United States
Department of
Agriculture

Forest Service

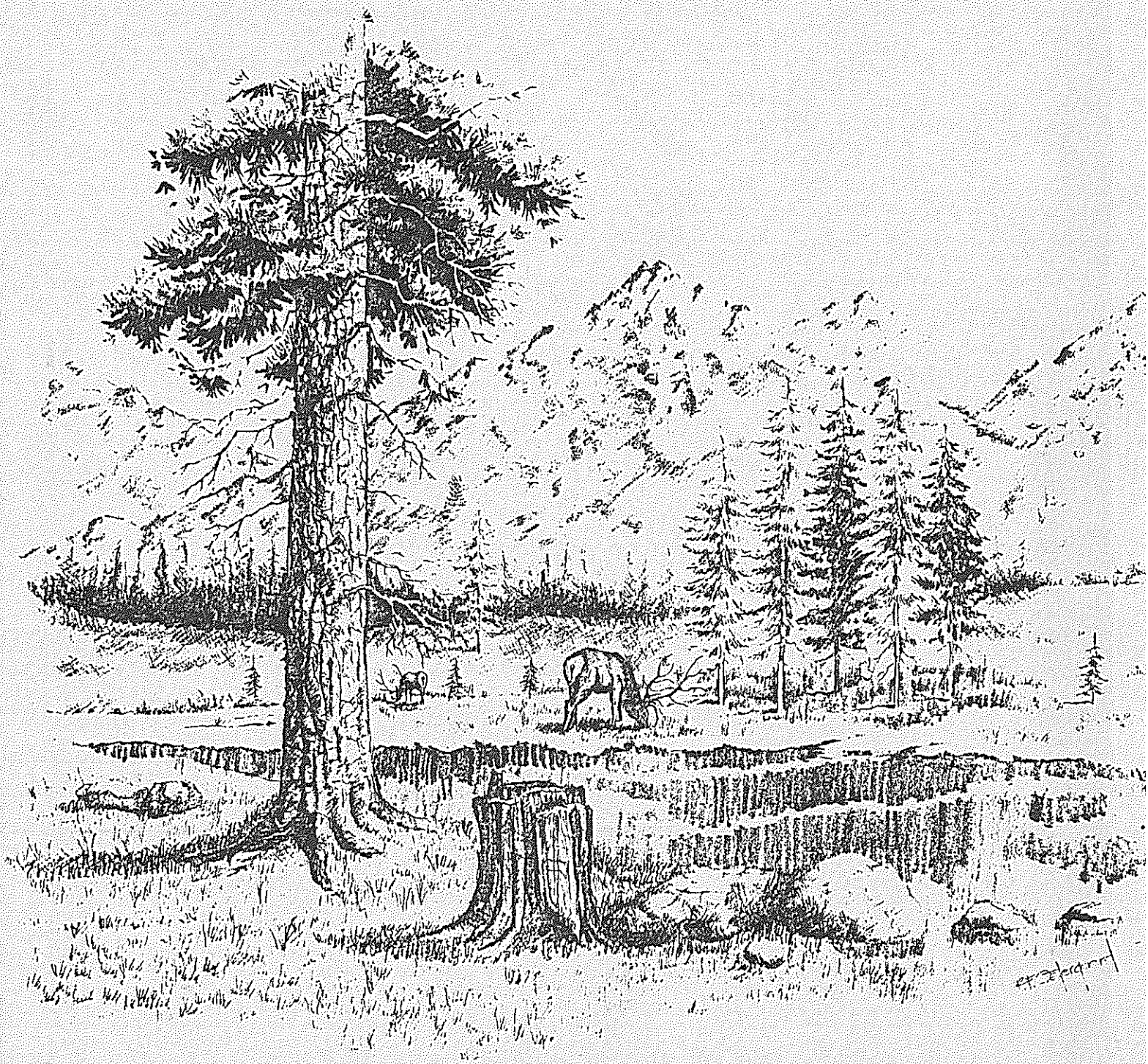
Durango, Colorado

FINAL ENVIRONMENTAL IMPACT STATEMENT

SAN JUAN NATIONAL FOREST

Vol. 2

Appendices & Maps



appendices

APPENDIX A

GLOSSARY

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Acre-Foot - A water volume measurement equal to the amount of water that would cover one acre to a depth of one foot (43,560 cubic feet or 325,851 gallons).

Aerial Logging - A system for hauling timber from the stump to a collecting point which employs aerial means of transportation, e.g., balloons, helicopters, or cables; as opposed to ground (tractor) skidding.

Aerial Stocking - The use of airplanes or helicopters to introduce fish into high mountain lakes.

Alienated Mineral Rights - Ownership of the mineral rights is by someone other than the surface rights owner.

Allowable Sale Quantity - The quantity of timber that may be sold from the area of suitable land covered by the Forest Plan for a time period specified by the Plan. This quantity is usually expressed on an annual basis as the "average annual allowable sale quantity."

Allowable Use - The degree of forage use estimated to be proper until proper use is known.

Alternative - One of several policies, plans or projects proposed for decision making.

Analysis Area - One or more sites combined for the purpose of analysis in formulating alternatives and estimating various impacts and effects.

Analysis of Management Situation (AMS) - A determination of the ability of the planning area to supply goods and services in response to society's demand for those goods and services.

Animal Unit Month (AUM) - The quantity of forage required by one mature cow (1000 pounds) or the equivalent for one month.

Animas-La Plata Project - Proposed water project transferring water from the Animas River to the La Plata River.

Aquatic Ecosystem - The lake bed or stream channel of perennial or intermittent streams; the water itself; and the biotic communities that occur therein.

Archaeological and Historical Sensitivity - See "Sensitivity Level."

Arches - Device used in skidding to keep the front end of the log off the ground.

Arterial Roads - Primary travel routes that provide service to a large land area and which usually connect with public highways or other Forest Service arterial roads.

AUM - See "Animal Unit Month."

Background (Visual Distance Zone) - The distant part of a landscape; surroundings, especially those behind something, and providing harmony and contrast; area located from 3 to 5 miles to infinity from the viewer.

Basal Area - Measurement of how much of a site is occupied by trees. It is determined by measuring the square feet of the diameter of all the trees in an area at breast height (4.5 feet).

Base Sale Schedule - The timber sale schedule formulated on the basis that the quantity of timber planned for sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade, and this planned sale and harvest for any decade is not greater than the long-term sustained-yield capacity.

Baseline Water Yields - Estimate of what water yield would be in the absence of any man-caused modifications in the precipitation-runoff process.

B/C Values - See "Benefit/Cost Ratio."

Benchmark Levels - Levels used for comparison purposes only. Benchmark levels remain constant and are used to define the available decision space for alternatives. They also serve as a base of comparison among alternatives.

Benefit/Cost Ratio - The total discounted benefits of an activity divided by the total discounted costs.

Big Game - The larger species of wild animals that are hunted, such as elk, deer, bighorn sheep, and mountain goats.

Biological Potential - The maximum production of a selected organism that can be attained under optimum management.

BLM - Bureau of Land Management.

Board Foot - Measure of an amount of timber equivalent to a piece 12" X 12" X 1". The boards bought at a lumber store are somewhat smaller because they have been planed or made smooth.

Broadcast Seeding - The scattering of seed more or less evenly over a whole area.

Brush Raking - The uprooting and piling of brush with a tractor or bulldozer to reduce competition between the brush and the favored species.

Burning Index (BI) - A number related to the contribution that fire behavior makes to the amount of effort needed to contain a fire in a particular fuel type within a rating area. A doubling of the BI indicates that twice the effort will be needed to contain a fire in that fuel type as was previously required. Numerically equivalent to 10 times the predicted flame length in feet.

Cable Logging - A method for transporting logs from stumps to collecting points which utilizes a cable system as the main device for moving them.

Canopy - The more or less continuous cover of branches and foliage formed collectively by the crown of adjacent trees and other woody growth.

Capability Area - An area of land delineated for the purpose of estimating responses to various management practices, resource values, output coefficients, and multi-resource or joint production functions. Capability areas may be synonymous with ecological land units, ecosystems, or land response units. Capability areas are the single geographic delineations used to describe characteristics of the land and resources in integrated forest planning.

Capable Range - Land that produces forage for animal consumption without impairing other forage values; generally considered as land that is not being cultivated.

Carrying Capacity - The maximum stocking rate possible without inducing damage to vegetation or related resources expressed in AUM's, may vary from year to year due to fluctuating forage production.

CEQ - Council on Environmental Quality.

CFR - Code of Federal Regulations.

Chemical Water Quality - Measurements of chemical parameters (alkalinity, dissolved oxygen, dissolved iron, etc.) used to describe the quality of water.

Clearcutting - A regeneration method used to establish even-age stands whereby all trees are removed in one harvest.

Coal Unsuitability Criteria - Regulations, developed by the Bureau of Land Management, which use the ability of an area's surface resources to accept or absorb the impacts of coal mining activities as a means to determine suitability or unsuitability of the area for coal mining.

Collector Roads - Roads that serve smaller land areas and are usually connected to Forest arterial roads or public highways. They collect traffic from local roads and terminal facilities. Collector roads are operated for constant use.

Commercial Forest Land - See "(Forest Land) Capable."

Concession Permit - A permit which authorizes private individuals or corporations to operate Forest Service owned facilities as a commercial profit-making venture.

Condemnation - In real property law, the process by which property of a private owner is taken for public use, without his consent, but requiring payment of just compensation.

Confine Fire - To utilize natural or preconstructed barriers, or environmental conditions, to restrict fire spread within a predetermined area. Suppression action could be minimal, and may be limited to surveillance.

Constant Road - (Constant entry road) A road developed and operated for continuous or annual recurrent service.

Constraint - A quantification of the minimum or maximum amount of an output or cost that could be produced or incurred in a given time period.

Contain Fire - To surround a fire, and any spot fires therefrom, with control line, as needed, which can reasonably be expected to check the fire's spread within a predetermined area under prevailing and predicted conditions.

Contracts, "8A" - Contracts set-aside for minority, small business.

Control Fire - To complete the control line around a fire, any spot fires therefrom, and any interior islands to be saved; burn out any unburned area adjacent to the fire side of the control line; and cool down all hot spots that are immediate threats to the control line, until the line can reasonably be expected to hold under foreseeable conditions.

Controlled Burn - See "Prescribed Fire."

Cord - A unit of gross volume measurement for stacked round or split wood. A standard cord is 4' X 4' X 8' or 128 cubic feet. A standard cord may contain 60 to 100 cubic feet of solid wood depending on the size of the pieces and the compactness of the stack.

Cost Coefficients - Values which relate an acre of land to a particular dollar cost in a specific period of time.

CRM - Cultural Resource Management.

Cuesta - A sloping plain which is terminated on one side by a steep slope.

Cultural Resource - The physical remains of past human cultural systems and places or sites of importance in human history or prehistory.

Current - Refers to the year 1980, as used in this document.

Data Base - See "Resource Data Base."

DBH - Diameter at breast height (4.5 ft.).

Deferred Rotation - Discontinuance of grazing on various parts of a range in succeeding years, allowing each part to rest successively during the growing season to permit seed production, establishment of seedlings or restoration of plant vigor.

Deflection Structure - Rock, concrete, or other material structure used to change direction of streamflow.

Demand Trends - The expected future need or desire for outputs, services and uses.

Departure - A schedule which deviates from the principle of nondeclining flow by exhibiting a planned decrease in the timber sale and harvest schedule at any time in the future. A departure can be characterized as a temporary increase, usually in the beginning decade(s) of the planning period, over the base sale schedule that would otherwise be established, without impairing the future attainment of the Forest's long-term sustained-yield capacity.

Developed Recreation - Recreation that requires facilities that results in concentrated use of an area. Examples are campgrounds and ski areas. Facilities might include: Roads, parking lots, picnic tables, toilets, drinking water, ski lifts and buildings.

Development Scale - A numerical scale describing the degree of site modification and the kinds of facilities that are appropriate to a particular type of developed recreation experience.

Recreation Opportunity Spectrum Class	Development Scale	Level of Site Modification
Primitive	1	Minimum site modification. Rustic or rudimentary improvements designed for protection of the site rather than comfort of the users. Use of synthetic materials excluded. Minimum controls are subtle. No obvious regimentation. Spacing informal and extended to minimize contacts between users. Motorized access not provided or permitted.
Semi-primitive	2	Little site modification. Rustic or rudimentary improvements designed primarily for protection of the site rather than the comfort of the users. Use of synthetic materials avoided. Minimum controls are subtle. Little obvious regimentation. Spacing informal and extended to minimize contacts between users. Motorized access provided or permitted. Primary access over primitive roads. Interpretive services informal, almost subliminal.

Roaded Natural	3	Site modification moderate. Facilities about equal for protection of site and comfort of users. Contemporary/rustic design of improvements is usually based on use of native materials. Inconspicuous vehicular traffic controls usually provided. Roads may be hard surfaced and trails formalized. Development density about three family units per acre. Primary access may be over high standard roads. Interpretive services informal, but generally direct.
Rural	4	Site heavily modified. Some facilities designed strictly for comfort and convenience of users. Luxury facilities not provided. Facility design may incorporate synthetic materials. Extensive use of artificial surfacing of roads and trails. Vehicular traffic control usually obvious. Primary access usually over paved roads. Development density 3-5 family units per acre. Plant materials usually native. Interpretive services often formal or structured.
Urban	5	High degree of site modification. Facilities mostly designed for comfort and convenience of users and usually include flush toilets; may include showers, bathhouses, laundry facilities, and electrical hookups. Synthetic materials commonly used. Formal walks or surfaced trails. Regimentation of users is obvious. Access usually by high-speed highways. Development density five or more family units per acre. Plant materials may be foreign to the environment. Formal interpretive services usually available. Designs formalized and architecture may be contemporary. Mowed lawns and clipped shrubs not unusual.

Directional Drilling - The art of drilling a borehole wherein the course of the hole is planned before drilling. Such holes are usually drilled with rotary equipment at an angle to the vertical, and are useful in avoiding obstacles or reaching side areas.

Dispersed Recreation - In contrast to developed recreation sites, such as campgrounds, picnic grounds, winter sports sites, resorts, and recreation residences, dispersed recreation areas are the lands and waters under Forest Service jurisdiction which are not developed for intensive recreation use. Dispersed areas include general undeveloped areas, roads, trails, and water areas not treated as developed sites.

District Key Contact List - List of influential members of the local community maintained by District Rangers.

Diversity - The relative degree of abundance of wildlife species, plant species, communities, habitats, or habitat features per unit of area.

Division #7 Water Rights Adjudication - Court delineation of all existing and pending water uses in the San Juan and Dolores river drainages. This adjudication is not yet active.

Domal Uplift - A geologic structure dome-like in shape caused by upward pressure of the earth's crust.

Dominant Species - Plants of outstanding abundance, or of such conspicuous appearance as to furnish the major aspect of the plant community for the season of observation.

Drill Seeding - Mechanical process used to plant seed in furrowed lines.

Durango Known Recoverable Coal Resource Area - KRCRA lying along the southern boundary of the San Juan National Forest from west of Pagosa Springs westward to near Mancos, containing about 222,000 acres of medium to high potential for economic coal resources, including about 75,000 acres within the San Juan National Forest.

EA - Environmental Assessment.

Ecological Position - The location of a wildlife habitat in terms of its environmental components such as latitude, altitude, precipitation, etc.

Ecosystem - The system formed by the interaction of a group of organisms and their environment.

Endangered Species - Any species which is in danger of extinction throughout all or a significant portion of its range.

Endemic - Native or confined to a certain region; having a comparatively restricted distribution.

Environmental Assessment (EA) - An analysis of all actions and their predictable short and long-term environmental effects, which include physical, biological, economic, and social factors and their interactions. Also, a concise public document required by the regulations for implementing the procedural requirements of the National Environmental Policy Act of 1969. (NOTE: The Environmental Assessment (EA) replaced the Environmental Assessment Report (EAR)).

Environmental Impact Statement (EIS) - The version of the statement of Environmental Effects required for major Federal actions under Section 102 of the National Environmental Policy Act (NEPA), and released to the public and other agencies for comment and review. It is a formal document which must follow the requirements of NEPA, the Council on Environmental Quality (CEQ) guidelines, and directives of the agency responsible for the project proposal.

Environmental Stresses - Non-infectious diseases such as air and chemical pollution, flood, drought, and excessive temperature.

Eolian - A term applied to deposits arranged or transported by the wind.

Erosion - The wearing away of the land's surface by running water, wind, ice, or other geological agents. It includes detachment and movement of soil or rock fragments by water, wind, ice, or gravity.

Erosion Tolerance Limits - Same as T factor; see "T, C & K Factors."

Escaped Fire - A fire which has exceeded, or is anticipated to exceed, preplanned initial action capabilities or the fire management direction.

Escaped Fire Situation Analysis - A decision analysis of those factors influencing suppression of an escaped fire from which a plan of action will be developed. The analysis includes the development of alternative suppression strategies and the probable cost and damages associated with each.

Evapotranspiration - The conversion of water, whether open or as soil moisture within plants, into water vapor that is released into the atmosphere.

Even-Aged Timber Management - The combination of actions that results in the creation of stands in which trees of essentially the same age grow together.

Even-Flow - Continuous supply of products over a given time period.

Existing Visual Condition (EVC) - The present state of visual alteration which is measured in six degrees (untouched, unnoticed, minor disturbance, disturbed, major disturbance, drastic disturbance) of deviation from the natural appearing landscape.

Extrusive - Applied to those igneous rocks derived from materials poured out or ejected at the earth's surface.

Eyrie - The nesting site of a bird of prey, as an eagle or a hawk.

Fauna - The animals of a given region or period.

Filter Strip - A designated land or water area, along the perimeter of some land use, whose own use is regulated so as to resist, absorb, or otherwise preclude or control unwanted development or other intrusions into areas beyond the filter.

Fire Intensity - The rate of heat energy released during combustion, usually expressed as BTU/second per unit length of fire front (foot).

Fire Intensity Level (FIL) - Groupings of fire intensities into six classes. The fire intensity level exhibited at a fire is indicated by the average flame length observed, as below:

FIL	Flame Length
1	0-2 feet
2	2-4 feet
3	4-6 feet
4	6-8 feet
5	8-12 feet
6	12+ feet

Fire Management - All activities required for the protection of resources and values from fire, and the use of fire, to meet land management goals and objectives.

Fire Management Area - One or more parcels of land with clearly defined boundaries and with established fire management direction which is responsive to land and resource management goals and objectives.

Fire Management/Effectiveness Index (FMEI) - The index value measures effectiveness of annual fire management operational programs. It is a planning, attainment, analysis, and evaluation tool for both annual and long-term programs. Measured in dollars per thousand acres protected, the objective is to minimize the index value.

Fire Prescription - A predesigned set of criteria established for the use of prescribed fire to accomplish specific land and resource management objectives.

Floodplain - Low land and relatively flat areas joining inland and coastal waters, including debris cones and flood prone areas of offshore islands. The minimum area included is that subject to a one percent (100-year recurrence) or greater chance of flooding in any given year.

Flora - The plants of a given region or period.

Flotation Tractor (Low PSI) - A tracked vehicle designed to have very low pounds per square inch (PSI). This type of vehicle is used in ground-skidding logs on wet or steep terrain.

Forage - All nonwoody plants (grass, grass-like plants and forbs) and portions of woody plants (browse) available to livestock and wildlife for food. Only a portion of a plant is available for forage if the plant is to remain healthy.

Forage Areas - Natural or created openings or shrub areas not dense enough to hide 90 percent of a deer at a distance of 200 feet. Most forage areas can be supplied by forested areas that are not as dense as cover areas.

Forage Utilization - (1) The portion of current year's forage production by weight that is consumed or destroyed by grazing animals. Syn., degree of use. Expressed in percent of current year's growth utilized by grazing animals on an average over time based on a system of range management that will maintain the key forage species while achieving other management objectives such as the maintenance of watersheds, wildlife habitat and recreational values and the protection of regenerating plants. (2) The percent expressed in the "Prescriptions for Management Areas" is the estimated average forage utilization allowable to meet the objectives of that prescription under sustained-yield management.

Forb - Any herbaceous plant other than grass or grass-like plants.

Foreground (Visual Distance Zone) - That part of a scene, landscape, etc., which is nearest to the viewer, and in which detail is evident, usually a one-half to one-quarter mile from the viewer.

Forest Direction - See "Management Direction."

Forest Land - Land at least 16 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use.

(Forest Land) Capable - Forest land which is capable of growing industrial crops of wood at or above the minimum biological growth established by the Regional plan. This classification includes both accessible and inaccessible, stocked and non-stocked land.

(Forest Land) Capable And Available - Capable forest land which has not been legislatively withdrawn or administratively withdrawn from timber production by the Secretary or the Chief of the Forest Service. This classification includes RARE II Further Planning Areas and administrative designation below the Chief's level withdrawing land from timber production.

(Forest Land) Capable But Not Available - Capable forest land which has been legislatively withdrawn or administratively withdrawn from timber production by the Secretary or Chief of the Forest Service. Capable but not available forest land is classed as not suited for timber production.

(Forest Land) Capable-Deferred - Capable forest land which has been legislatively designated or administratively designated by the Secretary or Chief for wilderness study or possible additions to the Wilderness System. This classification includes RARE II areas designated as Wilderness, but does not include RARE II areas designated for further planning.

(Forest Land) Capable-Reserved - Capable forest land which has been legislatively withdrawn or administratively withdrawn from timber production on a permanent basis. Examples of this classification are Wilderness Areas, Primitive Areas, Research Natural Areas or special interest areas or similar formal withdrawals approved by the Chief or higher authority.

(Forest Land) Not Capable - Forest land which is not capable of growing industrial crops of wood at least at the minimum biological growth potential of 20 cubic feet per acre annually as established in the Regional plan. Forest land not capable is classed as land not suited for timber production.

Forest Plan - A process, required by Congress for assessing economic, social, and environmental impacts, which describes how land and resources will provide for multiple use and sustained yield of goods and services.

FORPLAN - A specific linear program model designed for use in Forest Service planning.

Fourth-Order Watershed - Medium size watershed (10,000 to 25,000 acres).

Friable Topsoil - The dark-colored upper soil, that typically has favorable characteristics as a growth medium.

FSM - Forest Service Manual.

Fuel Break - A strategically located strip, normally 100 to 400 feet wide, where fuel has been reduced or modified; used as a safe location from which fire fighters can attack and control a fire.

Fuel Treatment - A rearrangement or disposal of natural or activity fuels to reduce the fire hazard. Fuels are defined as both living and dead vegetation materials consumable by fire.

Gabion - A wire mesh basket filled with rocks and used to protect erodible streambanks, or to create dams, deflectors, or other instream structures.

Gathering Pipeline - A pipeline which carries gas or liquid (natural gas, carbon dioxide, oil, etc.) from a well to a collecting facility or transmission pipeline.

Gauging Stations - Continuous streamflow measuring station usually operated by U.S. Geological Survey or Colorado Division of Water Resources.

Gene Pool Preserves - Any action that attempts to maintain the genetic equilibrium of a gene pool. Gene pool preservation requires extensive sampling of the gene pool, seed collection and continued storage (and replacement) of the seed. A nonsense term that assumes man can permanently stop natural evolutionary processes.

Growing Stock Level (GSL) - Expressed in either stems per acre or square feet of basal area of timber growing on any area.

Habitat - The place where animals live. It can be water for beaver, fish and aquatic insects; rocks for pika, bats and some species of birds, or forested areas for many mammals, birds and reptiles.

Hack Site - An artificial eyrie used to re-establish raptors into their historic range.

Hardwood - A conventional term for the timber of broad-leaved trees, and the trees themselves, belonging to the botanical group, Angiospermae.

Herbicide - A chemical compound used to kill or control growth of undesirable plant species.

Herbivore - An animal that feeds on plant substances.

Horizontal Diversity - The diversity in an area that results from the number of plant communities or successional stages or both; the greater their number the greater the horizontal diversity; also, the greater the amount of edge the higher the degree of horizontal diversity.

Human Resource Unit (HRU) - A human-geographic area characterized by particular patterns of cultural lifestyles, economic conditions, institutional arrangements, and topography. Human resource units vary in size. They typically are larger than individual towns and communities and cross county and other political jurisdictions. The HRU is used to design, implement, and evaluate management actions that respond to changing social conditions or physical resource uses at the District or Forest level.

Hummocking - An action caused by frost or changes in soil moisture content that gives the land an appearance of having small hills or knolls.

Hydraulic Gradient - Height of a drop in stream elevation over a given section expressed in percent. Example; a stream that drops 10 feet in elevation in a 1000 foot stream section has a hydraulic gradient of 1 percent in that section.

HYSED Water Yield Sediment Model - Computer model used to evaluate the water yield and sediment yield effects of proposed land management treatments. Developed by Lee Silvey and Dave Rosgen, Region 2, U. S. Forest Service.

Igneous - Rocks formed by solidification from a molten or partially molten state.

Implementing Regulations - Regulations generated by an agency to implement Act of Congress, i.e., 36 CFR 219 contains implementing regulations for RPA and NFMA.

Indicator Species - A species whose presence in a certain location or situation at a given population level indicates a particular environmental condition. Their population changes are believed to indicate effects of management activities on a number of other species or water quality. They include at least: Endangered and threatened species identified on State and Federal lists; species with special habitat needs that may be influenced significantly by planned management programs; and animal species commonly hunted, fished, or trapped. Also called "Management Indicator Species."

Indigenous Species - Species historically native to an area; not introduced by man.

Initial Action (Fire) - The prompt, preplanned response to a wildfire.

Input-Output Analysis Model (I-O) - A quantitative study of the interdependence of a group of activities based on the relationship between inputs and outputs of the activities. The basic tool of analysis is a square input-output table, interaction model, for a given period that shows simultaneously for each activity the value of inputs and outputs, as well as the value of transactions within each activity itself. It has especially been applied to the economy and the industries into which the economy can be divided.

Insecticide - An agent used to control insect populations.

Instream Flow - Usually used in defining the minimum flow necessary for all the uses of water while it is flowing through streams. Some of those uses are fisheries, channel stability, maintenance, riparian habitat maintenance and aesthetics.

Integrated Pest Management - A systematic decision making process and the resultant management actions which derive from consideration of pest-host systems and evaluation of alternatives for managing pest populations at levels consistent with resource management objectives.

Interdisciplinary Team (I.D.) - A group of individuals with skills from different resources. An interdisciplinary team is assembled because no single scientific discipline is sufficient to adequately identify and resolve issues and problems. Team member interaction provides necessary insight to all stages of the process.

Intermediate Harvest - Any removal of trees from an even-aged stand between the time of its formation and the regeneration cutting.

Intermittent Road - (Intermittent Use Road) A road developed and operated for periodic service and closed for more than one year between periods of use.

Intermittent Stream - A stream which flows only at certain times of the year when it receives water from springs or from some surface source such as melting snow in mountainous areas.

Interpretive Sites - A developed site at which a broad range of natural or cultural history is interpreted or described for the enjoyment of the public.

Intolerant Species - Those plant species that do not grow well in shade.

Intrusive - Rocks formed from solidification of fluid flowing into or between other rocks. Solidification occurs before surface contact.

Inversion - A stable layer of air where the temperature of the air increases with height.

Isolated Finds - An archeological object or objects found in solitary circumstances.

Issue - A subject or question of widespread public discussion or interest regarding management of National Forest System Lands.

Key Area - A portion of range, which, because of its location, grazing or browsing value, and/or use, serves as an indicative sample of range conditions, trend or degree of use seasonally. (A key area guides the general management of the entire area of which it is a part.)

Known Recoverable Coal Resource Area (KRCRA) - An area with medium to high potential for the occurrence of coal of sufficient amount and quality to support an economic mining operation. Determination of potential is made by the U.S. Geological Survey in consultation with the coal industry, the states concerned, and the public.

Krummholz - Dwarfed trees at or near timberline.

K-V Funds - In 1930, Congress passed the Knutson-Vandenberg Act (K-V Act) to authorize collection of funds (K-V Funds) for reforestation and timber stand improvement work on areas cut over by a timber sale.

Landline - Property boundary location of the San Juan National Forest.

Leasable Minerals - Coal, oil, gas, phosphate, sodium, potassium, oil shale, and geothermal steam.

Legal Administrative Status - Identifier to show specific legal or administrative requirements which may restrict management options on an area.

Linear Program Model - A mathematical method used to determine the best use of resources to achieve a desired result when limitations on available resources can be expressed in the form of equations.

Linear Programming - A mathematical technique for determining the effects of alternatives on resource allocation.

Lithics - Stone artifacts usually made through chipping or flaking techniques.

Litter - The uppermost layer of organic debris on the ground under a vegetation cover, i.e., essentially the freshly fallen or only slightly decomposed vegetable material, mainly from foliage but also bark fragments, twigs, flowers, fruits, etc.

Local Roads - Roads that connect terminal facilities with collector roads, arterial roads, or public highways. May be developed for either long-term or short-term service.

Locatable Minerals - Those hardrock minerals which are mined and processed for the recovery of metals. May include certain nonmetallic minerals and uncommon varieties of mineral materials such as valuable and distinctive deposits of limestone or silica. May include any solid natural inorganic substance occurring in the crust of the earth, except for the common varieties of mineral materials and leasable minerals.

Long-Term - Action governed by the Forest Plan generally taking place over a period longer than ten years from the present.

Long-Term Sustained Yield Capacity - The highest uniform wood yield from lands being managed for timber production that may be sustained under a specified management intensity consistent with multiple use objectives.

M - 1,000 Units.

Management Area - An area that has common direction throughout that differs from neighboring areas. The entire Forest is divided into management areas.

Management Area Direction - See "Management Direction."

Management Concern - A matter of importance to the management of the National Forest System Lands, which is identified internally by the agency.

Management Direction - Expressed in terms of both Forest Direction and Management Area Direction. Forest Direction consists of goals, objectives, and management requirements which are generally applicable to the entire Forest. Management Area Direction contains management requirements specific to individual areas within the Forest and are applied in addition to the Forest Direction management requirements. Management direction responds to public issues, management concerns, and opportunities within the availability, suitability, and capability of the land and resources.

Management Indicator Species - See Indicator Species.

Management Opportunity - A statement of general actions, measures or treatments that address the public issue or management concern in a favorable way.

Management Practice - A specific action, measure or treatment.

Management Prescription - Management practices selected and scheduled for application in a specific area to attain multiple use and other goals and objectives.

Management Team - Decision-making group consisting of the Forest Supervisor, Program Officers, and District Rangers.

Marginal Analysis - A type of analysis in which the only costs and benefits considered are those about which decisions can be made. Fixed benefits and costs are not considered.

Mass Movement - Downslope movement of a portion of the land's surface, i.e., a single landslide or the gradual simultaneous downhill movement of a whole mass of loose earth material on a slope face.

Maximum Modification (VQO) - A visual quality objective meaning man's activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background.

MBF - One thousand board feet of timber.

Mesa - A tableland; a flat topped mountain or other elevation bounded on at least one side by a steep cliff.

Middleground (Visual Distance Zone) - That part of a scene or landscape which extends from the foreground zone to 3 to 5 miles from the observer. Texture is discernible at this distance.

Migration Routes - Routes followed by an animal species during periods of annual movement usually between summer and winter ranges.

MIH Codes - Management Information Handbook codes.

Mineral Entry - The right under the Mining Law of 1872 to enter non-withdrawn public domain land, such as National Forests, and to explore for, extract, and sell certain locatable minerals; protected by the filing of a lode, placer, or mill site claim.

Minimum Level Management - The management strategy that would meet only the basic statutory requirements of administering unavoidable, non-discretionary land uses, preventing damage to adjoining lands of other ownerships, and protecting the life, health, and safety of incidental users.

Minimum Stocking Standard - The stocking that must be present on regenerated areas before a new stand can be considered established. Minimum stocking is normally stated in terms of number of trees per acre and tree stem heights by species.

MM - 1,000,000 Units.

MMBF - One million board feet of timber.

Modification (VQO) - A visual quality objective meaning man's activity may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground.

Montane - A climatic or vegetation zone characterized by the dominance of evergreen trees on cool upland slopes below timberline.

Multiple Use - The management of all various renewable surface resources of the National Forests so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions;

that some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

National Register of Historic Places - A listing maintained by the National Park Service of areas which have been designated as being of historical significance.

NEPA - National Environmental Policy Act.

NFMA - National Forest Management Act.

No Action Alternative - The most likely condition expected to exist in the future if current management direction would continue unchanged.

Non-commercial Forest Land - See "(Forest Land) Not Capable."

Non-declining Yield - A level of timber production planned so that the planned sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade.

Non-forest Land - Land that has never supported forests and lands formerly forested where use for timber utilization is precluded by development for other use. Includes areas used for crops, improved pasture, residential areas, improved roads of any width and adjoining clearings, and powerline clearing of any width. If intermingled in forest areas, unimproved roads and non-forest strips must be more than 120 feet wide, and clearing more than one acre in size to qualify as non-forest land. The non-forest land is classified as land not suited for timber production.

Non-game Species - Animal species that are not usually hunted in Colorado. This classification is determined by the State Legislature.

Non-structural Range Improvement - A modification of existing vegetation to improve the grazing resource. Examples are spraying or plowing sagebrush and seeding to grass.

Noxious Weed - A noxious, destructive, or troublesome plant when found to be in epidemic proportions and of economic importance to threaten the public welfare.

Objective - A clear and specific statement of planned results to be achieved within a stated time period. The results indicated in the statement of objectives are those which are designed to achieve the desired condition represented by the goal. An objective is measurable and implies precise time-phased steps to be taken and resources to be used which, together, represent the basis for defining and controlling the work to be done.

Obliteration - The returning of the land occupied by a road or trail to production.

Occupancy Trespass - The illegal occupation or possession of National Forest land.

Opportunity Costs - The value of the benefits foregone or given up due to the effect of choosing another management alternative that either impacts existing outputs or shifts resources away from other activities so that they are no longer produced and their benefits are lost.

ORV - Off-road vehicles; this includes all mechanical means of transportation; passenger cars, four-wheel-drive vehicles, trail bikes, and snowmobiles that are capable of traveling over land where no road exists.

Output Coefficient - Values which relate an acre of land to a particular quantity of output in a specific period of time.

Overstory - Relative to even-aged stands; the mature trees which overtop the younger trees.

Palustrine Nesting Habitat - Marsh-like areas with relatively stable water tables whereby nesting habitat for waterfowl, small mammals and non-game species is possible.

PAOT - See "Persons-At-One-Time."

Partial Retention (VQO) - A visual quality objective which in general means man's activities may be evident but must remain subordinate to the characteristic landscape.

Patented Mining Claim - A mining claim to which the Federal Government has granted the claimant all surface and some or all mineral rights. Patented mining claims are private land and may be sold or used for other than mining activity, such as residential or recreational use.

Perennial Stream - Streams that flow throughout the year and from source to mouth.

Persons-At-One-Time - A recreation-capacity measurement term indicating the number of people that can comfortably occupy or use a facility or area at one time.

Pest-Host System - A pest and the plant or animal which it associates with for its life cycle.

Pests - Plants, animals, and environmental stresses which the land manager determines are detrimental to achieving resource management objectives.

Pest Problem - A point at which the effects of pests adversely impact management objectives enough to warrant action.

Physiographic Province - Region of similar structure and climate that has had a unified landform history.

Placer Activity - Mining activity in which the surface rock debris is washed for gold or other valuable minerals.

Planned Ignitions - A fire started by a deliberate management action.

Planning Criteria - Criteria prepared to guide the planning process and management direction.

Planning Question - A major policy question of long-range significance, derived from the public issues and management concerns, to be decided when selecting among Forest Plan Alternatives.

Plantation - A forest crop or stand raised artificially, either by seeding or planting of young trees.

Pole Timber - As used in timber survey, a size class definition, trees 5.0 to 8.9 inches at DBH. As used in logging operations, trees from which pole products are produced, such as telephone poles, pilings, etc.

Post Market - The market of trees to be used as fence posts. They are normally four inches to ten inches in diameter and six to ten feet long.

Potential Yield - The level of timber harvest achievable by intensive management on every available acre. As used in this document, the management practices included are reforestation, full stocking level control, and use of genetically superior stock.

Pothunting - Slang term used by professional archaeologists to describe illegal or non-professional collecting of relics.

Predator - An animal species that obtains its food by hunting other animal species.

Preparatory Cut - See "Shelterwood Cut."

Prescribed Fire - Fire burning under conditions specified in an approved plan to dispose of fuels, control unwanted vegetation, stimulate growth of desired vegetation, change successional stages, etc., to meet range, wildlife, recreation, wilderness, watershed, or timber management objectives. The fire may result from either planned or unplanned ignitions.

Prescription - See "Management Prescription."

Present Net Value - Discounted benefits less discounted costs associated with providing all outputs to which monetary values can be assigned.

Preservation (VQO) - A visual quality objective that provides for ecological change only.

Primitive Management Area - A wilderness management area characterized by high levels of solitude in an essentially unmodified natural ecosystem, with a low level of trail access.

Primitive Road - A two-track road that has evolved primarily through use by off-road high clearance vehicles; usually no planning, design, or construction has occurred and the road snakes its way between obstacles to reach the user's destination.

Primitive ROS Class - A classification of the recreation opportunity spectrum characterized by an essentially unmodified environment, where trails may be present but structures are rare, and where probability of isolation from the sights and sounds of man is extremely high.

Pristine Management Area - A wilderness management area characterized by highest levels of solitude. High emphasis on opportunities for challenge, risk, and self-reliance, with no trail access.

Productive Deferred - See "(Forest Land) Capable-Deferred."

Productive Reserved - See "(Forest Land) Capable-Reserved."

Programmed Harvest - The part of the potential timber yield that is scheduled for harvest and financed annually. It is based on current demand, funding levels, silvicultural practices, and multiple use considerations.

Proper Use - A degree and time of use of current year's growth which, if continued, will either maintain or improve the range condition consistent with conservation of other natural resources.

Protection Element (Fire) - A support element providing protection to Forest resources and users; such as fire suppression.

Public Issue - A subject or question of widespread public discussion or interest regarding management of National Forest System Lands and identified through public participation.

Range Allotment - An area designated for the use of a prescribed number of cattle or sheep, or by common use of both, under one plan of management.

Raptor - A predatory bird.

Reclamation - Returning disturbed lands to a form and productivity that will be ecologically balanced and in conformity with a predetermined land-management plan.

Record of Decision - The documentation of what the decision was, the date, and a statement of reasons for the decision.

Recreation Opportunity Spectrum - A land classification system which categorizes National Forest land into six classes, each class being defined by its setting and by the probable recreation experiences and activities it affords. The six classes in the spectrum are primitive, semi-primitive non-motorized, semi-primitive motorized, roaded natural, rural, and urban.

Recreation Residence Site - House or cabin permitted on National Forest land for the recreational use of the owner, but not as a primary residence.

Recreation Visitor Day (RVD) - Recreational use of National Forest land which aggregates twelve hours. It may consist of one person for twelve hours, two people for six hours, or any combination that totals twelve hours.

Recreational River - Wild and Scenic Rivers Act Usage. Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Reforestation - The natural or artificial restocking of an area with forest trees.

Reforestation Backlog - Areas that need to have trees reestablished. This can be done by planting, seeding, or preparing the site for natural regeneration.

Regeneration - (1) The actual seedlings and saplings existing in a stand. (2) The act of establishing young trees naturally or artificially.

Regeneration Cut - Removal of trees with the intention of establishing a new crop of seedlings.

Regional Acceptable Work Standards - A set of standards which define or describe the way an activity is conducted whenever and wherever that activity is performed. The standards for the performance of specific activities are defined in the Management Information Handbook (FSH 1309.11). When an activity is performed, it will be performed within the limits established by the standard.

Regulated - Forest land managed for timber production under sustained yield principles.

Remote Sensing - The acquisition of information from a distance, generally by carriers that involve electromagnetic energy and sometimes by gravity and sound.

Removal Cut - See "Shelterwood Cut."

Research Natural Area - Land areas classified by order of the Chief of the U. S. Forest Service containing natural plant communities that have not been modified by man, and are protected and studied to obtain more information about the ecosystem.

Resource Data Base - Information about resources stored in a computerized system.

Restoration - See "Watershed Rehabilitation."

Rest-Rotation - An intensive grazing system requiring three or more management units or pastures, with each pasture systematically grazed and rested to provide livestock forage and other resource values while at the same time improving and maintaining the vegetation and soil resource.

Retention (VQO) - A visual quality objective which in general, means man's activities are not evident to the casual forest visitor.

Revegetation - The reestablishment and development of a plant cover. This may take place naturally through the reproductive processes of the existing flora or artificially through the direct action of man.

Riffle Section - Stream section of fast gradient and shallow water depth that creates turbulent water surface as opposed to pools.

Right of Eminent Domain - The taking of property for a necessary public use, with reasonable compensation being made to the property owner.

Rill Erosion - The removal of soil by the cutting of numerous small, but conspicuous water channels or tiny rivulets by concentrated surface runoff.

Riparian Area - A geographically delineated area with distinctive resource values and characteristics that is comprised of an aquatic ecosystem, a riparian ecosystem, floodplains, wetlands, and those adjacent upland areas that are within a horizontal distance of 100 feet from the normal high-water line of a stream channel or from the shoreline of a standing body of water.

Riparian Ecosystem - An ecosystem occurring between the aquatic and adjacent terrestrial ecosystem. Riparian ecosystems are distinguished by soil characteristics and distinctive existing or potential vegetation communities that are adapted to soils with consistently high levels of moisture.

Riprap - Materials such as rocks, logs, and concrete which are placed along a water course to stabilize the banks.

Road Density - The measure of the degree to which the length of road miles occupies a given land area, i.e., 1 mi/sq. mi. is one mile of road within a given square mile.

Road Obliteration - Reduction of erosion and/or sedimentation and return of a road to vegetation production. This involves scarification, seeding, providing sufficient drainage through water bars to avoid surface erosion, and blocking off vehicle access. Note that this is a permanent type of rehabilitation and should not be confused with "put to bed" which means to temporarily stabilize a road through mechanical and/or vegetation means until its next period of use.

Road Prism - The geometric features of a road structure including all the disturbed area within a given portion of road. These features include the cut bank, ditch, travel surface, and the fill slope.

Roaded Natural ROS Class - A classification of the Recreation Opportunity Spectrum that characterizes a predominantly natural environment with evidence of moderate permanent alternate resources and resource utilization. Evidence of the sights and sounds of man is moderate, but in harmony with the natural environment. Opportunities exist for both social interaction and moderate isolation from sights and sounds of man.

Rodenticide - An agent that kills, repels or controls rodents.

Roller Chopping - Crushing of undesirable vegetation with a large cylinder to encourage more desirable vegetation.

Root Plowing - The shearing of roots underneath the soil by a machine pulled by a large tractor or bulldozer, usually done in oak in the Region.

ROS Class - See "Recreation Opportunity Spectrum."

Rotation - The planned number of years between the start of a crop of trees and their final harvest. The rotation age will vary according to geographic location, tree species, and management objectives.

Roundwood - Trees that are used without being milled (fence posts, telephone poles, pulpwood, etc.).

RPA - Forest and Rangeland Renewable Resource Planning Act of 1974.

RPA National Assessment - A document compiled by the Secretary of Agriculture every 10 years which contains facts and analyses to develop and guide public and private forest and range land policies and programs.

RPA National Program - A document compiled by the Secretary of Agriculture every five years which outlines Forest Service programs for National Forest System management, cooperative assistance to States and private landowners, and research.

Rural ROS Class - A classification of the Recreation Opportunity Spectrum that characterizes an area in which the sights and sounds of man are prevalent and the landscape has been considerably altered by the works of man.

RVD - See "Recreation Visitor Day."

Salable Minerals - Deposits which, although they may have value for use in trade, manufacture, the sciences, or in the mechanical or ornamental arts, do not possess a distinct, special economic value for such use over and above the normal uses of the general sum of such deposits. May include sand, stone, gravel, pumicite, cinders, pumice (except that occurring in pieces over two inches on a side), clay, and petrified wood.

Salvage - Dead or dying trees which occur in excess of those needed for wildlife, aesthetics, or other purposes. These trees are harvested for products.

Sapling - As used in timber survey, a size class definition; trees 1.0 to 4.9 inches at DBH.

Satellite Imagery - A pictorial representation obtained from a satellite.

Satisfactory Range Condition - Rangeland in range condition class of at least fair with stable or upward trend.

Sawtimber - As used in timber survey, a size class definition; trees larger than 9 inches at DBH.

Scarification - Loosening the topsoil in open areas to prepare for regeneration by direct seeding or natural seedfall.

Scenic Easement - Relative to the Wild and Scenic Rivers Act (P.L. 93-621) 1975, and by definition of the act; the right to control the use of land (including the air space above such land) within the authorized boundaries of a component of the Wild and Scenic Rivers System, for the purpose of protecting the natural qualities of a designated wild, scenic or recreational river area, but such control shall not affect, without the owner's consent, any regular use exercised prior to the acquisition of the easement.

Scenic River - Wild and Scenic Rivers Act usage. Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

Scouring - The act of erosion, especially by moving water.

Sediment - Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

Sediment Yield - Amount of solid waste washed into a water course.

Sedimentary Rocks - Rocks formed by the accumulation and settling of suspended solid materials in water or from air. A characteristic feature of these rocks is a layered structure.

Seed Cut - See "Shelterwood Cut."

Seedbed - In natural regeneration, the soil of forest floor on which seed falls. In nursery practice, a prepared area which is seeded.

Seedling - As used in timber survey, a size class definition; trees less than one inch at DBH.

Selection Harvest Cut - A system which removes trees individually in a scattered pattern from a large area each year. (1) Individual tree selection cutting involves the removal of selected trees of all size classes on an individual basis. Regeneration is established under the partial shade of the overstory canopy after each cut. (2) Group selection cutting involves the removal of selected trees of all size classes in groups of a fraction of an acre up to 2 to 3 acres in size. Regeneration occurs in the groups under conditions similar to those found in small clearcuts.

Semi-Primitive Management Area - A wilderness management area characterized by moderate opportunity for solitude in a predominantly unmodified natural environment, with a moderate degree of trail maintenance.

Semi-Primitive Motorized ROS Class - A classification of the Recreation Opportunity Spectrum characterized by moderately dominant alterations by man, with strong evidence of primitive roads and/or trails.

Semi-Primitive Non-motorized ROS Class - A classification of the Recreation Opportunity Spectrum characterized by few and/or subtle modifications by man, and with a high probability of isolation from the sights and sounds of man.

Sensitive Areas - Areas of high erosion hazard, areas that may be susceptible to compaction, or areas of unstable slopes.

Sensitivity Level - As used in Cultural Resource Management; the degree of cultural resource development potential and/or the degree of conflict with other uses for a given area.

Sensitivity Level - As used in Visual Resource Management; a particular degree or measure of viewer interest in the scenic qualities of the landscape.

Sensitivity/Predictive Model - A tool developed on the San Juan National Forest to indicate cultural resource potentials of primarily uninventoried lands.

Sheet Erosion - The removal of a fairly uniform layer of soil from the land surface by runoff water, without the development of conspicuous water channels.

Shelterwood Cut - An even-age regeneration system where the mature trees are removed in two or more cuts. (1) The preparatory cut removes a portion of the mature trees and is intended to make the remaining trees more wind firm; preparatory cuts may be omitted where windfall is not a major concern. (2) The seed cut removes additional trees with the intent of allowing additional sunlight to reach the forest floor. The new trees become established following the seed cut. (3) The removal cut removes the last of the mature trees.

Silviculture - A combination of actions whereby forests are tended, harvested, and replaced.

Site Preparation - Preparation of the ground surface before planting or preparing a seedbed for natural regeneration; includes removal of unwanted vegetation, slash, stumps and roots from a site.

Skid Trail - Travelway used to drag or transport trees from the stump to the road.

Skidding Pan - A plate of heavy steel that supports the log being skidded to prevent it from digging into the ground.

Slash - Debris left after logging, pruning, thinning or brush cutting, and large accumulation of debris after wind or fire. It includes logs, branches, bark, and stumps.

Snag - A standing dead tree, used by birds for nesting, roosting, perching, courting, and/or foraging for food. There are many mammals that use snags for denning and foraging for food.

"Snag" Policy - See "Wildlife Tree Policy."

Social Resource Unit (SRU) - A human-geographic area exhibiting common cultural, economic, and institutional characteristics. An SRU is an aggregation of human resource units (HRU) and typically crosses National Forest, County, and State boundaries. The SRU is used to design, implement, and evaluate management actions that respond to changing social conditions or physical resource uses at an area or Regional level.

Softwood - A conventional term for both the timber and the trees belonging to the botanical group, Gymnospermae.

Soil Profile - A progression of distinct layers of soil, beginning at the surface that has been altered by normal soil-forming processes such as leaching, oxidation, and accretion.

Soil Resource Inventory - The systematic examination of soils in the field and laboratory, including descriptions, classification and mapping of soils, and the interpretation of soils according to their productivity and behavior under use and management.

Soil Survey - See "Soil Resource Inventory."

Spatial Feasibility - The capacity of a land allocation to be practically implemented on the ground.

Stage II Survey - An intensive inventory designed to gather and measure timber data specific to individual stands.

Structural Diversity - Variety in a forest stand that results from layering or tiering of the canopy; an increase in layering leads to an increase in structural diversity.

Structural Range Improvement - Any type of range improvement that is man-made (fences, corrals, etc.).

Subsoil - The layer below the soil surface in which roots normally grow.

Succession - An orderly process of biotic community development that involves changes in species, structure and community processes with time; it is reasonably directional and, therefore, predictable.

Suitable Range - Range which is accessible to livestock or wildlife, and which can be grazed on a sustained yield basis without damage to other resources.

Suitable Timber Lands - Forest lands to be managed for timber production.

Sustained Yield - The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forest without impairment of the productivity of the land.

T, C & K Factors - (T-Factor) - This is the tolerable soil loss factor. It is the amount of erosion that a specific soil can withstand and still maintain long-term productivity. The values have been determined for range and agricultural situations as 1-5 tons per acre per year, depending on the soil characteristics. (C- Factor)- This is the cover coefficient or vegetation management factor used in the universal soil loss equation (USLE). It is the ratio of soil loss from disturbed forest areas to that from a fallow condition of comparable soil. (K-Factor)- This is the soil erodibility factor used in the universal soil loss equation. It is a measure of the susceptibility of soil particles for detachment and transport by rainfall and runoff.

Thinning - Cutting made in an immature crop or stand, primarily to accelerate the diameter increment (annual growth) of the residual trees, but also by suitable selection, to improve the average form of the trees that remain.

Threatened Species - Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Threshold Limits - The amount of sediment (tons/year) which can occur in a drainage before unacceptable sediment concentrations and amounts, or channel stability problems occur.

Tiering - Incorporating information contained in an EIS (Environmental Impact Statement), such as the Forest Plan EIS, by reference in subsequent environmental documents.

Timber Stand Improvement (TSI) - Usually related to activities conducted in young stands of timber to improve growth rate and form of the remaining trees. Examples are: thinning, pruning, fertilization, and control of undesirable vegetation.

Tolerable Limits - For soils, see "T, C & K Factors." Refers to T-Factor.

Topsoil - The original or present dark-colored upper soil that ranges from a mere fraction of an inch to two or three feet deep.

Transmission Pipeline - A pipeline which carries gas or liquid from a producing field or central collection facility to a storage or consumption facility, usually over long distances.

TSI - See "Timber Stand Improvement."

Uneven-aged Timber Management - The combination of actions that result in the creation of forests in which trees of several or many ages grow together; achieved through selection harvest.

Universal Soil Loss Equation (USLE) - An empirical erosion model, originally designed for agricultural situations that computes long-term average soil losses from sheet and rill erosion under specific conditions. Recent research has provided methods so that USLE can also be used to estimate sheet and rill erosion for forest management activities.

Unpatented Mining Claim - A claim made by a qualified person for possession of locatable minerals on public domain land (e.g., National Forests); a properly recorded claim entitles the claimant to reasonable access to the claim and exclusive right to extract and sell valuable minerals from the claim. Unpatented mining claims may be occupied and used solely for mining and related activity.

