

Rivers or river segments are designated as Wild and Scenic Rivers to keep them in a free-flowing condition and to fulfill vital national conservation purposes. In the WSRA, Congress declared that:

... certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and ... shall be protected for the benefit and enjoyment of present and future generations.

The National System currently includes about 11,294 miles of river on 172 river segments. In contrast to designated wilderness, which is managed to maintain a pristine environment, rivers in the National System are managed to maintain the character of the river in its current state and protect and enhance specific resource values. The WSRA encourages a cooperative relationship between the agencies and landowners along designated rivers. Existing uses may continue, including grazing, timber harvest, and recreation. New uses must be consistent with the WSRA. Water projects, including dams or impoundments, are specifically prohibited.

1.2 PURPOSE AND NEED FOR ACTION

The purpose and need for action addressed in this EIS is twofold:

1. Document the Wild and Scenic River study for the North Fork of the South Platte and the South Platte Rivers. The study includes a three-step process:
 - Eligibility - determining what river segments are eligible for potential addition to the National System;
 - Classification - classifying these segments as to their most protective potential classifications as wild, scenic, or recreational rivers
 - Suitability - evaluating the eligible segments for their suitability for potential addition to the National System.
2. Amend the Forest Plan to ensure protection of river values pending final resolution of suitability. This action is in accordance with agency policy to protect the values identified in eligible segments until they are either designated by Congress as elements of the National System or found by the agency to be not suitable for inclusion in the National System. This policy states:
 - “Rivers identified for study are managed to maintain their outstanding values....” (*Forest Service Manual* at 1924.03(3))
 - “Management prescriptions for river corridors identified in the National River Inventory, or otherwise identified for study,

should provide protection in the following ways:

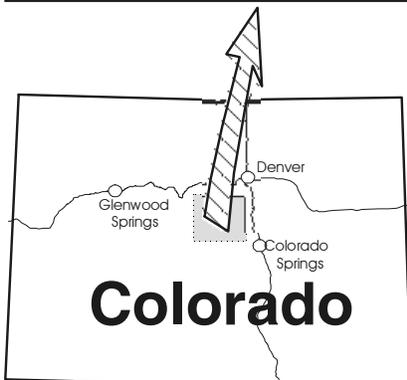
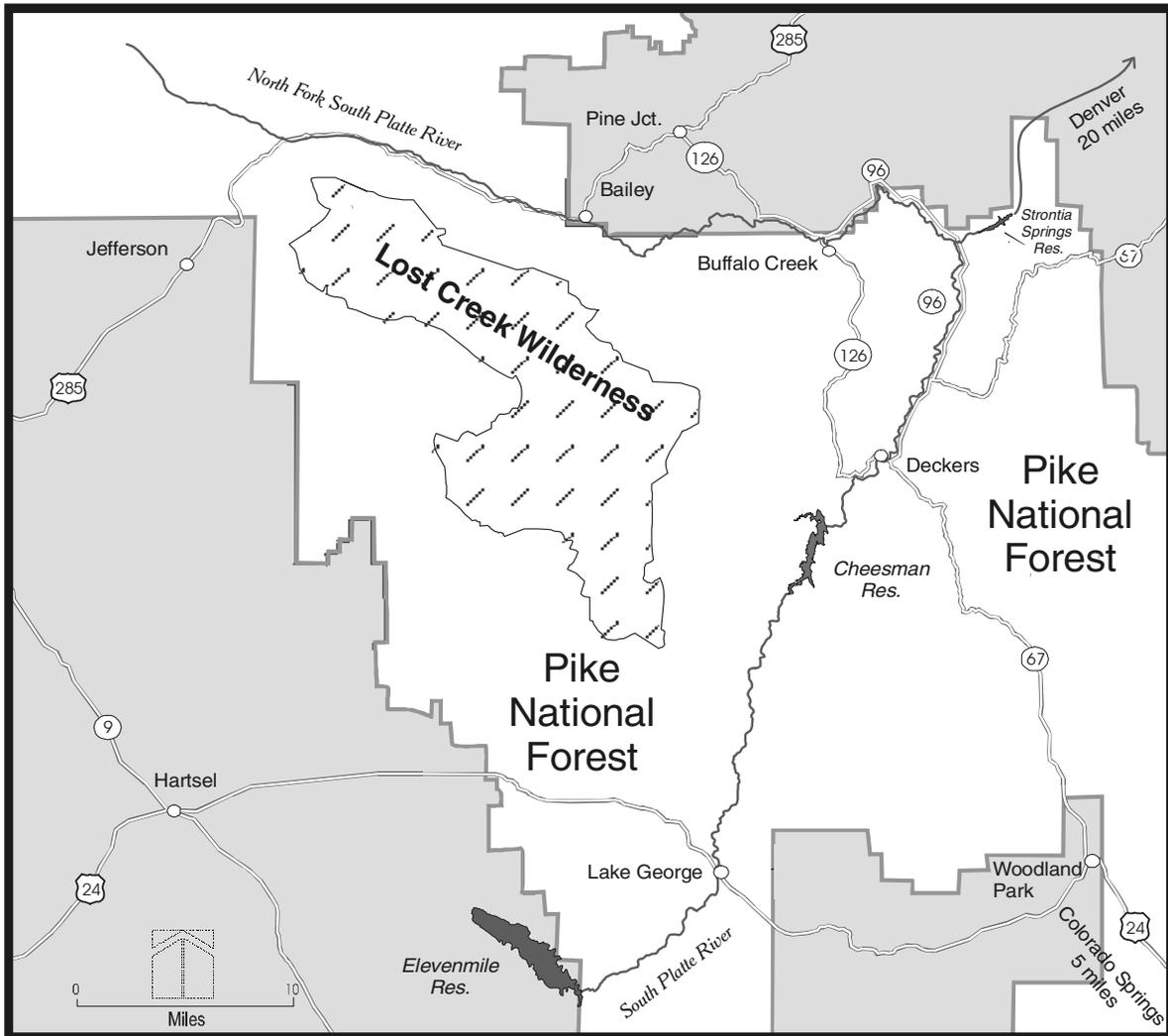
- To the extent the Forest Service is authorized under law to control stream impoundments and diversions, the free flowing characteristics of the identified river cannot be modified.
- Outstandingly remarkable values of the identified river area must be protected and, to the extent practicable, enhanced.
- Management and development of the identified river and its corridor cannot be modified to the degree that eligibility or classification would be affected (i.e., classification cannot be changed from wild to scenic or scenic to recreational).

. . .The protection requirements specified above must be documented in the forest plan prescriptions and continued until a decision is made as to the future use of the river and adjacent lands. . .” (*Forest Service Handbook* 1909.12 at 8.12)

These rivers were identified as candidates for inclusion in the National System through the forest planning process under section 5(d)(1) of the WSRA. The study was initiated in response to public concern for protecting unique river resources within close proximity to the Denver and Colorado Springs metropolitan areas from future water development.

Maps 1-1 through 1-3 show, respectively, the general vicinity of the study area, the river segments studied for eligibility, and the potential classifications of the eligible segments.

Vicinity Map



Land Ownership

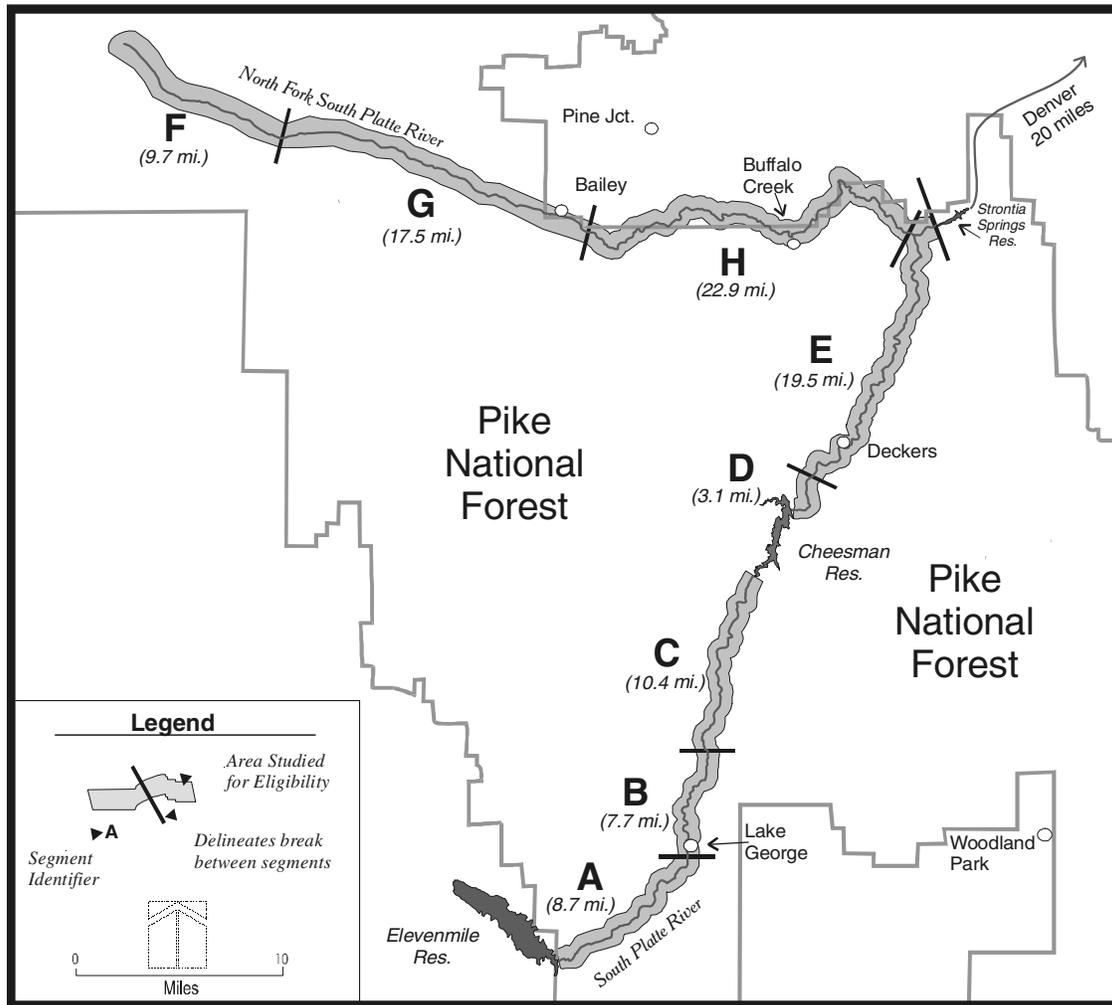
-  Within National Forest Boundary
-  Outside National Forest Boundary

Roads and Highways

-  State Highways
-  U. S. Highways

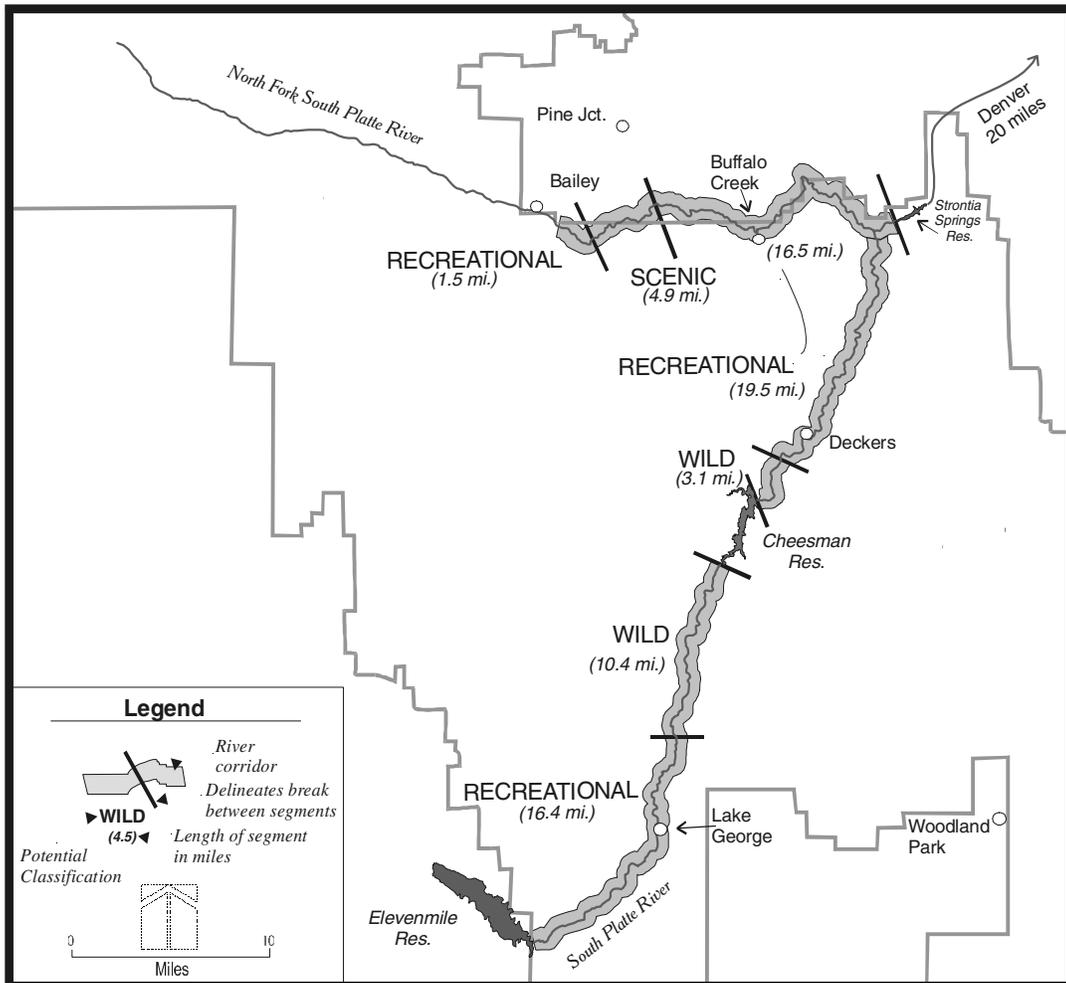
Map 1-1.—South Platte River and North Fork of the South Platte River Wild and Scenic River Study Vicinity Map.

River Segments Studied for Eligibility



Map I-2.—South Platte River and North Fork of the South Platte River Wild and Scenic River Study, River Segments Studied for Eligibility.

Eligible Segments with Potential Classification



Map 1-3.—South Platte River and North Fork of the South Platte River Wild and Scenic River Study, Eligible Segments with Potential Classification.

1.3 STUDY PROCESS

The Wild and Scenic Rivers study process is specified in the WSRA and in the associated Federal guidelines (*Federal Register* 47 FR 39454, September 7, 1982). This process has three major components: the eligibility determination, the classification analysis, and the suitability determination.

The purpose of the eligibility determination is to determine if a river meets the minimum requirements for addition to the National System. In order to be eligible, a river segment must be free-flowing and possess one or more “outstandingly remarkable values” (ORVs), in categories such as scenic, recreational, geologic, fish, wildlife, historic, ecologic, or cultural resources. The eligibility determination is documented in Appendices C and D and summarized in Chapter 3.

In the classification analysis, patterns of development and naturalness in the corridors of an eligible river are studied to determine whether the river would be classified as wild, scenic, or recreational, if the river eventually were added to the National System. The classification analysis is documented in Chapter 3.

The suitability determination is designed to determine whether an eligible river is an appropriate addition to the National System. Alternative ways of managing the river corridor are compared, including at least one alternative involving Federal designation of all eligible river segments and one alternative involving non-designation. Alternative B recommends designation of all eligible river segments to the most protective classification. Alternatives A1 (no Federal recommendation action), A2, and A3 have no designation recommendation. Suitability considerations include the environmental consequences of designation and the manageability of the river if it is designated, including costs and the willingness

of local and state governments to participate in river corridor management.

Suitability is determined by analysis of several factors specified in the *Forest Service Manual* 1909.12. Some factors to consider in the determination of suitability are:

1. The characteristics (such as ORVs) that do or do not make the river corridor a worthy addition to the National System.
2. The current status of land ownership and use in the area, including the amount of private land involved and the associated or incompatible uses on such land.
3. The reasonably foreseeable potential uses of the land and water that would be enhanced, foreclosed, or curtailed if the area were included in the National System and the values that could be foreclosed or diminished if the area is not protected as part of the National System.
4. Federal, state, local, tribal, public, or other interests in designation or non-designation of the river, including the extent to which the administration of the river, including the costs thereof, can be shared by state, local, or other agencies and individuals.
5. The estimated cost of acquiring necessary lands or interests in land and the cost of administering the area if it is added to the National System.
6. Ability of the agency to manage and/or protect the river area or segment as a Wild and Scenic River or other mechanisms to protect identified values other than Wild and Scenic River designation.
7. Historical or existing rights which could be adversely affected. In determining suitability, consideration of any valid

existing rights must be afforded under applicable laws (including the WSRA), regulations and/or policies.

8. Other issues and concerns identified during the planning process, including alternative ways to protect the rivers.

If a river is found to be eligible, its suitability is considered in the analysis of alternatives in the EIS accompanying the study report and the Forest Plan amendment.

The original draft legislative environmental impact statement (DLEIS) was issued in April of 1997. The South Platte Protection Plan (SPPP) (Appendix A) was submitted to the Forest Service in May of 1998 by a group comprised of a broad spectrum of stakeholders as an alternative to designation. The Forest Service determined that it was a viable alternative, and included it in a supplemental DLEIS (SDLEIS) released in March of 2000. Based on comments received during both comment periods, many changes were made in the two drafts to produce this final environmental impact statement (FEIS). These changes are described in the summary.

If the Forest Supervisor and the Regional Forester found the study rivers to be eligible and suitable, a recommendation to designate the river Wild and Scenic along with the final LEIS (FLEIS) would be forwarded to the Chief of the Forest Service, to the Secretary of Agriculture, and to the President. Approval at these levels would send the recommendation for designation to Congress, along with the FLEIS. Congress then would determine if the recommended river(s) or river segment(s) should be added to the National System.

1.4 PUBLIC INVOLVEMENT

After the stream segments were identified as candidates for inclusion into the National System, the Forest Service conducted an

extensive public involvement program to ensure that the alternatives would consider the concerns of landowners; local residents; permittees; water resource developers; water users in the Denver metropolitan area; Douglas, Jefferson, Park, and Teller Counties; the States of Colorado, Kansas, and Nebraska; and others having a stake in how the river is managed. The public involvement program consisted of public open houses, meetings, newsletters, mailings to interested parties, and ongoing informal meetings with any party requesting briefings.

On November 16, 1995, a notice of intent was published in the *Federal Register* (vol. 60, No. 221, p. 57571) to announce that an LEIS and Wild and Scenic River Study Report would be prepared and that written comments and suggestions were invited. In addition, interested parties were mailed a newsletter and invitations to public meetings.

The Forest Service conducted eight public scoping meetings between December 10, 1995, and March 14, 1996. The meetings took place in Bailey, Colorado Springs, Deckers, Denver, and Lake George, Colorado, and were attended by about 400 people. All of these meetings were advertised in local and regional media and by direct mailings. In some remote areas that are perceived to be underserved by media, posters located where community members were likely to see them, such as post offices and general stores, also advertised the meetings. Many of these meetings were covered by local and regional mass media (newspapers and radio). In addition, upon request, the Forest Service conducted about 25 briefings for county governments, water providers, citizen groups, landowners associations, and environmental groups.

Informational materials were mailed out four times:

1. During the issue identification process, to inform people about the study and request comments on the eligibility and classification determinations.

2. At the start of the suitability determination, to let people know about open houses and to request their issues and concerns.
3. Before the second round of open houses, to solicit comments on preliminary alternatives and gather additional issues and concerns.
4. After the DLEIS was published, to announce its availability.

These mailings were designed to make sure as many people as possible were informed about the study and how to make their views known. The mailings reached more than 2,600 people, including those owning land in or adjacent to the study river corridors; river users; grazing permittees; businesses related to the river corridor; recreationists; water providers; water users; local, state, and Federal agencies; interested parties; and others who requested to be kept informed of the study's progress.

Periodic briefings were also conducted with Arapahoe, Douglas, Jefferson, Park, and Teller County officials; Denver Water; and U.S. congressional delegations beginning in November 1995. In response to requests, presentations were also made to each county commission, the Metropolitan Water Providers, Suburban Water Suppliers Wild and Scenic Task Force, several county planning departments, and a variety of organizations in eastern Colorado. Additional issues, concerns, and opinions were made at these meetings and incorporated into the scoping process.

The DLEIS was published in April 1997, and a notice of availability was published in the *Federal Register* (vol. 62, No. 70, p. 17810) at the same time. During the 90-day comment period following release of the DLEIS, the Forest Service received letters and comments from about 324 people and a petition bearing 147 signatures. At the time the document was released, local stakeholders were beginning to develop a non-designation protection plan for the river. This was included in the DLEIS as

Alternative A2, although it had not been fully developed at the time.

Following release of the draft, the local stakeholder groups organized under the leadership of the Denver Water Board and the Suburban Water Providers' Wild and Scenic Task Force to develop the details of the A2 alternative. Seventy-three agencies and interest groups were invited to participate in the planning process. (See Appendix A for the full list of participants.) Four work groups were established to focus on different aspects of Alternative A2, including: (1) flow management; (2) water quality; (3) recreation, scenery, and wildlife; and (4) the endowment fund. Once each work group developed a draft plan, an overall group, the Synthesis Committee, put all the pieces together into one package. About 46 meetings were conducted over an 8-month period. In addition, three large public meetings were held at the beginning, middle, and end of the process to get comments from the general public and to allow participants in individual work groups to hear what other groups were doing.

Interest group representatives participated in the planning process with the understanding that their participation did not mean they necessarily supported the plan developed. Each group maintained its right to agree or disagree with the final product, but all participated with the intent of finding the best solution to their differences. When the final alternative, entitled the "South Platte Protection Plan," was submitted to the Forest Service, each group was asked to submit a letter of support directly to the Forest Service. The Forest Service received 47 letters with overall mixed support for the SPPP.

The Forest Service sent out a public mailing in October 1998 to announce (1) a review of the SPPP and (2) its decision to prepare a SDLEIS. The letter included a list of issues and concerns about the SPPP raised by the public or by Forest Service specialists. These focused on the SPPP's adequacy in protecting

the rivers' outstandingly remarkable values, water quality, and free-flow.

The Forest Service held a public meeting in February 1999 to discuss the issues and concerns about the SPPP and to present ideas for a modified SPPP alternative. Several individual meetings followed this with interested groups to clarify the issues and concerns and to discuss options for addressing the concerns in another alternative. Concurrent with these meetings, the mailing list was updated, and all interested parties were informed of new developments.

The A2 alternative was amended by the stakeholder groups in response to concerns that the Streamflow Management Plan (SFMP) did not adequately address impacts from high flows.

The SDLEIS was released for a 90-day comment period in March 2000, and a notice of availability was published in the *Federal Register* (vol. 65, No. 63, p. 17265) at the same time. The Forest Service received 232 individual comments during this period. The Forest Service also held public workshops in Bailey, Deckers, Lake George, and Denver, Colorado, during the comment period. All of these meetings were advertised in local and regional media and by direct mailings. As had been done for the scoping meetings, posters located in places such as post offices and general stores, where community members were likely to see them, also advertised the workshops. A total of 61 people attended these workshops. Local and metropolitan media also covered the workshops and reported on the status of the study. Individual group meetings and periodic project briefings were also presented for various interest groups and government agencies as requested.

In response to concerns by the Forest Service and various stakeholders, the groups that participated in the development of the SPPP, the A2 alternative, developed supplemental material that addresses unanswered questions in the original document, including provisions for enforcing of the tenets of the SFMP and water

development under a non-designation scenario. As they had done during the development of the original SPPP, members of a Forest Service interdisciplinary team observed the A2 development process to provide expertise on technical resource information, agency procedures, and the provisions of the WSRA.

Denver Water held public hearings to address the contents of the supplemental material in April 2001 in Denver and Deckers. The material was submitted formally to the Forest Service on June 5, 2001. The Forest Service received nine letters of support for the SPPP from local and state agencies, as well as organizations with an interest in management of the rivers' values. The letters specified that their support be based on the premise that the supplemental material be included in the FEIS.

The Forest Service conducted mailings in November 2000, December 2001, and December 2002 to update the constituency and update the mailing list pending distribution of this FEIS.

1.5 MONITORING

If any of the study corridor is designated as a Wild and Scenic River, the Forest Service, as the administering agency, would be required to identify what monitoring is already taking place, coordinate with other entities, and develop and implement a monitoring plan to ensure that the ORVs, free-flowing character, and water quality are protected and enhanced. The method of review and corrective action would be incorporated in the comprehensive River Management Plan.

Until a decision is made as to the future use of the river and adjacent lands (discussed under "Purpose and Need for Action" above), and if the South Platte Protection Plan is in effect, the Forest Service will coordinate with the SPPP to ensure that the river values, free-flowing character, and water quality are protected and perhaps enhanced and that

potential classifications are maintained. Key monitoring features include:

- ❖ Reviewing proposed activities, and
- ❖ Monitoring ongoing activities and resource conditions.

The method of review and corrective action will be discussed in the Record of Decision

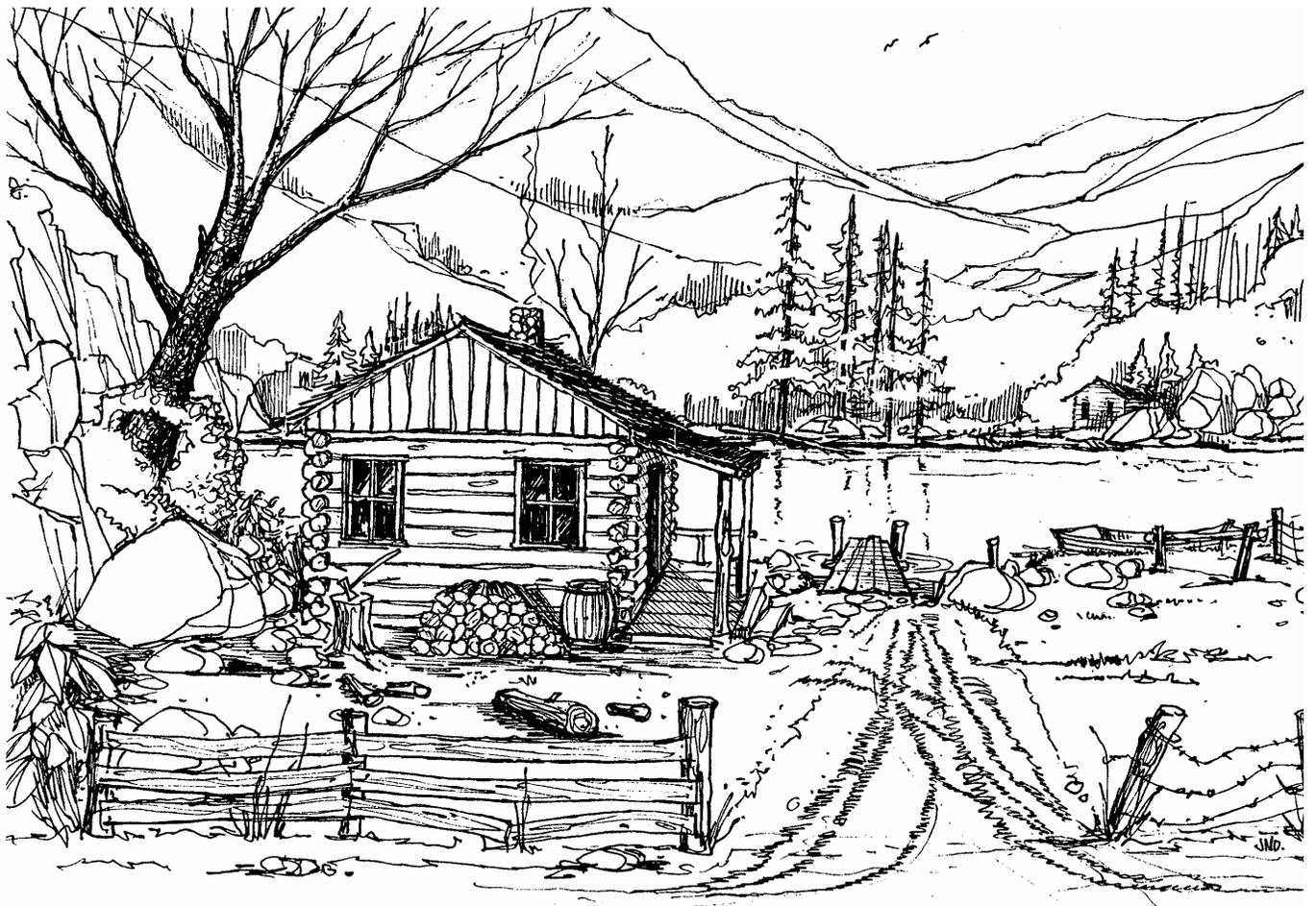
1.6 PUBLIC REVIEW AND FUTURE PROCESS

Public comments received on the DLEIS and the SDLEIS were utilized in preparing this FEIS. Following a comment period on this FEIS and Draft Plan Amendment, the Forest Service intends to review the comments and then issue a Record of Decision that amends the Forest Plan to ensure protection of free-flow, ORVs, and water quality. If at a later date the Forest Service receives a proposal for some activity that is inconsistent with the protection

of free-flow, ORVs, and water quality, it may become necessary to make a decision on the suitability of the river for designation as a Wild and Scenic River. At that time, it will be determined whether the current EIS is sufficient to support that decision or whether circumstances have changed so much that a new National Environmental Policy Act document will need to be prepared.

After publication of the Record of Decision associated with the current study, the SPPP will provide a management umbrella for dealing with activities affecting free-flow, ORVs, and water quality in the river corridor. If the SPPP is not implemented in a timely manner, then it may become necessary for the Forest Service to proceed with making a decision on suitability. Similarly, if over time it becomes apparent that the SPPP is not protecting free-flow, ORVs, and water quality in the river corridor sufficient to comply with agency policy regarding eligible rivers, it may also become necessary for the Forest Service to proceed with making a decision on suitability. Criteria associated with evaluating the SPPP's effectiveness are discussed in Chapter 4 under Preferred Alternative.

Description of Area



CHAPTER 2

Description of Area (Affected Environment)

2.1 INTRODUCTION

The purpose of this chapter is to summarize the character and resources of the Wild and Scenic River study corridors along the South Platte River and the North Fork of the South Platte. It describes the current conditions and existing trends to acquaint people with the study corridors and provide a basis from which to assess the consequences of the various designation and management alternatives presented in Chapter 4. An additional summary description of some of the affected environment and current conditions for each study river is also found in the Eligibility and Classification Determinations in Appendices C and D.

The term “river” is used in this document as defined in section 16(a) of the Wild and Scenic Rivers Act, which states that, “‘River’ means a flowing body of water or estuary, or a section, portion, or tributary thereof, including rivers, streams, creeks, runs, kills, rills, and small lakes.” The words “river” and “stream” are used interchangeably throughout this report.

2.2 REGIONAL SETTING

The North Fork of the South Platte and the South Platte River are located in east-central Colorado and are part of the Platte River drainage. Their headwaters lie high in the Rocky Mountains on the Continental Divide, and they drain eastward through the Front Range, merging at the unincorporated

community of South Platte. Both study rivers are located primarily within the Pike National Forest (National Forest). The eligible river segments studied comprise 72.3 miles of streams.

2.3 RIVER DESCRIPTIONS

The North Fork of the South Platte (North Fork) originates on the east crest of the Continental Divide at the base of Teller Mountain, 10 miles northeast of Breckenridge, in Park County, Colorado. The stream flows east for 50.3 miles into Jefferson County, Colorado, to its confluence with the South Platte River, 22 miles southwest of Denver. Although the entire river was considered in the eligibility determination, only that 22.9-mile portion of the stream from the upstream boundary of the Berger property near Insmont, Colorado, downstream to its confluence with the South Platte River was found eligible and included in the study corridor.

The South Platte River is formed by the Middle Fork and South Fork, 2 miles west of Hartsel, Colorado. The Middle Fork originates on the east crest of the Continental Divide near Wheeler Mountain, in Park County, Colorado, 13 miles northwest of Fairplay and flows southeast to its confluence with the South Fork. The South Fork originates on the Continental Divide at Weston Pass in Park County, Colorado, and flows southeast through Antero Reservoir to its confluence with the Middle

Fork. From Hartsel, in the middle of a grass-covered basin called South Park, the South Platte flows southeast for 20 miles through the Spinney Mountain and Elevenmile Reservoirs, then turns northeast through the Front Range, flowing through Cheesman, Strontia Springs, and Chatfield Reservoirs in Park, Teller, Douglas, and Jefferson Counties to Denver. From Denver, it continues northeast, across the plains, to its confluence with the North Platte, forming the Platte River, just east of North Platte, Nebraska. The 49.4-mile portion of the South Platte River from Elevenmile Dam to Strontia Springs Reservoir (excluding Cheesman Reservoir) was considered in the eligibility determination, found eligible, and is included in the study corridor.

