USDA United States Department of Agriculture

Forest Service

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Environmental Assessment

Dutton Pipeline Project

Pagosa Ranger District, San Juan National Forest,
Mineral & Archuleta Counties, Colorado

Responsible Official: Mark W. Stiles, Forest Supervisor

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Abstract:
This environmental assessment documents the environmental consequences of a proposal to issue a special use permit to the Pagosa Area Water and Sanitation District (PAWSD) to construct an underground pipeline that will provide water to the District's service area. The project area is located approximately nine miles north of the town of Pagosa Springs. The proposed pipeline would be approximately 29,000 feet in length and follow a route along the Fourmile and Plumtaw Roads to the Dutton Creek drainage that is tributary to Stevens Reservoir. The project is within the Pagosa Ranger District, San Juan National Forest, Colorado.

TABLE OF CONTENTS

INTRODUCTION

Document Structure

The Forest Service has prepared this Environmental Assessment to document the environmental effects of a proposal to construct a water transmission pipeline in the vicinity of the existing Dutton Ditch. This analysis complies with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts of the proposed action and alternatives to the proposed action. The document is organized into four parts:

- *Introduction:* The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Comparison of Alternatives, including the Proposed Action:* This section provides a more detailed description of the proposed action as well as alternative methods for achieving the stated purpose. This discussion also includes possible mitigation measures.
- *Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area. Within each section, the affected environment is described first, followed by the effects of the No Action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.
- *Agencies and Persons Consulted:* This section provides a list of preparers and agencies consulted during the development of the environmental assessment.

Additional analysis documentation is on file at the Pagosa Ranger District Office in Pagosa Springs, Colorado.

Background

The Pagosa Area Water and Sanitation District (PAWSD) has held a special use permit for the Dutton Ditch since 1987. The ditch diverts water from Fourmile Creek and travels for approximately five miles to the Dutton Creek drainage. The District draws water primarily during the fall and winter months for domestic water uses. There are two other users of the ditch, Tom Smith and Inez Seavy. These users primarily draw water during the summer months for the agricultural irrigation purposes.

PAWSD has applied for a Special Use Permit which proposes to replace the existing Dutton Ditch with a pipeline to continue to meet long-term domestic water demand within the District Service area, which includes Pagosa Springs.

PAWSD is a local municipal taxing authority. On November 5, 2002 the District received voter approval for issuance of General Obligation Bonds, a portion of which is to be used for the proposed project.

Proposed Action

The Pagosa Area Water and Sanitation District (PAWSD) proposes to construct an 18 to 30 inch in diameter buried water transmission pipeline approximately 29,000 feet in length along a route that generally would parallel the Dutton Ditch (Figure 1: Alternative 3 - Proposed Action, pg.7). Under Alternative 3 it is also proposed to rehabilitate and abandon the Dutton Ditch following installation and initial operation of the pipeline. This proposal would necessitate the issuance of a special use permit to PAWSD for construction and maintenance of the pipeline. A more detailed description of this proposed action alternative is found on page 5.

Need for and Purpose of Action

The needs for this proposal are as follows:

- **There is a need to increase the supply of water to the PAWSD service area to meet future projected demand (Davis Engineering Study, 2003 p. 9)**.

  The Davis Engineering Study indicates that future growth rate within the District's service area will increase 7 % annually from 2005 to 2010 and 4% from 2011 to 2025. Existing water supply is inadequate to meet projected demand.

- **There is a need to provide for an efficient water delivery system.**

  Within the ditch, water is lost as a result of seepage. In addition, water cannot always be diverted when PAWSD water rights are in priority (winter) since sections of the ditch stop flowing due to freezing. The capacity of Dutton Ditch has declined due to accumulation of sediment. In addition, where portions of the ditch pass over sensitive geologic areas ditch stabilization has been problematic due to breaches. This has resulted in a reduced carrying capacity from ± 14 c.f.s 15 years ago to a present capacity of ± 6 c.f.s

- **There is a need to have an economical water delivery system.**

  The PAWSD 10 year average annual maintenance cost for the Dutton Ditch is $20,000. In some years costs have been nearly $100,000. This includes costs incurred in repairing ditch breaches and resulting earthen slides.

- **There is a need to significantly reduce environmental impacts resulting from mass movement and geologic failures associated with breaches of the Dutton Ditch.**

  The ditch traverses some unstable geologic areas and breaches have caused extensive mass soil movement, erosion and road damage in areas adjacent the ditch right-of-way.

The purposes of this proposal are to:

- **Contribute to an adequate future supply of domestic water for the PAWSD service area.**

  Compared to the ditch, the proposed pipeline would be a more efficient carrier of water. Carrying capacity of the pipeline would accommodate the District's Dutton Ditch water rights as well as future conditional rights. There would be no water loss associated with evaporation, seepage and winter freezing. The District could more frequently and efficiently divert water when it was in priority during the winter months.

- **Reduce the maintenance costs of the current water delivery system.**

  It is projected that annual maintenance costs of the pipeline would be around $8,000 which is $12,000 less than current ditch maintenance costs.

- **Significantly reduce the probability of environmental impacts resulting from water delivery system operations.**

  Compared to existing ditch, the proposed pipeline, properly designed, will reduce the risk of failures that could result in breaches along with associated environmental effects.

Analysis area:

Unless otherwise stated the analysis area is the same as the project area. The project area for the proposed pipeline route is approximately 20-30 foot wide and 29,000 feet in length totaling approximately 20 acres. Under Alternative 3, the Dutton Ditch would be rehabilitated. This area is approximately 10 acres and is 12 to 14 foot in width for approximately 31,000 feet. See Figure 1 for location of proposed pipeline and existing ditch corridor.

Forest Plan Consistency

The proposed action, as submitted by PAWSD, would meet minimum Forest Plan standards and guidelines. Specific Forest Plan direction is as follows:

- "Act on special use applications according to the following priorities: (a) Land and land use activity requests relating to public safety, health and welfare, e.g., highways, power lines and public service improvements" (*FP pg. III-68*).
- Soil Resource Management direction is to "Maintain soil productivity, minimize man-caused soil erosion, and maintain the integrity of associated ecosystems." (*FP pg. III-72).*
- Water Uses Management direction states, "Special Use authorizations, easements, rights-of-ways and similar authorizations for use of NFS lands shall contain conditions and stipulations to maintain instream or minimum flows necessary to fulfill all National Forest uses and purposes. Maintain instream flows and protect public property and resources.", *(FP pg. III-47).*
- "Maintain habitat for viable populations of all existing vertebrate wildlife species. a) Habitat for each species on the Forest will be maintained at least at 40% or more of potential capability", *(FP pg. III-27).*

Decision Framework

Given the purpose and need, the deciding official will review the proposed action and the other alternatives in order to make the following decisions:

- Should the US Forest Service issue PAWSD a special use permit for construction of a water pipeline?
- If so, which alternative (and associated mitigation measures) best meets the Need for and Purpose of the Action?

Public Involvement

The proposal was listed in the Schedule of Proposed Actions in the March, - May 2003 edition and has been in every quarterly SOPA since that time. Tribal scoping for this project was initiated on April 18, 2003. General public initial scoping for this proposal occurred from June 10 to July 2, 2003. In addition to initial scoping letters, two articles discussing the Dutton Pipeline project were published in the Pagosa Springs Sun, one on June 10 and the other on June 26, 2003. The formal comment period for this project was held from May 29 to July 19, 2004. Two letters were received and the Forest Service discussed comments with the originating interested parties. Following these discussions, the public expressed satisfaction that their concerns had been addressed.

Initial Scoping Issues & Responses

Three issues raised during initial scoping are as follows, including Forest Service response.

1) Concern that side water taking will worsen problems of cattle moving to private property for water. (J.R. Ford)

Side water is already being taken with the existing ditch, this situation will not change with the operation of the new pipeline. To date, no one has advised the Forest Service that permitted cattle have been on private land. Generally, where this is a problem, landowners as required by State law, to fence these areas.

2) PAWSD will take more water than they are currently taking and thus reduce Fourmile ditch users allocation of water. (Ken Levine)

PAWSD, by law, cannot take more water than they have water rights for and can only divert water when they are in priority, which generally is after the irrigation season. Other water users, by law, can take water that they have rights for and can divert water when they are in priority regardless whether PAWSD builds the pipeline or not.

3) As this proposal was being developed, the Pagosa Ranger District has worked with PAWSD to assure the maintenance of a stream flow regime below the point of diversion for the pipeline sufficient to maintain trout habitat in Fourmile Creek. At the request of PAWSD, the Forest Service estimated that a minimum stream flow of 3 c.f.s. immediately below the point of diversion would be necessary for that purpose. The PAWSD is supportive of that minimum stream flow, and is not adverse to including that as a requirement in their special use authorization to operate and maintain the pipeline.-

Concerns about conditioning this special use authorization with a stream flow provision were raised during the analysis by entities other than PAWSD. Some have asserted that the agency has no authority to do so. The agency, in turn, has asserted that it does have the authority to condition special use authorizations for water development facilities when necessary to comply with the requirements of the Organic Administration Act, the Endangered Species Act, the National Forest Management Act, and other federal statutes. Agency decisions in other cases similar to this type of use to condition special use authorizations with stream flow requirements have been supported in administrative appeals and litigation decisions.

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes and compares the alternatives considered for the Dutton Ditch Pipeline project. It includes a description of alternatives considered in detail and a map of the proposed action alternative. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public.

Alternatives Considered in Detail

Alternative 1

No Action

Under the No Action alternative, current management plans would continue to guide management of the project area. No pipeline would be constructed. PAWSD and other users would continue to use the Dutton Ditch under special use permit.

Alternative 2: Construct Pipeline, Continue Operating Dutton Ditch

This alternative is similar to Alternative 3 (see below) with the following exceptions:

It is assumed under this alternative that, one or both of the other existing Dutton Ditch users (Smith and Seavy) will elect not to use the pipeline and will continue to use and be responsible for maintenance of the Dutton Ditch. Under this alternative, along the first 3,800 feet, the pipeline, except for minor curve straightening, would be buried beneath the existing Dutton Ditch, with the ditch being reconstructed following pipeline installation.

The Dutton Ditch would not be abandoned or rehabilitated.

Existing Ditch user(s) who elect not to use the pipeline would be issued operating plan(s) until such time as their (the) Ditch Bill application(s) are processed and/or permit(s) issued.

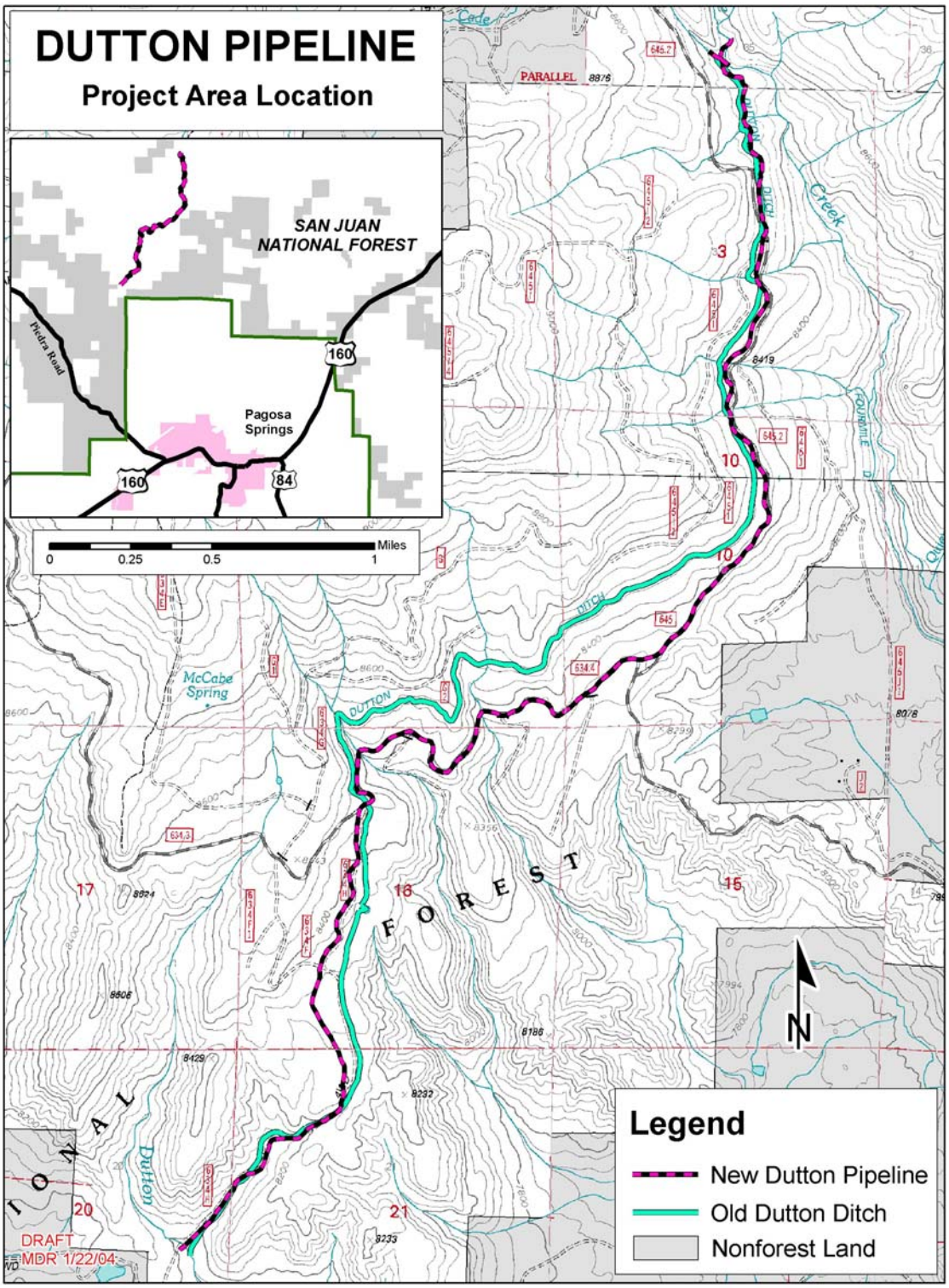
Alternative 3: Proposed Action - Construct Pipeline, Rehabilitate Dutton Ditch

The proposed action would involve the construction of approximately 29,000 feet of 18 to 30 inch pipe. The first 3,800 feet of the pipeline route would follow the existing Dutton Ditch corridor, the remainder of the route will follow Forest Service roads to a connection with the existing pipeline extension which delivers water to Hatcher Reservoir. Under this alternative along the first 3,800 feet, the pipeline, except for minor curve straightening, would be bedded and set within the Dutton Ditch and then covered over with soil and reseeded. Along Forest Service roads, the pipeline would be buried up to 10’ deep either next to or in the Forest Service Roads. The new pipeline would have capacity to carry the 35 c.f.s of Dutton Ditch water sufficient to carry all absolute and conditional rights.