Unplanned Ignition - A fire started at random by either natural or human causes, or a deliberate incendiary fire.

Unregulated - (Pre-1980 Terminology) Forest land that is suitable and available, but not organized for timber production under sustained yield principles; where timber harvest is permissible but not a goal of management.

Unsatisfactory Range Condition - Rangeland in range condition of poor or very poor and of fair in a downward trend.

Urban ROS Class - A classification of the Recreation Opportunity Spectrum in which the natural setting is dominated by man-made structures and the sights and sounds of man predominate.

Utility Corridor - A tract of land of varying width forming a passageway through which various commodities such as oil, gas, and electricity are transported.

Utilization of Forage - See "Forage Utilization."

Variety Class - As used in Visual Resource Management; a particular level of diversity of landscape character.

Vertical Diversity - The diversity in an area that results from the complexity of the above-ground structure of the vegetation; the more tiers of vegetation or the more diverse the species make-up, or both, the higher the degree of vertical diversity.

VIS (Visitor Information Services) - A service provided to the public by National Forests in which the public is supplied with information regarding opportunities or activities on National Forest land; usually but not restricted to recreational opportunities.

Visual Absorption Capacity (VAC) - Indicates the relative difficulty or cost of achieving VQO's. It measures the land's capacity to absorb the visual impacts of management activities.

Visual Distance Zones - Areas of landscapes denoted by specified distances from the observer. Used as a frame of reference, in which to discuss landscape characteristics or activities of man. The three zones are Foreground, Middleground, and Background.

Visual Management Program - Also referred to as "Landscape Management" or "Visual Resource Management"; the art and science of planning and administering the use of forest lands in such ways that the visual effects maintain or upgrade man's psychological welfare. It is the planning and design of the visual aspects of multiple-use land management.

Visual Quality Objective (VQO) - A desired level of excellence based on physical and sociological characteristics of an area. Refers to degree of acceptable alteration of the characteristic landscape. The five levels are Preservation, Retention, Partial Retention, Modification, and Maximum Modification.

Water - Streams, sloughs, estuaries, and canals 120 feet or more in width; and lakes, reservoirs, and ponds more than one acre in area.

Water Yield - The total net amount of water produced on the Forest including streamflow and groundwater recharge.

Watershed - The entire area that contributes water to a drainage or stream.

Watershed Rehabilitation - Treatment of land areas currently undergoing accelerated erosion or sedimentation to achieve a selected improved condition, in order to conform with land management objectives. Note that this is less intensive than restoration which would mean the exact conditions of the site before disturbance will be replicated. For example, watershed rehabilitation can include scarifying and reseeding a road or reducing gully erosion with gully plugs, where restoration would require recontouring of road cut and fill slopes as well as revegetation with original species and filling gullys in with soil.

Wetlands - Land where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in or on the soil.

Wheeled Skidders - An internal combustion wheeled vehicle specifically designed to skid logs.

Wild and Scenic River Corridor - See "Wild River" and "Scenic River."

Wild River - Wild and Scenic Rivers Act usage. Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted.

Wildcat Drilling - To drill and develop unproven ground far from previous production, generally of a risky nature.

Wilderness - The National Wilderness Preservation Act of 1964 defines a wilderness as an area of undeveloped, Federally owned land designated by Congress that has the following characteristics: (1) It is affected primarily by the forces of nature, where man is a visitor who does not remain. It may contain ecological, geological, or other features of scientific, educational, scenic, or historical value. (2) It possesses outstanding opportunities for solitude or a primitive and unconfined type of recreation. (3) It is an area large enough so that continued use will not change its unspoiled natural condition.

Wilderness Recreation Opportunity Management Areas - Delineated areas in wildernesses which have different use characteristics and degrees of trail development. The four management areas are Transition, Semi-primitive, Primitive, and Pristine.

Wilderness Study Area (WSA) - One of the areas selected by Congress from an inventory of unroaded and undeveloped National Forest lands as having apparent high qualities for wilderness. They will be studied to determine whether they should be recommended for addition to the National Wilderness Preservation System.

Wildfire - Any wildland fire that is not burning within an approved prescription and being managed as a prescribed fire.

Wildlife Habitat - The sum total of environmental conditions of a specific place occupied by a wildlife species or a population of such species.

Wildlife Structure - A site specific improvement of a wildlife or fish habitat, i.e., spring development or dugout to provide water, brushpile for cover, nestbox for birds, or rock and log placement in a stream for fish cover and pool creation.

Wildlife Tree Policy - A policy that encourages the preservation of snags for wildlife use; optimum numbers are 20-30 snags per 10 acres.

Winter Range - The area occupied by an animal species during the winter.

Withdrawal - Withholding an area of Federal land from settlement, sale, location, or entry, under some or all of the general land laws, for the purpose of limiting activities under those laws in order to maintain other public values in the area or reserving the area for a particular public purpose or program.

YUM Yarding - The skidding of unmerchantable material to a landing or collection point.

APPENDIX B

REFERENCES CITED AND EXISTING PLANS, STUDIES, REPORTS AND INVENTORIES

REFERENCES CITED AND EXISTING PLANS, STUDIES, REPORTS AND INVENTORIES

Copies of specific Forest Service Manuals, Forest Service Handbooks, and Congressional Acts and Laws referenced in this Plan, are on file in the library of the Forest Supervisor, San Juan National Forest, Durango, Colorado.

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APPENDIX C

PLANNING QUESTIONS SHEETS

PLANNING QUESTION I

How Should the San Juan National Forest be Managed to Provide a Broad Spectrum of Dispersed Recreation Opportunities?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P1. We want more dispersed recreation opportunities and facilities on the National Forest. (See Opportunities 3 and 4.)	1. Rehabilitate existing resource damage in use areas. (Addresses P2, 33 and 79.)	Forest Direction
P2. Some areas on the National Forest are being overused. (See Opportunities 1, 2 and 5.)	2. Manage use of sensitive areas by people, livestock and vehicles. (Addresses P2, 4, 32, 33, 34, 79, and C1, 3, 5, 16 and 36.)	Forest Direction
P4. Keep some roadless areas to enjoy without vehicles. (See Opportunities 2, 3, 5 and 8.)	3. Provide a wide spectrum of all season dispersed recreation use and facilities. (Addresses P1, 4, 35, 36, 40, 71, and C2, 3, 4 and 13.)	All prescriptions; best in 2A, 2B, 3A
P5. The Forest Service is not geared to manage dispersed recreation, so why encourage it? (See Opportunities 5 and 8.)	4. Provide suitable areas for ORV use. (Addresses P1, 35, 36, 40, and C4 and 16.)	1D, 2A, 2B, 4B, 5B, 6B, 7B1, 7C, 7E, 9B
P32. Restrict the use of ORV's in the National Forest. (See Opportunities 2, 5 and 8.)	5. Restrict ORV use. (Addresses P2, 4, 5, 32, 33, 34, 39, and C5, 6 and 36.)	1A, 1B, 3A, 8A through 8D, 9A, 10A, 10C, 10C1, 10D prohibit ORV's; all others restrict in varying degrees
P33. ORV's are destructive and offensive. (See Opportunities 1, 2 and 5.)	6. Emphasize dispersed non-motorized recreation opportunities in areas not classified as wilderness. (Addresses C2.)	3A
P34. Ban the use of ORV's in the National Forest. (See Opportunities 2 and 5.)	7. Increase mobility and efficiency throughout the transportation system. (Addresses P36, 40, and C1.)	All prescriptions (best in prescriptions 4B, 6B, 7B1, 7C, 7E)
P35. Keep the National Forest open for ORV use and don't close the roads to motorized use. (See Opportunities 3 and 4.)	8. De-emphasize dispersed motorized recreation. (Addresses P4, 5, 32 and 39.)	Prohibited in 3A, 8A through 8D, 10A, 10C, 10C1; de-emphasized in 5B
P36. We want to be able to go where we want via trails and roads on the National Forest in an efficient and safe manner. (See Opportunities 3, 4 and 7.)	9. Improve livestock distribution and use. (Addresses P79 and C5.)	All prescriptions allowing grazing (best in 4B, 6B, 7C and 7E)
P39. De-emphasize driving for pleasure. (See Opportunities 5 and 8.)	10. Reduce livestock numbers and/or seasons. (Addresses P79 and C5.)	4B, 5B, 9A
P40. Put more emphasis on driving for pleasure. (See Opportunities 3, 4 and 7.)	11. Restrict human use to minimize conflicts with grazing use. (Addresses P79 and C5.)	6B
P71. I would like to see more trout fishing. (See Opportunity 3.)	12. Restrict human use in specified wildlife areas. (Addresses C36.)	Best in 4B and 5B; all prescriptions restrict in varying degrees
P79. Sheep, cattle, and horses are interfering with recreation experiences and damaging resources. (See Opportunities 1, 2, 9, 10 and 11.)		

PLANNING QUESTION I (Continued)

How Should the San Juan National Forest be Managed to Provide a Broad Spectrum of Dispersed Recreation Opportunities?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
C1. Resource damage, overcrowding and parking problems are resulting in some locations leading to dispersed recreational areas. (See Opportunities 2 and 7.)		
C2. Dispersed recreation opportunities within classified wilderness areas are over-emphasized both internally and externally. (See Opportunities 3 and 6.)		
C3. Recreation use is concentrated in the popular areas, while many other areas are relatively unused. (See Opportunities 2 and 3.)		
C4. We are not accommodating the increasing demand for cross-country skiing, snowmobiling, and ORV use. (See Opportunities 3 and 4.)		
C5. Specific conflicts exist between the recreating public and domestic livestock grazing on the cattle allotments. (See Opportunities 2, 5, 9, 10 and 11.)		
C13. Present trail locations and standards do not adequately meet the needs of the public. (See Opportunity 3.)		
C16. The uncontrolled and increasing level of ORV use is and will continue to result in unacceptable erosion. (See Opportunities 2, 4 and 5.)		
C36. Dispersal of people conflicts with wildlife, i.e., solitude, calving areas, migration routes, etc. (See Opportunities 2, 5 and 12.)		

PLANNING QUESTION II

What is the Appropriate Role of the San Juan National Forest in Providing Campgrounds, Interpretive Sites, Picnic Areas, and Rest Stops?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P10. We need additional roadside picnic areas, rest stops, and campgrounds, especially along major highways. (See Opportunities 1 and 3.)	1. Provide additional sites for concentrated use, in response to need. (Addresses P10, and C8 and 9.)	1A
P12. There are already enough campgrounds and rest areas. (See Opportunities 2 and 4.)	2. Do not develop additional sites for concentrated use. (Addresses P12 and 13, and C6 and 7.)	All prescriptions except 1A
P13. National Forest campgrounds are in direct competition with private campground operations. (See Opportunities 2, 3 and 4.)	3. Develop concession permit or co-op areas. (Addresses P10 and 13, and C6, 7, and 8.)	1A
P14. There should be some camping areas open to tenters only. (See Opportunity 4.)	4. Modify existing sites to better meet needs. (Addresses P12, 13, and 14, and C6 and 10.)	1A, 10C
C6. We may be providing competition and duplicating the efforts of developed facilities provided in the private sector. (See Opportunities 2, 3 and 4.)	5. Coordinate any recreational development in the Chimney Rock vicinity with the economic goals and site development plans of the Southern Ute Tribe, particularly around Capote Lake. (Addresses C7.)	10C, 10C1
C7. Further Forest Service recreational development in the Capote Lake vicinity could adversely affect the economic goals of the Southern Ute Tribe. (See Opportunities 2, 3 and 5.)		
C8. There are too few scenic turnouts on major highways. (See Opportunities 1 and 3.)		
C9. Our existing facilities for providing recreation opportunity are not located, designed, or are types that are not sensitive to the need for energy conservation. (See Opportunity 1.)		
C10. Some existing developed recreation sites are not adequately located or the correct type (i.e., day use, overnight use, etc.) to meet the needs of the public. (See Opportunity 4.)		

PLANNING QUESTION III

What Resources and Uses Should be Allocated to Downhill Skiing on the San Juan National Forest?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P17. Lift lines at ski areas are too long. Do not preclude development of potential sites. (See Opportunity 1.)	1. Allow increased capacity for skiing. (Addresses P 17, 19 and 59.)	1B
P19. Stimulate and manage winter recreation, including a ski area. (See Opportunity 1.)	2. Do not allow for increased capacity for skiing. (Addresses P 20 and C 11.)	All except 1B
P20. Expansion of downhill skiing is not needed. (See Opportunity 2.)		
P59. Use the National Forest to improve local economy. (See Opportunity 1.)		
C11. Further development of downhill skiing to meet increasing demand could have adverse effects on community stability and availability of other resources. (See Opportunity 2.)		

PLANNING QUESTION IV

How Much Designated Wilderness Should the San Juan National Forest Have, and How Should it be Managed?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P21. There are too many people in some areas of the wilderness, noisy helicopters flying around, and hiker-horse conflicts that need correcting. (See Opportunities 1, 2, 5 and 6.)	1. Increase restrictions on numbers and distribution of people and recreational stock. (Addresses P21 and 26, and C3, 12 and 13.)	8A through 8D as applied in Alternatives A, G and I
P22. Restrictions on numbers of people are unnecessary and unwise at this time in the Weminuche Wilderness. (See Opportunities 6 and 7.)	2. Limit use of helicopters. (Addresses P21 and C12.)	8A through 8D
P23. Do not lock up our resources in wilderness. Maintain multiple use management. (See Opportunity 9.)	3. Manage livestock in a manner compatible with wilderness values. (Addresses P26, 27, and 28, and C12.)	8A through 8D
P24. Provide more wilderness. (See Opportunity 8.)	4. Maintain facilities for resource protection. (Addresses P26, and C12 and 13.)	8A through 8D
P26. Prevent resource damage in the wilderness. (See Opportunities 1, 3, 4 and 6.)	5. Emphasize dispersed non-motorized recreation opportunities in areas not designated as wilderness. (Addresses P21, and C2, 3 and 12.)	3A
P27. Allow us to graze our livestock in the wilderness. (See Opportunity 3.)	6. Expand public information and environmental education (I&E) programs offered to Forest users, interest groups, and schools. (Addresses P21, 22 and 26, and C2, 3 and 12.)	8A through 8D
P28. Restrict grazing of livestock in the wilderness. (See Opportunity 3.)	7. Do not restrict numbers, but educate users as to expected conditions. (Addresses P22.)	8A through 8D as applied in all alternatives except A, G and I
C2. Dispersed recreation opportunities within designated wilderness areas are overemphasized both internally and externally. (See Opportunities 5 and 6.)	8. Recommend to Congress that Wilderness Study Areas be designated wilderness. (Addresses P24.)	8A through 8D
C3. Recreation use is concentrated in the popular areas, while many other areas are relatively unused. (See Opportunities 1, 5 and 6.)	9. Recommend to Congress that Wilderness Study Areas not be designated wilderness. (Addresses P23.)	All except 8A through 8D
C12. Depreciation of wilderness resource values is, or may be, occurring through too many people, helicopter use for mining, trail signing and maintenance, overgrazing, water pollution, presence of livestock, horse-hiker conflicts, and structures. (See Opportunities 1, 2, 3, 4, 5 and 6.)		
C13. Present trail locations and standards do not adequately meet the needs of the public. (See Opportunities 1 and 4.)		

PLANNING QUESTION V

What Kind of Transportation System is Necessary to Serve Future Resource Management and Public Needs?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P4. Keep some roadless areas to enjoy without vehicles. (See Opportunities 3, 5, 8 and 13.)	1. Increase mobility and efficiency throughout the transportation system. (Addresses P35, 36, 40 and 102, and C13, 14, 17, 18 and 19.)	All prescriptions (best in prescriptions 4B, 6B, 7B1, 7C, 7E)
P8. The scenery isn't as nice anymore because of timber sales, utility lines, road corridors, and other things. (See Opportunities 5, 8 and 9.)	2. Provide increased access to Forest lands. (Addresses P35, 36, 40 and 102, and C13, 17, 18, 19 and 53.)	1B, 2B, 4B, 6B, 7B1, 7C, 7E, 9B
P32. Restrict the use of ORV's in the National Forest. (See Opportunities 3, 5 and 13.)	3. Minimize vehicle access to Forest lands. (Addresses P4, 32, 37, 38, 39 and 103, and C16.)	3A
P35. Keep the National Forest open for ORV use and don't close roads to motorized use. (See Opportunities 1, 2, 4 and 7.)	4. Provide for more dispersed recreation opportunities. (Addresses P35 and 36, and C1, 17, 18 and 19.)	All prescriptions (best in 2A, 2B, 3A)
P36. We want to be able to go where we want via trails and roads on the National Forest in an efficient and safe manner. (See Opportunities 1, 2, 4 and 7.)	5. De-emphasize dispersed motorized recreation. (Addresses P4, 8, 32, 37, 38, 39 and 42, and C16.)	Prohibited in 3A, 8A through 8D, 10A, 10C, 10C1; de-emphasized in 5B
P37. Don't build any more roads. (See Opportunities 3, 5 and 8.)	6. Construct and maintain roads/trails consistent with use and needs. (Addresses C13, 14, 15, 17, 18 and 19.)	Forest Direction
P38. Close and restore timber access roads. (See Opportunities 3, 5 and 14.)	7. Provide suitable areas for ORV use. (Addresses P35, 36 and 40, and C16.)	1D, 2A, 2B, 4B, 5B, 6B, 7B1, 7C, 7E. 9B
P39. De-emphasize driving for pleasure. (See Opportunities 3, 5 and 13.)	8. Curtail road building. (Addresses P4, 8, 37 and 103.)	3A, 5B, 9A, 10A, 10C1, 10D
P40. Put more emphasis on driving for pleasure. (See Opportunities 1, 2, 7 and 11.)	9. Provide a generally unmodified Forest environment. (Addresses P8.)	2A, 3A, 8A through 8D, 9A, 10A, 10C, 10C1, 10D
P42. Reduce or do not upgrade road standards. (See Opportunities 5 and 10.)	10. Use travel restrictions and regulations in lieu of road reconstruction to resolve use conflicts. (Addresses P42.)	Forest Direction
P102. We want access to and use of our National Forest. (See Opportunities 1, 2 and 12.)	11. Provide more roadside recreational opportunities. (Addresses P40 and C1.)	1A, 2B, 7C, 7E
P103. Reduce or restrict access sharply to protect our Forest. (See Opportunities 3, 8, 13 and 14.)	12. Determine and acquire needed rights-of-ways. (Addresses P102 and C53.)	Forest Direction
	13. Restrict ORV use. (Addresses P4, 32, 39 and 103, and C16.)	1A, 1B, 3A, 8A through 8D, 9A, 10A, 10C, 10C1, 10D prohibit ORV's; all others restrict to varying degrees
	14. Continue and/or increase road closure and obliteration programs. (Addresses P38 and 103, and C16.)	Forest Direction

What Kind of Transportation System is Necessary to Serve Future Resource Management and Public Needs?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
C1. Resource damage, overcrowding, and parking problems are resulting in some locations leading to dispersed recreation areas. (See Opportunities 4 and 11.)		
C13. Present trail locations and standards do not adequately meet the needs of the public. (See Opportunities 1, 2 and 6.)		
C14. Many roads providing access to heavily used recreation areas are not constructed or maintainted consistent with the use. (See Opportunities 1 and 6.)		
C15. Too much emphasis may be given to constructing new roads, rather than properly maintaining the existing roads. (See Opportunity 6.)		
C16. The uncontrolled and increasing level of ORV use is and will continue to result in unacceptable erosion. (See Opportunities 3, 5, 7, 13 and 14.)		
C17. Road closures restrict access to firewood. (See Opportunities 1, 2, 4 and 6.)		
C18. There is an increasing demand for firewood, which is becoming scarce in accessible areas. (See Opportunities 1, 2, 4 and 6.)		
C19. Very few accessible areas for Christmas tree cutting exist to meet the rapidly increasing demand. (See Opportunities 1, 2, 4 and 6.)		
C53. Access to National Forest land is being blocked by private landowners. (See Opportunities 2 and 12.)		

PLANNING QUESTION VI

How Should the San Juan National Forest Manage Its Tree Resources?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P8. The scenery isn't as nice anymore, because of timber sales... (See Opportunities 9 and 21.)	1. Permit fuelwood cutting in timber sale areas. (Addresses P46 and 72, and C17, 18 and 24.)	Forest Direction
P38. Close and restore timber access roads. (See Opportunity 7.)	2. Increase reforestation efforts to ensure success. (Addresses P44 and 45, and C21, 32 and 34.)	Forest Direction
P44. Clean up and reforest logging areas and prevent erosion. (See Opportunities 2 and 10.)	3. Make Christmas trees, house logs, and other products available through intermediate harvests. (Addresses P46, 59 and 61, and C19.)	Forest Direction
P45. We want areas that have been cutover to be reforested, so we will always have trees and wood products. (See Opportunities 2 and 22.)	4. Designate more wildlife trees. (Addresses C24.)	Forest Direction; (best in 4B, 5B)
P46. We want firewood, Christmas trees, house logs, and other Forest products to be available for use locally. (See Opportunities 1, 3 and 8.)	5. Minimize protection of wildlife trees. (Addresses P72, and C18 and 24.)	7B1
P47. Prohibit local use for firewood, Christmas trees, log houses, etc.; timber harvest should be on a national need only. (See Opportunity 22.)	6. Harvest timber via uneven-aged management. (Addresses P48.)	Portions of 4B, 5B, 7C, 9A
P48. Do not permit clearcutting. (See Opportunities 6 and 9.)	7. Continue and/or increase road closure and obliteration programs. (Addresses P38.)	Forest Direction
P49. Harvest timber. (See Opportunity 22.)	8. Encourage firewood gathering in oakbrush manipulation areas. (Addresses P46 and 72, and C17, 18 and 24.)	Forest Direction
P50. Do not harvest timber. (See Opportunity 21.)	9. Modify timber cutting in foreground areas to leave featured trees, screen visual distractions, and improve landscape viewing. (Addresses P8 and 48.)	All prescriptions except 4B, 5B, 6B, 7B1, 9B
P51. Timber should be harvested economically. (See Opportunity 19.)	10. Modify timber cutting practices on soil problem areas. (Addresses P44 and 114, and C21.)	Forest Direction
P53. The supply of timber needs to be more consistent and of higher quality. (See Opportunity 22.)	11. Modify site preparation methods where adverse effects occur. (Addresses C33.)	Forest Direction
P59. Use the National Forest to improve our economy. (See Opportunities 3, 19 and 22.)	12. Schedule timber harvests to provide and maintain vegetation diversity for a wide variety of wildlife species and to alleviate concentrated cutting in too few areas. (Addresses C20, 22, 25, 26 and 28.)	Forest Direction
P61. We need more employment in Forest-related industries. (See Opportunities 3, 19 and 22.)	13. Design sales to specifically emphasize resources other than timber. (Addresses C26 and 27.)	All prescriptions which permit timber harvesting except 7B1

How Should the San Juan National Forest Manage Its Tree Resources?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P62. We do not need more employment in the local timber industry. (See Opportunity 21.)	14. Provide increased access to Forest lands. (Addresses C17, 18 and 19.)	1B, 2B, 4B, 6B, 7B1, 7C, 7E, 9B
P72. Wildlife tree policy is becoming too restrictive for firewood gathering. (See Opportunities 1, 5 and 8.)	15. Reduce livestock numbers and/or seasons. (Addresses C40.)	4B, 5B, 9A
P77. We depend on the National Forest to run our livestock. It is getting to be more difficult and costly to do, because of conflicts with activities such as reforestation..... (See Opportunity 17.)	16. Restrict livestock grazing in plantations. (Addresses C40.)	2A, 2B, 4B, 5B, 7B1, 7C, 7E, 9B
P114. More timber should be offered for cable logging program over and above the regular sale offering. (See Opportunities 10, 19, 22 and 23.)	17. Compensate for some livestock damage by planting more trees per acre. (Addresses P77 and C40.)	4B, 6B
C17. Road closures restrict access to firewood. (See Opportunities 1, 8 and 14.)	18. Develop a tree management program to enhance other resource values. (Addresses C22, 26, 27 and 29.)	2A, 2B, 4B, 5B, 9B
C18. There is an increasing demand for firewood which is becoming increasingly scarce in accessible areas. (See Opportunities 1, 5, 8 and 14.)	19. Initiate research in methods to more fully utilize and market low-value wood products. (Addresses P51, 59, 61 and 114, and C22, 27, 29, 30, 31 and 35.)	Identified Research Need
C19. Very few accessible areas for Christmas tree cutting exist to meet the rapidly increasing demand. (See Opportunities 3 and 14.)	20. Provide for wildlife habitat improvement and enhancement of other renewable resources in Sale Area Improvement Plans. (Addresses C27 and 30.)	Forest Direction
C20. We have been concentrating cutting in too few areas because of having to meet timber targets within the restrictions of not entering roadless areas. (See Opportunity 12.)	21. Permit timber harvesting only for salvage, insect and disease control, or for other resource enhancement requirements. (Addresses P8, 50 and 62.)	1A, 1B, 3A, 9A, 10C, 10C1, 10D
C21. We are cutting in some areas with soil and vegetation problems which are difficult to solve. (See Opportunities 2 and 10.)	22. Manage areas for optimum sawtimber production. (Addresses P45, 47, 49, 53, 59, 61 and 114, and C30.)	2A, 4B, 5B, 6B, 7B1, 7C, 7E
C22. The necessity to cover road development costs results in the de-emphasis of small sales, which are needed to meet the objectives of other resource programs and the needs of small timber operators in the area. (See Opportunities 12 and 18.)	23. Cooperate with industry to develop an orderly program which will encourage investment into specialized logging equipment. (Addresses C23 and P114.)	All timber harvesting prescriptions

How Should the San Juan National Forest Manage Its Tree Resources?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
C23. More sophisticated timber harvesting techniques such as cable systems involve high planning and layout costs, which local industry is unwilling/unable to operate. (See Opportunity 25.)		
C24. In accessible areas there is a conflict between cutting snags for firewood or leaving them for wildlife purposes. (See Opportunities 1, 4, 5 and 8.)		
C25. Reforestation impacts large areas of wildlife escape cover and habitat. (See Opportunity 12.)		
C26. Apparent conflicts exist between wildlife habitat and timber management activities. (See Opportunities 12, 13 and 18.)		
C27. The timber program lacks flexibility to improve other resources because of volume targets. (See Opportunities 13, 18, 19 and 20.)		
C28. Concentration of vegetation manipulation projects and spaced (in time) application of management practices in the same geographical area... may be causing adverse long-term effects. (See Opportunity 12.)		
C29. The objectives of timber management and other related resources are not totally compatible. To meet volume objectives, sales must be scheduled in areas which do not need wildlife habitat improvement and in some cases detract from wildlife values. Conversely, areas needing wildlife habitat improvement often yield products which are uneconomical to harvest. (See Opportunities 18, 19 and 20.)		
C30. In many cases there are low economic returns due to frequent occurrences of low value timber associated with high development costs necessary for harvesting. (See Opportunities 19 and 22.)		

How Should the San Juan National Forest Manage Its Tree Resources?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
C31. We are thinning where there is a question of positive B/C values when all other factors, both tangible and intangible, are considered. (See Opportunity 19.)		
C32. The economic efficiency of reforestation efforts on the San Juan National Forest appears to be questionable. (See Opportunity 2.)		
C33. Very intensive site preparation methods which appear to be necessary to ensure plantation success in the ponderosa pine zone may be having adverse site effects. (See Opportunity 11.)		
C34. Past regeneration efforts on high elevational sites have had limited success. (See Opportunity 2.)		
C35. Post and pole markets are poor, which results in inadequate treatment of overstocked pole stands. (See Opportunity 19.)		
C40. Conflicts exist between maintaining livestock carrying capacity and the reforestation program. (See Opportunities 15, 16 and 17.)		

PLANNING QUESTION VII

What is the Role of the San Juan National Forest in Providing Wildlife Habitat?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P65. Protect our wildlife. (See Opportunities 1, 3, 4, 5, 13 and 14.)	1. Identify and initiate efforts for land acquisition to acquire winter range, migration routes, and stream-side lands. (Addresses P65, 69, 70, 71, 74 and 88, and C38 and 39.)	Forest Direction, 5B
P66. Preserve endangered wildlife species. (See Opportunity 4.)	2. Improve fisheries habitat. (Addresses P71 and 88, and C39.)	9A
P67. Non-game species should be given more consider-ation and protection. (See Opportunities 3, 4, 5, 7, 8 and 13.)	3. Develop special protective measures for sensitive areas. (Addresses P65, 67, 71 and 88, and C39.)	9A and Forest Direction
P69. Maintain and increase, where possible, our wildlife, especially big game. (See Opportunities 1, 5, 7, 10, 11 and 14.)	4. Restrict human use in specified wildlife areas. (Addresses P65, 66, 67 and 88, and C36.)	4B and 5B; all prescriptions restrict in varying degrees
P70. New subdivisions and increased use of private lands are depleting historic winter ranges and blocking migration routes of wildlife. (See Opportunity 1.)	5. Maintain acceptable vegetation diversity for a wide variety of species of wildlife (consider whole ecosystems in our management). (Addresses P65, 67, 69 and 88, and C25, 26, 28 and 38.)	Forest Direction
P71. I would like to see more trout fishing. (See Opportunities 1, 2 and 3.)	6. Improve livestock distribution and use. (Addresses P77 and C38.)	All prescriptions allowing grazing; best in 4B, 6B, 7C and 7E
P72. Wildlife tree policy is becoming too restrictive for firewood gathering. (See Opportunity 9.)	7. Improve watershed and riparian habitat conditions. (Addresses P67, 69 and 88, and C39.)	9A improves riparian areas; 4B, 5B, 6B will improve watersheds
P74. Herds need decreasing because private landowners are furnishing a large amount of feed for elk and deer. (See Opportunities 1, 10, 11 and 14.)	8. Designate more wildlife trees. (Addresses P67 and C24.)	Forest Direction; best in 4B, 5B
P77. We depend on the National Forest land to run our livestock. It is getting to be more difficult and costly to do, because of con-flicts with activities such as reforestation and recreation, and because of big game competition, access needs, lack of predator control, and restrictions on improvements. (See Opportunity 6.)	9. Minimize protection of wildlife trees. (Addresses P72 and C24.)	7B1
P88. Protect areas around lakes, rivers, and streams. (See Opportunities 1, 2, 3, 4, 5 and 7.)	10. Reduce livestock numbers or seasons. (Addresses P69 and 74, and C38.)	4B, 5B, 9A
	11. Provide forage for wildlife on winter range. (Addresses P69 and 74, and C38.)	4B, 5B
	12. Initiate research in methods to more fully utilize low-value wood products. (Addresses C22, 27 and 29.)	Identified Research Need
	13. Develop a timber program that enhances other resource values, including wildlife habitat. (Addresses P65 and 67, and C22, 26, 27 and 29.)	All prescriptions which permit timber harvesting except 7B1

What is the Role of the San Juan National Forest in Providing Wildlife Habitat?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
C22. Large sales are often necessary to cover road development costs resulting in the de-emphasis of small sales which are often required to meet objectives of other resource programs and the needs of small timber operators in the area. (See Opportunities 12 and 13.)	14. Improve quality and quantity of big game winter habitat on Forest Service lands. (Addresses P65, 69 and 74, and C38.)	4B, 5B
C24. In accessible areas there is a conflict between cutting snags for firewood or leaving them for wildlife purposes. (See Opportunities 8 and 9.)	15. Provide for wildlife habitat improvement and enhancement of other renewable resources in Sale Area Improvement Plans. (Addresses C22, 27 and 29.)	Forest Direction
C25. Reforestation impacts large areas of wildlife escape cover and habitat. (See Opportunities 5 and 13.)		
C26. Apparent conflicts exist between wildlife habitat and timber management activities. (See Opportunities 5 and 13.)		
C27. The timber program lacks flexibility to improve other resources because of volume targets. (See Opportunities 12, 13 and 15.)		
C28. Concentration of vegetation manipulation projects and spaced (in time) application of management practices in the same geographical area, i.e., burning, roller chopping, root plowing, may cause adverse long-term effects. (See Opportunity 5.)		
C29. The objectives of timber management and other related resources are not totally compatible to meet volume objectives. Sales must be scheduled in areas which do not meet wildlife habitat improvement and in some cases detract from wildlife values. Conversely, areas needing wildlife habitat improvement often yield products which are uneconomical to harvest. (See Opportunities 12 and 13.)		
C36. Dispersal of people conflicts with wildlife, i.e., solitude, calving areas, migration routes, etc. (See Opportunity 4.)		

What is the Role of the San Juan National Forest in Providing Wildlife Habitat?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
C22. Large sales are often necessary to cover road development costs resulting in the de-emphasis of small sales which are often required to meet objectives of other resource programs and the needs of small timber operators in the area. (See Opportunities 12 and 13.)	14. Improve quality and quantity of big game winter habitat on Forest Service lands. (Addresses P65, 69 and 74, and C38.)	4B, 5B
C24. In accessible areas there is a conflict between cutting snags for firewood or leaving them for wildlife purposes. (See Opportunities 8 and 9.)	15. Provide for wildlife habitat improvement and enhancement of other renewable resources in Sale Area Improvement Plans. (Addresses C22, 27 and 29.)	Forest Direction
C25. Reforestation impacts large areas of wildlife escape cover and habitat. (See Opportunities 5 and 13.)		
C26. Apparent conflicts exist between wildlife habitat and timber management activities. (See Opportunities 5 and 13.)		
C27. The timber program lacks flexibility to improve other resources because of volume targets. (See Opportunities 12, 13 and 15.)		
C28. Concentration of vegetation manipulation projects and spaced (in time) application of management practices in the same geographical area, i.e., burning, roller chopping, root plowing, may cause adverse long-term effects. (See Opportunity 5.)		
C29. The objectives of timber management and other related resources are not totally compatible to meet volume objectives. Sales must be scheduled in areas which do not meet wildlife habitat improvement and in some cases detract from wildlife values. Conversely, areas needing wildlife habitat improvement often yield products which are uneconomical to harvest. (See Opportunities 12 and 13.)		
C36. Dispersal of people conflicts with wildlife, i.e., solitude, calving areas, migration routes, etc. (See Opportunity 4.)		

What is the Role of the San Juan National Forest in Providing Wildlife Habitat?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
C38. Conflicts exist between domestic livestock and wildlife in lower areas where summer use of forage by livestock is in competition with winter forage needs by big game animals. (See Opportunities 1, 5, 6, 10, 11 and 14.)		
C39. Degradation of forage from grazing in some cases is causing unacceptable impacts on water, riparian habitats, high meadows, and sensitive soils. (See Opportunities 1, 2, 3 and 7.)		

PLANNING QUESTION VIII

What is the Role of the San Juan National Forest in Providing for Grazing of Domestic Livestock?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P60. Continue livestock grazing to make effective use of the Forest for economic betterment of the area. (See Opportunities 1 and 2.)	1. Improve livestock distribution and use. (Addresses P60, 78, 79 and 83, and C38, 40 and 49.)	All prescriptions allowing grazing; best in 4B, 6B, 7C and 7E
P77. We depend on the National Forest land to run our livestock. It is getting to be more difficult and costly to do, because of conflicts with activities such as reforestation, recreation, big game competition, lack of predator control, and restrictions on improvements. (See Opportunities 2, 4 and 11.)	2. Improve the quality and quantity of livestock forage. (Addresses P60, 77, 78, 79 and 83, and C38 and 40.)	6B
	3. Develop special management for sensitive areas. (Addresses P78, 79 and 80, and C39 and 49.)	9A and Forest Direction
	4. Control noxious weeds and predators in cooperation with counties and others. (Addresses P77 and 82.)	Forest Direction
P78. Protect against overgrazing. (See Opportunities 1, 2, 3, 5 and 6.)	5. Restrict livestock grazing in riparian areas. (Addresses P78, 79 and 80, and C5 and 39.)	9A
P79. Sheep, cattle, and horses are interfering with recreation experiences and damaging resources. (See Opportunities 1, 2, 3, 5, 6 and 10.)	6. Reduce livestock numbers and/or seasons. (Addresses P78 and 79, and C5, 38, 39, 40 and 49.)	4B, 5B, 9A
P80. Do not allow grazing. (See Opportunities 3 and 5.)	7. Restrict livestock grazing in plantations. (Addresses C40.)	2A, 2B, 4B, 5B, 7B1, 7C, 7E, 9B
P83. There are too many range fences; leads to cattle being in concentrated areas. (See Opportunities 1 and 2.)	8. Compensate for some livestock damage by planting more trees per acre. (Addresses C40.)	4B, 6B
C5. Specific conflicts exist between the recreating public and domestic livestock grazing along streams or in open meadows that are used by people. (See Opportunities 5, 6, 10 and 11.)	9. Provide forage for wildlife on winter range. (Addresses C38.)	4B, 5B
	10. Improve riparian habitats. (Addresses P79, and C5 and 39.)	9A
C38. Conflicts exist between domestic livestock and wildlife in lower areas where summer use of forage by livestock is in competition with winter forage needs by big game animals. (See Opportunities 1, 2, 6 and 9.)	11. Control human use to minimize conflicts with grazing use. (Addresses P77 and C5.)	6B

PLANNING QUESTION VIII (Continued)

What is the Role of the San Juan National Forest in Providing for Grazing of Domestic Livestock?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
C39. Degradation of forage from grazing in some cases is causing unacceptable impacts on water quality, riparian habitats, high meadows, and sensitive soils. (See Opportunities 3, 5, 6 and 10.)		
C40. Conflicts exist between maintaining livestock carrying capacity and the reforestation program. (See Opportunities 1, 2, 6, 7 and 8.)		
C49. Sheep grazing in the high country may be an adverse non-point source of water pollution. (See Opportunities 1, 3 and 6.)		

PLANNING QUESTION IX

How Should the San Juan National Forest Respond to the Increasing Demands for High-Quality Water?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P87. We want clean, pure water coming from the National Forest in sufficient quantities for municipal, agricultural, recreational, and local uses. (See Opportunities 1, 2, 3 and 4.)	1. Maintain watershed conditions. (Addresses P87, 88 and 89.)	Forest Direction
P88. Protect areas around rivers, streams, and lakes. (See Opportunities 1, 2, 5 and 6.)	2. Improve watershed and riparian habitat conditions. (Addresses P87, 88 and 89, and C39 and 45.)	9A improves riparian areas; 4B, 5B, 6B will improve watersheds
P89. Preserve soil and water. (See Opportunities 1 and 2.)	3. Ensure instream flows on selected streams. (Addresses P87, and C41 and 42.)	Forest Direction
C39. Degradation of forage from grazing in some cases is causing unacceptable impacts on water, riparian habitats, high meadows, and sensitive soils. (See Opportunities 2, 5 and 6.)	4. Augment water yields on the San Juan. (Addresses P87, and C41 and 42.)	6B, 9B
C41. The Forest may be impacted by projects such as the Animas-La Plata and East Fork San Juan diversions. (See Opportunities 3 and 4.)	5. Identify and initiate efforts for land acquisition to acquire streamside lands. (Addresses P88 and C39.)	Forest Direction
C42. There is an increasing number of water use applications on the Forest, many of which are apparently in conflict with our instream flow needs. (See Opportunities 3 and 4.)	6. Develop special protective measures for sensitive areas. (Addresses P88 and C39.)	9A and Forest Direction
C45. Mine acid drainage is affecting water quality in some areas. (See Opportunity 2.)		

PLANNING QUESTION X

What is the Role of the San Juan National Forest in Regard to the Identification, Protection, and Use of Cultural Resources?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P95. Protect America's heritage and let us learn about the past. (See Opportunity 4.)	1. Allow public use of Chimney Rock in a manner that considers the economy of the Southern Ute Tribe. (Addresses P96 and C37.)	10C, 10C1
P96. Many people want to see the outstanding Indian ruins restored at Chimney Rock and at the same time assist the Southern Utes to improve their economy. (See Opportunity 1.)	2. Increase our cultural resource inventory efforts. (Addresses C43.)	Forest Direction
P97. We don't need to try to protect every archaeological resource. (See Opportunity 3.)	3. Determine the relative significance of cultural resource properties, with emphasis on the problem of "isolated finds." (Addresses P97, and C47 and 48.)	Forest Direction
C37. The legal mandate to protect and manage the peregrine falcon habitat (endangered species) and the archaeological resources at Chimney Rock conflict with an increasing demand for public recreation in the same area. (See Opportunities 1 and 4.)	4. Increase inventory, protection and other Cultural Resource Management use efforts. (Addresses P95, and C37, 43 and 48.)	Forest Direction
C43. The lack of cultural resource inventory is delaying other resource management activities. (See Opportunities 2 and 4.)	5. Seek designation of suitable Archaeological Districts as Research Natural Areas (Addresses P95 and C48)	10A
C47. Failure to determine the significance of isolated finds (individual arrowheads, scattered lithics, etc.) continues to conflict with other resource practices. (See Opportunity 3.)		
C48. Cultural resource properties are "time capsules" with research potential for helping to answer Forest management and academic questions. (See Opportunities 3, 4 and 5.)		

PLANNING QUESTION XI

How Should the San Juan National Forest Respond to Mineral Resource Development?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P8. The scenery isn't as nice anymore because of timber sales, utility lines, road corridors, and other things. (See Opportunity 2.)	1. Provide for the development of mineral and energy resources. (Addresses P98 and 100.)	Forest Direction
P98. We need minerals and energy products, yet we also want to minimize the bad impacts of the mining operations. (See Opportunities 1 and 2.)	2. Mitigate resource damage. (Addresses P8, 98 and 100, and C44, 45 and 46.)	Forest Direction
P100. We need minerals and energy. Do not restrict exploration. (See Opportunities 1 and 2.)	3. Improve coordination in planning and decision-making with local, State, and other Federal agencies. (Addresses C44 and 45.)	Forest Direction
C44. Outstanding mineral rights held by the State on Junction Creek and other outstanding mineral rights limit our management options in preventing or reducing impacts when these minerals are extracted. (See Opportunities 2 and 3.)	4. Identify areas where little or no conflict exists between mining and other uses and resources. (Addresses C46.)	Forest Direction
C45. Mine acid drainage is affecting water quality in some areas. (See Opportunities 2 and 3.)		
C46. Existing mining laws grant certain statutory rights that limit our management options. (See Opportunities 2 and 4.)		

PLANNING QUESTION XII

How Should the San Juan National Forest Respond to the Increasing Demand for Special Uses and Land Adjustments?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P8. The scenery isn't as nice anymore because of ... utility lines, road corridors, and other things. (See Opportunities 1 and 2.)	1. Anticipate and plan utility corridors where appropriate. (Addresses P8 and C51.)	Forest Direction, 1D
P102. We want access to, and use of, our National Forests. (See Opportunities 2, 5, 6 and 7.)	2. Cooperate with other agencies to resolve land ownership, access, and utility corridors problems. (Addresses P8 and 102, and C51 and 53.)	Forest Direction
C50. Some existing summer homes under special use permits may (now and future) conflict with other public use of greater benefit. (See Opportunity 3.)	3. Assess summer home groups against potential greater public need and benefit. (Addresses C50.)	Forest Direction
C51. The demand for utility corridors across the San Juan National Forest is increasing rapidly, because of the need for regional and national energy distribution. (See Opportunities 1 and 2.)	4. Identify Forest boundaries. (Addresses C52.)	Forest Direction
C52. Occupancy trespass is occurring because National Forest boundaries are not surveyed or marked. (See Opportunity 4.)	5. Increase mobility and efficiency throughout the transportation system. (Addresses P102 and C53.)	All prescriptions (best in prescriptions 4B, 6B, 7B1, 7C, 7E)
C53. Access to National Forest land is being blocked by private landowners. (See Opportunities 2, 5, 6 and 7.)	6. Provide increased access to Forest lands. (Addresses P102 and C53.)	1B, 2B, 4B, 6B, 7B1, 7C, 7E, 9B
	7. Determine and acquire needed rights-of-way. (Addresses P102 and C53.)	Forest Direction

APPENDIX D

MANAGEMENT AREA DIRECTION USED IN FORMULATION OF ALTERNATIVES BUT NOT APPLIED IN THE PROPOSED ACTION

MANAGEMENT AREA DIRECTION USED IN FORMULATION OF ALTERNATIVES BUT NOT APPLIED IN THE PROPOSED ACTION

After the draft Environmental Impact Statement (EIS) for the San Juan National Forest Land and Resource Management Plan was completed, the Rocky Mountain Region formulated some uniform management prescriptions to be applied throughout the Region. This was done to ensure a degree of uniformity among the Forests in the Region in dealing with similar land areas, public issues and management concerns, and resource management emphasis. They also serve to facilitate management and public understanding by highlighting the similarities or differences among Forests through consistent use of terminology, format and numbering. Each individual Forest added specifics to the uniform prescriptions in order to address unique situations at the Forest level.

This final EIS and accompanying Forest Plan are expressed in terms of these uniform prescriptions as modified to address the situation on the San Juan National Forest. Although they are very similar in emphasis, these prescriptions differ in some specifics from the prescriptions used in the analysis presented in the draft EIS and in this document. With the exception of Alternative H (Proposed Action), the differences in specifics within the prescriptions which were presented in the draft EIS have been carried through the analysis of alternatives in this document.

In order to facilitate review and linkage to the draft EIS, the alternative maps included in the back of this document portray management area groupings in terms of the original numbering convention presented in the draft EIS. Table 1 consists of a cross-walk of the new prescriptions included in Chapter III of the Plan to the original prescriptions presented in the draft documents and shown on the alternative maps.

Two prescriptions (7B1 and 10C1) were not used in the Plan but were used in developing other alternatives. These prescriptions are included in this appendix beginning on page D-6. The Management Area Direction contained in Chapter III shows the management requirements which were used in analyzing Alternative H. This management direction is identical for the other alternatives except for certain specific differences as discussed above and shown in detail in Table 2. There is also a reference in Table 2 to the management area designations on the alternative maps so the management direction can be located on the ground.

TABLE 1

Cross-walk of Prescriptions For Management Areas Included in Chapter III of the Plan to the Prescriptions Presented in the Draft Documents and Shown on Alternative Maps

New Prescription Numbers Included In Chapter III of Plan	Management Area Emphasis	Original Prescription Numbers (Shown on Alternative Maps)	Remarks
1A	Developed recreation sites	Q	
1B	Winter sports sites	I	
1D	Utility corridors	None	Specific management direction for utility corridors was not presented in the draft documents; however, corridors were shown on alternative maps (see map legend).
2A	Semi-primitive motorized recreation opportunities	G_1, G_2, R	Only those portions of R which are presently developed or are likely to be developed in highly mineralized areas were incorporated into 2A. The undeveloped portions of R were incorporated into 3A.
2B	Rural and roaded-natural recreation opportunities	J	
3A	Semi-primitive non-motorized recreation opportunities	H, R	See remarks for 2A.
4B	Wildlife habitat for management indicator species	E, F_1, F_2	4B includes only those areas of E, F_1, and F_2 outside of identified big game winter range. E, F_1 and F_2 areas in identified big game winter range were incorporated into 5B.
5B	Big game winter range	E, F_1, F_2	See remarks for 4B.
6B	Livestock grazing	A_1, A_2, B	
7B1	Wood-fiber production and utilization through improved genetic stock	C	See page D-6 of this appendix for this prescription.
7C	Management of forested areas for wood-fiber production and utilization on steep slopes	D	7C includes only the steep slope portion of D. The gentle slope portions of D were incorporated into 7E.
7E	Management of forested areas for wood-fiber production and utilization on gentle slopes	D	See remarks for 7C.
8A	Pristine wilderness opportunities	8A, 8E	
8B	Primitive wilderness opportunities	8B, 8F	
8C	Semi-primitive wilderness opportunities	8C, 8G	
8D	Limited areas of wilderness providing for high density day use	8D, 8H	
9A	Riparian areas	M	
9B	Increased water yield	P_1, P_2	

TABLE 1 (Continued)

Cross-walk of Prescriptions For Management Areas Included in Chapter III of the Plan to the Prescriptions Presented in the Draft Documents and Shown on Alternative Maps

New Prescription Numbers Included In Chapter III of Plan	Management Area Emphasis	Original Prescription Numbers (Shown on Alternative Maps)	Remarks
10A	Research Natural Areas	0	
10C	Chimney Rock Archaeological Area, increased public use	L_2	
10C1	Chimney Rock Archaeological Area, restricted public use	L_1	See page D-17 of this appendix for this prescription.
10D	Wild and Scenic River corridors	N_1, N_2, N_3	
None	Management of Wilderness Study Areas until Congress Acts	K_3	A specific prescription for this is no longer felt necessary because the direction is covered in the Colorado Wilderness Act, i.e., until Congress acts, all Wilderness Study Areas will be managed to maintain the qualities which make them possible for inclusion in the National Wilderness Preservation System.

TABLE 2

Differences in Management Area Direction Specifics Between Application in Alternative H and Other Alternatives

New Prescription Numbers Included In Chapter III of Plan	Management Area Designations on Alternative Maps	Specific Differences Used in Analysis
1A	Q	No differences
1B	I	No differences
1D	See map legend	No differences
2A	G_1	Harvest Methods - 2A, as used in Alternative H, applies shelterwood in mixed conifer and Engelmann spruce-subalpine fir forest cover types. Selection was used for these types in analyzing the other alternatives.
	G_2	No differences.
	R	Visual Quality Objective (VQO) - 2A, as used in Alternative H, requires that a VQO of "partial retention" not be exceeded. "Modification" was used in analyzing the other alternatives.
2B	J	Harvest Methods - 2B, as used in Alternative H, applies shelterwood in the Engelmann spruce-subalpine fir forest cover type. Selection was used for this type in analyzing the other alternatives.
3A	H	No differences.
	R	Visual Quality Objective (VQO) - 3A, as used in Alternative H, requires that a VQO of "partial retention" not be exceeded. "Modification" was used in analyzing the other alternatives.

TABLE 2 (Continued)

Differences in Management Area Direction Specifics Between Application in Alternative H and Other Alternatives

New Prescription Numbers Included In Chapter III of Plan	Management Area Designations on Alternative Maps	Specific Differences Used in Analysis
4B	E	Visual Quality Objective (VQO) - 4B, as used in Alternative H, requires that a VQO of "modification" not be exceeded. "Maximum modification" was used in analyzing the other alternatives.
		Recreation Opportunities - 4B, as used in Alternative H, provides for roaded natural recreation as an overall objective. Rural recreation was used in analyzing the other alternatives.
		Grazing Systems - 4B, as used in Alternative H, provides for rotation grazing systems. Extensive grazing systems were used in analyzing the other alternatives.
	F_1 and F_2	No differences.
5B	E	Visual Quality Objective (VQO) - 5B, as used in Alternative H, requires that a VQO of "modification" not be exceeded. "Maximum modification" was used in analyzing the other alternatives.
		Recreation Opportunities - 5B, as used in Alternative H, provides for roaded natural recreation as an overall objective. Rural recreation was used in analyzing the other alternatives.
	F_1 and F_2	Grazing Systems - 5B, as used in Alternative H, provides for extensive grazing systems. Intensive grazing systems were used in analyzing the other alternatives.
6B	A_1 and A_2	Visual Quality Objective (VQO) - 6B, as used in Alternative H, requires that a VQO of "modification" not be exceeded. "Maximum modification" was used in analyzing the other alternatives.
		Recreation Opportunities - 6B, as used in Alternative H, provides for roaded natural recreation as an overall objective. Rural recreation was used in analyzing the other alternatives.
	B	No differences.
7C	D	Harvest Methods - 7C, as used in Alternative H, applies group selection in the Engelmann spruce-subalpine fir forest cover types. Shelterwood was used for slopes less than 60 percent and clearcut for slopes greater than 60 percent for this type in analyzing the other alternatives.
7E	D	No differences.
8A through 8D	8A through 8D	No differences.
	8E through 8H	Permit System - 8A and 8D, as used in Alternatives A, I and G, provide for an immediate permit system. Other alternatives would not institute a permit system until specific use levels are reached.
9A	M	No differences.
9B	P_1 and P_2	Visual Quality Objective (VQO) - 9B, as used in Alternative H, requires that a VQO of "modification" not be exceeded. "Maximum modification" was used in analyzing other alternatives.
10A	O	No differences.
10C	L_2	No differences.
10D	N_1, N_2, and N_3	No differences.