Each study river corridor is approximately one-half mile wide (one-quarter mile on each side of the river's usual high-water mark). This comprises the study area covered in this report. None of the study segments lie within any State Scenic Waterway or State Protected River corridors.

2.4 CLIMATE

The mountains and valleys of the South Platte and the North Fork basins exhibit marked differences in climate. The higher elevations along the western boundary of both basins receive most of their precipitation as snowfall in the winter. Average annual precipitation in the high mountains is about 40 inches. The portion of the watershed from South Park eastward usually receives relatively small accumulations of snowfall. Average annual precipitation in this area ranges from 11 to 15 inches, measured at Hartsel and Cheesman, respectively, and it usually comes in the form of convective rainstorms. In the high mountains along the western boundary, average annual temperature is less than 32 degrees Fahrenheit (°F). Temperature in the valleys averages about 45 °F.

2.5 PHYSIOGRAPHIC REGIONS AND GEOLOGY

PHYSIOGRAPHIC REGIONS

The two rivers are located within the Front Range, a complex portion of the Southern Rocky Mountains. This northerly trending range is bounded on the east by the Denver Basin and on the west by South Park. Igneous and metamorphic rock compose this mountain range, which stretches from Cripple Creek north to Wyoming and is more than 40 miles wide at its widest point west of Boulder. The Front Range consists of several granitic batholiths, including the Pikes Peak, Sherman, and Boulder Creek Batholiths. The Pikes Peak Batholith is the main feature of the study area. At higher elevations, the topography has been molded by glacial activity. The glacial and postglacial erosion has resulted in the deposition of alluvial materials along major drainages at lower elevations. The Kenosha Hills and Tarryall Mountains are northwest-trending features that form the western edge of the South Platte drainage basin. The Rampart Range forms the eastern edge of the basin.

Locatable minerals are minerals such as gold, silver, copper, lead, cinnabar, tin, gemstones, or other valuable deposits. Two areas within or adjacent to the study corridors are known to have the potential for locatable minerals. The South Platte Pegmatite District is centered around Raleigh Peak near South Platte, and the Tarryall Mining District lies just northwest of Lake George. Mining claims are located within T. 11 and 12 S., R. 71W, and T. 08 and 09 S., R. 70 W. The Bureau of Land Management's (BLM's) Geographic Mining Claims Index for March 26, 2002, shows 3 current claims and 82 that are closed. All the lands within the river corridors are open to mineral entry except for specific areas such as campgrounds. However, the potential for leasable mineral resources (oil and gas deposits) or active quarry sites within either corridor is low. The oil and gas Record of Decision for the Pike and San Isabel

National Forests and the Cimarron and Comanche Grasslands (PSICC), signed February 12, 1992, designated no leases on the mainstem and no surface occupancy on the North Fork.

The majority of the rock types found in this study were created from 1.7 to 1.0 billion years ago during the Proterozoic Eon of Precambrian time (Chronic and Chronic, 1972). The oldest rock unit is a biotite gneiss created during the middle Proterozoic. Various younger granites, mainly in the Elevenmile area, were formed from 1.7 to 1.4 billion years ago. Erosion followed, creating low rolling hills close to sea level. In a cycle repeated several times, episodes of mountain building, accompanied by metamorphism of pre-existing rocks, were followed by erosion. A long period of erosion completed Precambrian time.

Some Paleozoic Era rocks are found in the Manitou Half-Graben, a structural feature that lies to the east of the river corridor adjacent to the Rampart Range. The rock types include sandstones, limestones, dolomites, conglomerates, and shales. Among other things, they reflect an episode of mountain building during the Pennsylvanian Period of the Paleozoic, which created the ancestral Rocky Mountains.

Mesozoic Era rocks are missing in the study area. Strata preserved east of the Front Range, however, show that conditions in Colorado during that era ranged from arid plains to shallow marine environments that created generally fine-grained sandstones and shales.

An episode of mountain building, known as the Laramide Orogeny, began near the end of the Mesozoic and continued into the Tertiary Period of the Cenozoic Era. This activity created several north-south-trending ranges, including the Front Range. This uplift consists of a linear block, faulted on both sides with hogbacks to the east. Mineralized solutions migrated upward through joints and faults in the crust. Oligocene lava flows, east of the study area, created a lake in which fine volcanic

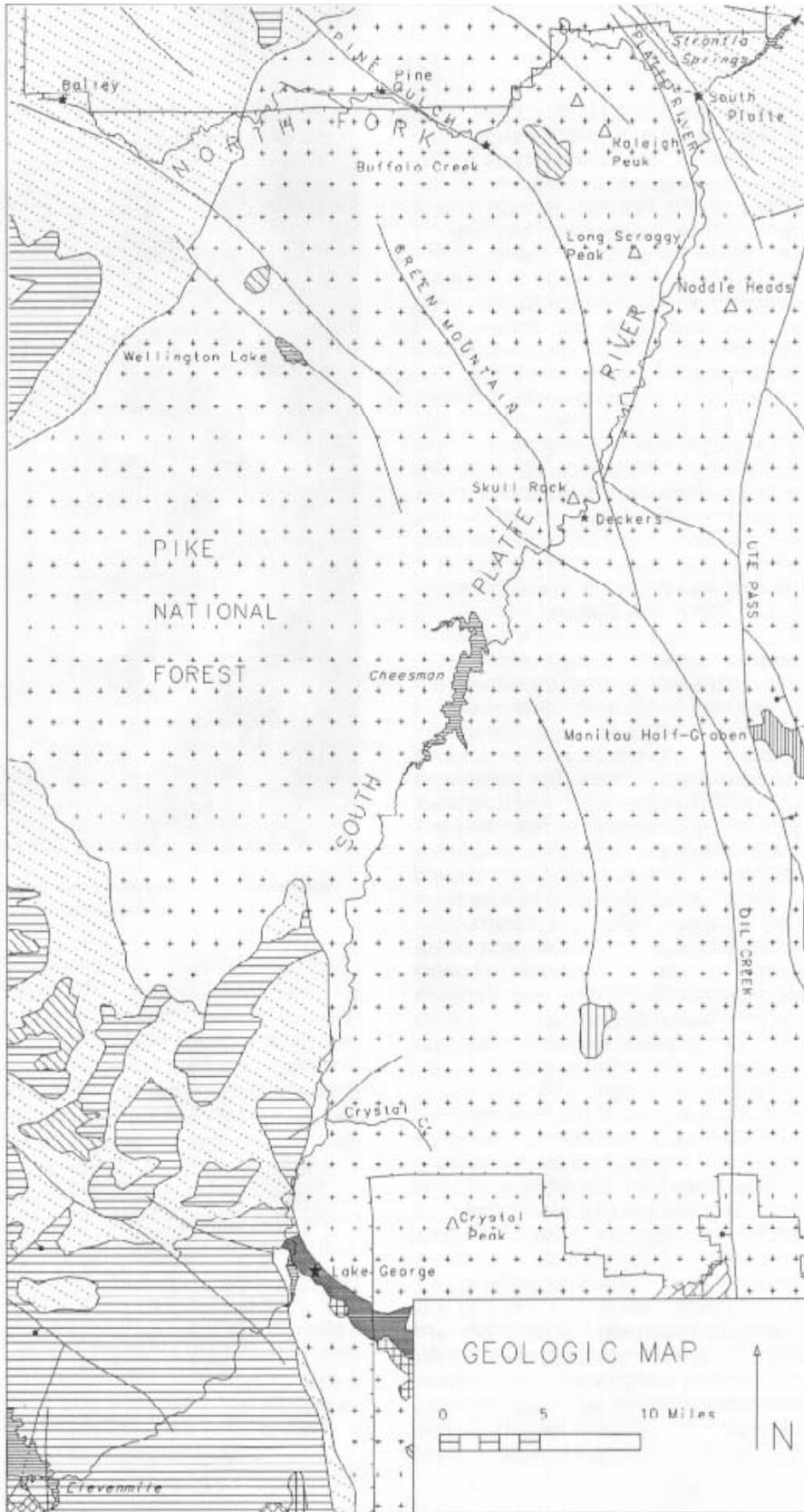
ash trapped insects and fish, preserving them, along with stumps and trees at Florissant. During the Quaternary Period, glaciers filled the high mountain valleys, the glacial outwash created alluvial fills in the lower valleys and terrace levels, and landslides areas were formed.

REGIONAL GEOLOGY

The Front Range is a northerly trending band of Precambrian age rocks that extends north from the Wet Mountains into Wyoming, terminating with the Laramie Range (Bryant et al., 1981; Scott et al., 1978). This range constitutes about half of the Southern Rocky Mountains physiographic province, a band of complex mountains with intermontane basins, defined by faulting on the eastern and western edges (Fenneman, 1931). The Front Range is bounded on the east by the asymmetrical Denver Basin, which extends northeast into Nebraska. The Denver Basin contains thick sedimentary sequences, which have been uplifted to create hogbacks along the western edge of the basin. South Park, a complex basin filled with sedimentary units that have been faulted and thrust, lies to the west of the Front Range (DeVoto, 1971). The Manitou Half-Graben, containing Upper Paleozoic rocks, lies to the east of Cheesman Reservoir. The Ute Pass Fault forms the western boundary of the half-graben. The main component of the Front Range in the river corridor is the Pikes Peak Batholith, an irregular mass of granitic-type rocks about 1.1 billion years old (Tweto, 1987). The Pikes Peak Granite includes the West Creek and Tarryall Creek Plutons and the Redskin and Lake George Stocks, all varied compositional forms of granitic rocks.

LOCAL GEOLOGY

The river corridors cut through the Pikes Peak Granite, outcroppings of biotite gneiss, various other Precambrian age granites, and Oligocene lake sediments, as shown on the geologic map (map 2-1). The Pikes Peak Batholith is roughly oval shaped and covers about 1,200 square



miles of the southern Front Range (Bryant, 1974, 1976; Peterson, 1964; Scott, 1963). The batholith consists of white to moderate orange-pink, medium to coarse-grained biotite and hornblende-biotite granite, which is very susceptible to weathering. Gradational rock types within the batholith include quartz monzonite, granodiorite, and syenite. The granite is composed of microcline perthite, quartz, hornblende, and biotite. The grains range in diameter from 1 inch for perthite to one-quarter inch for quartz with 1-inch thick books of biotite. Outcrops are generally large, rounded cubical forms that are perched atop each other, or large, slabby, tabular forms. Segregations of biotite and hornblende weather out as knobby forms of the granite surface. The quartz monzonite is a porphyritic, coarse-grained, light gray to light-pinkish-gray rock with dark speckles. Granodiorite and syenite are limited in the study area. They are composed of oligoclase, microcline, quartz, biotite, and microcline. Many xenoliths of gneiss and migmatite are found in the batholith. Northwest-trending sandstone dikes can be traced in faults at South Platte and Buffalo Creek (Scott, 1963). The sandstone is red or green fine-grained quartz of Cambrian age. Aplite dikes that strike north 60 degrees west and dip 10 degrees northeast, occupy fractures in the granite. They average 2 feet in width over distances of several hundred feet. The jointing is northwest oriented with a shallow southeast dip, creating beds of 12 inches and greater in thickness. The granite can easily weather to depths of 15 feet along joints or fractures. The weathering of the biotite and feldspar leaves a surface of friable aggregate. Pegmatite seams are found throughout the granite, particularly around the edge of the batholith. They may be either circular or elliptical in shape. The quartz-microcline-muscovite variety of pegmatite is the most abundant. Tourmaline, beryl, and fluorite are found within these pegmatite seams. Cavities in the seams contain crystals of pale brown microcline, clear quartz, and muscovite perched on the microcline and quartz.

The Precambrian biotite gneiss has been mapped as banded or layered sequences of sillimanitic biotite-muscovite and fine-grained biotite varieties located around the Pikes Peak Batholith border. The gneiss is fine to medium grained, well foliated as shown by a planar arrangement of the biotite crystals, and composed mainly of quartz, biotite, and oligoclase, with minor hornblende and microcline. The gneissic contact with the Pikes Peak Granite is sharp and well defined. Granite gneiss and amphibolite are mapped locally. The gneiss weathers easily, particularly where there is a concentration of biotite, to form smooth outcrop surfaces.

The Precambrian granites range from 1.4 to 1.7 billion years in age (Tweto, 1979; Wobus, 1976). They are medium- to coarse-grained porphyritic quartz monzonites, quartz diorites, and granodiorites. The mineral composition includes microcline, quartz, oligoclase, biotite, and muscovite with minor hornblende. These rocks are generally a pale pink compared to the brighter color of the Pikes Peak Granite. The feldspar crystals, microcline, and oligoclase weather to form tabular features on the surface. A porphyritic quartz monzonite borders the batholith west of Lake George and crops out in Elevenmile Canyon. The rock is a medium- to coarse-grained, pink porphyritic quartz monzonite with 1- to 1.5-centimeter microcline phenocrysts in a biotite-rich groundmass. The mineral composition includes quartz, plagioclase, microcline, biotite, and minor muscovite.

The Oligocene Florissant Fossil Beds extend from the national monument at Florissant northwest to Lake George (Wobus and Epis, 1978). These beds are composed of arkosic and volcanic conglomerates, tuff and volcanic mudflow breccias, tuffaceous shale and mudstones, and pumiceous tuffs. The beds are less than 150 feet thick and generally lie horizontal. Plant and insect fossils and fossilized stumps and logs are found in these beds. Examples are well exposed in the monument.

Alluvial materials of varied composition are found along both river corridors, particularly at wide points and at the confluence of the forks. Landslide, talus, and morainal deposits are not found in either river corridor.

STRUCTURE

Many faults occur in the area, and several major ones are labeled on the geologic map (map 2-1). Along the Elkhorn Fault, which forms the western border of the batholith, the granitic rocks were thrust at a low angle over the sedimentary units in South Park. The Jarre Canyon and Rampart Range Faults form the eastern edge of the batholith. These high-angle faults have dropped the sedimentary units of the Denver-Julesburg Basin down in relation to the Pikes Peak Granite. The Manitou Half-Graben is a repeat of a portion of the Paleozoic section with the Ute Pass Fault Zone forming the western edge. The Platte River, Pine Gulch, and Green Mountain Faults named by Harza Engineering (1985) are located within the river corridors. Area seismicity has been well documented by the U.S. Army Corps of Engineers (USACE) (USACE, 1986).

MINERALS

Although the corridors and surrounding areas have had some past mining history, activity has been minimal since the end of the 19th century. Of the study corridors' 82 mining claims, none are currently producing, and only 3 are active. The potential for future commercial operations for locatable and leasable minerals within the study corridors is very low. Although the study corridors have some potential for aggregate sources, they contain no active quarry sites. The potential for development of new sites is low due to the recreation use, fisheries, and other resource values in the study corridors. The mineral resources described below are shown on the mineral resources map (map 2-2).

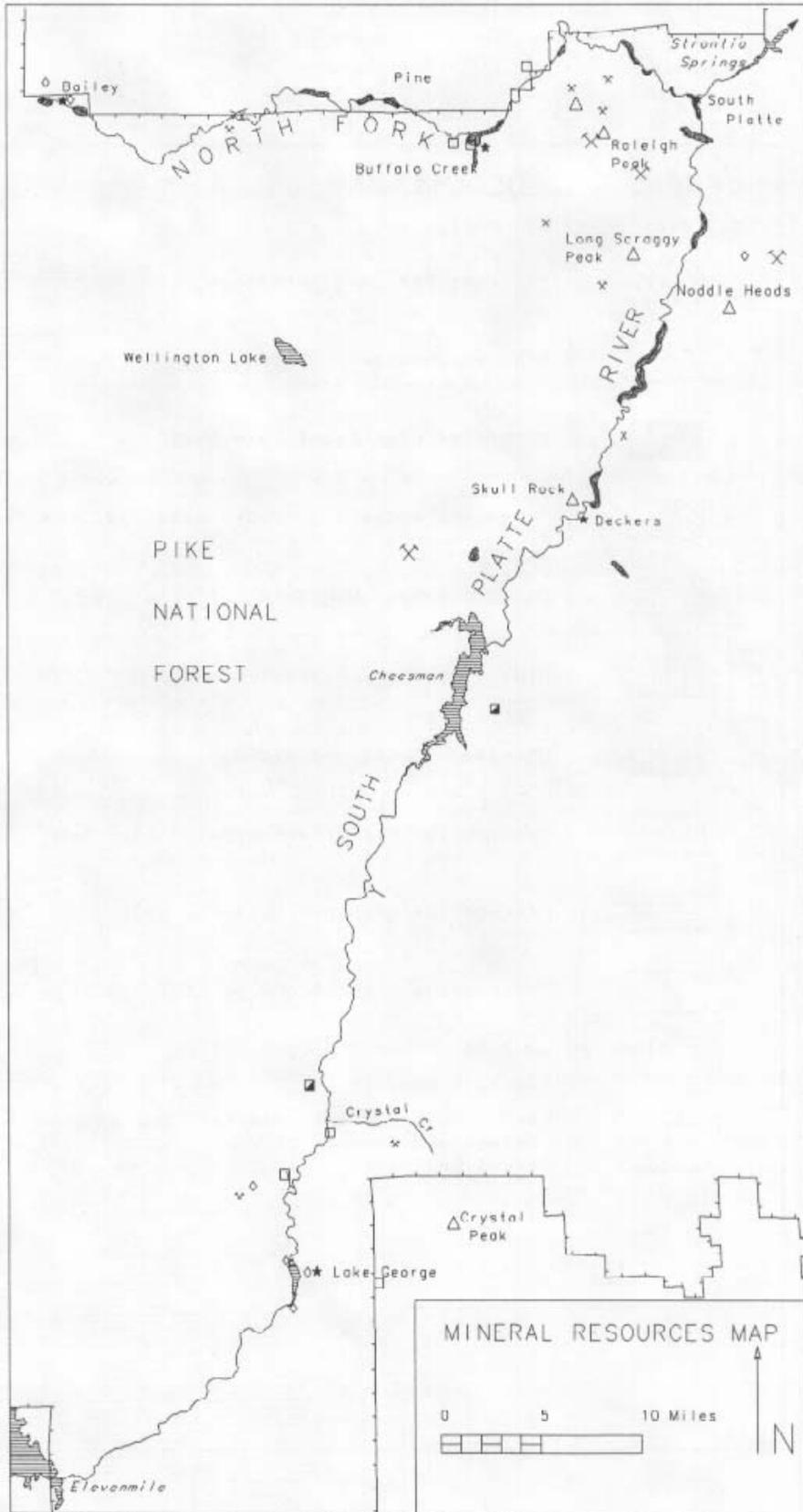
Industrial Minerals

A group of more than 50 rare earth and fluorine-rich pegmatites constitutes the South Platte Pegmatite District (Simmons and Heinrich, 1980). The Pine Creek pegmatite, located north of the Noddle Heads, and others in the district contain byproduct fluorspar (Van Alstine, 1964). The pegmatite composition in the South Platte Pegmatite District, which is centered around Raleigh Peak, is similar to the adjacent country rock, Pikes Peak Granite. Specific minerals found include quartz, feldspar (oligoclase, orthoclase, and microcline), biotite, magnetite, and, locally, hornblende, garnet, beryl, tourmaline, and sillimanite (Hawley and Wobus, 1977; Peterson, 1964). Mining activity in the Raleigh Peak area pursued feldspar, along with mica, beryl, topaz, fluorite, and some rare-earth minerals. The pegmatite dikes are large, complex, nearly vertical, and circular to elliptical; and they have definite zonation with bull-quartz centers that usually crop out above the ground surface.

Groups of pegmatites are also found north of Noddle Heads on Pine Creek, 3 miles northwest of Cheesman Dam on Wigwam Creek, and around Crystal Peak (Voynick, 1994). These pegmatites have produced clear and smoky quartz, greenish-white and pale blue amazonite, muscovite, orthoclase, and purple fluorite. Museum-grade topaz crystals have been excavated from pockets in the granite around Crystal Peak. Other minerals found in these pockets include phenakite and goethite. Crushed quartz has been removed from various pegmatites in the South Platte area (Adams, 1964).

Metals

A caved trench oriented N. 22° W. lies in sec. 18, T. 12S., R. 71 W., near Happy Meadows. The trench was driven in a light-salmon-colored granite probably for uranium or rare-earth elements. It is close to the Lake George beryllium area. Nelson-Moore and others (1978) reported a uranium occurrence



Legend – Mineral Resource Map

Mining Activity

— Adit

■ Shaft

x Prospects(s)

Commodities

● ◇ Aggregates (sand, stone, gius, granite)

○ Gemstone

□ Flourspar

⊗ Pegmatite, 5+ sites

x Pegmatite, 1–4 sites

— Forest Boundary

Map 2-2.—Minerals Resources Map.

1 mile to the north, but it may actually be the same occurrence. The Gilley Ranch skarn deposit lies west of the river in sec. 32, T. 11 S., R. 71 W. (Heinrich, 1981). A 5-foot-wide scheelite-bearing zone was mapped in the workings.

Aggregates

The alluvial fill found along the rivers is derived from the area bedrock, mainly the Pikes Peak Batholith. The fill is generally granitic in composition, consisting mainly of feldspar, quartz, and mica flakes. The quality and quantity of each deposit varies according to the location. There is sufficient material available between South Platte and Pine to be possible resources (Schwochow and Shroba, 1975). Mineral resource areas were defined by the USACE (USACE, 1986) and are shown on the mineral resources map (map 2-2).

Localized slide areas, colluvial deposits, and small terraces can be found within the river corridors. The sand, gravel, cobbles, and boulder shapes vary from subrounded to angular in these deposits. The Pikes Peak Granite is a good source material for road surfacing and subsurface material. Quarry locations and crushing specifications can be formulated for the required use.

Quartz has been mined from the South Platte pegmatites for terrazzo purposes.

Leasable Minerals

There are no known petroleum, natural gas, or coal resources in the river corridors (Smith et al., 1991; Jones et al., 1979; Tremain, 1984). Geothermal resources are found in the area, but not within the river corridors (Pearl, 1980).

2.6 LAND OWNERSHIP

The study corridors encompass a total of approximately 22,629 acres—15,427 on the

South Platte and 7,202 on the North Fork—with ownership apportioned as shown in table 2-1. Federal lands include 13,953 acres of the Pike National Forest, administered by the Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands. County lands within the study corridor include 545 acres in Pine Valley Ranch, an open space park owned by Jefferson County, plus 29 additional acres that were transferred to the county by the BLM in 2001. The Denver Water Department (Denver Water) owns 3,352 acres, and private lands account for 4,750 acres. Table 2-2 shows the distribution of land ownership in each of the study segments. See also maps 2-3, 2-4, and 2-5.

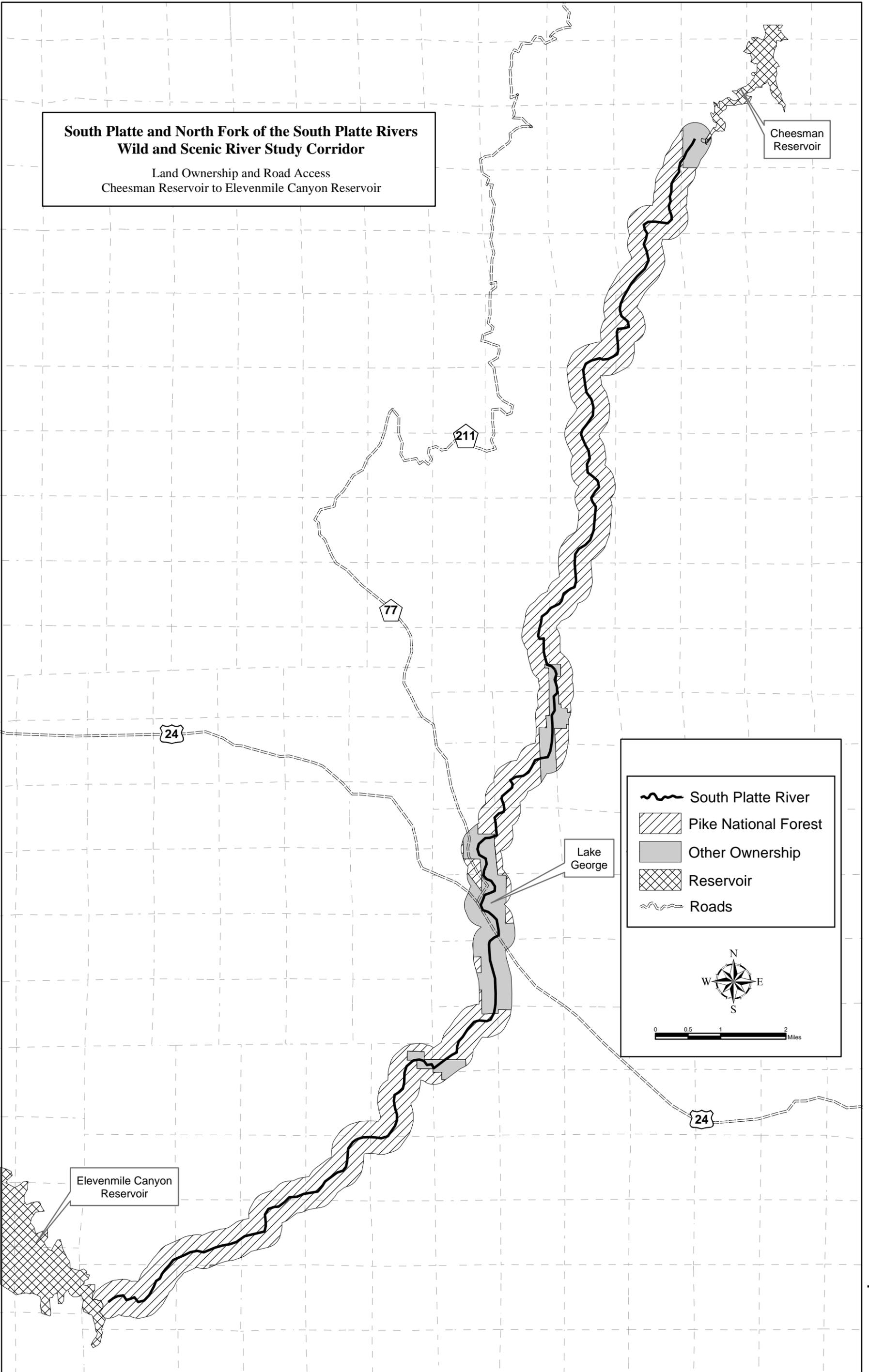
The proportion of public to private lands has remained stable for several decades. Prior to that, Denver Water was actively acquiring private lands for the potential Two Forks Reservoir between Strontia Springs Reservoir and Cheesman Dam on the South Platte and between the confluence and Bailey on the North Fork.

The two rivers in this study are not recognized as navigable by the State of Colorado. In accordance with law as interpreted today, the bed and the banks belong to the adjacent property owner.

2.7 LAND USE

FOREST PLAN MANAGEMENT AREAS

National Forest System lands are managed in accordance with the Land and Resource Management Plan for the Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands (Forest Plan), approved in November 1984. The Forest Plan determined that the 26.8-mile segment of the South Platte River from Elevenmile Dam to Cheesman Reservoir was eligible for inclusion into the Wild and Scenic River System and recommended a suitability analysis (the plan



Wild and Scenic River Study Corridor
Land Ownership and Road Access
Strontia Springs Reservoir to Cheesman Reservoir

Strontia Springs Reservoir

South Platte

126

40

Nighthawk

Oxyoke

67

Trumbull

Deckers

77

Cheesman Reservoir

Legend:

- South Platte River
- Pike National Forest
- Other Ownership
- Reservoir
- Roads

Scale: 0 0.5 1 2 Miles

Compass Rose: N, S, E, W

**South Platte and North Fork of the South Platte Rivers
Wild and Scenic Study Corridor**
Land Ownership and Road Access
Insmont to Confluence with the South Platte River

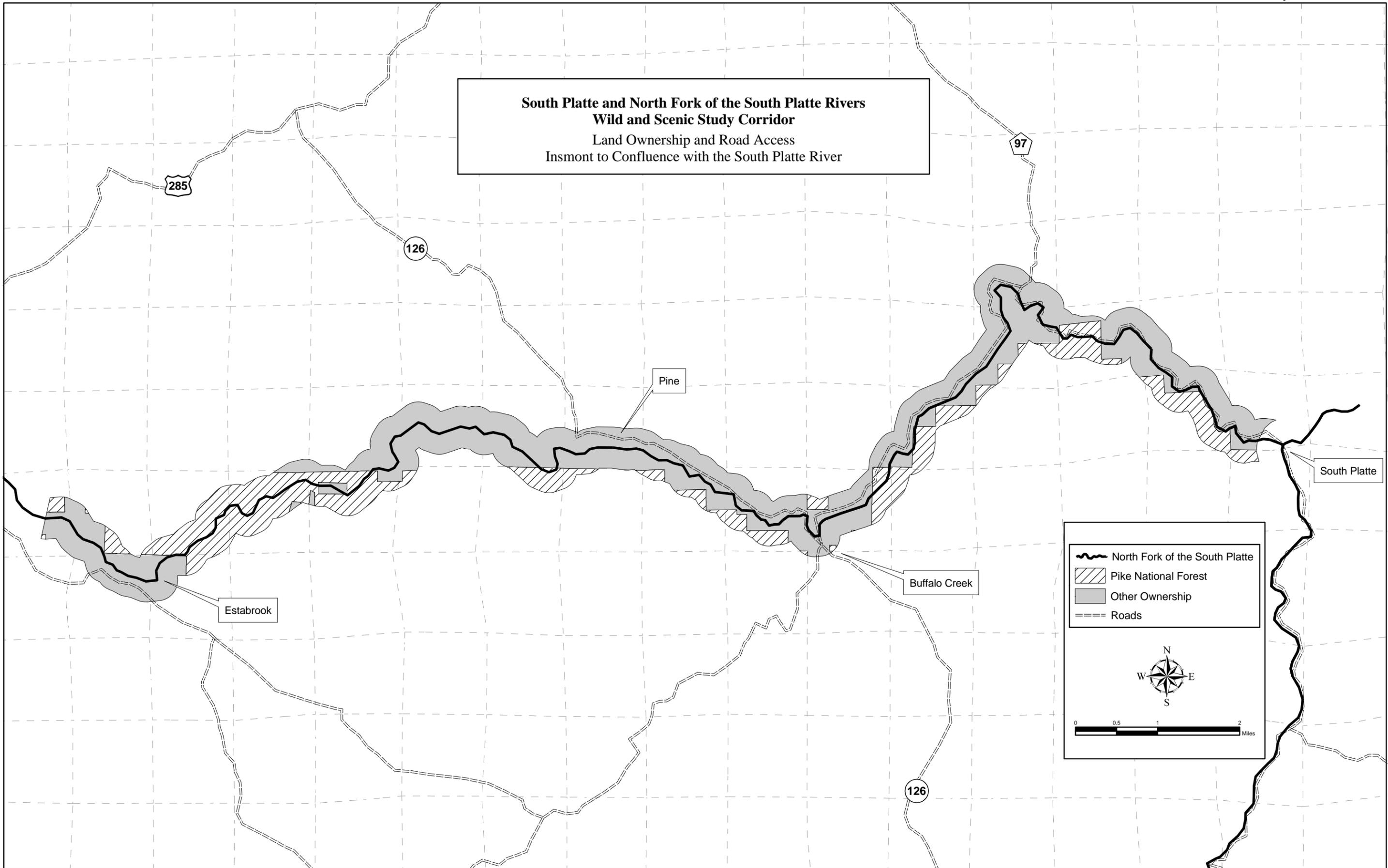


Table 2-1.—Land Ownership of Eligible Study Rivers

River	U.S. Forest Service		Jefferson County		Denver Water		Private Ownership	
	Acres	%	Acres	%	Acres	%	Acres	%
South Platte	11,783	76.4	0	0.0	1,710	11.1	1,934	12.5
North Fork	2,170	30.1	574	8.0	1,642	22.8	2,816	39.1
Totals	13,953	61.7	574	2.5	3,352	14.8	4,750	21.0

Table 2-2.—Land Ownership of Eligible Study Segments

River Segment	U.S. Forest Service		Jefferson County		Denver Water		Private	
	Acres	%	Acres	%	Acres	%	Acres	%
A&B - South Platte, Elevenmile to Beaver Creek.	3,911	75	0	0	0	0	1,302	25
C - South Platte, Beaver Creek to Cheesman.	3,267	98	0	0	52	2	0	0
D - South Platte, Cheesman to Wigwam Club.	680	71	0	0	281	29	0	0
E - South Platte, Wigwam Club to Strontia Springs	3,925	66	0	0	1,377	23	632	11
H1 & H3 – North Fork, Insmont to Estabrook and Cliffdale to confluence	1,165	19	574	15	1,642	29	2,312	41
H2 - North Fork, Estabrook to Cliffdale	1,005	67	0	0	0	0	504	33
Total	13,953	62	574	2	3,352	15	4,750	21

Total length of eligible segments = 72.3 miles. Total acreage in eligible study corridors = 22,629 acres.

listed the length as 23 miles, but it has been revised to 26.8 miles through use of Geographic Information System data). Pending the outcome of the suitability analysis, this segment and the adjoining study corridor are included in a special management area under the Forest Plan. The special management area, called the Scenic River Corridor, provides additional protection to preserve the characteristics that made the segment eligible for potential Wild and Scenic designation—specifically, its free-flow, water quality, and outstandingly remarkable values. The special protection continues until replaced by a River Management

Plan after designation, or until the segment is found not suitable for designation. In the latter case, the management of the area is released from special protection and reverts to the Forest Plan management area in which the corridor lies.