Proposed pipeline appurtenances would include a collection inlet and feeder pipeline at Cade Creek, which is tributary to Dutton Ditch. This collection point and associated water right, referred to as sidewater collection, will allow the pipe to capture and convey runoff from Cade Creek which has contributed to Dutton Ditch. Other features of this alternative include:

- Pipeline construction would occur over a period of approximately five months. The work could extend into the winter season, weather and road conditions permitting.
- Under this alternative all current ditch users would transport their water in the pipeline, and the Dutton Ditch would be abandoned and rehabilitated to Forest Service specifications.
- A permit and operating plan would be issued for pipeline operations.

Figure 1: Alternative 3 - Proposed Action



Mitigation Common to Action Alternatives

"Mitigation measures" are requirements that address site-specific conditions and are designed to reduce specific environmental effects. These mitigation measures have been selected to provide additional detail and guidance for those implementing this project. They are based on over three decades of local experience and field evaluation of their practicality and effectiveness. They have been evaluated by hydrologists, wildlife biologists, soil scientists, engineers, project administrators, and other resource specialists.
In addition, the ID Team used the following criteria in identifying and designing mitigation measures. Mitigation measures should:

- Reduce impacts to an insignificant level;
- Demonstrate effectiveness (in past usage);
- Lack controversy about their effectiveness;
- Be specific;
- Be measurable, and
- Be enforceable.

The Forest Service representative is the person primarily responsible for monitoring and documenting the implementation and effectiveness of the site-specific mitigation measures identified in this document. As appropriate individual resource specialists will monitor implementation of selected measures by visiting the project area during the active construction activities to determine where and whether mitigation was appropriately applied and assess mitigation effectiveness.

The following mitigation measures were developed to ease some of the potential impacts the various alternatives may cause. The mitigation measures will be applied to any of the action alternatives.

Vegetation

Restoration of the ground surface and revegetation of all disturbed areas with a USFS approved seed mix listed in Table 1.0.

The ROW will be seeded with a grass seed mix. Seeding rates will be based on Pure Live Seed (PLS) pounds per acre and applied according to the specifications below. Seeding rates are based on use of a seed drill and should be doubled if hand broadcast.

Table 1: Seed Mix for Dutton Ditch Pipeline Project

Grasses	PLS/ac
Agropyron smithii (Western wheatgrass)	2.0
Bromus anomalus (Nodding brome)	0.8
Agropyron trachycaulum (Slender Wheatgrass)	1.7
BROMUS MARGINATUS *(MOUNTAIN BROME)* ***3.2***	
Lolium multiflorum (Annual rye)	2.5

In order to minimize potential impacts to revegetation efforts from motorized vehicle access after construction is completed and trespass along the right-of-way, motorized vehicles will be prohibited through the use of signage. In addition, post and cable or rock/boulder features will be utilized along edge of and within the pipeline corridor where necessary to block access and protect the pipeline corridor.

Use of mufflers or spark arresters on all vehicles and equipment will be required for fire prevention.

Pagosa Area Water and Sanitation District will be responsible for treatment and control of noxious weeds that invade the pipeline and or existing ditch ROW. Monitoring will be conducted the 1st and 3rd year after construction.

Before construction begins on a project that will disturb more than 5 acres of land, Pagosa Area Water and Sanitation District must file with the Secretary a copy of its Stormwater Pollution Prevention Plan prepared for compliance with the U.S. Environmental Protection Agency's National Stormwater Program General Permit requirements.

The construction right-of-way width shall not exceed that described in the project description. However, additional construction right-of-way may be used (subject to compliance with all applicable survey and mitigation requirements) in limited areas for full right-of-way width topsoil segregation or where topographic conditions, such as side-slopes, require it to ensure safe construction.

Pagosa Area Water and Sanitation District is responsible for ensuring successful revegetation of soils disturbed by project-related activities. Follow-up inspections will be conducted of all disturbed areas after the first and second growing seasons to determine the success of the revegetation effort and to determine the need for additional restoration.

Revegetation shall be considered successful if upon visual survey the density and cover of reseeded areas are similar in density and cover to adjacent undisturbed lands. If vegetative cover and density are not similar or there are excessive noxious weeds after two full growing seasons, the Forest Service shall determine the need for additional restoration measures (such as fertilizing or reseeding), and implement the measures recommended by the agronomist.

Geology

The pipeline will be engineered and constructed by the proponent to withstand movement without breaching of the extensive recently known active landslides as well as any other landslides identified by further study of the proposed pipeline route.

The pipeline will be engineered and constructed so that surface and subsurface water is not intercepted by the trench, both before and after backfilling, and not allowed to concentrate in areas of landslides or potentially unstable slopes.

Watershed

This project should conform to the Forest Service Watershed Conservation Practices Handbook (WCHP).

Construction activities and soil disturbance will be kept to the least width possible, especially along the upper portion of project (from head gate to road crossing).

Silt fence and/or wattles will be placed around drainage areas, wetlands or other aquatic sites as designated by Forest Service personnel or other qualified specialists.

Avoid wetland areas along the roads even if this means curving the pipeline slightly.

If wetland areas cannot be avoided, the top 2 feet of soil should be removed and set aside. After activities are completed, the sod will be placed back where it came from. Additional seeding may be required.

Seed and place erosion blankets on any soil disturbance of slopes greater than 3:1. Installation shall follow manufactures' guidelines.

Maintain road drainage and existing contour along borrow ditches.

Soil

During periods when soils are too wet, construction equipment will not be allowed on land other than gravel roads. Soils are too wet when the soil moisture content exceeds the plastic limit. If soils within six inches of the surface can be rolled into threads that are three millimeters in diameter without breaking or crumbling, they are too wet.

Fisheries

During all periods when sufficient natural flow is available and PAWSD's water rights are in priority, a 3 c.f.s instantaneous minimum flow will be maintained by PAWSD in Fourmile Creek at the point of the pipeline and/or Dutton Ditch diversion.

The long-term maintenance of fish populations in Fourmile Creek is predicated on the assumption that stream flows will be adequate to maintain minimum levels of aquatic habitat. Monitoring of water diversions and stream flows downstream of the diversion structure(s) would be necessary to determine habitat maintenance. In addition, periodic sampling of fish populations would be required to ensure compliance with Forest Plan direction.

Transportation

The Forest service will conduct pre-project road conditions survey on open and closed roads that will be impacted by project activities. PAWSD will be required, following termination of project activities, to restore roads to their original conditions based on survey information.

Traffic delays along the Fourmile and Plumtaw roads will generally be kept to 30 minutes or less. In addition, signs will be posted notifying the public as to what day and approximate times delays will be occurring.

Closure gates will be installed along with wing fences for 50 feet either side of the gates at the following locations: where the pipeline intersects the Fourmile road, and where the pipeline leaves FSR 634H.

Public Safety

During active construction periods warning signs will be posted notifying the public of construction activities. Any open trench left at night will be clearly marked and barricaded.

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AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The first part of this section summarizes the physical, biological, social and economic environments of the affected project area and the potential direct and indirect effects to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the previous chapter. Cumulative effects are discussed at the end of this section.

Vegetation

Affected Environment

Vegetation types are variable in the analysis area as determined by topography, elevation and soils. Cool moist mixed conifer habitat type occurs on the slopes along the first portion of the existing Dutton Ditch and surrounding the northern (3,800 feet) extent of the proposed pipeline right-of-way (ROW). The complex overstory is dominated by white fir (*Abies concolor*) with scattered mature Douglas-fir (*Pseudotsuga menziesii)*, Engelmann spruce (*Picea engelmannii*), blue spruce (*Picea pungens*) and ponderosa pine (*Pinus ponderosa)*. Ponderosa pine becomes more prevalent along the southern extent of the existing ditch corridor. Large to small stands of aspen (*Populus tremuloides*) are interspersed throughout. Understory shrubs are sparse and include common juniper (*Juniperus communis*), snowberry (*Symphoricarpos oreophilus)* and Woods' rose (*Rosa woodsii*). Canopy closures range from 30-50%. Vegetation along the existing open roads includes seeded grasses and successional forbs. Smooth brome *(Bromus inermis)*, western wheatgrass *(Agropyron smithii)*, Kentucky bluegrass *(Poa pratensis)*, goatsbeard *(Tragopogon dubius)*, and dandelion *(Taraxacum officinale)* were identified in the project area.

Several small populations of curly dock (*Rumex crispus*), Canada thistle (*Cirsium arvense*), and butter and eggs *(Linaria vulgaris)* were identified along the existing ditch.

Threatened or Endangered Flora Species

There are no federally listed threatened or endangered plant species or potential habitat known or suspected to occur on the Pagosa Ranger District of the San Juan National Forest according to the revised January 2004 Rocky Mountain Region Endangered, Threatened and Sensitive Plants list.

Region 2 Sensitive Flora Species

The sensitive plant species evaluated for this project are from the January 2004 Rocky Mountain Region Endangered, Threatened and Sensitive Plant list and include only those species known or suspected to occur on the SJNF. Seven of these species are known or suspected to occur at elevations from 7,800 to 8,600 feet on the Pagosa Ranger District. These species include Aztec milkvetch *(Astragalus proximus)*, Missouri milkvetch (*Astragalus missouriensis var. humistraus*), giant helleborine orchid, *(Epipactis gigantea)*, Pagosa skyrocket *(Ipomopsis polyantha)*, yellow ladyslipper (*Cypripedium parviflorum)*, largeflower triteleia *(Triteleia grandiflora)* and the frosty bladderpod *(Lesquerella pruinosa)*. The *Biological Evaluation* on file at the Pagosa Ranger District office provides a discussion of the USFS Region 2 Sensitive species and provides remarks as to their occurrence in the project area. In summary, the determination for all plants considered was "no impact".

Environmental Consequences

Alternative 1: No Action

Currently, vegetative impacts associated with maintenance of the existing Dutton ditch are negligible along the ROW. Vegetation in the project area is subject to minimal amounts of trampling from hiking and vehicular access for maintenance along the ditch ROW. Total area of the existing ditch corridor is approximately 10 acres. Spring runoff has been identified as an issue associated with stability of the surface ditch (personal communication, Art Holloman 2003). Excessive runoff can increase soil erosion and potential for weedy species to occur in the mudflow areas.

As identified in the affected environment, several small populations of weed species occur along the ditch. Maintenance and operation of the existing ditch would continue to disturb areas adjacent to the ROW and low levels of weeds would continue to be problematic.

Any future ditch failures could trigger mass movement and thus impact vegetation in the affected area.

Alternative 2: Construct Pipeline, Continue Operating Dutton Ditch

Vegetation along the existing ditch ROW is subject to minimal amounts of trampling from hiking and vehicular access for maintenance. As identified in the affected environment, several small populations of weed species occur along the ditch. Maintenance and operation of the existing ditch would continue to disturb areas adjacent to the ROW and low levels of weeds would continue to be problematic.

The alignment of the proposed pipeline and impacts are discussed below in Alternative 3. Vegetation impacts resulting from pipeline construction are the same as those described under Alternative 3, except for rehabilitating the ditch,

Alternative 3: Proposed Action - Construct Pipeline, Rehabilitate Dutton Ditch

The alignment of the proposed pipeline follows existing roads for about 80 percent of its length. The pipeline will be buried under the existing roadbed or in the adjacent roadside ditch. Vegetation will be impacted at the diversion point and directly below the diversion along the existing ditch for about ¼ mile for a total of 5.7-acres of disturbance. This disturbance is in the Douglas-fir/cool moist mixed conifer habitat. It is expected that about 50 trees of various diameters scattered over the 5.7-acre area will be removed. The cut trees will be bucked up and lopped and scatter outside the pipeline corridor. Disturbance associated with installation of the proposed pipeline within the existing road prisms is approximately 19.9 acres.

Installation of the pipeline is expected to be completed in 2005 and will last from 60 to 120 days. Four heavy pieces of equipment will be working on site in addition to a heavy truck with a trailer that will supply pipe for the project. A helicopter may be used at the diversion site to supply concrete (personal communication, Art Holloman 2003).