PRESCRIPTION FOR MANAGEMENT AREA 7B1

(Emphasis is on wood-fiber production and utilization through improved genetic stock.)

MANAGEMENT PRESCRIPTION SUMMARY

General Description and Goals:

Management emphasis is on wood-fiber production and utilization of large roundwood of a size and quality suitable for sawtimber. Artificial regeneration methods using genetically superior planting stock rather than natural regeneration is used to achieve increased wood fiber production. The harvest method by forest cover type is clearcutting of aspen, Engelmann spruce-subalpine fir and mixed conifer on all slopes, and shelterwood in interior ponderosa pine on slopes less than 30 percent. Improved tree growth will permit rotations to be 10 to 15 percent shorter than rotations in other wood-fiber emphasis prescriptions.

The area generally will have a mosaic of fully stocked stands that follow natural patterns and avoid straight lines and geometric shapes. Management activities normally will be visually evident along Forest arterial and collector roads and primary trails. In other portions of the area, management activities may dominate in foreground and middleground viewing zones. When viewed as background, the visual characteristics of an activity will be those of natural occurrences within the surrounding area, harmonizing and blending with the natural landscape.

Rural recreation opportunities in a highly modified setting are provided as an overall objective although roaded natural and semi-primitive motorized recreation opportunities will also exist.

B. MANAGEMENT REQUIREMENTS

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
Diversity on National Forests and National Grasslands (A00)	01 Manage for natural succession in non-commercial forest and non-forest cover types. (0028SJ) (7B1)	
	02 Manage commercial forest cover types to meet diversity objectives through harvest treatments specified under management activity "Silvicultural Prescriptions." (0041SJ) (7B1)	
Cultural Resource Management (A02)	01 Allow recreation and non-recreation use of suitable cultural resource properties to the extent that such uses do not conflict with wood fiber production. Limit interpretation to low cost developments such as interpretive signing. (0526SJ) (7B1)	
Visual Resource Management (A04)	01 Meet stated visual quality objective. (0125) (7B1)	a. Meet the visual quality objective of "Maximum Modification" as a minimum for all activities. (6427SJ) (7B1)
Dispersed Recreation Management (A14 and 15)	01 Provide rural recreation opportunities as an overall objective. Roaded natural, semi-primitive motorized and semi-primitive non-motorized opportunities will be available until planned resource activities are implemented. (0529SJ) (7B1)	a. Maximum Use and Capacity Levels are: Recreation use and capacity range during the snow-free period (PAOT/acre): Trail use and capacity range (PAOT/mile of trail): Capacity Range* Class — Very Low, Low, Moderate, High ROS Class - Semi-Primitive Non-motorized

MANAGEMENT PRESCRIPTION 7B1

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Dispersed Recreation Management (A14 and 15)		On Trails PAOT/mile 2.0 3.0 9.0 11.0 Area-wide PAOT/acre .004 .008 .05 .08 ROS Class - Semi-Primitive Motorized On Trails PAOT/mile 2.0 3.0 9.0 11.0 Area-wide PAOT/acre .004 .008 .05 .08 ROS Class - Roaded Natural On Trails PAOT/mile - - - - Area-wide PAOT/acre .04 .08 1.2 2.5 ROS Class - Rural On Trails PAOT/mile - - - - Area-wide PAOT/acre .5 .8 5.0 7.5 Reduce the above use level coefficients as necessary to reflect usable acres, patterns of use, and general attractiveness of the specific management area type as described in the ROS Users Guide, Chapter 25. Reduce the above use levels where unacceptable changes to the biophysical resources will occur. * VERY LOW applies to alpine.

MANAGEMENT PRESCRIPTION 7B1

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Dispersed Recreation Management (A14 and 15)		LOW applies to rock, mtn. grass and clearcuts 1-20 years old. MODERATE applies to mtn. grass, PP size class 9, 8 and 7, DF size class 9, 8 and 7, Aspen size class 9, SF size class 7, shelterwood cuts 90-120 years old, selection cuts 1-20 years old and clearcuts 80-120 years old. HIGH applies to SF size class 9 and 8, Aspen size class 8 and 7 and clearcuts 20-80 years old. - (6428SJ) (7B1) b. Specify off-road vehicle restrictions based on ORV use management (FSM 2355, R2 Supp. 88). (6083) (7B1) c. See FSM 2331, FSM 7732, FSH 7709.12 (Trails Handbook), FSH 7109.11a and 11b (Sign Handbook). (6226) (7B1)
	02 Permit undesignated sites in Frissell condition class 1 through 3 where unrestricted camping is permitted. (0174) (7B1) 03 Manage site use and occupancy to maintain sites within Frissell condition class 3 except for designated sites which may be class 4. Close and restore class 5 sites. (0175) (7B1)	

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Dispersed Recreation Management (A14 and 15)	04 Prohibit motorized vehicle use (including snowmobiles) off Forest System roads and trails where needed to protect soils and vegetation (especially regenerating areas and seedling/sapling stands). Other specific land areas or travel routes may be closed seasonally or year-round for compatibility with adjacent area management, for economic reasons, and for user safety. (4726SJ) (7B1)	
Wildlife Habitat Improvement and Maintenance (C02, 04, 05 and 06)	01 Favor indicator species through timber management activities. (1528SJ) (7B1)	a. Deer, Elk, and Bear: Restrict disruptive human activity in calving and fawning areas during the last two weeks of May and the first two weeks of June. (7233SJ) (7B1) b. Merriam's Turkey Provide additional water sources as necessary in deficient low elevation areas to bring the total water sources up to two/section. (7235SJ) (7B1) c. Goshawk: Prohibit disruptive management activities within 300 feet of any occupied raptor nests during the period May 1 through July 31. (7231SJ) (7B1) d. Merriam's Turkey, Deer Mouse, Sharptail Grouse, Mallard, and Green-tailed Towhee: Fence one-third of the area of one out of every three earthen constructed livestock reservoirs to protect lacustrine nesting habitat for small non-game birds and mam-

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Wildlife Habitat Improvement and Maintenance (C02, 04, 05 and 06)		mals. (7236SJ) (7B1)
Range Resource Management (D02)	01 Utilize extensive management systems such as season-long or deferred grazing. (2031SJ) (7B1)	a. Vary utilization standards with grazing system and ecological condition. Specify standards in the allotment management plan. (6071) (7B1)
	02 Utilize transitory forage that is available where demand exists, and where investments in regeneration can be protected. (0132) (7B1)	
	03 Protect regeneration from livestock damage. (0133) (7B1)	a. Exclude livestock from plantations and naturally regenerating areas when utilization of useable forage exceeds 20 percent or when seedling stocking is less than the desired number per acre as shown in Forest Direction under management activity "Reforestation." (7626SJ) (7B1)
Range Improvement and Maintenance (D03, 04, 05 and 06)	01 Construct and maintain allotment boundary fences, short drift fences and water developments necessary to implement management systems. (2033SJ) (7B1)	
Silvicultural Prescriptions (E03, 06 & 07)	01 Manage forest cover types using the following harvest methods: - Clearcut in aspen, mixed conifer, lodgepole pine, and Engelmann spruce-subalpine fir. - Shelterwood in interior ponderosa pine. (2529SJ) (7B1)	a. Apply harvest treatments to forest cover types as specified below on at least 80 % of the forest cover type. Up to 20 percent of the type may be treated using other harvest methods specified in Forest Direction. (6074) (7B1)

MANAGEMENT PRESCRIPTION 7B1

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES

CONTINUATION OF:
Silvicultural
Prescriptions
(E03, 06 & 07)

b. Silvicultural Standards:

1) Clearcut:

	Forest Cover Type		
	Lodgepole Pine	Aspen	Engelmann spruce-subalpine fir&Mixed Conifer
Rotation Age	90-180 Yrs	70-90 Yrs	160-180 Yrs
Growing Stock Level	80-160	N/A	110-130
Thinning cycle	20-30 Yrs	N/A	25-35 Yrs

2) Two-Step Shelterwood:*

	Forest Cover type
	Interior Ponderosa Pine
Rotation Age	90-130 yrs.
Growing Stock Level	80-120
Thinning Cycle	25-35 Yrs
First Cut (seed cut). Cut to	BA 30-50

MANAGEMENT PRESCRIPTION 7B1

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Silvicultural Prescriptions (E03, 06 & 07)		Second Cut (removal cut) Remove all overstory when regenerated stand meets minimum stocking standards. * Does not apply on slopes > 30%. (8063SJ) (7B1)
	02 Apply intermediate treatments to maintain growing stock level standards. (0140) (7B1)	
	03 Utilize firewood material using both commercial and noncommercial methods. (0147) (7B1)	
	04 For management purposes, a cut-over area is considered an opening until such time as: - Increased water yield drops below 50 percent of the potential increase; - Forage and/or browse production drops below 40 percent of potential production; - Deer and elk hiding cover reaches 60 percent of potential; - Minimum stocking standards by forest cover type and site productivity are met; and - The area appears as a young forest rather than a restocked opening, and takes on the appearance of the adjoining characteristic landscape. (0500) (7B1)	a. When the Visual Quality Objective of an area is modification or maximum modification, the regenerated stand shall meet or exceed all of the following characteristics before a cut-over area is no longer considered an opening:

Forest Cover Type	Minimum Stocking Level (Trees/ acre)	Tree Stand Height (ft.) 1/
Inland Ponderosa Pine	190	6
Mixed Conifers	190	6
Lodgepole Pine	150	6
Engelmann Spruce-Subalpine		

MANAGEMENT PRESCRIPTION 7B1

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Silvicultural Prescriptions (E03, 06 & 07)		fir 150 6 Aspen 300 6 Forest Cover Type / Crown Closure (Percent) / Distribution 2/ Inland Ponderosa Pine 30 70% Mixed Conifers 30 75% Lodgepole Pine 30 75% Engelmann Spruce-Subalpine fir 30 75% Aspen 30 75% 1/ Applies to trees specified as minimum stocking level. 2/ Percent of plots or transects that are stocked. (6014) (7B1)
Timber Stand Improvement (E05)	01 Control undesirable understory vegetation to favor tree growth. (2527SJ) (7B1)	a. Ponderosa Pine: Control Gambel oak in stands on slopes <30% at 10-year intervals starting at a stand age of 30. (8060SJ) (7B1)
Genetic Forest Tree Improvement (E09)	01 Develop and plant trees that have a superior genetic quality. (0149) (7B1)	

MANAGEMENT PRESCRIPTION 7B1

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
Transportation System Management (L01 & 20)	01 Manage local constant roads to accommodate medium-light seasonal use (SADT 10-50). Regulate seasonal public use by closure if roadbed damage will occur. (4793SJ) (7B1)	a. Manage the area for a high density (one to three miles/square mile) of constant roads. (9326SJ) (7B1)
	02 Manage local intermittent roads to accommodate light use (SADT 0-20). Close to public use. (4728SJ) (7B1)	
Local Road Construction and Reconstruction (L11, 12, & 13)	01 Construct roads to support timber management activities. (4733SJ) (7B1)	a. Construct or reconstruct local constant roads with gravel support needed for timber operations and hauling. (9332SJ) (7B1)
		b. Construct local intermittent roads with no gravel support unless needed to extend logging seasons. (9328SJ) (7B1)
Road Maintenance (L19)	01 Maintain roads to support timber management activities. (4734SJ) (7B1)	a. Maintain local constant roads to maintenance level three. (9329SJ) (7B1)
		b. Maintain local intermittent roads to maintenance level two when open for project activities. (9330SJ) (7B1)
Trail System Management (L23)	01 Provide trails only when needed to access other management areas. (4735SJ) (7B1)	a. Maintain trails to maintenance level two. (9331SJ) (7B1)
Fire Planning and Suppression (P01)	01 Provide a level of protection from wildfire that is cost efficient and that will meet management objectives within the vegetation cover types. (5026SJ) (7B1)	a. Wildfire protection levels: 1) Pinon pine-juniper, gambel oak, grasslands, aspen. a) Confine or contain wildfires

MANAGEMENT PRESCRIPTION 7B1

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Fire Planning and Suppression (P01)		burning at Fire Intensity Levels (FIL) I and II. b) Effect control of wildfires burning at FIL's III and higher. 2) Mixed browse, mixed conifers, Engelmann spruce and subalpine fir. a) Promptly control wildfires burning at all FIL's. 3) Inland ponderosa pine. a) When stand age is < 30 years, promptly control wildfires burning at all FIL's. b) When stand age is > 30 years, confine or contain wildfires burning at FIL's I and II; effect control of wildfires burning at FIL's III and higher. (9626SJ) (7B1)

PRESCRIPTION FOR MANAGEMENT AREA 10C1

(Provides for special interest areas.)

MANAGEMENT PRESCRIPTION SUMMARY

General Description and Goals:

Emphasis is on management of areas of unusual scenic, historical, geological, botanical, zoological, paleontological, or other special characteristics to protect and where appropriate, foster public use and enjoyment of these areas.

B. MANAGEMENT REQUIREMENTS

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
Diversity on National Forests and National Grasslands (A00)	01 Manage for natural succession unless specific vegetation treatment is necessary for public safety, to meet recreation and visual objectives or for insect and disease control. (0039SJ) (10C1)	
Cultural Resource Management (A02)	01 Manage cultural resources for protection, preservation, investigation, and limited public use. a) Maintain reconstructed ruins to present standards with no significant activities that would require additional excavation oe reconstruction. b) Allow public visitation to occur on a limited basis; restrict to guided trips only during periods that do not adversely affect the peregrine falcon or damage archaeological resources. c) Issue antiquities permits compatible with area objec-tives to qualified academic institutions, individuals, and other organizations for study and research. d) Inform the public about the cultural resources found in the area. e) Curate artifacts found in the area if they are too significant to risk loss by leaving them on site. (055BSJ) (10C1)	
Visual Resource Management (A04)	01 Meet stated visual quality objective. (0125) (10C1)	a. Do not exceed an Adopted Visual Quality Objective (VQO) of retention. (6215) (10C1)
Recreation Site Construction and Rehabilitation (A05 AND 06)	01 Limit recreation development to that necessary for sanitation, resource protection, and interpretive purposes. Allow improvements to existing facilities and construction of sanitary facilities only. (0559SJ) (10C1)	

MANAGEMENT PRESCRIPTION 10C1

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Recreation Site Construction and Rehabilitation (A05 AND 06)	02 Do not develop overnight or day use facilities adjacent to the area. (0560SJ) (10C1)	
Dispersed Recreation Management (A14 and 15)	01 Close the area to all types of general public recreation use except interpretive/naturalist guided tours. (0564SJ) (10C1)	
Recreation Management (Private and Other Public Sector) (A16)	01 Permit only special land uses directly serving public visitation and interpretation of the ruins. (0561SJ) (10C1)	
Wildlife and Fish Resource Management (C01)	01 Maintain the peregrine falcon and improve its habitat at the Chimney Rock site as outlined in Memorandum of Understanding #130051. (1546SJ) (10C1)	
	02 Minimize impact to the peregrine falcon eyrie by conducting guided visitor tours so that they least conflict with nesting and rearing periods. (1547SJ) (10C1)	
	03 Undertake population reduction programs for any species of wildlife that increases in number to a point of being detrimental to the peregrine falcon habitat. (1548SJ) (10C1)	
	04 Cooperate with State officials in establishing and enforcing "no hunting and trapping" policies. (1549SJ) (10C1)	

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
Wildlife Habitat Improvement and Maintenance (C02, 04, 05 and 06)	01 Undertake projects to improve habitat of small song-birds to increase their numbers as prey for the peregrine falcon. (1550SJ) (10C1)	
Range Resource Management (D02)	01 Prohibit livestock grazing. (2054SJ) (10C1)	
Silvicultural Prescriptions (E03, 06 & 07)	01 Allow tree removal only for such purposes as public safety, improvement of aesthetics, insect and disease control, ruins research and maintenance, ruins reconstruction, or wildlife habitat improvement. (2547SJ) (10C1)	
Mining Law Compliance and Administration (G01)	01 Maintain current withdrawal from mineral entry on the 1,350 acres centered on the Chimney Rock cuesta (withdrawn 4/30/70 under authority of E.O. 10355). Pursue withdrawal of the remaining 1,810 acres of the designated Chimney Rock Archaeological Area. In the event that withdrawal is not made, supervise activities of claimants to insure minimum impact on cultural and wildlife resources. (3530SJ) (10C1)	
Special Use Management (Non-Recreation) (J01)	01 Permit only special land uses directly serving public visitation and interpretation of the ruins. (0561SJ) (10C1)	
Rights-of-way and Land Adjustments (J02, 13, 15, 16, 17, and 18)	01 Actively pursue acquisition of adjacent or nearby lands essential for protection of significant archaeological values. (4242SJ) (10C1)	
Property Boundary Location (J06)	01 Survey, mark and post the boundary of the Chimney Rock Archaeological Area. (4243SJ) (10C1)	

MANAGEMENT PRESCRIPTION 10C1

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
Transportation System Management (L01 & 20)	01 Develop transportation system only to enhance cultural resource interpretive or maintenance opportunities. (4781SJ) (10C1)	
	02 Close the Chimney Rock Archaeological Area to all motorized vehicles except those used for maintenance, emergencies, administration, and guided tours, or those authorized by the San Juan National Forest Supervisor. (4782SJ) (10C1)	
Local Road Construction and Reconstruction (L11, 12, & 13)	01 Construct no new roads. (4783SJ) (10C1)	
Trail System Management (L23)	01 Construct short interpretive trails for guided tours. (4784SJ) (10C1)	
Fire Planning and Suppression (P01)	01 Provide a level of protection from wildfire that is cost efficient and that will meet management objectives. (5032SJ) (10C1)	a. Wildfire protection levels: Promptly control wildfires burning at all Fire Intensity Levels except in areas managed for permanent openings. (9629SJ) (10C1)
	02 Use bulldozers in fire suppression only if necessary to protect known ruins, peregrine falcon habitat, or when justified by predicted loss of resource values outside the area. (5034SJ) (10C1)	
Fuel Treatment (P11 thru 14)	01 Maintain fuel conditions which permit fire suppression forces to meet fire protection objectives for the area. (0113) (10C1)	

MANAGEMENT PRESCRIPTION 10C1

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Fuel Treatment (P11 thru 14)	02 Prescribe burn for hazard reduction when archaeological, wildlife and recreational resources are not endangered. (5035SJ) (10C1)	
Law Enforcement (P24 thru 27)	01 Closely monitor ruins for deterioration and law violations. Increase law enforcement patrols during periods of public access. (5036SJ) (10C1)	

MANAGEMENT PRESCRIPTION 10C1

APPENDIX E

SAN JUAN RESOURCE ALLOCATION MODEL

SAN JUAN RESOURCE ALLOCATION MODEL

The resource allocation model used in developing the San Juan National Forest Plan is called FORPLAN. FORPLAN is a linear programming model that was used to allocate and account for acres managed under various prescriptions through time. Variables accounted for by the model include acres by prescription, resource output levels, costs, and period of implementation.

Major components of the model are as follows:

Scheduled Outputs: Scheduled outputs are those whose levels are a function of the prescription chosen and the period of implementation. Scheduled outputs in the San Juan FORPLAN model, with units in parentheses, are as follows:

Timber Production (Cubic Feet)
Livestock forage production (Animal Unit Months)
Wildlife forage production (Animal Unit Months)
Road construction (Miles)
Road reconstruction (Miles)
Road obliteration (Miles)
Road maintenance (Miles)
Roaded natural appearing area (Acres)
Semi-primitive motorized area (Acres)
Semi-primitive non-motorized area (Acres)

There are additional outputs from the Forest which were not included in the FORPLAN model yet which were included in the economic efficiency analysis of the alternatives. These are as follows:

Developed Recreation - Private (Visitor Days)
Developed Recreation - Public (Visitor Days)
Wilderness Use (Visitor Days)
Big Game Hunting (Visitor Days)
Small Game Hunting (Visitor Days)
Fishing (Visitor Days)
Non-game Use (Visitor Days)
Dispersed Recreation (Visitor Days)
Improved Water Yield (Acre-Feet)

MTVEST, a computer program for evaluating Forest investment opportunities, was used to incorporate all FORPLAN and non-FORPLAN benefits and costs into a Forest-wide economic efficiency analysis.

Analysis Areas: Analysis areas are aggregations of acres, not necessarily contiguous, which are similar with respect to existing road density, vegetation, slope, timber size class, stand basal area, and legal/administrative status. Special areas such as wilderness, research natural areas, archaeological areas, and developed sites were not included as analysis areas in the model. For these areas, outputs and costs were calculated outside the model; only areas for which allocation decisions had not yet been made were included in the linear program. One hundred and eighty-nine analysis areas were identified in the model.

Management Prescriptions: Management prescriptions are sets of coordinated management practices applied to specific analysis areas. Prescriptions were quantified in terms of outputs and costs for modeling purposes, and the results of this quantification are called coefficients. There are approximately 1,400 prescriptions in the model.

Coefficients fall into one of two categories: output or economic coefficients. Output coefficients reflect the number of units per acre that can be produced over a specific period of time. These were estimated by resource specialists, using simulation models or other data sources. Economic coefficients are either cost or benefit values. Cost coefficients were estimated using historical Forest budgetary data, whereas benefit values used in the model were calculated for the Forest as a result of the Regional planning and RPA efforts.

Planning Horizon: The planning horizon for the Forest-wide allocation model is 200 years, although only the timber resource was tracked for that length of time. All other outputs, as well as all dollar costs and benefits were tracked for a period of 50 years.

Constraints: Constraints are quantifiable limits placed on the model to ensure that only reasonable amounts of acres and dollars are used and that only reasonable amounts of outputs are produced. The following types of constraints were used in FORPLAN during the formulation and evaluation of alternatives:

- output constraints
- budget constraints
- timber flow constraints (e.g., non-declining yield)
- constraints on the restocking of non-stocked land
- prescription constraints
- inventory constraints

(See Appendix N for a more detailed discussion of the specific constraints used in formulation and evaluation of alternatives.)

Objective Function: Objective functions are mathematical expressions of the criteria by which the model allocates resources to various prescriptions. These can be either economic (e.g., maximize present net value for five decades) or physical (e.g., maximize timber production in the first decade). During evaluation of alternatives, all runs of the model were made using an objective function to maximize present net value over five decades.

Benefit Values: The following benefit values were used in the analysis of economic efficiency of the alternatives. These values result from the 1980 RPA and Regional Plan efforts. Timber values represent average bid prices, and were calculated from timber sale data on the Forest from 1974 through 1978. All values are in terms of 1978 dollars. Price trends have been applied to reflect real price changes over time, but any effects of inflation are not shown.

Benefit Values

Output	Unit	1981-1990	1991-2000	2001-2010	2011-2020	2021-2030
Water	Acre-Foot	19.70	(20.22)	20.73	(19.18)	17.62
Range	AUM	9.65	9.65	10.11	10.76	10.95
Developed Recreation						
Private	RVD	3.75	3.75	3.75	3.75	3.75
Public	RVD	3.00	3.00	3.00	3.00	3.00
Dispersed Recreation	RVD	3.00	(3.21)	3.42	(3.81)	4.20
Wilderness Use	RVD	8.00	8.00	9.12	10.24	11.20
Wildlife and Fish						
Big Game Hunting	RVD	25.20	(26.96)	28.73	(32.01)	(35.28)
Small Game Hunting	RVD	32.00	(34.24)	36.48	(40.64)	44.80
Fishing	RVD	15.75	(16.86)	17.96	(20.01)	22.05
Non-game Use	RVD	29.00	(31.03)	33.06	(36.83)	40.60
Timber						
Ponderosa pine	MBF	47.20	56.65	64.70	76.05	102.48
Aspen	MBF	3.34	3.41	3.41	3.46	3.53
Spruce-fir	MBF	33.09	38.69	43.53	50.25	60.07
Douglas-fir	MBF	29.03	30.07	40.97	48.72	59.98

AUM - Animal Unit Month
RVD - Recreation Visitor Day
MBF - Thousand Board Feet
( ) - Intervening numbers were not available from the RPA and Regional planning efforts, but were calculated by simple interpolation for the Forest planning effort.

COSTS

Costs were developed by surveying historical Forest-level data and by quizzing resource specialists. Virtually all direct timber-related costs for both existing (stocked and non-stocked) and regenerated timber stands were included in the model. These costs vary by timber species, slope class, and harvest method. Timber costs are for site preparation, sale preparation, sale administration, reforestation, timber inventory, and timber stand improvement.

Roading costs included in the model are for timber-related road construction, reconstruction, obliteration, and maintenance. These varied by slope class and management area prescription. Additional road costs were accounted for outside of the model.

Additional costs were included in the model by tracking a single scheduled output called "OTHER$." This output is an aggregate of the following costs: various dispersed recreation, grazing, and wildlife-

related costs for lands included in the model; various water-related costs, including water resource improvement projects; rights-of-way acquisition; and property boundary location.

Costs included in FORPLAN constitute approximately half of the total San Juan National Forest costs. The remaining costs were either for lands not included as FORPLAN analysis areas (e.g., wilderness areas and developed recreation sites), or they were costs that do not vary predictably on a per acre or per prescription basis (e.g., capital improvements, such as bridges). Special costs such as backlog reforestation and allocated funds were also not included in the linear programming model. All costs and benefits, FORPLAN and non-FORPLAN, were incorporated into the cost-efficiency analysis of alternatives through a computer program called MTVEST. The actual dollar values of these costs are part of the planning records on file at the Forest Supervisor's Office, Durango, Colorado.

APPENDIX F

ECONOMIC AND CONSTRAINT ANALYSIS OF ALTERNATIVES CONSIDERED IN DETAIL

ECONOMIC AND CONSTRAINT ANALYSIS OF ALTERNATIVES CONSIDERED IN DETAIL

This appendix contains two sections: one which describes the constraints used in formulating alternatives, and a second which describes cost-efficiency and PNV tradeoff analyses.

CONSTRAINT ANALYSIS OF ALTERNATIVES CONSIDERED IN DETAIL

As described in Chapter II, Comparison of Alternatives and Environmental Consequences, constraints were used in the alternative formulation stage of the planning process to ensure that alternatives are capable of accomplishing the goals and objectives established for them. They also facilitate incorporation of non-monetary and "non-FORPLAN" outputs and activities in the analysis process. For example, increased water yield was not included as a scheduled output in the FORPLAN model, yet through inventory and prescription constraints, the model was formulated in one alternative such that high water yield prescriptions were applied to the appropriate vegetative types and sufficient area was maintained in a clearcut condition to ensure an increase in water runoff throughout the planning period.

Tables 1 and 2 describe the constraints that were imposed on each of the ten alternatives considered in detail. Table 1 describes the four constraint types common to all alternatives. One of these ensures a non-declining yield of timber and another ensures that each alternative progresses toward full regulation of age classes on the suitable timber land. The two others are technical constraints in that they limit the allocation of prescriptions to the number of acres available on the Forest and to the configuration arrived at following an initial run of the model.

Table 2 describes the constraints specific to each alternative. Both tables show the following: the resource output being constrained, the type of constraint (LT, GT, and ET represent "less than," "greater than," and "equal to" respectively), the amount and limits of the constraint, and the applicable decade. Reasons for including the constraint are also given, as well as the status of each constraint in the final solution. An asterisk in the column entitled "Binding" indicates that the constraint was limiting the objective function and that a higher present net value could be obtained if that constraint were relaxed by one unit, (for example, from 26 MMBF/year to 25 MMBF/year). Non-binding constraints are of no consequence to the final solution.

TABLE 1

Constraints Common to All Alternatives

Alternative	Output/ System	Type of Constraint	Constraint	Units	1/ Binding	Applicable Decade	Reason for Inclusion
All	Timber	Harvest Flow	Non-declining Yield	MMBF/yr	*	1-20	To ensure a continued supply of timber volume in compliance with 36 CFR 219.16(a)(1).
	Timber	Inventory	Ending Inventory constraint	MMBF/yr	*	20	To ensure that total inventory volume left at the conclusion of the planning horizon will equal or exceed the volume that would occur in a regulated forest managed in accordance with the prescriptions selected for regenerated timber.
	Acreage	ET	(Varies by Analysis Area)	Acres	*	1-20	To ensure that the model would only allocate the exact number of acres of each analysis area type that is available on the Forest.
	Allocation/ Prescription	ET	(Varies by Prescription)	Acres	*	1-20	To ensure that the allocation selected during the first stage of the process was held constant during the scheduling phase of the process.

1/ Those constraints having an asterisk (*) in the column entitled "Binding" were limiting on the objective function (Maximize PNV) and can be attributed to at least part of the "opportunity costs" for that alternative.

TABLE 2

Constraints Specific to Each Alternative

Alternative	Output/ System	Type of Constraint	Constraint	Units	1/ Binding	Applicable Decade	Reason for Inclusion
A	Timber	GT	26	MMBF/yr	*	1	To ensure at least a minimum acceptable level of timber volume to sustain dependent industry.
		GT	26	MMBF/yr		2	
		GT	26	MMBF/yr		3	
		GT	26	MMBF/yr	*	4	
		GT	26	MMBF/yr		5	
	Timber - Restocking of non-stocked land	GT	4700	Acres	*	1	To ensure compliance with the National Forest Management Act in bringing all lands suitable for timber management under this Alternative up to management standards by 1985.

TABLE 2 (Continued)

Constraints Specific to Each Alternative

Alternative	Output/ System	Type of Constraint	Constraint	Units	1/ Binding	Applicable Decade	Reason for Inclusion
	Timber - Aspen	GT	5	MMBF/yr		1	To ensure sufficient aspen timber volume to support dependent industries in the area of Mancos, Colorado.
					*	2	
					*	3	
						4	
					*	5	
						6	
					*	7	
					*	8	
						9	
						10	
	Range	GT	178,000	AUMS/yr	*	1	To ensure at least a "minimum acceptable level" of livestock forage to sustain dependent livestock industries.
		GT	168,000	AUMS/yr	*	2	
		GT	160,000	AUMS/yr	*	3	
		GT	151,000	AUMS/yr		4	
		GT	143,000	AUMS/yr		5	
	Wilderness Acreage	ET	All WSA's Recommended Suitable for Wilderness	Acres	*	1	To maximize production of non-market outputs derived from wilderness opportunities, such as backpacking, fishing, hunting, and day hiking.
	Budgetary Costs	LT	9.03	MM$/yr		1	To ensure that budget expenditures do not exceed reasonable levels for the outputs expected under this alternative.
		LT	8.53	MM$/yr		2	
		LT	7.78	MM$/yr		3	
		LT	7.93	MM$/yr		4	
		LT	7.50	MM$/yr		5	
	Area managed under Prescriptions 4B ("E" portion), 5B ("E" portion), 6B ("A" portion), 7B1 and 9B	ET	0	Acres	*		To ensure that no prescriptions allowing "maximum modification." Visual Quality Objective would comprise this Alternative.
B	Timber	GT	40	MMBF/yr		1	To ensure a high level of timber volume consistent with the emphasis on market opportunities under this alternative.
		GT	48	MMBF/yr		2	
		GT	48	MMBF/yr		3	
		GT	48	MMBF/yr		4	
		GT	48	MMBF/yr		5	
	Timber - Restocking of non-stocked land	GT	11,800	Acres	*	1	To ensure that a large number of non-stocked acres constituting part of the timber producing base are brought into production during the first decade. This is consistent with the emphasis on market opportunities.

TABLE 2 (Continued)

Constraints Specific to Each Alternative

Alternative	Output/ System	Type of Constraint	Constraint	Units	1/ Binding	Applicable Decade	Reason for Inclusion
	Timber - Aspen	GT	5	MMBF/yr	*	1	To ensure sufficient aspen timber volume to support dependent industries in the area of Mancos, Colorado.
						2	
					*	3	
					*	4	
					*	5	
					*	6	
						7	
						8	
					*	9	
					*	10	
	Timber - Spruce-fir Inventory	GT	20% of the type must be in a clearcut condition.	Acres	*	1-5	To ensure that sufficient area of the spruce-fir timber type is in a clearcut condition at any one time to enhance water runoff.
	Timber - Douglas-fir Inventory	GT	20% of the type must be in a clearcut condition.	Acres	*	1-5	To ensure that sufficient area of the Douglas-fir timber type is in a clearcut condition at any one time to enhance water runoff.
	Range	GT	172,000	AUMS/yr	*	1	To ensure a high level of livestock forage production consistent with the emphasis on market opportunities.
		GT	189,000	AUMS/yr	*	2	
		GT	199,000	AUMS/yr	*	3	
		GT	209,000	AUMS/yr	*	4	
		GT	219,000	AUMS/yr	*	5	
	Wilderness Acreage	ET	No WSA's Recommended Suitable for Wilderness	Acres	*	1	To allow the eventual production of timber, livestock, and other market commodities on Wilderness Study Areas in conjunction with the emphasis on market opportunities.
	Budgetary Costs	LT	10.00	MM$/yr	*	1	To ensure that budget expenditures do not exceed reasonable levels for the outputs expected under this alternative.
		LT	9.02	MM$/yr	*	2	
		LT	8.76	MM$/yr	*	3	
		LT	8.11	MM$/yr	*	4	
		LT	8.30	MM$/yr		5	
C	Timber	GT	34	MMBF/yr	*	1	To ensure a level of timber consistent with emphasis on a mix of market and non-market opportunities, and to allow for maintaining current levels of timber production.
		GT	34	MMBF/yr	*	2	
		GT	34	MMBF/yr		3	
		GT	34	MMBF/yr		4	
		GT	34	MMBF/yr		5	

TABLE 2 (Continued)

Constraints Specific to Each Alternative

Alternative	Output/ System	Type of Constraint	Constraint	Units	1/ Binding	Applicable Decade	Reason for Inclusion
	Timber - Restocking of non-stocked land	GT	4,700	Acres	*	1	To ensure compliance with the National Forest Management Act in bringing all lands suitable for timber management under this alternative up to management standards by 1985.
	Timber - Aspen	GS	5	MMBF/yr	*	1	To ensure sufficient aspen timber volume to support dependent industries in the area of Mancos, Colorado.
						2	
						3	
					*	4	
					*	5	
					*	6	
						7	
					*	8	
					*	9	
						10	
	Range	GT	164,000	AUMS/yr	*	1	To ensure production of livestock forage at levels consistent with the emphasis on a mixture of market and non-market opportunities.
		GT	179,000	AUMS/yr		2	
		GT	179,000	AUMS/yr		3	
		GT	179,000	AUMS/yr		4	
		GT	179,000	AUMS/yr		5	
	Wilderness Acreage	ET	West Needle WSA Recommended Suitable for Wilderness	Acres	*	2	To provide both wilderness and non-wilderness experiences on Wilderness Study Areas in conjunction with the emphasis on a mix of market and non-market opportunities.
	Budgetary Costs	LT	8.42	MM$/yr		1	To ensure that budget expenditures do not exceed reasonable levels for the outputs expected under this alternative.
		LT	7.33	MM$/yr		2	
		LT	7.48	MM$/yr		3	
		LT	6.60	MM$/yr		4	
		LT	6.69	MM$/yr		5	
D	Timber	GT	21	MMBF/yr	*	1	
			33	MMBF/yr	*	2	
			34	MMBF/yr	*	3	
			36	MMBF/yr	*	4	
			36	MMBF/yr		5	
	Timber - Restocking of non-stocked lands	GT	9,800	Acres	*	1	To ensure a level of restocking which maximizes the amount of land brought into timber production within the constraints of a reduced budget.

TABLE 2 (Continued)

Constraints Specific to Each Alternative

Alternative	Output/ System	Type of Constraint	Constraint	Units	1/ Binding	Applicable Decade	Reason for Inclusion
	Timber - Aspen	GT	5	MMBF/yr	*	1	To ensure sufficient aspen timber volume to support dependent industries in the area of Mancos, Colorado
					*	2	
					*	3	
					*	4	
					*	5	
						6	
						7	
						8	
						9	
						10	
	Wilderness Acreage	ET	No WSA's Recommended Suitable for Wilderness	Acres	*	1	To ensure that the highest possible levels of market outputs such as timber, livestock forage, and developed recreation are produced within the constraints of reduced budgets.
	Budgetary Costs	LT	4.95	MM$/yr		1	To determine the level of market outputs that could be produced under 20 to 35 percent reductions in budgetary expenditures.
		LT	4.95	MM$/yr		2	
		LT	5.09	MM$/yr		3	
		LT	5.40	MM$/yr		4	
		LT	5.51	MM$/yr		5	
	Livestock Forage	GT	152,000	AUM's/yr	*	1	
			173,000	AUM's/yr	*	2	
			173,000	AUM's/yr	*	3	
			173,000	AUM's/yr		4	
			173,000	AUM's/yr		5	
E	Timber	GT	33	MMBF/yr	*	1	To ensure timber production at levels sufficient to meet 1980 RPA goals for the Forest.
		GT	34	MMBF/yr	*	2	
		GT	35	MMBF/yr	*	3	
		GT	35	MMBF/yr	*	4	
		GT	40	MMBF/yr	*	5	
	Timber - Restocking of non-stocked lands	GT	7,800	Acres	*	1	To ensure that sufficient non-stocked timber land is brought into production to meet 1980 RPA timber goals as well as produce such levels on a non-declining basis.

TABLE 2 (Continued)

Constraints Specific to Each Alternative

Alternative	Output/ System	Type of Constraint	Constraint	Units	1/ Binding	Applicable Decade	Reason for Inclusion
	Timber - Aspen	GT	5	MMBF/yr	*	1	To ensure sufficient aspen timber volume to support dependent industries in the area of Mancos, Colorado
					*	2	
						3	
						4	
					*	5	
					*	6	
					*	7	
					*	8	
						9	
						10	
	Range	GT	167,000	AUMS/yr	*	1	To ensure livestock forage production at levels sufficient to meet 1980 RPA goals for the Forest.
		GT	169,000	AUMS/yr		2	
		GT	169,000	AUMS/yr		3	
		GT	170,000	AUMS/yr		4	
		GT	170,000	AUMS/yr		5	
	Wilderness Acreage	ET	West Needle & Piedra WSA's Recommended Suitable for Wilderness	Acres	*	1	These two areas were recommended for wilderness designation under the RARE II planning process.
F	Timber	GT	35	MMBR/yr	*	1	To ensure a level of timber production consistent with current management projected into the future.
		GT	39	MMBR/yr	*	2	
		GT	42	MMBF/yr	*	3	
		GT	45	MMBF/yr	*	4	
		GT	48	MMBF/yr		5	
	Timber - Restocking of non-stocked lands	GT	11,800	Acres	*	1	To ensure compliance with the National Forest Management Act in bringing all lands suitable for timber management under this alternative up to management standards by 1985.
	Timber - Aspen	GT	5	MMBF/yr	*	1	To ensure sufficient aspen timber volume to support dependent industries in the area of Mancos, Colorado
					*	2	
					*	3	
					*	4	
					*	5	
						6	
						7	
						8	
						9	
						10	

TABLE 2 (Continued)

Constraints Specific to Each Alternative

Alternative	Output/ System	Type of Constraint	Constraint	Units	1/ Binding	Applicable Decade	Reason for Inclusion
	Range	GT	168,000	AUMS/yr	*	1	To ensure a level of livestock forage production consistent with current management projected into the future.
		GT	170,000	AUMS/yr		2	
		GT	169,000	AUMS/yr		3	
		GT	167,000	AUMS/yr		4	
		GT	165,000	AUMS/yr		5	
	Wilderness Acreage	ET	No WSA's Recommended Suitable for Wilderness	Acres	*	1	Although these areas are not recommended for wilderness designation, they are managed to most nearly approximate "current management" on the three Wilderness Study Areas.
	Budgetary	LT	8.80	MM$/yr		1	To ensure that budgetary expenditures are consistent with current management projected into the future.
		LT	7.90	MM$/yr		2	
		LT	9.01	MM$/yr		3	
		LT	7.02	MM$/yr		4	
		LT	7.10	MM$/yr		5	
G	Timber	GT	40	MMBF/yr	*	1	To ensure a maximum level of timber production consistent with a 10 percent reduction in budgets, reduced administrative regulation and an emphasis on market outputs.
		GT	40	MMBF/yr		2	
		GT	40	MMBF/yr		3	
		GT	40	MMBF/yr	*	4	
		GT	40	MMBF/yr		5	
	Timber - Restocking of non-stocked lands	GT	9,800	Acres	*	1	To ensure a level of restocking on lands suitable for timber management consistent with budget reductions, reduced regulations, emphasis on market outputs, and non-declining yield constraints.
	Timber - Aspen	GT	5	MMBF/yr	*	1	To ensure sufficient aspen timber volume to support dependent industries in the area of Mancos, Colorado.
					*	2	
					*	3	
					*	4	
					*	5	
						6	
						7	
						8	
						9	
						10	

TABLE 2 (Continued)

Constraints Specific to Each Alternative

Alternative	Output/ System	Type of Constraint	Constraint	Units	1/ Binding	Applicable Decade	Reason for Inclusion
	Range	GT	174,000	AUMS/yr	*	1	To ensure livestock forage production levels consistent with the emphasis on market outputs yet within the constraints imposed by 10 percent reductions in budgets.
		GT	180,000	AUMS/yr		2	
		GT	180,000	AUMS/yr		3	
		GT	180,000	AUMS/yr		4	
		GT	180,000	AUMS/yr		5	
	Wilderness Acreage	ET	All WSA's Recommended Suitable for Wilderness	Acres	*	1	To provide an alternative which emphasizes market outputs as well as recommends all Wilderness Study Areas for wilderness designation. This combination was requested by various individuals and organizations during one stage of the public involvement process.
	Budgetary Costs	LT	7.79	MM$/yr		1	To ensure that budgetary expenditures are reduced below current levels after the first decade.
		LT	6.64	MM$/yr		2	
		LT	6.06	MM$/yr		3	
		LT	5.89	MM$/yr		4	
		LT	5.94	MM$/yr		5	
H	Timber	GT	40	MMBF/yr	*	1	To ensure timber production levels consistent with the emphasis on timber, water yield, livestock forage, and developed recreation.
		GT	42	MMBF/yr	*	2	
		GT	44	MMBF/yr	*	3	
		GT	46	MMBF/yr	*	4	
		GT	48	MMBF/yr		5	
	Timber - Restocking of non-stocked lands	GT	9,200	Acres	*	1	To ensure compliance with the National Forest Management Act in bringing all land suitable for timber management under this alternative up to management standards by 1985.
	Timber - Aspen	GT	5	MMBF/yr		1	To ensure sufficient aspen timber volume to support dependent industries in the area of Mancos, Colorado.
						2	
						3	
					*	4	
					*	5	
						6	
						7	
						8	
						9	
						10	

TABLE 2 (Continued)

Constraints Specific to Each Alternative

Alternative	Output/ System	Type of Constraint	Constraint	Units	1/ Binding	Applicable Decade	Reason for Inclusion
	Timber - Aspen	LT	10	MMBF Aspen/yr		1	To ensure that aspen production does not grossly exceed present and anticipated needs of local industries utilizing that species.
		LT	10	MMBF Aspen/yr		2	
		LT	10	MMBF Aspen/yr	*	3	
		LT	10	MMBF Aspen/yr		4	
		LT	10	MMBF Aspen/yr		5	
	Range	GT	170,000	AUMS/yr		1	To ensure a level of livestock forage production consistent with emphasis on timber, water yield, livestock forage, and developed recreation.
		GT	191,000	AUMS/yr	*	2	
		GT	193,000	AUMS/yr		3	
		GT	197,000	AUMS/yr		4	
		GT	201,000	AUMS/yr	*	5	
	Wilderness	ET	West Needle & Piedra WSA's Recommended Suitable for Wilderness	Acres	*	1	To provide both wilderness and non-wilderness experiences on Wilderness Study Areas in conjunction with the emphasis on both market and non-market outputs.
	Budgetary Costs	LT	8.09	MM$/yr		1	To ensure that budgetary expenditures do not exceed reasonable levels for the outputs expected under this alternative.
		LT	7.60	MM$/yr	*	2	
		LT	6.69	MM$/yr		3	
		LT	6.39	MM$/yr		4	
		LT	6.36	MM$/yr		5	
I	Timber - Restocking of non-stocked land	GT	1,920	Acres	*	1	To ensure compliance with NFMA to bring all lands suitable for timber management up to management standards by 1985.
	Area managed under Prescriptions 4B ("E" portion), 5B ("E" portion), 6B ("A" portion), 7B1 and 9B	ET	0	Acres	*	1-5	To ensure that no prescriptions allowing "maximum modification" Visual Quality Objective would comprise this alternative.
	Wilderness	ET	All WSA's Recommended Suitable for Wilderness	Acres	*	1	To provide maximum level of non-market outputs derived from wilderness recreation opportunities.

TABLE 2 (Continued)

Constraints Specific to Each Alternative

Alternative	Output/ System	Type of Constraint	Constraint	Units	1/ Binding	Applicable Decade	Reason for Inclusion
J	Timber	GT	60	MMBF/yr	*	1	To provide a timber output level intermediate between the highest timber producing alternative in the draft EIS (Alternative B) and the proposed action (Alternative H).
	Timber - Restocking of non-stocked lands	GT	7,900	Acres	*	1	To ensure compliance with NFMA to bring all lands suitable for timber management up to management standards by 1985.
	Timber - Aspen	GT	5	MMBF/yr	*	1	To ensure sufficient aspen timber volume to support dependent industries in the area of Mancos, Colorado.
						2	
						3	
					*	4	
					*	5	
						6	
						7	
						8	
					*	9	
						10	
	Range	GT	172,000	AUM's/yr		1	To ensure a high level of livestock forage consistent with the emphasis on market opportunities.
			189,000			2	
			201,000		*	3	
			210,000		*	4	
			220,000		*	5	
	Area Managed under Prescriptions 2A ("G_2" portion), 3A ("H" portion), and 9B ("P_2" portion)	ET	0	Acres	*		To preclude any prescriptions which would manage available and capable timber land as unsuitable for timber management.
	Wilderness	ET	No WSA's Recommended Suitable for Wilderness	Acres	*		To allow maximum production of timber, livestock forage and other market outputs on the WSA's.

1/ Those constraints having an asterisk (*) in the column entitled "Binding" were limiting on the objective function (Maximize PNV) and can be attributed to at least part of the "opportunity costs" for that alternative.

COST-EFFICIENCY AND PNV TRADEOFF ANALYSIS

The discussion of cost-efficiency and present net value tradeoffs utilizes available economic data to focus on differences among alternatives. It should be read in conjunction with the information in Chapter IV which identifies specific differences in physical outputs, environmental conditions, economic and social impacts, receipts to the Treasury, budgets, and issues, concerns and opportunities.

Tables 3 and 4 show variations among alternatives in terms of PNV, discounted benefits, and discounted costs. PNV is a measure of national economic efficiency or net returns to United States taxpayers as a group. It does not provide a complete measure of net public benefits because only the value of outputs for which prices have been estimated are counted as benefits, even though the total expenditures necessary to produce both priced and non-priced benefits are counted as costs. This tends to bias the analysis in favor of alternatives having a larger proportion of priced benefits.

In Tables 3 and 4, the priced outputs that show the widest variation in contributions to discounted benefits (and to PNV) across alternatives are those which vary the most in quantity of outputs. On this Forest, those are timber, winter sports recreation, and wildlife-related recreation. Smaller variations in contributions are associated with dispersed and wilderness recreation, and the smallest contributions are associated with range, developed recreation and water.

In addition to the quantity of priced outputs, the pattern of production of those outputs over time influences PNV. Because of the process of discounting, the occurrence of priced outputs or management costs in early years influences PNV more than their occurrence in later years. The assumption of constant unit prices in this analysis (other than real price increases which apply evenly to all outputs of a given commodity) adds additional bias to PNV estimates. Neither differences in the quality of recreation experiences nor changes in commodity prices that may accompany changes in levels outputs (i.e., downward sloping demand curves) are reflected in the assigned values. Therefore, the PNV of an alternative stressing high quality experiences or low levels of commodity outputs is understated relative to the PNV's of other alternatives.

To the extent that discounting future priced benefits employed in calculating PNV does not accurately reflect society's true preference for future conditions relative to current conditions, PNV of BM #3 is a less accurate reflection of total public benefits. In contrast, PNV's of the alternatives were calculated under the policy of NDSY, which reduces the influence of discounting procedures by ensuring heavier output flows in later time periods than might otherwise occur.

Total differences among PNV's are explainable in terms of either (1) varying direct expenditures, and (2) the varying influence of constraints which limit the production of priced outputs and impose opportunity costs. Both direct costs and opportunity costs reflect varying emphases placed on the production of non-priced public benefits in each alternative.

TABLE 3

PNV Tradeoff Analysis - Summary, All Periods (Benefits and costs discounted at 4 percent, in million 1978 dollars) 1/

	Bench-mark #2	Bench-mark #3	Alternatives									
			D	H	E	F	B	C	G	J	A	I
Discounted Benefits (PVB)	553.495	627.409	556.950	605.176	582.919	564.750	625.482	555.266	561.817	577.834	512.825	496.448
Discounted Costs (PVC)	247.828	288.820	219.039	298.415	309.453	300.699	364.241	308.276	319.884	340.967	288.890	299.330
Present Net Value (PNV)	305.667	338.589	337.911	306.761	273.466	264.051	261.241	246.990	241.933	236.867	233.935	197.118
Difference in PVB (From MB#3)			-70.459	-22.233	-44.490	-62.659	-1.927	-72.143	-65.592	-49.575	-114.584	-130.961
Difference in PVC (From BM#3)			-69.781	9.595	20.633	11.879	75.421	19.456	31.064	52.147	.070	10.510
Difference in PNV (From BM#3)			-.678	-31.828	-65.123	-74.538	-77.348	-91.599	-96.656	-101.722	-114.654	-141.471
Contributions to Incremental Discounted Benefits by Resource												
Timber		50.010	28.287	34.629	25.028	30.379	52.177	22.240	33.541	42.246	22.983	14.024
Range		50.869	35.279	39.313	37.692	38.643	39.872	38.004	39.891	40.446	32.350	33.487
Developed Recreation - Public		58.890	51.117	58.890	57.060	57.060	58.916	57.098	51.117	58.890	56.068	56.069
Winter Sports Recreation		52.810	52.810	49.629	49.629	27.439	52.810	52.810	52.824	52.810	27.439	27.439
Dispersed Recreation		78.548	84.693	84.693	84.692	84.693	84.693	78.537	84.693	65.834	74.208	74.682
Wilderness Recreation		68.541	68.541	75.658	75.657	68.541	68.541	69.596	65.004	68.541	59.529	59.529
Wildlife-Related Recreation		245.046	223.140	245.316	236.853	242.411	242.066	221.435	220.470	231.403	226.443	221.952
Water		22.695	13.083	17.048	16.308	15.584	26.407	15.546	14.277	17.664	13.805	9.266

1/ All benefits and costs are incremental from Benchmark #1.

TABLE 4

PNV Tradeoff Analysis - Summary, All Periods (Benefits and costs discounted at 7 1/8 percent, in million 1978 dollars) 1/

	Bench-mark #2	Bench-mark #3	Alternatives									
			D	H	E	F	B	C	G	J	A	I
Discounted Benefits (PVB)	309.164	348.667	308.522	332.797	325.215	313.852	345.837	310.156	312.641	318.850	290.829	282.909
Discounted Costs (PVC)	141.829	165.421	127.327	169.111	178.976	168.957	201.256	175.627	179.994	190.927	164.600	169.595
Present Net Value (PNV)	167.335	183.246	181.195	163.686	146.239	144.895	144.581	134.529	132.647	127.923	126.229	113.314
Difference in PVB (From MB#3)			-40.145	-15.870	-23.452	-34.815	-2.830	-38.511	-36.026	-29.817	-57.838	-65.758
Difference in PVC (From BM#3)			-38.094	3.690	13.555	3.536	35.835	10.206	14.573	25.506	-.821	4.174
Difference in PNV (From BM#3)			-2.051	-19.560	-37.007	-38.351	-38.665	-48.717	-50.599	-55.323	-57.017	-69.932
Contributions to Incremental Discounted Benefits by Resource												
Timber		28.121	15.805	19.335	14.993	16.841	27.703	13.989	19.099	22.655	13.522	8.652
Range		30.476	21.551	23.953	23.107	23.593	23.975	23.197	24.268	24.365	20.107	20.798
Developed Recreation - Public		32.887	29.044	32.887	31.947	31.947	32.896	31.961	29.044	32.887	31.414	31.414
Winter Sports Recreation		27.228	27.228	26.066	26.066	15.667	27.228	27.228	27.239	27.228	15.667	15.667
Dispersed Recreation		42.699	45.175	45.175	45.175	45.175	45.175	42.691	45.175	33.099	40.702	41.006
Wilderness Recreation		35.013	35.013	38.774	38.774	35.013	35.013	35.573	34.226	35.013	31.907	31.907
Wildlife-Related Recreation		139.442	126.751	136.802	135.888	136.513	138.657	126.521	125.049	133.654	129.368	127.355
Water		12.801	7.955	9.805	9.265	9.103	15.190	8.996	8.541	9.949	8.142	6.110

1/ All benefits and costs are incremental from Benchmark #1.