Various segments of the study corridors lie within several different management areas, as defined under the Forest Plan. The following is a summary of the areas' management activities. More complete descriptions of the management areas and their general direction, management activities, and standards and guidelines are given in Chapter III of the Forest Plan.

Scenic River Corridor

River segments that have been determined eligible for potential addition to the National Wild and Scenic Rivers System are protected from activities that could diminish or change the free-flowing character, water quality, or the scenic, recreational, fish and wildlife, and other values that make the river eligible for designation. This is an interim management direction that applies to all study river segments upstream from Cheesman Reservoir.

Management Area 2A

Management emphasis is for semi-primitive motorized recreation opportunities such as snowmobiling, four-wheel driving, and motorcycling, both on and off roads and trails. Motorized travel may be restricted or seasonally prohibited on designated routes to protect physical and biological resources. Range resource management provides sustained forage yields.

Management Area 2B

Management emphasis provides opportunity for outdoor recreation in rural and roaded natural settings, including developed recreation facilities and year-round motorized and nonmotorized recreation. Motorized travel may be restricted or seasonally prohibited on designated routes to protect physical and biological resources.

Management Area 3A

Management emphasis is for semi-primitive nonmotorized recreation in a nonwilderness, semi-primitive setting. Roads are closed to public use.

Management Area 4B

Management emphasis is on the wildlife habitat needs of one or more management indicator species. Species with compatible habitat needs are selected for an area. The goal is to optimize habitat capability and, thus, numbers of species.

Recreation and other human activities are regulated to favor the needs of the indicator species. Roaded-natural recreation opportunities are provided along forest arterial and collector roads. Some local roads and trails are open to public motorized travel, and these provide semi-primitive motorized recreation opportunities. Others are closed, providing semi-primitive nonmotorized opportunities.

Management Area 5B

Management emphasizes is forage and cover on big game winter ranges. Winter habitat for deer, elk, bighorn sheep, and mountain goats is emphasized. Treatments to increase forage production or to create and maintain thermal and hiding cover for big game are applied. New roads, other than short-term, temporary roads, are located outside the management area. Short-term roads are obliterated within one season after intended use. Existing roads are closed, and new motorized recreation use is managed to prevent unacceptable stress on big game animals during the primary big game use season.

Management Area 7A

Management emphasis is productive tree stand management on lands available, capable, and suitable for production of a variety of commercial and noncommercial wood products. Roaded-natural recreation opportunities are provided along forest arterial and collector roads. Semi-primitive motorized recreation opportunities are provided on those local roads and trails that remain open; semi-primitive nonmotorized recreation opportunities are provided on those that are closed.

OTHER MANAGEMENT AREAS AND USES

The following is a list of management areas and other uses in the study corridors.

North Fork of the South Platte River

About half of the North Fork study corridor lies outside the National Forest, and Denver Water, Jefferson County, and private individuals own almost 70 percent of the corridor.

The upper 4 miles of the study corridor, from Insmont downstream to the Park County–Jefferson County line, lie within the Pike National Forest in Management Area 5B. The area from the county line downstream to the forest boundary lies in Management Area 7A. However, because of very difficult access and surrounding private property, the area has been managed similar to Management Area 5B.

From the National Forest boundary, the study corridor passes for several miles through either private property or the Pine Valley Ranch (a Jefferson County open space park). The study corridor re-enters the forest below Pine and, although it stays mostly on private land, includes a 2-mile section of Management Area 7A between Pine and Riverview.

The lower portion of this study segment, from Riverview to the confluence with the South Platte River, lies in Management Area 2B. The corridor is mostly on lands owned by Denver Water and private individuals, except for 29 acres recently transferred to Jefferson County by the BLM. Parts of it are outside of the forest boundary. The lands are currently under consideration for trade with Denver Water for other lands in the area.

South Platte River

The South Platte River study corridor is entirely within the Pike National Forest and contains about 75 percent National Forest System lands. The 26.8-mile section of the study corridor from Elevenmile Dam to Cheesman Reservoir has special management area status, as previously discussed, but also lies within several regular management areas.

From Elevenmile Dam to a mile downstream from Beaver Creek, the study corridor lies in

Management Area 2B. The area upstream from Lake George (Elevenmile Canyon) contains several developed campgrounds and picnic areas and is quite heavily used by the public. Site-specific management in Elevenmile Canyon is governed by the Elevenmile Canyon Ecosystem Project, which was approved in May 1995. The purpose of the plan is to enhance the quality of the recreation experience and activities, while reducing resource damage.

From 1 mile downstream from Beaver Creek to Cheesman Reservoir, the study corridor is in Management Area 2A, except for a small portion west of the South Platte River downstream from Wildcat Creek, which is in Management Area 3A.

From Cheesman Dam downstream to the confluence with the North Fork, the study corridor falls mostly in Management Area 2B. The area downstream from the Wigwam Club is readily accessible by roads and contains several developed and dispersed recreation sites (trailheads, parking areas, campgrounds, camping areas, and picnic areas). Downstream from Deckers, Denver Water is the largest landholder, but their holdings are interspersed with private and National Forest System lands.

The 3.1-mile portion east of the South Platte from Cheesman Dam to the Wigwam Club property lies in Management Area 5B, and the portion east of the South Platte from Deckers to Oxyoke lies in Management Area 7A (only 1 mile of this section is located on National Forest). Very little timber remains within the study corridor in this area.

The lowest section of the South Platte study corridor, from the confluence with the North Fork to Strontia Springs Reservoir, is in Management Area 4B.

Special Areas

There are no wilderness areas, research natural areas, or inventoried roadless areas in the study corridors. The Lost Creek Wilderness lies

immediately west of the study area and is within 1 mile of the South Platte study corridor near Corral Creek.

Access, Structures, and Private Land Uses

The study corridors are within a 90-minute drive of two-thirds of the State's population, and most of the area is easily accessible by roads, which parallel the river. Exceptions are Segments C, D, and the "scenic" portion of H, which have little or no road access. Small communities and many structures are present in parts of the study corridors. On National Forest System lands, there are fewer structures; and these are limited to bridges, developed and dispersed campgrounds, stream monitoring stations, several abandoned mining cabins, and summer homes under special-use permits. Denver Water is the largest non-Federal landowner. Its lands are managed for water delivery, dispersed recreation, summer-home rentals, and resource protection to ensure high water quality. Prior to the Two Forks Dam proposal, Denver Water acquired many of the private lands on the South Platte from Deckers to the North Fork confluence and on the North Fork from the confluence to Ferndale because the Two Forks Reservoir would have inundated those areas. Even though the Environmental Protection Agency (EPA) denied the permit for the dam and reservoir, Denver Water is continuing to acquire some land from willing sellers in the study area.

Private lands within the study corridors are primarily year-round rural residences, though some small communities are scattered along the rivers. These include, on the North Fork, the unincorporated towns of Pine and Buffalo Creek and the communities of Estabrook, Crossons, Cliffdale, Riverview, Ferndale, Argyle, Foxton, Dome Rock, Long-view, and South Platte; and, on the South Platte River, the incorporated town of Lake George and the communities of Nighthawk, Oxyoke, Trumbull, and Deckers. The towns include about 200 houses, community buildings, churches, and several retail businesses. Deckers contains

several retail stores and a restaurant leased from Denver Water. A volunteer fire department is located in Trumbull. A few ranches with grazing and irrigated hay fields occur in the upper portions of the North Fork study corridor and just north of Lake George. There is little timber production in the study corridors.

Utilities

Two high power transmission lines cross the South Platte study corridor—one at Corral Creek (Segment C2) and one north of Happy Meadows Campground, also in Segment C. Also, a water pipeline that parallels U.S. Highway 24 crosses the South Platte study corridor at Lake George. The pipeline and the two powerlines all run within designated utility corridors identified in the Forest Plan. Under the Federal Land Management Policy Act, the Forest Service recognizes that these corridors would be given first consideration for the location of future electric, gas, oil, and communication facilities, regardless of potential for Wild and Scenic River designation.

STUDY SEGMENT DESCRIPTIONS

The following are descriptions of the study corridors showing private land uses and the locations of roads, bridges, and structures.

South Platte – Segment A

This 8.7-mile segment from just below the fence line beneath Elevenmile Dam to the private land boundary south of Lake George lies within the Pike National Forest and, except for a small area owned by the Boy Scouts of America, is entirely National Forest System lands. The area is characterized as a rocky, 400-foot deep V-shaped granite canyon containing a fast-flowing mountain stream with a very narrow valley floor (or, in some places, no valley floor). The entire segment is paralleled by National Forest System Road (NFSR) 96, which follows an old railroad grade through several tunnels. Elevenmile Canyon is included in a special

recreation management area administered by the Forest Service and used primarily for developed and dispersed recreation, including camping, picnicking, hiking, fishing, tubing, swimming, and driving for pleasure. This area includes the Reservoir, Cove, and Riverside Campgrounds; the Idlewild, Messenger Gulch, Elevenmile, and O'Brien Picnic Areas; numerous designated parking areas; and some of the Sleeping Tom Summer Homes under special-use permit. The Wagon Tongue and Springer Gulch Campgrounds are located just outside the study corridor. The corridor also contains NFSR 96-1 E and NFSR 96-1-F, which are half-mile-long dead-end roads that access the summer homes and Springer Gulch Campground. NFSR 244 provides access to Wagon Tongue Campground but continues outside the corridor. Other developments in the area include a 10-foot diversion dam and abandoned aqueduct near Lake George and a private road with several old buildings up Rankin Gulch on Boy Scout Camp Alexander. (The camp and most of the other improvements are located just outside the corridor boundary.)

South Platte – Segment B

In this 7.7-mile segment from Lake George to Beaver Creek, the river channel and the valley floor both widen, and the canyon disappears from Lake George to Tappan Gulch. From Tappan Gulch to Beaver Creek, the valley bottom narrows, and the river enters another 200- to 400-foot-deep canyon. Most of Segment B is privately owned. It includes the town of Lake George with several hundred houses, community buildings, fire department, cemetery, schools, churches, and several retail businesses; the lake itself with several dams and a mile-long diversion channel; subdivisions with 25 to 50 houses each around the lake, on Vermillion Creek, and on Crystal Creek. The area is used primarily for year-round residences, but there is some private recreational use on Lake George. Some hay fields and grazing pastures exist along the mile-long reach from U.S. Highway 24 to Tappan Gulch. A 2-mile

segment between Tappan Gulch and Vermillion Creek is mostly National Forest System lands, and other National Forest lands lie above the subdivisions on Crystal and Vermillion Creeks.

The area includes U.S. Highway 24 and County Road 96, both of which have bridges across the South Platte. Other roads include NFSR 79, which parallels the lake for a mile; NFSR 298, which intersects 79 and leaves the corridor to the southwest; County Road 77, which parallels the South Platte for a mile north of Lake George; NFSR 207, which intersects County Road 77 and parallels the west side of the South Platte for 3 miles, from Tappan Gulch to Beaver Creek; NFSR 897, which parallels the east side of the South Platte from Vermillion Creek to Beaver Creek; and many city and private subdivision roads. Other improvements include several old ranch buildings near Tappan Gulch; several dams and small ponds along Tappan Gulch, Vermillion Creek, and Crystal Creek; a small pond along the South Platte near Crystal Creek; a private river bridge near Crystal Creek; an aqueduct that parallels U.S. Highway 24; the small Happy Meadows Campground administered by the Forest Service; a Forest Service trailhead; and a Forest Service trail, which parallels the river for several miles downstream from Vermillion Creek.

South Platte – Segment C

This 10.4-mile segment, from the north end of the private lands near Beaver Creek to the backwaters of Cheesman Reservoir, is known as Wildcat Canyon. This segment lies within the Pike National Forest and is entirely National Forest System lands, except for the lowest 750 feet of the corridor, which is owned by Denver Water. The area is used for dispersed recreation including hiking, fishing, and semi-primitive motorized recreation (four-wheel drives, all terrain vehicles, and motorcycles). Here, the river flows through a rugged, V-shaped, 400- to 600-foot-deep granite canyon with steep canyon walls and numerous large rock formations. The area is undeveloped and inaccessible except in Segment C2. In this

segment, a mile of National Forest System Trail (NFST 654) runs along the west side of the corridor at the upper end, and another National Forest System Trail (NFST 619, used as a four-wheel drive road) runs from NFSR 210 to the South Platte River near Platte Springs and north to Tarryall Creek. A four-wheel-drive road comes down to the river near Corral Creek (NFSR 540). One can ford the river here and climb out of the canyon to the east near Longwater Gulch (NFSR 221). NFSR 540 turns south just before the ford and parallels the west bank for a mile, then fords Tarryall Creek and meets NFST 220A. NFST 220A fords the South Platte and turns southeast towards the Hackett Gulch road (NFST 220). The Hackett Gulch Road still fords the river at its westernmost point, but NFSR 220B on the west side has been closed to the top of the ridge. NFSR 200B continues from there to NFST 619. In addition, four-wheel drive roads in Segment C3 proceed down Metberry Creek and Northrup Gulch to the study corridor (NFSR 205 and 206). Although some of these at one time forded the South Platte, the Northrup Gulch Road was closed several years ago about one-quarter mile from the river to mitigate erosion and protect resource values. The Metberry Creek Road, which currently goes to the river, has been closed at the river crossing below what was formerly the Custer Cabins to reduce erosion on a quarter-mile-long steep section.

All of these roads were closed pursuant to the Hayman Fire in June 2002 and will remain closed until a roads analysis can be completed. At that time, a determination will be made on whether to open roads, maintain closures, or decommission

Developments in this segment include remnants of old mining cabins on Tarryall Creek near Longwater Gulch. The Custer Cabin, a mining cabin on Metberry Gulch, was destroyed in the Hayman Fire, June 2002.

South Platte – Segment D

This 3.1-mile segment, from the downstream end of the stream gage below Cheesman Dam to the upstream end of the Wigwam Club property, is known as Cheesman Canyon. Although it lies within the Pike National Forest, the upper 0.9-mile is owned by Denver Water and the lower 2.2 miles by the Forest Service. The area is accessible only by the Gill Trail (NFST 610), which parallels the entire west bank of the river. A 600-foot-deep V-shaped canyon with steep canyon sides and numerous large rock formations characterizes the area. Although the area lies immediately below Cheesman Dam and the dam is visible from the upper 1 mile of the segment, the canyon is primitive, and there are no other developments in the corridor.

South Platte – Segment E

This 19.5-mile segment from the north end of the Wigwam Club property to the backwaters of Strontia Springs Reservoir lies within the Pike National Forest. The area is predominately National Forest System land, with about 20 percent owned by Denver Water and 10 percent privately owned. This segment, like the upper end of the North Fork segment, is characterized as an open, 500- to 1,500-foot-wide river valley with meadows, grasslands, and willow shrubs along a meandering stream. Side slopes are moderate, and the valley rims average 600 feet. An abandoned railroad spur used to provide access to Nighthawk from the main line up the North Fork. The old grade is mostly covered by the county road but is evident in places. This entire segment is paralleled by paved County Road 126 from the Wigwam Club to Deckers, paved County Road 67 and 97 from Deckers to Nighthawk, and graveled County Road 97 from Nighthawk to the confluence. Graveled County Road 75 parallels the east side of the South Platte for 1 mile south of Deckers. Graveled county roads, coming in from the east, intersect with the roads along the South Platte at Nighthawk (County Road 40) and Oxyoke (County Road 67). There are

numerous roads throughout the small communities. The Colorado Trail (NFST 1776) crosses the corridor near the confluence of the South Platte and the North Fork. Power and telephone lines access nearly all the houses in this study segment.

The Wigwam Club, a private fishing club, owns the upper end of this 19.5-mile segment. This mile-long area contains a lodge, 10-15 cabins and other structures, several fish ponds, two footbridges, four road bridges, more than 40 check dams, a road, and other improvements.

From the Wigwam Club to Deckers, the river crosses National Forest System lands and passes the Lone Rock Campground. In Deckers, there are two highway bridges across the South Platte and about 20 structures leased from Denver Water including cabins, a store, fishing shop, and restaurant (which is currently closed). Downstream from Deckers are the small communities of Trumbull, Oxyoke, Nighthawk, Twin Cedars, and South Platte. About two-thirds of the properties in these areas are owned by Denver Water, which leases out the buildings for year-round residences, summer homes, and other recreational use. The remaining third of the properties is privately owned residences. All these areas, including Deckers, are within the right-of-way granted by the Department of the Interior in 1931 to Denver Water for a dam and reservoir.

Trumbull, which straddles the South Platte for half a mile, contains more than 300 lots with more than 50 structures, mostly houses. Other developments include a volunteer fire department and a highway bridge over the South Platte. Ownership is split between Denver Water and private individuals, but Jefferson County also owns a few lots in the community. For 1½ miles downstream from Trumbull, Denver Water or private individuals own most of the river corridor. In this section, there are more than 20 structures, mostly houses, a highway bridge over the South Platte, and the Swayback Ranch, a private fishing club.

For a mile downstream from the Swayback Ranch, the river crosses National Forest System lands, which contain the Bridge Crossing Picnic Ground and the Platte River Campground.

The river runs a mile through the community of Oxyoke, which has more than 20 houses, a highway bridge over the South Platte, and a small pond on Gunbarrel Creek. Then it passes through a quarter mile of National Forest System land and runs for a half-mile across several small tracts of private land with a few houses. For the next several miles the river passes through a part of the National Forest that includes the following developed recreation sites: Ouzel Camping Area, Scraggy View Picnic Ground, Willow Bend Picnic Ground, and Osprey Camping Area. From Nighthawk to the confluence with the North Fork, the river traverses several miles of lands owned by Denver Water and private individuals that contain the communities of Nighthawk and Twin Cedars with over 40 structures, mostly houses or summer homes.

The river then flows for several more miles through the National Forest (crossing a small undeveloped private tract) and then reaches the community of South Platte at the North Fork confluence. South Platte includes about 10 houses and the historic South Platte Hotel (listed on the *National Register of Historic Places* [National Register]). There is also a highway bridge across the South Platte and a stream gaging station. A bridge owned by Denver Water, which crossed the North Fork behind the hotel, was washed out in the Buffalo Creek Flood in 1996. Below the confluence, the river enters the National Forest for a mile to the backwaters of Strontia Springs Reservoir. Denver Water maintains a gated road along this segment, which receives more use as a trail for anglers, and a footbridge across the South Platte near the backwaters of Strontia Springs Reservoir.

North Fork – Segment H

There is much evidence of past human activity throughout the 22.9-mile North Fork study corridor. Power and telephone lines access nearly all the houses in this study segment. An abandoned railroad grade runs the length of the North Fork study segment and is marked by numerous rock walls, bridge abutments, riprap, blast areas, through cuts, and some channelization. Because of fluctuations in flows due to the Roberts Tunnel, Denver Water has a very active cooperative program with landowners to stabilize banks, construct check dams, add riprap, and protect the resources along the North Fork study corridor. There has been extensive channelization upstream from the study corridor and some channelization in the study corridor upstream from Pine. The trend in the study corridor, however, is away from channel work and more toward easement acquisition to protect riparian areas.

The upper portion of the North Fork study corridor from the upstream end of the Berger property, near Insmont, to Buffalo Creek is characterized as an open 500- to 1,500-foot-wide river valley with meadows and grasslands along a meandering stream. Side slopes are moderate, and valley rims average 600 feet. The river loses some of this character between Estabrook and the Pine Valley Ranch, where the flat valley and the meanders disappear, the side slopes become steeper and rockier, and the valley becomes V-shaped between its 800-foot-high rims. Downstream from the outskirts of Buffalo Creek, the river speeds up and narrows. The valley deepens as the river cuts through a mountainous area and the channel is filled with large boulders.

The North Fork study corridor starts within the Pike National Forest on private land owned by the Berger Land Company. The area is used for grazing and is undeveloped except for a power line, several old structures, and a small private bridge. Near Estabrook, the stream is paralleled for a mile by graveled County Road 68, which provides access to at least 10 houses with a

variety of storage buildings. Along the 2-mile river stretch at Estabrook are three private bridges across the North Fork, a private bridge across Craig Creek, short roads to the houses, and a small pond along Craig Creek.

About a quarter mile downstream from Estabrook, the river enters National Forest System lands for 4.5 miles. This area is rugged, undeveloped, and inaccessible by roads except in several places across private land. There are few developments except for (1) several houses on private lands about a quarter mile from the river and (2) a diversion dam, footbridge, abandoned mine, five houses, and a private river bridge in a small private inholding at Crossons. Just below Crossons, the river leaves the National Forest. The area remains inaccessible and undeveloped until Cliffdale, except for some channel relocation structures downstream from Crossons. At Cliffdale, there are several houses on the river, several more under construction, and three houses about a quarter mile back from the river. A private dirt road parallels the north side of the river for 2 miles downstream to Pine, and several other private roads connecting with it through several drainages in the area. Just upstream from Pine, Jefferson County recently constructed the Pine Valley Ranch Open Space Park. There are 545 acres of the park in the study corridor. The park includes paved access, parking areas, a lodge, amphitheater, caretaker's house, tennis courts, covered picnic areas, fire station, buildings, foot trails, a road bridge, and several footbridges across the river. The area also contains several diversion dams, a large pond, and two abandoned gravel quarries. From the Pine Valley Ranch to Pine, the river flows through private lands used for grazing and horse pastures. The area includes a diversion dam and Crystal Lake, several dirt roads, a river bridge, a bed and breakfast inn, corrals, and several ranch houses, barns, and other buildings.

Near Pine, the paved access route to the Pine Valley Ranch Park and, eventually, paved State Highway 126 parallel the river. The unincorporated town of Pine then stretches

along the river for more than a mile and includes houses, a school, a fire department, community buildings, churches, and several retail businesses—more than 200 buildings in all. River developments include a diversion dam, several river bridges, and ponds from channel relocation.

From Pine, the river flows through several ranches for more than 2 miles and is paralleled by State Highway 126 to the outskirts of unincorporated Buffalo Creek. The area contains irrigated and non-irrigated pastures and is used for hay, horse pastures, and cattle grazing. Developments in this section include several ranch houses with numerous barns and outbuildings, corrals, fences, two river bridges, several diversion dams, a small pond, and some channel relocation.

A portion of the Buffalo Creek community is in the study corridor and includes a church; several houses; a combination store, gas station, and post office; and several short roads connecting Jefferson County Road 96 with State Highway 126. Near the store is a bridge crossing on State Highway 126 and a private road bridge across the North Fork.

On the outskirts of the community of Buffalo Creek, the North Fork enters a steep canyon where it remains until its confluence with the South Platte River. After leaving Buffalo Creek, the river crosses and recrosses the National Forest boundary until it reaches Douglas County Road 97 at the confluence with the mainstem of the South Platte River. Throughout this section, graveled County Road 96 parallels the river and is only a foot or two above the river in places. Recently paved Jefferson County Road 97 and graveled Last Chance Creek Road intersect County Road 96 near Foxton and climb out of the corridor up Last Chance Creek and Kennedy Gulch, respectively. Most of the upper portion of this segment is privately owned and used for rural residences, while the lower section is owned mostly by Denver Water and managed for water delivery, resource protection, and dispersed

recreation. Included in the lower portion are 29 acres of undeveloped land owned by Jefferson County and managed primarily to protect a peregrine nesting site and secondarily for dispersed recreation.

Between Buffalo Creek and the confluence, several small settlements are scattered on the hillsides on both sides of the river. These include Riverview, Ferndale, Argyle, Foxton, Dome Rock, and Longview. The first and largest is Riverview with about 30 structures, mostly residences. Foxton, Argyle, Dome Rock, and Longview are mostly on lands owned by Denver Water and leased back to the residents. A few residents, however, still maintain title.

Other developments include six private road bridges crossing the river, a statue to a heroic railroad brakeman, and a stream-monitoring gage near the confluence. The Buffalo Creek flood of June 1996 destroyed all the bridges below Buffalo Creek and caused other property damage. Most of the property damage has been repaired, and some bridges are being rebuilt.

2.8 LAND USE CONTROLS

A wide variety of local, State, and Federal programs have either a direct or indirect effect upon land uses within the corridor. The most significant programs, as well as those that have generated discussion during the scoping process, are discussed in this section.

COUNTY ZONING

All the private land in the study corridors lies within Douglas, Jefferson, and Park Counties in Colorado. All three counties have comprehensive land management plans that apply to all lands within the counties.

Park County Zoning

The private lands in the study river corridors of Park County are zoned Residential, Residential/Agriculture, Agricultural, Mountain Residential, and Commercial.

Residential zoning permits single-family dwellings, mobile homes, and essential services. Conditional uses include churches, schools, daycare centers, duplexes, fire stations, guest houses, home-based businesses, kennels, noncommercial parks, and water tanks. Minimum lot sizes are generally between 3 and 5 acres, depending on where they are located. Existing platted lots are exempt from lot size requirements and may be smaller.

Residential/Agriculture zoning permits single-family buildings and accessory buildings, mobile homes, and essential services. It also includes conditional uses as listed in Residential and Agriculture zones. The minimum lot area is 20 contiguous acres per tract.

Agricultural zoning permits single-family dwellings, accessory buildings, and on-site employee housing. Conditional uses include dude or guest ranches, church camps or retreat centers, public and private recreation centers, and private airstrips if Federal Aviation Administration sanctioned. Minimum lot area is 160 contiguous acres.

Commercial zoning permits all types of commercial enterprises with minimum lot size conditional, based on type of enterprise and business use. All zoning requires a minimum setback of 50–100 feet from all waterways.

In addition to the specific zoning regulations, Park County has extensive regulations to protect water and adjacent lands. Channelization of streams, which destroys aquatic habitat, is prohibited. Land uses must fit the channel. Revegetation will occur along riparian areas as quickly as possible. Land uses will not increase stream sedimentation and suspension loads.

Douglas County Zoning

The private lands within Douglas County are zoned Agricultural One, which is similar to Park County's Agricultural zoning. However, the density should not exceed one principal residence per 35 acres.

Jefferson County Zoning

The private lands within Jefferson County are primarily Agricultural One or Two and Mountain Residential Two, except for lands close to the communities, which are Mountain Residential Three, Commercial One, or Restricted Commercial.

The Agricultural One and Agricultural Two zoning categories are both intended to provide limited farming, ranching, and other agricultural uses while protecting the surrounding land from harmful effects. General farming, single-family dwellings, greenhouses, forestry farming, and public parks are allowed. Conditional uses include water supply reservoirs and irrigation canals, sewage treatment plants, transmission towers, oil and gas drilling, churches, schools, foster homes, day care centers, camps, picnic grounds, lodges, and other similar facilities. Minimum lot size is 5 acres in an Agricultural One zone and 10 acres in an Agricultural Two zone.

The Mountain Residential Two zoning is intended to provide for low-density residential development and allows both single-family and two-family dwellings. Certain agricultural uses, which are compatible with this residential development, are included. Single and two-family dwellings, group homes for as many as eight people, and public parks are allowed. Conditional uses include water supply reservoirs and irrigation canals, churches, libraries, foster homes, and day care centers. Minimum lot sizes are 17,400 square feet for a single-family dwelling and 10,000 square feet per family unit.

The Mountain Residential Three zoning is intended to provide for medium density residential development and provides both

single-family and two-family dwellings. Single and two-family dwellings, group homes for as many as eight people, and public parks are allowed. Conditional uses include water supply reservoirs and irrigation canals, churches, libraries, foster homes, and day care centers. Minimum lot sizes are 6,250 square feet for a single-family dwelling and 4,000 square feet per family unit (or up to 9,000 square feet for two units).

Commercial zoning permits all types of commercial enterprises with minimum lot size conditional, based on type of enterprise and business use (1 to 30 acres) unless the existing property ownership and adjacent property in the same ownership totaled less than 1 acre as of July, 27, 1978.

Jefferson County Open Space

The Jefferson County Open Space Program's mission is to provide a living resource of open space lands and waters throughout Jefferson County for the physical, psychological, recreational, and social enjoyment of present and future generations. This is accomplished through preserving and interpreting land that has scenic, natural, historical, educational, and recreational value. In addition to protecting, conserving, enhancing, and restoring the natural resources, unique landforms, and historic areas that define Jefferson County, the Open Space Program also provides recreational access and opportunities consistent with the natural and historic values of the property. Within the North Fork study corridor, the program owns and manages 545 acres that are part of the 884-acre Pine Valley Ranch open-space park, plus an additional 29 acres recently transferred to the county from the BLM.

ADVISORY COMMITTEE ON HISTORIC PRESERVATION

The Colorado Advisory Committee on Historic Preservation consists of members recognized professionally in the fields of history,

architectural history, architecture, archeology, and/or other disciplines. The Governor appoints the members.

The committee is charged with reviewing nominations to the National Register within the State and recommending approved nominations to the State Historic Preservation Office pursuant to the National Historic Preservation Act of 1966. The committee also reviews statewide plans for historic preservation.

The committee has identified several sites along the North Fork study corridor that are listed or nominated for the National Register.

COLORADO WATER CONSERVATION BOARD

A division of the Department of Natural Resources, the Colorado Water Conservation Board administers State laws and policies relating to the diversion and appropriation of surface and ground water, protects State water compacts and entitlements, and, where necessary, determines and sets minimum instream flows.

COLORADO DIVISION OF WILDLIFE

This division of the Department of Natural Resources is responsible for preserving, protecting, and managing all wildlife and fish in the State of Colorado. It maintains optimum numbers of indigenous fish and wildlife and ensures that no species are threatened with extinction. It is responsible for developing and administering State fish and wildlife regulations and monitoring both angling effort and harvest, as well as hunter effort and harvest. The Colorado Wildlife Commission also has the authority to designate Gold Medal and Wild trout fisheries in the State. It is noted in the eligibility determination (Appendix D) for Segments D through H which segments under study have been conferred a designation for Gold Medal trout fisheries.

COLORADO STATE FOREST SERVICE

The mission of the State Forest Service is to achieve stewardship of Colorado's environment through forestry outreach and service. The agency provides assistance to private landowners and administers the State laws pertaining to forestry and wildfire prevention and suppression.

DENVER BOARD OF WATER COMMISSIONERS

The Denver Board of Water Commissioners is chartered by the city and county of Denver to have complete charge and control of the waterworks system and plants for supplying the city and county with water. The board has the power to purchase, condemn, lease, or otherwise acquire land and water rights and to construct, maintain, and operate water treatment plants **and distribution systems for Denver Water**. Denver Water, which supplies water to about half of the Denver metropolitan area, owns 3,352 acres in the study corridors and has many water rights in the study corridors. It has been involved in strong individual efforts on its lands and in cooperative efforts on other lands to improve recreation opportunities and protect natural resources in the study corridors.

ELEVENMILE CANYON ECOSYSTEM MANAGEMENT PROJECT

This management plan, approved by the Forest Service in May 1995, provides additional direction to protect the unique recreational, fisheries, and other values in the Elevenmile Canyon area (Segment A). The plan for this area calls for converting most of the campgrounds to day use facilities and constructing a single large campground on the canyon rim to the south. It also recommends closing the upper 3 miles of the road below Elevenmile Dam to motor vehicles and paving the remaining roads to reduce sediment and protect fisheries. Under the plan, a

concessionaire under a special-use permit manages recreation facilities and parking sites in the canyon. This ensures the protection of the quality recreation experience and resources by providing intensive management of visitor use and behavior in the area.