Under this alternative the existing ditch is to be abandoned, with most of the reclamation being left to natural forces and time. However, at drainage intersections the ditch will be breeched to allow natural water flow down slope. Only minor vegetation disturbance during breeching is expected (personal communication, Rebecca Smith 2003). The existing ditch comprises 10 acres of corridor area and vegetation would re-establish in the ditch over 1 to 5 years and revert to natural conditions.

Loss of vegetation in the proposed project area would occur due to blading and trenching during pipeline installation. A total of approximately 5.7-acres of cool moist mixed conifer forested

vegetation would be impacted and 19.9 acres of roadside reseeded grasses would be removed as a result of the development of the proposed action. The removal of vegetation along the pipeline route could increase the potential for noxious weed infestations in the project area. As disturbed areas of the pipeline are reclaimed, impacts would be reduced to minimal.

Threatened or Endangered Flora Species Consequences

Alternative 1: No Action

There are no federally listed threatened or endangered plant species known or suspected to occur on the Pagosa District of the San Juan National Forest according to the revised October 23, 1996 Rocky Mountain Region Endangered, Threatened and Sensitive Plants list. Therefore, a determination of **"no effect"** was reached for threatened and endangered plant species.

Alternative 2: Construct Pipeline, Continue Operating Dutton Ditch

A determination of "**no effect"** was reached for threatened or endangered plant species (see above).

Alternative 3: Proposed Action - Construct Pipeline, Rehabilitate Dutton Ditch

A determination of "**no effect"** was reached for threatened or endangered plant species (see above).

Region 2 Sensitive Flora Species Consequences

Alternative 1: No Action

A **"no impact"** determination was made for *Astragalus proximus* (Aztec milkvetch), *Astragalus missouriensis var. humistraus* (Missouri milkvetch), *Epipactis gigantea* (Giant helleborine orchid), *Ipomopsis polyantha* (Pagosa skyrocket), *Cypripedium parviflorum* (yellow ladyslipper), *Triteleia grandiflora* (largeflower triteleia) and *Lesquerella pruinosa* (frosty bladderpod). On-site investigations were conducted by Ecosphere biologists on May 23rd, July 10th and August 14th, 2003. No *Astragalus proximus, Astragalus missouriensis var. humistraus, Epipactis gigantea, Ipomopsis polyantha, Cypripedium parviflorum, Triteleia grandiflora* or *Lesquerella pruinosa* were found within the project area during field reconnaissance.

Alternative 2: Construct Pipeline, Continue Operating Dutton Ditch

A **"no impact"** determination was made for Sensitive plant species (see above).

Alternative 3: Proposed Action - Construct Pipeline, Rehabilitate Dutton Ditch

A **"no impact"** determination was made for Sensitive plant species (see above).

Geology

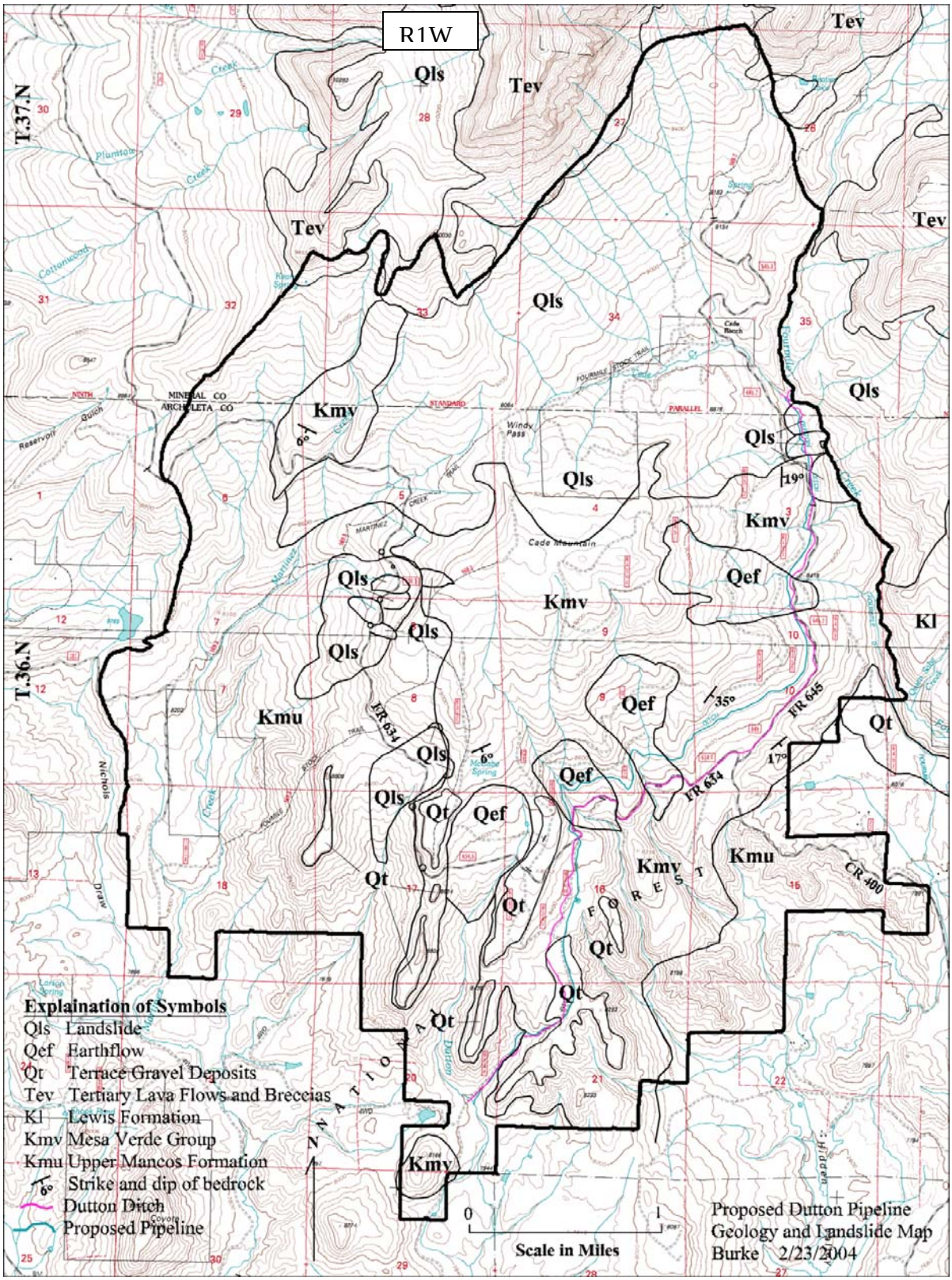
Affected Environment

The Cretaceous bedrock formations along and near the proposed Dutton Pipeline are, from oldest to youngest, the upper Mancos Formation, the Mesa Verde Group and the Lewis Formation (See Figure 2: Dutton Area Geology). The upper Mancos Formation consists of calcareous shale and argillaceous limestone. The Mesa Verde Group consists of interbedded sandstone and dark-gray clay shale. The Lewis formation is dark brown clay shale. To the south, terrace gravels cap some of the ridges and mesa tops. In the eastern part of the study area, the sedimentary beds dip approximately 20 degrees to the east and southeast, gradually transitioning to 6 to 7 degrees to the south in the western part of the study area. The shale of the Mancos and Lewis Formations weathers to an olive brown silty clay soil that is highly erosive and often dissected by gullies. The Mancos, Mesa Verde and Lewis Formations are also susceptible to both large and small landslides.

Much of the area near the proposed pipeline is landslide terrain. Landslides in the study area can be subdivided into the following categories:

- Large earth flows and landslides, generally on slopes where the orientation of the bedding surfaces roughly parallels the ground surface. The failure surface is probably along weak shale beds in either the Mancos Formation or within the Mesa Verde Formation. Also contributing to the formation of these slides could be fractures in the sandstone overlying the more deformable shale resulting from the folding of the beds. Based on the absence of recent cracks, and leaning trees, these large slides appear to have been inactive for at least 100 years.
- Smaller, recently and currently active slides on some of these larger earth flows and landslides. Some of these smaller slides probably were triggered by road construction but others are from natural adjustment over time of the weakened large scale slide mass material. Slides that have occurred along both the east and west sides of Fourmile Creek, in response to down cutting of the creek.

Figure 2: Dutton Area Geology



- Small landslides just down slope from the Dutton Ditch. Although these slides are small, the rapid release of water from the ditch onto natural slopes has caused considerable erosion and sedimentation. Seepage from the ditch is the probable cause of these landslides.
- Small landslides in fill slopes along the Fourmile and Plumtaw roads. These slides were caused primarily by the weight of the fill material overloading pre-existing landslides or weak soils below the road, or in some cases, seepage of water from the ditch. They have generally extended 1/2 to 2/3 of the way across the road but not reached the ditch.

The existing Dutton Ditch crosses several older earth flows and smaller recently active landslides, all in weathered shale and soils formed from the Mesa Verde Group.

Consequences

Alternative 1 - No Action

Under this alternative, there will be no perceptible short-term change in the slope stability conditions of the study area. Some of the smaller active slides will continue to move during wet periods and additional ones may occur. The larger earth flows will probably remain stable. Small slope failures caused by seepage from the Dutton Ditch will continue to occur as they have in the past, causing extensive down-slope erosion and sedimentation. Slow movement of the landslides crossed by the existing ditch for approximately 3,800 feet from the diversion from Fourmile Creek to the Fourmile Road will likely occur during wet periods, and necessitate repair to the ditch. Seepage from the ditch is not likely to initiate or accelerate movement of these slides.

Alternative 2 – Construct Pipeline, Continue Operating Dutton Ditch

Under this alternative, the existing Dutton Ditch will still be used and the environmental consequence with regards to the ditch will be the same as for Alternative 1. A 24” or 30”’ pipeline will parallel and perhaps underlie the Dutton Ditch for approximately 3,800 feet from the Fourmile Creek diversion to where the ditch crosses the Fourmile Road. The pipeline will be engineered and constructed by the proponent to withstand movement without breaching of the extensive recently active landslides in this section as well as any other landslides identified by further study of the proposed pipeline route. Also, the pipeline will be engineered and constructed so that surface and subsurface water is not intercepted by the trench, both before and after backfilling, and not allowed to concentrate in areas of landslides or potentially unstable slopes. Based on these considerations, the risk of slope failures damaging the pipeline or being activated by it will be low.

Alternative 3 – Proposed Action - Construct Pipeline, Rehabilitate Dutton Ditch

Under this alternative, the probable slope failures and subsequent erosion, sedimentation and maintenance issues associated with the Dutton Ditch and described under the no action alternative would be avoided. If the pipeline is engineered and constructed as described under alternative 2, the risk of slope failures damaging the pipeline or being activated by it will be below as described above.

Soil

Affected Environment

The analysis area is primarily associated with the Lewis Shale and Mesaverde Geologic Formations. Landslide deposits of volcanic and sedimentary origin are also present. This area is mostly associated with moderately steep mountain slopes and relatively flat structural benches. Slope gradients are predominantly in the 10–30% range.

The soil of the area predominantly classify as Typic and Vertic Hapludalfs fine, smectitic. They are mostly deep, well-drained, and productive. Surface soil textures are silt loam and loam, while subsurface textures are clay and clay loam. Surface layers are mostly 4 inches or greater. Litter layers are primarily 1 inch or greater. Ground cover is greater than 70% in most places. Soil compaction potential for the project area is moderate, due to silt and clay content. Typic Argiudolls that display similar properties as described above are also present to a minor extent in the project area.

Excepting landslide areas identified in the geology section, there are no soil erosion or soil compaction problems evident along the proposed pipeline route.

Environmental Consequences

Alternative 1: No Action

Some erosion and soil movement associated with the existing Dutton Ditch would continue. Any ditch failure could result in soil erosion and displacement until the affected area were stabilized and revegetated.

Alternative 2: Construct Pipeline, Continue Operating Dutton Ditch

Barring any ditch failures, given the soil mitigation that will be applied (see page 10) it is expected soil displacement and soil erosion will be minimal. The same amount of soil disturbance would occur in the roadways with either Alternatives 2 or 3. There is potential for more disturbance with this alternative in the upper section where the pipeline and ditch would run together since the ditch would be buried beneath the existing ditch and the ditch would need to be reconstructed.

Alternative 3: Proposed Action - Construct Pipeline, Rehabilitate Dutton Ditch

There may be minor soil displacement as a result of breeching the Dutton Ditch. Ceasing operation of the ditch would result in the elimination of the risk of erosion and soil displacement from ditch failures. All other soil consequences under this alternative would be similar to those described under Alternative 2.

Watershed

AFFECTED ENVIRONMENT

Wetlands

There are 5 small wetlands along the proposed pipeline route either along the existing ditch, Fourmile Road or Plumtaw Road. Total area of the wetlands is approximately 0.29 acres. All wetlands are

predominantly wet meadow type. The wetlands are listed in the Table 2 below, and are located on and Figure 4.