DIRECT COSTS

The implications of direct expenditures are frequently complex and are often consequences of production decisions. For example, a decision to produce a high level of timber may lead to increased costs for road construction, reductions in fire, insect and disease protection costs, and either increases or decreases in wildlife management costs. In addition, recreation use may increase or shift to areas within the Forest. Although many benefits and costs are indirectly linked, only a synopsis of major differences across alternatives is presented here.

Examples of direct expenditures that account for the large variations in total costs among alternatives but that make little or no contribution to total discounted benefits are those focused on improving the quality of the recreation experience, increasing acreages classified as wilderness, and protecting and enhancing the resource production potential of the forest. These are discussed individually below.

Quality of Recreation

Certain expenditures enhance the quality of recreation experiences, and it is likely that the prices recreationists would be willing to pay for higher quality National Forest experiences are also higher. Because adequate supporting data do not exist, however, the PNV's in Tables 3 and 4 reflect only differences in the costs of providing high quality experiences at varying output levels. Because of a lack of available data, changes in the number of recreationists on the Forest were estimated mainly as a function of the land use allocation - specifically, the area in various Recreation Opportunity Spectrum (ROS) classes. Quality differences were not accounted for with respect to benefits.

Service Management Level of Developed Recreation Facilities

The level of management (as defined in Forest Service Handbook 1309.1) reflects both the level of services provided to recreationists and the attention paid to maintaining facilities. Percentages of developed facilities managed under FSM (Full Service Management) vary across alternatives. Although management of facilities at less than full service levels will lead to a shorter useful life and an earlier need for capital reinvestment, constant costs, regardless of service level, were assumed in the analysis. When combined with an inability to reflect quality differences in price per RVD, this implies that the public benefits of alternatives having high proportions of FSM are understated and the costs are overstated, relative to alternatives having smaller proportions of FSM.

Service Management Level of Wilderness

The level of management in wilderness reflects both the level of signing and related services provided to recreationists and the degree of management of wilderness use. In addition to increased quality of the recreation experience, non-priced public benefit increases due to expenditures for increased management include enhanced protection of

natural ecosystem conditions through increased guidance of use, and increased safety, as fewer recreationists will become lost or injured. Again, these benefits have not been quantified, and only differences in costs are reflected in PNV.

Trail Construction

Costs of trail construction vary from nearly $15,000 to $18,000 per mile (1982 dollar terms). In the first decade, average construction varies across alternatives from 6 to 27 miles per year. Non-priced public benefit that increase as a result of trail construction include increased resource protection, increased safety, and higher quality recreation experiences. Although not explicitly addressed in the analysis for this Forest, it is also likely that an increase in trail construction would lead to a decrease in certain management expenditures, such as for fire management, simply because access would be simpler. These benefits are not fully accounted for in the PNV tradeoff analysis.

Acres Designated as Wilderness

Proposed total wilderness acres varies from 335,000 to 445,000 acres across alternatives. General management costs are higher than for non-wilderness areas. High levels of wilderness management (e.g., permit system) have been assigned the highest management costs, but such differences are not reflected in total discounted benefits. Fire protection costs may be less in wildernesses if access is possible; however, there has not been enough experience with the concept of managed wildfires to determine if that is, in fact, generally true for this Forest. Finally, larger contiguous areas designated as wilderness may actually provide greater public benefits (at least before tradeoffs are considered) than smaller areas, but this is not certain.

Enhancement and Protection of Resource Base

Numerous expenditures are made primarily to rehabilitate, protect and enhance the production base of the Forest. These expenditures are for the most part indirectly reflected in PNV through the future production of priced outputs. For example, current enhancement of soil conditions through surveys, watershed improvements, and rehabilitation of degraded areas may be implied in predictions of future timber production as indicated in timber yield tables. On the other hand, present rehabilitation expenditures are often required to compensate for past activities, that is, they are costs of past rather than future production. In any case, specific priced benefits for these activities were not part of the PNV analysis.

Big Game Winter Range Carrying Capacity

Carrying capacity varies by alternative. Greater capacities would reduce the current conflicts encountered when big game summering on the National Forest move to land of other ownerships for the winter. This

public benefit is not recognized in PNV, although costs to provide such benefits are included. In contrast, the number of hunters attracted by larger big game herds are counted as RVD's and included as priced benefits.

Wildlife Habitat Diversity

Diversity depends both on the acreage and pattern of timber harvesting and the equivalent acres treated, which varies across alternatives from 121,000 to 240,000 per year in the first decade. As a consequence, management costs also vary across alternatives. Although diversity is recognized as a public benefit, economic values for varying levels of diversity were neither estimated nor included in the economic analysis.

Many additional examples could be given of activities and projects that increase costs but result in benefits which cannot be easily quantified or included in the efficiency analysis. The above discussion should be sufficient to underscore the fact that PNV is but one indication of the net public benefits that accrue from each alternative.

OPPORTUNITY COSTS

Alternatives were formulated to respond to a full range of issues, concerns and opportunities with varying levels of emphasis. Sets of analytical constraints reflecting those emphases were applied to the FORPLAN computer model, and these are discussed earlier in this appendix. Since the objective function was always to maximize PNV, that set of constraints that least interferred with maximization led to the highest PNV. Achieving the goals of Alternative D had the least effect on the objective function and therefore the least reduction in PNV. The sets of constraints applied to all other alternatives led to greater tradeoff costs between PNV and achievement of the goals related to issues and concerns.

Benchmark #3 was not constructed in this manner. Because it was intended to estimate the maximum PNV achievable, it was constrained only to ensure that it was approximately implementable and that it did not destroy the long-term productivity of soil and water resources. In contrast to all of the alternatives, its timber production patterns were not required to conform to the general policy of non-declining sustained yield (NDSY). Only timber flows constrained by NDSY were considered for the alternatives because of the need to maintin a continued supply for local dependent timber industries.

Several analytical constraints (other than NDSY) had major influences on the objective function of alternatives. Tables 1 and 2 list the constraints imposed on the alternatives, and the column entitled "Binding" indicates those binding on the final solution. In many alternatives, specification of a minimum timber harvest volume, especially in the first decade, was binding on the objective function. This indicates that timber harvesting may not make as great a contribution to PNV as other resource management activities. As pointed out in earlier discussion, many of the benefits of vegetation treatment and

timber harvesting were not priced in the FORPLAN model, whereas most of the costs were included. This would account for the negative contribution to PNV of certain timber production levels. One reason for imposing minimum constraints on first decade timber harvests, when such harvests do not contribute positively to PNV, is to respond to concerns for maintaining local income and employment. Achieving this and other non-priced public benefits requires incurring opportunity costs rather than direct public expenditures.

A second constraint having significant implications was the minimum livestock forage requirement, which was imposed to ensure output at a level consistent with the philosophy of the alternatives as well as ensure continued support to the local livestock industry. This constraint was often binding in early decades, reflective of the fact that permitted livestock grazing must be reduced in some areas to allow needed range improvement to take place. This need was built into the livestock forage yield tables.

Another constraint limiting the PNV in many alternatives required at least five MMBF of aspen volume every year for the first ten decades. This was to ensure a continued supply of raw material for industries which use aspen exclusively. Since aspen has the lowest price of the four timber types, but similar costs (except for reforestation), it does not often make a positive contribution to PNV. Yet many of the economic, visual, and ecological benefits of treating this species are not accounted for in the PNV analysis.

These and other constraints have been imposed to ensure that the model reflects real world conditions and that it addresses issues and concerns to the fullest extent possible. They are necessary to ensure that non-priced benefits are accounted for, although the acceptable tradeoffs between priced and non-priced outputs are subjectively determined.

APPENDIX G

RESULTS OF BENCHMARK ANALYSIS

RESULTS OF BENCHMARK ANALYSIS

Benchmark levels were discussed in Chapter II in the section by the same name. This appendix describes the constraints and assumptions used in formulating benchmarks and the results of benchmark analyses. Table 1 lists the constraints and assumptions used in formulating Benchmarks #1-#5. Benchmarks #2-#5 were analyzed using the FORPLAN model, whereas Benchmark #1 was analyzed by first assuming minimum level management applied across all acres of the Forest and then estimating the outputs, costs, and activities that would be associated with such a management regime.

Of the eleven benchmark levels, an economic efficiency analysis was only carried out for Benchmarks #1-#3. Results of applying both four percent and 7 1/8 percent discount rates are shown in Table 2. Minimum level management, Benchmark #1, has a relatively high PNV and B/C ratio due to incidental amounts of dispersed and wilderness recreation that occur with very small budget expenditures. All other benefits, costs, and economic efficiency indicators shown are incremental from Benchmark #1.

The efficiency analysis of Benchmark #2 cannot be readily compared with Benchmarks #1 or #3 because it includes dollar benefits for only those outputs that produce revenues to the United States Treasury (i.e., timber, livestock forage, public developed recreation and downhill skiing). The other two benchmarks, plus all the alternatives, have all resources with assigned values included in the efficiency analysis.

Benchmark #3 is an estimate of the highest possible present net value of the Forest, assuming that only minimum laws and regulations relating to stewardship of the land must be followed. This benchmark is the standard from which all alternatives are compared, and helps define the opportunity costs (or benefits forgone) of the constraints in the alternatives considered in detail.

Table 3 displays average annual resource outputs during the first decade and over the first five decades for Benchmarks #1-#3. For the remaining Benchmarks (#4-#11), no economic analysis was carried out, as only the level of output for the single resource being maximized was estimated. The purpose of this exercise was to define the decision space within which a feasible range of alternatives should be considered. For Benchmarks #4 and #5, maximum timber and livestock forage output levels were estimated using the FORPLAN model. For Benchmarks #6-#11, resource staff specialists estimated the capacity of the Forest to produce each resource. One exception was Benchmark #7 (maximum developed recreation), which would theoretically develop every accessible and suitable site on the Forest. This would result in astronomically large capacity figures which would not contribute to the analysis of the Forest resource base. Therefore, potential capacity of developed recreation was not estimated. Table 4 displays maximum potential resource outputs as estimated from the benchmark analyses.

TABLE 1

Constraints and Assumptions Associated with Benchmark Levels

Alternative	Purpose	Objective Function	Harvest Flow Constraint	Ending Inventory Constraint Applied?	Outputs Valued in the Analysis	Basis Used for Output Values	Other Constraints and Assumptions
Benchmark #1-Minimum Level	To determine outputs, activities, and costs associated with applying minimum level management	Minimize Cost	(This benchmark was not analyzed using the FORPLAN model)	N/A	Water, dispersed recreation	"Willingness to pay"	1. Protect life, health, safety of incidental users. 2. Prevent impairment of productivity of the land and protect adjacent land from fire, insect, or disease originating on National Forest land. 3. Apply minimum level management on all areas of the Forest.
Benchmark #2-Maximum present net value of outputs having established market price	To show resource uses, outputs and costs resulting from mgt. direction to maximize present net value of all outputs having established market price	Maximize present net value over five decades	Sequential lower and upper bounds at 25 percent	Yes	Timber, livestock forage, developed recreation	"Willingness to pay" - Historical data used for timber prices -1980 RPA or Regional prices used for all other outputs	1. Harvest level in first decade constrained to at least 80 percent of current level. (This constraint was not binding and therefore of no consequence to the solution.) 2. Activity constrained to such a level that productivity of soil and water is not impaired. 3. Unused output capacity not valued in the analysis. 4. All available, capable, and suitable, land area was used in FORPLAN analysis area acreage.
Benchmark #3-Maximum present net value of outputs having assigned value	To show resources, outputs and costs resulting from mgt. direction to maximize present net value of all outputs having assigned value	Maximize present net value over five decades	Sequential lower and upper bounds at 25 percent	Yes	Timber, livestock forage, dispersed and developed recreation, water	"Willingness to pay" - Historical data used for timber prices -1980 RPA or Regional prices used for all other outputs	1. Harvest level in first decade constrained to at least 80 percent of current level. (This constraint was not binding and therefore of no consequence to the solution.) 2. Activity constrained to such a level that productivity of soil and water is not impaired. 3. Unused output capacity is not valued in the economic analysis. 4. All capable, suitable, and available land area was used in FORPLAN analysis area acreage.

TABLE 1 (Continued)

Constraints and Assumptions Associated with Benchmark Levels

Alternative	Purpose	Objective Function	Harvest Flow Constraint	Ending Inventory Constraint Applied?	Outputs Valued in the Analysis	Basis Used for Output Values	Other Constraints and Assumptions
							5. This benchmark was used in the maximum present net value tradeoff analysis shown in Table II-3.
Benchmark #4-Maximum timber level	To determine biological potential for timber production	Maximize timber over five decades	Sequential lower and upper bounds at 25 percent	Yes	Timber, livestock forage, dispersed and developed recreation, water	"Willingness to pay" - Historical data used for timber prices -1980 RPA and Regional prices used for all other outputs	1. Harvest level in first decade constrained to at least 80 percent of current level. 2. Activity constrained to such a level that productivity of soil and water is not impaired. 3. Unused output capacity is not valued in the economic analysis. 4. All capable, suitable, and available land area was used in FORPLAN analysis area acreage constraints.
Benchmark #5-Maximum livestock forage level	To determine the biological potential for livestock forage production	Maximize livestock forage over five decades	Sequential lower and upper bounds at 25 percent	Yes	Timber, livestock forage, dispersed and developed recreation, water	"Willingness to pay" - Historical data used for timber prices -1980 RPA or Regional prices used for all other outputs	1. Livestock forage in first decade constrained to at least 80 percent of current level. 2. Activity constrained to such a level that productivity of soil and water is not impaired. 3. Unused output capacity is not valued in the economic analysis. 4. All land capable, suitable, and available for livestock grazing was used in FORPLAN analysis area acreage constraints.
Benchmarks #6 through #11	(These were not analyzed using the FORPLAN model. Output levels were estimated by resource specialists, results of which are shown in Table 4 of this appendix.)						

TABLE 2

Economic Analysis of Benchmark Levels at Discount Rates of 4 Percent and 7-1/8 Percent. 1/

Economic Parameter	Benchmark #1	Benchmark #2	Benchmark #3
4% Discount Rate			
Present Net Value, Incremental	1,095.0	305.7	338.6
Benefit Cost Ratio, Incremental	89.7	2.2	2.2
Discounted Benefits, Incremental	1,107.3	553.5	627.4
Discounted Costs, Incremental	12.3	247.8	288.9
7 1/8% Discount Rate			
Present Net Value, Incremental	694.7	167.3	183.2
Benefit Cost Ratio, Incremental	99.2	2.1	2.1
Discounted Benefits, Incremental	701.7	309.2	348.7
Discounted Costs, Incremental	7.1	141.8	165.4

1/ All figures, except those for Benchmark #1, are incremental above Benchmark #1 (Minimum Level Management).

TABLE 3

Total Resource Outputs for Benchmarks #1 through #3

	Benchmark #1	Benchmark #2	Benchmark #3
First Period - Average Annual Outputs			
Timber (MCF)	--	38	43
Range (AUM's)	--	174	207
Developed Recreation (MRVD's)	--	403	581
Dispersed Recreation (MRVD's)	210	1,220	1,317
Winter Sports (MRVD's)	--	302	302
Wilderness Use (MRVD's)	80	264	264
Wildlife Habitat Improvement (Acres Treated)	--	7,045	3,165
Increased Water Yield (M Acre-Feet)	--	2,496	2,502
Arterial Road Construction/ Reconstruction (Miles)	--	3	6
Collector Road Construction/ Reconstruction (Miles)	--	8	17
Summary, 50 Years - Average Annual Outputs			
Timber (MCF)	--	30	53
Range (AUM's)	--	286	249
Developed Recreation (MRVD's)	--	760	1,197
Dispersed Recreation (MRVD's)	210	1,945	1,993
Winter Sports (MRVD's)	--	921	921
Wilderness Use (MRVD's)	80	570	570
Wildlife Habitat Improvement (Acres Treated)	--	1,585	1,038
Increased Water Yield (M Acre-Feet)	--	2,495	2,514
Arterial Road Construction/ Reconstruction (Miles)	--	17	33
Collector Road Construction/ Reconstruction (Miles)	--	37	73

TABLE 4

Maximum Potential Resource Outputs as Indicated from Benchmark Analyses (Average annual outputs)

Output	Unit	Benchmark #	Maximum Output Level
PERIOD 1 (1981-1990)			
Timber Production	MMBF	4	221
Livestock Grazing	MAUM	5	309
Dispersed Recreation	MRVD	6	24,010
Developed Recreation	MRVD	7	N/A
Downhill Skiing	MRVD	8	4,000
Wilderness Recreation	MRVD	9	296
Wildlife Habitat Improvement	Acres	10	9,900
Total Water Yield	M Ac. Ft.	11	2,499
PERIOD 2 (1991-2000)			
Timber Production	MMBF	4	165
Livestock Grazing	MAUM	5	385
Dispersed Recreation	MRVD	6	24,010
Developed Recreation	MRVD	7	N/A
Downhill Skiing	MRVD	8	4,000
Wilderness Recreation	MRVD	9	470
Wildlife Habitat Improvement	Acres	10	12,800
Total Water Yield	M Ac. Ft.	11	2,522
PERIOD 3 (2001-2010)			
Timber Production	MMBF	4	125
Livestock Grazing	MAUM	5	408
Dispersed Recreation	MRVD	6	24,010
Developed Recreation	MRVD	7	N/A
Downhill Skiing	MRVD	8	4,000
Wilderness Recreation	MRVD	9	640
Wildlife Habitat Improvement	Acres	10	11,600
Total Water Yield	M Ac. Ft.	11	2,539
PERIOD 4 (2011-2020)			
Timber Production	MMBF	4	157
Livestock Grazing	MAUM	5	416
Dispersed Recreation	MRVD	6	24,010
Developed Recreation	MRVD	7	N/A
Downhill Skiing	MRVD	8	4,000
Wilderness Recreation	MRVD	9	716
Wildlife Habitat Improvement	Acres	10	12,300
Total Water Yield	M Ac. Ft.	11	2,565
PERIOD 5 (2021-2030)			
Timber Production	MMBF	4	118
Livestock Grazing	MAUM	5	448
Dispersed Recreation	MRVD	6	24,010
Developed Recreation	MRVD	7	N/A
Downhill Skiing	MRVD	8	4,000
Wilderness Recreation	MRVD	9	812
Wildlife Habitat Improvement	Acres	10	12,900
Total Water Yield	M Ac. Ft.	11	2,582

APPENDIX H

UNSUITABILITY ASSESSMENT FOR ALL OR CERTAIN STIPULATED METHODS OF COAL MINING WITHIN KNOWN RECOVERABLE COAL RESOURCE AREAS IN THE SAN JUAN NATIONAL FOREST

INTRODUCTION AND PURPOSE

On August 3, 1977, the President signed into law the Surface Mining Control and Reclamation Act. Section 522 of the Act requires the Secretary of the Interior to conduct a Federal lands review in order to determine those lands unsuitable for surface coal mining or surface operations and impacts of underground coal mining.

Twenty criteria have been developed (43 CFR 3461.1) to assess the unsuitability for mining of areas of medium to high potential for coal recovery. These areas are classified by the U. S. Geological Survey as Known Recoverable Coal Resource Areas (KRCRA's). The criteria will aid land managers in identifying those areas with key features, principally environmental, that cannot properly be protected if subjected to mining. Application of the unsuitability criteria will ensure that protection of the most sensitive and valuable environmental features of Federal lands is accomplished in a consistent, uniform, and objective manner so that coal development planning will be concentrated in areas where environmental conflicts are less likely to add delay, cost, or conflict to production efforts.

The unsuitability criteria are designed to be applied only to those areas in which surface (strip) mining of coal will occur, or to those areas in which underground mining of coal will produce surface effects which include disturbance to surface occupancy, subsidence, fire, and other detrimental environmental impacts to Federal lands. Areas in which underground mining of coal will not produce such surface effects are exempt from application of the criteria.

The Memorandum of Understanding between the Departments of Agriculture and Interior, signed May 20, 1980, assigned the responsibilities for assessing Federal lands which contain federally owned coal resources classified by the U. S. Geological Survey as KRCRA's to determine which are unsuitable for all or certain types of coal mining operations. The San Juan National Forest assessed the Federal lands under their jurisdiction within the KRCRA's, omitting the lands with other surface ownership or privately owned minerals.

The assessment process for coal resource lands within the San Juan National Forest has been undertaken as an integral part of the comprehensive land-use planning effort by the Forest Interdisciplinary Team. Results of the assessment process will support land allocation decisions and help determine the direction of coal resource development over the life of the Forest Land Management Plan. This Appendix contains the results achieved to date and serves to notify interested individuals and local, State, and Federal agencies of the recommended decisions on coal-related land use within the classified coal resource lands of the Forest, and to invite comment on those decisions.

DESCRIPTION OF THE UNSUITABILITY ASSESSMENT PROCESS

This Appendix to the Environmental Impact Statement for the San Juan National Forest Land Management Plan describes the unsuitability assessment process involving the application of 20 unsuitability criteria adopted by the Secretary of the Interior and delegated to the Forest Service, Department of Agriculture, and the results of their application. These 20 criteria can be divided into four categories:

1. Those required under Section 522 of the Surface Mining Control and Reclamation Act (SMCRA)(e.g., Federal land systems, buffer zones along rights-of-way and easements or adjacent to communities and buildings);

2. Criteria discretionary under Section 522 of SMCRA (e.g., lands used for scientific studies, municipal watersheds, and floodplains);

3. Other requirements under statute which the Department chooses to enforce through application of specific criteria (e.g., Federally listed endangered species, and bald and golden eagle protection); and

4. Those resources which are not addressed specifically by statute, but which are of high public interest (e.g., scenic areas, state fish and wildlife and state lands criteria).

The 20 criteria were applied within limits imposed by the availability of existing data. If sufficient data were not available to apply the criteria, areas were considered suitable subject to additional information that may come from public comment or during activity planning, lease sale, or post-lease sale activities.

The process for assessing National Forest administered lands unsuitable for coal mining involves six steps, the first four of which have been accomplished:

1. Federal lands (i.e., National Forest System lands with federally owned coal) contained within a Known Recoverable Coal Resource Area (KRCRA) as classified by the U. S. Geological Survey were considered suitable, subject to application of the unsuitability criteria.

2. Exemptions to the unsuitability criteria were studied for possible application. Exemptions would remove coal lands from further assessment, retaining them as suitable for coal mining.

3. The unsuitability criteria were studied for possible application. Application of a criterion would render coal lands unsuitable for all or certain stipulated methods of coal mining and remove them from further consideration for leasing.

4. Exceptions to the unsuitability criteria were studied for possible application. Exceptions would allow coal mining to proceed subject to certain stipulations which would be attached to the lease or mining permit.

Remaining steps to be completed are:

5. Areas where leasing may take place, as determined by the preceding four steps, will not include lands where other resources and uses are determined during land management planning to be more important than coal production. These multiple-use decisions will also determine when other resources and uses may be temporarily or permanently modified to allow for coal leasing and production.

6. Within 2 years prior to proposed leasing of Federal coal for surface mining, owners of land which overlies Federal coal within the proposed lease will be consulted and asked to state their preference for or against the leasing of Federal coal under their land. If a significant number of surface owners opposes leasing of Federal coal under their land, leasing may be dropped by the Bureau of Land Management from further consideration in that area.

Future actions which may affect the recommended designations of unsuitability of coal resource lands on the San Juan National Forest include:

1. Acquisition of more detailed information concerning land or resource values;

2. Public comment, and consultation with Federal and State agencies, as required by Title 43, Code of Federal Regulations, Part 3461.3-2;

3. Governmental review of the Federal Coal Management Program and attendant regulations;

4. Site-specific evaluation of an operating plan for a proposed coal mine, or assessment of lands included in a proposed coal lease; and

5. Petitions for change of designation of unsuitability of coal resource lands.

LOCATION AND DESCRIPTION OF UNSUITABILITY ASSESSMENT AREAS

The San Juan National Forest contains two areas within the Durango KRCRA. These have been designated as Unsuitability Assessment Areas (UAA's) and are shown in Figure 1.

Unsuitability Assessment Area 1 (UAA 1) is an 80 acre tract within the Mancos Ranger District in Montezuma County. UAA 1 is Federally owned in both surface and mineral estate and consists of a portion of the east-facing slope of Menefee Mountain near U. S. Highway 160 with no improvements (Figure 2). There has been no historical production of coal or other mineral resources from UAA 1; current land use is limited to two Special Use grazing pastures. No Federal coal leases or applications are pending. UAA 1 partially contains one Federal oil and gas lease; potential for occurrence of oil and gas is medium to high. Coal in UAA 1 is recoverable by either surface or underground mining.

INDEX MAP SHOWING LOCATIONS OF UNSUITABILITY

ASSESSMENT AREAS 1 AND 2

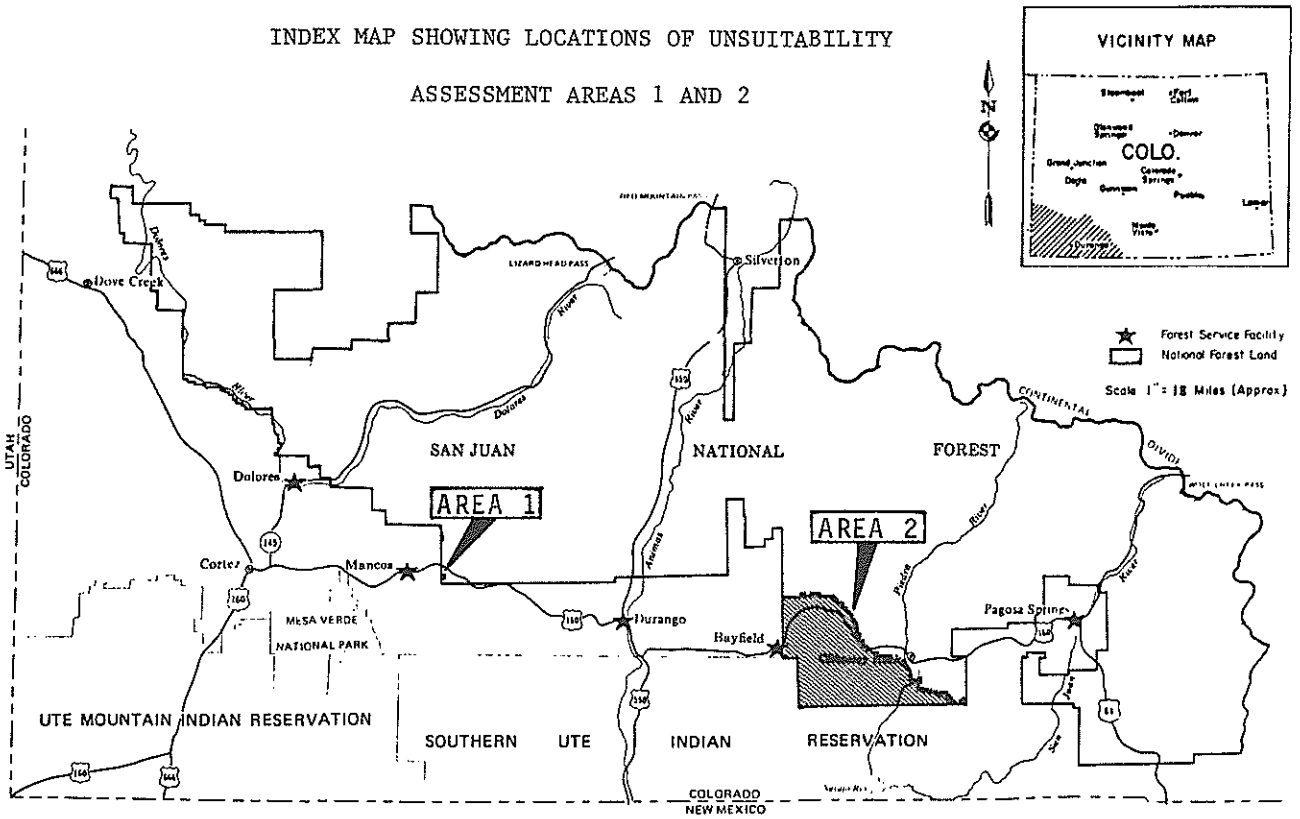


FIGURE 1

MAP OF UNSUITABILITY ASSESSMENT AREA 1

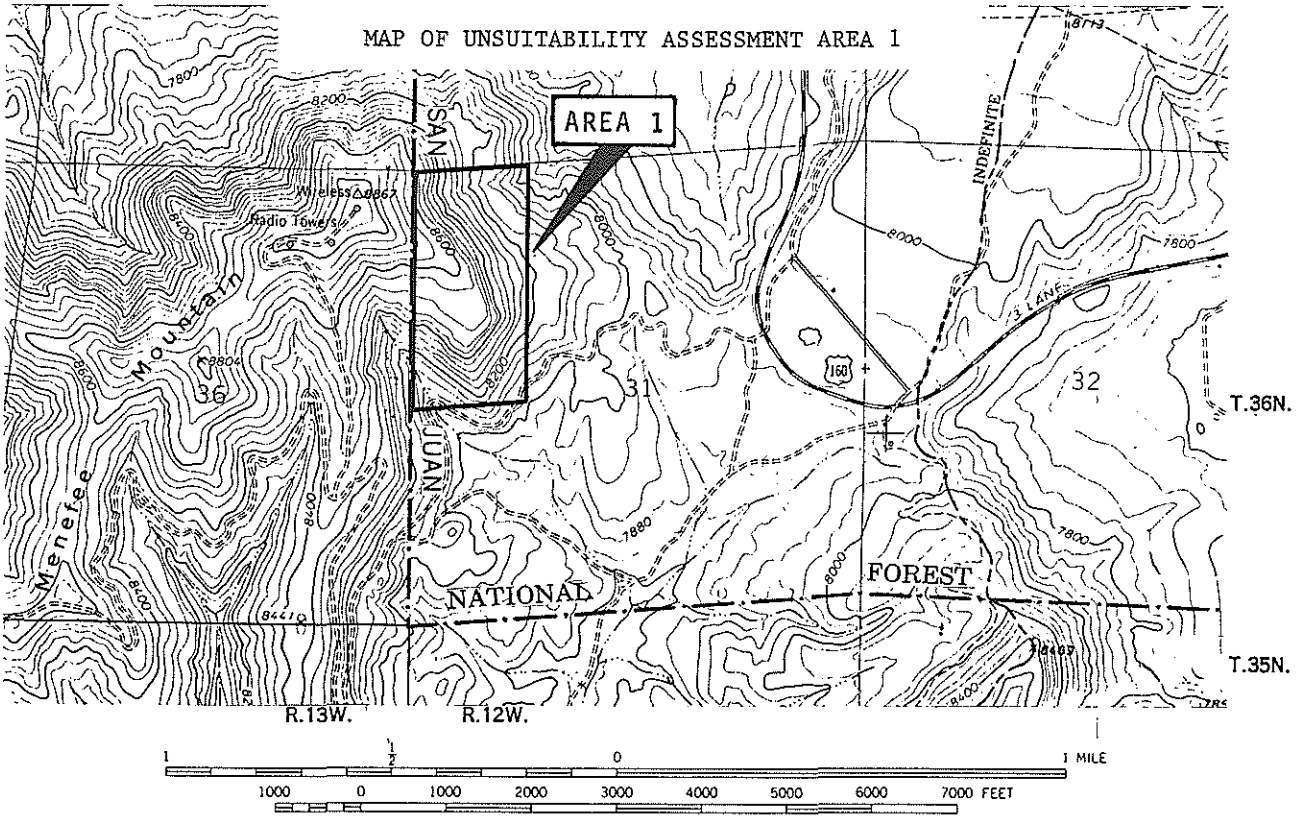


FIGURE 2

Unsuitability Assessment Area 2 (UAA 2) consists of approximately 75,500 acres on the Pine and Pagosa Ranger Districts in La Plata and Archuleta Counties (Figure 3). The tract contains varied terrain including the H-D Mountains and the drainages of the Piedra River and Stollsteimer, Beaver and Spring Creeks, among others. Land ownership patterns are complex and include Federal ownership of coal only, surface only, both coal and surface, and neither; as well as varied state and private ownerships of coal and surface. Improvements include U. S. and State roads, Forest System roads, radio facilities, natural gas pipelines, electric transmission lines, fences and erosion control projects. A portion of this tract is within the Chimney Rock Archaeological Area and the entire tract is potentially valuable for cultural resources. A cultural inventory is scheduled for 1984 - 1985 and it will help to refine this initial assessment.

Areas of private ownership of coal under Federal surface ownership (alienated rights), and private coal and surface ownership, are not subject to assessment according to 43 CFR 3461. These areas, combined as shown in Figure 3, comprise approximately 23,500 acres, or approximately 31 percent of the 75,500 acres of UAA 2.

Current land use is varied. Beyond the improvements listed above, UAA 2 lies within two grazing allotments; two timber sales are scheduled for completion in 1981, and one timber sale will be offered in October of 1982. The area wholly or partially contains 43 Federal oil and gas leases and three Federal oil and gas lease applications. Several natural gas wells have been drilled and completed in the Zabel Canyon-Spring Creek area, which contains a proven reserve of natural gas. Potential for occurrence of oil and natural gas is medium to high throughout UAA 2.

Coal production within UAA 2 has historically been minor. One strip mine is currently active on privately owned coal and surface along Stollsteimer Creek. The operator of this mine, Chimney Rock Coal, has a Federal emergency coal lease application for approximately 45 acres of National Forest land adjacent to the present open-pit operation. As of June 1983, no other Federal coal lease applications or leases exist within UAA 2.

Coal in UAA 2 is recoverable by either surface or underground mining methods.

SUMMARY OF RESULTS OF THE UNSUITABILITY CRITERIA APPLICATION

Completion of Steps 1-4 of the unsuitability assessment process resulted in the following recommended unsuitability designations:

UAA 1: 80 acres (100 percent) of UAA 1 were found to be unsuitable for surface coal mining under unsuitability criterion 2. Underground methods of coal mining would be permitted.

MAP OF UNSUITABILITY ASSESSMENT AREA 2 SHOWING LAND AND COAL OWNERSHIP PATTERNS AND CULTURAL FEATURES

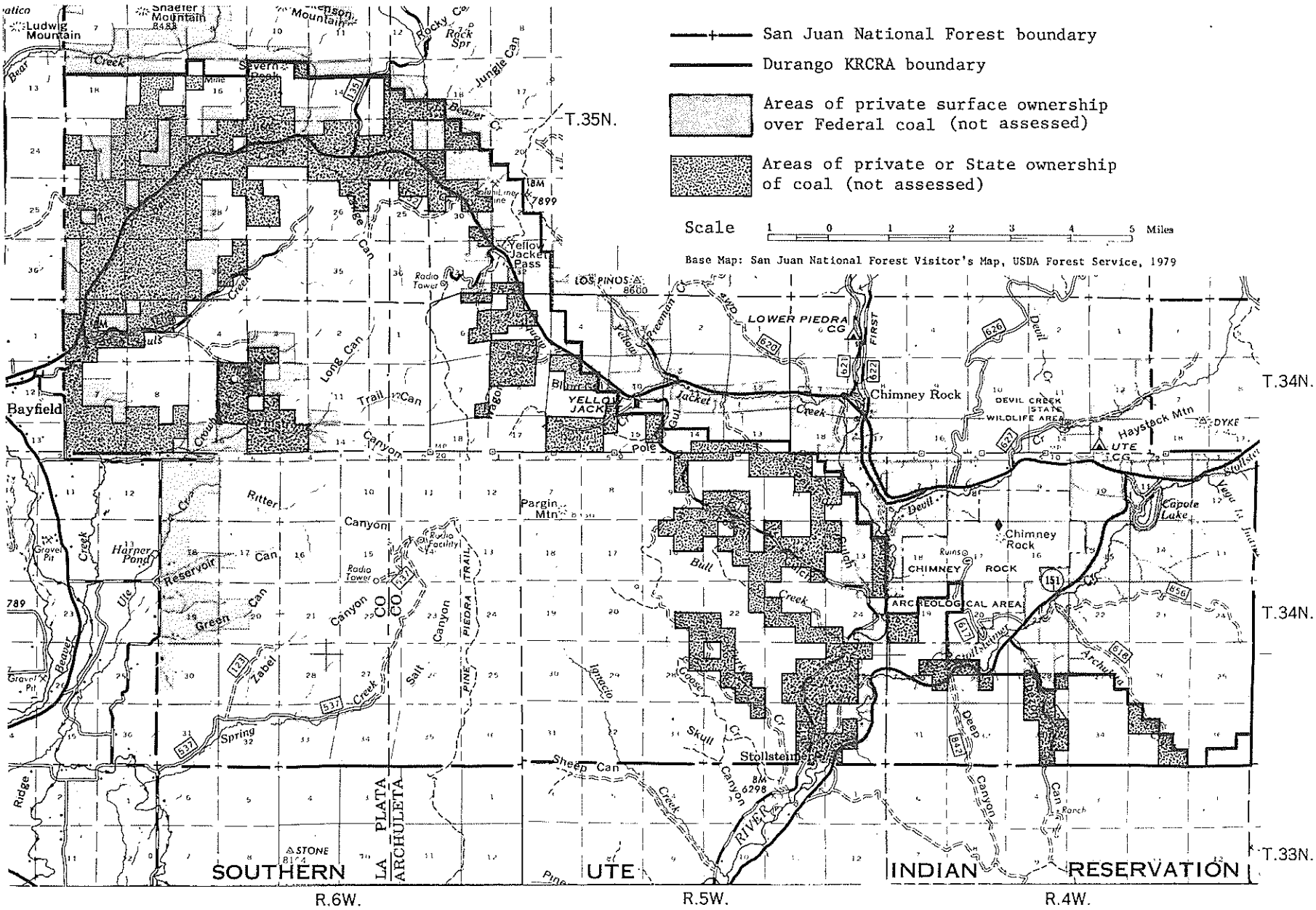


FIGURE 3

UAA 2: Approximately 2,125 acres (four percent of total area) of UAA 2 were found to be unsuitable for all methods of coal mining under unsuitability criteria 3 and 19. All methods of coal mining would be permitted on the remaining 49,875 acres of assessed land in UAA 2, with appropriate mitigation of surface impacts to protect specific surface values.

Following is a summary of the results in each step of the unsuitability assessment process.

In the first step, Unsuitability Assessment Areas 1 and 2 were delineated. Eighty areas (100 percent) of UAA 1 and 52,000 acres (about 70 percent) of UAA 2 were determined to be subject to the unsuitability assessment process. The remaining 23,500 acres (30 percent) of UAA 2 were not subject to assessment because the coal in these areas is not owned by the Federal government or is beneath non-Forest surface ownership.

The small size of UAA 1 allows control of coal activity which may be proposed for underground mining methods; therefore, this area can be excluded from assessment of affects from subsurface mining. The much larger area of UAA 2 prevents site-specific study of possible effects of underground mining; for this reason, and since the coal in UAA 2 has been classified by USGS as recoverable by either surface or underground methods, the area was determined to be subject to assessment under the criteria for all methods of coal mining. Site-specific operating plans for underground mining will be required to show that no significant surface effects will occur in order to determine that the unsuitability criteria do not apply to a specific area.

In the second step, exemptions to the unsuitability criteria were studied. No exemptions were found to be applicable; therefore, no lands were removed from consideration in this step.

The third step involved application of the unsuitability criteria. Sixteen of the 20 unsuitability criteria were found not to apply to UAA 1; one criterion could not be applied due to lack of information. Nine unsuitability criteria did not apply to UAA 2, and two unsuitability criterion could not be applied due to lack of knowledge. The remaining three unsuitability criteria which applied to UAA 1 and nine unsuitability criteria which applied to UAA 2 were used to delineate areas unsuitable for surface and/or underground coal mining. Table 1 lists the criteria and their applicability.

After application of the unsuitability criteria both UAA 1 and UAA 2 were considered unsuitable for any method of coal mining. This designation affected the total 52,080 acres of assessed lands in both areas.

In the fourth step, exceptions to the unsuitability criteria were studied for application. In UAA 1, exceptions were found to apply to the three applicable unsuitability criteria. In UAA 2, exceptions were found to apply to seven of the nine applicable unsuitability criteria. Table 2 lists the criteria for which exceptions were applied.

TABLE 1

Criteria Applicable to Unsuitability Assessment Areas

Criterion Number	Criterion Title	Applicable to UAA 1	Applicable to UAA 2
1	Federal Land Systems	Yes	Yes
2	Rights-of-Way and Easements	Yes	Yes
3	Buffer Zones Along Rights-of-Way	No	Yes
4	Wilderness Study Areas	No	No
5	Scenic Areas	No	No
6	Lands Used for Scientific Studies	No	No
7	Historic Lands and Sites	*	*
8	Natural Areas	No	No
9	Federally Listed Endangered Species	No	Yes
10	State Listed Endangered Species	No	Yes
11	Bald and Golden Eagle Nests	No	No
12	Bald and Golden Eagle Roost and Concentration Areas	No	Yes
13	Falcon Cliff Nesting Sites	No	No
14	Migratory Birds	Yes	Yes
15	State Resident Fish and Wildlife	No	Yes
16	Floodplains	No	*
17	Municipal Watersheds	No	No
18	National Resource Waters	No	No
19	Alluvial Valley Floors	No	Yes
20	State Proposed Criteria	No	No

* Not applied due to lack of adequate information.

After application of the exceptions, all 80 acres of UAA 1 were found to be unsuitable for surface coal mining but suitable for underground coal mining with appropriate protection of the surface from mining operations and impacts. This designation affects 100 percent of UAA 1 (Figure 2).

In UAA 2, approximately 2,125 acres were retained as unsuitable for all methods of coal mining after application of the exceptions listed in Table 2. The remaining 49,875 acres of assessed land in UAA 2 were considered suitable for surface coal mining and underground coal mining with appropriate protection of the surface from mining operations and impacts. Figure 4 illustrates the results of the four completed steps of the unsuitability assessment process for UAA 2. Table 3 lists the acreage and percentages of lands designated as unsuitable in both UAA 1 and UAA 2.

TABLE 2

Application of Exceptions to Criteria

Criterion Number	Criterion Title	Applicable to UAA 1	Applicable to UAA 2
1	Federal Land Systems	Yes	Yes
2	Rights-of-Way and Easements	Yes	Yes
3	Buffer Zones Along Rights-of-Way	-	No
9	Federally Listed Endangered Species	-	Yes
10	State Listed Endangered Species	-	Yes
12	Bald and Golden Eagle Roost and Concentration Areas	-	Yes
14	Migratory Birds	Yes	Yes
15	State Resident Fish and Wildlife	-	Yes
19	Alluvial Valley Floors	-	No

TABLE 3

Land Unsuitable After Completion of Steps 1 through 4

		Acres	Percent (Assessed Land)	Percent (Total Area)
Area Unsuitable for Surface Mining of Coal	UAA 1	80	100	100
	UAA 2	2,125	3	4
Area Unsuitable for Underground Mining of Coal	UAA 1	0	0	0
	UAA 2	2,125	3	4
Area Unsuitable for All Methods of Coal Mining	UAA 1	0	0	0
	UAA 2	2,125	3	4

UAA 1 was considered suitable for underground mining methods only.

Approximately 2,125 acres in UAA 2 were considered unsuitable for all methods of coal mining. Lands considered unsuitable are those which clearly should not be mined because of resource conflicts and environmental sensitivities which cannot be mitigated or which would require stipulations in the lease or mining permit so restrictive that mining

MAP OF UNSUITABILITY ASSESSMENT AREA 2 SHOWING RESULTS OF ASSESSMENT PROCESS

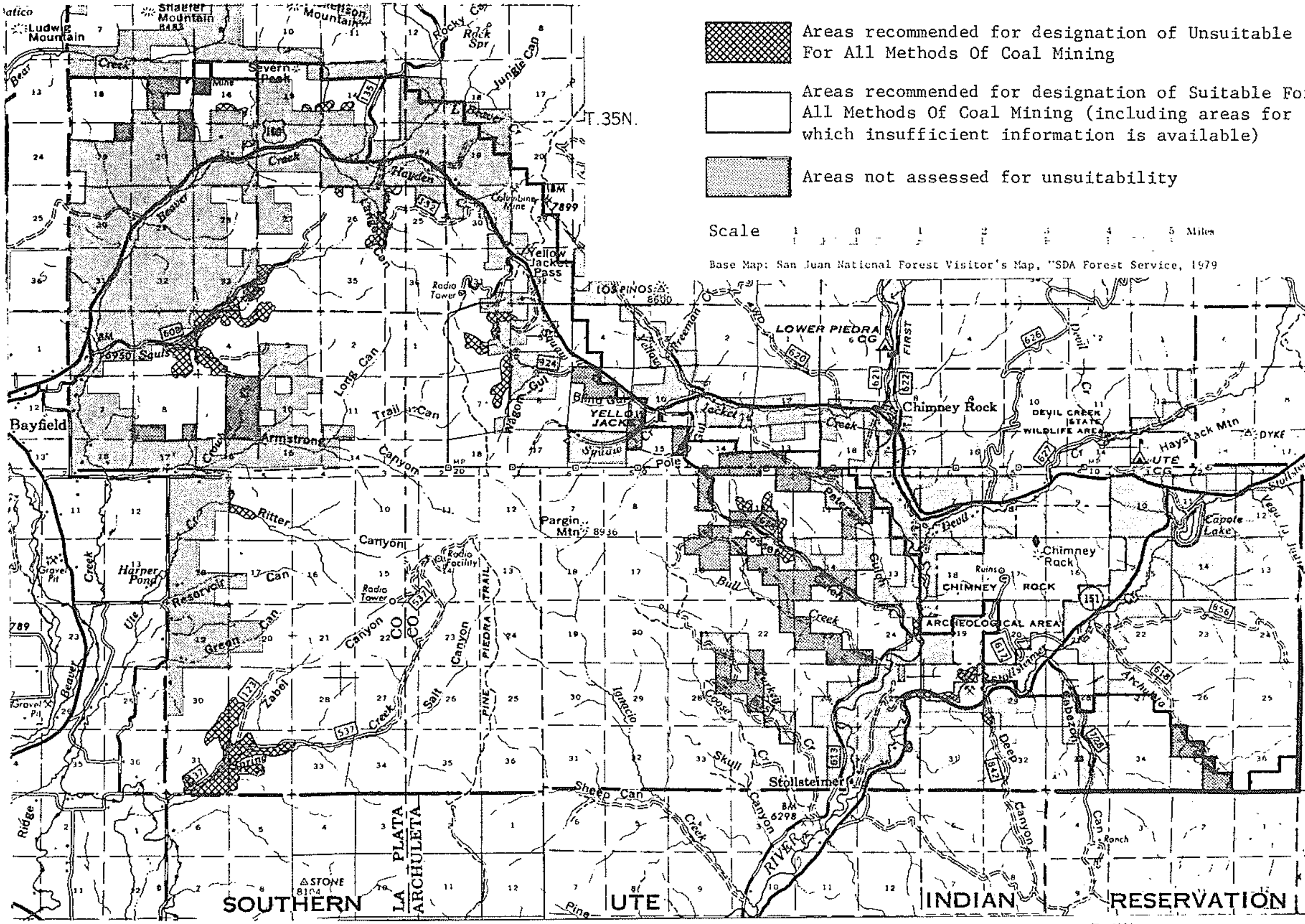


FIGURE 4

would be uneconomic. The remaining 49,875 acres of assessed land in UAA 2 are considered suitable for mining of coal at this stage of the assessment process and may be considered further for coal leasing.

The impact of unsuitability designation on the environment may result in the following maximum or worst-case effects:

1. No disturbance to any surface resources or values in areas designated as unsuitable for both surface and underground mining (23 percent of coal lands assessed in this study).

2. Surface disturbance limited to surface operations and impacts incidental to underground mining in areas designated as suitable for underground mining only (UAA 1 - 80 acres).

3. Surface disturbance due to surface mining, and surface operations and impacts incidental to underground mining in areas designated as suitable for all methods of coal mining (97 percent of coal lands assessed in this study).

The impact of unsuitability designation on the local economy will be minor. Economic support of the area by the coal production industry is limited. There has been no production of coal from Unsuitability Assessment Area 1 (UAA 1). While production of coal from UAA 2 has occurred since the late 1800's, it has been sporadic and of limited scope. Coal recovered from the area has been for dominantly local use as fuel for ore smelters, railroads, and space heating.

Current production on UAA 2 is solely from the Chimney Rock Coal Company mine on privately owned land and coal along Stollsteimer Creek south of Chimney Rock. Production in 1981 was 255,011 tons, a sharp increase over previous years' coal recovery. Several smaller mines were active in 1979 within the Durango KRCRA but outside of the Forest; total production in 1979 from these mines was 97,412 tons of coal.

Other than the emergency lease application submitted by Chimney Rock Coal, interest in development of coal resources on the Forest by industry has been generally lacking. The San Juan River Regional Coal Team indicates further leasing of coal is scheduled for 1986 in the Second Round Lease Sale.

Due to the limited amount of coal within the Unsuitability Assessment Areas of the San Juan National Forest and the current low demand for those coal resources, the designation of unsuitability is unlikely to present a serious adverse impact to coal development, the environment, the economy, or the supply of coal.

FINDINGS OF INDIVIDUAL CRITERION AND EXCEPTION APPLICATION

Criterion Number 1 "All Federal lands included in the following land systems or categories shall be considered unsuitable: National Park System, National Wildlife Refuge System, National System of Trails, National Wilderness Preservation System, National Wild and Scenic Rivers

System, National Recreation Areas, lands acquired with money derived from the Land and Water Conservation Fund, National Forests, and Federal lands in incorporated cities, towns, and villages."

Both Unsuitability Assessment Areas (UAA's) 1 and 2 are considered unsuitable for all methods of coal mining involving surface coal mining operations. This includes strip mining, and underground mining where there would be surface-disturbing operations and impacts.

Exception: A lease may be issued within the boundaries of the Forest if no significant recreational, timber, economic, or other values exist which may be incompatible with the lease; and surface operations and impacts are incidental to an underground coal mine, or surface mining may be in compliance with the Multiple-Use Sustained Yield Act of 1960, the Federal Coal Leasing Amendments Act of 1976 and the Surface Mining Control and Reclamation Act of 1977.

There are no significant recreational, timber, economic, or other values in UAA 1 (80-acre tract) or UAA 2 (75,500-acre tract) which are incompatible with surface operations and impacts incidental to an underground coal mine. Stipulations on mining methods and mitigation of surface effects can provide adequate protection for recreational facilities and sites, timber areas, mineral leases other than coal, mining claims for locatable minerals, and sources of salable minerals. Determination of compliance with the Acts cited in the exception requires site-specific operating plans for each mining proposal involving surface mining operations.

Finding: Unless other criteria apply, both UAA 1 and UAA 2 are considered suitable for all methods of coal mining including surface mining operations.

Criterion Number 2 - "Federal lands that are within rights-of-way or easements or within surface leases for residential, commercial, industrial, or other public purposes on Federally owned surface shall be considered unsuitable."

This criterion applies to both areas of the KRCRA on the Forest. Unsuitability Assessment Area 1 (UAA 1) is contained within 2 special use pastures. Unsuitability Assessment Area 2 (UAA 2) is contained within the H.D.'s, Turkey Exclosure, and Chimney Rock grazing allotments and contains rights-of-way for U.S. and State roads, Forest system roads and easements for pipelines and electric lines. Other uses include radio facilities and fences.