The Forest Service is not anticipating implementing this plan in its entirety. The Service lacks the resources to design and construct a large facility or pave and close the upper 3 miles of the road. A total maximum daily load (TMDL) study was completed in the spring of 2002 (Colorado Department of Public Health and Environment [CDPHE], 2002b). Recommendations from this study include improving road maintenance practices and identifying opportunities within developed recreational sites to reduce sediment in the canyon. The Forest Service intends to rehabilitate existing facilities to reduce erosion and prevent new sources of sediment.

ELEVENMILE CANYON RECREATION AREA

In addition to the ecosystem management project discussed above, special regulations established in 1984 help protect in this area. These rules prohibit the discharge of firearms and also prohibit camping and campfires outside of developed campgrounds.

FRONT RANGE MOUNTAIN BACKDROP PROJECT

This is a joint cooperative project involving landowners along the Front Range as well as Boulder, Douglas, Jefferson, El Paso, and Larimer Counties, to help encourage the preservation of the mountain backdrop extending from Ft. Collins to Colorado Springs. The study will be used to update the open-space components of the counties' master plans. It will define "viewsheds" and visual aspects of the mountains and will help the counties determine where development or other land uses are appropriate. The counties are also

exploring future cooperative efforts to assist in preserving key open space and historic lands. These include conservation easements, limited development rights, concentrating development in some areas while permanently restricting it in others, long-term leases to keep property in agricultural use, land trades and exchanges, reclamation of disturbed lands, and fee simple purchases from willing sellers. This project may help to preserve the North Fork and South Platte study corridors in Douglas and Jefferson Counties.

INTERIM MANAGEMENT PLAN FOR THE SOUTH PLATTE

In 1993, an Interim Management Plan was instituted to improve public safety, protect the recreation experience, and protect and repair impacted riparian and wetland areas along the South Platte from Deckers to the confluence and along the North Fork from Buffalo Creek to the confluence. The plan and subsequent orders for the area eliminated overnight camping except in designated camping areas, prohibited parking except in designated sites, prohibited overnight use except in developed facilities, allowed fires only in designated camping area fire rings, and closed the “Chutes” area to the public. Dispersed camping was banned within one-quarter mile of either side of the rivers. There are now 72 parking areas that will accommodate approximately 1,600 people at one time, and camping is allowed only in designated sites.

Under the plan, some recreation sites were rehabilitated, damaged riparian areas were restored, trees, grass, and shrubs were re-established, and vehicle barriers were installed. The plan is implemented through a major cooperative effort between the Forest Service, BLM, Denver Water, the Colorado Division of Wildlife (CDOW), and the Douglas and Jefferson County Sheriff's Departments and has greatly improved the recreation experience and natural resources in the area.

U.S. ARMY CORPS OF ENGINEERS

Any encroachment or channeling activities in a natural stream or wetland as defined by the U.S. Army Corps of Engineers are subject to the requirements of section 404 of the Federal Clean Water Act. A permit must be obtained from the USACE before any such activities can occur within the streams.

U.S. FISH AND WILDLIFE SERVICE

The U.S. Fish and Wildlife Service (USFWS) administers the Endangered Species Act of 1973 (as amended) (ESA) for plants, animals, and non-anadromous fish within the United States. Government agencies and private landowners may find their range of management strategies limited by the ESA when it is determined that a threatened or endangered species, or its critical habitat, may be affected by a proposed management action.

All Federal projects that may affect threatened or endangered species, or their habitat, must be approved by the USFWS in accordance with the ESA. These approvals and/or modification recommendations provide additional direct protection to these species in the study corridors.

The entire North Fork and the South Platte study corridors include populations of bald eagles, which are listed as threatened under the ESA. In addition, Segment H of the North Fork and the South Platte downstream from Corral Creek contain up to 20 percent of the population and critical habitat for the Pawnee montane skipper butterfly, listed as threatened under the ESA. The butterfly's habitat, which extends up the dry hillsides above the study corridor, contains the world's sole population of this species. Also, based on the known elevation limits of the Preble's meadow jumping mouse, Segments C, D, E, and H contain potential habitat for this threatened species.

U.S. ENVIRONMENTAL PROTECTION AGENCY

EPA is responsible for administering the Nation's laws on air quality, water quality, solid and hazardous wastes, pesticides, toxic substances, and cleanup of hazardous wastes under the Superfund. Its functions include setting and enforcing environmental standards; conducting research on the causes, effects, and control of environmental problems; and assisting the States and local governments. EPA reviewed the USACE's *Two Forks Reservoir Environmental Impact Statement* and denied the permit for the Two Forks Dam and Reservoir under section 404(c) of the Clean Water Act (EPA, 1990). EPA would continue to review any new dam proposals in the area under the Clean Water Act.

2.9 GRAZING

Most of the study area supports herbaceous or shrubby vegetation that provides forage and habitat for wildlife. Vegetative types in the study river corridors vary from riparian meadow bottoms to upland grass and shrub types with conifer overstories.

Domestic livestock grazing is a common use on the private lands in the upper portions of the North Fork study corridor and on the private lands downstream from Lake George. There are also some small private horse pastures along the lower North Fork and lower South Platte. Some grazing also occurs on portions of the National Forest System lands within the corridors and is controlled by a permit system administered by the Forest Service. The study corridors serve as the boundary between several allotments, and grazing within them is light. This grazing is allowed under controlled management conditions that will maintain or improve the range resource and riparian health. Current management includes the use of allotments with individual pastures where animals are rotated through areas according to

the season, available forage, utilization levels, and resource objectives. Allotments along the South Platte River corridor include the Thirtynine Mile Mountain North, Wagon Tongue, Blue Mountain, Rocky, Badger, Crystal, Lower West Creek, Wigwam, and Platte River. Allotments along the North Fork include Spring Creek, Buffalo, and Craig Meadows. All of these are or have been stocked with cattle. The grazing use that does occur within these allotments is described below.

ALLOTMENTS ALONG THE SOUTH PLATTE RIVER CORRIDOR

Thirtynine Mile Mountain North

The northern edge of the Reservoir unit of this allotment borders the South Platte River just below the spillway at Elevenmile Reservoir. The terrain is too steep to allow access to the river by the cattle on this allotment. The river corridor is unaffected by grazing from domestic livestock along this 1-mile stretch of river.

Wagon Tongue

The northern boundaries of the Rimrock and Sledgehammer units border the South Platte River from about a mile below the spillway to Rankin Gulch. Steep topography prevents access to the river for most of the 4 miles on this stretch. Drift fences have been installed to prevent access to the river along this corridor. The Elevenmile Canyon Recreation Area occupies the entire stretch of river described as the boundaries for the units in the Thirtynine Mile and Wagon Tongue allotments. The river is not a source for water or forage on these allotments. Cattle use in this area is incidental.

The Blue Mountain unit in this allotment was added to the Wagon Tongue allotment in the 1960s. Blue Mountain borders the South Platte River from Rankin Gulch to Lake George. This unit has been vacant since the late 1960s, and there are no plans to restock it.

Rocky

This allotment has five units that border the South Platte River on its southern boundary from the spillway at Elevenmile to Lake George. The allotment has been vacant since 1947. There are no plans to restock it.

Badger

To the north of the Rocky allotment is the Badger allotment. The Tappan Gulch, Platte Springs, and Matukat units of this allotment all border the South Platte River on the west from Happy Meadows Campground to about a mile past the confluence of Tarryall Creek and the South Platte. All of these units are active. The Tappan Gulch and Platte Springs units are under permit for 25 head of cattle from June 11 to October 31. Most of the South Platte River is inaccessible to the cattle due to steep topography. Grazing is incidental. Part of the South Platte within the Tappan unit flows through a piece of private property known as the Sportsman's Paradise. Property owners are allowed to have horses on their lots, but there is no community horse pasture, and no grazing occurs along the river itself.

The Matukat unit was historically used as a separate unit and was permitted for 35 head season long. In 1989, the permittee elected to discontinue use of this unit due to conflict with public use. The unit remained vacant until 1996, when it was temporarily used with the Wigwam allotment to the north. The steepness of the terrain in this unit discourages cattle from accessing the river. Use is light along the river and occurs from cattle moving upstream from the Wigwam allotment. This unit will probably remain active in the future.

Crystal

On the east side of the South Platte directly across from the Badger allotment is the Crystal allotment. This allotment has been vacant since 1947, with the exception of 1989 when the allotment was stocked with a temporary permit

for 50 head of cattle. This proved to be unsuccessful due to the poor condition of existing fences and the inability of the permittee to keep the cattle within the bounds of the allotment. This allotment borders approximately 9 miles of the South Platte River, much of which is too rugged and unsuitable for grazing. This allotment is expected to remain vacant and may be closed.

Lower West Creek

North of the Crystal allotment is the Lower West Creek allotment. The west side of this allotment borders the South Platte from Metberry Gulch to about a quarter-mile south of Cheesman Reservoir. Historical problems from overgrazing, logging, and fire resulted in exclusion from grazing in 1950. In order to protect the watershed and allow re-establishment of vegetation, this allotment has remained vacant. There are no plans to restock it.

Wigwam

On the west side of the South Platte, north of the Badger allotment, is the Wigwam allotment. This allotment is divided into three units. The southernmost, the Wildcat unit, borders the South Platte for a little over a mile. There are 85 head of cattle permitted on this allotment from June 1 to September 30. The cattle are rotated between the three units during the grazing season. They are in the Wildcat unit a little over a month. The cattle have good forage along the river as well as in old burns and clear cuts on a bench above the river. Grazing use is light in all of these areas. Recreational use, particularly by off-road vehicles, is high along this stretch of the river. This prevents the cattle from concentrating in one place for any length of time. The cattle can also graze in Wildcat Creek and Corral Creek, which are tributaries to the South Platte. At Wildcat Creek, the allotment boundary swings to the east and away from the river. The river is not accessible to cattle from the northern and middle units.

ALLOTMENTS ALONG THE NORTH FORK OF THE SOUTH PLATTE RIVER CORRIDOR

Spring Creek

The Spring Creek allotment was located at the confluence of the North Fork with the South Platte River. Its boundary roughly followed the North Fork to Riverview. Most of the ownership along the North Fork is private. There is very little information on the history of this allotment. The allotment was excluded from grazing sometime prior to 1942, apparently because of severe erosion associated with grazing. The allotment has remained vacant since that time.

Buffalo Creek

Upriver from the Spring Creek allotment is the Buffalo Creek allotment, which includes about 1½ miles of the North Fork study corridor. It is all private property. The allotment was active until 1994, when the permit was waived back to the Forest Service. The permit was for 90 head of cattle. There are no plans to restock this allotment.

Craig Meadows

The vacant Craig Meadows allotment was combined with the Buffalo Creek allotment under one management plan. The North Fork is contained within the allotment to a point about a mile downriver from Bailey. None of the river is accessible by livestock as the terrain is too steep. The remainder of the corridor is located on private property. There are no plans to restock this allotment.

SUMMARY

Currently there are four active allotments along the South Platte River corridor and no active allotments along the North Fork corridor. No significant impacts from grazing have occurred on the river from these allotments. The Wigwam allotment is the only allotment where

cattle actively use the South Platte River. There are no plans to increase the number of cattle on this or any allotment along the river corridor.

The effects of management practices in the past and the increasing pressure over the last 50 years from urban growth and recreational use have made most of the vacant allotments impractical and uneconomical to use. Many of the historic ranches have been subdivided into smaller tracts and the water rights sold to meet the needs for growth along the Front Range. The allotments were usually adjacent to these ranches. It is doubtful that any of the vacant allotments will ever be restocked.

2.10 FOREST ECOLOGY

VEGETATION

Late in the 1800s, railroads provided access to the timber within the North Fork, lower South Platte (upstream to Nighthawk), and Elevenmile Canyon areas of the South Platte. Primitive roads provided access into most of the other areas. Historic surface fires and mixed severity fires maintained the forests in relatively open conditions. Dr. Merrill Kaufman (2000), U.S. Forest Service Rocky Mountain Research Station, estimates that more than 90 percent of the landscape around Cheesman Reservoir had crown closure of 30 percent or less. Large park-like ponderosa pine stands mixed with Douglas fir and some minor amounts of Colorado blue spruce covered much of the study area in the late 1800s and were harvested to provide timber for the railroad and lumber for the construction of Denver and other local communities. Large uncontrolled fires followed early timber operations. These areas regenerated to the dense forest conditions seen today as a result of these past logging practices, grazing, fire suppression, and Civilian Conservation Corps plantings during the 1930s.

Elevations range from 6029 to 9240 feet within the South Platte study corridor and from 6100

to 8400 feet within the North Fork study corridor. Ponderosa pine stands still cover much of the study area. Today's forests are denser than those of 200 years ago, and they have fewer old growth stands, fewer openings, and more Douglas fir. South-facing slopes at lower elevations are brushy with Gambel oak, mountain mahogany, and scattered Rocky Mountain juniper and ponderosa pine. North-facing slopes contain mixed stands of Douglas fir and ponderosa pine. All vegetation age classes are present, with the majority of stands 80 to 130 years old. Ground cover is relatively sparse. Riparian areas are characterized by riparian grasses, sedges, woods rose, willows, dogwood, and alder, interspersed with a few scattered narrowleaf and plains cottonwoods. Mountain grasslands typically occupy untimbered areas adjacent to mountain shrub, ponderosa pine, and Douglas fir types. They are scattered throughout the study area on relatively flat terrain between about 6500 and 9000 feet in elevation. Stands of quaking aspen are present in Elevenmile Canyon.

A small portion of the study corridor is used for agriculture (about 2,000 acres). Agricultural lands consist primarily of riparian and mountain grasslands situated on private lands along the river. These areas are used mainly for livestock grazing and a minor amount of hay production. Most of the agricultural lands lie in the upper portions of the North Fork study corridor above Buffalo Creek and in the area between Lake George and the northern boundary of private lands near Tappan Gulch. There are also nonagricultural grasslands along the South Platte study corridor between Deckers and the confluence with the North Fork.

Of special importance in the study corridors is the prairie gayfeather plant (*Liatris punctata*), which is the primary food source of the threatened Pawnee montane skipper butterfly. This butterfly is endemic to the study corridors and to adjacent areas on the North Fork and South Platte downstream from Tarryall Creek. There are no records of federally listed threatened or endangered plants in the study

area. There are also no records of plants within the study area that are on the Forest Service's list of sensitive species. The corridor does contain potential habitat for one federally listed threatened species—the Ute ladies' tresses orchid (*Spiranthes diluvialis*).

Noxious Weeds

Noxious weeds are prevalent along the river corridor. To date, noxious weed occurrences have been mapped, and treatments on National Forest system lands have been conducted since 1999. Denver Water is also actively working to control weeds on their lands. Open houses have been held in the general vicinity of Deckers for 2 years to educate local private landowners about noxious weeds and weed management. The threat of continued spread increased significantly as a result of the Hayman Fire. Efforts to treat and prevent further expansion are being addressed as part of the Hayman restoration program.

TIMBER

Logging was important in the entire study area from 1860 to 1900. Cutting rates probably peaked shortly after 1880 to support mills supplying lumber for Denver and various mining towns. The Denver, South Park and Pacific Railroad (DSP&P) was constructed along the North Fork from Denver to Leadville by 1880 and provided rail access to wagon road systems, which covered the area. In about 1896, the Colorado Midland Railroad was completed from Denver to Buena Vista and Leadville through Elevenmile Canyon. Much of the saw timber, readily accessible to the railroads, was removed by the turn of the century. Much of the area is shown as "cut over and burned" on early Forest Service timber inventories.

Nearly all the National Forest System lands in the study area are forested and part of the suitable timber base for the Pike and San Isabel National Forests. In the past 50 years, there have been no commercial timber sales on

National Forest System lands in the corridors. Timber harvest has been limited to the cutting of dead and down timber for firewood. The Upper South Platte Watershed and Protection Project has identified 1,434 acres for treatment within the study area.

The study area is estimated to contain 4,895 acres of suitable timber on National Forest System lands. "Suitable" is defined as harvestable timber on forest lands in Forest Plan management areas, which include scheduled timber harvest on a regular sustainable basis. These suitable acres currently produce an average of 11.6 cubic feet of wood per acre annually or 56,770 cubic feet of wood annually for the study corridors.

Minimal harvest on private lands in the 1900s consisted of thinnings and partial cuts. Harvesting decreased in the late 1900s due to increased recreational use and residential development. Denver Water, Colorado State Forest Service, and the U.S. Forest Service have begun restoration timber management following the 1996 Buffalo Creek and 2000 Hi Meadow Fires, each of which burned more than 10,000 acres. Approximately 500 acres of Denver Water lands have been commercially thinned since 2000.

On the 29 acres of the North Fork study corridor near Cathedral Spires that had been managed by the BLM until 2001, timber harvest and other management activities were governed by BLM's Northeast Resource Area Management Plan. The plan identified the corridor as part of the Evergreen Management Unit. Within this unit, the area is composed of forest and rock outcrops. Under BLM management, the entire area was unavailable for commercial timber harvest, and management was restricted to maintain recreation, scenic, wildlife, and watershed values. This land was transferred to Jefferson County ownership in 2001. The county will continue to manage the area for the same values.

ECOLOGY

Wildfires and Native American burns were the predominant shapers of vegetation types prior to European settlement in the middle of the 19th century. Fire exclusion since the 1940s has led to the loss of openings and increased tree density in ponderosa pine and Douglas fir stands. This resulted in little understory development in the grass and shrub components, poor tree vigor due to overstocking, and a shift in fire intervals from frequent cool fires to infrequent, high intensity, stand-replacement fires. This resulted in a decline in forest health, including increased insect infestations, disease, and parasitism by dwarf mistletoe. Douglas fir mortality has become very noticeable in the past decade with losses from spruce budworm, tussock moth, and bark beetles. Ponderosa pine bark beetle mortality was heavy in parts of the study area in the 1960s and 1970s but has been low since then. Adjacent areas are experiencing an increase in mountain pine beetle mortality. These conditions have increased the potential for large, intense fires.

An example of the problem created by fire exclusion is the Buffalo Creek Fire in May 1996. Driven by strong winds, the fire burned 11,875 acres in the Buffalo Creek area. Fire intensity levels were extreme, killing all forest vegetation on more than 7,000 acres and destroying several homes. In the river corridor, about 800 acres were affected; but tree mortality was light. Subsequent flooding devastated the riparian vegetation along Spring Creek and Buffalo Creek.

In June 2000, the Hi Meadows Fire burned another 11,000 acres in the North Fork of the South Platte River drainage. Fire intensity was less severe than the Buffalo Creek Fire; but more than 5,000 acres of forest vegetation was killed, and 51 homes were destroyed. Tree mortality in the study area was also light. Sediment from the Hi Meadow Fire has created scouring in some tributary channels but has had little effect on the riparian environment.

2.11 SOILS

GENERAL SOIL TYPES

The soils of the study area have developed primarily from materials derived from the Pikes Peak Batholith. The granites from the batholith include medium- and coarse-grained hornblende-biotite deposits throughout most of the study area and fine-grained quartz monzonite and granodiorite in the northern portion of the study area. Within the river corridors, the soils have developed in colluvial deposits on mountain sides and fluvial deposits in intermittent and perennial drainage bottoms. Slopes range from 15 to 80 percent along the mountain slopes and 0 to 10 percent in the valley bottoms. In general, the soils are moderately acidic, have low cation exchange capacity and low organic matter content, and are shallow to bedrock. These soils are commonly referred to as “decomposed granite.”

Two dominant soils occur along the river corridors. These are the Sphinx and Legault. The Sphinx soils are shallow and somewhat excessively drained. They formed in material weathered from Pikes Peak granite on mountain sides. The surface layer is gravelly to coarse sandy loam. It has high permeability and little available water capacity; so runoff is moderate to rapid, and the hazard of water erosion is moderate to severe depending on slope. The Sphinx soil supports ponderosa pine and Douglas fir communities. The Legault soil is dark grayish brown, very gravelly coarse sandy loam that has also formed from weathered Pikes Peak granites. It is found on north-facing slopes and at higher elevations on the mountain sides. Its permeability is moderately high, and its available water capacity is very low. Runoff is rapid, and the hazard of water erosion is moderate to severe depending on slope. The dominant vegetation consists of Douglas fir.

The valley bottoms contain fluvial deposits. These deposits represent past flooding events and are commonly stratified by sizes that

represent different flow rates or flood intensities. Due to their proximity to the drainages, these soils support a much higher production and diversity of vegetation. The soils and the associated vegetation of the valley bottoms are critical for maintaining the equilibrium within the watershed. Soils and associated vegetation as they provide protection and storage for water and nutrients and act as a buffer to erosional events.

USE AND MANAGEMENT

The soils derived from the Pikes Peak Batholith are very erosive. The erosional processes include unraveling and rolling of particles downslope. Sheet, rill, and gully erosion are common following any surface disturbance in this area. Due to the structure of the bedrock, the soils are not susceptible to mass wasting or land slides. South- and west-facing aspects are more susceptible to erosion, owing to the low amounts of organic matter in the soil surface and higher amounts of rock outcrop and bare soil. Slopes greater than 35 percent occur along the river corridors. The erosion potential on these slopes is rated as severe.

Recreational uses in the study area are increasing and are expected to increase further in the future. Road and trail systems in the area are currently the most likely sources of erosional soil losses and downstream sediment impacts. Proper location of road and trail systems is required to minimize soil losses and maintain watershed health. Access points and travel corridors should be located along contours and outside of drainage channels. The road and trail systems above the river corridor impact the health and water quality of the South Platte River and must be taken into consideration. Downstream impacts of sedimentation can be seen in several areas. The origin of the sediment is generally higher in the watershed and related to soil disturbance through access or recreational uses. The potential for soil losses and degradation of the river corridor is very high, given the inherent erosiveness and low productivity of the soils.

In May 1996, a human-caused wildfire burned about 11,875 acres in the Buffalo Creek area, including about 800 acres within the study corridors near the confluence of the North Fork with the South Platte River. The burn was quite light within the study corridors and resulted in little tree mortality. The case was quite different however, outside the study corridors, where tree mortality was 100-percent mortality on more than 7,000 acres. On July 12, 1996, a major storm caused serious flooding in Buffalo Creek, which continued downstream along the North Fork to Strontia Springs Reservoir and from Spring Creek down the South Platte to Strontia Springs Reservoir. A 10- to 20-foot wall of water and mud washed down these streams, causing two fatalities and destroying several trailer houses, the fire station, the town water system, a community building, numerous automobiles, seven private bridges crossing the North Fork, and portions of County Road 96 along the North Fork. In addition, the flooding caused serious sheet erosion on the burned areas and deposited tons of sediment and debris into Strontia Springs Reservoir and along the study corridor below Buffalo Creek. Forest Service and local citizen and government rehabilitation efforts include seeding, construction of sediment check dams to limit erosion, and efforts to repair roads or replace bridges. It is unclear however, if all the private bridges will be rebuilt.

In June 2000, the Hi Meadow Wildfire burned 10,944 acres on public and private lands along the North Fork of the South Platte River. Roughly one-third of this human-caused fire was a stand-replacement event. High-intensity burn areas of Beaver, Buck, and Miller Gulches received extensive post-fire rehabilitation. However, summer monsoonal rainstorms in 2000 and 2001 have resulted in substantial sediment deposition from these tributaries of the North Fork.

In June of 2002, the Hayman Fire burned 137,500 acres, much of it along the mainstem in

Wildcat Canyon (Segment C) and around Cheesman Reservoir. Light summer rains lessened the potential impact of sedimentation, but even small rain events increased sediment loads in tributaries as well as the mainstem. The risk of increased sedimentation may be even higher a year after the fire.

The area of the South Platte below the Buffalo Creek, Hi Meadow and Hayman Fires will continue to receive large amounts of sediment through the mainstem and the North Fork for many years. Even though the lands have healed from the Buffalo Creek and Hi Meadow fires, the soil losses from the Hayman Fire could impact the river corridors for several decades, and the potential for a similar fire and subsequent erosion to occur in the South Platte watershed is high.

2.12 HYDROLOGY AND WATER RESOURCES

WATERSHED CHARACTERISTICS

The area of the South Platte River basin considered in this analysis consists of a roughly ½-mile-wide corridor (spreading out one-quarter mile from the ordinary high-water mark on each side of the river) that extends along the South Platte River from the high-water line of Strontia Springs Reservoir upstream to Elevenmile Reservoir and along the North Fork of the South Platte River from its confluence with the South Platte to the upstream property boundary of Berger Land Company, near Insmont. This is the area that was qualified in the Forest Plan for the eligibility determination for consideration for inclusion into the Wild and Scenic River System. However, in order to describe the hydrology of the reaches in question, it is important to consider the entire basin within which the rivers reside. The interrelationship between the climate and the geomorphology of the basin governs how the hydrologic system is managed.

The watershed above the high-water line of Strontia Springs, including the North Fork and the mainstem of the South Platte, covers an area of about 2,580 square miles. The landscape of the watershed above Strontia Springs Reservoir is varied, consisting of a mosaic of rugged rocky slopes, heavy forest, and open mountain meadows. The western boundary of the watershed is the Continental Divide, and the south and southwest boundary is the divide between the South Platte and Arkansas River basins. The east boundary is the Rampart Range, a divide between Plum Creek and the South Platte River above the high-water line of Strontia Springs Reservoir. The north boundary is a discontinuous chain of mountains that forms a divide with other tributaries that join the South Platte farther downstream. The mountains forming the divides range from 6,000 to more than 14,000 feet above mean sea level. South Park is a large, nearly treeless mountain meadow of about 1,000 square miles, located above Elevenmile Reservoir and entirely surrounded by mountains. Downstream from Elevenmile Reservoir, the river enters a narrow valley, and the surrounding terrain becomes considerably steeper. The North Fork also flows in a narrow valley and merges with the South Platte upstream from Strontia Springs Reservoir.

FLOW CHARACTERISTICS

The North Fork and the South Platte historically exhibited a runoff pattern typical of a snowmelt-dominated system—they had high flows in the late spring and low flows in the winter. This runoff pattern has been altered by the construction of several reservoirs throughout the basin. The reservoirs moderate the highs and lows depending upon the storage and release patterns prescribed to meet water demands for agriculture and domestic uses along the Front Range. Release patterns are highly dependent upon downstream water rights, which commonly “call” water through these reservoirs. Spring peak flows tend to not be as sharp, and winter flows are much higher than natural runoff. During the runoff season,

the peak flows are taken off and stored in reservoirs, from which they can be released at a later time to meet demands in the Front Range area. These releases increase the flows in the river at times when it naturally would have low flows. The Front Range itself is rainfall dominated receiving substantial amounts of moisture from summer rainstorms. The effects of this pattern have been altered by the addition of transmountain diversions.

The reservoirs are owned and operated by Front Range municipalities primarily for water supply purposes. See table 2-11 for a list of reservoirs. Water storage is critical and serves two purposes—it provides a day-to-day opportunity to regulate both water use and surplus storage, and it provides carryover on an annual basis. Both are essential to water providers because of the variation of the weather, which affects demand both day-to-day and over the long term.

Low flows recorded at the South Platte gage below Cheesman show that the average mean monthly flow, since the start of the period of record (1924), has been as low as 2.0 cubic feet per second (cfs). This was the mean monthly flow in April 1957. A 13-year period of record, from 1956 to 1968, featured some of the lowest flows recorded for the South Platte over an extended period of time. The lowest year of record, however, was the 1978 runoff year, during which the average mean monthly flow was 60 cfs. The mean monthly flow has not dropped below 22 cfs since 1969. Even though the lowest total flow for a water year occurred since 1969, the mean monthly flow has remained above 22 cfs due to releases from reservoirs during low natural flow periods to meet demands of the Front Range.

Few minimum flow release requirements are in force on the South Platte River. The city of Aurora is required to release approximately 6 cfs for streamflow maintenance from its South Park sources. The city of Denver is required to release 30-60 cfs, depending on the season of the year, below Strontia Springs Reservoir

downstream to Chatfield Reservoir for fish habitat. There are no minimum release requirements and no major diversions on the North Fork. The lowest mean monthly flow recorded on the North Fork at its confluence with the South Platte since 1957 was 17 cfs.

In 1977, the Colorado Water Conservation Board (CWCB) established a 7-cfs instream flow right from the headwaters of the South Platte to Rich Creek. Otherwise, there are few instream flow rights for either the South Platte or the North Fork. There are, however, CWCB instream flow rights for 56 streams that are tributary to these two rivers.

Recent augmentations of base flows from releases by Elevenmile Reservoir and Cheesman Reservoir have improved conditions for trout in late summer, fall, and winter. In addition, these reservoirs modify spring peak flows and trap sediment being transported from upstream, resulting in altered stream morphology and aquatic habitat. High-flow stresses on fish are dependent on the magnitude and duration of the snowmelt runoff. The duration of high flows, at or near bankfull discharge, has been

increased by reservoir releases on the South Platte, and even more so by water imports through the Roberts Tunnel on the North Fork. Increased high-flow stresses on fish and increased bank erosion in some reaches have been documented in both rivers. However, flood flows still do not occur, often reducing channel scouring or bank formation. Thus, sediment remains trapped in the channel and is not flushed on a regular basis.

Tables 2-3 and 2-4, respectively, show mean monthly flow records for the South Platte (below Cheesman Reservoir) and for the North Fork (at the community of South Platte) over several decades. These flow records are unadjusted for reservoir releases or the influx of transbasin water.

Since the addition of flow from the Roberts Tunnel to the North Fork began in 1963, the mean annual flow in the North Fork measured near Grant has increased from 66 cfs to 135 cfs.

The North Fork basin produces nearly the same amount of water as the South Platte basin, even though the South Platte basin is at least 1,000 square miles larger. This is accounted for by the large amount of dry park area that contributes little flow from the upper South

**Table 2-3.—Mean Monthly Flows for South Platte River Below Cheesman Reservoir
(Period of Record 1924–95; United States Geological Survey [USGS] Gauge No. 06701500)
(cfs)**

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Average	123	65	46	50	49	51	147	282	326	345	342	197
Minimum	13	6.3	5.3	5.3	2.8	3.1	2	11	38	54	67	33
Maximum	380	266	118	130	143	208	932	1,716	1,067	984	984	431

**Table 2-4.—Mean Monthly Flows for North Fork of the South Platte River
At the Community of South Platte
(Period of Record 1909-10 and 1913-82; USGS Gauge No. 06707000)
(cfs)**

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Average	124	79	59	53	52	60	122	359	472	301	242	145
Minimum	36	32	18	19	17	26	45	69	83	64	57	42
Maximum	110	204	151	180	150	155	452	1,062	1,193	608	579	685

Platte basin and the transmountain diversions from the Blue River through Roberts Tunnel to the North Fork.

CHANNEL CHARACTERISTICS

Extensive and detailed channel stability studies were performed on the North Fork and mainstem of the South Platte River as part of the Two Forks study. The Forest Service determined the data collection methods, data sites, and channel classification techniques. The following channel stability information is taken from Simons & Associates (1986b).

The North Fork of the South Platte River has bed material consisting mainly of cobbles and boulders with some sand and gravel. The bed is quite stable and shows no evidence of significant aggradation or degradation problems. For the most part, the channel banks are low and stable. Some minor bank erosion is evident. Several reaches from Roberts Tunnel to the town of Insmont have had their water-conveying capabilities enhanced with drop structures and riprap. This work was performed by Denver Water as preventive stabilization in some cases and in response to bank instability problems in others. Some private landowners have requested and received from Denver Water special types of stabilization work, and others have performed their own stabilization work. In some reaches, low-flow channelization was constructed, and riprapped islands and random rocks have been placed to improve fish habitat. Significant development adjacent to the river includes agriculture, roads, and small towns.

Based on field surveys conducted on the South Platte and the North Fork by the Forest Service, bank erosion has substantially increased over the past several decades in the lower gradient, meandering reaches on both rivers. Eroding stream banks occupy a larger percentage of reach length than is typical for these stream types. This increased bank erosion is caused mainly by the increased duration and fluctuation of high flows, at or near bankfull discharge, due

to reservoir releases on the South Platte and water imports through the Roberts Tunnel on the North Fork. In some of these reaches, road location and maintenance activities, concentrated livestock, or recreation use along the river has further aggravated the bank erosion.

Channel types on the North Fork include rocky, steep canyon areas, like those from Estabrook to Crystal Lake near the town of Pine, and flatter, meandering areas through wider valley sections, as is the case from Pine to Buffalo Creek. Throughout this range of channel types, the river is basically stable, partly because of channel stabilization work and partly because of the inherent existing stability due to coarse bed material and vegetated banks. Denver Water has an ongoing project to enhance the water-conveying capabilities of the North Fork of the South Platte River. This has required site-specific channel stabilization procedures to eliminate any increased degradation or lateral migration associated with flow conditions since the Roberts Tunnel began operations in 1963.