Figure 3: Existing Wetlands, upper pipeline

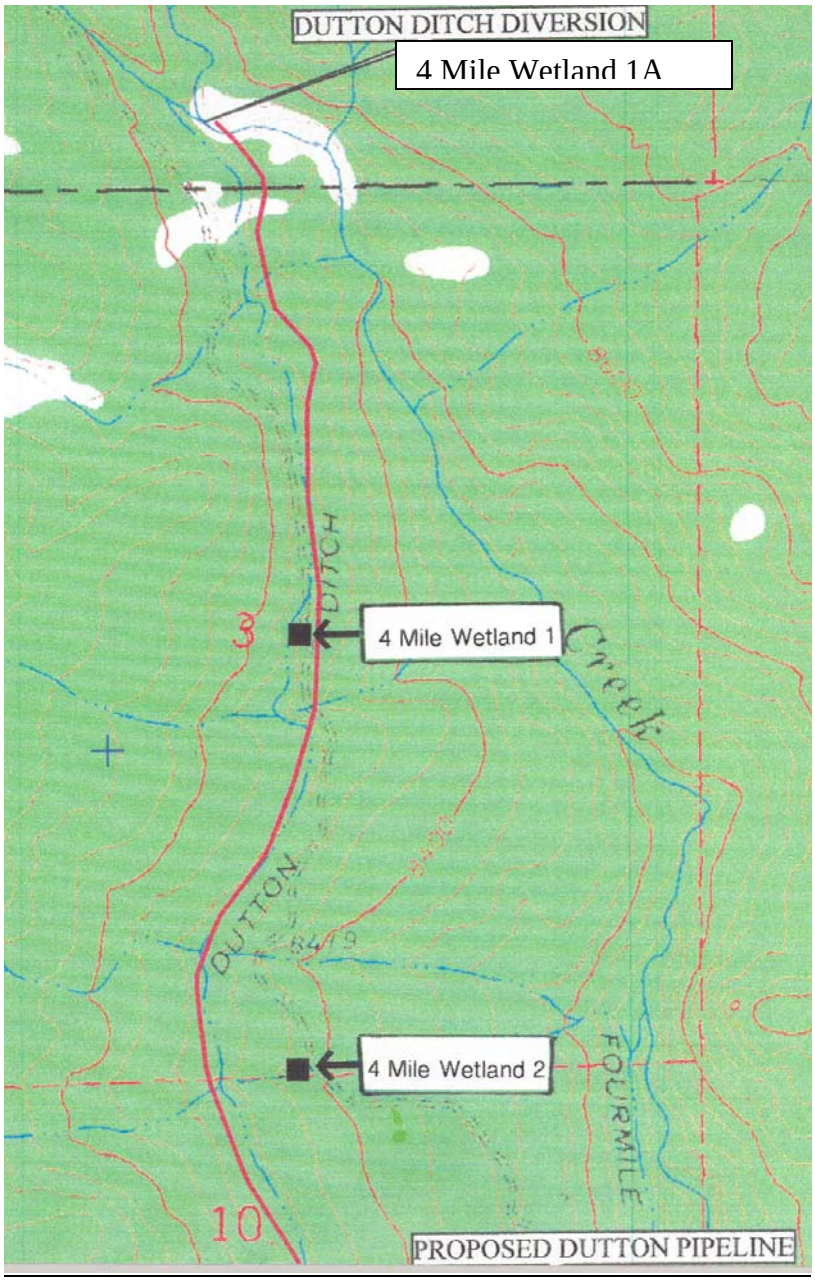


Figure 4: Existing Wetlands, lower pipeline

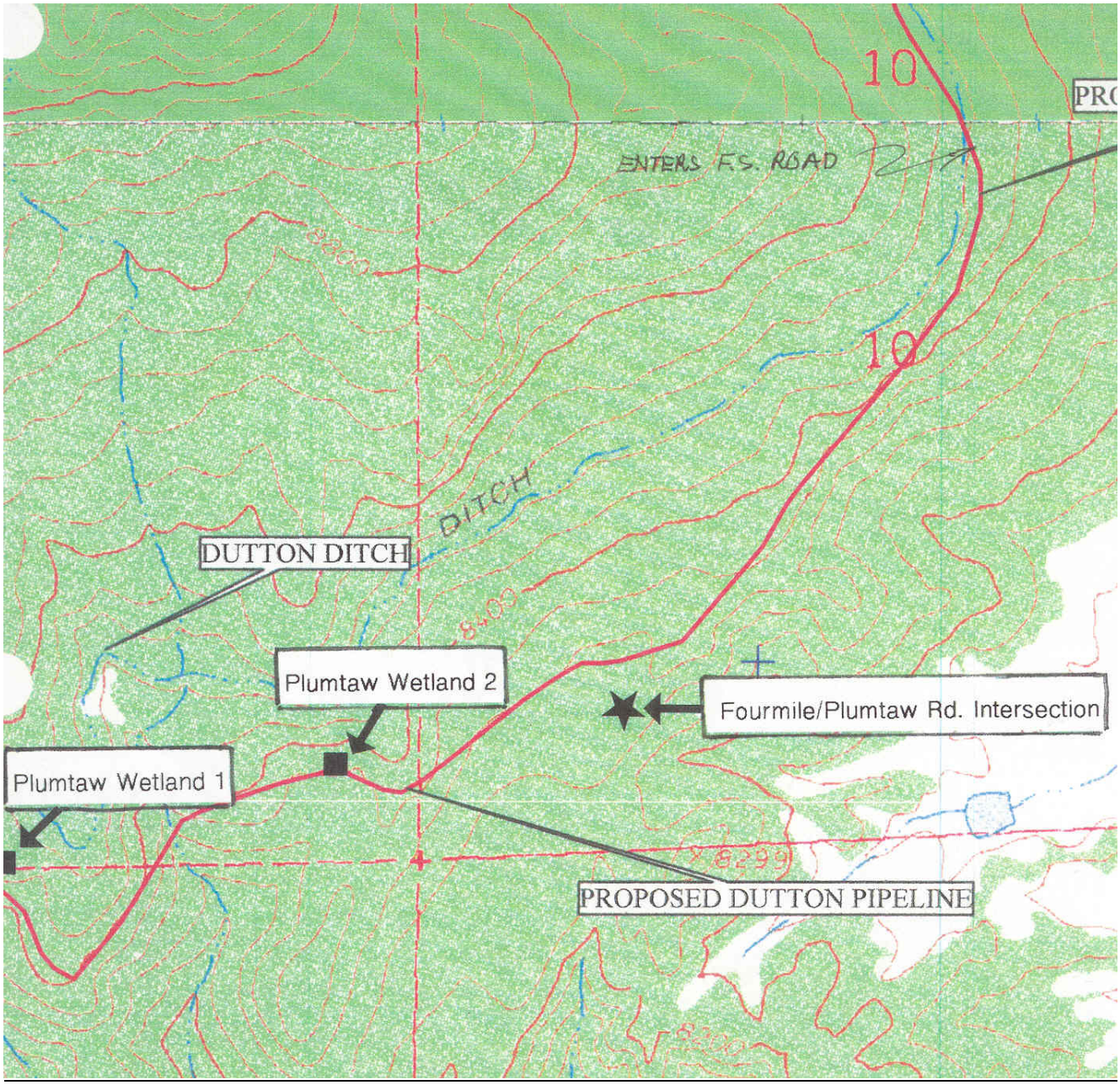


Table 2: Existing Wetlands

Name	Type	Hydrology	Acreage
4 Mile 1A	Wet Meadow	seasonal drainage	0.15
4 Mile 1	Wet Meadow	road drainage/ ditch seepage	0.12
4 Mile 2	Wet Meadow	ditch seepage	0.01
Plumtaw 1	Wet Meadow	seasonal drainage	0.005
Plumtaw 2	Wet Meadow	road drainage	0.007
			0.29 Total

Functions and values of these wetlands are minor due to their small size and scattered location. The primary function is to absorb and retain run-off water, thus trapping some sediment. This is valuable for downstream water quality although extremely minor in volume. Another value is the use of wet areas by amphibians, small mammals and birds.

Drainages

Streams in the project area include the mouth of Cade Creek, Fourmile Creek and several intermittent tributaries to Fourmile and Dutton Creeks. The discussion here is limited to the intermittent tributaries. The existing Dutton Ditch and the proposed pipeline cross over four tributaries to Fourmile Creek. The ditch intercepts all of them. The ditch also intercepts two tributaries of Dutton Creek before the ditch water flows into Dutton Creek.

All of these tributaries are low order (1-2), high gradient channels draining from Cade Mountain. They have narrow, but defined beds with rocky substrate. The Division of Water Resources measured tributary flow to the point of ditch interception at 220 acre feet during the 2001 irrigation year. Tributary flow from the channels is likely to be greater during some years.

ENVIRONMENTAL CONSEQUENCES

Alternative 1: No Action

Under this alternative there would be no change to the wetlands or current interception of tributary flows. The current interception of the tributary flows by the ditch, influences low flow water supply to the larger drainages and modifies high flow water and sediment input. There may be some reduction of the vigor and abundance of riparian vegetation along the tributaries below the ditch under the current conditions. There may also be some minor influence to the channels themselves due to modified flow regimes, but this is hard to quantify. Current maintenance and operation of the ditch would continue.

Alternative 2: Construct Pipeline, Continue Operating Dutton Ditch

Impacts to wetlands would be the same as described under Alternative 3 with the exception of 4 Mile 1A. Disturbance to this wetland may be larger due to a larger construction area needed to accommodate the ditch and pipeline buried beneath it. The edge of wetland impact would be no more than 15 feet wide along the length of the ditch (90 feet). The channel interception that occurs here would remain the same, as with the No Action alternative, with only high flows diverted through the dump gate.

The other drainages would still be intercepted by the Dutton Ditch as is occurring now. Seepage from the ditch to the small roadside wetlands may or may not occur depending on maintenance. Since the

wetland hydrology of these wetlands is partially from road drainage, they should persist even if ditch leakage is reduced or stopped. Impacts of this interception are discussed in the No Action discussion.

If this alternative were implemented, watershed and water quality impacts would not be significantly changed from current conditions. Temporary construction activities would disturb soils but this would be minimized with effective BMP application as described in the mitigation measures.

Alternative 3: Proposed Action - Construct Pipeline, Rehabilitate Dutton Ditch

The majority of the pipeline would follow existing Forest Service roads, and construction activity would be in the road or right-of-way. From the diversion to the crossing of Fourmile Road, with the exception of minor curve straightening, the pipeline would be placed underneath the existing ditch alignment. The wetland along the upper part of the ditch (4 Mile 1A) would be temporarily impacted at the very edge during construction, but have no long term impacts with mitigation measures implemented. The edge of wetland impact should be no more than 5 feet wide along the length of the ditch (90 feet). The ditch would be properly rehabilitated where it crosses the tributary, so that hydrology would be maintained to the wetland.

The small wetlands along the road should not be impacted by pipeline construction. Avoidance of these areas will be feasible and construction related impacts will be minimized (See Mitigation Measures).

Since the wetland hydrology of these wetlands is partially from road drainage, they should persist even if ditch leakage is stopped.

Since the ditch would no longer intercept water from the tributaries (other than Cade Creek), water previously intercepted would flow into either Fourmile or Dutton Creeks. The “additional” water would recharge ground water, provide more base flow to the creeks and perhaps sustain more riparian vegetation such as grasses and sedges below the ditch. The ditch would be stabilized and re-contoured appropriately at these channel crossing areas, to allow water to bypass the pipeline and flow down the tributary channels below the existing ditch.

The abandoned ditch would be evaluated for locations needing re-habilitation and stabilization. Much of the ditch is currently stable and vegetated.

If this alternative is implemented, watershed and water quality impacts would not be significantly changed, and most likely improved. Improvement would occur due to more water in the tributaries, which may increase riparian vegetation. Rehabilitating unstable or eroded sections of the ditch will reduce slumping and soil loss which could reduce sediment delivery to the watershed.

Range

Affected Environment

The existing Dutton Ditch and proposed pipeline are within the 8,524 acre Fourmile grazing allotment. The allotment is annually used from approximately June 11 through Oct 10 by 100 cow-calf pairs. Livestock currently utilize water from the Dutton Ditch when water is present.

Environmental Consequences

Direct and indirect impacts to the existing range operation in the area were considered. Currently, during the summer months, the Dutton Ditch serves as a water source for cattle grazing in the area. There would be no effect on the grazing operation in the area under Alternatives 1 and 2. Under Alternative 3 the Ditch is rehabilitated and subsequently the ditch would no longer provide cattle with a source of water. The loss of this water source could result in modification of the rotation schedule or result in construction of additional stock ponds in the area.

Recreation

Affected Environment

In the analysis area, big-game hunting is the dominant recreation activity, occurring in the fall. Summer dispersed recreation includes hiking, horseback riding, and driving for pleasure.

The Fourmile Trailhead located at the end of the Fourmile Road, serves as a popular portal to the Weminuche Wilderness. Use at this trailhead is estimated at 60 visits per day from June–September.

Winter recreation use, primarily snowmobiling and cross-country skiing, is considerably less than summer/fall use. A local snowmobile club (under permit) grooms both the Plumtaw and Fourmile Roads, and an outfitter-guide conducts snowmobile tours on them from mid-December through April.

Environmental Consequences

Alternative 1 – No Action

Under this alternative there would be no effect to recreation within the area.

Alternatives 2 and 3

Pipeline construction along the Fourmile and Plumtaw roads may cause temporary traffic delays. Should construction activities occur in the fall, noise from this activity may disturb some hunters, but this effect is expected to be minor and not impact hunting within interior forest areas.