Exception: A lease may be issued and mining operations approved in these areas if all or certain types of coal development will not interfere with the purpose of the right-of-way, easement, or other special use.

This exception applies to UAA 1 for underground mining only.

Coal mining with properly mitigated surface operations and impacts will not interfere with grazing uses in UAA 2. Location of surface operations and impacts of all methods of coal mining away from road, fence, gas and electric lines and radio facility sites will prevent interference with these uses.

Finding: UAA 1 is unsuitable for surface coal mining (80 acres). UAA 2 is suitable for all methods of coal mining with mitigation of surface impacts (52,000 acres).

Criterion Number 3 - "Federal lands affected by Section 522(e) (4) and (5) of the Surface Mining Control and Reclamation Act of 1977 shall be considered unsuitable. This includes lands within 100 feet of the outside line of the right-of-way of a public road or within 100 feet of a cemetery, or within 300 feet of any public building, school, church, community or institutional building or public park or within 300 feet of an occupied dwelling."

This criterion does not apply to UAA 1. UAA 2 (Figure 5) contains portions of U.S. 160 and Colorado 151 to which this criterion applies. These areas are considered to be unsuitable for coal mining (190 acres).

No exceptions apply to either area of the KRCRA on the Forest.

Finding: The portions of the U.S. 160 and Colorado 151 road corridors subject to Criterion 3 are unsuitable for coal mining.

Criterion Number 4 - "Federal lands designated as wilderness study areas shall be considered unsuitable while under review by the Administration and the Congress for possible wilderness designation."

This criterion does not apply to either area of the KRCRA on the Forest. No such areas are designated as wilderness study areas.

Criterion Number 5 - "Scenic Federal lands designated by visual resource management analysis as Class I (an area of outstanding scenic quality or high visual sensitivity) but not currently on the National Register of Natural Landmarks shall be considered unsuitable.

This criterion does not apply to either area of the KRCRA on the Forest. Highway 160, a major travelway in UAA 2, and the portion of the Chimney Rock Archaeological Area which overlaps the KRCRA in UAA 2 are both areas of visual sensitivity level 1 but do not qualify as BLM Visual Resouce Class I areas. Portions of the Highway 160 travel corridor are considered unsuitable under Criterion 3.

MAP OF UNSUITABILITY ASSESSMENT AREA 2 SHOWING LANDS AFFECTED BY CRITERION 3

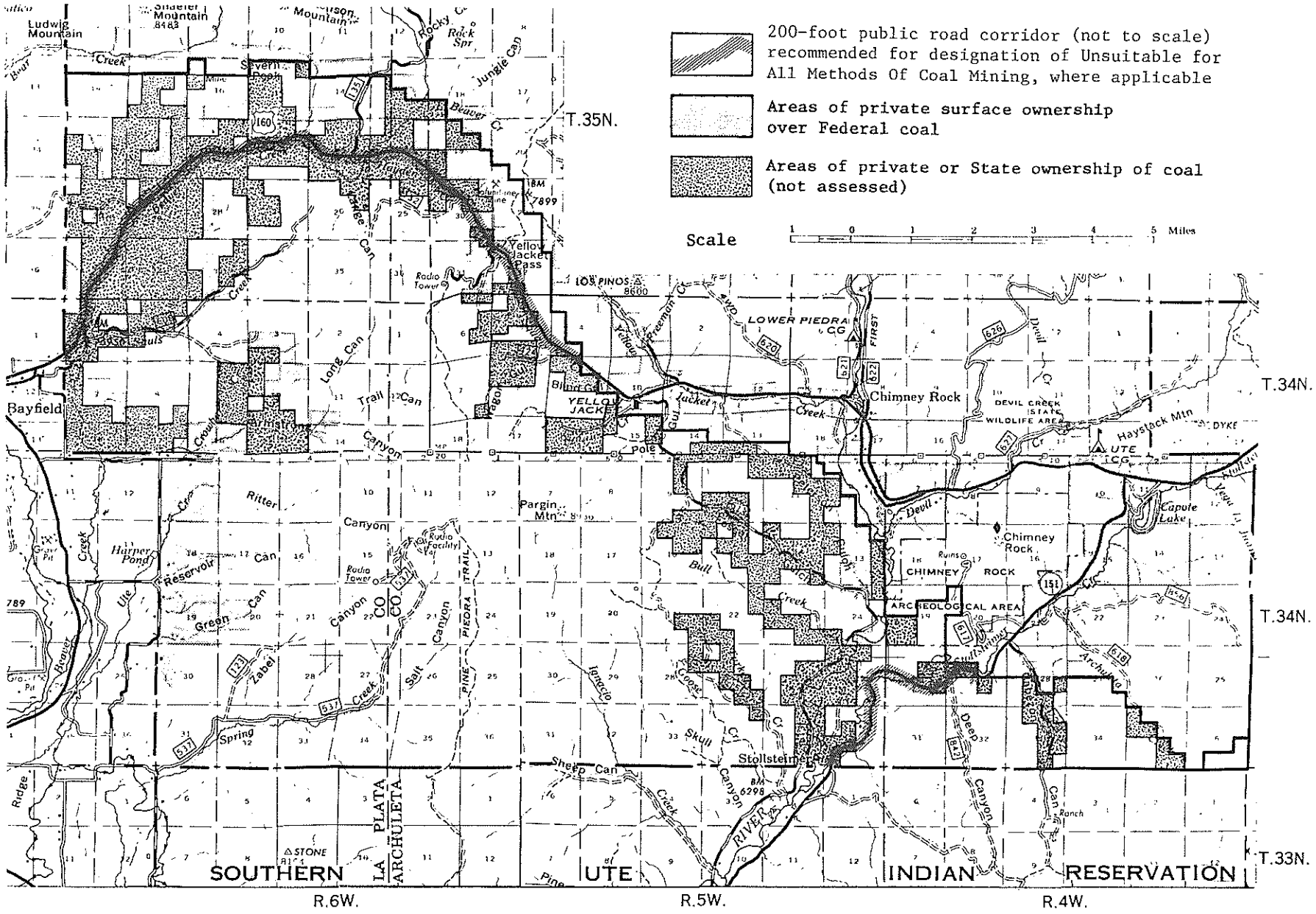


FIGURE 5

Criterion Number 6 - "Federal lands under permit by the surface management agency, and being used for scientific studies involving food or fiber production, natural resouces, or technology demonstrations and experiments shall be considered unsuitable for the duration of the study demonstration or experiment, except where mining could be conducted in such a way as to enhance or not jeopardize the purposes of the study."

This criterion does not apply to either area of the KRCRA on the Forest. No such areas are being used for the purposes described in the criterion.

Criterion Number 7 - "All districts, sites, buildings, structures, and objects of historic, architectural, archaeological, or cultural significance on Federal lands which are included in or eligible for inclusion in the National Register of Historic Places, and an appropriate buffer zone around the outside boundary of the designated property (to protect the inherent values of the property that make it eligible for listing in the National Register) as determined by the surface management agency, in consultation with the Advisory Council on Historic Preservation and the State Historic Preservation Office shall be considered unsuitable."

Available information, at this time, is considered inadequate for applying this criterion. However, UAA 2 does contain the "Zabel Canyon Indian Ruins," listed in 1983 on the National Register as an Archaeological District of some 3,200 acres, and impinges on the National Register Archaeological Site at Chimney Rock. Also, UAA 2 is generally considered an area of high sensitivity for the presence of prehistoric ruins and sites. UAA 1 is considered to be a generally low sensitivity area for the presence of any important cultural resources phenomena.

According to instructions given in 43 CFR 3461.3-1(b)(1), inventory and evaluative data needed to apply this criterion should be acquired in fiscal year 1984. Necessary analysis and consultations to complete the process and provide input to the Federal Coal Management Program should be accomplished in 1985 or early 1986.

Criterion Number 8 - "Federal lands designated as natural areas or as National Natural Landmarks shall be considered unsuitable."

This criterion does not apply to either area of the KRCRA on the Forest. No such areas have been designated as natural areas or as National Natural Landmarks.

Criterion Number 9 - "Federally designated critical habitat for threatened or endangered plant and animal species, and habitat for Federal threatened or endangered species which is determined by the Fish and Wildlife Service and the surface management agency to be of essential value and where the presence of threatened or endangered species has been scientifically documented, shall be considered unsuitable."

This criterion does not apply to UAA 1. UAA 2 contains land delineated jointly by the Forest Service and the Fish and Wildlife Service as essential habitat for the American peregrine falcon. This area is considered to be unsuitable for mining under Criterion 9.

Exception: A lease may be issued and mining operations approved if the proposed activity is not likely to jeopardize the continued existence of the species and/or habitat.

The area to which Criterion 9 is applicable is suitable for all methods of coal mining under this exception with proper mitigation of surface operations and impacts; including minimizing of vehicular and human activities and surface use of explosives during the period February - August and minimizing disturbance to vegetation to preserve habitat for prey species.

Finding: The area delineated as essential habitat for peregrine falcon is suitable for all methods of coal mining with mitigation of surface operations and impacts (14,260 acres). Unless other criteria apply, all other portions of the KRCRA areas are suitable for any coal mining activities.

Criterion Number 10 - "Federal lands containing habitat determined to be critical or essential for plant or animal species listed by a state pursuant to state law as endangered or threatened shall be considered unsuitable."

This criterion does not apply to UAA 1. UAA 2 contains land considered to be essential habitat for the river otter. This area is considered to be unsuitable for mining under Criterion 10.

Exception: A lease may be issued and mining operations approved if the proposed activity will not adversely affect the species.

The area to which Criterion 10 is applicable is suitable for all methods of coal mining under this exception if surface operations and impacts are not allowed to disturb the riparian habitat.

Finding: The area considered to be essential habitat for river otter is suitable for all methods of coal mining with mitigation of surface operations and impacts (980 acres). Unless other criteria apply, all other portions of the KRCRA areas are suitable for any coal mining activities.

Criterion Number 11 - "A bald or golden eagle nest or site on Federal lands that is determined to be active and an appropriate buffer zone of land around the nest site shall be considered unsuitable. Consideration of availability of habitat for prey species and of terrain shall be included in the determination of buffer zones."

This criterion does not apply to UAA 1. There are at present no known bald or golden eagle nesting sites in UAA 2. Information from the Colorado Division of Wildlife and U.S. Fish and Wildlife Service shows known sites are outside of the assessed area.

Criterion Number 12 - "Bald and golden eagle roost and concentration areas on Federal lands used during migration and wintering shall be considered unsuitable."

This criterion does not apply to UAA 1. UAA 2 contains land in the Piedra River-Stollsteimer Creek drainage which is known to be a winter roosting area for bald eagles; this area has been recommended as essential habitat for bald eagles. Such areas are considered under this criterion to be unsuitable for coal mining.

Exception: A lease may be issued if mining activities can be carried out with such limitations of method and time period that eagles are not adversely affected.

This area is considered suitable for all methods of coal mining under this exception if vehicular and human activities are minimized during the period December - March.

Finding: The area known to be a winter roosting area for bald eagles in UAA 2 is suitable for all methods of coal mining with limitations on surface operations and impacts (4,520 acres). Unless other criteria apply, all other KRCRA areas on the Forest are suitable for any coal mining activities.

Criterion Number 13 - "Federal lands containing a falcon (excluding kestrel) cliff nesting site with an active nest and a buffer zone of Federal land around the nest site shall be considered unsuitable. Consideration of availability of habitat for prey species and of terrain shall be included in the determination of buffer zones."

This criterion does not apply to UAA 1. There are at present no known falcon nesting sites in UAA 2. Information from the Colorado Division of Wildlife shows that the only known sites are outside of the assessed area.

Criterion Number 14 - "Federal lands which are high priority habitat for migratory bird species of high Federal interest on a regional or national basis, as determined jointly by the surface management agency and the Fish and Wildlife Service, shall be considered unsuitable."

Both Unsuitability Assessment Areas (UAA's) are used intermittently during the spring, summer and fall by band-tailed pigeons. These lands are used primarily as forage grounds and are considered to be unsuitable for coal mining under this criterion.

Exception: A lease may be issued if mining activity will not adversely affect the habitat during use by the species.

These areas are considered suitable for all methods of coal mining under this exception if disturbance to the vegetative cover by surface operations and impacts is minimized.

Finding: UAA 1 and UAA 2 are suitable for all methods of coal mining with minimal disturbance of vegetation (52,080 acres).

Criterion Number 15 - "Federal lands which the surface management agency and the state jointly agree are fish and wildlife habitat for resident species of high interest to the state and which are essential for maintaining these priority wildlife species shall be considered unsuitable. Examples of such lands which serve a critical function for the species involved include:

(i) Active dancing and strutting grounds for sage grouse, sharp-tailed grouse, and prairie chicken;
(ii) Winter ranges most critical for deer, antelope, and elk; and
(iii) Migration corridors for elk."

This criterion does not apply to UAA 1. UAA 2 contains lands delineated jointly with the Colorado Division of Wildlife as (1) key winter range for deer and elk; (2) elk calving area; and (3) elk migration corridor. These areas are considered to be unsuitable for mining under this criterion.

Exception: A lease may be issued if coal mining will not have a significant long-term impact on the species.

(1) Key winter range critical for the survival of deer and elk is suitable for all methods of coal mining under this exception if vehicular and human activity is curtailed during the period December - March, and roads are kept below a maximum of 2 miles per section (23,140 acres).

(2) Elk calving area is suitable for all methods of coal mining if no activity occurs in the area during May and June (1,280 acres).

(3) Elk migration corridor is suitable for all methods of coal mining if roads are kept below a maximum of 2 miles per section (41,900 acres).

Finding: Lands in UAA 2 to which Criterion 15 applies are suitable for all methods of coal mining with proper mitigation of surface operations and impacts (46,760 acres). The Colorado Division of Wildlife supports this finding. Unless other criteria apply, all other KRCRA areas on the Forest are suitable for any coal mining activities.

Criterion Number 16 - "Federal lands in riverine, coastal, and special floodplains (100-year recurrence interval) on which the surface management agency determines that mining could not be undertaken without substantial threat of loss of life or property shall be considered unsuitable for all or certain stipulated methods of coal mining."

This criterion does not apply to UAA 1. Lack of information prevents complete assessment of UAA 2 under this criterion.

Criterion Number 17 - "Federal lands which have been committed by the surface management agency to use as municipal watersheds shall be considered unsuitable."

This criterion does not apply to either area of the KRCRA on the Forest. No such areas are listed as municipal watersheds.

Criterion Number 18 - "Federal lands with National Resource Waters, as identified by states in their water quality management plans, and a buffer zone of Federal lands ¼ mile from the outer edge of the far banks of the water shall be unsuitable."

This criterion does not apply to either area of the KRCRA on the Forest. No such areas are identified as National Resource Waters.

Criterion Number 19 - "Federal lands identified by the surface management agency, in consultation with the state in which they are located, as alluvial valley floors according to the definition in Section 3400.0-5(a) of this title, the standards in 30 CFR Part 822, the final alluvial valley floor guidelines of the Office of Surface Mining Reclamation and Enforcement when published, and approved state programs under the Surface Mining Control and Reclamation Act of 1977, where mining would interrupt, discontinue, or preclude farming, shall be considered unsuitable."

This criterion does not apply to UAA 1. UAA 2 (Figure 6) contains lands identified as alluvial valley floors to which this criterion applies. Lack of information prevents identification of lands outside alluvial valleys to which this criterion would apply. Alluvial valley floors under this criterion are unsuitable for mining.

There are no exceptions to this criterion.

Finding: Alluvial valley floors to which this criterion applies are considered to be unsuitable for any coal mining activities (1,935 acres). Lack of information prevents identification of lands outside alluvial valleys which would be unsuitable under this criterion. Unless other criteria apply, all other KRCRA areas on the Forest are suitable for any coal mining activities.

MAP OF UNSUITABILITY ASSESSMENT AREA 2 SHOWING LANDS AFFECTED BY CRITERION 19

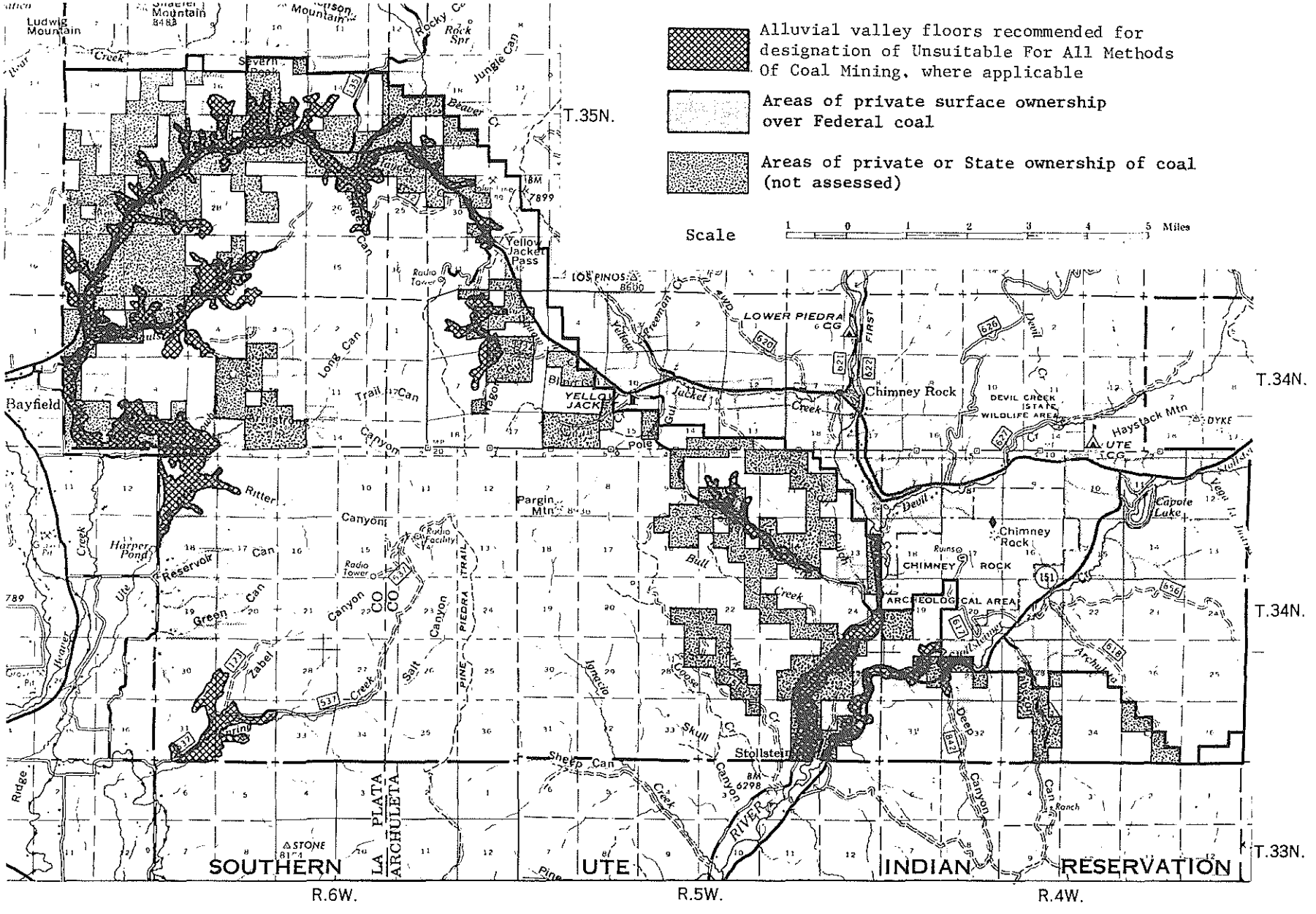


FIGURE 6

Criterion Number 20 - "Federal lands in a state to which is applicable a criterion (i) proposed by that state, and (ii) adopted by rulemaking by the Secretary, shall be considered unsuitable."

The State of Colorado has not developed unsuitability criteria for Federal lands; therefore, this criterion does not apply to either UAA 1 or 2.

APPENDIX I

DETERMINATION OF ANIMAS AND SAN JUAN RIVERS FOR WILD AND SCENIC RIVER ELIGIBILITY

DETERMINATION OF ANIMAS AND SAN JUAN RIVERS FOR WILD AND SCENIC RIVER ELIGIBILITY

INTRODUCTION AND PURPOSE

Each Forest involved in the development of its Land and Resource Management Plan has been directed to make an evaluation of Wild and Scenic River potential for selected rivers. The selected rivers were identified by a Nation-wide inventory conducted by Heritage Conservation and Recreation Service (HCRS).

The San Juan National Forest contains two inventoried rivers; the San Juan and the Animas. The rivers, as inventoried, are described as follows:

> San Juan River: From its juncture with Fourmile Creek upstream to the headwaters of its East and West Forks.
>
> Animas River: From old Animas City upstream to its juncture with Mineral Creek, just north of Silverton.

The evaluation of these rivers is a two-step process:

1. Inventory the physical aspects of the river.

2. Evaluate the river for eligibility for inclusion into the National Wild and Scenic Rivers System. Criteria to be used is found in Public Law 93-621 as amended, the U.S.D.I. - U.S.D.A. guidelines adopted in February 1970 and finalized on September 7, 1982, and the supplemental guidelines developed for the National Study of the Piedra River in 1976-77 (See Exhibit 3).

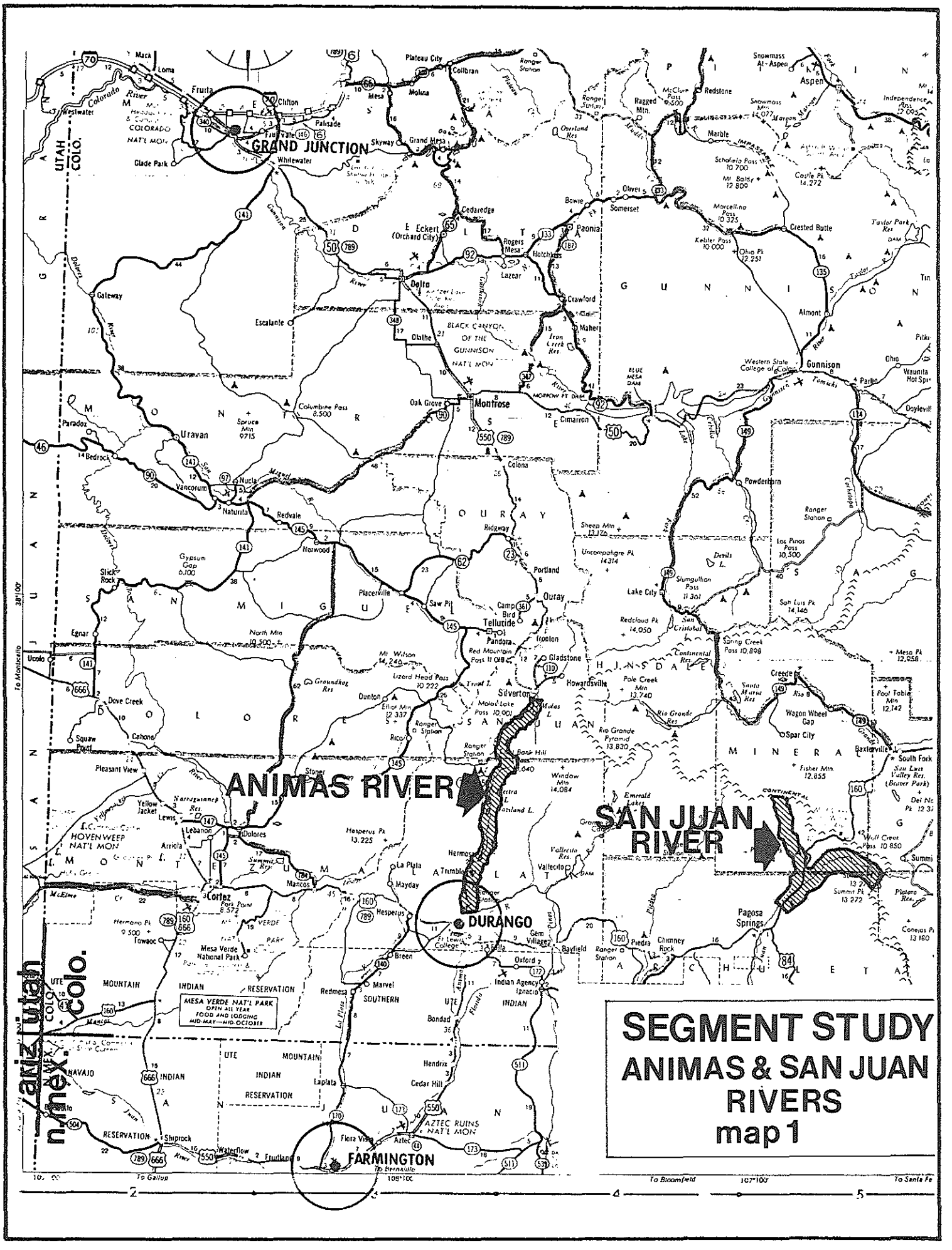
This Appendix first identifies specific information about each of the rivers and compares the information against eligibility criteria. It concludes with a summary of the assessment and the determinations of eligibility for each of the rivers.

RIVER INFORMATION AND ASSESSMENT

LOCATION OF RIVERS

The San Juan is located on the east side of the San Juan National Forest in the Pagosa Human Resource Unit (HRU). Its West Fork originates along the Continental Divide in Mineral County and joins with the East Fork in Archuleta County to form the mainstream which is entirely located in Archuleta County. The East Fork originates along the Continental Divide in Archuleta County, thence flows through a portion of Mineral County and then returns to Archuleta County.

The portion of the Animas being studied is located in the center of the San Juan National Forest in the Animas HRU. The approximate upper one-half is in San Juan County and the lower portion is in La Plata County. Locations of the rivers are shown on Map 1.


SEGMENT STUDY
ANIMAS & SAN JUAN RIVERS
map 1
ANIMAS RIVER
SAN JUAN RIVER
GRAND JUNCTION
DURANGO
FARMINGTON
Montrose
Gunnison
Delta
Cortez
Telluride
Silverton
Ouray
Ridgway
Durango
Farmington
Aztec
Bayfield
Ignacio
Pagosa Springs
Hesperus
Mancos
Dolores
Rico
Dunton
Lake City
Creede
Baxterville
Paonia
Crawford
Olathe
Naturita
Uravan
Nucla
Vancorum
Norwood
Redvale
Placerville
Saw Pit
Portland
Gladstone
Howardsville
Lazear
Hotchkiss
Rogers Mesa
Cedaredge
Eckert (Orchard City)
Collbran
Molina
Mesa
Palisade
Clifton
Fruita
Loma
Mack
Westwater
Whitewater
Glade Park
Grand Mesa
Skyway
Plateau City
Redstone
Aspen
Snowmass
Marble
Crested Butte
Almont
Maher
Cimarron
Escalante
Gateway
Paradox
Bedrock
Gypsum Gap 6,100
Slick Rock
Egnar
Ucolo
Dove Creek
Cahone
Squaw Point
Pleasant View
Yellow Jacket
Lewis
Lebanon
Arriola
Mancos
Mayday
La Plata
Hermosa
Trimble
Breen
Redmesa
Marvel
Bondad
Hendrix
Cedar Hill
Laplata
Shiprock
Waterflow
Fruitland
Flora Vista
Towaoc
Mesa Verde National Park
MESA VERDE NAT'L PARK
OPEN ALL YEAR
FOOD AND LODGING
MID-MAY—MID-OCTOBER
HOVENWEEP NAT'L MON
COLORADO NAT'L MON
BLACK CANYON OF THE GUNNISON NAT'L MON
AZTEC RUINS NAT'L MON
UTAH
COLO.
ariz. utah
n. mex. colo.
UTE MOUNTAIN INDIAN RESERVATION
SOUTHERN UTE INDIAN RESERVATION
NAVAJO INDIAN RESERVATION
To Montezuma
To Gallup
To Bloomfield
To Santa Fe
To Bernalillo
108°100'
107°100'
38°100'

RIVER AREA STUDY BOUNDARIES

The rivers were segmented to distinquish distinct and significant differences in character, access, and level of development. The segments are identified below and also on Maps 2 (Animas) and 3 (San Juan).

Animas River Segments

Segment A - The mainstream of the Animas from the 32 Street bridge in Durango near old Animas City (S. 16 and 17, T.35N., R.9W., N.M.P.M.) upstream to Baker's Bridge (S. 24, T.37N., R.9W., N.M.P.M.).

Segment B - The mainstream of the Animas from Baker's Bridge upstream to the Rockwood Cut (S. 7, T.37N., R.8W., N.M.P.M.).

Segment C - The mainstream of the Animas from Rockwood Cut upstream to Elk Park (S. 17, T.40N., R.7W., N.M.P.M.).

Segment D - The mainstream of the Animas from Elk Park upstream to its confluence with Mineral Creek, one quarter mile south of Silverton (S. 19, T.41N., R.7W., N.M.P.M.

San Juan River Segments

Segment A - The mainstream of the San Juan from Fourmile Creek (S. 32, T.36N., R.1W., N.M.P.M.) upstream to the confluence of the East Fork and the West Fork (S. 12, T.36N., R.1W., N.M.P.M.).

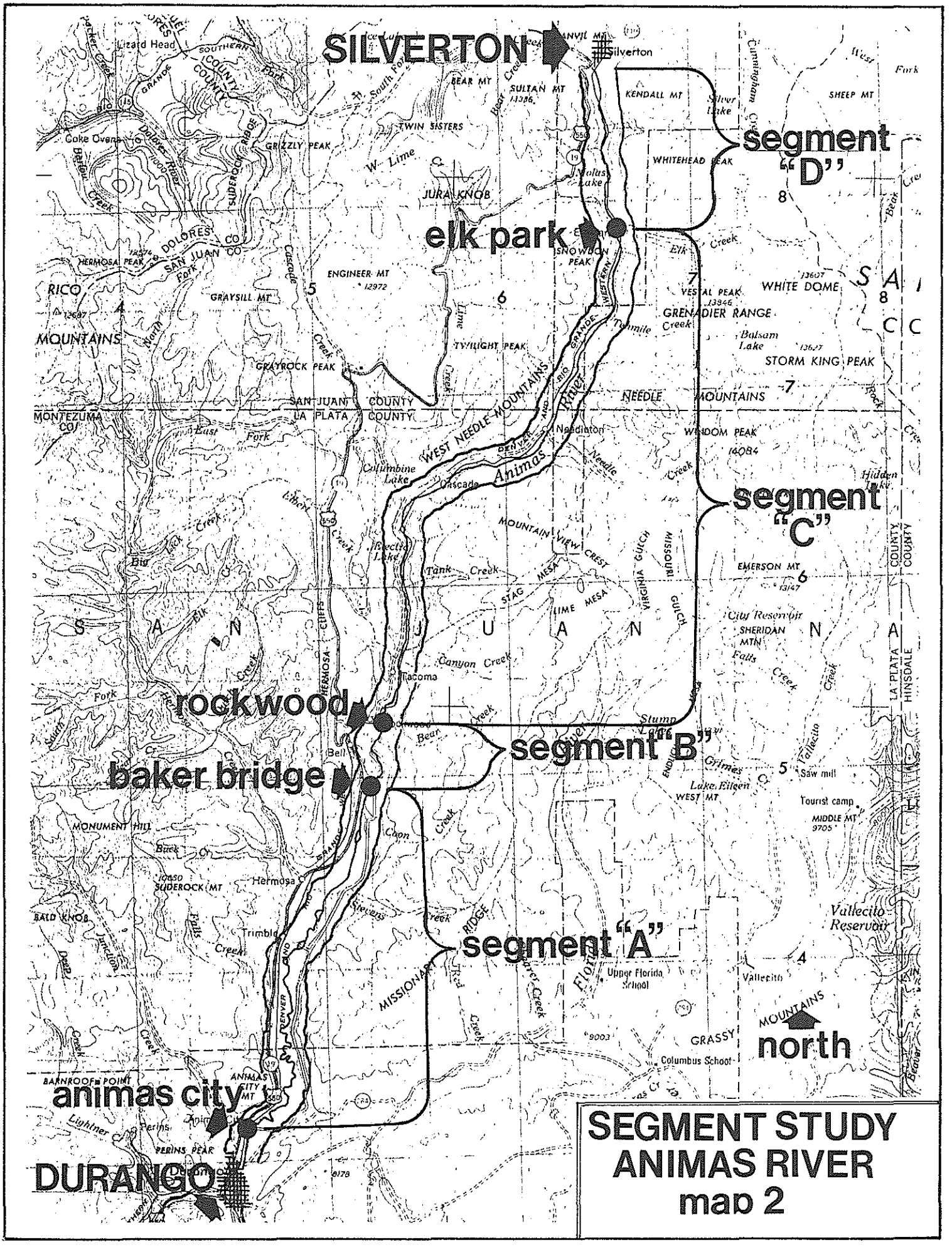
Segment B - The West Fork of the San Juan from its confluence with the East Fork upstream to its origin along the Continental Divide (S. 4 and 5, T.38N., R.1W., N.M.P.M).

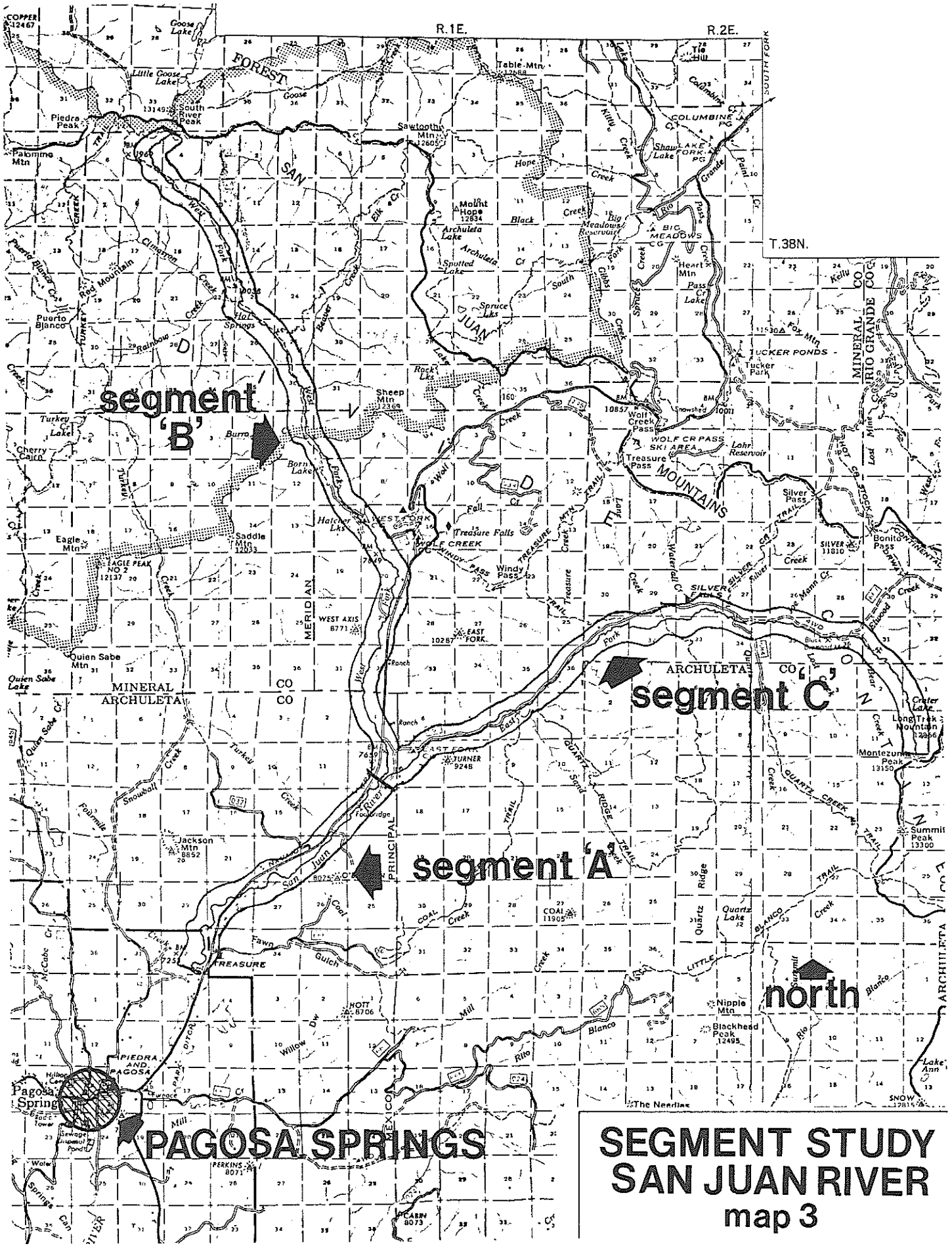
Segment C - The East Fork of the San Juan from its confluence with West Fork upstream to its origin along the Continental Divide (S. 12, T.36N., R.2E., N.M.P.M.).

HISTORY

Both the San Juan and Animas have the history background common to the majority of the western United States. The first entries of the white man occurred for mining activities. This was followed by the settlement of small towns and establishment of the ranching industry in the 1880's.

The narrow gauge railroad up the Animas Canyon has been designated as a National Historical Site and is on the National Register of Historical Places.


SILVERTON
elk park
segment "D"
segment "C"
rockwood
segment "B"
baker bridge
segment "A"
animas city
DURANGO
north
SEGMENT STUDY
ANIMAS RIVER
map 2



SEGMENT STUDY
SAN JUAN RIVER
map 3

TRANSPORTATION

The general vicinities of both the San Juan and Animas are easily accessed through the existing transportation network. U.S. Highway 160 serves the area from east and west. U.S. Highway 550 serves the area from north and south along with U.S. Highway 84 and Colorado Highway 172. Commercial bus travel into the Durango and Pagosa areas exists. Both communities are served by airports. La Plata field near Durango can accommodate jet traffic up to DC-9's and 737's. Pagosa Springs Aviation at Pagosa can accommodate planes up to DC-4's and small corporate jets.

There is good access by roads and railroad (the scenic Durango to Silverton Railroad along the Animas) to the river segments except for the following situations.

-The upper nine miles of San Juan Segment B is only served by trail since it is in the Weminuche Wilderness.

-The upper three miles of San Juan Segment C is served only by game and livestock trails.

-In the vertical-walled gorge of Animas segment B there are no trails or roads. The railroad does not go through this section.

LAND STATUS AND USE CLASSIFICATION

Table 1 displays the land status data for each segment of the rivers. A broad surface use classification is shown in Table 2.

TABLE 1

Lands Data

	San Juan Segments			Animas Segments			
	A	B	C	A	B	C	D
Approximate Miles of River	6	16	15	16	4	22	5
Corridor Acres							
National Forest	570	3170	2550	-	430	4360	-
Bureau of Land Management	-	-	-	-	-	1830	880
Private & Other	1350	1950	1250	5120	850	850	720
Total Acres	1920	5120	4800	5120	1280	7040	1600
Percent of Corridor Ownership							
Public	31	62	74	-	34	88	55
Private	69	38	26	100	66	12	45

TABLE 2

Broad Surface Use Classification (Approximate acres)

	San Juan Segments			Animas Segments			
	A	B	C	A	B	C	D
Subdivided Lands	800	500	-	2500	400	80	-
General Forest Type	570	3170	2550	-	600	4360	-
Agriculture and Pasturage	710	1450	1250	2620	280	-	-
Historic Mineral Area	-	-	100	-	-	2600	1600
Total	1920	5120	4800	5120	1280	7040	1600

EXISTING DEVELOPMENTS

Each river segment has any number of uses that detract from the attributes of wild, scenic, or recreational rivers. When considered individually, each use may have little or no significance. Collectively for any reach, the consequences are cumulative. Table 3 displays facilities, improvements and developments within each segment of the rivers.

RESOURCES AND PHYSICAL SETTING

Table 4 summarizes the physical character of the rivers and their immediate corridors.

Visual Description

The segments of the Animas included in this assessment are renowned for their mountain scenery. Aesthetically, the zone includes some of the most diverse and dynamic landscapes in the Colorado Rocky Mountains. There is much physical variety in the segments, starting from the high alpine valley in the north through the Animas gorge of vertical canyon walls to the broad alluvial valley in the south of the Animas Valley.

The San Juan segments under consideration have landscapes that are typical to the Southern Colorado Rockies. The area encompasses the open pastoral valley, dotted with trailer courts and subdivisions, of the lower portion to the high alpine landscapes of the Continental Divide. Portions of the area contain outstanding diversity in the landscape elements of landform, water form, and vegetation. However, there are segments that have only a moderate degree of diversity in these elements with high visual impacts from man's activities and are not particularly outstanding in visual quality.

TABLE 3

Facilities, Improvements, Developments

Improvement or Structure	San Juan Segments			Animas Segments			
	A	B	C	A	B	C	D
Bridges (All)	2	5	3	3	-	5	2
High Density Subdivisions	3	2	-	5	-	1	-
Rural Homes and Ranches	Several	7	2	many	2	-	-
Fence Crossings	9+	10+	3	many	-	-	-
Gravel Operations	3	4	1	3	-	-	1
Mines (Abandoned or Active)	-	-	2	-	-	1	many
Commercial (Lodges, Stores, etc.)	2	3	-	many	-	2	-
Water Diversion Structures	8	22	4	many	-	-	-
Existing Water Rights (Cubic Feet/Second)	30.9	100.0	113.5	1784	-	-	-
Power Plants	-	-	-	-	-	1	-
Miles of Railroad Track	-	-	-	6	-	20	5
Miles of Parallel Paved Roads	6	4	-	13	-	-	2
Miles of Parallel Non-Paved Roads	2	4	13	many	-	-	3
Stream Modification (Channeling, riprap, etc.)	some	some	mod.	excess	-	mod.	excess

TABLE 4

Physical Character

Attribute	San Juan Segments A	B	C	Animas Segments A	B	C	D
Surface Geology (Number of geological periods represented)	3	2	2	1	1	2	3
Slope Dissection	Low	Mod	Mod	Low	Low	High	High
Valley Shape (Gorge, U,V)	U	Mix	V	U	Gorge	V	V
Cliff Features	None	Mod	Mod	None	High	High	High
Vegetation Variation	Mod	Mod	Low	Low	Mod	High	Mod
Variation in Water Form	Low	Mod	Mod	Low	High	High	High
Large Rapids or Falls	None	Few	Few	None	Many	Many	None
Variety of Recreation Uses-Water	Few	Few	Few	Few	Few	Few	Few
Land	Few	Mod	Many	Few	Few	Many	Many
Fisheries*	Poor	Good	Fair	Poor	Poor	Poor	None
Wildlife Animals	Fair	Good	Excel	Poor	Poor	Poor	Poor
T&E Species	No	Maybe	Maybe	No	No	No	No
Unusual Abundance Unique Associations	No	No	No	No	No	No	No
Cultural Values** Historic	No	No	No	Yes	Yes	Yes	Yes
Prehistoric	No	No	No	No	No	No	No

* Fisheries are discussed in more detail in Exhibits 1 and 2 at the end of this Appendix.

**This indicates cultural properties on the state or national register.

Geological Description

Geology of both the Animas and San Juan are described in many sources. The upper San Juan Basin has extremely diverse geology. However, the surface geology of the two rivers can be considered ordinary for rivers in southwestern Colorado. Table 5 is a summary of surface geology.

Water Resources

Exhibits 1 and 2 at the end of this Appendix provide detailed analyses of water quantity and quality for the Animas and San Juan respectively. Following is a brief summary:

Quality - The Animas does not meet the minimum quality standards set forth by the Federal Water Pollution Control Administration's Water Quality Criteria, particularly from a chemical standpoint. There are no plans for restoration of water quality.

The San Juan has good general water quality.

Quantity - The average annual flow of the Animas is 645,000 acre-feet at the Colorado-New Mexico state-line. There are 1784 cfs of existing water rights for irrigation and domestic purposes.

The average annual flow of the San Juan is 482,000 acre-feet at Colorado-New Mexico state line. There are 257 cfs of existing water rights from the river for irrigation and domestic purposes.

There are no major impoundments on either river. Both rivers have numerous diversion structures for irrigation purposes, particularly in those portions running through private lands.

Wildlife

Wildlife on both rivers consist of the many species common to the Rocky Mountains. On neither river is the river corridor the prime or major habitat for big game species.

ASSESSMENT SUMMARY AND DETERMINATIONS OF ELIGIBILITY

Table 6 is a summary of how each river segment meets eligibility requirements. The summary does not weight the criteria nor does it express that any subjective values are more or less important. The summary is based upon the collective intent of the criteria combining those of the legislation and those developed by USDI-USDA.

TABLE 5

Surface Geology (Lower to upstream)

River Segment	Formation	Geologic Period
	Animas River	
A	Alluvial Deposits	Quaternary
B	Baker's Bridge Granite	Precambrian
C (1)	Irving Formation	Precambrian
(2)	Alluvial Deposits	Quaternary
(3)	Electra Lake Gabbro	Precambrian
(4)	Irving Formation	Precambrian
(5)	Alluvial Deposits	Quaternary
(6)	Twilight Gneiss	Precambrian
(7)	Irving Formation	Precambrian
(8)	Alluvial Deposits	Quaternary
(9)	Tenmile Granite	Precambrian
(10)	Glacial Drift	Quaternary
(11)	La Jara Canyon Tuff	Tertiary
(12)	Irving Formation	Precambrian
(13)	Alluvial Deposits	Quaternary
(14)	Uncompahgre Formation	Precambrian
D (1)	Alluvial Deposits	Quaternary
(2)	Uncompahgre Formation	Precambrian
(3)	Irving Formation	Precambrian
(4)	Intrusive (Oligocene)	Tertiary
(5)	Alluvial Deposits	Quaternary
	San Juan River	
A (1)	Lewis Shale	Upper Cretaceous
(2)	Glacial Drift	Quaternary
(3)	Alluvial Deposits	Quaternary
B (1)	Alluvial Deposits	Quaternary
(2)	Volcaniclastic Facies	Tertiary
(3)	Fish Canyon Tuffs	Tertiary
(4)	Huerto Formation	Tertiary
(5)	Bachelor & Carpenter Tuffs	Teriary
(6)	Table Mountain Volcanics	Tertiary
C (1)	Glacial Drift	Quaternary
(2)	Volcaniclastic Facies	Tertiary
(3)	Telluride Conglomerates	Tertiary
(4)	Alluvial Deposits	Quaternary
(5)	Blanco Basin Formation	Tertiary
(6)	Volcaniclastic Facies	Tertiary

TABLE 6

Summary of How River Segments Meet Eligibility Criteria

Criteria	San Juan Segments A	B	C	Animas Segments A	B	C	D
Free Flowing	no	yes	no	yes	yes	yes	yes
Water Quantity	yes	yes	yes	yes	yes	yes	yes
Water Quality	yes	yes	yes	no	no	no	no
Outstanding Remarkable							
Scenery	no	no	no	no	yes	yes	no
Recreation	no	no	no	no	no	yes	yes
Geology	no	no	no	no	yes	yes	yes
Fish and Wildlife	no	no	no	no	no	no	no
Cultural Values	no	no	no	no	yes	yes	yes

Neither the Animas nor the San Juan is considered to be eligible for Wild and Scenic River classification. Following is a brief narrative of why specific segments were not found to be eligible.

ANIMAS RIVER

Animas Segment A

This segment has been highly modified by subdivisions, gravel operations and fences. For most of its length it is lined with old car bodies or downed cottonwood trees cabled to anchors on the adjoining agriculture lands. Water quality does not meet minimum Federal or State standards. It lacks "outstandingly remarkable" character.

Animas Segment B

Water quality does not meet minimum Federal and State standards.

Animas Segment C

Water quality does not meet minimum Federal and State standards. It also contains stream modification due to extensive riprap and cribbing structures to protect the railroad bed.

Animas Segment D

This short segment is considered a dead river because of chemical pollution from past mining operation. The channel has been modified in several places. The aesthetics of the river are marred by iron oxide stains from the high waterline down to the present water level.

In all Animas segments, the water quality is deemed so bad that it could not be restored without the cost of millions of dollars. The Colorado Division of Wildlife does not stock the Animas throughout the segmented

area. This indicates the lack of a suitable fishery. The severity of the violation of the water quality criteria overrides the other values of wild and scenic river classification. There are no plans for restoration of water quality.

SAN JUAN RIVER

San Juan Segment A

This segment and its corridor has been highly modified through land subdivision and gravel dredging operations for most of its length. The segment has numerous fence crossings and several water diversions which detract from water quantity. The segment does not meet the criterion of "outstandingly remarkable."

San Juan Segment B

The West Fork of the San Juan on its lower reaches is in the same condition as the mainstream. The upper portion within the Weminuche Wilderness does not have any development except for a recreational trail but lacks the "outstandingly remarkable" character as stated by the law. Because the unmodified portion of this river lacks outstanding values, it does not appear to meet the spirit and intent of Public Law 90-542 as amended.

San Juan Segment C

This segment contains approximately 1½ miles on private land in the middle of the segment that has been severely altered by bulldozed channelization. The fisheries are maintained only through stocking. Therefore, the segment lacks the "outstandingly remarkable" character.

EXHIBIT 1

WILD AND SCENIC RIVER ELGIBILITY REPORT
ANIMAS RIVER
WATER QUALITY AND FISHERIES, WATER FLOWS, AND FLOODPLAINS

The objectives of this report are to 1) present information required for the Animas Wild and Scenic River Eligibility Analysis for the San Juan National Forest Management Plan, and 2) to evaluate the water quality of the river.

WATER QUALITY

The Final Revised Guidelines for Eligibility, Classification and Management of river areas does not provide explicit criteria or standards for water quality. However, water quality is studied for the Animas to determine the potential to upgrade quality to standards of the Clean Water Act. This analysis uses the "Aesthetics - General Criteria" in the Federal Water Pollution Control Administration's Water Quality Criteria, (WQC), April 1, 1968, which includes the following:

-All surface waters should support life forms of aesthetic value.

-Surface waters should be free of:

--Materials that will settle to form objectionable deposits.

--Floating debris, oil, scum, and other matter.

--Substances producing objectionable color, odor, taste, or turbidity.

--Toxic materials which produce undesirable physiological responses in humans, fish, and other animal life and plants.

--Substances which produce undesirable aquatic life.

Table 1-1 lists the standards considered to be satisfactory for aquatic life as recommended in the Federal Water Pollution Control Administration's Water Quality Criteria, (WQC), April 1, 1968.

Water quality data which was available for the Animas between Silverton and Durango is displayed in Table 1-2. The Colorado Department of Health, Water Quality Control Commission will be establishing water quality standards for all streams in the San Juan - Dolores river basins, including the Animas. Proposed Colorado Water Quality Control Division standards (being considered by the Commission) are also listed in Table 1-2. The WQC (1968) criteria for physical and biological parameters can be supplemented with inorganic and metal parameters from the Colorado Department of Health. The inorganic and metal parameters can be used to address the WQC (1968) category of toxic materials "which produce undesirable physiological responses in humans, fish, and other animal life and plants."

EXHIBIT 1 (Continued)

TABLE 1-1

Standards Considered to be Satisfactory for Aquatic Life

Parameter	Standard
pH	6-9
Total dissolved materials	Below 1500 mg/l
Total acidity	Should not lower alkalinity to below 20 mg/l
Temperature	Should not be raised more than 5°F above normal
Dissolved Oxygen	Above 6 mg/l
Carbon Dioxide	Below 25 mg/l
Oil	No surface oil films, odors, or deposits
Turbidity	Below 10 Jackson turbidity units from waste discharges
Settleable materials	Should not inhibit flora
Floating materials	Foreign origin excluded
Tainting	Should not taint fish or invertebrates
Radionuclides	United States Public Health Service drinking water standards
Total phosphorus	Below .1 mg/l

Frequent violations of the metal standards, particularly lead, manganese, zinc, and iron can be observed at all stations (four at Silverton, two at Baker's Bridge, two at Durango). Heavy metal pollution from mine discharges and milling operations in the Animas above Silverton is well documented (Wentz, 1974; Wuerthele, 1975; Smith, 1976, Woodling, 1977). Several mine acid discharges are heavily impacting the Animas and tributaries. In June of 1978, the bottom of Lake Emma fell into Standard Metals workings and polluted water from the American and Terry tunnels reached the Animas, a disaster which had severe water quality effects for at least six months (WQCD, 1981).