The South Platte channel types range from a relatively flat, meandering channel through wider valley areas to very steep, rocky canyons. The meandering channel sections include the reaches from 1 mile below Oxyoke to Trumbull, the first mile upstream of the confluence with the North Fork of the South Platte River, and the reach from below Lake George to the mouth of Beaver Creek. Steeper, rocky canyons include the reaches from 1 mile below Oxyoke to 1 mile above the confluence of the North Fork, from Deckers to Cheesman Dam, from Cheesman Reservoir to the mouth of Beaver Creek, and through Elevenmile Canyon between Lake George and Elevenmile Reservoir.

Bed material sizes range from sand, gravel, and cobbles in flatter areas up to extremely large boulders in the steeper areas. Several reservoirs along this river have buffered the flow and reduced the sediment load. Minor amounts of land development have occurred along this

river, and no major river stabilization has occurred. Channel work that has been done in a few areas includes a number of jetties and weirs, built by fishing clubs on their own land. In summary, the South Platte in the study area is generally stable and has only minor amounts of bank instabilities. Simons & Associates (1986a) further states that:

There were no overall significant impacts to channel stability identified as a result of the diversion of water for any of the site-specific or No Federal Action alternatives for the mainstem channels in the study area.

The primary factors affecting channels are the frequency, magnitude, and duration of flow; bed and bank material size distribution; channel bank vegetation; sediment transport capacity; and sediment supply.

The effects of dams and reservoirs on channels are complex. Gravel and cobble bed channels may experience aggradation below dams because the flow releases are insufficient to transport gravel and cobbles deposited by tributary streams during spring high flows and other episodic events. On the other hand, water that has had the natural sediment load removed by impoundments can erode channels in order to reach a state of dynamic equilibrium.

The channel of the North Fork has been altered by the placement of bank stabilization structures to protect the banks from erosion brought about by the Roberts Tunnel transbasin diversion. Erosion has accelerated because of the increase of time that flows have been held near bankfull in order to meet metropolitan area water demands. Denver operates the flow from the Roberts Tunnel with the intent of never exceeding a combined flow of 680 cfs, measured at the State gage near Grant, or 980 cfs at the confluence with the South Platte. The 680 cfs is the sum of natural flow above the gage at Geneva Creek and does not include transbasin diversions from the tunnel. The 980-cfs value is the combined total of all natural flows and the transbasin diversion. When the natural flow of the North Fork exceeds 680 cfs

at the gage, Denver does not add water to the system from the Roberts Tunnel. With a lag time of 12 hours between release of flows from the Roberts Tunnel and gage readings at Grant and the confluence, sudden storms may add runoff to the augmented flows and, thereby, cause the flow to exceed 680 or 980 cfs.

The Roberts Tunnel at full capacity can deliver 1,020 cfs. In the future, the city of Denver does not plan to deliver flows from the tunnel that would increase the combined flow of the North Fork above Grant and the tunnel to greater than 680 cfs. However, the duration of flows up to 680 cfs may increase as greater demands are placed on Denver Water to provide water in the future.

The channel of the South Platte above the confluence of the North Fork has experienced some erosion due to high flows and/or longer than normal near bankfull conditions brought about by the combination of reservoir releases to meet demands and storms.

The channel gradient of the South Platte as it flows through South Park is about 0.7 percent. Below Elevenmile Reservoir to Lake George, the gradient increases to 1.0 percent. From Lake George to Cheesman, the gradient increases to 1.3 percent. From Cheesman to Strontia, the gradient reduces to 0.5 percent. The gradient of the North Fork from Insmont to its confluence with the South Platte averages approximately 1–2 percent.

WATER QUALITY

Water quality and stream condition information have been updated by revised editions of the State's Clean Water Act 303(d) and 305(b) reports of impaired streams (CDHPE, 2002a and 2002b) and by a watershed reconnaissance done by the Forest Service from 1997 to 1999.

This information is reported below for the eligible segments in the South Platte and the North Fork.

South Platte River

The upper basin provides excellent habitat for aquatic life and recreational opportunities in spite of sediment loading in many tributaries. Table 2-5 shows water quality information from the State 303(d) report (CDHPE, 2002b) for the South Platte basin above Strontia Springs. That report lists (1) the South Platte River from Elevenmile Dam to Cheesman Reservoir and (2) Trout Creek and its tributaries as only partially supporting coldwater aquatic life due to high sediment loads. South Mosquito Creek is identified as not supporting, and Mosquito Creek as only partially supporting, the designated beneficial uses owing to metals from mining impacts. In addition, table 2-6 lists several tributaries of the South Platte for which the report recommends further monitoring and evaluation, because these tributaries have suspected water quality problems and may deliver sediment to the South Platte River. Streams listed for temperature impairment may have exceeded temperature standards for cold

water aquatic life (20 degrees Celcius [°C]) or may have exceeded the temperature standard for diurnal fluctuation in temperature (no more than 3 °C increase over a minimum of a 4-hour period, lasting 13 hours maximum).

Temperature impairment may be due to releases of warmer surface water from reservoirs, changes in stream morphology (from narrow, deep channels to wide, shallow channels), or lack of shading by streamside vegetation.

Table 2-7 shows how eligible river segments on the South Platte could be affected by inflow from those streams, as determined by the Pike National Forest watershed reconnaissance completed in 1997.

The Pike National Forest watershed reconnaissance shows 20 tributaries of the South Platte in the study area to be impacted by sediment loads. These tributaries deliver increased sediment loads to the river. Sediment sources include roads, off-road-vehicle paths, concentrated-use sites, bank erosion, and sediment from the Buffalo Creek and Hi Meadow Fires, most of which are inventoried. The Hayman Fire of 2002 burned 137,500 acres within the Upper South Platte watershed. Approximately 3,400 acres or 15 percent (%) of

**Table 2-5.—Water Quality in South Platte Mainstem Basin
(Not Including the North Fork) Above Strontia Springs**

Segment Description	Status ¹	Constituent(s)	Use Classification ¹
South Platte River, from Elevenmile Dam to Cheesman Reservoir (COSPUS01A)	Partially supporting	Sediment	Aquatic Life Cold 1 Recreation 2 Water Supply Agriculture
Mosquito Creek, Source to Middle Fork South Platte River (COSPUS02B)	Partially supporting	Zn, Cd, Pb	Aquatic Life Cold 1 Recreation 1 Water Supply Agriculture
South Mosquito Creek, Above Mosquito Creek, Below Historic Mining (COSPUS02C)	Not supporting	Cd, Fe, Zn, Mn	Aquatic Life Cold 1 Recreation 1 Water Supply Agriculture
Trout Creek and Tributaries (COSPUS03)	Partially supporting	Sediment	Aquatic Life Cold 1 Recreation 2 Water Supply Agriculture

¹ See Appendix I for an explanation of status and classification.

**Table 2-6.—Streams in the South Platte Basin
(Not Including the North Fork)
Above Strontia Springs Identified for Monitoring and Evaluation**

Segment Description	Impairment
South Platte River, Sources to North Fork South Platte River	Sediment
South Platte River, Spring Creek to North Fork South Platte River	Sediment (Buffalo Creek Fire)
Balm of Gilead Creek	Sediment, Temperature
Cross Creek	Sediment, Temperature
Fish Creek	Sediment, Temperature
Ranger Station Creek	Sediment, Temperature
Salt Creek Downstream of North Fork	Sediment, Temperature
Sims Creek	Sediment, Temperature
Tarryall Creek	Sediment
Threemile Creek	Sediment, Temperature
Twin Creek	Sediment, Temperature
Union Creek	Sediment, Temperature
Wigwam Creek (Flying G Ranch to South Platte)	Sediment
Goose Creek (Lost Valley Ranch to Cheesman)	Sediment, Temperature
Horse Creek	Sediment, Temperature
Indian Creek	Sediment
Pine Creek	Sediment
Russell Gulch	Sediment
South Fork Lost Creek	Sediment
Spring Creek and Tributaries	Sediment (Buffalo Creek Fire)
Sugar Creek	Sediment
Trail Creek	Sediment, Temperature

**Table 2-7.—Impacts on Eligible River Segments from
Suspect Tributaries in the South Platte Basin
(Not Including the North Fork)**

Segment	Impact
A	Sediment loads, noxious weeds, flow disruption (some), bank damage (some)
B	Sediment loads, noxious weeds, flow disruption (some), bank damage (some)
C	Sediment loads, flow disruption
D	Sediment loads, flow disruption (some), bank damage (some)
E	Sediment loads, noxious weeds, flow disruption (some), bank damage (some)

the Wild and Scenic River study corridor burned. Much of the area did not burn due to higher moisture levels and steep canyon walls. The burn that did occur within the corridor was low, 84%, to moderate, 9%, with only 7% of the corridor inventoried as severely burned. However, sedimentation is high as sediment flows in from severely burned areas above the corridor, especially from the east side.

North Fork of South Platte River

Aquatic life is severely restricted in the North Fork and in tributaries such as Geneva Creek because water quality in these streams has been degraded by past mining activities and by natural contact with minerals. The State 303(d) report (CDHPE, 1998)(see table 2-8) lists the North Fork of the South Platte River (Hall Valley), Geneva Creek, and Scott Gomer Creek as partially supporting coldwater aquatic life due to metals contamination from abandoned mines and from mineral-rich geology. In addition, the State 305(b) report (CDHPE, 2002) lists Buffalo Creek and the North Fork below Buffalo Creek as severely impacted by sediment loads from the Buffalo Creek Fire and floods. Table 2-9 lists

streams in the North Fork watershed that have been placed on the State’s 303(d) monitoring and evaluation list, and table 2-10 shows how eligible river segments on the North Fork could be affected by inflow from those streams, as determined by the Pike National Forest watershed reconnaissance completed in 1997.

The Pike National Forest watershed reconnaissance identifies several tributaries to the North Fork of the South Platte in the study area to be impacted by sediment loads. These tributaries deliver increased sediment loads to the river. Sediment sources include roads, off-road-vehicle paths, concentrated-use sites, bank erosion, and sediment from the Buffalo Creek Fire, most of which are inventoried.

WATER DEVELOPMENT AND USES

Current Water Supply

Indigenous and imported water is released from storage reservoirs and transported down the rivers to satisfy domestic and irrigation demands along the Front Range. Table 2-11 lists the reservoirs in the South Platte basin and in

Table 2-8.—Water Quality in the North Fork of the South Platte Basin Above Strontia Springs

Segment Description	Status ¹	Constituent(s)	Use Classification ¹
North Fork South Platte, Hall Valley to Geneva Creek (COSPUS04)	Partially supporting	Al, Cd, Cu, Fe, Pb	Aquatic Life Cold 1 Recreation 2 Water Supply Agriculture
Geneva Creek, Scott Gomer Creek to North Fork South Platte River (COSPUS05B)	Partially supporting	Zn	Aquatic Life Cold 1 Recreation 2 Agriculture

¹ See Appendix I for an explanation of status and classification.

Table 2-9.—Streams in the North Fork of the South Platte Basin Identified for Monitoring and Evaluation

Segment Description	Impairment
Buno Creek and Tributaries	Metals
Buffalo Creek, Indian Creek to South Platte River	Sediment (Buffalo Creek Fire)
North Fork South Platte, Buffalo Creek to South Platte River	Sediment (Buffalo Creek Fire)
Geneva Creek above Scott Gomer Creek	Zn, Mining Impacts

Table 2-10.—Impacts on Eligible River Segments from Suspect Tributaries in the North Fork of the South Platte Basin

Segment	Impact
H1	Sediment loads, chemical/metals, flow disruption, channel work
H2	Sediment loads, chemical/metals, flow disruption, channel work
H3 (above Buffalo Creek)	Chemical/metals, flow disruption, channel work
H3 (below Buffalo Creek)	Chemical/metals, flow disruption, channel work, sediment loads, and bank damage (some)

Table 2-11.—Reservoir Capacity, Control or Ownership, and Amount of Storage by Municipality

Reservoir Name	Capacity (acre-feet)	Municipality	Storage by Municipality (acre-feet)
South Platte Basin			
Tarryall	2,445	CDOW	2,445
Antero	20,015	Denver	20,015
Spinney Mountain	53,651	Aurora Thornton	53,151 500
Elevenmile	97,779	Denver	97,779
Cheesman	79,064	Denver	79,064
Strontia Springs	7,864	Denver Aurora	7,164 700
Jefferson Lake	2,170	Aurora	2,170
Wellington	4,400	Wellington Res. Co. Thornton	4,300 100
Duck Lake	600	Burlington Ditch Res. Co. Thornton	550 50
Blue River Basin			
Dillon	254,036	Denver	254,036
Arkansas/ Eagle River Basin			
Homestake	45,000	Aurora	21,441
Turquoise	129,433	Aurora	20,000
Twin Lakes	140,339	Aurora	2,717

adjacent basins that supply water to the Denver metropolitan area through the South Platte River system.

An understanding of how the supply system is managed can be gained by studying how the city of Denver manages its water needs. The following description of the Denver Water system is limited to information necessary to understand the potential effects of a Wild and Scenic designation on the system. All of Denver's water is derived from water rights owned or controlled by Denver Water through the State of Colorado water rights priority system. Raw water supply system diversions are located on both the eastern and western slopes of the mountains, in the South Platte and Blue River basins, respectively.

In many years, the Denver Water raw water system can legally divert more water than can be consumed or stored; however, during dry years and during parts of the fall, winter, and spring months, the divertible yield to the Denver Water system is less than the demand, and water must be drawn from storage reservoirs to provide the difference. The divertible yield is the amount of water that Denver Water could legally remove from the various river basins, assuming adequate storage is available for all water not immediately used. The actual yield to Denver consumers in a given year is also influenced by operational factors and carryover storage.

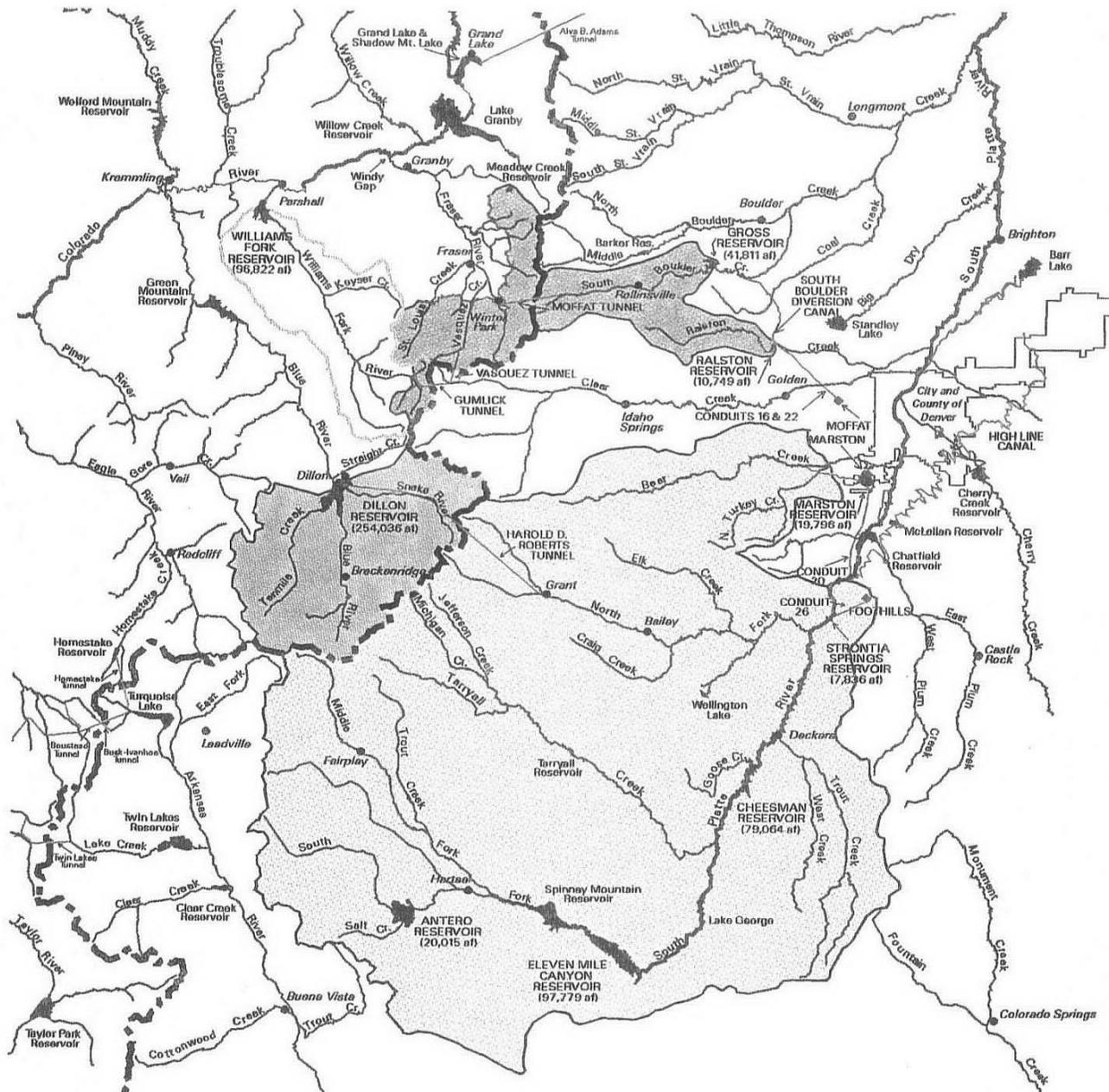
The Denver Water raw water supply system is composed of water rights and physical facilities. The water rights comprise a large number of diversion, storage, and exchange rights. Physical facilities include diversion, storage, and conveyance elements, which are necessary to reliably satisfy the demand of Denver Water users and meet the commitments to other water suppliers in the Denver metropolitan area for raw and treated water. Denver's system is divided into two major units: the southern system and the northern system. Potential Wild and Scenic River designation would affect only the southern system, which consists of the

water that is released from Antero, Elevenmile, Cheesman, and Dillon Reservoirs and conveyed through the South Platte, the Roberts Tunnel, and the North Fork to the Marston and Foothills water treatment plants (map 2-6).

Antero Reservoir.—Antero Reservoir, located on the South Fork of the South Platte River, has a capacity of 20,015 acre-feet. The reservoir has a relatively junior water right (1907) and is operated to provide Denver Water with carryover storage that is needed during long drought periods. Once Antero Reservoir is filled, it is maintained as full as possible and is not used to provide for normal seasonal fluctuations in demand. When Antero Reservoir's storage is depleted, it may take many years to refill because of its junior water right and upstream location. Evaporation losses from Antero Reservoir, Elevenmile Reservoir, and Cheesman Reservoir (discussed below) are made up to the South Platte River system through exchange at the Metropolitan Denver Sewage Disposal District 1 Central Plant (MDSDD No. 1) by discharging sewage effluent derived from western slope water.

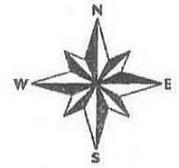
Elevenmile Reservoir.—Elevenmile Reservoir, located on the South Platte River, has very junior decreed rights (1926 and 1957). The storage capacity is 97,778 acre-feet. The reservoir is operated in the Denver Water system to provide carryover storage that is needed during long drought periods. Once Elevenmile Reservoir is depleted, it may take many years to refill because of the junior water rights.

Cheesman Reservoir.—Cheesman Reservoir, located on the South Platte River, has relatively senior decreed rights (1889, 1893, and 1929) for an active storage capacity of 79,064 acre-feet. Cheesman Reservoir is operated to provide storage to accommodate seasonal fluctuations in supply and demand and provide carryover storage for long-term dry periods. Because of its senior rights and downstream location, Cheesman Reservoir is more easily refilled than any of the other large South Platte reservoirs.

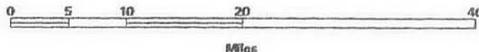


LEGEND

- | | | | |
|--|-----------------------------------|--|-------------------------|
| | South Platte Collection System | | Continental Divide |
| | Roberts Tunnel Collection System | | Major Stream or River |
| | Moffat Collection System | | Major Canal or Tunnel |
| | Williams Fork Reservoir Watershed | | Major Lake or Reservoir |
| | Denver Water Treatment Plant | | Town |



Scale 1:1,000,000



Map 2-6.—Water Collection System.

Dillon Reservoir.—The upstream component of the Blue River basin subsystem is Dillon Reservoir, which was constructed in the 1960s as part of the development of the Blue River basin as a water supply source for Denver. Dillon Reservoir has a capacity of 254,346 acre-feet of storage above the outlet to the Roberts Tunnel. The terms of a Federal right-of-way provide for a minimum release to the Blue River of 50 cfs or the natural inflow to Dillon Reservoir, whichever is less. Historically, the minimum release and downstream tributary inflows have been sufficient to satisfy active senior agricultural water rights downstream on the Blue River.

The Roberts Tunnel conveys water from Dillon Reservoir to the North Fork at Grant. The direct flow decreed capacity of the tunnel is 788 cfs. The Roberts Tunnel also intercepts a ground water source and produces approximately 5 cfs of yield in addition to the transmitted flow. Water delivered to the eastern slope through the Roberts Tunnel flows down the North Fork from Grant to the confluence with the mainstem of the South Platte River. Flow in the North Fork is constrained by channel capacity, which is 680 cfs at Grant and 980 cfs at the confluence with the mainstem. The flow in the North Fork is further constrained in the winter because of icing conditions that reduce channel capacity. Roberts Tunnel releases are restricted to the differences between actual flow in the North Fork and the capacity constraints of the channel. Conveyance losses of 5 percent are charged by the State Engineer against water delivered from Dillon Reservoir to account for seepage losses in the North Fork.

Denver looks to the South Platte basin to provide approximately 75 percent of its water supply needs (50 percent from the South Platte and 25 percent from the North Fork). The current demand on the Denver system averages 285,000 acre-feet per year. The current yield is approximately 375,000 acre-feet per year, which is a long-term average. In extended periods of drought—such as has occurred in the last few

years—available water supplies can become inadequate. Water restrictions and pricing disincentives ensue, serving as reminders to citizens and governments that abundant water cannot be assumed.

Other water providers manage their systems in much the same way as Denver Water to one degree or another. Only those listed below have rights that make a noticeable impact on the South Platte basin.

Aurora.—The current demand for Aurora is approximately 60,000 acre-feet per year and growing at about 2 percent per year. Of that, 45 percent is native South Platte River water, 50 percent is imported from the Arkansas and Colorado basins using the South Platte as a conduit, and 5 percent is from local supplies. Current water rights available through the South Platte basin total 35,000 acre-feet per year.

Aurora is projecting a need for an additional 10,000 acre-feet every decade. Some of that will come from water conservation, additional reuse within the service area, and other local supplies. It is expected that a majority of the new supplies will be delivered through the existing South Platte system.

Thornton.—Thornton derives approximately 15 percent of its water supply needs from the South Platte basin during average or wet years. During drought years, that figure rises to approximately 25 percent. Thornton's current demand is approximately 24,000 acre-feet per year.

Future Demands for Water

Projecting the future water needs of the Denver metropolitan area is a highly complex undertaking. Studies are made every few years on the matter; and while the general pattern of projected shortages regularly appears, the details vary. For example, information supplied by the water providers indicates that their long-term needs for additional firm annual supplies total 34,000 acre-feet for Denver Water (after the year 2035), 125,000 acre-feet for the Suburban

Water Providers, and 39,000 acre-feet for Aurora. (Denver Board of Water Commissioners, 1997; Suburban Water Suppliers Wild and Scenic Task Force, 1997).

In another view of projected water needs, the Metropolitan Water Supply Investigation (MWSI) (Hydrosphere Resource Consultants, Inc., 1999) explored cooperative solutions to future water supply needs in the metropolitan Denver area. Prepared for the Colorado Water Conservation Board, the investigation reviewed supply and demand projections, as summarized in table 2-12. It also identified future unmet water needs in the range of 79,000 to 148,000 acre-feet and reviewed cooperative approaches that could help address the unmet needs of the metropolitan area. Considerable uncertainty surrounds the projections made therein, related to the assumptions that had to be made for environmental factors, political factors, population growth, price changes, and other factors.

While Denver Water, Suburban Water Suppliers Wild and Scenic Task Force, and MWSI reports do not appear completely consistent, any actual discrepancies simply point out the complexity that is inherent in projections of this nature. Additional complexity comes from the magnitude of information and analytical systems required for making comprehensive analyses of water resource issues. An effort currently underway is described in the *South Platte Decision Support System* by the Colorado Water Conservation Board (2001; see especially p. 1-1 to 1-3). A summary of various efforts can be found also in a study published by the Natural Resources Law Center at the University of Colorado School of Law (Nichols et al., 2001, pp. 15-20). While this Wild and Scenic River study takes note of these complexities, it is beyond the scope of this study to resolve them. Regardless of the actual numbers, it remains clear that the Denver metropolitan area will need to obtain additional water, from some source, to serve projected growth.

Water suppliers in the Denver metropolitan area are not equally prepared for these future demands for water. Denver Water is the best prepared, having secured adequate supplies for at least the next 50 years. Some suburban providers are much less prepared, as they rely on ground water supplies that are being recharged either not at all or at a rate insufficient to perpetually supply the demands of a rapidly growing area. Surface water rights from the South Platte, Arkansas, and Colorado River basins have been the preferred source of water supplies.

As surface water supplies become more costly because of limited supplies, environmental regulations, and political resistance to new dams and reservoirs, other sources are being explored. Northern Denver suburbs have acquired irrigated farmland and concomitant water rights with plans to divert and use the water for municipal purposes. Agriculture accounts for more than 90 percent of all Colorado water consumption, and municipal use of the same water would actually reduce consumption (Natural Resources Law Center, University of Colorado School of Law, 2001, p. 111). However, Denver area residents and local governments are concerned that pursuing agricultural water could threaten the traditional and desirable land use and small town economies just outside the metro area.

Southern Denver suburbs have chosen ground water as their primary source, at least temporarily. The southern suburbs are located on top of four vast deep aquifers—Dawson, Denver, Arapahoe, and Laramie-Fox Hills. Each is being heavily tapped by subdivisions in Douglas County. Experts disagree on the merits of using this resource. While all recognize that the water source is limited, some believe it is acceptable to draw down the aquifers and rely on the supplies for many years. Others see this as prudent only in the short term, allowing local water providers time to pursue more reasonable long-term supplies.

**Table 2-12.—Projected Water Supply and Demand, Denver Metropolitan Area
(Data in Acre-Feet per Year)**

Sub-region	Projected Future Water Demand	Basis of Projection	Reasonably Certain Future Supply¹	Future Unmet Needs²	Applicable Cooperative Supply Opportunities³
Denver Central	⁴ 454,000	Build-out	410,000	⁵ 14,000 to 44,000	Conjunctive use with South sub-region, effluent management with northeast sub-region, system integration with northwest sub-region and Aurora
South Metro	127,000	Build-out	127,000	0	Conjunctive user with Denver, effluent management within Cherry and Plum Creek basins
City of Aurora	⁶ 105,000	2030	75,000	⁶ 30,000	Effluent management with Northeast sub-region, coordinated reservoir operations with Denver
Northeast metro	125,000	Build-out	⁷ 61,000 to 100,000	⁷ 25,000 to 64,000	System integration and effluent management among Denver, Aurora, Brighton, South Adams County WSD, Thornton and the Barr Lake companies
Northwest Metro	100,000	Build-out	90,000	10,000	System integration with Denver, effluent management within Clear Creek and Big Dry Creek basins
Total	911,000		763,000 to 802,000	79,000 to 148,000	

¹ Based on their planning efforts to date, water providers have a relatively high degree of confidence in these supplies.

² Providers have a relatively lower degree of confidence in their plans to meet these needs, based on uncertainty factors and the comparatively longer time frames before these supplies would be needed.

³ Cooperative supply opportunities could be used to meet future unmet needs or as an alternative to reasonably certain future supplies.

⁴ Includes Denver Water and Englewood; includes Denver Water's 30,000 AF safety factor

⁵ Based on the expected range of Denver Water's future safety factor.

⁶ Includes Aurora's 10,000 AF planning reserve

⁷ Depending on the degree of implementation of Thornton's Northern Project.

All of the study corridors contain areas that have potential dam sites for water storage for the Denver metropolitan area. Some of these sites have been under consideration for more than a century. The entire South Platte study corridor is within existing power site withdrawals—lands reserved for power development under section 24 of the Federal Power Act of June 10, 1920, as amended (16 United States Code [USC] 818). This land was withdrawn in cooperation with the Federal Energy Regulatory Commission (FERC) for the planned Two Forks dam and reservoir, and

the withdrawals are still in effect. As a result, none of the study rivers currently receive any legal protection from hydropower development, dam construction, diversions, or other water developments other than under section 404 of the Clean Water Act (dredge and fill permit system administered by the U.S. Army Corps of Engineers and the Environmental Protection Agency).

In addition, Denver Water has an approved right-of-way for a 345,000-acre-foot reservoir, issued in 1931 by the

U.S. Department of the Interior pursuant to the provisions of the Transfer Act of February 15, 1905 (33 Statute 628). A reservoir on this right-of-way would inundate private and National Forest System lands from just below the confluence of the South Platte and the North Fork to just upstream of Foxton on the North Fork and to just upstream of Deckers on the South Platte (map 2-7).

In the 1980s, a proposal for a 1,100,000-acre-foot reservoir was analyzed in the 1988 *Metropolitan Denver Water Supply Environmental Impact Statement* (USACE, 1988). The preferred alternative proposed the construction of a 600-foot-high Two Forks Dam just below the confluence of the South Platte and the North Fork in the same general vicinity as the reservoir contemplated under the 1931 right-of-way (map 2-7). Other alternatives proposed included a smaller, 400,000-acre-foot Two Forks Reservoir, a 200,000-acre-foot reservoir at Estabrook, and a new Cheesman Reservoir formed by a dam just downstream from the current Cheesman Dam (Cheesman Expansion). The Environmental Protection Agency issued a Recommendation Determination in 1989 to prohibit construction of all proposed options under section 404(c) of the Clean Water Act. The Final Determination, issued by EPA in 1990, was upheld in a June 5, 1996, U.S. District Court decision on an appeal by eight suburban water districts. (See Section 3.3, History.) The decision to prohibit dam construction under the 1988 proposals does not affect the original 1931 right-of-way for a 345,000-acre-foot reservoir.

Interest in dam construction in the study corridors is likely to continue, inasmuch as the two study rivers serve as major conduits for transporting water to the Denver metropolitan area from within the basin and from the western slope. Some water

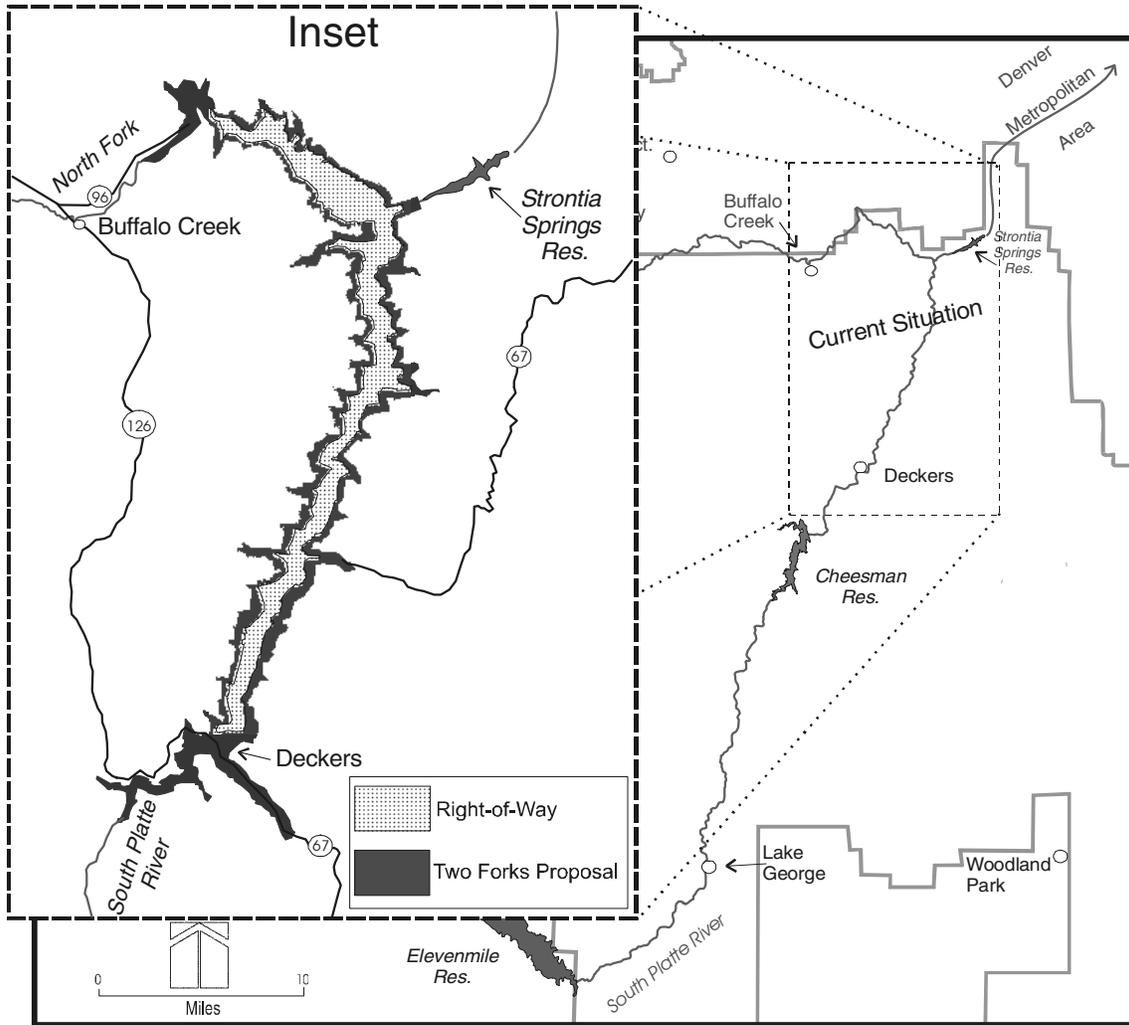
resource development interests claim the study area contains the most efficient and least costly storage sites for supplying the future water needs of the Denver metropolitan area. However, there are no current projects or active applications for dam construction or energy development within the study segments.