There may be an increase in illegal ATV access, primarily during the fall hunting season, for that portion of the pipeline right-of-way that runs from the diversion point to where the pipeline intersects the Fourmile road. PAWSD will be required to gate the pipeline ROW where it leaves the Fourmile road. This should minimize the number of illegal ATV intrusions into this area.

Since no construction activities are planned during the winter months of heavy snow there will be no effect upon the area's winter recreation.

Fisheries

Affected Environment

Fourmile Creek

Fourmile Creek is a fourth-order perennial stream of approximately 15.5 miles in length. Its headwaters are located in the Weminuche Wilderness Area within Section 2, T37N, R2W, NMPM. Approximately 11 miles of stream occur on National Forest System lands, 5.6 of which are located within the wilderness area. Approximately 4.5 miles of stream are located on private lands. Much of

the stream can be characterized as a high-gradient, step-pool system with above average habitat complexity. It supports populations of brown trout (*Salmo truta*), rainbow trout (*Oncorhynchus mykiss*), brook trout (*Salvelinus fontinalis*, non-endemic cutthroat trout (*Oncorhynchus clarki spp.*) and mottled sculpin (*Cottus bardi*).

The two action alternatives being considered would allow for the diversion of water from Fourmile Creek at a point near the mouth of Cade Creek (SW1/4, Sect. 35, T37N, R2W, NMPM) and also from Cade Creek. Diversions from Cade Creek may include PAWSD "side water rights" (water historically intercepted by the existing Dutton Ditch). The removal of water at these locations would affect the lower 8.6 miles of Fourmile Creek, and portions of the San Juan River downstream from the San Juan-Fourmile confluence. Of the lower 8.6-mile section of Fourmile Creek, 4.1 miles of stream is on National Forest and 4.5 miles is associated with private lands.

Presently, the PAWSD has an absolute water right that allows for the diversion of up to eight cubic-feet per second (c.f.s) from Fourmile Creek. The water is transported to Stevens and Hatcher Reservoirs by way of the Dutton Ditch. The ditch was constructed in 1907 and has a history of maintenance issues. In its current state, transport capacity is reduced below the 8 c.f.s level.

The original PAWSD water allocation was for agricultural purposes and was later converted to municipal use. As a result, the timing of use changed from spring and summer, to primarily fall and winter. The 8 c.f.s right held by the PAWSD is junior to other rights for the Ditch, and to a number of uses of Fourmile Creek occurring downstream of the Dutton Ditch diversion point. This means that the PAWSD diversions are reduced or eliminated during periods when supply (stream flow) is limited and other water uses have priority. This commonly occurs during the irrigation months of June, July and August.

Fourmile Creek has no permanent flow gages and few flow records exist. Point-in-time measurements do exist and provide an indication of what base-flow rates occur. These measurements were taken during dry-year conditions and represent the low end of the flow spectrum. Twenty-five measurements taken from October 15, 2001, through March 28, 2002, identified flow rates from a low of 5 c.f.s, to a high of 7 c.f.s. Mean flow for the five-month period was calculated at 6.04 c.f.s. The lowest recorded flow was taken on March 31, 2001, when a rate of 2.85 c.f.s was observed.

San Juan River

Fourmile Creek is a tributary to the Upper San Juan River. The confluence of these streams is located approximately 3.5 mile upstream of the town of Pagosa Springs (SE1/4, Sect 32, T36N, R1W, NMPM). The mainstem San Juan is the primary drainage for Southwest Colorado, flowing southwest into New Mexico, then northwest into Southern Utah. The San Juan River empties into the Colorado River at the southern portion of Lake Powell, Utah.

The San Juan is the largest river in the Four Corners area and supports a variety of fish species. The Colorado portion of the river maintains self-sustaining populations of brown trout, rainbow trout, brook trout, non-endemic cutthroat trout, mottled sculpin, speckled dace, white sucker, bluehead sucker, and flannelmouth sucker. A number of other species inhabit the lower San Juan River, including two species listed by the federal government as endangered, the Colorado pikeminnow and the razorback sucker.

Flow rates in the San Juan River, near its confluence with Fourmile Creek, were measured by the U.S. Geological Survey from 1936 through 1999. Median wintertime base flow values for this period range from a low of 53 c.f.s for January, to a high of 100 c.f.s for March. The lowest median value occurred

during October of 1957, when 18 c.f.s was observed. It is estimated that flow rates in the San Juan River are approximately ten times those observed in Fourmile Creek at the Dutton Ditch diversion. It should be noted that this is based on very limited data for Fourmile Creek.

Environmental Consequences

Direct and Indirect Effects

The Colorado Division of Wildlife lists the primary limiting factor for fish populations in Fourmile Creek as "Water Diversion-Irrigation" (CDOW 1980). In other words, mortality rates and population densities are negatively influenced by the amount of water diverted from the stream, to the point where diversions dictate fish population dynamics.

For the two action alternatives being considered, the primary impact to aquatic habitats and fish populations would result from the diversion of water.

Alternative 1 (no action)

Under the "no action" alternative, the PAWSD would retain their current land use authorization for the Dutton Ditch and maintain historic water uses. It can be assumed that ditch maintenance would be performed sufficient to allow for the maximum level of diversion (8 c.f.s). This would allow for diversion rates as described in Table 3. The maximum diversion related to the historic 8 c.f.s of PAWSD use is estimated at 4,866 acre-feet per year, most of which would occur during the months of September through May. Aquatic habitats and fish populations would continue to be reduced from the levels that would occur under natural flow regimes.

Table 3: Historic PAWSD diversions for the Dutton Ditch.

Historic Use Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
CFS	8.0	8.0	8.0	8.0	8.0	8.0	8.0	6.0	2.4	2.4	6.0	8.0	
AF/day	15.9	15.9	15.9	15.9	15.9	15.9	15.9	11.9	4.8	4.8	11.9	15.9	
AF/month	476.2	492.0	492.0	444.4	492.0	476.2	492.0	357.1	147.6	147.6	357.1	492.0	4866

Alternatives 2 and 3

There is no difference in the amount of water that would be diverted from Fourmile Creek between Alternatives 2 and 3. Therefore, Alternatives 2 and 3 are discussed together. In addition to the historic rates of diversion, Alternatives 2 and 3 would increase water diversions by as much as 10 additional cubic-feet per second. This will further impact aquatic habitats and fish populations.

Both action alternatives incorporate an instantaneous minimum flow of three cubic-feet per second (or natural inflow, whichever is less) in Fourmile Creek immediately downstream of the Dutton diversion(s). The effects analysis for the two action alternatives is based on the assumption that the minimum flow will be included as a term and condition of the Special Use Permit, will be effectively implemented, will be monitored, and will be enforced over the term of the Permit. This measure would place a limit on the level of impacts to aquatic habitats. The minimum flow is intended to provide habitat sufficient to support a viable, self-sustaining trout fishery. However, both alternatives would decrease the magnitude of flows in Fourmile Creek and extend the duration of low-flow periods, reducing the quantity and quality of habitat available to support fish populations. For

PAWSD uses only, it is estimated that during the months of October through March, stream flows would be reduced to less than 50% of natural inflow for normal flow years.

The effects of both alternatives would be most pronounced during fall and winter months when stream flows are naturally low and the amount of habitat is most limited. The proposals call for increased diversions during these critical periods. Table 4 describes the rates and volumes of flow diverted by month for new and historic uses during periods of maximum need and high runoff conditions.

Table 4: Proposed Historic and New PAWSD Diversions for Alternatives 2 & 3.

Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Historic (c.f.s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	6.0	2.4	2.4	6.0	8.0
New (c.f.s)	4.0	2.8	1.6	2.8	4.0	10.0	10.0	0.0	0.0	0.0	0.0	4.0
Total (c.f.s)	12.0	10.8	9.6	10.8	12.0	18.0	18.0	6.0	2.4	2.4	6.0	12.0
AF/day	23.8	21.4	19.0	21.4	23.8	35.7	35.7	11.9	4.8	4.8	11.9	23.8
AF/month	714.2	664.2	590.4	600.0	738.0	1071.4	1107.1	357.1	147.6	147.6	357.1	738.0

Under Alternative 2, the Pipeline would have a diameter of 30 inches at the diversion point, with a maximum capacity of 35 c.f.s. Development of 10 c.f.s of the 20 c.f.s conditional water right could result in a new diversion of 2,367 acre-feet per year.

Alternative 3 represents the same PAWSD water uses described under Alternative 2. In addition, it incorporates two on-going Dutton Ditch uses into the pipeline. These are agricultural uses of 12.85 c.f.s, now owned by Tom Smith, and 2.0 c.f.s owned by Inez Seavy. These uses represent maximum diversions from Fourmile Creek of approximately 956 acre-feet per year for Smith, and 150 acre-feet per year for Seavy. The diversions typically occur during the irrigation season of May through July.

Fisheries: Threatened and Endangered Species

A determination was made that both action alternatives are likely to adversely affect two endangered fish species, and their critical habitats. This is described in detail in the Fisheries Biological Assessment and related Biological Evaluation on file at the Pagosa Ranger District. The U.S. Fish and Wildlife Service issued a Biological Opinion (June 17, 2004; ES/GJ-6-CO-04-F-010), which concurred with the Forest Service's finding and also concluded that the proposed action "is not likely to jeopardize the continued existence of the Colorado pikeminnow and razorback sucker, and the proposed action in not likely to destroy or adversely modify designated critical habitat."

Fisheries: Sensitive Species

Sensitive species are those whose recent declines in numbers raise concerns about long-term survival. The Forest Service has designated four fish species that occur on the SJNF as sensitive. These are the bluehead sucker (*Catostomus discobolus*), flannelmouth sucker (*Catostomus latipinnis*), roundtail chub (*Gila robusta*) and Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*). None of these species are known to inhabit Fourmile Creek.

Bluehead and flannelmouth suckers inhabit the San Juan River and may be affected by the proposed action(s). Of the two, the flannelmouth is most rare. These species prefer larger rivers and rely on riffle habitats with large cobbles to provide forage. As a "scraper" forage species, the bluehead is especially reliant on large cobble substrates, which have relatively high primary productivity on which the bluehead relies. Altered stream flow regimens that reduce the quantity and quality of habitats can

present a significant risk to bluehead and flannelmouth population viability. Habitat fragmentation and hybridization with the white sucker is also of concern.

When considered alone, the action alternatives being considered present little risk to the sucker populations in the San Juan River. However, in combination with the many other water uses that alter stream flows and aquatic habitats in the San Juan River, implementation would contribute to the overall negative effects to the species. In conclusion, the project may affect individuals of these species but is not likely to affect populations.

Fisheries: Relationship to Forest Plan Direction, Standards and Guidelines

Forest lands affected by the proposed action fall under Management Areas 7E (wood fiber production) and 6B (livestock grazing). These prescriptions have no direction specific to aquatic habitats or fish populations. Therefore, only forest-wide direction, standards and guidelines apply. Applicable forest-wide direction is as follows:

1. "Maintain habitat for viable populations of all existing vertebrate wildlife species" (III-26).
2. "Manage waters capable of supporting self-sustaining trout populations to provide for those populations" (III-27).
3. "Manage and provide habitat for recovery of endangered and threatened species as specified…" (III-27
4. "Improve habitat capability through direct treatments of vegetation, soil, and waters" (III-27).

Applicable Plan standards relate to forest-wide direction No. 1 above, and require that "Habitat for each species on the forest will be maintained at least at 40 percent or more of potential" (III-26). This standard identifies the minimum threshold for aquatic habitat as it relates to the populations of vertebrate species present. It is applicable to the stream reach scale.

As previously discussed under the affected environment sections for Alternatives 2 and 3, natural stream flows may be reduced by more that 50 percent for reaches of Fourmile Creek. This may suggest that habitat has been reduced by about 50% during low-flow months. However, flow rate does not equate directly to habitat potential. Habitat potential can only be determined by establishing the relationship between flow rates and the habitat requirements for the target species. The accepted method for identifying this relationship is the Physical Habitat Simulation System (PHABSIM) developed by the U.S. Fish and Wildlife Service. The PHABSIM method is data intensive and the associated costs are a consideration, typically requiring $20,000 plus, per steam reach studied.

Although not as precise, alternative methods exist that approximate the results the PHABSIM method. These methods can be used to derive a first-cut estimate of habitat potential. To rely on these methods requires experience with the application of both approaches in the context of evaluating habitat capability standards. For this assessment, experienced personnel applied an alternative method (WINXSPRO). It was concluded that maintaining an instantaneous minimum flow of 3 c.f.s would likely maintain aquatic habitat at or above the 40 percent level for all trout species. If the flow rate being proposed is maintained in Fourmile Creek, it is expected that viable, self-sustaining populations of all four trout species will be maintained.

Management Indicator Species

One of the goals of managing National Forest lands is to provide for healthy ecosystems capable of sustaining viable populations of wildlife species. These ecosystems include many different habitat types that support a variety of wildlife species. Due to the large number of species potentially occupying any given area, it would be impossible to evaluate the status of all species in an area over time. Therefore, a subset of species are selected to represent larger groups of species which have similar habitat needs or similar population characteristics, and whose populations can be quantitatively ascertained. These are referred to as Management Indicator Species (MIS). Species identified as MIS are selected because their population changes are believed to indicate the effects of management activities on wildlife populations as a whole (36 CFR 219.19 (a) (1)).