As a result of these past and present activities, water quality of the Animas from Silverton to Elk Park (seven miles downstream) is extremely degraded. Aquatic invertebrate inventories (Wentz, 1974) Smith, 1976) in the Animas at and above Silverton found no aquatic insects in riffle or pool areas (mayflies, stoneflies, caddisflies, beetle larvae, black flies, dragonflies, true flies). The rock substrate in the area is stained yellowish-orange from precipitates of iron hydroxide ($Fe(OH)_3$ and iron sulfate ($FeSO_4$), both products of pyrite oxidation, common in mine acid drainage (Wentz, 1974). These precipitates can be considered "objectionable deposits," and violate the "aesthetic - general requirements" (WQC, 1968).

EXHIBIT 1 (continued)

TABLE 1-2

Animas River, Water Quality Analysis, Wild and Scenic River Evaluation

Parameter	Prop. Colo.D. of Health Standards Source to Molas Cr.	Prop. Colo.D of Health Standards Molas Cr. to Durango	WQC 1968	Colo.D.Health (Smith, 1976) Animas @ Silverton		Colo.D.Health 1980 data Animas @ Silverton		Colo.D.Health (Smith, 1976) Baker's Bridge		Colo.D.Health 1978-1980 Baker's Bridge RR		Wuerthele 1975 Bridge below Silverton		Wuerthele 1975 Durango KOA		Wentz 1971 @ Silverton	Bur. of Rec. 1977-1978 @ Durango	
phy & bio				mean	range	mean	range	mean	range	mean	range	Smp#1	Smp#2	Smp#1	Smp#2		mean	range
Dis.Oxygen	6.0	6.0	6.0	7.7	4.5*-10		7.5-13.8	9.1	5*-13		7.7-10.8	8.3	7.6	7.5	7.5		8	7.8-11
pH	6.5-9	6.5-9	6-9	7.7	6.3*-9		7-8.2	7.9	6.9-8.9		6.3-8.4	5.8*	6.9	4.9*	7.3	7.9	7.8	7.1-8.7
Temp°C	20°C	20°C	20°C	5.8	0-14		4-14	5.9	0-16.1		1-14	12	11	13	13	11		
Fecal Coliform							3-9				23-93							
inorganic																		
NH_3	.02	.02		.2	0-1.3*	.003	-.062*	.05	0-.72*		.001-.004.3*				1.6*			
NO_2	.05	.05						.002	0-.009									
NO_3	10	10		.3	0-1.5		.16-5	.1	0-.8									
Boron		.75		.034	0-.22	.001	.0067		0-.08		.023						.158	.124-.184
Chloride		250		4.7	2-8		4-12				3-12	2	2	4			19	.4-46.4
Sulfate		250		193	47-367*		30-210	87.2	25-139		21-140	90	190	135	230		114	18-212
metals																		
Arsenic	.05	.05					.001-.005	0			.005					.005	.004	.003-.005
Cadnium	.004	.001		.0019	0-.005*			.0002	0-.003		.001-.002			.002				
Chromium	.1	.1						0										
Copper	.005	.035		.0092*	0-.110*	.021	.009-2.1			.0016	.007-.036*			.01			.012*	.009-.018
Lead	.004	.085		.009*	0-.06*	.072*	.006*-.460	.016	0-.03	.014*	.009*-.16*			.01*			.001	.001
Manganese	.05	.05		.0071	.003-.012*	.485*	.220*-1.5*	.186*	.05-.8*		.25*-.77*			3.3*			.13	.076*-.203*
Mercury	.00005	.00005						.0002*	0-.0005*							.0002*	.001*	0-.002*
Nickel	.05	.1														.002	.006	.001-.021
Selenium	.05	.05						0									.002	.001-.004
Silver	.00001	.00001					.0007*	0										
Zinc	.05	.3		.774*	0-2.02*	.497*	.3*-.8*	.120*	0-.55*							.5*		
Iron	.3	2.0		.904*	.1-6.3*	.642*	.25*-2.1*	.370.	05-1.2		.1-3.1*					.02		

*Water Quality Standard Violation

Dilution from inflow of high quality tributary streams below Elk Park (Elk Creek, Tenmile Creek, Noname Creek, Ruby Creek, Needle Creek, Cascade Creek) gradually improves water quality in the Animas so that by Baker's Bridge (about 12 miles above Durango) at the mouth of Animas Canyon, water quality is greatly improved. Water quality standards violations of ammonia, copper, lead, manganese, mercury, zinc, and iron are still consistently observed at Baker's Bridge (Table 1-2). Bureau of Reclamation monitoring at Durango (1977 and 1978) detected metal standard violations of copper, manganese, and mercury; Wentz (1971) reports zinc concentrations at Durango at ten times above 1981 Colorado standards (Table 1-2).

Terry and Adams (1979) report a heavy metal toxicity problem in the Animas at the 32nd Street bridge in Durango. Bioassary tests of adding nitrogen and phosphorous to Animas water samples from Durango and measurements of low algae growth response indicate that high metal concentrations, particularly zinc, severely limit the primary productivity of the Animas (Terry and Adams, 1979). The lack of algae or other aquatic vegetation is notable in the Animas from the headwaters downstream through Durango.

Aquatic invertebrate samples at Baker's Bridge, 32nd Street bridge, and near the Holiday Inn (Durango) indicate increasing numbers and diversity of organisms at these stations although the aquatic insect populations are low compared to similar Colorado streams (Smith, 1976).

In summary, water quality degradation from mining activity above Silverton has significantly impacted the Animas from Silverton through Durango. The river does not meet many of the WQC, 1968 or proposed Colorado Department of Health criteria.

FISHERIES

Fish shocking and creel census data for the Animas from Silverton to Durango is extremely limited. The following conclusions can be drawn from examination of fisheries information by Smith (1976):

-Overall, the Animas from Silverton to Durango is a poor - mediocre rainbow trout fishery.

-The fishery above Silverton is limited to a small population of stocked rainbows in a 2.5 mile segment between Howardsville and the Standard Metals Mill (2 miles above Silverton).

-Between the Standards Metals Mill through Silverton to Elk Park, the river is a non-fishery and probably basically dead due to "highly mineralized water, large mineralized salt and oxide deposits, and excess tailings covering the bottom strata."

-The area from Elk Park to Baker's Bridge will support fish with only limited success between Needleton and Elk Park.

-A fair fishery exists between Baker's Bridge and Durango with most of the game fish being rainbows, although browns and a few cutthroat and brook trout were sampled.

-Fish population estimates are extremely low with respect to the size of the river and the non-game fish populations are slightly higher than normal.

-Poor-good rainbow-brown, or rainbow-brook-cutthroat trout fisheries occur in many of the tributary streams to the Animas. Most of the Animas tributaries above Silverton are non-fisheries due to mine acid drainage and toxic tailings substrate deposits.

Bill Weiler (Montrose) and Mike Japhets (Durango), Fishery Biologists with the Colorado Division of Wildlife (contacted by phone; 6/29/81) reaffirmed that no fishshocking and very little creel census data is available from Silverton to Baker's Bridge. Both felt that the fishery in this river segment is probably quite limited due to steep gradient and poor water quality. Weiler mentioned that some excellent pool habitat exists within the canyon which could support good fish populations with improved water quality.

In summary, the fisheries resource in the Animas from Silverton to Durango reflects the water quality, improving from non-existent to poor-fair. Therefore, the Animas cannot be considered a high quality fishery.

FREE FLOWING CHARACTERISTICS

The Wild and Scenic Rivers Act provides that a river must be in a free flowing natural condition to be eligible for inclusion in the Wild and Scenic Rivers system. Section 15b of PL 93-621 defines free flowing as "without impoundment, diversion, straightening, riprapping or other modification of the waterway." The law further states that "low dams, diversion works, and other minor structures will not automatically preclude the river unit from being included in the National Wild and Scenic Rivers System, providing such structures do not unreasonably diminish the free flowing nature of the stream and the scenic, scientific, geological, historical, cultural, recreational, and fish and wildlife values present in the area."

No impoundments occur on the Animas. According to Biff Stransky and Wayne Dunn, Animas Ranger District, no diversions occur in the Animas Canyon. A few minor diversions (irrigation ditches and pipes) occur between Baker's Bridge and Durango. Riprap exists in locations within the Animas Canyon to protect the narrow gauge railroad from high water flows. A large riprap project occurred at Elk Park in 1978 to protect the railroad from a meandering segment of the Animas (2520, 9/14/78).

Below Baker's Bridge, the amount of riprap and river straightening increases, particularly at the gravel pits below Trimble Lane. In several places used car bodies, rocks, and concrete blocks have been

dumped along the stream banks to reduce channel erosion. Although the car bodies, rocks, and concrete blocks do not "unreasonably diminish the free flowing nature of the stream." They do have a high visual impact when viewed from the river.

In summary, the Animas can be considered a free flowing river from Silverton to Durango.

STREAMFLOWS

The USDA/USDI (1970) Guidelines provide that for a river to be eligible for Wild and Scenic River designation, "there should be sufficient volume of water-related outdoor recreation activities generally associated with comparable rivers." The revised USDA/USDI (1982) Guidelines state that flows are sufficient if they sustain or complement the outstandingly remarkable values for which the river would be designated.

Average annual discharge of the Animas at the Colorado-New Mexico state line (approximately 25 miles south of Durango) is 645,000 acre-feet. Using U.S.G.S. streamflow gauging stations on the Animas, 7-day/10-year low flow calculates to be 10.7 cfs at Howardsville, 65.2 cfs above Tacoma, and 125.7 cfs at Durango (Hook, 1975). Peak flows on the Animas are generally associated with snowmelt runoff (usually 3,000 to 8,000 cfs at Durango in June) although the largest flood on record (25,000 cfs at Durango in October, 1911) resulted from a massive frontal rain storm.

The most frequent recreational use of the Animas between Durango and Silverton is scenic viewing passengers riding the Durango to Silverton narrow gauge railroad. Limited fishing and floating occur through these segments although considerable fishing and floating occurs in and below Durango.

Due to no significant diversions from the Animas in the Silverton to Durango segment and sufficient low flow characteristics, the river provides sufficient water flows during a normal year to provide full enjoyment of the limited water-related outdoor recreation.

FLOODPLAIN

Floodplain characteristics of the Animas and major tributaries in the Hermosa-Durango area are delineated in two Army Corps of Engineer Flood Hazard Information reports (Dept. of Army, 1977). The Standard Project Flood (one that may be expected from the most severe combination of hydrometerological conditions, usually about 500 years) from Baker's Bridge to Durango occupies a floodplain from the East Animas Road to Highway 550 (about two miles wide). At Durango, just below the 32nd street bridge, the stream channel gradient sharply increases and the standard Project Flood is confined to the existing channel and immediate area (about 500 feet wide). Although no floodplain mapping has been done for the Animas Canyon, the narrow steep gradient will confine even

the standard Project Flood to the immediate channel area except for the few low gradient river sections within the canyon (such as Elk Park) where the flood will spread out several hundred feet wide.

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EXHIBIT 2

WILD AND SCENIC RIVER ELIGIBILITY REPORT
SAN JUAN RIVER
WATER QUALITY AND WATER FLOWS

The objectives of this report are to 1) present information required for the San Juan Wild and Scenic River Eligibility Analysis for the San Juan National Forest Management Plan, and 2) to evaluate the water quality of the river.

WATER QUALITY

The Final Revised Guidelines for Eligibility, Classification and Management of River Areas does not provide explicit criteria or standards for water quality. However, water quality is studied for the San Juan to determine how well it meets the standards of the Clean Water Act. This analysis uses the "Aesthetics - General Criteria" in the Federal Water Pollution Control Administration's Water Quality Criteria, (WQC), April 1, 1968, which includes the following:

-All surface waters should support life forms of aesthetic value.

-Surface waters should be free of:

--Materials that will settle to form objectionable deposits.

--Floating debris, oil, scum, and other matter.

--Substances producing objectionable color, odor, taste, or turbidity.

--Toxic materials which produce undesirable physiological responses in humans, fish, and other animal life and plants.

--Substances which produce undesirable aquatic life.

Table 2-1 lists the standards considered to be satisfactory for aquatic life as recommended in the Federal Water Pollution Control Administration's Water Quality Criterion, (WQC), April 1, 1968.

Available water quality for the San Juan River is displayed in Table 2-2. The Colorado Department of Health, Water Quality Control Commission will be establishing water quality standards for all streams in the San Juan-Dolores river basins, including the San Juan. Proposed Colorado Water Quality Control Division standards (being considered by the Commission) are also listed in Table 2-2. The WQC (1968) criteria for physical and biological parameters can be supplemented with inorganic and metal parameters from the Colorado Department of Health. The inorganic and metal parameters can be used to address the WQC (1968) category of toxic materials "which produce undesirable physiological responses in humans, fish, and other animal life and plants."

EXHIBIT 2 (Continued)

TABLE 2-1

Standards Considered to be Satisfactory for Aquatic Life

Parameter	Standard
pH	6-9
Total dissolved materials	Below 1500 mg/l
Total acidity	Should not lower alkalinity to below 20 mg/l
Temperature	Should not be raised more than 5°F above normal
Dissolved Oxygen	Above 6 mg/l
Carbon Dioxide	Below 25 mg/l
Oil	No surface oil films, odors, or deposits
Turbidity	Below 10 Jackson turbidity units from waste discharges
Settleable materials	Should not inhibit flora
Floating materials	Foreign origin excluded
Tainting	Should not taint fish or invertebrates
Radionuclides	United States Public Health Service drinking water standards
Total phosphorus	Below .1 mg/l

The San Juan has excellent water quality. No violations of physical and biological parameters have been measured except for a 21.5° C water temperature reading at Pagosa in August 1980. Dissolved nitrogen constituents are considerably below standard (Table 2-2). Wuerthele (1975) reports total phosphorous readings taken in 1974 in the .02 to 0.4 range in the West Fork and main stem. The WQC (1968) states that to prevent nuisance algae growth "as a guideline, the concentration of total phosphorus should not be increased to levels exceeding .1 mg/l in flowing streams." No nuisance algae growth have been observed in the San Juan. The moderately high total phosphorous readings on the West Fork could possibly be attributed to pasture management activities (grazing and irrigation return flows) on private lands on the West Fork (below West Fork Campground) and on the main stem of the San Juan. Walt Werner (District Ranger, Pagosa Ranger District) mentioned that fertilization occurs on some of the private lands on the West Fork in the early 1970's. It is possible that the phosphorous could result from irrigation return flows flushing fertilized fields. At any rate, the presence of phosphorous is probably not consistent, could result from a lab analysis error, and does not result in nuisance growth. All other inorganic and metal parameters are well in compliance with water quality standards.

No known violations of the "WQC" Aesthetics - General Requirements" occur. The San Juan and east and west fork tributaries are generally free of objectionable material (debris, oil, scum, toxic materials).

EXHIBIT 2 (Continued)

TABLE 2-2

San Juan River, Water Quality Analysis, Wild and Scenic River Evaluation

Parameter	San Juan R & E&W Fks. to 4 mi.Ck.	San Juan R 4 mi.Ck.to Navajo R	SQC 1968	Wuerthele (1975) East Fork	Wuerthele (1975) West Fork	Wuerthele (1975) Main Stem S.J.	For.Serv. 1980 data East Fork	For.Serv. 1980 data San Juan @ Pagosa	For.Serv. 1981 data East Fork	For.Serv. 1981 data West Fork	For.Serv. 1981 data San Juan @ Pagosa
phy & biol.											
Dis. Oxygen	Above 6.0	Above 6.0	Above 6.0	9.5	8.5	9.1	7-10	8-11	8.4		8.8
pH	6.5-9	6.5-9	6-9	7.8	7.7	8.1	7-9	7-9	7.1		7.0
T°C	20°C	20°C	20°C	9	12.5	14	1-18	1-21.5*	10.3	5.7	9.3
fecal coliform	200/100 ml	2000/100 ml					30	21	1		61.4
inorganic											
NH_3	.02	.02		0	0	0					
NO_2	.05	.05		0	0	0					
NO_3	10	100		0	0	0			.01		.12
TDS			Below 500 mg/l								
Total P			Below .1	0	.21*	.35*					
Chloride	250			9	7	6					
Sulfate	250			13	9	13			5.4		8.5
metals											
Arsenic	.05	.05		-	-	-					
Cadnium	.0004	.0004		-	-	-					
Copper	.005	.02		0	0	0					
Iron	.3	1.0		.1	.15	.2					
Lead	.004			0	0	0					
Zinc	-	-	0	0	0						

*Water Quality Standards Violations

Wuerthele (1975) concludes that "the San Juan River exhibited better water quality and biological communities within the monitoring area than did any other river in this study" and "seemed to be the least affected within the (San Juan) Basin by man's activities."

In summary, the San Juan exhibits excellent water quality through at least Pagosa Springs.

FREE FLOWING CHARACTERISTICS

The Wild and Scenic Rivers Act provides that a river must be in a free flowing natural condition to be eligible for inclusion in the Wild and Scenic Rivers system. Section 15b of PL 93-621 defines free flowing as "without impoundment, diversion, straightening, riprapping or other modification of the waterway." The law further states that "low dams, diversion works, and other minor structures will not automatically preclude the river unit from being included in the National Wild and Scenic Rivers System, providing such structures do not unreasonably diminish the free flowing nature of the stream and the scenic, scientific, geological, historical, cultural, recreational, and fish and wildlife values present in the area."

No impoundments occur on the San Juan above Navajo Reservoir. Several small diversions occur on the West Fork below West Fork Campground, but do not significantly impair the free flowing characteristics. Considerable diversions and particularly channel alternations (riprap gravel pits, diking) have significantly altered the free flowing characteristics of the East Fork in Section 31-34, T.37N., R2E., and the main stem of the San Juan below the confluence of the East and West Forks. The San Juan cannot reasonably be considered a free-flowing stream in these altered segments.

STREAMFLOWS

The USDA/USDI (1970) Guidelines provide that for a river to be eligible for Wild and Scenic River designation, "there should be sufficient volume of water-related outdoor recreation activities generally associated with comparable rivers." The revised USDA/USDI (1982) Guidelines state that flows are sufficient if they sustain or complement the outstandingly remarkable values for which the river would be designated.

Average annual water yield of the San Juan at the Colorado-New Mexico State-line (approximately 30 miles southwest of Pagosa Springs) is 482,000 acre-feet averaging 666 cfs. The seven-day ten-year low flows (Hook, 1975) are calculated at 7.8 cfs for East Fork, 9.4 cfs for West Fork, and 20.5 cfs for the San Juan mainstem. Peak flows are usually a result of snowmelt runoff although the highest USGS gauge recorded flows result from fall frontal storms (2,460 cfs on East Fork, September 14, 1970; 16,000 cfs on San Juan at Pagosa, October 5, 1911).

The river provides sufficient water flows in a normal year to allow full enjoyment of water-related outdoor recreation (scenic viewing, fishing, floating).

EXHIBIT 2 (Continued)

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EXHIBIT 3

SUPPLEMENTAL GUIDELINES FOR DETERMINATION OF OUTSTANDINGLY REMARKABLE VALUES

The phrase "outstandingly remarkable" has strong emotional appeal but is difficult to define in factual or objective terms. In reading these supplemental guidelines, it is important to bear one qualification in mind; it is important to understand each guideline, but more important is their collective intent. Although each distinctive character need not be present, each character must be considered in evaluating the stream segments. In some cases, just one distinctive character may justify the river's addition to the National System.

OUTSTANDINGLY REMARKABLE SCENIC VALUES

These values are associated with the content of what the viewer sees and the capability of the area to be seen. They include:

-Slopes which are dissected, uneven, sharp exposed ridges or large dominant features that provide opportunity to view as opposed to situations that have no prominent features and no or low visibility.

-Rock or cliff forms with features standing out on land form as opposed to features that are not visible.

-Vegetation providing a variety of patterns, contrast in color, texture, and shape as opposed to continuous vegetative cover with little or no change.

-Water forms that provide changing character including falls, pools, riffles, rapids, and meanders as opposed to streams that have little diversity.

-The ability to see wildlife in its natural habitat.

OUTSTANDINGLY REMARKABLE RECREATIONAL VALUES

The stream and its immediate environment should provide a wide variety of related land and water based recreation opportunity. Recreation activities should provide exhilaration and challenge to meet the expectations of the novice and/or the skilled. Camping and picnicking should be accommodated in the immediate environment without being seen from the streambed.

OUTSTANDINGLY REMARKABLE GEOLOGY

The opportunity to appreciate geologic phenomena for scientific, recreational, and aesthetic purposes relies upon geologic formations being exposed and reasonably accessible.

-There should be a variety of rock types, fossilized rocks, rare rock or mineral types, and uncommon rock associations.

EXHIBIT 3 (Continued)

-Formations should contain a variety of examples of geologic processes including: folded, tilted, horizontal, or vertical strata; evidence of thrust faulting; intrusive or extrusive volcanics; exemplary cases of slumps or slides.

-Areas should be available for rock-hounding and gem or semi-precious stone collecting.

-Exposed formations should present several eras of the geologic time scale.

OUTSTANDINGLY REMARKABLE FISH AND WILDLIFE VALUES

Lakes along all stream segments should be capable of maintaining fish populations without stocking of creel size fish.

Streams should have self-sustaining population of trout or other desirable species capable of providing a sport fishery without supplemental stocking.

Presence of species that are endangered or threatened.

Provides vital habitat for ranging wildlife, i.e., nursery areas, migration routes, and winter range.

Has known or verified populations of wildlife species separated from their normal range.

Unusual abundance of a single wildlife species.

Unusual diversity or unique associations of wildlife species.

OUTSTANDINGLY REMARKABLE CULTURAL VALUES

Association of the river or river segments with events that have made a significant contribution to recorded history. These include, but are not limited to, events of early American exploration, Spanish exploration and sites of national importance (National Register).

Artifacts of prehistoric cultures should suggest group activity or a pattern of life as opposed to the chance wandering of an individual.

Artifacts should identify a type, period, or method of construction, artisan, and craft or craftmanship found nowhere else.

APPENDIX J

SELECTED OUTPUTS AND ACTIVITIES OF ALTERNATIVES

Selected Outputs and Activities of Alternatives

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
RECREATION										
Developed Recreation Use (including Visitor Information Service and downhill skiing)	Thousand Visitor Days 1/	W01-06, W10	612	A	659	935	1,211	1,491	1,742	1,859
				B	659	1,105	1,521	2,000	2,507	2,799
				C	659	1,080	1,491	1,961	2,462	2,749
				D	659	1,043	1,381	1,820	2,297	2,559
				E	659	1,080	1,491	1,886	2,337	2,589
				F	659	950	1,231	1,511	1,762	1,884
				G	659	1,043	1,381	1,820	2,297	2,559
				H	659	1,105	1,521	1,925	2,387	2,639
				I	659	935	1,211	1,491	1,742	1,859
				J	659	1,105	1,521	2,000	2,507	2,799
Downhill Skiing Use	Thousand Visitor Days		138	A	115	165	235	300	365	385
				B	115	295	495	750	1,060	1,250
				C	115	295	495	750	1,060	1,250
				D	115	295	495	750	1,060	1,250
				E	115	295	495	675	940	1,090
				F	115	165	235	300	365	385
				G	115	295	495	750	1,060	1,250
				H	115	295	495	675	940	1,090
				I	115	165	235	300	365	385
				J	115	295	495	750	1,060	1,250
Dispersed Recreation Use (including Wildlife and Fish)	Thousand Visitor Days	W07-W09	873	A	1,170	1,430	1,660	1,920	2,170	2,410
				B	1,170	1,460	1,790	2,180	2,510	2,780
				C	1,170	1,420	1,730	1,990	2,260	2,530
				D	1,170	1,380	1,780	2,170	2,490	2,740
				E	1,170	1,470	1,820	2,150	2,490	2,760
				F	1,170	1,440	1,800	2,190	2,530	2,810
				G	1,170	1,420	1,720	2,140	2,480	2,760
				H	1,170	1,430	1,790	2,220	2,590	2,780
				I	1,170	1,430	1,690	1,910	2,160	2,400
				J	1,170	1,460	1,780	2,160	2,510	2,770
Off-Road Motorized Use	Thousand Visitor Days		63	A	80	130	190	240	300	370
				B	80	100	170	210	240	260
				C	80	130	180	230	290	350
				D	80	130	180	250	320	360
				E	80	110	150	190	230	280
				F	80	100	130	160	180	200
				G	80	110	160	220	290	340
				H	80	100	130	160	190	200
				I	80	130	200	260	360	470
				J	80	140	210	300	390	490

1/ Recreation Visitor Day = 12 hours of recreation for one person or one hour of recreation for 12 persons or any combination thereof.

Selected Outputs and Activities of Alternatives (Continued)

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Trail Construction/ Reconstruction	Miles	L21, L22	12	A	7	45	45	45	28	28
				B	7	30	30	30	18	18
				C	7	43	43	43	27	27
				D	7	5	5	5	5	5
				E	7	41	41	41	26	26
				F	7	37	37	37	23	23
				G	7	36	36	36	22	22
				H	7	40	40	40	25	25
				I	7	47	47	47	30	30
				J	7	38	38	38	24	24
WILDERNESS										
Wilderness Management (San Juan N.F.)	Thousand Acres	B02, B03	355.0	A	445.2	445.2	445.2	445.2	445.2	445.2
				B	355.0	355.0	355.0	355.0	355.0	355.0
				C	370.8	370.8	370.8	370.8	370.8	370.8
				D	355.0	355.0	355.0	355.0	355.0	355.0
				E	412.4	412.4	412.4	412.4	412.4	412.4
				F	355.0	355.0	355.0	355.0	355.0	355.0
				G	445.2	445.2	445.2	445.2	445.2	445.2
				H	412.4	412.4	412.4	412.4	412.4	412.4
				I	445.2	445.2	445.2	445.2	445.2	445.2
				J	355.0	335.0	335.0	335.0	335.0	335.0
Wilderness Use (San Juan N.F.)	Thousand Visitor Days	W16-W18	139.0	A	240	352	360	445	528	598
				B	214	314	420	539	639	725
				C	217	318	425	546	647	734
				D	214	314	420	539	639	725
				E	232	341	456	585	693	787
				F	214	314	420	539	639	725
				G	240	352	385	495	587	665
				H	232	341	456	585	693	787
				I	240	352	360	445	528	598
				J	214	314	420	539	639	725
WILDLIFE AND FISH										
Wildlife Habitat Improvement	Thousand Acre Equivalents Treated	C02, C03	130.0	A	155	155	104	109	90	114
				B	240	240	131	162	97	168
				C	131	131	95	121	76	101
				D	138	138	92	100	104	108
				E	218	218	143	193	171	180
				F	173	173	129	169	128	160
				G	152	152	91	116	96	124
				H	196	196	134	168	158	163
				I	121	121	61	64	58	72
				J	187	187	129	134	118	140

Selected Outputs and Activities of Alternatives (Continued)

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Winter Range Carrying Capacity (Deer, Elk)	Thousand Animals		16.4/ 12.8	A Deer-16.4	18.3	18.3	19.5	21.4	22.6	24.5
				Elk -12.8	13.4	13.4	13.8	14.4	14.8	15.4
				B Deer-16.4	23.6	23.6	26.5	29.5	32.2	35.2
				Elk -12.8	15.0	15.0	15.9	16.8	17.6	18.5
				C Deer-16.4	18.9	18.9	19.8	21.3	22.2	22.7
				Elk -12.8	13.6	13.6	13.9	14.4	14.7	15.1
				D Deer-16.4	18.6	18.6	19.2	20.3	20.9	22.0
				Elk -12.8	13.5	13.5	13.7	14.0	14.2	14.5
				E Deer-16.4	19.9	19.9	20.9	22.8	23.8	25.7
				Elk -12.8	13.9	13.9	14.2	14.8	15.1	15.7
				F Deer-16.4	18.0	18.0	18.3	18.9	19.2	19.8
				Elk -12.8	13.3	13.3	13.4	13.6	13.7	13.9
				G Deer-16.4	19.3	19.3	20.1	21.4	22.1	23.4
				Elk -12.8	13.7	13.7	13.9	14.3	14.5	14.9
				H Deer-16.4	19.4	19.4	21.2	23.8	26.1	28.7
				Elk -12.8	13.7	13.7	14.3	15.1	15.8	16.6
				I Deer-16.4	17.5	17.5	17.5	17.7	17.7	17.8
				Elk -12.8	13.1	13.1	13.1	13.1	13.1	13.2
				J Deer-16.4	17.7	17.7	17.7	18.3	18.3	18.6
				Elk -12.8	13.2	13.2	13.2	13.4	13.4	13.5
Fish and Wildlife Structures	Number	C02, C03	29	A	95	95	95	97	51	37
				B	50	50	59	62	63	67
				C	70	70	71	73	74	76
				D	19	19	19	21	23	26
				E	118	118	120	118	55	56
				F	78	78	79	82	86	73
				G	43	43	44	45	47	50
				H	79	79	61	62	62	47
				I	95	95	82	82	34	20
				J	44	44	28	30	29	28
RANGE										
Grazing Use (Livestock)	Thousand Animal Unit Months 2/	W43	170.2	A	157.5	137.1	150.1	155.1	153.0	155.9
				B	157.3	171.6	188.6	198.3	208.9	218.4
				C	161.9	163.8	183.0	185.6	189.7	192.2
				D	157.5	137.1	173.6	173.6	175.6	176.8
				E	162.4	166.6	181.5	180.1	185.5	189.4
				F	162.8	168.6	187.1	187.2	192.5	195.5
				G	163.5	173.6	194.5	195.2	200.9	202.3
				H	162.6	175.4	187.5	192.5	197.2	200.6
				I	159.4	145.4	156.6	159.7	159.9	159.2
				J	162.0	168.7	195.8	200.3	209.3	218.8

2/ Animal Unit Month = the amount of forage consumed by one mature cow or its equivalent in a one-month period.

Selected Outputs and Activities of Alternatives (Continued)

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
TIMBER										
Programmed Sales Offered	Million Board Feet	Y37,Y40 Y45	45.7	A	34.2	26.5	26.0	26.0	26.0	35.2
				B	34.2	59.5	72.4	72.4	72.4	72.4
				C	34.2	34.0	34.0	34.0	34.0	37.2
				D	34.2	21.3	32.8	34.4	36.0	41.2
				E	34.2	32.9	34.0	34.8	35.2	40.0
				F	34.2	35.7	38.8	42.0	44.8	72.4
				G	34.2	40.0	40.0	40.0	40.0	45.6
				H	34.2	41.3	42.0	44.0	46.0	48.0
				I	34.2	8.2	8.2	8.2	8.2	21.4
				J	34.2	60.0	60.0	60.0	60.0	60.0
Reforestation 3/	Thousand Acres	E04	3.4	A	2.5	2.0	0.3	2.2	1.0	0.0
				B	2.5	2.8	3.8	4.3	1.8	5.9
				C	2.5	0.5	1.2	1.4	1.0	1.4
				D	2.5	0.0	0.0	1.4	1.6	1.7
				E	2.5	1.3	0.2	0.5	0.7	0.0
				F	2.5	0.0	0.1	0.5	0.0	2.2
				G	2.5	0.1	0.9	1.0	0.5	1.9
				H	2.5	2.4	1.3	1.6	0.3	1.8
				I	2.5	0.1	0.1	0.5	0.2	3.2
				J	2.5	0.4	1.8	4.2	1.1	3.8
Timber Stand Improvement	Thousand Acres	E05	3.3	A	1.9	6.7	6.7	5.3	6.3	6.3
				B	1.9	11.5	10.9	7.2	7.2	3.1
				C	1.9	9.4	9.4	8.9	8.9	7.7
				D	1.9	9.2	9.2	7.8	6.4	4.9
				E	1.9	10.0	10.0	10.0	10.0	10.0
				F	1.9	11.9	11.9	11.4	11.4	9.1
				G	1.9	9.2	9.2	9.1	9.1	7.3
				H	1.9	9.4	8.9	8.7	8.7	6.4
				I	1.9	4.8	4.8	4.5	4.5	1.6
				J	1.9	9.8	9.8	9.4	9.4	7.4
WATER										
Meeting Water Quality Goals	Million Acre-Feet	Y77	1.85	A	1.85	1.85	1.85	1.89	1.89	1.89
				B	1.85	1.85	1.81	1.78	1.74	1.71
				C	1.85	1.85	1.85	1.89	1.89	1.89
				D	1.85	1.85	1.85	1.89	1.89	1.89
				E	1.85	1.85	1.85	1.89	1.89	1.89
				F	1.85	1.85	1.85	1.89	1.89	1.89
				G	1.85	1.85	1.85	1.89	1.89	1.89
				H	1.85	1.85	1.85	1.89	1.89	1.89
				I	1.85	1.85	1.85	1.89	1.89	1.89
				J	1.85	1.85	1.85	1.89	1.89	1.89

3/ Reforestation figures include site preparation for natural regeneration plus acres to be planted.

Selected Outputs and Activities of Alternatives (Continued)

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Average Annual Yield	Million Acre-Feet		2.5	A	2.500	2.500	2.503	2.511	2.515	2.515
				B	2.513	2.513	2.545	2.547	2.553	2.556
				C	2.501	2.501	2.507	2.513	2.525	2.529
				D	2.499	2.499	2.503	2.506	2.508	2.509
				E	2.502	2.502	2.505	2.523	2.531	2.529
				F	2.500	2.500	2.508	2.520	2.520	2.519
				G	2.500	2.500	2.506	2.511	2.514	2.513
				H	2.501	2.501	2.513	2.525	2.526	2.527
				I	2.495	2.495	2.493	2.492	2.490	2.489
				J	2.502	2.502	2.513	2.529	2.533	2.532
MINERALS	Number of Operating Plans	G01-G08	153	All	167	168	168	168	168	168
HUMAN AND COMMUNITY DEVELOPMENT										
Human Resource Program	Enrollee Years	X11-X17	31	All	25	N/A	N/A	N/A	N/A	N/A
PROTECTION										
Fire Management Effectiveness Index	Dollars/ Thousand Acres	Z91	103	A	103	108	113	118	118	118
				B	103	108	108	108	108	108
				C	103	108	113	118	118	118
				D	103	108	108	113	108	113
				E	103	108	108	113	113	118
				F	103	108	108	113	113	118
				G	103	108	108	108	108	113
				H	103	108	113	113	118	118
				I	103	108	113	113	113	118
				J	103	108	108	108	108	108
Fuelbreaks and Fuel Treatment	Thousand Acres	P11-P14	4.2	A	4.3	3.9	3.9	3.9	3.9	3.9
				B	4.3	7.9	7.9	7.9	7.9	7.9
				C	4.3	5.4	5.4	5.4	5.4	5.4
				D	4.3	7.2	7.2	7.2	7.2	7.2
				E	4.3	6.5	6.5	6.5	6.5	6.5
				F	4.3	6.0	6.0	6.0	6.0	6.0
				G	4.3	7.8	7.8	7.8	7.8	7.8
				H	4.3	7.2	7.2	7.2	7.2	7.2
				I	4.3	3.9	3.9	3.9	3.9	3.9
				J	4.3	5.5	5.5	5.5	5.5	5.5

Selected Outputs and Activities of Alternatives (Continued)

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Insect and Disease Surveys	Thousand Acres		1,868	All	1,868	1,868	1,868	1,868	1,868	1,868
LANDS										
Land Purchase and Acquisition (Excludes Exchange)	Acres	J15	0	A	0	80	80	80	80	80
				B	0	160	160	160	160	160
				C	0	100	100	100	100	100
				D	0	80	80	80	80	80
				E	0	1,130	160	160	160	160
				F	0	80	80	80	80	80
				G	0	80	80	80	80	80
				H	0	100	100	100	100	100
				I	0	80	80	80	80	80
				J	0	160	160	160	160	160
Land Exchange	Acres	J14	0	A	150	250	250	250	250	250
				B	150	1,000	1,000	1,000	500	500
				C	150	500	500	500	250	250
				D	150	250	250	250	250	250
				E	150	750	750	750	750	750
				F	150	250	250	250	250	250
				G	150	250	250	250	250	250
				H	150	500	500	500	250	250
				I	150	250	250	250	250	250
				J	150	1,000	1,000	1,000	500	500
Rights-of-Way Acquisition	Cases	J18	4	A	3	2	2	2	2	2
				B	3	4	4	4	2	2
				C	3	3	3	3	3	2
				D	3	2	2	2	2	2
				E	3	4	4	4	2	2
				F	3	3	3	3	3	2
				G	3	2	2	2	2	2
				H	3	3	3	3	3	2
				I	3	2	2	2	2	2
				J	3	4	4	4	2	2

Selected Outputs and Activities of Alternatives (Continued)

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Occupancy Trespass	Cases		2	A	2	3	3	3	3	3
				B	2	6	6	6	6	6
				C	2	4	4	4	4	4
				D	2	2	2	2	2	2
				E	2	8	8	8	8	8
				F	2	3	3	3	3	3
				G	2	2	2	2	2	2
				H	2	4	4	4	4	4
				I	2	3	3	3	3	3
				J	2	6	6	6	6	6
Landline Location	Miles		29	A	30	26	26	26	26	26
				B	30	64	64	64	64	64
				C	30	30	30	30	30	30
				D	30	15	15	15	15	15
				E	30	85	85	85	85	0
				F	30	29	29	29	29	29
				G	30	26	26	26	26	26
				H	30	45	45	45	45	45
				I	30	26	26	26	26	26
				J	30	64	64	64	64	64
SOILS										
Soil and Water Resource Improvement (Improved Watershed Condition)	Acres	X89, Y86	500	A	560	291	291	291	291	291
				B	560	660	660	660	641	188
				C	560	470	470	470	470	470
				D	560	572	572	572	572	155
				E	560	466	466	466	466	466
				F	560	342	342	342	342	342
				G	560	572	572	572	572	155
				H	560	447	447	447	447	447
				I	560	284	284	284	284	284
				J	560	559	559	559	559	487
FACILITIES 4/										
Road Construction/ Reconstruction (Arterial)	Miles	L04, L05	0.0	A	3	6	6	6	6	6
				B	3	6	6	6	6	6
				C	3	7	7	7	7	7
				D	3	1	2	2	3	3
				E	3	6	6	6	6	6
				F	3	6	6	6	6	6
				G	3	8	8	8	8	8
				H	3	6	6	6	6	7
				I	3	8	7	7	7	6
				J	3	8	8	8	8	8

4/ Includes roads constructed/reconstructed by timber purchasers.

Selected Outputs and Activities of Alternatives (Continued)

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Road Construction/ Reconstruction (Collector)	Miles	L08, L09	5.0	A	8	13	13	13	13	13
				B	8	13	14	14	14	14
				C	8	15	15	15	15	15
				D	8	3	4	4	5	5
				E	8	12	12	12	12	12
				F	8	13	12	14	14	14
				G	8	17	17	17	17	17
				H	8	12	12	12	12	15
				I	8	16	16	16	14	14
				J	8	17	17	17	17	17
SOCIO-ECONOMIC EFFECTS 5/										
Returns to Treasury	Thousand Dollars		746.7	A	1,070	1,070	1,001	1,060	1,107	1,325
				B	1,476	1,476	2,113	2,220	2,337	2,411
				C	1,194	1,194	1,275	1,366	1,470	1,601
				D	1,037	1,037	1,224	1,344	1,479	1,647
				E	1,190	1,190	1,278	1,366	1,470	1,627
				F	1,215	1,215	1,352	1,472	1,588	2,201
				G	1,266	1,266	1,407	1,494	1,601	1,777
				H	1,287	1,287	1,469	1,290	1,732	1,828
				I	893	893	643	700	750	1,048
				J	1,464	1,464	1,840	1,938	2,051	2,125
Payment to Counties	Thousand Dollars		186.7	A	268	268	250	265	277	331
				B	369	369	528	555	584	603
				C	299	299	319	342	362	400
				D	259	259	306	336	370	412
				E	298	298	320	342	368	407
				F	304	304	338	368	397	550
				G	317	317	352	374	400	444
				H	322	322	367	323	433	457
				I	223	223	161	175	188	262
				J	366	366	460	485	513	531
Changes (Direct, Indirect and Induced) in Total Employment Associated with Forest Outputs in Index Year 1995	Number of Jobs		6,740 (Jobs Associated with 1980 Forest Outputs)	A	N/A	N/A	5,220	N/A	N/A	N/A
				B	N/A	N/A	9,940	N/A	N/A	N/A
				C	N/A	N/A	8,500	N/A	N/A	N/A
				D	N/A	N/A	8,840	N/A	N/A	N/A
				E	N/A	N/A	9,110	N/A	N/A	N/A
				F	N/A	N/A	5,610	N/A	N/A	N/A
				G	N/A	N/A	8,600	N/A	N/A	N/A
				H	N/A	N/A	9,500	N/A	N/A	N/A
				I	N/A	N/A	5,050	N/A	N/A	N/A
				J	N/A	N/A	9,750	N/A	N/A	N/A

5/ All benefits and costs are in constant 1978 dollars.

Selected Outputs and Activities of Alternatives (Continued)

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Changes (Direct, Indirect and Induced) in Total Income Associated with Forest Outputs in Index Year 1995	Million Dollars		115.0 (Income Associated with 1980 Forest Outputs)	A	N/A	N/A	87.8	N/A	N/A	N/A
				B	N/A	N/A	163.6	N/A	N/A	N/A
				C	N/A	N/A	138.2	N/A	N/A	N/A
				D	N/A	N/A	144.0	N/A	N/A	N/A
				E	N/A	N/A	148.9	N/A	N/A	N/A
				F	N/A	N/A	94.9	N/A	N/A	N/A
				G	N/A	N/A	140.2	N/A	N/A	N/A
				H	N/A	N/A	155.7	N/A	N/A	N/A
				I	N/A	N/A	84.6	N/A	N/A	N/A
				J	N/A	N/A	160.5	N/A	N/A	N/A
COSTS 5/										
Operations and Maintenance	Thousand Dollars		4,014	A	3,678	4,202	4,013	4,025	4,110	4,195
				B	3,678	5,449	5,388	5,493	5,675	5,856
				C	3,678	4,008	3,979	4,110	4,097	4,330
				D	3,678	3,084	3,438	3,557	3,679	3,891
				E	3,678	7,480	4,549	4,539	4,730	4,920
				F	3,678	4,191	4,166	4,247	4,762	5,277
				G	3,678	4,298	4,199	4,353	4,409	4,641
				H	3,678	4,412	4,244	4,334	4,300	4,266
				I	3,678	3,096	2,946	2,987	3,011	3,423
				J	3,678	5,079	4,976	5,105	5,186	5,335
Capital Investments	Thousand Dollars		1,584	A	1,994	2,821	2,614	3,270	2,567	2,314
				B	1,994	2,931	3,604	3,740	3,095	4,129
				C	1,994	4,209	3,055	2,929	2,922	2,761
				D	1,994	1,049	695	718	907	803
				E	1,994	2,618	2,319	2,319	1,919	1,758
				F	1,994	2,560	2,502	2,508	2,249	2,566
				G	1,994	3,066	3,371	3,318	2,988	3,162
				H	1,994	2,604	2,425	2,581	2,066	3,092
				I	1,994	3,817	3,741	5,224	3,556	3,487
				J	1,994	3,088	3,128	3,735	2,567	3,049
General Administration	Thousand Dollars		1,001	A	929	968	962	970	963	960
				B	929	988	996	1,000	994	1,012
				C	929	985	970	967	968	969
				D	929	816	816	816	816	816
				E	929	1,013	962	962	959	959
				F	929	964	963	964	968	979
				G	929	972	975	977	973	979
				H	929	967	963	966	958	972
				I	929	966	963	985	961	966
				J	929	985	984	995	978	988

5/ All benefits and costs are in constant 1978 dollars.

Selected Outputs and Activities of Alternatives (Continued)

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Backlog 6/	Thousand Dollars		945	A	1,261	175	175	124	124	124
				B	1,261	430	430	305	305	305
				C	1,261	201	201	143	143	143
				D	1,261	101	101	71	71	71
				E	1,261	571	571	405	405	405
				F	1,261	195	195	138	138	138
				G	1,261	175	175	124	124	124
				H	1,261	302	302	214	214	214
				I	1,261	175	175	124	124	124
				J	1,261	430	430	305	305	305
Total San Juan National Forest	Thousand Dollars		6,599	A	6,601	7,991	7,589	8,265	7,640	7,469
				B	6,601	9,368	9,988	10,233	9,764	10,997
				C	6,601	9,202	8,004	8,006	7,987	8,063
				D	6,601	4,949	4,949	5,091	5,402	5,510
				E	6,601	11,111	7,830	7,820	7,608	7,637
				F	6,601	7,715	7,631	7,719	7,979	8,822
				G	6,601	8,336	8,545	8,648	8,370	8,782
				H	6,601	7,983	7,632	7,881	7,324	8,330
				I	6,601	7,879	7,650	9,196	7,528	7,876
				J	6,601	9,152	9,088	9,835	8,731	9,372

6/ Backlog expenditures include land line location and reforestation which are also included in operation and maintenance and capital investment figures respectively; backlog figures are therefore not additive.

APPENDIX K

DETERMINATION OF LANDS AVAILABLE, CAPABLE AND TENTATIVELY SUITABLE FOR TIMBER PRODUCTION

DETERMINATION OF LANDS AVAILABLE, CAPABLE AND TENTATIVELY SUITABLE FOR TIMBER PRODUCTION

One requirement in the planning process is to determine lands capable, available and suitable for timber production. The following process was followed:

-Total net acres of the San Juan National Forest were divided into water acres and land acres.

-Land area was classified into either forest land (that which is at least 16 percent stocked by trees or formerly had trees) or non-forest land.

-Forest land was determined to be either capable or not capable. Capable forest land has the biological growing potential to produce at least 20 cubic feet of wood per acre per year. Anything less is classified as Not Capable forest land.

-Lands determined capable were judged as to their availability for timber production; not available lands are those productive forest lands legislatively or administratively withdrawn from timber production. This classification includes wildernesses, wilderness study areas, research natural areas, wild and scenic river corridors, and administrative sites.

-Land both capable and available for timber production was then evaluated as to suitability. Two physical suitability tests are required:

1. The first test is whether technology is available to ensure that timber production, including harvesting, does not result in irreversible resource damage to soil productivity or watershed condition. Availability of technology is judged on whether technology is currently developed and available for use. This is not an economic test, and the technology does not necessarily have to be available in the local area. The conclusion is that technology is available to harvest timber from all areas of the Forest while adequately protecting the soil and water resource.

2. The second test is whether there is reasonable assurance that such lands can be adequately restocked within five years after final harvest. Ponderosa pine on slopes greater than 30 percent cannot be reasonably assured of adequate restocking within five years after final harvest. Currently non-stocked ponderosa pine stands on any slope cannot be reforested with reasonable assurance of plantation establishment.

   Non-stocked land has less than 40 square feet of basal area of pole timber or sawtimber size trees or less than 300 trees per acre of seedling or sapling size trees. Currently non-stocked land is non-stocked at the time of Forest Plan preparation. Land which may become non-stocked in the future is not included in this category.

All of the currently non-stocked ponderosa pine land is now fully occupied with other vegetation. Most of the currently non-stocked ponderosa pine land became non-stocked as a result of timber harvesting from 1900 to 1940. These lands have been occupied with other vegetation for the past 40-80 years. This other vegetation, mostly Gambel oak, competes with ponderosa pine and precludes establishment of pine seedlings. The environment necessary for ponderosa pine establishment does not presently exist. Continuous efforts have been made to reforest these sites and, with few exceptions, these efforts have failed. Based on current site factors and historic records of regeneration failure, it has been determined that a reasonable chance of plantation success does not exist on these lands. Therefore they are determined to be technologically not suitable.

With changes in technology these lands may be reclassified as tentatively suitable. During the next 10-year period, a portion of these lands will be planted with ponderosa pine using the most recent state-of-the-art reforestation techniques. The success or failure of these plantations will determine future classification of these lands.

Currently stocked stands of ponderosa pine on slopes less than 30 percent are tentatively suitable for timber production. There is reasonable assurance that these stands can be regenerated within five years of final harvest. On sites currently occupied with ponderosa pine, the trees maintain an environment favorable for tree growth. Wind movement through the stand is modified by the trees, hence soil drying by wind is reduced. Trees provide shade, and soil drying by solar radiation is reduced. Shade also reduces the vigor of competing understory vegetation. Competing understory vegetation can be further reduced in vigor by periodic prescribed burning using low intensity fires.

In addition to periodic burning, it is necessary to remove understory vegetation at the time of a regeneration cut. This must be done immediately after the regeneration cut and before plants can respond to increased solar radiation.

A loose mineral soil seedbed is a requirement for natural establishment of ponderosa pine seedlings. It is also very desirable if the area is to be planted. Plowing or discing, using mechanized equipment, has been successful in removing understory vegetation while at the same time preparing a loose mineral soil seedbed.

The above practices can be accomplished on slopes less than 30 percent with resultant reasonable assurance that stands can be regenerated. However, the fact that mechanized equipment is necessary both for removing understory vegetation and preparing a mineral seedbed restricts this assurance to areas where equipment can be used. Because of equipment limitations and the potential for accelerated erosion, equipment is restricted to slopes less

than 30 percent. Use on slopes greater than 30 percent could result in a 15-fold increase in the erosion rate, causing irreparable loss to the long-term productivity of the site. Therefore, ponderosa pine on slopes greater than 30 percent is technologically not suitable.

Available productive forest land failing to meet either of these tests was classed as physically not suitable forest land. Available forest land passing both tests was classed as tentatively suitable, productive timber land.

The results of the above assessment are shown in Chapter III. The following tables display and compare the various categories of land classification.

-Table 1 compares present timber classification with the 1976 Timber Management Plan.

-Table 2 compares land presently classified as tentatively suitable with the 1976 Timber Management Plan by type and stand size class.

-Table 3 is a summary of Forest classification of capable forest land by type and stand size class.

-Table 4 is a summary of Forest classification of capable forest land by type and slope class.

Of the lands identified as tentatively suitable, economic considerations were used to help identify lands actually suitable for timber production in the various alternatives. These are defined as lands that are cost-efficient in meeting objectives, including timber production, for the respective alternatives. Such lands were tentatively identified by using FORPLAN to help select analysis areas on which timber harvesting prescriptions would be applied. This acreage information was then used by District Rangers and their staff in determining where to apply specific prescriptions on the ground. By incorporating their knowledge of actual site-specific conditions, District personnel were able to control the location of timber harvesting activities to maximize cost-efficiency of timber production. The results of this step are shown in Chapter IV.

The changes in acreages of the various land classifications between the 1976 Timber Management Plan and this Forest Plan (Tables I and II) can be explained to some extent by the use of different inventory techniques. Basic differences were:

-The plan inventory in 1976 was based on 1967 Forest Survey data using an inventory system of a double sample technique in combination with photogrammetric interpretation of non-sampled stands.

-The Forest Plan inventory used a combination of LANDSAT satellite imagery, three-acre cells interpreted for accuracy by district foresters using aerial photos, infrared photos, previous survey data and timber type maps. A plan to test the accuracy of the LANDSAT system is being developed.

Another difference between the two inventories resulted from reclassifying some acres from commercial to non-commercial forest land as a result of the Reforestation Backlog Environmental Assessment approved in December 1980. This included 98,000 acres in the Gambel oak type which had been misclassified as non-stocked ponderosa pine.

Also, there are an additional 85,911 acres of ponderosa pine that were determined in the Forest Plan inventory to be not technologically suited for timber production as discussed above.

TABLE 1

Comparison of Classification Categories with 1976 Timber Management Plan

	1976 Timber Management Plan (Acres)	This Plan (Acres)	Percent Change
Area Summary			
Net National Forest	1,850,300	1,867,782	+1%
Total Forested Land	1,559,700	1,346,562	-14%
Total Capable Forest Land 1/	1,388,500	1,119,006	-19%
Total Capable and Available Forest Land 2/	1,098,300	801,474	-27%
Total Not Capable Forest Land 3/	171,200	227,556	+33%
Total Non-Forest Land and Water	290,600	521,220	+79%
Capable Forest Land Not Available			
Capable Reserved	139,000	158,203	+14%
Capable Deferred 4/	151,200	73,418	-51%
Capable Administratively Withdrawal	-0-	-0-	-0-

1/ Capable forest land in this Plan; productive forest land in the 1976 Timber Management Plan.