Interest arises, from time to time, in obtaining additional western slope waters for use in the Denver metropolitan area. Western slope interests tend to be strongly opposed to such transbasin diversion. Should any such efforts prove successful, the obtained waters would probably be transported to the Denver area via the South Platte River system. However, it is unclear how much of this water would require additional reservoir storage within the study corridors. The kind of water involved would undoubtedly be snowmelt water from years of abundant runoff, and storage would initially be needed in the river basin where the runoff occurs. From there, the water would only need to be delivered to the Front Range area for treatment and use—and an additional storage facility in the study corridors might not be necessary.

Alternatives to dam construction are receiving increased interest. These alternatives include conservation, agricultural water, and conjunctive use.

Conservation.—For several years, Denver Water has been stressing water conservation within its service area, with notable success. While population has increased more than 10 percent in that area since 1980, water consumption has not changed appreciably (Denver Water, 1998).

Agricultural Water.—Substantial amounts of water are devoted to agricultural uses in the Front Range area. Portions of these waters have been converted to municipal uses in the past (Hydrosphere, 2001, p. 26),



Inset shows the approximate extent of water-line for (1) the 1931 USDI Right-of-Way and (2) the Two Forks reservoir proposed in the 1980's.

Map 2-7.—Areas Associated with Right-of-Way and Once-Proposed Two Forks Reservoir. South Platte River and North Fork of the South Platte River Wild and Scenic River Study.

and more could be converted as provided by Colorado water law. This practice is highly controversial. Communities, governments, and other institutions located in agricultural areas are generally reluctant to support conversion to nonagricultural uses elsewhere because of concerns that economic contraction in the agricultural areas could follow (Nichols et al., 2001, pp. 111-121). This is an ongoing issue and is far from being resolved.

Conjunctive Use.—A promising avenue for increasing water supplies in the Denver metro area lies with conjunctive use. The same geologic formations that contain the aquifers mentioned above could be used as underground reservoirs. Suburbs that acquire surface water rights could divert them to the area and pump them down into the formations during seasons and years of high flows. During dry seasons and drought years, this stored water would then be pumped back up. This strategy relies on the efficient use of all existing water delivery systems (dams, reservoirs, canals, natural channels, etc.) of most metro area water providers, plus an investment in aquifer pumping and distribution facilities. Improved cooperation among water providers would also be necessary.

2.13 FISHERIES

HISTORY

The Arkansas River and the South Platte River are the two main drainages east of the Continental Divide in Colorado. Because of its size, accessibility, and high quality fishery resource, the South Platte River has an extensive history, in terms of its fishing heritage. Being relatively large and close to the major population centers of Colorado, it offers the most prolific and probably highest quality trout fishing resource in

eastern Colorado. Close to the city of Denver, the fishery in the South Platte River has been utilized since Euro-Americans first settled the area. Native Americans most likely used the fishery in the system as well.

The high quality of the fishery has historically provided anglers from throughout the country with a quality recreational fishing experience. The Platte Canyon was a popular resort area from 1880 through the early decades of the 20th century. In addition to other services, the famous “fish train” operated in the summer months (Kindig et al., 1959). The fish train brought anglers from the Front Range communities into the Platte Canyon, dropping them off along the South Platte River for a day or weekend of fishing. The trains were a popular way to reach the numerous resorts along the river. A Monday morning run was made early enough to ensure that weekend guests could be back to work on time.

The native trout in the South Platte River was the greenback cutthroat trout (*Oncorhynchus clarki stomias*). This species was apparently highly utilized, and the large number of anglers and abundant catches eventually took their toll on the native trout fishery. As early as the 1880s, fish culturists began rearing non-native trout in the Denver area. An early explanation for introducing brook trout included the observation that the greenback cutthroat “is so easily caught, it is so unwary and confiding, that the fish in a moderate-sized stream can be taken out in one season with a hook line and grasshopper” (Wiltzius, 1985). Private hatcheries began operation along the South Platte River as early as 1872, which began the introduction of non-native trout in Colorado. The result of these and subsequent stocking of brook, rainbow and brown trout in the South Platte

drainage was largely responsible for the loss of the greenback, through competition and hybridization.

Whirling disease was introduced in Colorado accidentally in 1987 from a private hatchery in Idaho (CDOW, 2003). Since then, it has spread throughout the State. The water borne parasite that causes the disease, *Myxobolus cerebralis*, has a two-host lifecycle that involves trout and a common bottom-dwelling tubifex worms. Young-of-the-year less than 5 inches in length are most susceptible as the myxobolus organism attacks soft cartilage before it turns to bone. In larger fish, this cartilage has hardened into bone making them less susceptible to the effects of the disease. These larger fish can, however, carry the whirling disease spores. Symptoms include deformities resembling scoliosis and erratic tail-chasing, hence the name.

Mortality of young trout results from various histological and physical impairments caused by the disease which leaves the fish vulnerable to limiting over-winter habitat factors. Thus, recruitment of the young trout through the winter is severely reduced or eliminated. All species of trout are susceptible to the disease, especially rainbow and cutthroat trout. Brook trout are more susceptible in areas with high infestations of the infective stage of the disease. Brown trout appear to be less susceptible to losing a lot of young to the disease but can carry a large number of spores throughout the adult life stage. Also, there is some evidence to suggest brown trout immune systems work to reduce the level of spores carried throughout the adult life stage.

The tubifex worms that host the disease are found throughout the South Platte River system, but the level of spore burdens in trout vary with changes in habitat. There appears to be no correlation between the level of nutrients and sediment in the water

and level of infestations of spores. The level of fine sediment does appear to be more of a controlling factor than nutrient enrichment. CDOW has made tremendous strides in containing the disease, ensuring that stocked fish are either disease free or are large enough (greater than 5 inches) to lessen susceptibility to the effects of the disease.

The effects of the disease for each river segment are described below.

The South Platte River, in particular the Cheesman Canyon area, has been the subject of magazine articles, television shows, and even books. The high quality and aesthetic values of the fishery have drawn considerable attention to this area for a number of years.

CDOW manages fish populations within the study area.

SEGMENT DELINEATION

River segments referred to throughout Chapter 2 are described in table 1-2 and shown on map 1-3.

South Platte – Segments A and B

Habitat Characteristics.—These segments of the South Platte River probably contain the most diverse habitat conditions of any of the study areas. The river exits the Elevenmile Dam, which influences physical characteristics of the river channel, as well as several water quality parameters.

The physical characteristics of the South Platte River in Elevenmile Canyon are, in large, part a result of the canyon morphology. The river flows through cascades and high-gradient boulder rapids in areas where the canyon is relatively narrow and the valley gradient is high. These areas also include deep pools where the river has scoured the streambed adjacent to bedrock

cliffs. Areas where the valley is wider and the gradient is less exhibit different characteristics. These areas are dominated by wide, shallow riffles and glides, and they are depositional areas for sediment that has been produced from erosional processes upstream. Erosion is also more prevalent in the low-gradient areas, primarily due to the unconsolidated banks and the depositional nature of the channel.

As the stream exits the canyon, it travels through private land that is channelized around the town of Lake George. This area provides little fish habitat, as adequate depths and other forms of cover are extremely limited. Just downstream of this channelized section, the river passes through a wide valley, where it exhibits considerable meandering. Unfortunately, there is little woody riparian vegetation along this stretch; and, as a result, there is considerable bank erosion and poor pool development.

As the river enters a steeper canyon downstream of the private land, meandering decreases, and habitat also improves. A variety of habitat conditions exist in this portion of the segment, between the private land and Beaver Creek. Pools, rapids, and glides are more abundant here, and the substrate is more variable, with large boulders becoming more prevalent, providing additional habitat.

The river exits Elevenmile Reservoir through a surface release outlet. Although the amount of released water can be regulated to some extent, the storage capacity of the reservoir dictates the amount of water released during the snowmelt runoff period. The flow releases from the dam affect the hydrologic conditions downstream. A hydrograph of the river in this section generally follows a pattern normally seen in stream systems in the Rocky Mountain Region, with peak flows occurring in the summer months, and low

flows occurring in the fall, winter, and part of the spring. The main difference is that there are relatively sudden increases and decreases in flows, which typically are not as often and dramatic as in unregulated streams.

Historically, extremely low flows during winter months contributed to poor habitat conditions during the winter months (CDOW, unpublished sampling report, 1985). Indeed, flows of less than 3 cfs were recorded as late as 1978. The completion of Spinney Mountain Reservoir in 1981 provided sufficient storage to improve winter flow conditions. Records indicate that winter flows have not been less than 15 cfs since 1987.

Surface-release reservoirs have several effects on the stream system downstream. Because the water is coming from the upper portion or epilimnion of the reservoir, stream temperatures tend to be warmer during summer months. During the winter months, when the reservoir is ice covered, the coldest water is typically found at the top of the reservoir. As a result, the river downstream carries colder water than would typically be found if the reservoir were not present. Temperatures in the South Platte River downstream of Elevenmile Dam exhibit higher seasonal fluctuations than they would if a bottom-release reservoir or no reservoir were present. Although there is evidence to indicate that these temperature fluctuations may improve conditions for the native sucker species in Elevenmile Canyon, they do not appear to benefit the trout fishery.

The surface-release outlet works on the dam may provide a food source for aquatic macroinvertebrates directly downstream of the reservoir. Nutrients, algae, and zooplankton in the surface layer are typically washed over the dam, where aquatic insects downstream consume them. These insects, in turn, are a primary food source for fish in

close proximity to the dam. Many of these insects are highly specialized to capture the floating material and organisms coming over the dam by the use of specialized filtering appendages and net-like devices they construct. Because there is little information on the aquatic macroinvertebrate populations downstream of Elevenmile Dam, it is impossible to say whether the current situation benefits the fishery or not.

Chadwick Ecological Consultants (1986) used the Instream Flow Incremental Methodology (IFIM) to model flows in this reach during the 1980s. Their results indicated that for brown trout, juvenile habitat is the most abundant type of habitat in this section. For adult rainbow trout, suitable habitat is almost twice as abundant as adult brown trout habitat. The amount of suitable habitat, for all life stages, decreases during the high flows of the snowmelt runoff period. Although this seasonal trend is also apparent for rainbow trout, adult habitat far exceeds that of other life stages. When compared to other sections of the South Platte River, Segments A, B, and C, contain the second highest amount of suitable trout habitat in the river. Only Cheesman Canyon (Segment D) contains more adult habitat for both species. This may be due in part to the variety of habitats in this reach, especially the deeper pools and runs associated with large rocks and boulders.

Fishery Management.—Segment A is managed as a quality regulation area, from Elevenmile Dam to the Wagon Tongue Gulch Bridge, approximately 2.5 miles downstream. Regulations include a limit of two fish over 16 inches. This regulation provides a higher quality fishery in terms of the ability of anglers to catch larger, trophy-size trout. The remainder of Segments A and B are managed as a standard regulation area, with an eight-fish limit.

Several game fish found in this reach, some actively managed by CDOW and others, are a result of migration from Elevenmile Reservoir (Chadwick and Associates, 1986). Catchable and subcatchable rainbow, brown, and cutthroat trout have been planted in this section of the river to provide a put-and-take fishery and to establish self-sustaining populations of trout. Although rainbow trout reproduction is limited in this segment, the brown trout population is, by and large, self-sustaining.

Native fish in these segments include white suckers (*Catostomus commersoni*), longnose suckers (*Catostomus catostomus*), and creek chubs (*Semotilus atromaculatus*). Although the two sucker species are common, they are generally not considered a desirable game fish.

Whirling disease becomes more prevalent in trout populations the further downstream one gets from Elevenmile Dam. The rainbow trout in Elevenmile Canyon still maintain self-sustaining populations because much of the in-stream habitat is not conducive to supporting the whirling disease two-stage life cycle.

Angler Use.—Angler use in the public sections of these segments is relatively high (CDOW, 1993, 1994). In 1994, the CDOW conducted creel census estimates of three segments of this section, all in Elevenmile Canyon. This census was conducted between May and September, when the highest number of anglers was present. Results indicated that the lower and middle portions of the canyon received similar fishing pressure (651 and 737 hours per acre, respectively). The upper portion closer to the dam received considerably more use (4,018 hours per acre). Discrepancies between the two areas could be attributable to available camping in the upper portion of the canyon, preference for special regulations in that area, or a

combination of factors. The relatively high fishing pressure in these segments may be attributable to several factors, including accessibility from adjacent roads, close proximity to major population areas along the Front Range, the high quality fishery, intensive management by the CDOW, and the aesthetic value of the area. Most likely, it is a combination of these factors that provides the high quality fishery observed in this segment.

South Platte – Segment C

Habitat Characteristics.—This segment of the South Platte River is, in most part, confined in a narrow, high-gradient canyon. Sinuosity is relatively low, while stream gradient is higher than in many portions of Segments A and B. Although there are areas of reduced gradient, much of this segment is typified by pool-riffle complexes associated with boulders and bedrock. Riparian vegetation is restricted to areas directly adjacent to the river, and several tributaries, including Tarryall Creek, enter the river in this segment.

The nutrient enrichment and the thermal and chemical modifications associated with Elevenmile Reservoir most likely do not significantly influence this section of the river. However, the flow releases from the dam do affect the hydrologic conditions here. The hydrograph of the river in this section generally follows a pattern normally seen in stream systems in the Rocky Mountain Region, with peak flows occurring in the summer months and low flows occurring in the fall, winter, and part of the spring. The main difference is that there are relatively sudden increases and decreases in flows, which are not observed to this extent in unregulated streams. Although the inputs from tributaries such as Tarryall Creek ameliorate these fluctuations more than in Segments A and B, they are, nevertheless, a significant influence.

Historically, extremely low flows contributed to poor habitat conditions during the winter months (CDOW, unpublished sampling report, 1985) although these flows were not as low as those in Segments A and B, owing to the influence from tributaries in this segment. In addition, recent flow conditions in the river have provided considerably more water during the winter months as a result of additional upstream reservoirs and the transmission of additional water to Denver. Habitat conditions for brown and rainbow trout is similar to segments A and B and is described above for those segments.

Fishery Management.—This segment of the South Platte River is designated as “wild trout waters” by the CDOW. This designation is given to relatively high quality waters that are capable of producing a quality trout fishery. These waters receive little, if any, hatchery supplementation and rely primarily on natural reproduction for recruitment to the fishery. This designation was placed on this portion of the river for two primary reasons: (1) the lack of fishing pressure due to the inaccessible nature of the area and (2) the relatively high potential for natural reproduction. CDOW last stocked fingerling brown trout in this segment in 1990. Steelhead rainbow fry were stocked in Happy Meadows (Segment B) and Wildcat Canyon (Segment C) from 1990 through 1994. This stocking was conducted to supplement natural reproduction of brown trout and to introduce a large rainbow trout strain that would migrate to Cheesman Reservoir as juveniles and return to the river as large adults. However, it was learned that the stocked fish were not a true steelhead trout strain but were an undetermined rainbow trout strain. The likelihood that these fish will exhibit migration behavior akin to a true steelhead strain (migrating from Cheesman Reservoir upstream to spawn annually) is low (Gerlich, 1997).

Fish population information is limited, primarily due to the inaccessibility of the area. As part of the Two Forks study, two fish sampling stations were located in this segment, upstream and downstream of the confluence of Tarryall Creek. Sampling at these stations revealed that both brown and rainbow trout are self-sustaining in this area and constitute a healthy fishery. In addition, native longnose and white sucker populations are present.

When disasters (natural or manmade) eliminate or severely reduce the existing fish populations or preclude the ability of the fish to maintain self-sustaining populations, the CDOW has the authority to re-stock the stream or river with suitable numbers, species, and sizes of fish to re-build the fish community. The CDOW will continue to monitor the fishery over time and may discontinue stocking when self-sustaining fish populations are re-established and/or the instream habitat conditions improve. Sampling in the spring of 2003 showed that adult fish were present in this segment despite large inputs of sediment resulting from the Hayman Fire of June 2002. The CDOW will sample more intensively in the fall of 2003 to determine if stocking is needed to boost populations.

Infectivity levels here have not been actively monitored, but it is assumed that the segment is positive for whirling disease since Segments A, B and D are known to be positive. The fishery through this segment is considered wild trout water, there is no stocking, and the brown and rainbow trout populations are self-sustaining.

Angler Use.—Angler use in this area has not been formally monitored. In part, this lack of information has been the result of the difficulty in accessing this portion of the river. Access is limited to a relatively few trails and primitive roads. The Forest Service and CDOW have made attempts at

limiting access on severely degraded roads, to control erosion. The result of this restricted access is a fishery experience in a relatively undisturbed setting. Except in the Corral Creek area, this segment provides an opportunity to fish the river with little contact with civilization. Roads and trails are rare, which limits the public's access. As a result, fishing pressure in this segment is probably lower than in any of the other South Platte River study segments.

South Platte – Segment D

Habitat Characteristics.—This segment of the South Platte River is located primarily in a confined canyon, known as Cheesman Canyon. Although it is a relatively short segment, it contains probably the best habitat in the study area (Chadwick and Associates, 1986). The confined nature of the canyon and the abundance of exposed bedrock and boulders provide excellent pool development and other habitats for both rainbow and brown trout.

Habitat for adult rainbow trout in this segment had the highest weighted usable area (WUA) of habitat for any life stage of trout. WUAs for all life stages of brown and rainbow trout were highest during the fall and winter months. Flows during this period are moderate and relatively stable (Chadwick and Associates, 1986). Habitat appears to be at a minimum during the snowmelt runoff period, when velocities are at their greatest. This trend was similar to those seen in the two previously described segments. Nehring (1986) found a strong negative correlation between monthly discharge and rainbow and brown trout year class strength. Nehring concluded that flows during May and June were critical for brown trout survival, while those of June and July were the most critical for rainbow trout. Recruitment during years with moderate and relatively stable flows during the spawning and rearing period produced

higher numbers of young and ultimately higher adult biomass. As a result, increased flows during critical times of the year can have a negative effect on the trout population in this section. (Nehring and Anderson, 1993)

The releases from Cheesman Reservoir have affected the flow levels as well as the physio-chemical properties of the downstream environment. Unlike Elevenmile Reservoir, the flow releases from Cheesman Reservoir are from the bottom of the dam, constituting a hypolimnetic release. This type of release results in different water quality properties than the Elevenmile Reservoir surface release. By removing water at the bottom of the reservoir, the receiving stream temperatures are more constant than would be expected in an unregulated stream. Aquatic macroinvertebrate food sources are modified greatly, typically becoming dominated by high densities of smaller organisms. Invertebrates that require seasonal temperature changes to initiate growth and metamorphosis typically disappear soon after bottom releases are initiated.

Fishery Management.—The Cheesman Canyon segment of the South Platte River is one of only a few stream segments in the State designated “Gold Medal.” This is the highest classification given to a river segment or lake. These waters are managed to maximize the outstanding qualities of the river or lake. Specifically, a standing crop of trout must exceed 40 pounds per acre, with at least 12 fish per acre being of quality size (14 inches or greater). In addition, the river must have above average scenic quality and be wider than 20 feet. Fish populations in the Cheesman Canyon segment have been extensively studied (CDOW unpublished sampling result, 1986; Chadwick and Associates, 1986). Typically, rainbow trout biomass exceeds 300 pounds per acre in this

segment, with values documented at over 700 pounds per acre during the mid-1980s. The sustained high quality of the fishery in this segment has resulted in many articles in local newspapers as well as books and nationally distributed magazines. Nationwide, there are extremely few trout fisheries that approach the population dynamics of this segment.

The Hayman Fire appears to have affected rainbow and trout populations downstream from the confluence of the South Platte River and Wigwam Creek (Nehring, 2002). Adult population parameters for both brown and rainbow trout were at all time lows in the fall of 2002 at this site. Most likely, this is due to the effects of flash flood inputs from both Wigwam and Horse Creeks. However, rainbow trout statistics have been hovering at low levels since the mid-1990s, due in large part to the devastating effects of whirling disease.

The Hayman Fire, which began June 8, 2002, appears to have had an effect on survival of young-of-the-year (YOY) wild rainbow trout fry which hatch in late May and emerge from the gravel in mid-June. Given the extremely low levels of rainbow trout fry abundance in the fall of 2002, numbers of age-1 wild rainbow trout juveniles in the fall of 2003 will likely be almost non-existent. This is considered to be an aberration as a result of the fire, and future year classes should rebound. All year classes will continue to be monitored by CDOW for effects of sedimentation as well as whirling disease. Conversely, brown trout fry survival was quite good. This is because brown trout fry hatch in February or March and begin emergence from the gravel in late-April to early May in the South Platte River corridor downstream of Cheesman Dam, thus escaping potential lethal the effects of the fire—including sedimentation, rising water temperatures, and lower dissolved levels of oxygen.

Whirling disease infections are present in this stretch of the river, but recorded incidence has been low due to habitat less susceptible to tubifex worms.

Angler Use.—This segment of the river is only accessible by foot, making it highly desirable to anglers pursuing a more primitive fishing experience. The Gill Trail provides fast access from the lower portion of the canyon to near the base of Cheesman Dam. Fishing accessibility is good throughout the length of the canyon. Creel census information collected from the CDOW during the mid 1980s indicates that this segment of the South Platte River receives heavy fishing use. Total fishing use approached 13,000 hours of angling use in June, and more than 53,000 angler hours were spent during the April through September sampling period. During this time period, more than 59,000 trout were caught, for a catch rate in excess of 1.1 trout per hour. These statistics are higher than those for any of the other areas sampled during the same time period in the segments being studied, and the sustained catch rate is especially high considering the intensive use in this segment.

The fishing is quite challenging in this segment and is limited to artificial lures only. As a result, there are several successful guiding services permitted each year for angling excursions to this segment.

South Platte – Segment E

This segment of the South Platte River constitutes a diverse section of the river, from the standpoint of habitat, management, and angler experience. Beginning at the Forest Service boundary, the river passes through the privately owned Wigwam Club and then enters a relatively wide valley, which ultimately affects the characteristics of the river. Highway access is

good throughout this segment, and private land is scattered throughout its length.

Habitat Characteristics.—As the river exits Cheesman Canyon, the river valley begins to widen. The stream gradient is relatively less; and although pools created from bedrock and boulder outcrops are apparent, they are not as prevalent as in the steep canyon upstream. The riparian area is more extensive in this segment, and the river is wider.

Habitat, in terms of WUA, is less in this section for all life stages of brown and rainbow trout than in the Cheesman Canyon segment (Segment D) (Chadwick and Associates, 1986). However, brown trout spawning habitat appears to be higher in this segment. Adult rainbow trout habitat appears to be higher in this segment than in Segments A, B, or C, and values for all life-stages of brown trout appear to be at least as high in this segment as in the other three South Platte segments.

Sedimentation, a result of erosion from adjacent roads and tributaries, appears to be limiting this segment. Historic road maintenance of the adjacent County Road 533 has contributed excessive amounts of sediment in this segment. However, recent paving efforts by Jefferson and Douglas Counties, as well as travel management by several cooperators, have resulted in a considerable decrease in sediment.

Fishery Management.—This segment of the South Platte River is also managed with special regulations, although it is not considered a Gold Medal section by the CDOW. However, the special regulations in place are restrictive and are designed to maintain a high quality fishery. Prior to this regulation, the vast majority of trout in this segment were less than 3 years of age (Nehring and Anderson, 1983). Indeed, trout biomass in this segment was typically less than 10 percent of that in the Cheesman

Canyon segment. Although habitat in this segment appears to be less than in Segments A, B, and C, Nehring and Anderson attributed part of the reduced trout population to angling pressure. After special regulations were implemented in 1983, extensive monitoring was conducted to determine their effectiveness. Nehring (1986) found that the implementation of special regulations in the Deckers area resulted in a dramatic increase of the rainbow trout population there. Near the downstream portion of this segment, where more liberal fishing regulations are in effect, brown trout still comprised over 80 percent of the trout captured by Nehring and Anderson.

The Wigwam Club is not open to the public and is managed as a trophy fishery for its members. Stocking does occur in this segment, and biomass estimates approach levels seen in Cheesman Canyon.

Spores that cause whirling disease are present in this segment, and infectivity has been slightly higher than in Cheesman Canyon since sediment loading increases downstream. Stocking larger fish has reduced mortality resulting from the disease and reduced continued spread.

Angler Use.—This segment of the South Platte River is easily accessible to the large population centers along the Front Range of Colorado. County Roads 67 and 97 are adjacent to the river throughout its length, with camping, parking, and picnic areas available throughout its length. Although there is some private property along this segment, the majority of the river is open to public angling.

Creel census data collected by the CDOW in 1986 indicate that angling pressure was relatively high during the summer of that year. More than 43,000 hours of angling were estimated for this relatively short section of stream from April through

September. Approximately 34,000 trout were caught, with a total catch rate of 0.78 trout per hour. Catch rates for brown and rainbow trout were identical, which is considerably different from Segment D, which had a much higher catch rate for rainbow trout.

Creel information for the Scraggy View to Twin Cedars area during the same time period revealed that an estimated 38,000 angling hours were spent on this section during the same time period. Although this estimate is slightly lower than that for the previously discussed section, it should be noted that the area analyzed was considerably longer. As a result, it appears that during the sampling period there was considerably less pressure in this downstream section of Segment E. A total of 41,000 trout were caught during the sampling period in this section, for a catch rate of 1.09 trout per hour. This higher catch rate could be attributed to the fact that hatchery reared trout were planted in this section of the river during the creel census period. Indeed, the rainbow trout catch rate was almost four times the catch rate for brown trout in this section, showing the vulnerability of these fish to anglers.

North Fork – Segment H1

For all segments on the North Fork, H1, H2, and H3, the worms that carry the spores that cause whirling disease are present in these stretches, but little information is available on infectivity levels. Rainbow trout are stocked when greater than 5 inches in length, and browns dominate the stretch.

Habitat Characteristics.—The North Fork of the South Platte River is considerably smaller than the segments addressed for the South Platte River. Originating on the south side of Mount Evans, the river passes the town of Bailey and enters the study

segment downstream. This segment has a relatively low gradient and, typically, a gravel and cobble substrate. Riparian vegetation consists primarily of willows, with grasses and sedges interspersed. Pools are associated mainly with lateral migration of the stream channel and manmade check dams. Although some boulders provide cover, this segment is dominated by riffle habitat, which is typically considered marginal. Because this segment is located on private land, there is little current fishery habitat inventory data available for reference. The stream in this segment averages approximately 30 feet wide, and it averages 1.0 foot deep during low flows (Chadwick and Associates, 1986).

Streamflow in this segment is modified by water delivered from the western slope through the Roberts Tunnel. These imported flows have been known to increase the discharge in the river considerably. Adult rainbow trout habitat was measured to be the highest amount of habitat in this portion of the river, based on IFIM analysis (Chadwick and Associates, 1986). All habitats for rainbow as well as brown trout declined dramatically after April and started to increase again after June. This trend can be related to increased discharges during the summer months from the snowmelt runoff and water augmentation from the Roberts Tunnel.

Fishery Management.—Sampling results indicate that there are cutthroat, brown, brook, and rainbow trout and longnose suckers in this segment (CDOW unpublished results, 1986; Chadwick and Associates, 1986). Brown trout dominate the density and biomass of trout in this segment and are apparently self-sustaining. Rainbow trout are present primarily as a result of stocking efforts. Although the CDOW plants rainbow trout both upstream and downstream of this segment, they do not plant trout within the private areas of

the segment. The private landowners may plant fish or may be conducting habitat improvement projects in this segment. However, this information was not available for this analysis.

Angler Use.—Because this segment is located on private land, there is no information on angler use. No public fishing access is available for this segment.

North Fork – Segment H2

Habitat Characteristics.—This segment is located in a relatively steep canyon, which has a higher gradient than the previous segment discussed. As a result of the steep topography, access is limited; and little information is available about the habitat conditions. Information from other sections of the North Fork and from the South Platte suggests that this section should have abundant boulders and associated habitat. Indeed, evaluation of aerial photographs indicates that the substrate in this segment contains considerable boulders and bedrock outcrops. The best fisheries in the South Platte (Cheesman Canyon, Elevenmile Canyon) are found in areas of this type. The higher gradient generally results in greater scouring of pools and deposition of smaller amounts of fine sand and gravel. The presence of boulders and bedrock would increase the number of pools, which provide good trout cover. Based on information from other segments in the study area and aerial photographs, this segment probably represents the best trout habitat in the study area on the North Fork.

Streamflow in this segment is modified by water delivered from the western slope through the Roberts Tunnel. These imported flows increase the discharge of the river considerably. Adult rainbow trout habitat was measured to be the highest amount of habitat in this portion of the

river, based on IFIM analysis (Chadwick and Associates, 1986). All habitats for rainbow as well as brown trout habitat declined dramatically after April and started to increase again after June. This trend can be related to increased discharges during the summer months from the snowmelt runoff and water augmentation from the Roberts Tunnel. In terms of habitat conditions related to flow, the difference between this segment and Segments A and B is the presence of pools and other deep-water habitats associated with the boulder substrates. These provide refuges in which the trout can avoid high-velocity conditions. As a result, considerably more suitable habitat is preserved during high flows, when habitat is generally at a minimum.

Fishery Management.—Only minimal stream enhancement work has been done on this segment. This is not surprising considering the rugged nature of the canyon, the poor access, and the large boulders in the channel. In addition, it appears that trout habitat is relatively good compared to other reaches in the river. Based on knowledge of preferred trout habitat in the South Platte River system, this boulder-dominated segment of the river probably provides some of the highest quality habitat in the North Fork.

Due to the inaccessibility of this section of river, there is no fish stocking in this segment. As a result, the fishery is most likely dominated by a self-sustaining brown trout population. Hatchery reared rainbow trout may migrate into the segment from upstream, and there may be some residual brook trout in the reach. However, it is doubtful that they comprise more than a fraction of the biomass or density of fish found in this segment. Basically, this segment is managed as a wild trout fishery by the CDOW, although no special regulations have been implemented.

Angler Use.—Because this segment is relatively inaccessible, fishing is limited to a “walk-in” type experience. Relatively few segments of the North Fork corridor provide this type of fishing experience, which is a more secluded, pristine experience than is found in most other portions of the river. Use is light.

North Fork – Segment H3

Habitat Characteristics.—This segment of the North Fork of the South Platte River encompasses a variety of habitats, from steep, boulder-dominated areas, to relatively low gradient gravel substrate stretches. Because roads parallel the river through most of this segment, the channel is constricted, and riprap is abundant between the road and the stream. The unpaved roadway that parallels the river downstream from the town of Bailey results in considerable sedimentation. In addition, riparian vegetation is poorly developed along most of this segment, primarily a result of the encroachment of the adjacent road.

Streamflow in this segment is modified by water delivered from the western slope through the Roberts Tunnel. These imported flows increase the discharge of the river considerably. Adult rainbow trout habitat was measured to be the most abundant sort of habitat in this portion of the river, based on IFIM analysis (Chadwick and Associates, 1986). All habitats for both rainbow and brown trout declined dramatically after April and started to increase again after June. This trend can be related to increased discharges during the summer months from the snowmelt runoff and water augmentation from the Roberts Tunnel.