Each National Forest is managed under a Land and Resource Management Plan (LRMP) that establishes management goals and objectives, including those for resident wildlife species. The LMRP identifies MIS for the purpose of evaluating Plan alternatives, and to assist in the ongoing evaluation of Plan implementation. The Plan contains management objectives, standards and guidelines, and monitoring requirements specific to MIS. These requirements are applicable to all actions conducted on National Forest System lands, and are based in the laws, regulations and policies governing National Forest Management.

The primary objective of any MIS assessment is to identify forest-wide trends in population numbers, forest-wide trends in habitats that support these populations, and to identify any possible relationship between observed changes in habitat and changes in wildlife populations, as described in 36 CFR 219.19 (a) (6). Analysis of population and habitat status that presently exists at the project level can then be related to the large-scale trend analysis. This can result in better identification of cause and effect relationships, which in turn support alternative selection. The analysis may also help identify information needs and help focus Forest-level monitoring efforts.

There may be situations where it is appropriate to use habitat trend alone as a surrogate for population trend. This occurs when it is well established in the scientific literature that the tie between habitat and species abundance is unusually strong and that population trends follow habitat trends. This approach is often applied when population data are unattainable or unreliable and habitat data alone provide a better understanding of population trends.

Scales of MIS Analysis

A variety of spatial scales may be applied to an MIS assessment. In evaluating species-habitat relationships, it is important to understand which spatial scales are appropriate for the question being asked. For example, population trends for wide-ranging species (e.g. elk) are best determined at a forest-wide scale. For these species, trend evaluations done at a local scale will not account for behavioral factors such as movement, and if taken alone can lead to erroneous conclusion about species mortality rates and actual population densities. It is also infeasible or impractical to collect what may be years of baseline information sufficient to determine population trends at a local scale. This would require that projects be identified in enough detail to structure such studies many years in advance of implementation. This approach is simply impractical, technically infeasible and not cost effective.

Data collection and analysis at the project level may be very different, since it is often collected with a different purpose in mind. If identifying specific factors that limit species abundance and distribution

is desired, a Forest-wide approach may not be possible. Due to the number of variables involved and the inability to isolate and control the variables at a large scale, this question is best left to small-scale assessments where variables can be better controlled and treatments can be directly correlated with species response.

Forest Service regulations and policies establish the need to evaluate trends of MIS populations and identify any relationship to changes in their habitats at the forest-wide scale (36 CFR 219.19 (a)(6)). Because of the large scale being considered, the data used to identify these trends is often general and coarse in nature. In many cases, the results provide an initial "heads-up" look at how populations and habitats might be changing. This scale of analysis is not intended to identify the specific limiting factors that determine population structure. While it may be possible to acquire some relevant information about these factors, such attempts are often technically infeasible and not cost effective. Limiting factor assessments are best left to small-scale applications and may or may not incorporate population trend analyses.

Where technically feasible, this MIS analysis addresses trends in species abundance and their associated habitats at the forest-wide scale. It then relates what is known at the project level about species occurrence and habitat distribution in a manner that addresses project effects to overall forest-wide trends.

The MIS species selected for this proposed action are well distributed across the National Forest. Areas adjacent the project area provide terrestrial habitats that are well distributed and connected to the larger national forest unit. The project area does not provide unique or isolated habitats within which discrete populations are dependent. The MIS are not species at risk nor are they species that are trending towards protected status. Our concern is how this project may affect the broader Forest wide trends for these MIS species.

Fisheries MIS Analysis

Affected Environment

This information was previously described under Fisheries.

Species Selection:

The brown trout was selected as the MIS for aquatic habitats in Fourmile Creek. It is the most abundant trout species in Fourmile Creek and, of the four trout species present, provides the best indication of changes in relative abundance. Also, the brown trout spawns during the fall months, which is when the proposed action will likely have its greatest influence on fish populations.

Species Characteristics:

The brown trout is native to Europe and western Asia. It was introduced into most major drainages of Colorado during the late 1800s (Behnke 2002). It now occurs widely throughout much of the United States and Canada (Beckman 1953) and is common in cold-water habitats of the State of Colorado.

The brown trout is managed as a game fish and may be harvested subject to State fishing regulations. Its selection as an MIS for the SJNF is due to its importance as a game species, and to some degree its potential to respond to management actions. Due to its widespread distribution and abundance, there is no concern about the brown trout's viability as a species.

Brown trout inhabit cold-water streams and lakes. In streams, they prefer deeper, lower-velocity water with adequate cover in the form of submerged rocks, undercut banks, and overhanging vegetation. Typically they tolerate warmer water temperatures than other species of trout. Optimal water temperature for growth and survival is 12 to 19^{o}C. Upper incipient lethal temperature ranges between 22 and 28^{o}C (Frost and Brown 1967, Needham 1969, Alabaster and Lloyd 1980). The species becomes sexually mature during its second to fifth year (Beckman 1953). Spawning occurs during late fall and early winter when water temperatures approach 7^{o}C. As with other trout species, the brown trout requires cool running water and clean spawning gravels to successfully reproduce. Females produce about 10,000 eggs per spawning event.

Fry (young-of-year fish) occupy quiet waters and feed principally on aquatic and terrestrial macro invertebrates. In addition to macro invertebrates, adult brown trout prey on other fish species, including other species of trout. They can be considered the top predator for many aquatic ecosystems. The brown trout is known to compete effectively with other species for food and living space. They often out compete native trout species, to the point of exclusion (Beckman 1953, Behnke 2002).

SJNF Status and Distribution:

Brown trout often occupy lower elevations where higher water temperatures and poorer water quality preclude the existence of other trout species (Raleigh et al. 1986). These areas can represent the lower thresholds of suitable habitat for brown trout. Although more tolerant of degraded conditions than many other species of trout, brown trout still require relatively cold and clean water to survive. Seasonally high temperatures, combined with marginal habitat conditions, are factors that most likely limit abundance and distribution of brown trout in many SJNF streams. However, this is not likely the case with Fourmile Creek.

Starting in 1987, inventory and monitoring of fish populations have been conducted by the CDOW and the FS on perennial streams throughout the SJNF. To date, 286 streams have been investigated for the presence or absence of fish. Of these, 190 are known to support fish populations. A total of 287 population-density estimates have been calculated at multiple sites over a 17-year period.

Of the 286 streams investigated, brown trout are known to occupy 41 streams (14%). The occupied streams represent a total of 325 miles of riverine habitat. Brown trout are most common in the larger rivers at lower elevations of the SJNF. Forest-wide, 133 population density estimates have been calculated for brown trout, representing 24 locations on nine of the 41 occupied streams. Density estimates range from a low of eight fish per mile and one fish per acre (Upper Animas River, 1998) to 995 fish per mile and 175 fish per acre (Lower Dolores River, 1992). The median density for all samples at all locations is 198 fish per mile and 30 fish per acre.

Population Trends:

High levels of statistical variation are common when estimating densities of fish populations (Ricker 1975), a consideration that should be acknowledged when interpreting population trend data. Ninety-five percent confidence intervals have been calculated for each of the 133 brown trout density estimates considered for this analysis. For many samples, high levels of statistical variation occur. As a result, brown trout population trends can be determined with confidence for six sites associated with two of the nine streams sampled. The results from the other seven streams must be considered inconclusive and are not analyzed further.

The locations where trends have been well described provide insight concerning the effects of water depletions to local brown trout populations. These analyses show declining population trends correlated with reduced flows and increased water temperatures. These results agree with the results of numerous scientific peer-reviewed studies that have evaluated the cause and effect relationships between stream flows, aquatic habitats, and fish population response. In addition, it requires only common sense to reason that reductions in stream flows will result in reductions in aquatic habitats, which in turn will typically lead to reductions in aquatic organisms that rely on these habitats, including trout. Given this, it is reasonable to conclude that brown trout and other fish populations have declined from historic levels across the SJNF as a result of incremental water development occurring over the last 130 years.

More recently, it is likely that fish populations have been further reduced by the severe drought conditions experienced from 2000 through 2003. As an example, the combined stress of reduced stream flows, high temperatures, poor water quality, and resulting marginal habitat conditions, increased mortality in the lower Dolores River to the point that only 13 percent of the pre-drought brown trout population now exists. In other streams, like the lower Florida River, stream flows were reduced to zero, virtually eliminating suitable habitat and any dependent aquatic populations. In addition, water temperature limits were probably exceeded in some sections of the occupied streams, contributing to what is expected to be a downward trend in brown trout populations forest-wide.

Environmental Consequences

Relationship of Proposed Action(s) to Forest-wide MIS Trend:

Both action alternatives would result in higher mortality rates for brown trout in Fourmile Creek. This will contribute to the downward trend in brown trout densities forest-wide.

Wildlife MIS Analysis

Affected Environment

Human disturbances along the Fourmile and Plumtaw roads and within the Lost Valley of the San Juan sub-division are well established thus wildlife behavioral patterns have been previously influenced by these disturbance levels.

The existing Dutton Ditch corridor is 10 acres in size and traverses through cool moist mixed conifer, warm-dry mixed conifer and ponderosa pine. For the first 3,800 feet, beginning at the point of diversion on Fourmile Creek, the proposed pipeline would, except for minor curve straightening, follow the existing Dutton Ditch alignment to its intersection with the Fourmile Road. Through this section the pipeline would be buried below the existing ditch. Impacted area for this section would be approximately 5.7 acres of cool moist mixed conifer. Within these 5.7 acres approximately 50 live trees will be removed, scattered along the length of this section. The remainder of the pipeline would be placed in existing disturbed road corridors impacting an area of 19.9 acres.

Species Selection and Non-Selection

Three species were selected for the MIS analysis; elk, American marten and Hairy woodpecker. Elk is a forest generalist and uses a variety of habitats across the Forest. American marten habitat includes spruce-fir and cool moist mixed conifer. Hairy woodpecker is a snag dependent species and uses aspen and other forest habitats. These species have habitat or are known to exist in the project area, and may

be affected by the project. Background habitat and species assessment information utilized in this analysis are contained in the San Juan National Forest MIS Assessment documents.

Table 5 that follows describes the rationale for dismissing other MIS from this project analysis.

Table 5: Rationale for MIS Not Selected

MIS	HABITAT TYPE	HABITAT OR SPECIES IN PROJECT AREA	REASON FOR SELECTION IN FOREST PLAN	RATIONALE FOR NOT SELECTING MIS
Abert's squirrel	Ponderosa pine	No	Unique habitat that easily monitors change and limited range Nationwide	No habitat will be impacted within the project area.
Bald eagle	Mature forest associated with large bodies of water	No	Threatened Species	Populations will not reflect management changes to habitat on the SJNF.*
Beaver	Aquatic, riparian, and aspen	Yes	Unique habitat	Populations will not reflect management changes to habitat on the SJNF.*
Black bear	All forested types, grassland, riparian, mountain shrub, aspen, and pinyon-juniper	Yes	Economically important, represents large group of species	Not technically feasible or cost effective to collect population data.*
Black-footed ferret	Low elevation grassland and shrublands	No	Endangered Species	No existing population on the SJNF.
Canada lynx	Mixed conifer, spruce-fir and aspen	Yes	Threatened Species	Do not have a structurally functional population on the Forest.*
Columbian sharp-tailed grouse	Mountain shrub	No	Limited habitat on the Forest	No populations exist on the SJNF.
Deer mouse	All terrestrial habitats except alpine	Yes	Unique habitat and represents larger group of species	Populations will not reflect management changes to habitat on the SJNF.*
Green-tailed towhee	Mountain shrub, pinyon-juniper, sagebrush, and riparian	No	Unique habitat, habitat that can be monitored	No habitat or populations in the project area.
Mallard	Aquatic and riparian	No	Economically important and wetland habitat indicator	Populations will not reflect management changes to habitat on the SJNF.*
Merriam's turkey	Grasslands, riparian, mountain shrub, aspen, pinyon-juniper, ponderosa pine, and mixed conifer	No	Limited habitat on the Forest that will readily monitor change	No habitat or populations in the project area.
Mexican spotted owl	Mature ponderosa pine and mixed-conifer in canyons	No	Threatened Species	No habitat or populations in the project area. Species not recorded on SJNF.
Mountain bluebird	Alpine, aspen, mixed conifer, mountain shrub,	No	Unique habitat that will monitor management	No habitat or populations in the

MIS	HABITAT TYPE	HABITAT OR SPECIES IN PROJECT AREA	REASON FOR SELECTION IN FOREST PLAN	RATIONALE FOR NOT SELECTING MIS
	pinyon-juniper, ponderosa pine, and sagebrush		practices	project area.
Mule deer	All terrestrial habitats; pine, pinyon-juniper and mountain shrublands in winter	Yes	Economically important, public issue	Elk used as a more suitable indicator to assess representative habitats.
Northern goshawk	Mature forest habitats	Yes	Unique habitat and environmentally sensitive	Populations will not reflect management changes to habitat on the SJNF.*
River otter	Aquatic and riparian	Yes	State Endangered Species	Populations will not reflect management changes to habitat on the SJNF.*
Southwestern willow flycatcher	Riparian shrub	No	Endangered Species	Extremely limited numbers on SJNF. Species and habit not known in project area.
Uncompahgre fritiliary butterfly	Alpine with snow willow	No	Endangered Species	No habitat in project area. No known populations on SJNF.

* Reference SJNF MIS Assessment for further explanation of selection rationale.

Species Characteristics

Elk:

Feeding habitat consists primarily of early successional stages of forest development such as grass-forbs, and shrub-seedling areas, as well as mature, open canopy forested areas where grass-forbs species are able to grow given adequate sunlight and moisture.