2/ Tentatively suitable forest land in this Plan; commercial forest land in the 1976 Timber Management Plan.

3/ Not capable forest land in this Plan; non-productive forest land in the 1976 Timber Management Plan.

4/ Includes Wilderness Study Areas.

TABLE 2

Comparison of Classification Categories with 1976 Timber Management Plan by Type and Stand Size Class

Type and Stand Size Class	1976 Timber Management Plan Commercial Forest Acres	Tentatively Suitable Acres for Forest Plan Alternatives	Percent Change
Ponderosa pine			
Non-stocked	147,000	-0-	-100%
Seed-sap	-0-	1,855	
Poletimber	-0-	8,785	
Sawtimber	185,000	116,970	-37%
Total	332,000	127,610	-62%
Spruce-fir			
Non-stocked	17,000	17,770	+5%
Seed-sap	10,000	16,921	+69%
Poletimber	10,000	6,118	-39%
Sawtimber	284,000	269,171	-5%
Total	321,000	310,733	-3%
Douglas-fir			
Non-stocked	21,000	4,138	-80%
Seed-sap	3,000	427	-86%
Poletimber	10,000	4,798	-52%
Sawtimber	186,000	115,429	-38%
Total	220,000	124,792	-43%
Aspen			
Non-stocked	60,000	16,392	-73%
Seed-sap	24,000	4,846	-80%
Poletimber	89,000	97,058	+9%
Sawtimber	52,000	120,043	+131%
Total	225,000	238,339	+6%
Total All	1,098,000	801,474	-27%

TABLE 3

Forest Classification Area of Capable Forest Land by Type and Stand Size Class (Acres)

	Stand Size Class				
	Non-stocked	Seedling/ Sapling	Pole-timber	Saw-timber	Total
CAPABLE FOREST LAND					
NOT AVAILABLE					
Reserved					
Ponderosa pine	227	--	--	1,542	1,769
Spruce-fir	6,103	158	7,150	115,455	128,866
Douglas-fir	273	--	220	13,263	13,756
Aspen	1,644	--	7,732	4,436	13,812
Total	8,247	158	15,102	134,696	158,203
Deferred					
Ponderosa pine	750	--	1,157	2,111	4,018
Spruce-fir	215	--	2,509	21,911	24,635
Douglas-fir	--	--	258	24,969	25,227
Aspen	36	--	10,090	9,412	19,538
Total	1,001		14,014	58,403	73,418
AVAILABLE					
Not Technologically Suitable					
Ponderosa pine	56,443	--	2,259	27,209	85,911
Tentatively Suitable					
Ponderosa pine	0	1,855	8,785	116,970	127,610
Spruce-fir	17,770	17,486	6,306	269,171	310,733
Douglas-fir	4,138	427	4,798	115,429	124,792
Aspen	16,392	4,846	97,058	120,043	238,339
Total	38,300	24,614	116,947	621,613	801,474
Total All	103,991	24,772	148,322	841,921	1,119,006
Percent	10	2	13	75	100

TABLE 4

Forest Classification Area of Capable Forest Land by Type and Slope Class (Acres)

	Slope Class			
	0-30%	30-60%	60% +	Total
CAPABLE FOREST LAND				
NOT AVAILABLE				
Reserved				
Ponderosa pine	454	454	861	1,769
Spruce-fir	21,966	50,806	56,094	128,866
Douglas-fir	2,373	3,198	8,185	13,756
Aspen	3,783	6,945	3,084	13,812
Total	28,576	61,403	68,224	158,203
Deferred				
Ponderosa pine	2,172	1,688	158	4,018
Spruce-fir	6,428	11,626	6,581	24,635
Douglas-fir	9,601	11,587	4,039	25,227
Aspen	9,278	7,222	3,038	19,538
Total	27,479	32,123	13,816	73,418
AVAILABLE				
Not Technologically Suitable				
Ponderosa pine	49,261	29,236	7,414	85,911
Tentatively Suitable				
Ponderosa pine	127,610	--	--	127,610
Spruce-fir	107,617	129,364	73,752	310,733
Douglas-fir	55,450	52,809	16,533	124,792
Aspen	109,136	73,220	55,983	238,339
Total	399,813	255,393	146,268	801,474
Total All	505,129	378,155	235,722	1,119,006
Percent	45	34	21	100

APPENDIX L

OUTPUTS OF MANAGEMENT ALTERNATIVES FOR LIZARD HEAD, WEMINUCHE AND SOUTH SAN JUAN WILDERNESSES

OUTPUTS OF MANAGEMENT ALTERNATIVES FOR LIZARD HEAD, WEMINUCHE AND SOUTH SAN JUAN WILDERNESSES

Because of the need for uniform management direction on designated wildernesses which are on more than one Forest, this draft EIS develops alternatives and discloses the effects of alternatives for management direction of an entire wilderness. This is done for the following wildernesses:

Name	Net N.F. Acres	Administrative Unit
Lizard Head Wilderness	20,816	San Juan N. F.
	20,342	Uncompahgre N. F.
	41,158	
Weminuche Wilderness	294,457	San Juan N. F.
	164,715	Rio Grande N. F.
	459,172	
South San Juan Wilderness	39,783	San Juan N. F.
	87,902	Rio Grande N. F.
	127,685	

The overall effects of alternatives relating to these wildernesses are discussed in the body (Chapter IV) of this draft EIS. The one exception is the economic efficiency analysis which will be covered in the specific environmental impact statements for the individual Forests. This is necessary in order to incorporate the total costs and benefits (including wilderness management) within each Forest's overall analysis of alternatives.

The purpose of this appendix is to show more detailed information by individual Forest for each wilderness than is portrayed in Chapter IV. This is done in five tables.

-Table 1 shows estimated wilderness management area acreage.

-Table 2 shows the estimated visitor days.

-Table 3 shows the estimated authorized livestock grazing.

-Table 4 shows mineral leasing recommendations.

-Table 5 shows estimated base water yield.

TABLE 1

Estimated Wilderness Management Area Acreage by Alternative, Area, and Forest

Area	Pristine	Primitive	Semi-Primitive	Transition	Total
ALTERNATIVES A AND I					
Existing Wildernesses					
Lizard Head					
San Juan NF	14,363	1,457	3,123	1,873	20,816
Uncompahgre NF	5,313	9,331	4,038	1,660	20,342
Weminuche					
San Juan NF	225,672	26,561	36,276	5,948	294,457
Rio Grande NF	31,840	17,446	115,429	0	164,715
South San Juan					
San Juan NF	33,258	4,933	1,592	0	39,783
Rio Grande NF	20,686	3,923	62,319	974	87,902
Wilderness Study Areas (San Juan NF)					
West Needle	14,040	800	960	0	15,800
Piedra	30,940	9,920	640	0	41,500
South San Juan Expansion	22,720	8,000	2,080	0	32,800
San Juan NF Total	340,993	51,671	44,671	7,821	445,156
Rio Grande NF Total	52,526	21,369	177,748	974	252,617
Uncompahgre NF Total	5,313	9,331	4,038	1,660	20,342
TOTAL	398,832	82,371	226,457	10,455	718,115
ALTERNATIVES B, D, F AND J					
Existing Wildernesses					
Lizard Head					
San Juan NF	14,363	1,457	3,123	1,873	20,816
Uncompahgre NF	11,188	5,086	3,662	406	20,342

TABLE 1 (Continued)

Estimated Wilderness Management Area Acreage by Alternative, Area, and Forest

Area	Pristine	Primitive	Semi-Primitive	Transition	Total
Weminuche					
San Juan NF	225,672	26,561	36,276	5,948	294,457
Rio Grande NF	31,840	17,446	115,429	0	164,715
South San Juan					
San Juan NF	33,258	4,933	1,592	0	39,783
Rio Grande NF	20,686	3,923	62,319	974	87,902
Wilderness Study Areas	0	0	0	0	0
San Juan NF Total	273,293	32,951	40,991	7,821	355,056
Rio Grande NF Total	52,526	21,369	177,748	974	252,617
Uncompahgre NF Total	11,188	5,086	3,662	406	20,342
TOTAL	337,007	59,406	222,401	9,201	628,015
ALTERNATIVE C					
Existing Wildernesses					
Lizard Head					
San Juan NF	14,363	1,457	3,123	1,873	20,816
Uncompahgre NF	11,188	5,086	3,662	406	20,342
Weminuche					
San Juan NF	225,672	26,561	36,276	5,948	294,457
Rio Grande NF	31,840	17,446	115,429	0	164,715
South San Juan					
San Juan NF	33,258	4,933	1,592	0	39,783
Rio Grande NF	20,686	3,923	62,319	974	87,902
Wilderness Study Areas (San Juan NF)					
West Needle	14,040	800	960	0	15,800

TABLE 1 (Continued)

Estimated Wilderness Management Area Acreage by Alternative, Area, and Forest

Area	Pristine	Primitive	Semi-Primitive	Transition	Total
San Juan NF					
Total	287,333	33,751	41,951	7,821	370,856
Rio Grande NF					
Total	52,526	21,369	177,748	974	252,617
Uncompahgre NF					
Total	11,188	5,086	3,662	406	20,342
TOTAL	351,047	60,206	223,361	9,201	643,815
ALTERNATIVES E AND H					
Existing Wildernesses					
Lizard Head					
San Juan NF	14,363	1,457	3,123	1,873	20,816
Uncompahgre NF	11,188	5,086	4,068	0	20,342
Weminuche					
San Juan NF	225,672	26,561	36,276	5,948	294,457
Rio Grande NF	31,840	17,446	115,429	0	164,715
South San Juan					
San Juan NF	33,258	4,933	1,592	0	39,783
Rio Grande NF	20,686	3,923	62,319	974	87,902
Wilderness Study Areas (San Juan NF)					
West Needle	14,040	800	960	0	15,800
Piedra	30,940	9,920	640	0	41,500
San Juan NF					
Total	318,273	43,671	42,591	7,821	412,356
Rio Grande NF					
Total	52,526	21,369	177,748	974	252,617
Uncompahgre NF					
Total	11,188	5,086	4,068	0	20,342
TOTAL	381,987	70,126	224,407	8,795	685,315

TABLE 1 (Continued)

Estimated Wilderness Management Area Acreage by Alternative, Area, and Forest

Area	Pristine	Primitive	Semi-Primitive	Transition	Total
ALTERNATIVE G					
Existing Wildernesses					
Lizard Head					
San Juan NF	14,363	1,457	3,123	1,873	20,816
Uncompahgre NF	11,188	5,086	3,662	406	20,342
Weminuche					
San Juan NF	225,672	26,561	36,276	5,948	294,457
Rio Grande NF	31,840	17,446	115,429	0	164,715
South San Juan					
San Juan NF	33,258	4,933	1,592	0	39,783
Rio Grande NF	20,686	3,923	62,319	974	87,902
Wilderness Study Areas (San Juan NF)					
West Needle	14,040	800	960	0	15,800
Piedra	30,940	9,920	640	0	41,500
South San Juan Expansion	22,720	8,000	2,080	0	32,800
San Juan NF Total	340,993	51,671	44,671	7,821	445,156
Rio Grande NF Total	52,526	21,369	177,748	974	252,617
Uncompahgre NF Total	11,188	5,086	3,662	406	20,342
TOTAL	404,707	78,126	226,081	9,201	718,115

TABLE 2

Estimated Wilderness Visitor Days by Alternative and Time Periods in Existing Wildernesses (Thousand wilderness visitor days)

Area	1980	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
ALTERNATIVE A AND I							
Lizard Head							
San Juan NF	13	20	31	33	40	50	61
Uncompahgre NF	8	9	10	12	13	14	16
Weminuche							
San Juan NF	121	186	268	272	337	391	438
Rio Grande NF	72	110	121	140	148	161	178
South San Juan							
San Juan NF	5	8	15	16	20	30	35
Rio Grande NF	30	53	58	64	70	75	85
TOTAL	249	386	503	537	628	721	813
ALTERNATIVES B, C, D, E, F, H, and J							
Lizard Head							
San Juan NF	13	20	31	40	54	63	71
Uncompahgre NF	8	9	10	12	13	14	16
Weminuche							
San Juan NF	121	186	268	360	457	541	613
Rio Grande NF	72	110	121	147	162	179	198
South San Juan NF							
San Juan NF	5	8	15	20	28	35	41
Rio Grande NF	30	53	58	71	78	86	95
TOTAL	249	386	503	650	792	918	1,034
ALTERNATIVE G							
Lizard Head							
San Juan NF	13	20	31	40	54	63	71
Uncompahgre NF	8	9	10	12	13	14	16
Weminuche							
San Juan NF	121	186	268	275	348	412	466
Rio Grande NF	72	110	121	147	162	179	198
South San Juan							
San Juan NF	5	8	15	20	28	35	41
Rio Grande NF	30	53	58	71	78	86	95
TOTAL	249	386	503	565	683	789	887

TABLE 3

Estimated Authorized Livestock Grazing in Existing Wildernesses (Thousand animal unit months per year)

Area	1980	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
ALL ALTERNATIVES							
Lizard Head							
San Juan	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Uncompahgre	.9	.9	.9	.9	.9	.9	.9
Weminuche							
San Juan	9.1	9.1	9.1	9.1	9.1	9.1	9.1
Rio Grande	6.6	6.6	6.6	6.6	6.6	6.6	6.6
South San Juan							
San Juan	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Rio Grande	7.1	7.1	7.1	7.1	7.1	7.1	7.1
TOTAL	27.1	27.1	27.1	27.1	27.1	27.1	27.1

TABLE 4

Minerals Leasing Recommendations for Designated Wildernesses

Area and Forest	Leasing Availability Recommendations	Alternatives															
		A and I		B and J		C		D		E		F		G		H	
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
South San Juan (San Juan National Forest)	No Lease	31,155	78	28,320	71	29,007	73	28,452	72	28,452	72	39,783	100	31,155	78	29,007	73
	Lease	513	1	513	1	513	1	513	1	513	1	0	0	513	1	513	1
	Lease without Surface Occupancy	8,115	21	10,950	28	10,263	26	10,818	27	10,818	27	0	0	8,115	21	10,263	26
	Total for Area	39,783	100	39,783	100	39,783	100	39,783	100	39,783	100	39,783	100	39,783	100	39,783	100
South San Juan (Rio Grande National Forest)	No Lease	65,115	74	64,747	73	65,115	74	64,747	73	64,747	73	87,902	100	65,115	74	65,115	74
	Lease	3,212	4	3,212	4	3,212	4	3,212	4	3,212	4	0	0	3,212	4	3,212	4
	Lease without Surface Occupancy	19,575	22	19,943	23	19,575	22	19,943	23	19,943	23	0	0	19,575	22	19,575	22
	Total For Area	87,902	100	87,902	100	87,902	100	87,902	100	87,902	100	87,902	100	87,902	100	87,902	100
Entire South San Juan Wilderness	No Lease	96,270	75	93,067	73	94,122	74	93,199	73	93,199	73	127,685	100	96,270	75	94,122	74
	Lease	3,725	3	3,725	3	3,725	3	3,725	3	3,725	3	0	0	3,725	3	3,725	3
	Lease without Surface Occupancy	27,690	22	30,893	24	29,838	23	30,761	24	30,761	24	0	0	27,690	22	29,838	23
	Total for Area	127,685	100	127,685	100	127,685	100	127,685	100	127,685	100	127,685	100	127,685	100	127,685	100
Weminuche (San Juan National Forest)	No Lease	211,077	72	210,141	71	211,077	72	210,141	71	210,670	72	294,457	100	210,141	71	211,077	72
	Lease	44,540	15	44,540	15	44,540	15	44,540	15	44,540	15	0	0	44,540	15	44,540	15
	Lease without Surface Occupancy	38,840	13	39,776	14	38,840	13	39,776	14	39,247	13	0	0	39,776	14	38,840	13
	Total for Area	294,457	100	294,457	100	294,457	100	294,457	100	294,457	100	294,457	100	294,457	100	294,457	100

TABLE 4 (Continued)

Minerals Leasing Recommendations for Designated Wildernesses

Area and Forest	Leasing Availability Recommendations	Alternatives															
		A and I		B and J		C		D		E		F		G		H	
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Weminuche (Rio Grande National Forest)	No Lease	103,478	63	103,478	63	103,478	63	103,478	63	103,478	63	164,715	100	103,478	63	103,478	63
	Lease	14,937	9	14,937	9	14,937	9	14,937	9	14,937	9	0	0	14,937	9	14,937	9
	Lease without Surface Occupancy	46,300	28	46,300	28	46,300	28	46,300	28	46,300	28	0	0	46,300	28	46,300	28
	Total for Area	164,715	100	164,715	100	164,715	100	164,715	100	164,715	100	164,715	100	164,715	100	164,715	100
Entire Weminuche Wilderness	No Lease	314,555	68	313,619	68	314,555	68	313,619	68	314,148	68	459,172	100	313,619	68	314,555	68
	Lease	59,477	13	59,477	13	59,477	13	59,477	13	59,477	13	0	0	59,477	13	59,477	13
	Lease without Surface Occupancy	85,140	19	86,076	19	85,140	19	86,076	19	85,547	19	0	0	86,076	19	85,140	19
	Total for Area	459,172	100	459,172	100	459,172	100	459,172	100	459,172	100	459,172	100	459,172	100	459,172	100
Lizard Head (San Juan National Forest)	No Lease	5,379	26	5,379	26	5,379	26	5,379	26	5,379	26	20,816	100	5,379	26	5,379	26
	Lease	9,793	47	9,793	47	9,793	47	9,793	47	9,793	47	0	0	9,793	47	9,793	47
	Lease without Surface Occupancy	5,644	27	5,644	27	5,644	27	5,644	27	5,644	27	0	0	5,644	27	5,644	27
	Total for Area	20,816	100	20,816	100	20,816	100	20,816	100	20,816	100	20,816	100	20,816	100	20,816	100
Lizard Head (Uncompahgre National Forest)	No Lease	10,781	53	10,781	53	10,781	53	10,781	53	10,781	53	20,342	100	10,781	53	10,781	53
	Lease	814	4	814	4	814	4	814	4	814	4	0	0	814	4	814	4
	Lease without Surface Occupancy	8,747	43	8,747	43	8,747	43	8,747	43	8,747	43	0	0	8,747	43	8,747	43
	Total for Area	20,342	100	20,342	100	20,342	100	20,342	100	20,342	100	20,342	100	20,342	100	20,342	100

TABLE 4 (Continued)

Minerals Leasing Recommendations for Designated Wildernesses

Area and Forest	Leasing Availability Recommendations	Alternatives															
		A and I		B and J		C		D		E		F		G		H	
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Entire Lizard Head Wilderness	No Lease	16,160	39	16,160	39	16,160	39	16,160	39	16,160	39	41,158	100	16,160	39	16,160	39
	Lease	10,607	26	10,607	26	10,607	26	10,607	26	10,607	26	0	0	10,607	26	10,607	26
	Lease without Surface Occupancy	14,391	35	14,391	35	14,391	35	14,391	35	14,391	35	0	0	14,391	35	14,391	35
	Total for Area	41,158	100	41,158	100	41,158	100	41,158	100	41,158	100	41,158	100	41,158	100	41,158	100
Total South San Juan, Weminuche and Lizard Head Wildernesses	No Lease	426,985	68	422,846	67	424,837	68	422,978	67	423,507	67	628,015	100	426,049	68	424,837	68
	Lease	73,809	12	73,809	12	73,809	12	73,809	12	73,809	12	0	0	73,809	12	73,809	12
	Lease without Surface Occupancy	127,221	20	131,360	21	129,369	20	131,228	21	130,699	21	0	0	128,157	20	129,369	20
	Total for Area	628,015	100	628,015	100	628,015	100	628,015	100	628,015	100	628,015	100	628,015	100	628,015	100

TABLE 5

Estimated Base Water Yield in Existing Wildernesses (Thousand acre-feet per year)

Area	1980	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
ALL ALTERNATIVES							
Lizard Head							
San Juan	37.0	37.0	37.0	37.0	37.0	37.0	37.0
Uncompahgre	32.8	32.8	32.8	32.8	32.8	32.8	32.8
Weminuche							
San Juan	516.4	516.4	516.4	516.4	516.4	516.4	516.4
Rio Grande	213.6	213.6	213.6	213.6	213.6	213.6	213.6
South San Juan							
San Juan	68.2	68.2	68.2	68.2	68.2	68.2	68.2
Rio Grande	110.5	110.5	110.5	110.5	110.5	110.5	110.5
TOTAL	978.5	978.5	978.5	978.5	978.5	978.5	978.5

APPENDIX M

WILDERNESS STUDY AREA INFORMATION AND EVALUATION

WILDERNESS STUDY AREA INFORMATION AND EVALUATION

This appendix presents detailed information on each of the three Wilderness Study Areas (WSA's) on the San Juan National Forest. The West Needle, Piedra, and South San Juan Wilderness Expansion Study Areas were established under the Colorado Wilderness Act of 1980 (P.L. 96-560). Under this Act, the Secretary of Agriculture is directed to review each WSA and make a recommendation by December 31, 1983, as to its suitability or unsuitability for inclusion in the National Wilderness Preservation System. The information given below is generally more detailed than that presented in the body of the EIS. It is intended to portray biological, geographical, and physical characteristics as well as the analyses in one place so that an informed decision can be made concerning the wilderness suitability of each area.

WEST NEEDLE WILDERNESS STUDY AREA

VICINITY

The West Needle WSA is located in San Juan and La Plata Counties in southern Colorado between the towns of Durango and Silverton. It adjoins the western boundary of the existing Weminuche Wilderness Area, separated by the Durango and Silverton Narrow Gauge Railroad right-of-way. The area consists of 21,580 acres of unroaded and undeveloped land of which 15,800 acres are administered by the Forest Service, and 5,780 acres are administered by the Bureau of Land Management. Access to the WSA is by U.S. Highway 550, which runs between Durango and Silverton. The Lime Creek Road (Forest Road No. 591), which joins U.S. Highway 550 in two places, runs nearly parallel to the western boundary for approximately five miles at distances of less than a half mile. Almost the entire eastern and southern boundaries parallel both the Animas River and the Durango and Silverton Narrow Gauge Railroad line, from which there are several access points to the WSA. The Cascade Creek Trail (Forest Trail No. 510) borders the extreme southwestern edge of the WSA.

Figure 1 is a location map showing the WSA in relation to the Four Corners Area (Colorado, Utah, Arizona, and New Mexico), and Figure 2 is a detailed map of the WSA.

PHYSICAL SETTING

VEGETATION

Vegetation on the WSA varies with elevation, which ranges from 8,000 feet to over 13,100 feet. Coniferous vegetation occurs over 40 percent of the area, with the dominant species being Engelmann spruce. Aspen stands, which occur on five percent of the area, are scattered throughout. The remainder of the area is mostly grassland and rock. Browse occurs on only a few areas, primarily at lower elevations. Thurber fescue is the most abundant type of vegetation in non-timbered areas. A variety of grasses and forbs is also found as understory vegetation and within grassland and wetland areas. Above timberline, rocklands and rock outcrops commonly preclude any vegetation. The higher peaks have a

FIGURE 1 - Location Map of the West Needle Wilderness Study Area

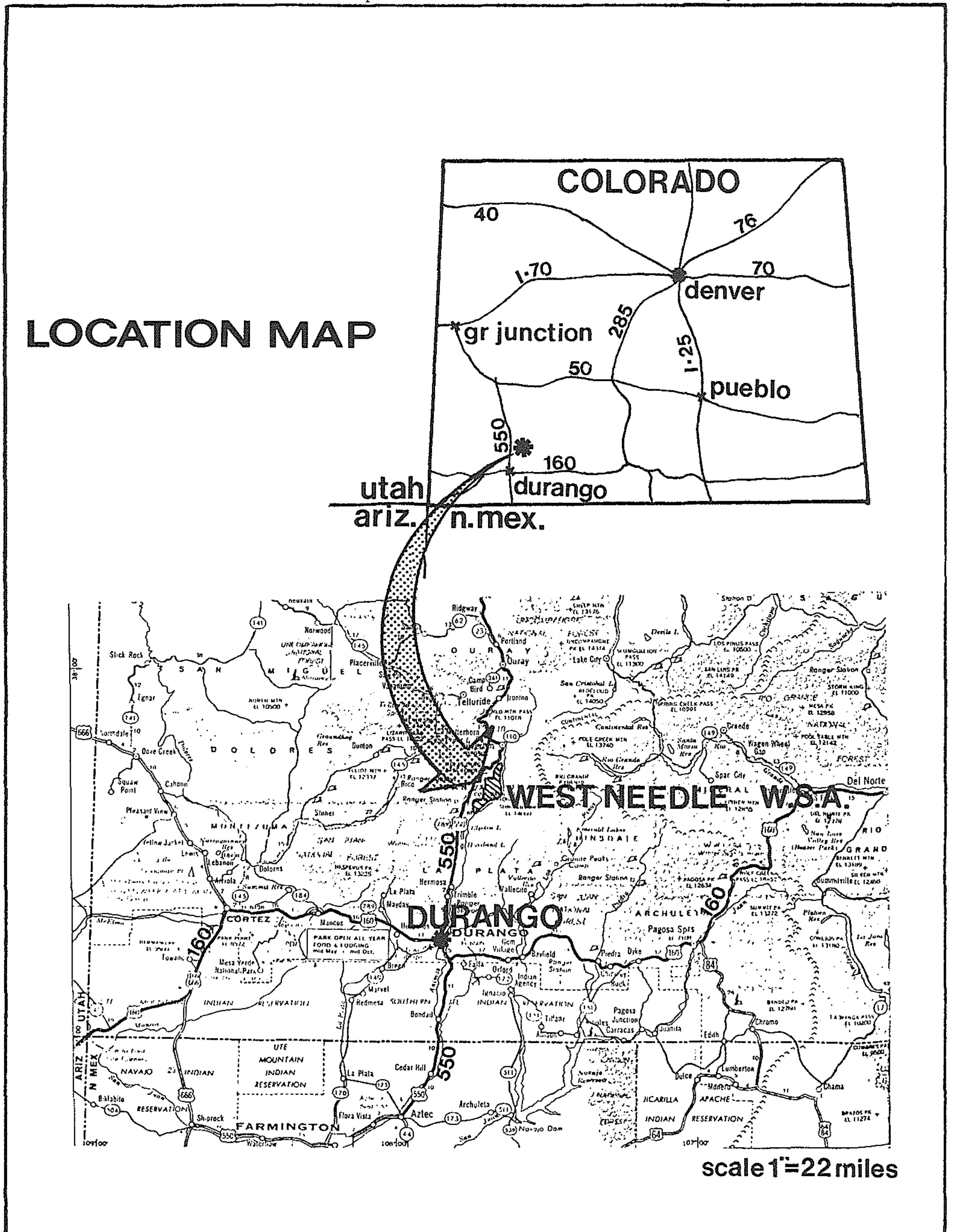
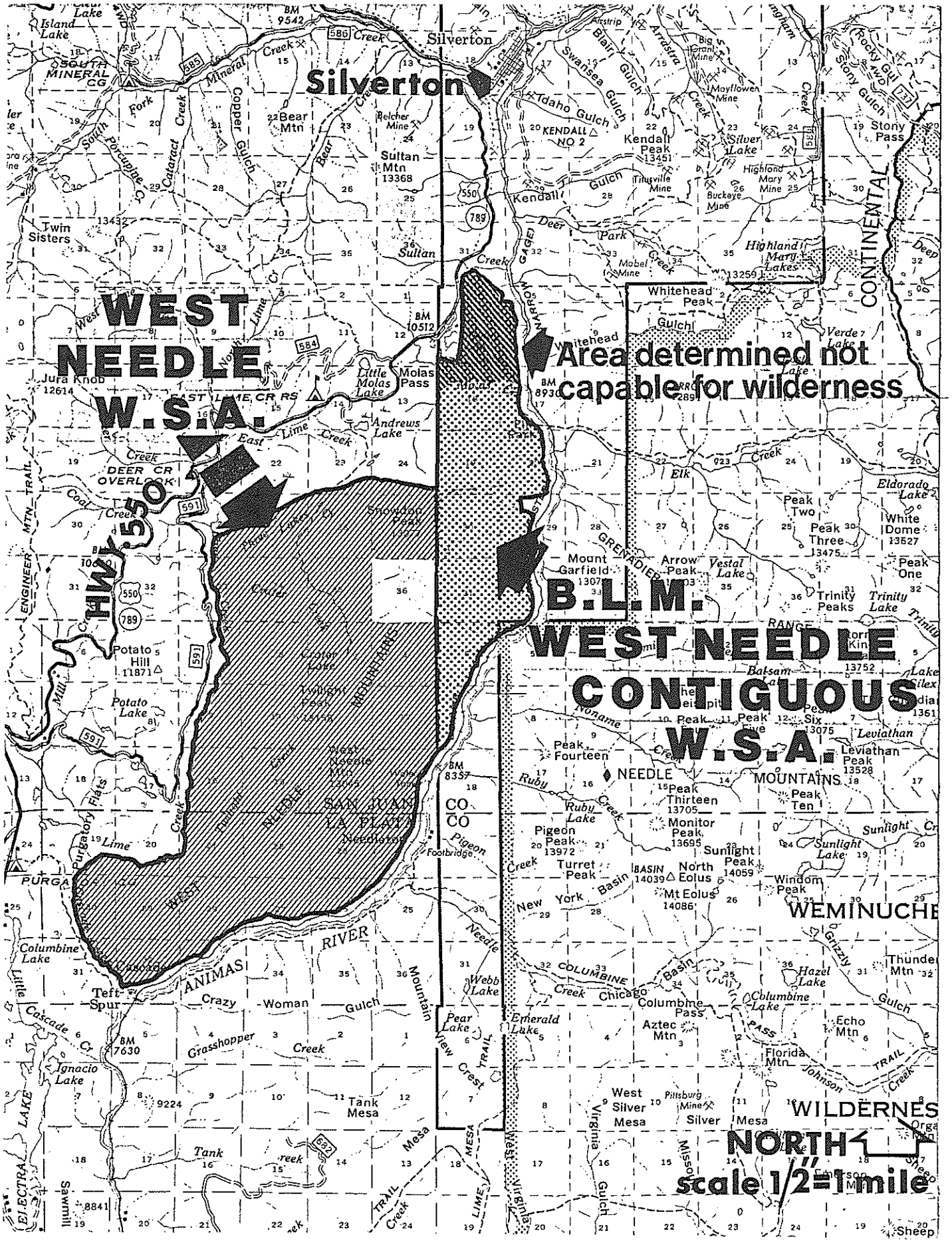


FIGURE 2 - Detail Map of the West Needle Wilderness Study Area



considerable amount of rock and soils, where they exist, are shallow. Table 1 lists the frequency of occurrence of various ecosystem types on the WSA in comparison with other wildernesses. The table indicates that the area is not unique with respect to vegetation composition. Lodgepole pine is common on the western side of the WSA in the area of the Lime Creek Burn, which occurred in 1879. This species, which is exotic to the area, was planted following the burn and is gradually being interspersed with naturally occurring spruce and fir.

There are no known threatened or endangered plants in the WSA.

TABLE 1

Representative Ecosystems in the West Needle Wilderness Study Area and Nearby Wildernesses

Ecosystem	West Needle WSA	Weminuche Wilderness	South San Juan Wilderness	Lizard Head Wilderness	La Garita Wilderness
Alpine	Extensive	Common	Common	Common	Extensive
Subalpine	Common	Common	Common	Common	Common
Spruce-fir	Uncommon	Common	Common	Uncommon	Common
Douglas-fir	Uncommon	Uncommon	Uncommon	Uncommon	Uncommon
Aspen	Uncommon	Uncommon	Uncommon	Uncommon	Uncommon
Ponderosa pine	None	Uncommon	None	None	None
Lodgepole pine	Uncommon	None	None	None	Uncommon

Key

Extensive - Type occurs on more than 50 percent of the area.
Common - Type occurs on 10 to 40 percent of the area.
Uncommon - Type occurs on less than 10 percent of the area.
None - Type does not occur in area.

LANDFORM

The WSA lies within what is called the San Juan uplift portion of the Southern Rocky Mountain Province. The area is characterized by rugged

and steep terrain. The mountains have been uplifted and subjected to glacial erosion and shaping. The WSA is flanked on the east by the steep Animas Canyon and partly on the west by Lime Creek Canyon.

GEOLOGY

The geological setting of the West Needle Wilderness Study Area consists mostly of Pre-Cambrian metamorphic and intrusive igneous rocks. Lower flanks of mountains and canyon walls are veneered with talus, landslide deposits, and thin gravels. Rocks of the western half of the WSA are metamorphosed lava flows, called Twilight Gneiss. The eastern half of the WSA consists of a variety of rock types. The Irving Formation, which includes metamorphosed volcanics and sediments crosses the southern two-thirds of the eastern half. The Tenmile Granite forms an intrusive mass along the eastern boundary of the WSA.

SOILS

Soil characteristics and production potentials within the WSA vary considerably as a function of landform, slope and parent material. Although there is only limited data on soils in the WSA, some general statements and assumptions can be made. Soils and landforms of the area can generally be classified into two groups.

The first group consists of areas with smooth to moderately sloping terrain. These occur in the northwest and central mid-portions of the WSA. Soils range from shallow to moderately deep and are medium to coarse textured, often times with gravel or cobble on the surface. They are mostly well drained but there are bog-like depressions associated with this area that remain wet and saturated most of the year. The soil is generally not very productive, and is best suited for water storage, wildlife habitat, grazing and recreational uses. These soils and landforms comprise approximately 40 percent of the WSA. The area has a low potential for surface erosion and mass wasting.

The remainder of the area, roughly 60 percent of the WSA, is made up of steep to very steep mountain and canyon sideslopes. The area is predominantly rockland, rock outcrop and talus slopes. Some areas contain very shallow loamy soil materials, supporting some vegetation in the form of grass or scattered trees. These areas however, are generally not capable of supporting commercial timber production. Erosion hazard is low, due to the proportion of bare rock, and soils are generally not erodable. The major hazards are rock falls and potentially unstable talus areas.

SOCIAL AND ECONOMIC SETTING

The West Needle Wilderness Study Area is located within the Animas Human Resource Unit (HRU), which is one of three areas of analysis within the primary zone of social and economic influence of the San Juan National Forest. A Human Resource Unit is an area characterized by particular patterns of lifestyles, economic conditions, institutional arrangements, and topography. HRU's vary in size but are typically larger than individual towns and communities, and they may cross political jurisdictions.

The Animas HRU contains most of La Plata and San Juan Counties and a small portion of Hinsdale County. The population of San Juan County has remained stable at approximately 850 people over the past 20 years, most of whom live in Silverton. Population of La Plata County, which includes Durango, grew from 19,200 to 27,100 between 1970 and 1980, for an increase of over 40 percent. That portion of Hinsdale County within the HRU is largely uninhabited.

Per capita income in the HRU averaged $5,920 in 1978. Unemployment in 1980 averaged 3.5 percent, although under-employment remains a chronic problem because of the large number of trained and educated individuals who migrate to the area because of its perceived quality of life rather than its employment opportunities.

Lifestyle - The Animas HRU is moderately urbanized in the Durango area, but a rural mountain lifestyle prevails in Silverton and in most other areas. In both of these towns lifestyles for many are centered around a seasonal tourist economy. The majority of the workforce is employed in retail and tourist-related business; skilled trades such as construction, agriculture, and logging; and in white-collar professions such as public administration and education. Oil and gas exploration and drilling and hard-rock mining, as well as construction and tourism, are growing areas of employment. A large proportion of the residents of the HRU spend at least some of their leisure time in the Forest.

Attitudes, Beliefs and Values - This HRU has a mix of residents with a wide range of attitudes, beliefs, and political philosophy. At one end of the spectrum are those who believe strongly in individual rights and oppose interference from government at all levels. At the other end of the spectrum are those who believe that government can and should be used to solve social and community problems. The community within the HRU is easily polarized on issues, including those related to natural resource management.

Social Organization - The standard social services available in most small American cities are found in Durango, including a four-year college. Because of its diverse population and economic base, the Animas HRU is not as vulnerable to social disruption from specific projects such as mineral or ski area development as other communities in southwest Colorado might be.

Population and Land Uses - Population increases of the past decade have created problems resulting from the conversion of agricultural lands to residential and commercial uses. Recreational use of the National Forest is growing along with population increases, with much of the activity taking place on Forest lands within the Animas HRU.

RESOURCE AND SUPPORT ELEMENTS

RECREATION

Dispersed Recreation

There are no developed recreation sites within the West Needle WSA, and no recreational structures other than trails. Current use, approxi-

mately 8,000 RVD's annually over the 20,340 acres (0.39 RVD's per acre), is relatively low compared to other nearby wildernesses and dispersed recreation areas in the San Juan National Forest.

Current recreation activities include fishing, hiking, horseback riding, big game hunting, viewing scenery, cross-country skiing, and mountain climbing. Other activities occurring in limited amounts include some snowmobile travel and motorcycle riding on trails. Virtually all recreation opportunities in the West Needle WSA are of the semi-primitive non-motorized type.

Visual Resource

The landscape of the WSA is dominated by topographic features including sharp peaks, glacial remnants, cirque basins, and rugged, steep cliffs. Talus slopes and avalanche chutes are common. Vegetation is mainly alpine and sub-alpine intermixed at lower elevations with deciduous and coniferous trees and large natural openings. Vegetation contrasts in form and color with barren rock and talus slopes. Waterforms include small alpine lakes, ponds, dispersed wet meadows, and small streams, some of which cascade from sheer rock walls. About 60 percent of the WSA is classified as having distinctive or outstanding scenic quality. The remainder is common to the characteristic alpine landscape of the area.

Cultural Resource

Although no archaeological field surveys have been undertaken for the WSA, it is possible that remnants of some small prehistoric camps exist. It is unlikely that archaeological remains are numerous due to the rugged topography and extreme climatic conditions which would not have been conducive to long-term use by native peoples. Generally the WSA is considered to have low archaeological sensitivity.

One important historic property exists in the vicinity. The former Denver and Rio Grande Western Railroad from Durango to Silverton, which is now operated as a tourist attraction by the Durango and Silverton Narrow Gauge Railroad, runs along the eastern and southern boundary of the WSA. It is listed on the National Register of Historic Places and is designated a National Historic Landmark by the U. S. Department of the Interior. No other significant historic properties are known to exist within the WSA, which is considered to be of low historic sensitivity for much the same reasons as cited for archaeological sensitivity.

The WSA is situated in the historic territory of the Ute Indians. Archival research and contacts with members of the Southern Ute and Ute Mountain Ute Tribes, however, have failed to identify any specific sites important to the Ute peoples within the WSA.

WILDERNESS

The West Needle WSA is primarily natural in character, and there are no known "imprints of man." Portions of the area have been used for grazing of domestic livestock, but this is not evident to the casual observer.

Outstanding opportunities for unconfined recreation within an unmodified environment are afforded. The WSA has rugged mountains, numerous side canyons with enclosed cirque basins, and abundant wildlife. These features are attractive to hikers, backpackers, fishermen, hunters, mountain climbers and cross-country skiers. Because of the varied terrain and vegetation composition, as well as the large area of contiguous wildlands, the area offers outstanding opportunities for solitude.

FISH AND WILDLIFE

Big Game

Big game species presently found in the West Needle WSA include elk, mule deer, Rocky Mountain goat, Rocky Mountain bighorn sheep, black bear and possibly mountain lion. All species use the area primarily as spring, summer, and fall habitat, although mountain goat, bighorn sheep, and black bear make limited use of the area during winter months.

Small Game

Among the small game species inhabiting the WSA are snowshoe hare, blue grouse and white-tailed ptarmigan.

Non-game

Numerous song birds, raptors, and mammals normally found in coniferous forests and subalpine and alpine regions of Colorado inhabit the WSA. Commonly observed species include pika, marmot, Canada jay, goshawk, coyote, weasel and pine grosbeak. Because of its rugged terrain and remote conditions, a large portion of the area is considered to be acceptable wolverine habitat.

Threatened and Endangered (T&E) Species

There are no known listed T&E species presently inhabiting the WSA. The wolverine is on the Colorado list of threatened species, but it is not known to inhabit the area even though acceptable habitat is present. Habitat for pine marten, a species of limited population, is also found within the WSA.

Fish

Cutthroat, rainbow and brook trout are found in several of the lakes and streams within the WSA. A very limited amount of natural reproduction

occurs in streams. Such populations are sustained by periodic restocking by the Colorado Division of Wildlife and by fish escaping from lake populations. Many of the streams in the area do not support fish because of steep gradients and extreme fluctuations of flow.

RANGE

Range activity on the West Needle WSA is limited mainly to domestic sheep grazing which is authorized on about two-thirds of the WSA. Due to the steepness of the terrain, almost thirty percent of the authorized area is not grazed. Some grazing by horses for recreational activity also occurs.

Most of the range is in "fair" or better condition, and productivity ranges from average to below average for the Forest. Current annual grazing use on both the Forest Service and BLM portions of the WSA is approximately 590 animal unit months (AUM's). Of this, 360 AUM's are permitted on the total unadjusted BLM portion of the WSA. On the BLM portion north of Molas Creek that is determined not suitable because of manageability constraints, permitted grazing use is approximately 40 AUM's per year. There are portions of two sheep allotments in this area, both of which are under extensive management.

On Forest Service land, there are portions of three sheep allotments, two of which are extensively managed and one of which is currently being managed for recreation horses and big game.

TIMBER

Of the 20,340 acres within the WSA, 19 percent (3,808 acres) is classified as forest land capable for timber production. Sixty-nine percent of the capable forest land has sawtimber size trees. The predominant timber type is spruce-fir which covers eighty-four percent of the capable forest land. The distribution by timber type and size class is shown in Table 2.

TABLE 2

Area Capable of Timber Production by Type and Stand Size Class (Acres)

	Stand Size Class				
Timber Type	Non-stocked	Seedling/ sapling	Pole timber	Saw-timber	Total
Ponderosa pine	-	-	-	-	0
Spruce-fir	-	-	1,168	2,045	3,213
Douglas-fir	-	-	-	115	115
Aspen	-	-	-	480	480
Total	0	0	1,168	2,640	3,808

Timber productivity on the West Needle WSA ranges from average to somewhat below average for the Forest. The WSA is characterized by rugged terrain, and many areas would be inaccessible from the standpoint of an economically efficient timber management program. Timber stands are widely scattered throughout the WSA.

The current timber inventory on capable forest lands is 10.9 million cubic feet or 37.3 million board feet. Most inventory volume is in the spruce-fir type and almost all capable forest land occurs on slopes between 30 and 60 percent. The distribution of inventory volume is shown in Table 3.

TABLE 3

Inventory Volume by Timber Type

Timber Type	Million Cubic Feet	Million Board Feet
Ponderosa pine	0	0
Spruce-fir	9.7	33.8
Douglas-fir	0.3	1.0
Aspen	0.9	2.5
Total	10.9	37.3

WATER

Water Yield

Water yield from the West Needle WSA is estimated at 33,800 acre-feet per year or 1.66 acre-feet/acre/year. The eastern part of the WSA drains into the Animas River via several short, steep, ephemeral drainages. Molas Creek, along the eastern part, is the only perennial stream. The western portion of the WSA is drained by tributaries to Lime Creek including Crater Creek and Twilight Creek. Water uses within the WSA include wildlife and livestock drinking, fishing, scenic viewing and maintenance of riparian and aquatic habitat. Downstream water uses on the Animas River include a wide variety of both domestic and agricultural uses.

At present, no water resource measurement sites are located within the WSA.

Water Quality

No specific water quality data is presently available for the WSA, although the predominantly Precambrian parent material (gneiss, quartzite, schist) commonly produces high quality water low in both dissolved substances and sediment.

MINERALS

Mining and Mineral Leasing Activity

Current mining activity, which is limited to a number of unpatented mining claims, is minimal. There have been no recent surface disturbing mineral exploration activities that would require an operating plan, although the BLM portion of the WSA borders an active uranium mine. There are no applications or existing leases for leasable minerals in the WSA. Current mineral activity is summarized in Table 4.

TABLE 4

Current (As of April 30, 1982) Mineral Activity

Activity	Number	Acres
Patented Mining Claims	0	0
Unpatented Mining Claims	502	10,040
Producing Sites or Known Reserves	0	0
Federal Oil & Gas Lease Applications	0	0
Federal Oil & Gas Leases	0	0

Of the 502 unpatented mining claims, 31 are located in the area north of Molas Creek. These comprise approximately 620 acres.

Mineral Potential

The potential for mineral deposits exists on the WSA, although there is little activity on existing claims. Presently, 502 unpatented mining claims cover 10,340 acres. The geology indicates that it has a low potential for leasable minerals. No leases or lease applications for oil, gas, or geothermal resources currently exist. If designated as wilderness under provisions of the 1964 Wilderness Act, the WSA would be withdrawn from mineral location and leasing, subject to valid existing rights, after December 31, 1983.

An initial assessment of the WSA's locatable mineral potential indicated that about 94 percent had moderate to high potential. This was based on past and present mineral activity, mining claims, and geological inference. However, the preliminary U. S. Bureau of Mines 1983 mineral investigation report for the WSA states:

> "The analytical data from the prospect pits, adits, and shafts in and near the West Needle Wilderness Study Area show minor base and precious metal values which do not indicate the presence of mineral resources. Analytical data from the pits, adits, and shafts which showed moderate to high values of silver are localized in veins in faults which could not be traced into the study area.
>
> Exxon Minerals Company's drilling program identified a potentially large uranium deposit centered at the Elk Park Mine on the boundary of the BLM West Needle Contiguous Wilderness Study Area. Analytical data from the main workings disclose moderate to high values of uranium. The deposit can be projected laterally into the study area; however, drilling within the study area would be required to determine depth, extent, and ore grade."

For these reasons, only the Elk Park area of the WSA is estimated to have moderate to high locatable mineral potential.

LANDS

Land Ownership

Total land area within the West Needle Wilderness Study Area consists of approximately 15,800 acres administered by the Forest Service and 5,780 acres administered by the BLM. On the BLM portion, approximately 1,240 acres are in the area north of Molas Creek. One section (640 acres) is owned by the State of Colorado including all surface and mineral rights. This section is completely surrounded by Forest Service and BLM land, and has been identified as highly desirable for acquisition by the Forest Service.

A Bill (H. R. 3433) has been submitted to the Congress that would modify the boundary of the San Juan National Forest. If passed, this Bill would transfer the area of the West Needle Contiguous WSA south of Molas Creek to the Forest Service. The entire WSA, excluding the area determined unsuitable for wilderness management, would then be under Forest Service administration.

Special Land Uses

There are no improvements under special land use permits.

Power Withdrawals

Approximately 2,260 acres within the Forest Service portion and 1,650 acres within the BLM portion are encumbered by power-site withdrawals

(Power Site Classification No. 219 and Executive Order of July 2, 1910 respectively), although there are no existing plans to develop these areas for power generation. The Federal Energy Regulatory Commission is scheduled to review these withdrawals for possible revocation within the next three years.

Proposed Impoundments

No existing or proposed impoundments, irrigation reservoirs, or distribution systems are located within the WSA. No decreed water rights exist according to Colorado Water Resource Division records.

FACILITIES

The West Needle Wilderness Study Area contains no facilities other than trails. These are maintained by the Forest Service and are used principally for recreation and to a minor degree, for livestock management. The Molas Trail, (Forest Trail 665) traverses from U.S. Highway 550 to the Animas River, passing through the extreme northern portion of the WSA. The Crater Lake Trail (Forest Trail 623) accesses the central portion of the WSA from Andrews Lake, which is located adjacent to U.S. Highway 550. This trail terminates at Crater Lake. Total length of trails within the WSA is approximately 5.5 miles.

Road access to the West Needle Wilderness Study area is provided via U.S. Highway 550 which is an all weather route between Durango and Silverton. The Lime Creek Road (Forest Road 591), which joins U.S. Highway 550 in two places, borders approximately five miles of the southwestern edge of the WSA. The Cascade Creek Trail (Forest Trail 510) borders the extreme southwestern edge of the WSA.

PROTECTION

Air Quality

The West Needle WSA is designated a Class II air quality area. This classification allows only moderate degradation over baseline concentrations of sulfur oxides and particulate matter.

Fire

Fire has always been a natural component of the ecosystems represented within the WSA. A naturally occurring fire regime has the effect of reducing fuels, maintaining wildlife habitat diversity, creating browse, and preventing the attainment of climax vegetation across large areas of land. In recent years, natural fire has generally been excluded from the area through intensive control and suppression efforts, although some man-caused fires have occurred along the eastern boundary of the WSA in association with the narrow gauge railroad. Most fires result from lightning strikes and are controlled at less than 10 acres in size.

ALTERNATIVES AS THEY RELATE TO THE WEST NEEDLE WSA

Five separate alternatives concerning the suitability or unsuitability for wilderness designation of the WSA were incorporated within the ten alternatives considered in detail in the EIS. One WSA alternative is a suitable recommendation for wilderness designation of the West Needle WSA which is included in Alternatives A, C, E, G, H, and I. The others are a no action alternative (Alternative F) and three unsuitable for wilderness alternatives (Alternatives B, D, and J). The no action alternative maintains the qualities of the area which make it possible for inclusion in the National Wilderness Preservation System without a determination as to its suitability or unsuitability. The other three are resource development alternatives which emphasize unique combinations of market and non-market commodities.

The Wilderness Act of 1964 provides that all components of the National Wilderness Preservation System will be withdrawn from mineral entry on December 31, 1983. Additionally, the legislative history of the Colorado Wilderness Act of 1980 indicates that there is no intention to extend that date (Congressional Record, June 30, 1980, pages S9000-S9001). It was, therefore, assumed in both the alternative formulation and the analysis that the WSA would be withdrawn from mineral entry if and when it was designated wilderness by Congress.

Table 5 shows acres by management area prescription under each alternative. Full descriptions of each prescription are found in Chapter III of the Forest Plan. The areas to which the management prescriptions are applied in the respective alternatives are shown on maps in the back of this document.

ALTERNATIVES A, C, E, G, H, AND I - SUITABLE FOR WILDERNESS DESIGNATION

Alternatives A, C, E, G, H, and I recommend to Congress that both the West Needle WSA and the BLM West Needle Contiguous WSA, as adjusted, are suitable for inclusion in the NWPS. The adjustment, which is necessary because of manageability constraints, is described below in the discussion of wilderness capability. Total area recommended as suitable is 20,340 acres, and all subsequent references to the West Needle WSA indicate this combined, adjusted acreage.

Under the suitable alternative, 18,580 acres would be managed for pristine wilderness opportunities under the prescription for Management Area 8A. This prescription emphasizes protection and perpetuation of pristine biological and physical conditions and a high degree of solitude. Evidence of past human use is not perceptible.

On 800 acres the WSA would be managed for primitive wilderness opportunities under the prescription for Management Area 8B which emphasizes protection and perpetuation of essentially natural biological and physical conditions. On-site regulation of recreation use would be minimal, and travel would either be cross-country or over a low-density constructed trail system.

TABLE 5

West Needle WSA Acreage Allocation by Management Area Prescription for Each Alternative

Management Area Prescription	Emphasis	Alternatives				
		A, C, E, G, H, and I (Suitable)	F (No Action)	B (Unsuitable - Resource Development)	D	J
2A	Semi-primitive motorized recreation opportunities				146	
3A	Semi-primitive non-motorized recreation opportunities			17,787	19,870	16,507
6B	Livestock grazing			2,229		3,509
8A	Pristine wilderness opportunities	18,580				
8B	Primitive wilderness opportunities	800				
8C	Semi-primitive wilderness opportunities	960				
N/A	Maintenance of the qualities of an area which make it possible for inclusion in the National Wilderness Preservation System		20,340			
9A	Riparian areas			324	324	324
Total		20,340	20,340	20,340	20,340	20,340

On the remaining 960 acres, management would be for semi-primitive wilderness opportunities under the prescription for Management Area 8C, which also emphasizes protection and perpetuation of essentially natural biological and physical conditions. Solitude and the absence of any evidence of past use are not essential ingredients in these areas. Human travel would be principally on system trails.