Fishery Management.—A self-sustaining brown trout populations dominates this segment (Chadwick and Associates, 1986

and 1997; CDOW, 1986). Biomass values typically are greater than 30 pounds per acre, while rainbow trout typically compose less than 5 percent of the total biomass. Brook trout are apparently absent or very rare in this segment and longnose, and/or white suckers are common.

The CDOW typically supplements the brown trout population with thousands of catchable rainbow trout every year. Different species and strains of trout are stocked; but, typically, the management is geared toward a “put and take” type of rainbow trout fishery.

Angler Use.—No formal creel census information is available for this section. Access to public land is good in this segment. However, there is a considerable amount of private land that is not available to the public. Informal creel census information collected by the CDOW indicates that the majority of people fishing in the segment are residents of Colorado, and catch rates are typically less than 0.5 fish per hour. Hatchery reared rainbow trout make up the majority of the fish caught, with brown trout contributing less than 25 percent of the catch.

2.14 WILDLIFE

On the Pike and San Isabel National Forests, there are approximately 375 species of mammals, birds, reptiles, and amphibians. While not all of these species can be found in the study area, many of them are likely to occur on a seasonal or year-round basis.

This analysis will focus on federally listed species (threatened, endangered, and proposed), Forest Service sensitive species, and management indicator species that are likely to occur in the study area and may be

affected by the preferred alternative. Table 2-13 lists these species.

Many other wildlife species such as mule deer, black bear, Rocky Mountain bighorn sheep, and mountain lion are found along the river corridor. Several species of raptors use the corridor for foraging or nesting, including golden eagles, prairie falcon, and osprey. Waterfowl are also common in the corridor, as are smaller birds, mammals, reptiles, and amphibians. Approximately 75 percent of the wildlife species known to occur in Colorado are dependent on riparian areas during all or a portion of their life cycles (National Diversity Information Source [NDIS], 2001).

The study area contains a diverse mix of vegetation types important to wildlife for foraging, resting, and breeding. These include wetland and riparian habitat (2,215 acres), grass-forb (310 acres), shrub-seedling (220 acres), and forested structural stages (17,060 acres). The study area also contains important special habitat features for wildlife such as large rock outcrops and snags, which are used by many avian species for breeding and roosting. Approximately 3,400 acres of the study area burned in the Hayman Fire, primarily under low and moderate burn severities. Several assessments are underway to determine the effect of the fire on wildlife habitats and populations.

On an ecosystem scale, the river provides a path for the flow of organisms through the various wildlife habitat types. It provides outputs such as food, cover, and nest sites. It connects different patches of habitat and allows animals to travel from site to site.

Wildlife in the study area is used both consumptively and non-consumptively. Several of the common mammal species found in the corridor are hunted, with the exception of bighorn sheep. Less than 1 percent of the statewide mule deer and elk

Table 2-13.—Species Considered in the Analysis, with Federal Status and Colorado Natural Heritage Program (CNHP) Rank

Species	Federal Status ¹	CNHP Rank ²
Northern leopard frog <i>Rana pipiens</i>	S	G5S3
Tiger salamander <i>Ambystoma tigrinum</i>	S	G5S5
Western (boreal) toad <i>Bufo boreas boreas</i>	C, S	G4T1QS1
Bald eagle <i>Haliaeetus leucocephalus</i>	T	G4S1BS3N
Flammulated owl <i>Otus flammeolus</i>	S	G4S4
Fox sparrow <i>Passerella iliaca</i>	S	G5S4BSZN
Golden-crowned kinglet <i>Regulus satrapa</i>	S	G5S4
Goshawk <i>Accipiter gentiles</i>	S	G5S3BSZN
Lewis' woodpecker <i>Melanerpes lewis</i>	S	G4S4
Mexican spotted owl <i>Strix occidentalis lucida</i>	T	G3T3S1BSUN
Mountain bluebird <i>Sialia currucoides</i>	MIS	G5S5
Olive-sided flycatcher <i>Contopus cooperi</i>	S	G4S3S4B
Osprey <i>Pandion haliaetus</i>	S	G5S3BSZN
Peregrine falcon <i>Falco peregrinus</i>	MIS	G4S2BSZN
Pygmy nuthatch <i>Sitta pygmaea</i>	S	G5S4
Three-toed woodpecker <i>Picoides tridactylus</i>	S	G5S3S4
Wilson's warbler <i>Wilsonia pusilla</i>	MIS	G5S4BSZN
Pawnee montane skipper <i>Hesperia leonardus Montana</i>	T	G4T1S1
Abert's squirrel <i>Sciurus aberti</i>	MIS	G5S5
Dwarf shrew <i>Sorex nanus</i>	S	G4S2
North American wolverine <i>Gulo gulo luscus</i>	C, S	G4T4S1
Preble's jumping mouse <i>Zapus hudsonicus preblei</i>	T	G5T2S1
Ringtail <i>Bassaricus astutus</i>	S	G5S4
Townsend's big-eared bat <i>Plecotus townsendii</i>	S	G4S2
<i>Botrychium lineare</i>	C,S	G1S1
<i>Carex livida</i>	S	G5S1
<i>Draba smithii</i>	S	G2S2
<i>Machaeranthera coloradoensis</i>	S	G5S2
<i>Malaxis brachyopoda</i>	S	G4QS1
<i>Mimulus gemmiparus</i>	S	G2S2
<i>Primula egalksensis</i>	S	G4S2
<i>Potentilla rupincola</i>	S	G5?T2S2
<i>Ptilagrostis monogholica ssp porteri</i>	S	G3G5T2S2
<i>Rubus acticus ssp. acaulis</i>	S	G5T5S1
<i>Spiranthes diluvialis</i>	T	G2S2
<i>Viola selkirkii</i>	S	G5S1

¹ Federal Status: E = Endangered; T = Threatened; C = Candidate; S = U.S. Forest Service, Region 2 Sensitive; MIS = Management Indicator Species.

² CNHP Rank: Rare species tracked by CNHP: (G)lobal and (S)tate ranking range from 1 = Critically Imperiled to 5 = Demonstrably Secure. (T)rimomial rank indicates subspecies or varieties. See CNHP 2002 for more detail.

harvest occurs in the study area and likely less than 4 percent of the annual statewide small game harvest (Mason, CDOW, personal communication, 1996). Non-consumptive use of wildlife is important for many Coloradans. High proportions (63 percent) consider wildlife viewing a very important part of their recreation activities, and 33 percent take trips specifically to photograph, feed, or observe birds or other wildlife (Colorado State University, CDOW, 1993). The chance to see certain animals, such as eagles, rare or endangered species, and bighorn sheep, is extremely important to people when deciding to take a trip to view wildlife (Manfredo et al., 1991). National Forests are one of the primary locales (25.6 percent) for participating in non-consumptive wildlife activities (Standage, Accureach, Inc., 1990).

THREATENED, ENDANGERED, AND PROPOSED SPECIES

The Endangered Species Act of 1973, as amended, provides Federal protection for threatened and endangered species and their critical habitats. As a land managing agency, the Forest Service makes many decisions that affect wildlife resources. The act directs the Forest Service to ensure that its actions are not likely to jeopardize the continued existence of any proposed, endangered or threatened species or result in the destruction or adverse modification of critical habitat (16 USC 1536(a)(2)). The study area provides potential habitat for five federally listed species. These are the Pawnee montane skipper, Preble's meadow jumping mouse, bald eagle, Mexican spotted owl, and Ute ladies' tresses orchid.

FOREST SERVICE SENSITIVE SPECIES

The Forest Service has established direction in *Forest Service Manual (FSM) 2670* and in

Region 2 Supplement 2600-94-2 to guide habitat management for sensitive species.

Sensitive species include those plants and animals that are declining in either numbers or occurrences, species whose habitat is declining, or species whose population or habitat is limited (FSM 2600-94-2). The study area provides potential habitat for 27 sensitive species (table 2-13).

MANAGEMENT INDICATOR SPECIES

The National Forest Management Act of 1976 directs the Forest Service to provide for the maintenance of viable populations of native and desired non-native vertebrate species. Twenty species were identified as management indicator species (MIS) in the *PSICC Land and Resource Management Plan* to represent the various habitats that occur in the forest. In this study, Albert's squirrel is the MIS selected for mature ponderosa pine forest, Wilson's warbler represents riparian habitat, the mountain bluebird represents forest meadow habitat, and the peregrine falcon represents rock features.

SEGMENT DELINEATION

The following text describes the distribution of wildlife habitat in each of the seven river segments. Occurrences of threatened, endangered, and sensitive species and other notable wildlife species are also discussed.

South Platte – Segments A and B

Habitat Features.—This segment of the South Platte River begins as a rocky canyon below Elevenmile Dam. Riparian vegetation, primarily willow thickets, occurs in a narrow band adjacent to the river and along the tributary streams. Wetland vegetation, more common after the river exits Elevenmile Canyon, can typically be found on the floodplain above the river. Both north- and south-facing slopes contain

a mixed-conifer forest of ponderosa pine and Douglas fir. In Elevenmile Canyon, much of the Douglas fir is dead from insect outbreaks. The upper and lower portions of this segment contain prominent rocky outcrops suitable for nesting raptors. Approximately 520 acres of Segment B burned in the Hayman Fire, primarily under low burn severities.

Wildlife Occurrences.—The Colorado Division of Wildlife records the use of Elevenmile Canyon by golden eagles and prairie falcons (Craig, CDOW, personal communication, 1996). No nest sites have been located.

Threatened, Endangered, and Sensitive Species Occurrences.—A bald eagle winter communal roost site is located along the South Platte River north of Lake George (Public Service Company of Colorado, 1993).

Three sensitive species are known to occur in this segment. A flammulated owl nest was located in the downstream portion of this segment (Public Service Company of Colorado, 1993). The buffer zone established around the nest site overlaps with the study area. Osprey sightings have been recorded around the Lake George area, and approximately 2.5 river miles of this segment are included within the osprey's distribution area (Public Service Company of Colorado, 1993). Northern leopard frogs have been recorded in the river and in small ponds adjacent to the river in this segment (Howard, Forest Service, personnel communication, 1996).

Other Region 2 sensitive species that may occur in this segment include the tiger salamander, fox sparrow, golden-crowned kinglet, goshawk, Lewis' woodpecker, olive-sided flycatcher, pygmy nuthatch, three-toed woodpecker, common loon, dwarf shrew, North American wolverine, ringtail, Townsend's big-eared bat, and all

11 sensitive plants. Although specific locations for these species are unknown at this time, suitable habitat exists within this river segment.

South Platte – Segment C

Habitat Features.—This segment of the South Platte River is fairly confined within a canyon. Riparian vegetation, primarily willow thickets, occurs in a narrow band adjacent to the river and along the tributary streams of Corral Creek and Tarryall Creek. Benches of willow and wetland vegetation can typically be found on the floodplain above the river. Both north- and south-facing slopes contain a mixed-conifer forest of ponderosa pine and Douglas fir. Massive rock formations dominate the lower portion of this segment. Approximately 2,270 acres of this segment burned in the Hayman Fire under high, moderate, and low burn severities.

Wildlife Occurrences.—Golden eagles have used the area in the recent past. The south-facing slopes are considered severe winter range and winter concentration areas for mule deer (NDIS, 2001).

Threatened, Endangered and Sensitive Species Occurrences.—The federally listed Pawnee montane skipper is known to occur in this segment in the vicinity of Corral Creek. This threatened species has a restricted range along the mainstem of the South Platte River and the North Fork of the South Platte. The northeast limit of the ponderosa pine/blue grama grass community overlaps with the southwestern limit of the prairie gayfeather (*Liatris punctata*) to create suitable habitat for the Pawnee montane skipper. Optimum features of its habitat include open ponderosa pine stands with a canopy closure of 30 percent, shrub and grass cover generally less than 10 percent, and the presence of prairie gayfeather and blue

grama in specific densities. Skipper habitat in this segment is limited compared to other river segments.

The bald eagle, a threatened species, may also occur in this segment. Winter concentration areas for this species are found both upstream and downstream. It is likely that the eagle forages along this segment of the South Platte River, particularly in the lower portion that flows into Cheesman Reservoir.

Suitable habitat exists for the Preble's meadow jumping mouse, but it has not been recorded here.

The goshawk is a Region 2 sensitive species known to occur in the study area. The goshawk inhabits montane areas of coniferous, deciduous, and mixed forests. A foraging area created around a known nest site overlaps with the study area (Public Service Company of Colorado, 1993).

Other Region 2 sensitive species that may occur in this segment include the northern leopard frog, tiger salamander, flammulated owl, fox sparrow, golden-crowned kinglet, Lewis' woodpecker, olive-sided flycatcher, osprey, pygmy nuthatch, three-toed woodpecker, dwarf shrew, ringtail, Townsend's big-eared bat, *Malaxis brachypoda* and *Potentilla rupicola*. Although specific locations for these species are unknown at this time, suitable habitat does exist within this river segment.

South Platte – Segment D

Habitat Features.—This segment is also within a confined, steep-sided, rocky canyon. Patches of willow thickets, wet meadows, and other wetland types do occur; but they are more limited because of the abundance of bedrock and boulders along the stream banks. Both north- and south-facing slopes contain a mixed-conifer forest of ponderosa pine and Douglas fir. Large

rock outcrops occur throughout the canyon. Approximately 230 acres of this segment burned in the Hayman Fire primarily under low burn severities.

Wildlife Occurrences.—Severe winter range for mule deer is present throughout this segment.

Threatened, Endangered and Sensitive Species Occurrences.—The federally listed Pawnee montane skipper is known to occur in this segment (Environmental Research & Technology, Inc. [ERT], 1986). This threatened species has a restricted range along both the North Fork and the mainstem of the South Platte Rivers. There are 230 acres of skipper habitat in this river segment.

The bald eagle, a threatened species, also occurs in this segment. Cheesman Reservoir is a winter concentration area, and the eagles are often seen in Cheesman Canyon. The combination of an abundant, readily available food supply with one or more suitable night roost sites is the primary characteristic of winter habitat (USACE, 1988).

Region 2 sensitive species that may occur in this segment include the northern leopard frog, tiger salamander, flammulated owl, fox sparrow, golden-crowned kinglet, goshawk, Lewis' woodpecker, olive-sided flycatcher, osprey, pygmy nuthatch, three-toed woodpecker, dwarf shrew, ringtail, and Townsend's big-eared bat. Although specific locations for these species are unknown at this time, suitable habitat does exist within this river segment.

South Platte – Segment E

Habitat Features.—This segment of the river is predominantly a wide valley with diverse wildlife habitats. The Two Forks study identified an abundance of willow thickets, willow-sedge, cottonwood-willow,

and other wetlands types along the river corridor and tributary streams (USACE, 1988). The upland provides grass-forb, shrub seedling, and forested stages of ponderosa pine and Douglas fir forest. Dominant rock features that provide nesting habitat also occur in this segment. Approximately 373 acres of this segment burned in the Hayman Fire primarily under low burn severities.

Wildlife Occurrences.—Noteworthy wildlife records include active prairie falcon eyries on dominant rock outcrops, severe winter range for mule deer throughout this segment, turkey concentration areas on the eastern portion of the segment, and Rocky Mountain bighorn sheep overall habitat in the lowermost portion of this segment (NDIS, 2001).

Threatened, Endangered, and Sensitive Species Occurrences.—The federally threatened Pawnee montane skipper is known to occur in this segment. The skipper has a restricted range, occupying an area (although not necessarily all the available habitat within it) roughly 23 miles long and 5 miles wide. It occurs along the mainstem of the South Platte River for approximately 20 miles and along the North Fork of the South Platte for approximately 15 miles upstream from their confluence to Cheesman Reservoir and to Crossons, respectively. The present range covers approximately 38 square miles (ERT, 1986). The skipper's habitat forms a continuous band along the mainstem of the South Platte River and the North Fork and includes the Buffalo Creek and Horse Creek tributaries. The northeast limit of the ponderosa pine/blue grama grass community overlaps with the southwestern limit of the prairie gayfeather (*Liatris punctata*) to create suitable habitat for the Pawnee montane skipper. Optimum features of its habitat include open ponderosa pine stands with a canopy

closure of 30 percent, shrub and grass cover generally less than 10 percent, and the presence of prairie gayfeather and blue grama in specific densities (ERT, 1986). The Pawnee montane skipper's existence in this extremely limited and specialized area accentuates the ecological precariousness of the skipper (EPA, 1990). There are 2,605 acres of skipper habitat within this segment.

The Preble's meadow jumping mouse was located in this segment in 1999. Bald eagles are known to use this segment for winter foraging and roosting, and potential habitat exists for the Ute ladies tresses orchid. This segment is within the boundary of designated critical habitat for the Mexican spotted owl.

The osprey, a Region 2 sensitive species, is found in this segment during spring and fall migrations. The osprey will often remain in the area for several days feeding along the river corridor.

Other Region 2 sensitive species that may occur in this segment include the northern leopard frog, tiger salamander, flammulated owl, fox sparrow, golden-crowned kinglet, goshawk, Lewis' woodpecker, olive-sided flycatcher, pygmy nuthatch, three-toed woodpecker, dwarf shrew, ringtail, and Townsend's big-eared bat. Although specific locations for these species are unknown at this time, suitable habitat does exist within this river segment.

North Fork – Segment H1

Habitat Features.—In this short segment, the North Fork of the South Platte runs through a wide river valley. Willow thickets and other wetland types are common in this segment, and cottonwood-willow habitat occurs occasionally. The side slopes are forested with ponderosa pine, Douglas fir, and stands of lodgepole pine.

Wildlife Occurrences.—This segment provides severe winter range for mule deer.

Threatened, Endangered and Sensitive Species Occurrences.—Suitable habitat exists in this segment for the Preble's meadow jumping mouse, but it has not been recorded here.

Region 2 sensitive species that may occur in this segment include the northern leopard frog, tiger salamander, boreal toad, flammulated owl, fox sparrow, golden-crowned kinglet, goshawk, Lewis' woodpecker, olive-sided flycatcher, osprey, pygmy nuthatch, three-toed woodpecker, dwarf shrew, ringtail, Townsend's big-eared bat, *Malaxis brachypoda* and *Potentilla rupincola*. Although specific locations for these species are unknown at this time, suitable habitat does exist within this river segment.

North Fork – Segment H2

Habitat Features.—Because of the narrow canyon structure in this segment, the riparian and wetland components are much reduced, limited to a few areas of willow thickets and cottonwood-willow habitat. A closed-canopy Douglas fir forest dominates the north-facing slope, and the south-facing slope is mixed ponderosa pine and Douglas fir. Several large rock outcrops are in the canyon.

Wildlife Occurrences.—This segment provides severe winter range for mule deer, especially on the south-facing slopes.

Threatened, Endangered and Sensitive Species Occurrences.—Suitable habitat exists in this segment for the Preble's meadow jumping mouse, but it has not been recorded here.

Region 2 sensitive species that may occur in this segment include the northern leopard frog, tiger salamander, flammulated owl, fox sparrow, golden-crowned kinglet, goshawk,

Lewis' woodpecker, olive-sided flycatcher, osprey, pygmy nuthatch, three-toed woodpecker, dwarf shrew, ringtail, Townsend's big-eared bat, *Malaxis brachypoda* and *Potentilla rupincola*. Although specific locations for these species are unknown at this time, suitable habitat does exist within this river segment.

North Fork – Segment H3

Habitat Features.—This segment of the river includes both a wide valley section with diverse wildlife habitats and a narrower canyon section with roaded access. The Two Forks study identified an abundance of willow thickets, willow-sedge, cottonwood-willow, and other wetland types along the river corridor and tributary streams in the upper portion of this segment (USACE, 1988a). In the lower portion of this segment, the willow component is severely reduced, and other wetland types dominate. The upland habitat provides grass-forb, shrub-seedling, and mature stages of ponderosa pine–Douglas fir forest. Dominant rock features that provide nesting habitat also occur in this segment.

Wildlife Occurrences.—The entire length of this segment provides severe winter range for mule deer. A golden eagle nest site has been recorded in this segment.

Threatened, Endangered and Sensitive Species Occurrences.—There are approximately 2,110 acres of Pawnee montane skipper habitat in this segment. There is potential habitat for Preble's meadow jumping mouse and Ute ladies tresses orchid. The segment is also within designated critical habitat for the Mexican spotted owl.

Region 2 sensitive species that may occur in this segment include the northern leopard frog, tiger salamander, flammulated owl, fox sparrow, golden-crowned kinglet, goshawk, Lewis' woodpecker, olive-sided flycatcher,

osprey, pygmy nuthatch, three-toed woodpecker, dwarf shrew, ringtail, and Townsend's big-eared bat. Although specific locations for these species are unknown at this time, suitable habitat does exist within this river segment.

2.15 RECREATION

SUMMARY

With flows exceeding 200,000 acre-feet a year, the South Platte River is one of the three largest rivers on Colorado's eastern slope. Its large river canyons, leading to the plains, represent a limited recreational resource. Good access, predominantly public ownership, high-quality fishing, and a diversity of other recreation opportunities in close proximity to a large metropolitan area characterize the South Platte.

The gentle stream gradients, level areas, vegetation patterns, and scenic quality along the river enhance recreation activities. These activities include camping, picnicking, fishing and fly fishing, swimming, tubing, sunbathing, motorcycling, sightseeing, rock climbing, and organized activities such as volleyball and horseshoes. The majority of these are day-use activities and are related to the presence of the river either directly (as for boating, tubing, and fishing) or indirectly (as for sightseeing). Designated parking areas and developed campgrounds are also important to activities such as hiking and motorcycling in adjacent areas, which are only marginally related to the river resource.

The study area includes more than 50 miles of discontinuous water suitable for whitewater boating, tubing, and water play. This includes approximately 11 miles of the North Fork between Bailey and Pine, 5 miles near Foxton, 15 miles on the South Platte from Deckers to the backwaters of Strontia Springs Reservoir, 13 miles

between Lake George and Cheesman Reservoir, and 6 miles on the South Platte from Reservoir Campground to Riverside Campground in Elevenmile Canyon. More than 12,000 kayakers and canoeists use the South Platte River and the North Fork each year. This represents 70 percent of the river boating activity in the Pike National Forest and .02% of total whitewater use in Colorado (Griswold, 1997). The study area offers a broad range of whitewater boating conditions, from Class I to Class V (International Scale of Difficulty). The whitewater boating opportunity is especially significant because the area provides river sections that are suitable for teaching and practicing boating skills and is close to the Denver metropolitan area. The North Fork is considered an important kayak area within the region due to its difficulty and due to late-season releases from the Roberts Tunnel, which extend the length of the kayaking season.

Much of the popularity of this area is due to its unique capability to accommodate a wide variety of recreation activities in one location. This diversity of recreation opportunities within the project study area contributes significantly to the popularity and uniqueness of the area.

RECREATION FACILITIES

Developed recreation facilities in the study area are concentrated in Elevenmile Canyon and from Wigwam Creek downstream to the confluence. Public developed recreation facilities in the study corridor include 10 National Forest campgrounds with a combined capacity of 975 persons. Most of the facilities are managed by concessionaires under special use permits. Twelve other campgrounds within a half-hour's drive of the river can accommodate another 2,400 people, although three of these campgrounds were closed due to fire and flood damage in 1996. In addition to the

campsites on the South Platte, there are seven developed picnic areas and numerous trailheads and parking sites. Private recreational facilities in the study corridor include private resorts, two private fishing clubs, a YMCA camp, and a private campground.

The area has long been popular as a site for summer homes. There are several hundred private residences in the study corridor. Some of these are still used primarily as summer homes, although many other former summer homes have now become year-round residences.

There are 29 recreation residences in four summer home groups under special use permit on National Forest lands in the study corridor. Eight summer homes are located in Elevenmile Canyon, and 21 are located along the South Platte in three summer home groups near Nighthawk, Lazy Gulch, and Shadybrook.

OTHER RECREATION OPPORTUNITIES

Rock climbing is a popular activity in the area. A published climbers' guide (Hubbel and Rolofson, 1988) is devoted specifically to the South Platte and the North Fork. Although many of the climbs associated with the South Platte River are outside the half-mile-wide river corridor, the access points for these climbs are within the corridor. Primary climbing routes in or near the study area include Top of the World, Malay Archipelago, Elevenmile Canyon, and Noddle Heads. The available data are insufficient to allow an assessment of how the rock climbing values in this area compare with those of other rock climbing areas in the region.

Special user groups play a large part in the use and management of the South Platte River. Youth groups, such as scouting

organizations, do public service projects on the river each year. Other service groups, such as Trout Unlimited, also do yearly projects designed to protect and enhance the river while promoting their organizations. Trout Unlimited also holds its annual "Masterfly" fishing event in Cheesman Canyon. The Paralyzed Veterans of America provides recreation opportunities for senior citizens and mentally challenged youths as well as for its own members on an annual basis.

Commercial recreation services in the study corridor include eight companies permitted by the Forest Service to conduct guided fly fishing trips and instruction. Guided fishing activities occur primarily below Cheesman Dam and in the Elevenmile Canyon area. The Forest Service also receives many applications for new permits for guided fishing on the South Platte. Several other permitted companies, or nearby church and organization camps, offer tubing, horseback riding, hiking, and other activities, although there are no commercial rafting or kayaking operations.

The study area includes portions of two significant trail systems. Several motorized (motorcycle) trails reach into the corridor between Deckers and the confluence. These trails are part of the extensive Rampart Range Motorcycle Area. The Colorado Trail, which runs from Denver to Durango, crosses the river corridor near the confluence. In 1996, the Buffalo Creek flood destroyed a bridge on the North Fork belonging to the Denver Water Department that was used for access to the Colorado Trail. The Forest Service has requested funds to replace the bridge.

RECREATION USE AND TRENDS

The Pike and San Isabel National Forests rank 8th of 113 National Forests in terms of visitor use, with 7.3 million recreation visitor days (RVDs) in 1996. Typical of many “urban National Forests,” this area experiences intense day use, usage that peaks strongly on weekends and holidays, and many activities that are not “traditional” forest recreation. Much of the use is strongly motivated by a desire to escape from the city, relax, enjoy nature, and socialize.

Changes in the management of parking and camping and more intensive law enforcement along the North Fork (Segment H) and the South Platte River (Segment E), initiated in 1992, have led to a resurgence of interest in the area by families, fly fishing enthusiasts, and others who had previously avoided the area’s crowding and conflicts. These management actions are the result of a major cooperative effort between the Forest Service, Denver Water, the Colorado Division of Wildlife, and the Douglas and Jefferson County Sheriffs. Management actions include regulations that:

- Prohibit overnight use in the area from Nighthawk to the confluence on the mainstem and from Buffalo Creek to the confluence on the North Fork,
- Allow parking and camping in designated areas only,
- Allow fires in designated fire rings only, and
- Discourage firearms use.

Additional improvements included:

- The development of several camping areas by the Forest Service;

- The placement and maintenance of portable rest rooms by Denver Water;
- Improved signage, through the joint efforts of all cooperating agencies, directing visitors to recreation sites and informing them of regulations;
- The closure and revegetation of many erosion-prone parking areas and dispersed campsites, and
- Agreements with county law enforcement agencies.

These efforts have resulted in improved scenery, more pleasant and secure recreation experiences, a major reduction in erosion, and protection of riparian areas and values from overuse.

Changes in management of the Elevenmile Canyon area (Segment A) have also accomplished similar results. In 1995, the Forest Service developed a management plan, which set up the Elevenmile Canyon Ecosystem Management Project. The purpose of the project is to enhance the quality of recreational experiences and to reduce resource damage in the area. Resource improvements include revegetation, erosion control, and the improvement of fisheries, campgrounds, picnic areas, trails, fishing access sites, roads, parking, interpretation, and information facilities. Management actions include regulations which require payment of a parking fee before entering the area, allow camping in designated areas only, allow fires in existing metal fire rings only, and allow no firearms use.

Use of the South Platte River area and adjacent uplands has increased 3-4 percent annually during the past decade and was estimated at 1,650,000 RVDs in 1995. In 1984, recreation use of the smaller study area associated with the proposed Two

Forks reservoir, which excluded Elevenmile Canyon, was estimated at 317,000 RVDs.

Usage has increased in concert with rapid population growth in the Denver metropolitan area and surrounding counties, particularly Douglas County. New residents moving to the area tend to be young, active, and reasonably affluent, giving rise to a disproportionate increase in demand for “active” sports, dispersed activities (particularly involving sport utility vehicles and other motorized equipment), and activities that tend to require expensive or “high tech” equipment (from mountain bicycles to graphite fly rods).

Angling is a major use of the river in Elevenmile Canyon and from Cheesman Dam downstream and is a clue to the area’s overall popularity and recreation use intensity. These areas typically receive 1,500 to 4,000 angling hours per mile of stream annually; and some locations, such as Cheesman Canyon, may see as many as 17,000 angling hours per mile. Catch rates, due mainly to catch and release regulations and other restrictions, are as high as 1.2 fish per hour in some parts of the river. (For comparison, at the time of its designation as a Wild and Scenic River, the Cache La Poudre River was receiving 1,500 to 4,800 angling hours per mile depending on location.) It is estimated that 11,400 anglers fished Cheesman Canyon in 1986 and that 20,000 fished Elevenmile Canyon in 1994.

RECREATION OPPORTUNITY CLASSES

The South Platte from Deckers to Twin Cedars is classified as “rural” in the Recreation Opportunity Spectrum, a system used by the Forest Service to describe the recreation setting in terms of the physical, social, and managerial characteristics of the area. “Rural” applies to areas that include extensive modifications to the natural

environment but still have a pastoral character. High-quality transportation and other facilities and obvious residential and even commercial development are apparent. These areas provide recreation experiences in which socialization with others is important, contact with other visitors is common, and visitors generally do not seek a high degree of risk or wish to practice self-reliance. Management controls such as regulations, signs, and enforcement patrols are obvious and extensive. Developed recreation facilities in this part of the study area include four National Forest campgrounds between the Wigwam Club and Strontia Springs Reservoir, with a combined capacity of more than 520 people. In addition, there are three developed picnic areas that can accommodate as many as 56 people at one time.

The South Platte below Twin Cedars to the confluence, Elevenmile Canyon downstream to Vermillion Creek (north of Lake George), and the North Fork are classified as “roaded natural,” which means the area retains a generally natural appearance but has a variety of scattered developments, roads for conventional vehicles, and other modifications. The social environment typically results in frequent encounters between groups. Facilities are designed for structured activities and to influence and control use, and management of the area is obvious (signs, enforcement patrols, etc.). These areas provide an opportunity for experiences that involve some privacy and limited opportunity for challenge and risk but include frequent contact among users at campsites and other developments. The 8-mile-long segment of Elevenmile Canyon is primarily a narrow granite canyon. The road follows the route of the historic DSP&P and passes through two tunnels, which add to the scenic driving experience. The canyon has six campgrounds that

provide capacity for as many as 455 campers, and three picnic areas that can accommodate 95 people at a time. Along with camping and picnicking, fishing, swimming, tubing, and rock climbing are the most significant activities.

The South Platte from Vermillion Creek (just downstream from Lake George) to near Corral Creek is classified “semi-primitive motorized.” This area has an extensive network of poor-quality and four-wheel drive roads into the river corridor and across the river at Longwater Crossing. This area has an essentially natural physical environment with few developments and only primitive roads or trails. It offers a type of experience that involves solitude, closeness to nature, and the opportunity to experience self-reliance and risk using motorized equipment. Managerial controls and presence are not highly obvious, and restrictions are few.

Wildcat Canyon from Corral Creek to the inlet of Cheesman Reservoir is classified as “semi-primitive nonmotorized.” This area is accessible only by trail and is a natural appearing environment in which visitors have a high probability of experiencing solitude, closeness to nature, self-reliance and risk, with low interaction between visitors and only some evidence of past use by others. This 3-mile segment is the only part of the study corridor where visitors do not encounter vehicular use in close proximity to the river.

Cheesman Canyon, from the dam downstream to the Wigwam Club property, meets the criteria for semi-primitive nonmotorized, as it is accessible only by trail. While the semi-primitive classification implies few encounters with other people or groups, the use of this area is so high at present that it is often crowded. Parking to serve Cheesman Canyon and the Gill Trail is limited and typically crowded.

2.16 SCENERY

SUMMARY

The South Platte River study corridor is located within the Southern Rocky Mountains physiographic region and the “Front Range” landscape character subtype, for the purpose of evaluating scenic quality. Landscape character is defined as the particular attributes, qualities, and traits of a landscape that give it an image and make it identifiable or unique (Forest Service, 1995).

The river has a variety of visual settings, ranging from deep, narrow canyons, to flat-bottomed valleys, to broad meadows. This allows a range of visual experiences, from total enclosure and immediate foreground views only to distant or background views. Water is present in many forms, including waterfalls, whitewater, still pools, long straight sections, and very sinuous sections. Water clarity is generally high.