Mature open canopy coniferous and deciduous forested stands comprise most of the available foraging habitat for big game, followed by Gambel oak and open meadows/parks. Even though foraging opportunities exist within forested stands, forage quality is probably less than in Gambel oak stands and open meadows/parks because of the lack of grass-forbs species present.

American Marten:

Habitat consists of mature and late successional cool-moist mixed conifer, cold-wet mixed conifer, and spruce-fir forests. These forests typically contain the habitat attributes such as large trees, large downed logs, large snags, and relatively high canopy closures that provide suitable habitat for prey species such as red squirrels, snowshoe hare, blue grouse, and southern red backed voles.

Martens have large home ranges considering their body size (Buskirk and Ruggerio 1994). The size of the home range varies considerably throughout its range, from less than one km² to 16 km² (0.39-6.18 mi²). In telemetry studies in Wyoming (the closest known study to Colorado) home range size was 2.0-3.2 km² (0.77-1.24 mi²) for males and 0.8 km² (0.31 mi²) for females. Home range size may change with population density, food abundance and body size (Clark et al. 1987).

Hairy Woodpecker:

This species prefers ponderosa pine, Douglas-fir, lodgepole pine, spruce-fir, and aspen forests, as well as riparian forests, pinyon-juniper woodland, and urban areas with tall trees (Andrews and Righter 1992). It also appears they prefer live trees with heartwood rot (Gano 1981). They are associated with areas having a high understory density and large diameter snags over 12 inches DBH (30 centimeters); Evans and Conner 1979, McComb, 1985). In a review of extensive and intensive studies from 1984 to 1986 of forest birds associated with Douglas-fir forests of the Pacific Northwest (Ruggiero et al. 1991), Hejl (1994) found that hairy woodpeckers were clearly associated with old-growth forests (250-500 years age class).

These woodpeckers live throughout Colorado from timberline to the plains, and are more common in the mountains in the summer, and at lower elevations in the winter (Andrews and Righter 1992, Winternitz, 1998). The mountain subspecies (*P. v. monticola*) that is found in the San Juan Mountains occurs predominantly in conifers (61% of Atlas records), although a substantial number (36%) use aspen forests and deciduous foothills streams, which usually have some streamside or mountainside conifers (Winternitz, 1998).

SJNF Status and Distribution:

Elk:

Elk have no listing status with the United States Fish and Wildlife Service. The San Juan National Forest Land and Resource Management Plan identifies elk as an early successional, management indicator species (MIS) (1992), and the Colorado Division of Wildlife (CDOW) manages elk as a big-game species.

"Management of deer and elk has historically focused on providing populations capable of supporting hunting, providing diverse opportunities to hunt these species, and controlling damage done by both species to agricultural crops. In the future the DOW will manage deer and elk to provide healthy populations capable of supporting both significant harvests and opportunities for non-consumptive uses because these species are valuable to many segments of Colorado's public." (Freddy 1993) CDOW '2002 Strategic Plan' (2002) reaffirms this as an objective for big-game species. In addition, the plan identifies the following as one of ten management principles: 'hunting and fishing license fees are expected to continue to be the major source of revenue for wildlife programs in Colorado'. The sale of elk licenses account for a large percentage of all license revenue, illustrating the importance of elk herd management in the state.

American marten:

The marten currently has no federal status. It is classified as a "sensitive species" in Regions 2 and 5 of the U.S. Forest Service (USFS).

In Colorado, the marten occurs in most coniferous forest in the higher mountains (Fitzgerald 1994). Marten distribution in Colorado is shown in Figure 2 (Fitzgerald et. al. 1994). Based on occasional observations by Forest Service personnel and on the previously mentioned 1992 CDOW wolverine survey, which detected martens on roughly 80% of bait stations, and on snow track population trend surveys, it is assumed that the marten is fairly-well distributed across the SJNF in suitable habitats. Although they are most commonly observed in the spruce-fir forest type they are occasionally seen in lower elevational mixed-conifer forests (A. Garcia, per. comm.).

Hairy Woodpecker:

Hairy Woodpeckers have no listing status with the United States Fish and Wildlife Service nor are they a sensitive species. Hairy woodpeckers are primary cavity nesters, and their dependence on snags as been well documented in the literature. At a forest-wide scale, aspen, warm-dry mixed conifer, cool-moist mixed conifer and spruce-fir have suitable snags present to support viable populations of hairy woodpeckers. Snags in ponderosa pine habitat are below Forest Plan Standards and Guidelines in easily accessed areas.

Data from the Colorado Breeding Bird Atlas Project and Monitoring Colorado Birds Forest population trend surveys.show hairy woodpeckers to be well distributed across the SJNF. In addition, the highest abundances in the state occurred in the San Juan Mountains (Winternitz, 1998).

Population Trends

Elk:

Elk populations associated with the San Juan National Forest have steadily grown from 33,753 individuals in 1983 to 44,496 in 1992. From 1992 to 2002 the numbers steadily decreased to 27,448. While herd numbers have varied over time due to differing herd management practices, elk numbers are currently slightly above the population objective established by the Colorado Division of Wildlife.

American Marten:

Given the amount of suitable habitat available, population trend survey information, the fact that marten harvest is no longer occurring, the shift in timber harvest treatments from even-aged to uneven-aged management, little influence from fire activity, and the likely low to moderate influence from livestock grazing and recreation, marten population trends are likely to be stable or possibly upward.

Hairy Woodpecker:

Hairy woodpecker population trends across the Four Corners area (Colorado, New Mexico, Arizona, and Utah), and the San Juan National Forest (SJNF Assessment), are stable. This is based on information from the Colorado Breeding Bird Atlas, Forest and State population trend surveys as part of Monitoring Colorado Birds, BBS and CBC survey information.

Environmental Consequences: Direct and Indirect Effects

Alternative 1 No Action

Under this alternative no pipeline would be constructed thus there would no impact to habitats in the area. The Dutton Ditch would remain and existing habitat conditions along the ditch would not be altered. Given there would be no change to the area's existing vegetative environment under this alternative, there would be no impact to any of the selected terrestrial MIS.

Alternatives 2 & 3

Under Alternative 2 operation of the Dutton Ditch would continue and associated MIS impacts would be as described under Alternative 1.

Under Alternative 3 the Dutton Ditch would be abandoned with most of the reclamation being left to natural forces and time. However, at drainage intersections the ditch will be breeched to allow natural

water flow down slope. Only minor vegetation disturbance during breeching is expected (personal communication, Rebecca Smith 2003). The existing ditch comprises 10 acres of corridor area and vegetation would reestablish in the ditch over 1 to 5 years and revert to natural conditions. There would be no appreciable acreage increase of the existing vegetative types or habitats along the ditch, thus there would be no impact to MIS habitats or their populations.

Under both Alternatives 2 and 3 the pipeline would be constructed. Relative to habitat impacts, installation of the pipeline would impact approximately 5.7 acres of cool-moist mixed conifer involving the removal of 50 trees and also impact 19.9 acres of existing disturbed road corridors.

Proposed Pipeline MIS Consequences

Elk: The project area is not winter range. Elk have a summer range that encompasses most of the 1,787,878 acres San Juan National Forest (SJNF Species Assessment 2003). The 5.7 acres of impacted cool-moist mixed confer habitat is minute in scale relative to the Forest's available summer range. The removal of 50 trees scattered along 3,800 feet of pipeline right-of-way will have a negligible effect on elk habitat and thus, will not influence elk habitat trends at the Forest level. The localized disturbance resulting from pipeline construction activity may temporarily displace some individuals. This disturbance will have minor effect on elk at the project level and no change to elk population trend across the Forest.

American marten: This species home range is approximately 1,280 acres (SJNF Species Assessment). Given this large home range size, the scale of this project's impact (5.7 acres) is small. The removal of 50 trees scattered along 3,800 feet of pipeline right-of-way and disturbances to down woody material from construction will have a negligible effect on marten habitat and thus, will not influence habitat trends at the Forest level. The localized disturbance resulting from pipeline construction activity may temporarily displace some individuals. This disturbance will have minor effect on American marten at the project level and no change to marten population trend across the Forest.

Hairy woodpecker: The home range of one individual Hairy woodpecker varies from 20 to 25 acres (personal communication Chris Schultz, SJNF). It is estimated that tree removal associated with the pipeline installation may impact 5.7 acres of hairy woodpecker nesting habitat (structural stage 4A). The 5.7 acres of impacted habitat represents 23-28 percent of one Hairy woodpecker's home range. The removal of 50 trees scattered within the 5.7 acres will have no appreciable or measurable effect on hairy woodpecker habitat and will not contribute to any change to the Forest level hairy woodpecker population trend.

The Monitoring Colorado's Birds Partnership Project, 1998–2001 determined density estimates for Hairy woodpecker within mixed conifer habitat to be 0.01 birds per acre (SJNF Species Assessment). The density on 5.7 acres then would equate to approximately 0.06 birds. Given this low density it is unlikely that construction activity would temporarily displace any individuals of this species. In conclusion, there would be no effect from the project on the stable Hairy woodpecker population trends across the Four Corners area (Colorado, New Mexico, Arizona, and Utah), and the San Juan National Forest (SJNF MIS Species Assessment).

Wildlife

Wildlife: Threatened, Endangered, and Sensitive Species (TES)

Summary

The Biological Assessment (BA) for Threatened and Endangered Species identified habitat for only one species, Canada lynx. For all alternatives the determination of effect for lynx is 'may affect, not likely to adversely affect'. This determination has been concurred by the U.S. Fish and Wildlife Service, October 2003 Biological Opinion. Table 6 below summarizes the analysis determinations for the threatened, endangered and sensitive species analyzed for this project.

The Biological Evaluation (BE) for Sensitive Species and the Biological Assessment (BA) are on file at the Pagosa Ranger District Office, 180 Pagosa St., Pagosa Springs, Colorado (263-2268).

Table 6: Summary of TES Determinations

Common Name	Scientific Name	Status	Determinations of Effects		
Mammals			**A1t 1**	**Alt 2**	**Alt 3**
Canada lynx	*Felis lynx Canadensis*	Threatened	MANL	MANL	MANL
Spotted bat	*Euderma maculatum*	Sensitive	Baseline, NI	NI	MAII
Townsend's big-eared bat	*Corynorhinus townsendii*	Sensitive	Baseline, NI	NI	MAII
River otter	*Lontra Canadensis*	Sensitive	MAII	MAII	MAII
American marten	*Martes americana*	Sensitive	Baseline, NI	MAII	MAII
Wolverine	*Gulo gulo*	Sensitive	Baseline, NI	NI	NI
Birds					
Boreal owl	*Aegolius funereus*	Sensitive	Baseline, NI	MAII	MAII
Bald eagle	*Haliaeetus leucocephalus*	Threatened	NE	NE	NE
Mexican spotted owl	*Stix occidentalis lucida*	Threatened	NE	NE	NE
Southwestern willow flycatcher	*Empidonax trailii extimus*	Endangered	NE	NE	NE
Northern goshawk	*Accipiter gentilis*	Sensitive	Baseline, NI	NI	NI
American peregrine falcon	*Falco peregrinus anatum*	Sensitive	Baseline, NI	NI	NI
American three-toed woodpecker	*Picoides dorsalis*	Sensitive	Baseline, NI	MAII	MAII
Olive-sided flycatcher	*Contopus cooperi*	Sensitive	Baseline, NI	MAII	MAII
Amphibians					
Boreal toad	*Bufo*	Sensitive	Baseline, NI	MAII	MAII

	boreas boreas				
Northern leopard frog	*Rana pipiens*	Sensitive	Baseline, NI	MAII	MAII
Insects					
Uncompahgre e fritiliary butterfly	*Boloria acrocnema*	Endangered	NE	NE	NE

* Threatened and Endangered Species: NE = *No effect*; MANL = *May affect, not likely to adversely affect*; MBA = *May beneficially affect*; MALA = *May affect, likely to adversely affect.*

*Sensitive Species: NI = *No impact*; MAII = *May adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend to federal listing or a loss of species viability rangewide.*

Wildlife: Relationship to Forest Plan Direction, Standards and Guidelines

Note no habitat will be impacted within the 4B (MIS management emphasis) prescription area. Forest lands affected by the proposed action fall under Management Areas 7E (wood fiber production) and 6B (livestock grazing). These prescriptions have the following direction relative to wildlife.

1. "Maintain habitat for viable populations of all existing vertebrate wildlife species" (III-26).

   The Biological assessment and MIS analysis concluded that the project would not substantively impact any habitats and that the project, given its minute scale, would not affect the viability of any wildlife populations.

2. "Maintain habitat capability for MIS at 60% capability (III-184)"

   The MIS analysis demonstrates there would be no impact upon habitat capability from this project.

3. "Provide adequate forage to sustain big-game population levels agreed to in the Statewide Comprehensive Wildlife Management Plan on NFS. (III-184)"

   The opening created by the removal of 50 trees would not substantially add to the available forage within the area. The project would have no meaningful impact upon forage within the area.

4. For Hairy woodpecker: "Protect and/or provide for 20 snags per 10 acres in all forested types. Also provide for snag replacement." (III-185)

   The trees to be removed are green and none are considered viable recruitment snags.
   The opening created by the removal of 50 trees would not substantially add to the available forage within the area. The project would have no meaningful impact upon forage within the area.

Transportation

Affected Environment

Opens roads impacted by the proposed project are the Plumtaw Road FSR 634, Fourmile Road FSR 645 and FSR 634H. FSR 645 provides access to the Lost Valley of the San Juan sub-division and the Fourmile trailhead.