The vegetation surrounding the river includes riparian forms such as alder, cottonwood, and willow. Upslope from the river, aspen, ponderosa pine, and Douglas fir are all present. In some areas the tree stands are very dense while in others, particularly on the south slopes, the stands are commonly park-like. Many tree stands are interrupted by grassland openings.

Landforms are quite varied as well, including rock outcrops, vertical walls, and boulder-strewn streambeds. The color of the rock formations is primarily gray, with some isolated spots of red and light gray. Scraggy View, Slide Rock, and the Chutes are a few of the named features.

The visual resource of the study area has been inventoried according to the National Forest Visual Resource Management System. This provides an inventory of the existing visual quality objectives. Current land management direction from the Forest

Plan requires that these objectives be met to the extent practical in all management activities.

VARIETY CLASSES

Variety classes are obtained by classifying the landscape into different degrees of variety. This determines those landscapes that are most important and those that are of lesser value from the standpoint of scenic quality. This visual variety is the basis for a further delineation of landscapes. The variety classes are designated A, B, and C. "A" landscapes are those with the most variety and are, therefore, considered the most scenic. "C" landscapes represent those areas with the least variety in form, line, color, or texture.

These inventory classifications are based upon a variety of factors, such as landforms, vegetation patterns, water forms, rock formations, line, color, and texture.

Class A is distinctive. It refers to those areas where features of landform, vegetation patterns, water forms, and rock formations are of unusual or outstanding visual quality. Such features are usually not common in a given landscape character type.

Class B is typical or common. It refers to those areas where features contain variety in form, line, color, and texture, or combinations thereof, but which tend to be common throughout a character subtype area and are not outstanding in visual quality.

Class C is minimal or indistinctive. It refers to those areas whose features have little change in

form, line, color, or texture. It includes all areas not found in Classes A and B.

The majority of the river corridor is in either "A" or "B" variety class settings. Variety classes are combined with sensitivity level and viewing distance.

SENSITIVITY LEVEL

Sensitivity levels are a measure of the public's concern for the scenic quality of the National Forests. Level 1 is the highest sensitivity, level 2 is average sensitivity, and level 3 is the lowest sensitivity.

DISTANCE ZONES

Distance zones are divisions of particular landscapes being viewed.

Foreground is limited to those distances at which details can normally be perceived. Normally, in foreground views, the individual boughs of trees form texture. Foreground is usually limited to areas within one-quarter to one-half mile of the observer.

Middleground extends from the foreground zone out to 3 to 5 miles from the observer. Texture is normally characterized by masses of trees in stands of uniform tree cover.

Background extends from the middleground to infinity. Texture in stands of uniform tree cover is generally weak or nonexistent.

Variety class, sensitivity, and distance are combined to determine visual quality objectives (VQOs).

VISUAL QUALITY OBJECTIVES

VQOs are a measurable set of standards for management of the land. They are measured in terms of the deviation from the natural landscape based upon the importance of aesthetics.

The following terms are used to describe VQOs:

Preservation is assigned to all existing and recommended wilderness and other primitive non-roaded areas.

Retention provides for management activities that are not visually evident. Activities may only repeat forms, lines, colors, and textures that are frequently found in the characteristic landscape. Changes in the size, amount, intensity, direction, or pattern of these properties should not be evident.

Partial Retention provides for management activities that remain visually subordinate to the characteristic landscape.

Modification allows management activities to be visually dominant, but natural in appearance, even when viewed as foreground or middleground within the surrounding area.

Maximum Modification allows alterations of vegetation and landforms to dominate the characteristic landscape. However, when viewed as background, the visual characteristics must be those of the natural setting within the surrounding area.

EXISTING VISUAL CONDITION

The existing visual condition (also known as “existing scenic integrity”) is an inventory of the current state of the landscape, considering previous human alterations. This inventory is not influenced by variety class or sensitivity level but is based solely on physical conditions and appearance. The six categories or condition levels are defined below. Type I includes those areas that are least impacted, and Type VI represents areas that receive the heaviest impacts.

TYPE I Areas in which only ecological change has taken place except for trails needed for access. They appear to be untouched by human activities.

TYPE II Areas in which changes in the landscape are not visually evident to the average person unless pointed out. They appear undisturbed.

TYPE III Areas in which changes in the landscape are noticed by the average visitor, but do not attract attention. The natural appearance of the landscape dominates. Disturbances appear to be minor.

TYPE IV Areas in which changes in the landscape are easily noticed by the average visitor and may attract attention. They appear to be disturbances but resemble natural patterns.

TYPE V Areas in which changes in the landscape are strong and would be obvious to the average forest visitor. These changes stand out, dominating the landscape, yet are shaped so they might

resemble natural patterns when viewed from a distance. They appear to be major disturbances.

TYPE VI Areas in which changes in the landscape are in glaring contrast to the natural appearance. Almost all forest visitors would be displeased with the effect. They appear to be drastic disturbances.

Review of an “Existing Visual Condition” inventory completed prior to 1989 shows that the visual types of various areas within the Wild and Scenic River study corridor range from Type II to Type V. The impacts are associated primarily with the roads paralleling the river, the many small towns, artificial stream banks, road and train bridges, modification of the streambed configuration, irrigation diversions, riprap that doesn’t match the surroundings, impacts from use, recreation facilities, and water clarity.

DESCRIPTION OF SPECIFIC RIVER SEGMENTS

As a result of the foreground viewing distance, sensitivity levels, and variety class considerations, most of the study segments have a VQO of “Retention.”

South Platte – Segment A

This segment of the river, from Elevenmile Dam to Lake George in Elevenmile Canyon, passes by several campgrounds and picnic areas. The area is known for its rock formations, attractive water features, and old railroad tunnels. Its scenic beauty draws people from all over the region. A road closely parallels the river, and two road bridges cross the river. A third bridge is for

pedestrian access to the Elevenmile picnic area. The Elevenmile Reservoir Dam dominates the upstream end of the canyon, and a 10-foot diversion dam stands at the mouth of the canyon. Lake George and Highway 24 are visible, as are powerlines and other utilities. This segment has a VQO of Foreground Retention, Variety Class A, Sensitivity Level 1, and an Existing Visual Condition of Category IV along the river and Category II along the canyon rims. One generally cannot see outside the river corridor.

South Platte – Segment B

This segment, from Lake George to Beaver Creek, shows visible human influences, particularly around the Lake George area. Utility lines, Highway 24, private residences, and businesses are all visible. North of Happy Meadows campground, a more natural appearance is evident. The river exits a steep-sided canyon from Segment A and meanders through broad meadows, until it enters another steep-sided canyon near Vermillion Creek. This segment has a VQO of Foreground Retention, Variety Class B, Sensitivity Level 1, and an Existing Visual Condition of Category V. The area just outside the study corridor has a VQO of Middleground Partial Retention, Variety Class B, Sensitivity Level 1, and an Existing Visual Condition of Category II.

South Platte – Segment C

Segment C, from Beaver Creek to Cheesman Reservoir, known as Wildcat Canyon, is entirely on National Forest System lands and shows little human impact except for a high-voltage powerline, several abandoned mining cabins, and several four-wheel-drive roads. The area is known for its remoteness, undeveloped character, and rock formations. This segment has a VQO of Foreground Retention, Variety Class A, Sensitivity Level 1, and an Existing Visual

Condition of Category II, except for a small section along Northrup Gulch where it is Category III. One generally cannot see outside the river corridor. The Hayman Fire in 2002 burned acreage, which can be viewed from the river corridor. The intensity of the fire was low in this segment, and subsequent assessment found no change to the VQO or Existing Visual Condition.

South Platte – Segment D

Segment D, from Cheesman Dam to the Wigwam Club property, lies within 600-foot deep Cheesman Canyon and is marked by steep side slopes. The area is only accessible by trail, and there are no developments in this segment. Cheesman Dam dominates the view in the upper third of this river segment, and the Wigwam Club improvements are visible from the lower third. The area is known for its limited access, undeveloped character, and rock formations. This segment has a VQO of Foreground Retention, Variety Class A, Sensitivity Level 1, and an Existing Visual Condition of Category II west of the river and Category III east of the river. One cannot see outside the river corridor.

South Platte – Segment E

In Segment E, from the Wigwam Club property to Strontia Springs Reservoir, the valley bottom widens, and there are many flat areas covered with willows and grass. Numerous recreation facilities are located along the riverbanks. A road parallels the river from Deckers to the confluence. Many private residences, bridges, and roads are visible. Dispersed recreation and the impacts associated with it are heavy along this section of the river. At the recreation sites and in other dispersed areas, the vegetation is often park-like, with small openings. This segment has a VQO of Foreground Retention, Variety Class A,

Sensitivity Level 1, and an Existing Visual Condition of Category IV along the river and Category II outside the river corridor.

North Fork – Segment H

This segment is predominately privately owned. It begins on the Berger property, used mostly for grazing, passes the small community of Estabrook, enters the National Forest for several miles through an inaccessible undeveloped canyon between Estabrook and Cliffdale, and then remains mostly on private land passing through the town of Pine and several smaller communities, the Pine Valley Ranch Open Space Park, and several ranches. Most of the corridor's scenery includes either rural communities with roads, powerlines, and private residences or small ranches and grazing pastures. From Buffalo Creek to the confluence with the South Platte, there are large rock formations such as Cathedral Spires and Dome Rock, which loom over the study corridor, but a graveled county road paralleling the North Fork right along the riverbank detracts from scenic views in the corridor.

This segment has a VQO of Foreground Retention or Middleground Partial Retention, Variety Class B, and Sensitivity Level 1. The Existing Visual Condition Category varies within the segment: it is IV along the river and III along the side slopes from Insmont to Estabrook, Category IV along the river and II along the side slopes from Estabrook to Crossons, Category I within the National Forest System lands from Crossons to downstream of Pine (no rating outside the National Forest), Category V along the river and II along the side slopes from Pine to Ferndale, and Category IV along the river and II along the side slopes from Ferndale to the South Platte confluence. The area outside the study corridor, where visible, has a VQO of

Middleground Partial Retention, Variety Class B, and Sensitivity Level 1.

This segment includes several diversion dams for irrigation, constructed of rocks, concrete, or a combination of the two. It also includes many check dams, some channelization, and areas of riprap, which is used along the highway side of the river and on the outside of some of the meanders. The material generally matches the surroundings in color and style, and it would appear natural to the casual observer. Several abandoned railroad bridge abutments are evident. Several other foot and vehicle bridges, in varying states of repair, are also visible.

2.17 CULTURAL RESOURCES

INTRODUCTION

Although cultural resource inventories undertaken by the Forest Service and other State and Federal agencies within the study corridors are incomplete, considerable knowledge regarding cultural resources within the analysis area has been accumulated. Most of the knowledge is based on the cultural resources investigations done by the Denver Water Board and the Metropolitan Water Providers for the Two Forks study. Other investigations have been done by the Forest Service as part of its continuing cultural resources management program and by the Colorado Department of Transportation in the U.S. Highway 285 corridor, which parallels the North Fork along its upper reaches. Currently, 92 recorded cultural properties are known within the analysis area; 44 of these reflect prehistoric occupations, and the other 47 can be characterized as historic uses or occupations. Many more resources are known but have not been adequately

documented. Included in this category are 216 structures with possible architectural significance at 17 historic sites that were visited and photographed during the analysis for the Two Forks Reservoir project.

PREHISTORIC RESOURCES

The study area contains a relatively high density of prehistoric sites when compared to the more rugged higher elevation areas adjacent to the river corridor. The prehistoric sites range in their expressions from isolated single artifacts to large areas of chipped stone debris near the river, to sheltered caves on the slopes adjacent to the floodplain. Culturally scarred trees, which reflect the American Indian practice of harvesting the inner bark of the ponderosa pine in the late 18th or early to middle 19th century, are known but have not been well documented in the Elevenmile Canyon portion of the corridor. Intuitively, it seems that both the North Fork and South Platte valleys would have been very attractive to prehistoric groups both as seasonal living locations and as areas where critical natural resources were relatively plentiful.

The valleys were probably occupied for hundreds of generations, although this has not been conclusively documented. Contemporary 19th century accounts by the first European settlers in the area describe encounters with Ute Tribe groups and individuals. These accounts mention Horse Creek, the Long Scraggy vicinity, and Wigwam Creek on the South Platte, and Pine Creek and Buffalo Creek on the North Fork as traditional summer camping places for Ute groups. The recorded archeological sites in these areas are probably the camping spots used most recently by the Ute Indians. Groups affiliated with other Colorado Indian tribes known to the first European settlers (for example, the Arapaho and Cheyenne) probably used the same areas.

Earlier groups probably frequented these valleys also, and they may well have used the same camping locations. Radiocarbon dates from Dancing Pants Shelter, located on the South Platte a few miles upstream from the confluence, suggest 4,000 years of use. Artifacts collected during the Two Forks archeological survey also suggest a lengthy prehistoric occupation. Archeological sites were identified upstream from the confluence along both forks (along the South Platte from the confluence to Cheesman Dam, and upstream along the North Fork to Pine). As a group, these sites constitute a significant resource, which could make the area eligible for the National Register. As a case set for archeological research, they contain the vital data necessary to build a local sequence of mountain prehistory and also could be used to reconstruct the lifeways of the prehistoric Ute Indians and other earlier groups. These resources also would be significant for descendant modern American Indian groups in the context of their heritage.

HISTORIC RESOURCES

Recorded historic resources differ widely in their expression and represent a variety of historic uses. Among the major themes in Colorado history reflected in the study area are early transportation (stagecoach roads and railroad routes), mining (mines, mills, and tramways), logging (charcoal production sites and timber mills), recreation and tourism (hotels, resorts, and summer residences), water development (Cheesman Dam and related construction camps), and ranching (homesteads and ranches along the river). Three resources—the North Fork Historic District, the Estabrook Historic District, and the Glen Isle Resort—are listed on the National Register.

There are several recorded resources in the study area that contribute to the mining theme. At the head of the North Fork

north of Kenosha Pass is Hall Valley, which was the site of an extensive silver mining operation beginning in 1869. The several mines, tramway, smelter and mill sites, and company town were the holdings of the Hall Valley Silver-Lead Mining and Smelting Company, Ltd. One of the first ore smelters in Colorado was built in Hall Valley about 4 miles downstream from the principal mines. The original firm failed in 1876, but the holdings were taken over by a series of owners; the last full-scale operations apparently occurred in the 1920s. The Hall Valley mining-related sites are eligible for the National Register. Lower on the North Fork is the Saxonia area, which contains a mill and several mines; Saxonia is recommended eligible to the National Register. At the confluence of Metberry Gulch and the South Platte River in Wildcat Canyon were the Custer Cabins, circa 1870, and an associated mining complex. These cabins were recommended eligible to the National Register prior to being destroyed by the Hayman Fire in June of 2002.

RAILROAD HISTORY RESOURCES

The remains of two pioneering railroads—the DSP&P and the Midland Railroad—are very significant heritage resources located in the study area. The initial settlement of Colorado by people of European descent was tied closely to the discovery of gold and silver in the high country. Travel to the mineral areas from the new cities located on the eastern plains initially was difficult and could be measured in terms of a week or more. Enterprising railroad men were quick to remedy this situation, and several railroads were soon under construction, using the most easily constructed routes. The South Platte River corridor offered one of the easiest routes for the railroad entrepreneur. Beginning in 1872, the DSP&P thrust up the South Platte canyon from Waterton south of Denver to the

confluence of the Forks and then up the North Fork to Kenosha Pass and on to the gold and silver fields near Fairplay and Leadville. For more than 50 years, the DSP&P and its successors hauled mining barons, their agents, and supplies to the mountains and hauled ore back down to the plains. A second major source of DSP&P trade was the burgeoning tourist and recreation industry, which became a major factor in the Colorado economy after 1890. The North Fork was a popular summer destination noted for its spectacular scenery, quiet rural setting, and fishing opportunities. The railroad and other private entrepreneurs built several tourist resorts along the North Fork to accommodate potential visitors. These included several large facilities at Bailey (the Kiowa Lodge), Glen Isle, and Shawnee. Glen Isle is currently listed on the National Register. Today, much of the abandoned grade has been destroyed or altered by highway construction and other developments. There are two stretches within the study corridor that exhibit better preservation. One is in the lower canyon beginning below the confluence and continuing up the North Fork to the vicinity of Pine. Much of this stretch is a contributing element of the North Fork Historic District, listed on the National Register. The surviving features of the railroad include the grade itself, rock work and quarries along the grade, the highway bridge (formerly a railroad bridge) across the river just downstream from the confluence, a boxcar modified to serve as a residence about a mile upstream from the confluence, a second boxcar turned on its back and used as a bridge across the river, the former station building at Dome Rock, and the Westfall Monument (commemorates a heroic engineer who died in a train accident).

A portion of the grade west of Pine to the vicinity of Bailey is not within the North Fork District; however, most of this section

is well preserved and displays the engineering acumen necessary to construct a railroad in a wild and rugged river canyon. Within this section is the Estabrook Historic District, which includes the former Estabrook Depot, now used as a private residence. Farther upstream near the town of Bailey is the Keystone Bridge spanning the river; this former railroad bridge has been relocated; it originally crossed the river downstream from the confluence near Strontia Springs. The bridge was salvaged during construction of the Strontia Springs Dam. The North Fork Historic District and the Estabrook Historic District possess outstandingly remarkable values for the purposes of this study.

The DSP&P was a narrow gage operation and, hence, was limited in the tonnage and volume of freight it could haul. In 1886, the Midland Railroad, a standard gage line, began constructing grade and track between Colorado Springs and Aspen. With its standard gage permitting larger cars and bigger engines with more horsepower, the Midland figured to have an inherent competitive advantage over its narrow gage rivals. The line was routed over Ute Pass to Florissant, then through Elevenmile Canyon on the South Platte, and across South Park to the Arkansas Valley and Leadville. Eventually, the line was connected to Aspen and its mining district via the Hagerman Tunnel under the Continental Divide. The Midland also catered to tourists and local recreationists from Colorado Springs; a favorite destination was the Elevenmile Canyon area, with its spectacular rock formations and sparkling mountain stream. The Midland had approximately 35 years of operation, from 1887 through October 1921; it did not survive the economic upheavals resulting from World War I. The basic alignment of the grade is preserved in Elevenmile Canyon; other surviving features include three tunnels, several cuts and fills, quarries for fill material, the former railroad

stops at Lidderdale and Idlewild, and several railroad construction crew camps located in side canyons. The grade and features of the Midland are eligible for the National Register.

RECREATION – TOURISM RESOURCES

Recreation and tourism is a second major theme prominent in Colorado history and relevant to this study. The mountains west of Denver and other young Front Range cities were recreation havens for the stressed-out urbanites even before the establishment of permanent towns and roads. Once the railroads were constructed in the last decades of the 19th century, they became the most efficient means of reaching mountain recreation sites. The North Fork was a particularly favored recreation and resort destination for well-to-do citizens of Denver. Bailey was initially developed to accommodate travelers journeying between Denver and the mining districts in South Park and further west, but soon it also catered to the recreation trade. During the 1890s, many resorts and private summer retreats were built along the North Fork, which was easily accessible via the railroad. Recreation development also occurred to a lesser degree along the South Fork above the confluence; resorts and private cabins and clubs along the stretch of the river from South Platte to present day Cheesman Dam catered especially to anglers. The popularity of the South Platte west of Denver as a recreation and tourism destination seems to have peaked in the period between the world wars. The industry was severely hampered by World War II and did not recover after the war.

Some significant historic recreation/tourism related properties are located along the North Fork. Previously noted are the historic railroad-associated resorts, such as the Kiowa and Shawnee Lodges and Glen Isle. The North Fork Historic District

contains some recreation-related historic components, including the South Platte Hotel near the confluence; a log summer home in colonial style east of Ferndale; several jointed-log cabins in Ferndale that were double family company resort houses; the community of Longview, which contains some summer cabins vintage 1910–20; similar resort houses at Dome Rock; historic cabins at Foxton; company cabins of the Hendrie and Bolthoff Manufacturing Company at Riverview; the La Hacienda summer home built by John Jerome, the J.W. Green Mercantile Store, the Little Chapel in the Hills, and the Bluejay Inn, all at Buffalo Creek; and summer homes at Pine.

On the South Platte above the confluence are the Deckers (formerly Daffodil) Resort, the Wigwam Club, and the Grandview Resort, which also are significant resources in terms of the recreation/resort theme. Farther downstream are Tanglewood and the Childs' Cabin. These are summer residences constructed in the 1930s that are related to the recreation theme and also appear to have architectural significance.

OTHER NOTEWORTHY HISTORIC RESOURCES

Cheesman Dam and Reservoir and related sites, located on the South Platte, constitute a significant historic site because of their association with Colorado water development and a more general connection with the history of metropolitan Denver. Completed in 1902, the dam and its construction (featuring the use of large granite blocks) also are significant in the context of engineering history and development. Several properties along the South Platte are significant in terms of the early settlement of the Colorado Mountains and ranching and homesteading themes. These include the Fletcher Ranch, a former stage stop on Horse Creek; the Swayback

Ranch, which was originally developed and operated by Dell Manning, who tried lumbering and cattle raising in the area; and the Oxyoke Ranch, which was operated by the historically prominent Ammons family (Elias and Teller Ammons were governors of the State of Colorado). Farther downstream, at Scraggy View, is the Corbin Homestead or the “Little White House,” which was the home and ranch headquarters for the Ammons ranching operations. On the North Fork is the community of Bailey, which was established by William Bailey, his wife, and her sister, Mrs. Entriken. The Bailey family established the Bailey Ranch for travelers in 1864. The Bailey town site and perhaps some of the surviving older structures in the community probably are historically significant.

2.18 SOCIOECONOMICS

This section reviews the demographic statistics of the people who live in the towns and counties of the area, along with recent and projected growth.

AREA OF INFLUENCE

The area of influence for this study is much broader than the river corridor study area. The counties chosen as the area of influence are comprised of people whose cultural and economic development is tied, to some degree, to the study area and its management. Dependence on and use of the water resources in the study area are very important to the public in the area of influence.

The area of influence for this study includes the heavily populated metro counties (Adams, Arapaho, Denver, El Paso, Douglas, and Jefferson) and the more rural, less densely populated non-metro counties (Park and Teller). The Metro counties all

depend on the South Platte River for some or all of their water consumption needs. El Paso County water needs are met mostly from the Arkansas River but are included because its citizens heavily use the study area for recreation and because the county exchanges some of its water with other municipalities that use the South Platte system.

Some of the economic and social differences in the distinction between the metro and non-metro communities are blurring, if not disappearing. New communities in Park, Douglas, and El Paso Counties, while not yet major population centers, are well within commuting distance of Denver and Colorado Springs. The 2000 Federal census reported that Douglas County was the fastest growing county in the United States during the 1990s as a percentage of current population.

POPULATION GROWTH IN THE AREA OF INFLUENCE

Population statistics and projections in this section are based on preliminary population projections (see table 2-14) (Colorado Department of Local Affairs, 2001). This area, in both metro and non-metro counties, has been experiencing significant population growth. The total population living in the counties in the area of influence grew from 2.0 million to 2.6 million between 1990 and 2000. This represents a total percentage change of 30 percent for the 10-year period. The population in the area of influence has been growing faster proportionately than the total population of the State of Colorado, a State whose population growth rate is among the highest of all States in the Nation.

Table 2-14.—Population Projections

County	1990	1995	2000	2005	2010	2015	2020	2025	Average Annual Percent Change				
									'90-95	95-00	'00-05	'05-15	'15-25
Adams	265,708	312,593	365,858	411,878	471,403	531,413	587,065	640,996	3.3	3.2	2.4	2.6	1.9
Arapahoe	393,284	442,539	490,651	520,672	547,690	570,785	593,011	612,621	2.4	2.1	1.2	0.9	0.7
Denver	467,854	507,723	557,688	584,916	608,976	629,887	653,966	685,505	1.6	1.9	1.0	0.7	0.8
Jefferson	439,885	491,314	529,956	551,427	572,996	594,755	617,495	638,022	2.2	1.5	0.8	0.8	0.7
El Paso	397,887	469,693	519,773	562,500	607,295	653,736	700,016	744,645	3.4	2.0	1.6	1.5	1.3
Douglas	61,559	103,839	176,733	222,649	270,075	315,701	353,864	389,438	11.0	11.2	4.7	3.6	2.1
Metro	2,026,177	2,327,701	2,640,659	2,854,042	3,078,435	3,296,277	3,505,417	3,711,227	2.8	2.6	1.6	1.5	1.2
Park	7,269	10,577	14,603	23,629	37,004	56,470	83,873	121,377	7.8	6.7	10.1	9.1	8.0
Teller	12,511	16,981	20,668	24,041	26,217	28,019	29,654	31,121	6.3	4.0	3.1	1.5	1.1
Non-Metro	19,780	27,558	35,271	47,670	63,221	84,489	113,527	152,498	6.9	5.1	6.2	5.9	6.1
Area of Influence	2,045,957	2,355,259	2,675,930	2,901,712	3,141,656	3,380,766	3,618,944	3,863,725	2.9	2.6	1.6	1.5	1.3
Colorado	3,304,042	3,811,077	4,327,192	4,717,697	5,131,089	5,567,551	6,009,699	6,463,157	2.9	2.6	1.7	1.7	1.5

Source: Colorado Department of Local Affairs, 2001.

In the area of influence, the total population of the metro counties dwarfs the population of the non-metro counties (2,640,659 versus 35,271 in 2000). The total population growth of the metro counties in the area of influence is much larger than that of the non-metro counties (614,482 to 15,491).

However, the growth rates of the non-metro counties exceed those of all metro counties except for Douglas County. Douglas County, while classified as a metro County in most published census statistics, has been transforming from a non-metro county to a Denver suburban county. The non-metro counties grew by 78 percent versus 30 percent for the metro counties over the 10-year period. This trend would be even more pronounced if El Paso County were artificially split between metro and non-metro areas, since the majority of the population increase is taking place in the Colorado Springs vicinity. The same generalization is true of Douglas County. A notable part of the population growth in these two counties, as well as in Jefferson and Douglas Counties, is at the urban-forest interface.

Most of the population growth is due to immigration and births exceeding deaths. The people migrating to these towns include people leaving eastern Colorado, people from southern California and other cities along the West Coast, and a smaller percentage of people from all other parts of the Nation. These population changes are part of a national pattern of population movement.

PROJECTING FUTURE POPULATION GROWTH FOR THE AREA OF INFLUENCE

Table 2-14 shows recent population projections made by the Colorado Department of Local Affairs for the area of influence. This set of projections predicts

population growth of approximately 1.2 million additional people in the area of influence in the next 25 years, with 1 million of these people projected to move into the metro counties.

By 2025, the area population is projected to be approximately 57 percent of the population of the entire State of Colorado. Several of the counties will grow significantly faster than the State average, even though the entire area of influence will grow slightly slower than the State of Colorado.

As discussed under Water Uses, demands for water are projected to exceed water supply in coming years. This begs the question 'How would Front Range growth be affected'. Other areas in dry climates have asked similar questions, and the answers are not clear. Residential water demand is dependent on a variety of factors, but one of the best correlated is price. As price goes up, some water uses are curtailed significantly. Prices can be increased through such things as fines during water restrictions or increases in use rates. What is regarded as a water shortage under one price structure may be a water surplus under another. Aggressive conservation measures also affect the determination of adequate water supplies. New technologies in water treatment and reuse and in industrial processing affect water consumption rates. Finally, aggressive conservation measures affect the determination of adequate water supplies. Some may claim that if little or no additional water is provided, then metro area growth will cease and economic ruin will follow. Research in other parts of the arid West has been unable to substantiate these claims (Nichols et al., 2001).

2.19 WILD AND SCENIC RIVERS IN THE REGION

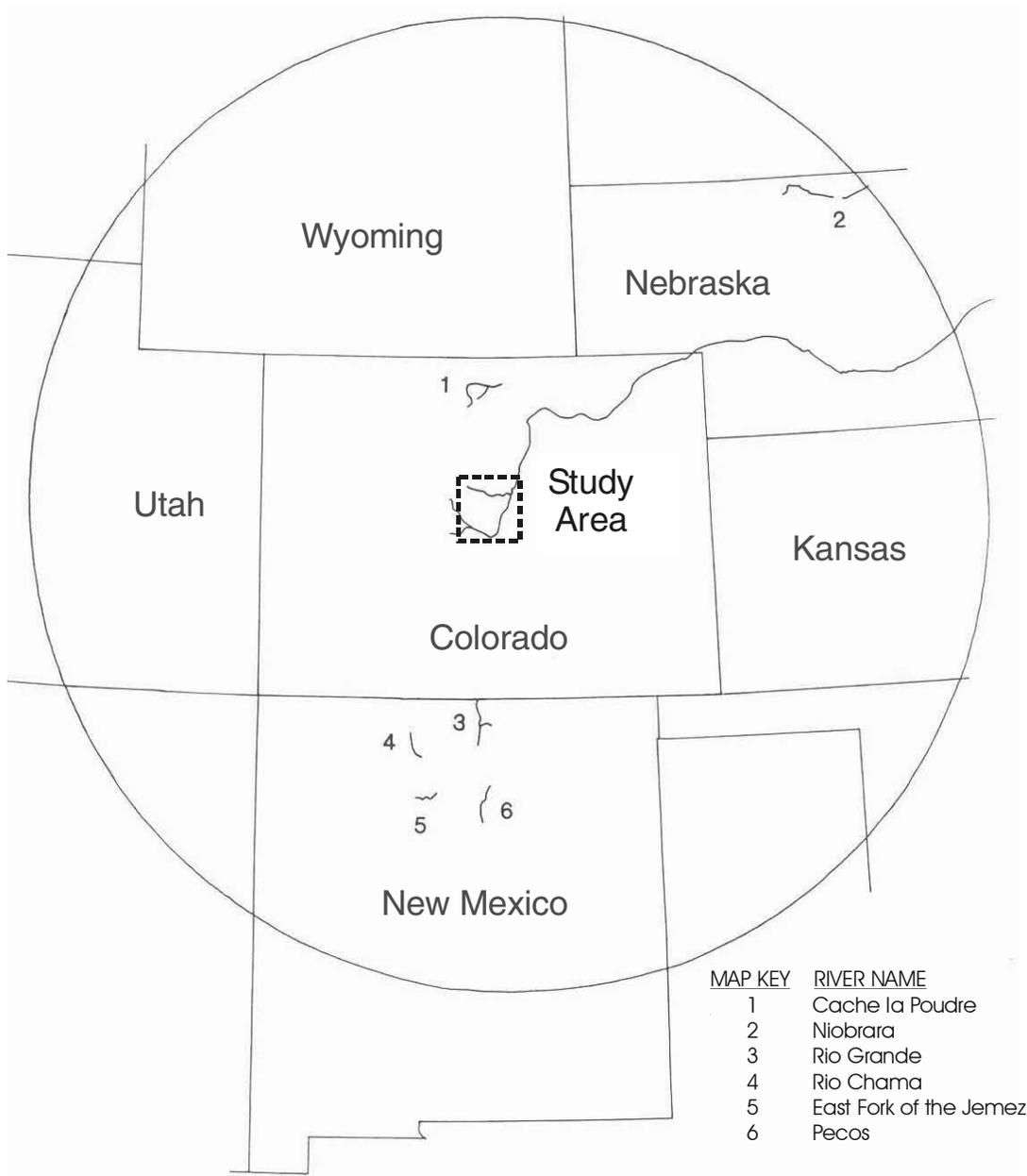
NATIONAL WILD AND SCENIC RIVERS SYSTEM

The Cache la Poudre River is the only designated Wild and Scenic River in the Front Range physiographic province and the only designated river within the State of

Colorado. Within the Forest Service's Rocky Mountain Region, there is only one other designated river, 20.5 miles of the Clarks Fork of the Yellowstone in northwestern Wyoming, about 450 miles from the study area. There are six designated rivers within 400 miles of the study area: they are listed in table 2-15 and shown on map 2-8.

Table 2-15.—Rivers with Federal or State Protection Within 400 Miles of the Center of the Study Area

River Name	State	Administering Agency	Map Key	Mileage	River Status
Cache la Poudre	Colorado	Forest Service/National Park Service	1	76.0	National System
Niobrara	Nebraska	National Park Service/USFWS	2	103.0	National System
Rio Grande	New Mexico	Forest Service/BLM	3	64.75	National System
Rio Chama	New Mexico	Forest Service/BLM	4	24.6	National System
East Fork of the Jemez	New Mexico	Forest Service	5	11.0	National System
Pecos	New Mexico	Forest Service	6	20.5	National System



Map 2-8.—Rivers with Federal or State Protection Within 400 Miles of the Center of the Study Area, South Platte River and North Fork of the South Platte River Wild and Scenic River Study.