Environmental Consequences

Under Alternative 1 – No action there will be no impact to the area's road system or traffic volume.

Under Alternatives 2 and 3 the following transportation consequences are predicted:

- There would be an increase of heavy truck traffic encountering existing forest road traffic.
- Temporary traffic delays would likely occur but will be limited in duration, see mitigation measure page 10.
- During construction there will be some gravel contamination as excavated soil mixes with road surfacing.

Land Uses

There are two Forest Service special-use-permitted facilities in the area: the Dutton Ditch and a power line. The ditch is currently under permit to the Pagosa Area Water and Sanitation District, and the power line to the La Plata Electric Association. The power line serves residents of the Lost Valley of the San Juans subdivision.

The Lost Valley of the San Juans subdivision (platted in 1972) is near the beginning of the project area, on the north slope of Cade Mountain. This 300-acre development is in both Mineral and Archuleta Counties. The development is subdivided into 72 lots, ranging from 0.49 to 35 acres. At the end of 2000, all but six lots were sold; there are 21 structures in the development. Most of the owners are seasonal residents, during the summer. The development has no formal homeowners association.

Under Alternatives 2 and 3 a potential impact on Lost Valley of the San Juans residents is noise from construction activities. Also, during the construction period there would be a slight increase in heavy truck traffic on the Fourmile road. Traffic delays in the summer months, due to construction activities will inconvenience sub-division residents and the general public traveling the Fourmile road, these delays will normally not exceed 30 minutes.

Socio-Economics

Spatial and Temporal Scope of Analysis

The financial and economic efficiency analyses covers a period of 10 years of costs, revenues and benefits. Beyond a decade the discounted costs, revenues and benefit values become small and somewhat speculative in nature. The spatial area for this analysis is the boundary of the Pagosa Area Water and Sanitation District (PAWSD).

Affected Environment

PAWSD service area encompasses approximately 64.7 square miles and includes within its boundary the Town of Pagosa Springs and unincorporated portions of Archuleta County including the Pagosa Lakes community. The service area population and tap growth has increased 7 % a year for the last ten years. Currently the population within the PAWSD is 7,420 based on the 2000 census. (Davis Engineering Study 2003)

Projected PAWSD Water Demand

The following is a summary of water demand information from the Davis Engineering study; *Preliminary Engineering Study of Water Supply Alternatives for Pagosa Area Water and Sanitation District, January 13, 2003.*

For the past 10 years Archuleta County has grown at a rate of 6.5% per year. The equivalent tap growth rate within PAWSD was 7.1% from 1995 to 2000. The County grew at a rate of 4.0% per year during the 1980's, a period of moderate growth. These growth rates are also applicable to the PAWSD service area. The growth within PAWSD is projected to continue at 7.1% for the next 10 years, then after 2010, the growth rate is projected to decrease to a moderate value of 4% per year.

The estimated permanent population within PAWSD and the water usage based on: 215 gallons per person per day from 2000 to 2010; 210 gallons per person per day from 2010 to 2020; and 205 gallons per person per day from 2020 to 2025; are shown in Table 7 for each 5 year increment from 2000 to 2025. The population within the PAWSD in 2000 is estimated to be 75% of the Census data, or 7,420.

Table 7: Estimated PAWSD Future Water Demand

Year	Annual Growth Rate	Estimated Permanent Population	Annual Use Per Capita (g/cap/day)	Total Annual Demand (acre-feet)	Total Annual Demand (million gallons)
2000		7,420	215	1,787	582
	7.10%				
2005		10,456	215	2,518	821
	7.10%				
2010		14,733	215	3,548	1,156
	4%				
2015		17,925	210	4,217	1,374
	4%				
2020		21,809	210	5,130	1,672
	4%				
2025		26,534	205	6,093	1,985

The population in the service area in 2025 is projected to be about 26,534. The associated annual water demand is 1,985 million gallons or 6,093 acre-feet.

PAWSD plans to have facilities constructed by 2010 that are adequate to supply the estimated 2025 annual and monthly water demand.

PAWSD is developing plans that will allow the construction of water supply facilities well ahead of the need for the estimated water demand because: (1) the 2025 water demand is based on long term population increases for Archuleta County, should the population growth of 7.1% per year continue for the next two decades, rather than one decade, the estimated 2025 water demand of 6,093 acre-feet will occur between 2015 and 2020 rather than 2025; and (2) the time to construct new water supply facilities is significant due to permitting, funding, and other issues which commonly delay construction of new facilities.

Environmental Consequences

This section summarizes the results of the financial and economic efficiency analyses for Alternatives 1-3. Details of these analyses are on file at the Pagosa Ranger District. The analysis that follows is in compliance with FSM 1970.3, 1970.6 and the Region 2 Supplement.

Financial Efficiency

Financial Efficiency is a comparison of those costs and revenues that can be quantified in terms of actual dollars spent or received on the project. The main criterion in assessing the financial efficiency of each alternative is Present Net Value (PNV), which is defined as the discounted value (at 4 percent) of Forest Service and Partner (PAWSD) revenue minus Forest Service and partner costs. When considering quantitative issues, financial efficiency analysis offers a consistent measure in dollars for comparison of alternatives. This type of analysis does not account for non-market benefits, opportunity costs, individual values, or other values, benefits (i.e. water), and costs that are not easily quantifiable.

Present Net Value is an economic measure that accounts for all current and future costs and revenues for the proposed project in a single dollar figure. Future costs and benefits are estimated and discounted into today's dollars and added to the current project costs and revenues. The result is a figure that can be compared across alternatives representing the total financial impact over the life of the project. Because a dollar is worth more now than it would be in the future, discounted costs and revenues are smaller figures. For example, a revenue of $1,000,000 in 100 years is worth about $20,000 today using the standard government discount rate of four percent.

Table 8 displays a summary of the financial efficiency analysis for quantifiable costs and benefits by alternative.

Table 8: Summary Financial Efficiency Analysis

All Partners

	Alternative 1 Existing Ditch only	Alternative 2 Pipeline & Ditch	Alternative 3 Pipeline & No Ditch
R/C Ratio	0.02	0.00	0.00
Present Net Value ($)	-$172,305.88	-$4,165,133.63	-$4,265,133.63
PV-Revenues ($)	$3,222.30	$3,222.30	$3,222.30
PV-Costs ($)	-$175,528.17	-$4,168,355.93	-$4,268,355.93

PAWSD

	Alternative 1	Alternative 2	Alternative 3
R/C Ratio	0.00	0.00	0.00
Present Net Value ($)	-$174,654.90	-$4,167,482.65	-$4,267,482.65
PV-Revenues ($)	$0.00	$0.00	$0.00

PV-Costs ($)	-$174,654.90	-$4,167,482.65	-$4,267,482.65

USFS

	Alternative 1	Alternative 2	Alternative 3
R/C Ratio	3.69	3.69	3.69
Present Net Value ($)	$2,349.02	$2,349.02	$2,349.02
PV-Revenues ($)	$3,222.30	$3,222.30	$3,222.30
PV-Costs ($)	-$873.27	-$873.27	-$873.27

Source of PAWSD cost estimates: Davis Engineering

Alternative 1 includes costs incurred by PAWSD for maintaining the existing ditch and includes Forest Service permit administration costs for the ditch and permit fees collected. Alternative 2 includes the cost of constructing the new pipeline. Under this alternative ditch maintenance is no longer included or incurred by the District since this cost will transfer to the remaining user(s) that continue to operate the ditch. Alternative 3 is similar to Alternative 2 except it also includes the cost to PAWSD for the rehabilitation of the Dutton Ditch which would no longer be operated or maintained.

For the PAWSD portion of the financial analysis no revenues were included since the value of water traveling through either the ditch or pipeline and eventually into storage reservoirs, is not included in this analysis. These values are included in the economic efficiency analysis that follows. Since there are very little quantifiable revenues (only for Forest Service) versus costs generated under any of the alternative, the present net values for all partners yields large deficits for each alternative.

Economic Efficiency

Economic efficiency analysis estimates the present and future benefits of the proposed project and alternatives considered. This analysis includes the benefit values of PAWSD water associated with the existing ditch operation and/or the new pipeline once constructed. Costs used in the financial efficiency analysis for Alternatives 1-3 are similar in the analysis with one addition. Under Alternative 1 there is an additional cost to PAWSD. Due to ditch capacity limitations and seasonal water transmission inefficiencies there would be a future cost to PAWSD for seeking additional water sources to meet future projected demand.

Table 9: Summary Economic Efficiency Analysis

All Partners

	Alternative 1	Alternative 2	Alternative 3
B/C Ratio	0.13	1.65	1.62
Present Net Value ($)	-$3,209,895.92	$2,729,127.78	$2,629,127.78
PV-Benefits ($)	$458,730.20	$6,897,483.71	$6,897,483.71
PV-Costs ($)	-$3,668,626.12	-$4,168,355.93	-$4,268,355.93

PAWSD

	Alternative 1	Alternative 2	Alternative 3
B/C Ratio	0.12	1.65	1.62
Present Net Value ($)	-$3,212,244.94	$2,726,778.76	$2,626,778.76
PV-Benefits ($)	$455,507.91	$6,894,261.41	$6,894,261.41
PV-Costs ($)	-$3,667,752.85	-$4,167,482.65	-$4,267,482.65

USFS

	Alternative 1	Alternative 2	Alternative 3

B/C Ratio	3.69	3.69	3.69
Present Net Value ($)	$2,349.02	$2,349.02	$2,349.02
PV-Benefits ($)	$3,222.30	$3,222.30	$3,222.30
PV-Costs ($)	-$873.27	-$873.27	-$873.27

Source of PAWSD cost & revenue estimates: Davis Engineering

The results in Table 9 for PAWDS show a substantial positive increase in benefit/cost ratio for Alternatives 2 and 3 compared to Alternative 1. This increase is the result of: improved water transmission capacity of the pipeline compared to the Dutton Ditch, the ability of the District to capture more water in the winter months, and reduced annual maintenance costs for the pipeline compared to the ditch. It is anticipated under Alternative 3 the probability for pipeline failure is greatly reduced compared to future failures of the ditch, should it continue to be operated under Alternatives 1 and 2. Thus, with proper pipeline design, the risk of environmental costs associated with ditch failures resulting in landslides, soil erosion and rehabilitation needs, is significantly reduced under Alternative 3.

Cultural Resources

The cultural resources survey of the Dutton Ditch Pipeline Project was conducted on November 6 and 7, 2002, and July 24, 2003 by personnel of La Plata Archaeological Consultants. The survey area covered about 53.9 acres. Only one archaeological site was encountered in the survey area and rerecorded. The one site is the Dutton Ditch, which is proposed for conversion to a pipeline during this project. The site has been determined to be officially ineligible for National Register nomination. Therefore, no special protective measures are recommended for the site and archaeological clearance is recommended for this project, therefore the project will have no effect to cultural resources.

Scenery

Direct and indirect scenery impacts were considered during the analysis. Since the pipeline would follow closely to the already disturbed ditch corridor or be along the Fourmile and Plumtaw roads, no additional scenery impacts would occur.

Cumulative Effects

This section considers the effects on the environment resulting from the incremental impact of the alternatives analyzed in detail, when added to other past, present, and reasonably foreseeable actions and trends.

Unless otherwise stated, the spatial and temporal scale are the Dutton Analysis Area and 20 years into the future, respectively.

Present Actions considered

- Existing road traffic.
- Existing grazing operation.
- Continued ditch operation.

- Fourmile water appropriations

Reasonably Foreseeable Future Actions

In the next 20 years, we anticipate the following occurring in the analysis area:

- An increase in vehicular traffic along Fourmile Road of 6 percent annually;
- Road construction and clearing of land for home construction on private land;
- Suppression actions taken on wildfires, when discovered and suppression forces and equipment are available; and
- Continued livestock grazing at current levels.
- Forest thinnings
- Prescribed fire
- Increase in illegal ATV along interior forest pipeline corridor **

**This action was considered but discounted since it is difficult, and speculative, to quantify the number and locations of incidences and the resulting effects such activity would have on any of the area's resources.

Under Alternative 2 and 3, the scale of impact from this proposed project is small relative to the magnitude of the other actions considered. Given this, the increment addition of this project to those other actions yielded no identifiable cumulative effects for the following: vegetation, geology, soils, watershed, range, recreation, MIS, TES wildlife, transportation, scenery, lands, economics, or cultural resources.

Fisheries

In addition to the aforementioned Dutton Ditch uses, there are presently 19 additional water appropriations that remove water from Fourmile Creek. If available, these appropriations can take a total of 81.5 c.f.s from Fourmile Creek. These uses primarily occur during the spring and summer months and are mostly used for agricultural irrigation. These uses have priority over the Dutton Ditch uses and serve to maintain stream flows in the upper sections of stream occurring on National Forest lands. In effect, these diversions mitigate the potential effects of the Dutton Ditch diversions and any new diversions that would occur during irrigation seasons. However, these same diversions decrease flow and reduce aquatic habitats on National Forest lands located downstream of their diversion points.

CONSULTATION & COORDINATION

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

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U. S. Fish and Wildlife Service

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Archuleta County

Mineral County

Town of Pagosa Springs

Pagosa Area Water & Sanitation District

TRIBES:

List on File at Pagosa Ranger District Office

OTHERS:

List of general publics on file at Pagosa Ranger District Office.

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