All resource management activities would be integrated so that evidence of current use, including permitted and recreation livestock, would not be noticeable the following season and so that natural biological processes would not be adversely or permanently changed by human use.

ALTERNATIVE F - NO ACTION

This alternative continues current management on the WSA by maintaining the qualities of the area which make it possible for inclusion in the NWPS. This accommodates the requirements of the Colorado Wilderness Act that the wilderness potential of the West Needle WSA be maintained until Congress acts on the Administration's recommendation regarding the suitability or unsuitability of the area. Emphasis would be on perpetuating natural conditions. Primitive recreation experiences would be provided throughout most of the area; however, motorized use would be permitted to continue as long as the wilderness potential is not jeopardized. Any management activities would be carried out without leaving any permanent or long-lasting evidence. No permanent structures would be allowed other than corrals, fences, and water developments.

RESOURCE DEVELOPMENT ALTERNATIVES (UNSUITABLE)

Under three alternatives, the WSA is managed to provide a mix of market and non-market outputs. These alternatives recommend the WSA as unsuitable for wilderness designation and allow development which may be incompatible with wilderness values. On the West Needle WSA, there is relatively little difference between the three resource development alternatives because of limitations associated with access, terrain, and vegetation. Most of the area under any of the three is managed for amenity or non-market outputs.

Alternative B

Although Alternative B has a high emphasis on market outputs, this is not reflected in the allocation of Management Area Prescriptions on the WSA because such a small proportion of it is actually suitable for significant resource development. The prescription for Management Area 3A, which emphasizes semi-primitive non-motorized opportunities, is applied on 17,787 acres. A variety of opportunities such as hiking, horseback riding, hunting and cross-country skiing would be available in these lands. Vegetation treatment activity would be low and any management would not be visually evident or would remain visually subordinant. Investments in such uses as livestock grazing and minerals exploration would be permitted, although all roads would be closed to public use. No commercial timber harvests would occur, mainly because of the low quality of the stands present and the limitations on access.

An additional 2,229 acres would be managed under the prescription for Management Area 6B, which emphasizes livestock grazing. In these areas, intensive grazing management systems would be utilized, and range condition maintained through forage improvement practices and livestock management. Both structural and non-structural means would be used for range improvement.

The remaining 324 acres would be managed under the prescription for Management Area 9A, which provides for ecosystem management on riparian areas.

Alternative D

Alternative D emphasizes commodity production under conditions of a reduced budget, although this emphasis does not translate into many differences between it and the no action alternative (Alternative F) on the WSA. The prescription for Management Area 3A, which is discussed above, emphasizes semi-primitive non-motorized recreation and is applied on 19,870 acres, while 146 acres would be managed for semi-primitive motorized recreation (Management Area 2A). The remaining 324 acres would be managed as riparian ecosystems.

Alternative J

Alternative J is an output alternative which emphasizes production of market commodities. The allocation is similar to that of Alternative B with 16,507 acres managed under the prescription for Management Area 3A, which emphasizes semi-primitive, non-motorized recreation; 3,509 acres managed under the prescription for Management Area 6B, which emphasizes livestock grazing; and 324 acres managed as riparian ecosystems (Management Area 9A). The overall emphasis on commodity production under this alternative has relatively little influence on the allocation because of limitations on resource development imposed by such factors as terrain, access, vegetation, and site productivity.

RESOURCE ENVIRONMENTAL CONSEQUENCES

This section describes environmental consequences as they relate to individual resources. All alternatives are discussed in the narrative, although only Alternatives A, C, E, G, H, and I (suitable), Alternative F (no action), and Alternative J (the alternative which would have the maximum resource development on the WSA) are compared in tables and in the economic analysis. These "comparison" alternatives serve to articulate the full range of outputs and environmental consequences resulting from any alternative.

RECREATION

Under Alternatives A, C, E, G, H, and I, all of which are suitable recommendations to Congress, the WSA would be managed for pristine wilderness opportunities on 18,580 acres, for primitive wilderness opportunities on 800 acres, and for semi-primitive wilderness opportunities on 960 acres. The WSA could theoretically accommodate 27,000

recreation visitor days (RVD's) of wilderness recreation per year while still meeting desired wilderness experience objectives and protecting wilderness resource values. The proximity of the WSA to heavily traveled U. S. Highway 550 permits relatively easy access for persons seeking a wilderness experience in a scenically attractive setting, and predictions of wilderness use indicate that visitor controls would have to be inaugurated sometime during the third decade to maintain use within acceptable levels. Some visitors would use the area for a wilderness experience of one day duration or less, while others would stay longer. Activities would include backpacking, hiking, horseback riding, big game hunting, fishing and viewing scenery.

Under Alternative F, the no action alternative, the WSA would be managed for semi-primitive non-motorized recreation opportunities on approximately 18,540 acres, and for semi-primitive motorized recreation opportunities on approximately 1,800 acres. Theoretically, the area could accommodate 37,000 RVD's annually. Motorcycle and snowmobile use would be permitted to continue in areas where such uses now occur, but use would be controlled if maintenance of wilderness qualities were jeopardized. No other uses that might jeopardize wilderness qualities would be permitted. Other activities similar to those under Alternatives A, C, E, G, H, and I would occur.

Alternative J provides for maximum resource development. Under this alternative the WSA would be managed for semi-primitive non-motorized recreation opportunities on approximately 16,831 acres and for roaded natural recreation opportunities on approximately 3,509 acres, resulting in a theoretical capacity of approximately 127,000 RVD's annually. Major uses would include road oriented recreation, particularly for big game hunting, fishing and viewing scenery, although some motorcycle use and snowmobiling would also occur. There would still be opportunities for hiking, backpacking and horseback riding, but user conflicts between these semi-primitive forms of recreation and road oriented recreation could develop due to the limited area of the WSA.

Alternative B would provide for a theoretical annual recreation capacity slightly lower than Alternative J; however, the types of recreation opportunities and predicted levels of use would be approximately the same due to similarities in road development. Alternative D would provide for approximately one-half of the theoretical capacity of Alternative J, and would have types of recreation opportunities and levels of predicted use more nearly those of Alternative F.

Table 6 compares the predicted recreation use for the "comparison" alternatives. Under Alternatives A, C, E, G, H, and I, predicted wilderness recreation use would reach a level approaching theoretical capacity during the third decade (2001-2010), and controls would be inaugurated to limit visitor use if wilderness values are in danger of being degraded.

Although not obvious from the table, Alternative J results in a theoretical recreation capacity of nearly five times that of Alternatives A,

TABLE 6

Predicted Recreation Use by Alternative in Thousand Recreation Visitor Days

Alternative	1980	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
A, C, E, G, H, and I (suitable)		12.0	16.0	21.0	25.0	25.0	25.0
F (no action)	8.0	11.0	13.0	16.0	20.0	23.0	25.0
J (unsuitable - maximum resource development)		12.0	16.0	22.0	28.0	35.0	40.0

C, E, G, H, and I and more than three times that of Alternative F. Alternative J provides for management of 17 percent of the area for roaded recreation, while Alternative F provides for semi-primitive motorized recreation opportunities on only nine percent of the area. Road access into this highly scenic area would result in the highest predicted recreation use of any alternative. Under Alternatives A, C, E, G, H, and I, wilderness designation of this area, along with its proximity to U. S. Highway 550 as well as to local population and tourist centers would attract wilderness visitors for day hiking as well as longer trips; therefore, predicted wilderness recreation use could exceed dispersed recreation use under Alternative F.

Cultural and Historic Resources

There are no known cultural or historic sites in the WSA, and the potential for significant sites to exist in this area is low. Therefore, environmental consequences on these resources should be limited under all alternatives.

Under Alternatives A, C, E, F, G, H, and I, resources would not be subject to potentially damaging resource development and potential adverse consequences would be extremely low. Management activities such as road construction under Alternatives B and J have the potential to damage these resources; however, the probability of adverse consequences would be low because of the limited potential for significant sites to exist and the unlikelihood of significant development due to terrain and access problems.

There are no known effects on Native American religious values under any alternative.

Visual Resource

Under Alternatives A, C, E, F, G, H, and I, the natural landscape character would be maintained primarily by natural ecological forces. The visual quality objective of preservation would be prescribed for the area to assure naturalness.

Under Alternative J, the maximum resource development alternative, various management practices could impact the existing visual quality. For example, road construction would be required for vegetation treatment and the vegetation treatment itself would alter the visual quality. Mitigation measures described in the Forest and Management Area Direction (Chapter III of the Forest Plan) would keep the impacts within the visual quality objectives for the area. Under the other unsuitable alternatives, the effects of Alternative B would be similar to those of Alternative J, although slightly fewer acres would have the potential for vegetation treatment. Alternative D provides for little to no vegetation treatment and road building. Its effects would be very close to those of Alternative F, the no action alternative.

Mineral development of valid mineral claims and leases under all alternatives could result in localized site degradation and in landscape alteration. Mitigation measures described in the Forest and Management Area Direction under all alternatives would keep these impacts at a level commensurate with the form of management prescribed.

WILDERNESS

The entire West Needle WSA has been managed to retain its wilderness character since its designation as a WSA. The proximity of the WSA to a major, heavily traveled highway, and to a major southwest Colorado population center, would provide access to additional wilderness opportunities under Alternatives A, C, E, G, H, and I in an area where localized portions of existing wilderness are being heavily used.

Under Alternatives A, C, E, G, H, and I, all current motorized recreation use would be prohibited, and mineral exploration would not be permitted subsequent to the area's designation as wilderness.

Under Alternative F, the no action alternative, mineral exploration would be permitted to continue on the entire area after December 31, 1983. Road building associated with mineral development could adversely affect the natural integrity, apparent naturalness, and the opportunities for solitude and primitive recreation which presently characterize the area. The loss of these attributes would lower the area's potential for future wilderness designation. Mineral exploration and development opportunities and consequences are more fully described in the Minerals section of this chapter. Under this alternative, a relatively minor amount of motorcycle and snowmobile use would continue to occur on approximately 1,800 acres within the area. This semi-primitive motorized recreation use would not of itself result in a loss of wilderness attributes, and would not lower the area's potential for future wilderness designation. Management of the remaining 18,540 acres for semi-primitive non-motorized recreation would maintain wilderness attributes on that portion of the area.

Under Alternative J, the maximum resource development alternative, the potential effects of mineral development and associated road building would be similar to those under Alternative F. In addition, vegetation treatment activities, and roads associated with such activities, could occur on approximately 3,500 acres. Such activities would have a significantly adverse effect on the natural integrity, apparent naturalness, and on the opportunities for solitude and primitive recreation that now characterize the WSA; therefore, the potential for future wilderness designation would be reduced on that portion of the WSA. Management of the remaining 16,840 acres for semi-primitive non-motorized recreation opportunities would likely maintain wilderness attributes on that portion of the area.

Under Alternative B, these consequences on the area's potential for future wilderness designation would be similar to those of Alternative J, but slightly less adverse. Alternative B provides for vegetation treatment with roads which would result in a potential loss of wilderness attributes on approximately 2,230 acres. Semi-primitive non-motorized recreation opportunities would be provided on about 18,110 acres.

Under Alternative D, the remaining unsuitable alternative, the consequences on the area's potential for future wilderness designation would be similar to those of Alternative F. Over 20,000 acres, or approximately 99 percent of the area, would be managed for semi-primitive non-motorized recreation under Alternative D. The attributes of natural integrity, apparent naturalness, and opportunities for solitude and primitive recreation which currently characterize the area probably would not be adversely affected on these areas.

In summary, the four alternatives other than Alternatives A, C, E, G, H, and I (suitable) all have varying potential adverse effects on wilderness attributes and subsequent reduction in the area's potential for future wilderness designation. Ranked in order from most adverse to least adverse affects, the alternatives would be Alternative J, Alternative B, Alternative D, and Alternative F.

WILDLIFE

As a general rule, the more human activity or development in an area, the greater will be the impacts on wildlife. Conversely, those alternatives having the least development or human activity will also provide the least opportunities for vegetation treatment to benefit wildlife. Under Alternatives A, C, E, G, H, and I, any benefits to wildlife would result from natural fire or natural succession as no treatment activities would take place. Little or no increases from present use levels in recreation and grazing would result from either Alternatives A, C, E, G, H, and I or Alternative F, and therefore, consequences on wildlife would be minimal.

Under the resource development alternatives, opportunities are available for vegetation treatment activities to benefit wildlife, although because of the vegetation, terrain, and potential access problems, very

little such activities would actually be carried out in the WSA. Alternatives B and J would provide more opportunities than Alternative D because of the larger area on which livestock grazing would be emphasized.

The WSA has a fair amount of natural ecological diversity resulting from variations in landform, soils, and geology. This provides a level of vegetation diversity which will occur regardless of the alternative selected. The drainage patterns, steep slopes, and rocky areas which characterize the WSA preclude the possibility that large continuous areas of a single vegetation type will ever dominate the area. Most presently available habitat will remain available under any alternative.

TIMBER

With respect to timber, there is relatively little difference among any of the alternatives. Technically, the resource development alternatives (Alternatives B, D, and J) would permit commercial timber production on 3,808 acres classified as capable forest land which has a biological yield potential of approximately one-half million board feet. But any resource development activities would be severely limited by access constraints as well as other economic and environmental considerations which render the overall WSA unsuitable for timber management.

Therefore, even under Alternative J, which has maximum emphasis on market commodities, timber outputs are zero.

RANGE

Current livestock use and management would not change significantly under any alternative. Grazing use would be the same under Alternatives A, C, E, G, H, and I as under Alternative F. Under Alternative J, the maximum resource development alternative, an increase of approximately 100 AUM's per year would be achieved mostly on the land managed under a livestock grazing emphasis. There would also be some increase, but to a lesser extent in Alternative B. Most increases in AUM's would be realized by vegetation treatment to increase range production. The remaining resource development alternative, Alternative D, would have grazing output levels very close to those of the Alternatives A, C, E, F, G, H, and I.

WATER

Water Yield

Under Alternatives A, C, E, G, H, and I, future water development projects in the WSA would be precluded unless special approval were given by the President of the United States. Most alpine snowpack management activities, such as snowfences or similar structures, would be incompatible with the wilderness character of the area. Estimated yield is 33,800 acre-feet per year. Under the other alternatives, techniques to increase water yield could be implemented in a very limited number of areas, but these would not result in appreciable increases in water yield.

Water Quality

Under any alternative, water quality could decline due to increased use around Crater Lake. Any other improvements in access or developments that would increase use could be expected to affect to some degree the generally high water quality that presently characterizes the area. Available mitigation measures include public education, camping restrictions, and limitations on numbers of users.

Water quality classification and standards assigned by the Colorado Water Quality Commission would be expected to emphasize maintenance of existing water quality under Alternatives A, C, E, F, G, H, and I, but would allow some degradation under the other alternatives.

Water Uses and Water Rights

None of the alternatives would affect either on-site or downstream water uses. Alternatives A, C, E, G, H, and I would prohibit water development projects except by approval of the President in accordance with the 1964 Wilderness Act.

MINERALS

The alternatives differ somewhat in their effects on the various stages of mineral exploration and development. Mineral exploration activities can legally take place under any alternative and may be undertaken regardless of designation, at least until the end of 1983. If an operator has adequate time to do the required exploration and is not unreasonably restricted in access and movement within the area, the feasibility of developing a mineral resource will be based on the normal costs of doing business. This will be the case under Alternatives B, D, F, and J. If, on the other hand, an operator foresees that there will not be time to validate claims prior to designation, or that access and movement will be severely restricted, he may be discouraged from further investment in the exploration effort. The additional costs of mitigation and restoration for exploration and development might make a feasible project uneconomical under the suitable alternatives, Alternatives A, C, E, G, H, and I.

Rehabilitation of disturbed sites to a condition suitable for semi-primitive, non-motorized recreation under the unsuitable alternatives would generally be feasible and reasonable. This would involve regrading, revegetating, and restoring production of the land but not necessarily restoring the original contours of the land surface. Large flat areas could remain as evidence although the area would be essentially natural in character. Rehabilitation of disturbed sites to a condition suitable for wilderness would mean restoration of natural ecosystems. In many cases, this degree of restoration is probably not technically or economically feasible in the short-term.

As of April 30, 1982, there were a total of 502 unpatented mining claims, comprising approximately 10,040 acres, on the WSA. Thirty-one of these claims, comprising approximately 620 acres, are located north of Molas Creek. According to the preliminary U. S. Bureau of Mines 1983

mineral investigation report for the WSA, only the Elk Park area of the WSA is rated as having a high to moderate potential for locatable minerals. The entire WSA is rated as having a low potential for leasable minerals. Although mineral exploration and development may legally take place under any alternative, feasibility under Alternatives A, C, E, G, H, and I may be limited by increased access costs as well as environmental constraints and mitigation measures required in the operating plan. There is also the possibility that mineral discoveries could be foregone following withdrawal of the WSA from mineral location and leasing.

LAND STATUS

Alternatives A, C, E, G, H, and I would result in withdrawal of the area from mineral entry after December 31, 1983 under provisions of the 1964 Wilderness Act. Because of this, the other alternatives would have a greater possibility of land being taken to patent under provisions of existing mining laws. None of the alternatives would have apparent effects upon special land uses in the WSA.

LANDFORM AND SOILS

Landforms and soils would not be significantly affected under any alternative. Increased potential for mineral activity in Alternatives B, D, F, and J could displace soils within specific project areas, but mitigation measures would be required to reduce this impact. Natural forces and erosion rates would continue unaffected, for the most part, under any alternative.

PROTECTION

Air Quality

There is no evidence to indicate that selection of any alternative would impact either the current Class II air quality designation or air quality protection requirements within or without the area.

Fire

Under Alternatives A, C, E, G, H, and I, the suitable alternatives, fire could potentially resume its natural role in the ecology of the area. Because of its limited size, as well as the need to protect adjacent areas from wildfire, it would not be possible to implement a complete natural fire policy. Nevertheless, a fire management policy incorporating the use of naturally occurring fires burning within prescription could be implemented to promote a wilderness environment truly shaped by naturally-occurring phenomena. Without such a policy, wildfire occurrence and intensity would increase in the long-run due to natural accumulation of ground fuels. As the possibility of major fires increases, adjacent lands would be increasingly threatened as well. Under this alternative, transportation of personnel to fires, as well as suppression efforts, would be generally restricted to non-mechanical means. This would increase response time and enhance the likelihood of larger fires.

Under the other alternatives, a fire management policy would take much the same form as under the suitable alternatives. Possible differences would be that the option of using mechanical means for transportation and suppression exists in areas where the terrain would permit. Increased use of the area under any alternative could increase the occurrence of man-caused fires.

Integrated Pest Management

Under Alternatives A, C, E, F, G, H, and I, opportunities for utilizing an integrated approach to pest management would be very limited. Prevention and control of insect and disease outbreaks using integrated pest management would be limited to those situations in which non-wilderness values on adjacent lands are threatened.

Under the resource development alternatives, limited opportunities would be available to coordinate pest management with vegetation treatment activities. These opportunities would be limited by access to the area.

VEGETATION

Under Alternatives A, C, E, F, G, H, and I, vegetation within the WSA would continue to be influenced mainly by natural ecological forces. Livestock grazing and dispersed recreation will continue to be the major man-caused impacts unless major mineral developments occur, which could remove some land from production. Though reclamation can return disturbed areas to production, vegetation composition and productivity could be influenced over a long period of time due to the slow recovery of fragile alpine and sub-alpine ecosystems. Natural fire burning under prescription would perpetuate aspen vegetation.

Under Alternatives B, D, and J, vegetation could be modified through wildlife habitat and range improvement activities, but only in a limited number of areas.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Table 7 summarizes the environmental consequences of Alternatives A, C, E, G, H, and I (suitable) and the unsuitable alternative representing the maximum resource development on the WSA (Alternative J). Consequences of Alternative F, the no action alternative, are also shown as a standard of comparison.

ECONOMIC AND SOCIAL IMPACTS

ECONOMIC EFFECTS

None of the alternatives relating to the West Needle WSA would have significant impacts either on the cost-efficiency of the Forest or on the social and economic integrity of nearby residents and communities. Economic impacts of Alternatives A, C, E, G, H, and I (suitable) and Alternative J (maximum resource development) were estimated using a regional Input-Output (I-O) model (IMPLAN). The analysis was based on

TABLE 7

Summary of Environmental Consequences (Outputs are average annual - summary of all periods unless otherwise noted)

Resource	Unit of Measure	Alternatives F (No Action)	A, C, E, G, H, and I (Suitable)	J (Unsuitable - Maximum Resource Development)
WILDERNESS				
Potential loss of wilderness character 1/		Very Low	None	Increased
Change in wilderness attributes 1/				
Natural Integrity		No Change	No Change	Decreased
Apparent Naturalness		No Change	No Change	Decreased
Solitude		No Change	Increased	Decreased
Primitive Recreation Opportunity		No Change	Increased	Decreased
Supplementary Attributes		No Change	No Change	Decreased
Scenic Value		No Change	No Change	Decreased
Addition to the National Wilderness Preservation System	Acres	-0-	20,340	-0-
West Needle WSA (National Forest System)	Acres		15,800	
West Needle Contiguous WSA (BLM)	Acres		4,540	
RECREATION OPPORTUNITY				
Dispersed recreation capacity	Thousand Visitor Days 2/	37	-0-	127
Projected dispersed recreation use	Thousand Visitor Days	19.2	-0-	27.8
Wilderness recreation capacity	Thousand Visitor Days	-0-	27	-0-
Projected wilderness recreation use	Thousand Visitor Days	-0-	22	-0-
Area open to motorized use	Acres	1,800	-0-	3,500
FISH AND WILDLIFE				
Habitat improvement opportunities 1/		Low	Very Limited	Increased
RANGE LIVESTOCK				
Grazing use	Animal Unit Months 3/	550	550	653
Grazing capacity 1/		No Change	No Change	Increased
TIMBER				
Forest land capable and available for timber production	Acres	-0-	-0-	3,808
Forest land suitable for timber management		-0-	-0-	-0-
Long-term sustained yield potential	Million Board Feet	-0-	-0-	0.5
Annual sales offerings	Million Board Feet	-0-	-0-	-0-

TABLE 7 (Continued)

Summary of Environmental Consequences (Outputs are average annual - summary of all periods unless otherwise noted)

Resource	Unit of Measure	F (No Action)	Alternatives A, C, E, G, H, and I (Suitable)	J (Unsuitable - Maximum Resource Development)
WATER QUALITY				
Risk of pollution caused by recreation and other use 1/		No Change	Increased	Increased
Risk of pollution caused by surface disturbing activities 1/		No Change	Decreased	Increased
WATER USES				
Feasibility of planned or proposed water developments		Not feasible at this time.	Not feasible at this time.	Not feasible at this time.
Likelihood of development of water storage facilities		Low	None 4/	Low
Effects on existing water uses		None	None	None
WATER QUANTITY				
Water yield	Acre-Feet	33,800	33,800	33,800
MINERALS				
Cost of Exploration 1/		No Change	Increased	Decreased
Likelihood of significant mineral discovery and development		Low	Low	Low
Costs of administering mineral activity 1/		No Change	Increased	Decreased
LANDOWNERSHIP				
Likelihood of future private ownership under mineral patents 1/		No Change	Decreased	No Change
PROTECTION				
Integrated pest management opportunities 1/		No Change	Decreased	Increased
SOCIAL AND ECONOMIC				
Present net value (4 percent discount rate) 1/ and 5/	Thousand Dollars	N/A	-422	+1,382
Income 5/ and 6/	Million Dollars	Not Calculated	1.40	1.51
Employment 6/	Jobs	Not Calculated	81	88
Population 6/	Persons	Not Calculated	181	197

1/ Changes are estimated using the No Action Alternative as a basis of comparison.

2/ Recreation Visitor Day = 12 hours of recreation for one person or one hour of recreation for 12 persons or any combination thereof.

3/ Animal Unit Month = The amount of forage consumed by one mature cow or its equivalent in a one-month period.

4/ Except as provided for under authority of the President in the 1964 Wilderness Act.

5/ Expressed in terms of 1978 dollars.

6/ Based on the total estimated outputs in index year 1995 which are directly or indirectly attributed to West Needle WSA outputs and activities.

estimates of outputs in 1995, which were used to determine total income, employment, and population that can be directly or indirectly associated with resources produced on the WSA. Cost-efficiency of these same two alternatives was also analyzed to arrive at an incremental present net value from Alternative F (no action). These were based on estimating outputs and costs and discounting all dollar values to the present. Economic effects of Alternatives B, D, and F would be intermediate between the extremes represented by the analyzed alternatives.

Income, Employment, and Population

The IMPLAN model used to estimate effects on income, employment, and population is based on historic data and therefore is not responsive to changes in exogeneous variables such as national markets, interest rates, inflation, and other changes outside the economic impact area. Input-output models are most adapted to estimating short-term effects in local economies, and application of the model was based on the assumption that historic relationships between forest outputs and income, population, and employment levels will remain unchanged through the year 1995.

The economic analysis for the WSA indicates very little difference between the impacts of a wilderness recommendation (Alternatives A, C, E, G, H, and I) at one extreme and maximum resource development (Alternative J) at the other extreme. The IMPLAN model was run based on estimated outputs from the WSA in index year 1995. Total rather than incremental outputs were used to figure total income, employment, and population levels that are either directly or indirectly associated with resources on the WSA. Results are shown in Table 8. The table indicates that, at most, seven jobs would be forgone under a wilderness recommendation, resulting mainly from lower total recreation and grazing outputs in Alternatives A, C, E, G, H, and I. Total income would also be slightly less, although the differences shown cannot be considered significant in light of the general accuracy of the model and the size of the economic impact area in relation to the WSA. Although the effects of minerals development were not estimated, any significant development could impact both employment and income patterns in the area.

Cost-Efficiency Analysis

A cost-efficiency analysis was carried out to determine the effects that both wilderness designation and maximum resource development would have on present net value. This involved estimating resource outputs and costs for the suitable alternatives (Alternatives A, C, E, G, H, and I) and for the maximum resource development alternative (Alternative J). In order that the analysis be incremental from what would take place in the absence of a suitability or unsuitability determination, all effects are incremental from Alternative F (no action). Benefit values were the same as those used in the total alternative analysis, and both 4 percent and 7 1/8 percent discount rates were applied. Results are shown in Table 9.

TABLE 8

Income, Employment, and Population Associated With Total Resource Outputs from the West Needle WSA

	Alternative	
	A, C, E, G, H, and I (Suitable)	J (Maximum Resource Development)
Income (million 1978 dollars)	1.40	1.51
Employment (number of jobs)	81	88
Population	181	197

The incremental PNV of a suitable recommendation (Alternatives A, C, E, G, H, and I) is negative under both discount rates, whereas under maximum resource development (Alternative J), incremental PNV's are positive. Based on a four percent discount rate, the non-wilderness benefits foregone under the suitable alternatives actually exceed wilderness benefits accrued, and therefore incremental benefits are negative. When incremental costs are subtracted, the resulting PNV is even more negative. Based on the outputs and costs considered, Alternatives A, C, E, G, H, and I result in a lowered cost-efficiency of management of the Forest. This is qualified by the fact that certain intangible benefits and costs, for which quantification was not possible, were not included in the analysis. An example of such an intangible benefit is the vicarious satisfaction derived by some individuals in knowing that the area is protected under a wilderness designation even though they personally have no intention of ever visiting the area. The higher estimated recreation use under Alternative J accounts for a large portion of the difference in PNV between alternatives. Minerals benefits were not included in the analysis because of lack of accurate data on the resources and dollar values involved.

SOCIAL EFFECTS

Additional impacts not within the realm of quantitive economic analysis may also result from a suitable or unsuitable designation for the WSA. These are discussed below.

Lifestyle

None of the alternatives would significantly alter lifestyles in the area unless major mineral activity occurred. In this respect, Alternatives A, C, E, G, H, and I are least likely to affect lifestyles in the vicinity of the WSA.

TABLE 9

Cost-Efficiency Analysis for the West Needle WSA based on 4 percent and 7 1/8 percent Discount Rates (Costs and benefits are in thousands of 1978 dollars, incremental from the no action alternative, Alternative F)

Resource/Cost	Alternatives			
	A, C, E, G, H, and I (Suitable)	J (Maximum Resource Development)	A, C, E, G, H, and I (Suitable)	J (Maximum Resource Development)
	4 Percent Discount Rate		7 1/8 Percent Discount Rate	
Timber	0	0	0	0
Increased Water Yield	0	0	0	0
Recreation				
Wilderness	3,773	0	2,106	0
Non-Wilderness	-3,807	1,599	-2,094	765
Range	0	15	0	6
Benefits	-34	1,614	12	771
Costs	388	232	199	119
Incremental PNV	-422	1,382	-187	652

Attitudes, Beliefs, and Values

Many people in the area, especially newer residents, tend to favor preservation of natural areas such as those within the West Needle WSA. Others more oriented toward land-based economies such as agriculture, feel that resources in the WSA should be used to support jobs and improve standards of living in the area. A certain amount of conflict and resentment could result from implementing any alternative.

Social Organization

None of the alternatives would significantly affect the level or type of social services available in the area. Alternatives A, C, E, G, H, and I could result in slightly less payments to counties in the long-run as a result of potentially lower mineral and livestock resource outputs, but this reduction would be slight.

Population and Land Uses

None of the alternatives would significantly affect land uses and population distribution unless a discovery of a major mineral deposit is made. Such a discovery could cause an increase in population and changes in land uses within the area.

WILDERNESS SUITABILITY OR UNSUITABILITY

OVERVIEW

Standards to be met by components of the National Wilderness Preservation System (NWPS) were established in the Wilderness Act of 1964. Forest Service policy requires that capability, availability and need for wilderness be analyzed prior to determining the suitability or unsuitability of an area for inclusion in the NWPS. These three criteria are discussed below.

WILDERNESS CAPABILITY

Wilderness capability is analyzed without regard to either the need for more wilderness or the availability of the area for wilderness designation. It is determined by both the degree to which an area possesses the basic characteristics necessary for wilderness designation as well as the degree to which an area can be managed for wilderness.

With respect to the first of these two criteria, the Wilderness Attribute Rating System (WARS) was developed during RARE II to indicate the degree to which an area possesses wilderness attributes. The system involves a rating for each of several attributes, which are then summed to arrive at a composite WARS rating. Possible scores range from 4 to 28, with 28 indicating possession of optimum wilderness characteristics. Table 10 is a summary of the WARS rating for the Forest Service portion of the West Needle Wilderness Study Area (RARE II Area No. A2303). Detailed worksheets are in the planning records on file in the Forest Supervisor's Office in Durango, Colorado. These ratings were reconfirmed during the Forest Planning process. Although no such rating was made for the West Needle Contiguous WSA, the area is similar enough in characteristics that any conclusions drawn from the rating would be applicable to the BLM portion as well.

The West Needle WSA rating of 21 is ninth among the 38 RARE II areas on the San Juan National Forest. Of the 300 RARE II areas in Colorado the median rating is 19. Thus, basic wilderness characteristics are well represented on the WSA.

The second element of wilderness capability is "manageability." The most uncertain aspect of manageability relates to the potential future development of mineral resources, primarily in the eastern portion of the area. The following are indicators of manageability:

TABLE 10

Summary of West Needle WSA Wilderness Attributes Ratings

Wilderness Attribute	Rating
Influence on Natural Integrity	6
Influence on Apparent Naturalness	6
Solitude Opportunity	4
Primitive Recreation Opportunity	5
Composite WARS Rating	21
Supplementary Wilderness Attributes	3
Scenic Value	5

Ability to Manage the Area as an Enduring Resource of Wilderness and to Protect and Manage its Natural Character

Recreation, grazing and other natural resource uses can generally be managed to protect wilderness character on both the Forest Service and BLM portions of the WSA. An exception to this is the area of the West Needle Contiguous WSA north of Molas Creek. This land is adjacent to Molas Lake and Molas Lake Campground, which is on land owned by the town of Silverton. Recreation activities in the vicinity of Molas Lake include fishing, developed site camping, and off-road vehicle use. The terrain is such that there are no topographic or other natural barriers separating the developed recreation area from the WSA. Significant manageability problems would exist in attempting to prevent motorized use from taking place within designated wilderness. This is why, under the suitable alternatives, an adjustment has been made to exclude this 1,240 acre area which is determined as incapable for wilderness.

Mining activity also represents a potential manageability problem under the suitable alternatives. Although active mines were specifically excluded from the West Needle Contiguous WSA during the delineation of the eastern boundary, there is a possibility that additional mining claims presently within the WSA could become active. Although most surface disturbances from mining could be mitigated under Federal regulations, some impacts and use conflicts could be expected from exploration and developmental activities.

Size and Shape of the Area

The West Needle and West Needle Contiguous WSA's contain a total of 21,580 acres, with the suitable alternatives recommending 20,340 for wilderness designation. This area is relatively compact with boundaries

in many areas being determined by well defined topographic features. The area is of sufficient size and shape to be manageable as wilderness. Manageability problems in relation to boundaries are discussed below.

Location Relative to External Influences

The West Needle and West Needle Contiguous WSA's are almost completely bounded by transportation corridors. Along the south and west boundaries is the Durango and Silverton Narrow Gauge Railroad right-of-way which follows the Animas River. There are very few developments in this segment of the valley, limited to a few cabins and patented mines. The narrow gauge railroad runs several trips per day during summer months, with backpackers using the train as a means of access to the Weminuche Wilderness. The train is a unique historical feature of the area, although some might feel that its proximity to the WSA boundary would detract from a true wilderness experience. The train is also responsible for starting several fires per season along the right-of-way. Most of these are immediately discovered and extinguished by railroad personnel.

U. S. Highway 550 runs along the north and west boundaries of the WSA at distances from one to three miles. This corridor is heavily used during summer and fall months and can be viewed from many locations within the WSA. Forest Road 591 parallels the western boundary of the WSA for approximately four miles at distances of less than a half mile. This road is used by sight-seers, campers, fishermen, and hunters.

Considerable mining activity occurs to the north of the WSA near Silverton, but this is at such a distance as to have no major impacts on the WSA. Of greater significance is the mineral activity along the eastern edge of the West Needle Contiguous WSA. Associated with this activity are helicopter flights over the WSA for purposes of aerial surveys and transportation of men and equipment.

Along the southwest side of the boundary runs the Purgatory Trail, which is fairly heavily used by horseback riders, backpackers, and hunters. The Weminuche Wilderness is east of any point within the WSA.

In summary, there are several types of external influences which could detract from the wilderness environment of the WSA, but many of these are actually means of access to the WSA. Manageability of the WSA in relation to these factors would be dependent upon the extent to which use could be controlled to prevent overcrowding from taking place.

Boundaries

The following points can be made concerning boundaries on both the Forest Service and BLM WSA's:

-They can generally be located to avoid conflicts with existing uses and developments. However, under Alternatives A, C, E, G, H, and I, mineral activity taking place based on prior rights could present manageability problems within the boundary.

-They can be readily and accurately described in most areas. Problems could exist in locating the western boundary of the West Needle Contiguous WSA north of the Forest Service portion. There are no topographic features to help define the boundary, which is actually the line separating Forest Service and BLM land.

-They can be located in most areas to use features that constitute a barrier to prohibited use or a shield to protect the wilderness environment. An exception is the area of the West Needle Contiguous WSA adjacent to Molas Lake. Here, no barriers exist, and manageability with respect to prohibited uses would pose problems. This area of 1,240 acres is excluded under the suitable alternatives.

-They can be located to provide an opportunity for access and trailhead facilities.

Boundary location, in general, poses no major problems with respect to manageability of the area as wilderness.

Based on analysis of both manageability and possession of wilderness characteristics, the West Needle WSA is capable for wilderness.

WILDERNESS AVAILABILITY

Value Comparison

Availability of an area for wilderness designation is determined, in part, by a comparison of the value and need for the wilderness resource with the value and need for other resources. In theory, the values of the wilderness resource, both tangible and intangible, should be greater than the values foregone. However, the highest and best use of an area for wilderness in economic terms is difficult to assess because of the difficulty of establishing and agreeing upon monetary values for the intangible benefits of wilderness.

Wilderness values in the West Needle Wilderness Study Area include:

-The potential to provide the opportunity for a wilderness recreation experience to 112 people at one time (PAOT).

-Protection of natural ecosystems, soil and water quality, and other resources.

Minerals represent the most significant potential resource value foregone under the suitable alternatives (Alternatives A, C, E, G, H, and I) which would initially place additional constraints on exploration by increasing costs to the operator. Following December 31, 1983, the area would be withdrawn from mineral entry. Under the remaining alternatives, mineral exploration would be allowed with appropriate safeguards.

With respect to timber resources, very little timber value would be foregone under the suitable alternatives. Although the WSA includes

approximately 3,800 acres of land capable for timber production, none of this is considered suitable for timber management because of the scattered nature of manageable stands as well as access constraints imposed by the rugged terrain.

Although recreation would constitute a major use of the WSA under any alternative, wilderness recreation, by its very nature, results in lower capacity than would otherwise be the case. Therefore, total recreation contribution to overall value is less in Alternatives A, C, E, G, H, and I than under Alternative J (maximum resource development).

Alternatives A, C, E, F, G, H, and I would preclude projects designed to increase water yield in the WSA and would also decrease the opportunity to construct water storage and related facilities in the WSA since water improvements in wilderness require Presidential approval.

Existing Constraints and Encumbrances

A 640 acre parcel of land within the West Needle WSA is owned by the State of Colorado. Under all alternatives, this land is identified as highly desirable for acquisition or exchange. If the parcel is not obtained, problems could arise in managing the surrounding area under the suitable alternatives. The State may elect to develop the area for minerals, for example, and require access across designated wilderness.

All other land within the WSA is administered by either the Forest Service or the Bureau of Land Management.

Two power withdrawals are located within the WSA, one of which is on Forest Service land and the other on BLM land. Since there are no present or anticipated plans for water developments, availability of the WSA for wilderness should not be affected.

Activities on unpatented mining claims would be governed by Federal Regulations (36 CFR 228 - Forest Service, and 43 CFR 3802 - BLM), although surface impacts and access routes could reduce wilderness values.

Effect of Wilderness Designation and Management on Adjacent Lands

The WSA is topographically well defined, and for the most part, geographic barriers would minimize both the effects of wilderness designation and management on adjacent lands as well as the effects of nearby non-wilderness management on wilderness. No transportation or utility corridors are proposed through the area, and trailhead and access facilities would be similar under either alternative.

Summary

The West Needle WSA is available for wilderness. Values foregone under the suitable alternatives are greatest with respect to mineral resources, although these values are not quantified due to the lack of specific data on available resources. There are sufficient opportunities to make up for the small amount of resources foregone on lands outside the WSA.

WILDERNESS NEED

The RARE II process dealt with "wilderness need" on a National basis, and the process included extensive public involvement. The San Juan National Forest Land and Resource Management Planning process considered current and future public need for additional designated wilderness in the general vicinity of the West Needle Wilderness Study Area.

In considering the need for wilderness, certain assumptions were made:

-Visits to designated wilderness will increase with both increasing population and a growing awareness of wilderness.

-Some undeveloped lands provide opportunities for a primitive type of recreation experience outside wilderness.

-Within social and biological limits, management increases the capacity of established wildernesses to support human use without unacceptable depreciation of wilderness resources.

The following factors were considered in determining the need for designated wilderness on the West Needle WSA:

Location, Size, and Type of Other Wildernesses in the General Vicinity and their Distance From the Study Area

Prior to 1980, there were eight wildernesses within a 100-mile radius of the West Needle WSA, with a total of 679,607 acres. Four are administered by the Forest Service, and three are administered by the National Park Service. With passage of the New Mexico Wilderness Act of 1980 and the Colorado Wilderness Act of 1980, Congress increased the size of four of these National Forest System wildernesses and established five new wildernesses within such a radius. The new wildernesses are all within the National Forest System and contain a total of almost 700,000 acres. Therefore, there are now thirteen wildernesses with a total of 1.38 million acres within the 100-mile radius of the West Needle WSA. Eleven are in the National Forest System and two are in the National Park System.

Figure 3 shows the location of the wildernesses within a 100-mile radius of the West Needle WSA. Table 11 lists acres and recreation use on wilderness in the vicinity of the WSA. The table indicates that there are a number of designated wildernesses in the vicinity of the West Needle WSA, representing a large acreage base. These cover a diversity of ecosystem and landform types, including canyons, sand dunes, and mountainous alpine areas.

Present Visitor Pressure on Other Wildernesses, Trends in Use, and Changing Patterns of Use

Because of the large land area represented by designated wildernesses within a 100-mile radius of West Needle WSA, as well as the relatively low population density in this part of the Southwest, overall visitor

FIGURE 3 - West Needle Wilderness Study Area and Nearby Wildernesses

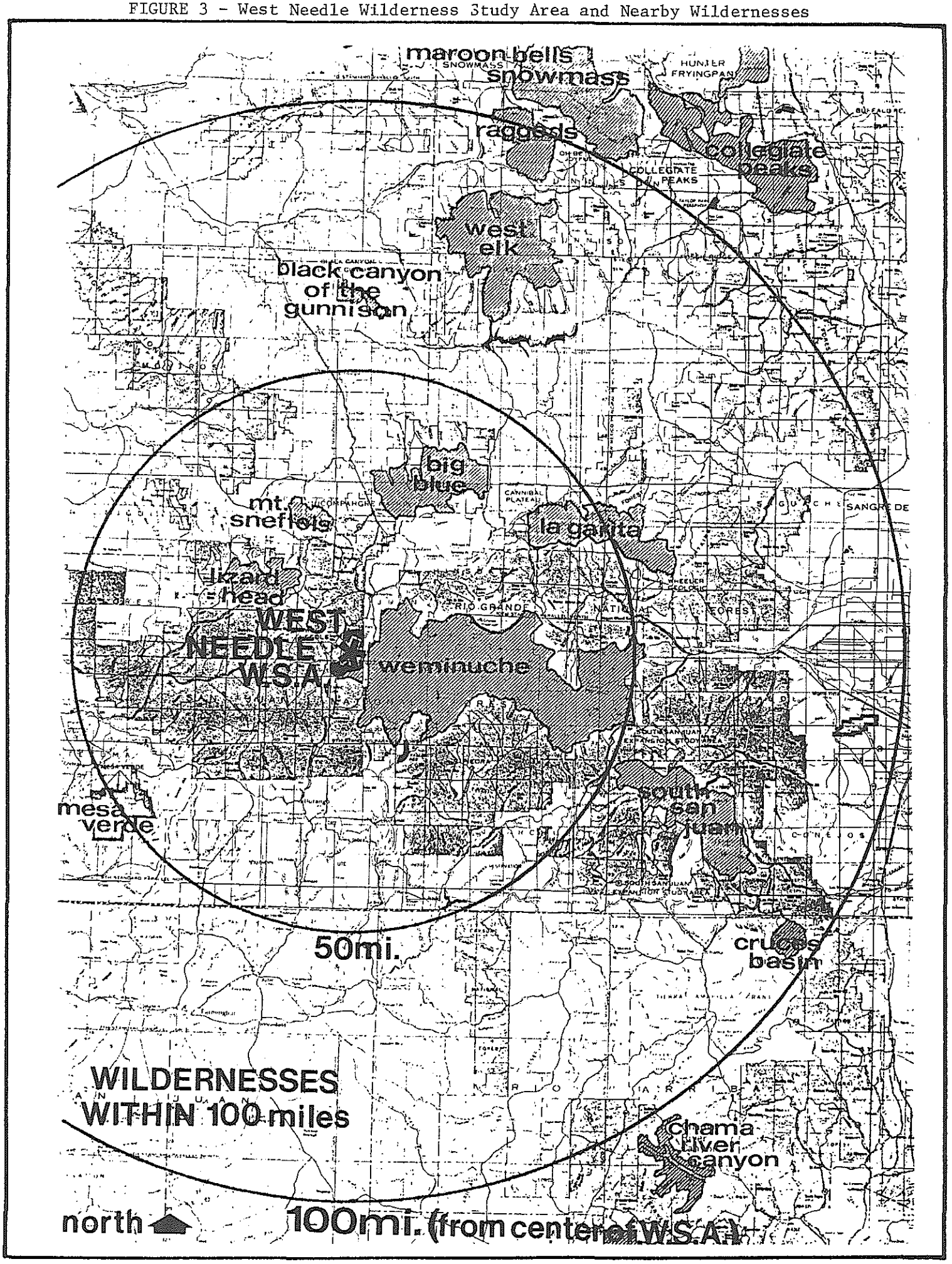


TABLE 11

Wildernesses Within a 100-Mile Radius of West Needle WSA, Showing Size, Total Recreation Visitor Days, and Relative Use Ratings

Wilderness	Acres	1980 Use	Recreation Visitor Days/ Acre/Year	Relative Use Rating
Big Blue	97,700	NA	NA	Low*
Black Canyon of the Gunnison (NPS)	11,180	NA	NA	Low*
Chama River Canyon	50,260	5,600	.11	Low
Cruces Basin	18,000	1,600	.09	Low
La Garita	108,486	32,300	.30	Low
Lizard Head	40,000	21,000	.53	Moderate
Maroon Bells	174,329	130,900	.75	High
Mesa Verde (NPS)	8,100	NA	NA	Low*
Mt. Sneffels	16,200	11,100	.69	Moderate
Raggeds	68,000	19,000	.28	Low
South San Juan	133,463	41,500	.31	Low
Weminuche	463,224	255,400	.55	Moderate
West Elk	194,412	101,500	.52	Moderate
Total	1,303,605			

NPS - Administered by the National Park Service, U.S. Department of the Interior
NA - Data not available
* - Estimated relative use rating.

Relative Use Ratings Based on:
0-.35 Recreation Visitor Days/Acre/Year Low
.36-.70 Recreation Visitor Days/Acre/Year Moderate
.70+ Recreation Visitor Days/Acre/Year High

pressure on other wildernesses is relatively low. (See Table 11.) This can be partially explained by the fact that wilderness recreation experiences, by definition, require low user density per unit area. Therefore, the low visitor pressure on nearby wildernesses can be interpreted to indicate that existing areas are indeed fulfilling their purpose in providing "opportunities for solitude in areas untrammeled by man." But demand for and use on wildernesses is expected to increase in the immediate future. Trends indicate that individuals and families will tend to spend more of their vacation time in one location rather than on the road. Wilderness trips provide an opportunity to experience the outdoors in a natural setting, along with a unique type of challenge

not available in urban areas. More people are realizing this, and wilderness visits are expected to increase accordingly. Increases in leisure time as well as a growing national awareness of environmental matters will influence this trend as well.

The overall low visitor pressure on nearby wildernesses does not mean that localized overuse is not occurring. Many areas within the San Juan National Forest are very popular, and during summer months use is at such levels that wilderness experiences may be impaired.

The West Needle Wilderness Study Area is in a very accessible location between Durango and Silverton. It is a popular area from the standpoint of both on-site use and off-site observation. The area can be viewed and photographed from U. S. Highway 550, and is readily entered from a trailhead a short distance from the same highway. Along the eastern side of the WSA runs the Durango and Silverton Narrow Gauge Railroad, from which the WSA can also be observed and accessed. The popularity of the area is an important factor from the standpoint of need.

Lands' Ability to Provide Opportunities for Unconfined Outdoor Recreation Experiences

While the West Needle Wilderness Study Area has high potential to provide opportunities for unconfined outdoor recreation experiences, these opportunities are not in short supply in the surrounding area.

Ability of Plant and Animal Species to Compete with People and Projects

Natural ecological forces will continue relatively undisturbed under all alternatives. Plant and animal species native to the area will be maintained under all alternatives as well.

The Need to Provide Sanctuary for Species that Have Demonstrated an Inability to Survive in Less Primitive Surroundings

No species have been identified on the WSA that require a wilderness environment for survival.

Provide for Preservation of Unique Landform Types and Ecosystems

Although there are no unique ecosystems or landforms within the WSA, the area is characterized by spectacular scenery and rugged mountains. These can be viewed from a major highway and the railroad right-of-way. Wilderness designation would preserve this scenery in its natural setting as well as protect the sensitive alpine and sub-alpine ecosystems that are common within the WSA.

Summary

Based on the six factors discussed above, the West Needle WSA is not needed for wilderness. Although the area is characterized by rugged topography, spectacular scenery, and natural integrity, there is not an established need for additional wilderness-related opportunities in this type of setting.

OTHER CONSEQUENCES

None known.

SHORT-TERM USES OF MAN'S ENVIRONMENT VS. THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

There would be no direct effects on long-term productivity or renewable resources under either alternative. The increased likelihood of mineral activity under all alternatives except Alternatives A, C, E, G, H, and I, the suitable alternatives, could increase the possibility of long-term effects on the renewable resource productivity of the land actually disturbed by mining. However, most of the surface resource effects caused by mining could be mitigated under Federal Surface Protection Regulations.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

With the exception of lost wilderness opportunities and extraction of minerals, there would be no irreversible or irretrievable commitment of resources under the unsuitable alternatives. "Irretrievable" refers to a loss of resource production or use of renewable resources resulting from management decisions, whereas "irreversible" refers to long-term unavailability of a resource. Mining represents an irreversible commitment of non-renewable mineral resources. Mining activity would also involve minimal commitments of livestock forage as areas become disturbed. By using proper reclamation techniques, however, losses of production can be made short-lived and insignificant in quantity. The wilderness resource could be irreversibly committed, depending on how the area was to be managed under the unsuitable alternatives, although this is unlikely in the West Needle WSA.

Under Alternatives A, C, E, G, H, and I, mineral resources could be irreversibly lost following the minerals withdrawal deadline of December 31, 1983. Certain amounts of livestock forage could be irretrievably lost as a result of the inability to carry out intensive management activities in a wilderness area. Irretrievable resources are limited to the difference between quantities produced under the suitable alternatives and the unsuitable alternatives.

PROBABLE ADVERSE EFFECTS THAT CANNOT BE AVOIDED

SUITABLE ALTERNATIVES (ALTERNATIVES A, C, E, G, H, AND I)

-There would be reduced opportunities and an increase in the cost of mineral exploration and development because of the need for more stringent mitigation and restoration measures.

-Opportunities for vegetation treatment will be lost.

-There would be less opportunities for developing a variety of uses. There would be a loss of semi-primitive motorized recreation opportunities.

-A minimal amount of livestock forage would be foregone.

NO ACTION ALTERNATIVE (ALTERNATIVE F)

-Opportunities for vegetation treatment would be lost.

-Mineral resources could be developed. This development with associated roads could reduce opportunities for solitude and affect the natural integrity and the scenic values.

UNSUITABLE ALTERNATIVES (ALTERNATIVES B, D, and J)

-There could be an eventual irreversible loss of wilderness character through mining, and recreation activities in the area.

-There would be a slight reduction in wilderness values and wilderness recreation opportunities.

CONFLICT WITH OTHER GOVERNMENT AGENCY PLANS

There are no known conflicts with plans of other government agencies under any alternative.

PIEDRA WILDERNESS STUDY AREA

VICINITY

The Piedra Wilderness Study Area is located in parts of Archuleta and Hinsdale Counties in southwestern Colorado between the towns of Durango and Pagosa Springs. The area consists of 41,500 acres of unroaded and undeveloped forest land. Access to the area is by U. S. Highway 160 and then three and one-half miles along Forest Road No. 620-622 from the south. Forest Road No. 631-642 lies within one-eighth mile of the northern boundary. Figure 4 is a location map showing the Piedra WSA in relation to other nearby wildernesses and to the Four Corners Area (Colorado, Utah, Arizona, and New Mexico) and Figure 5 is a detailed map of the area.

The Piedra Wilderness Study Area lies almost entirely within the Piedra River drainage and includes the primary tributaries of Sand Creek, First Fork, and Sheep Creek. Boundaries are determined by well-defined topographic features on about one-third of the proposed area. The Piedra River is the dominant geographic feature of the area and the general landform is southward sloping and deeply dissected by streams and rivers.

PHYSICAL SETTING

VEGETATION

Vegetation on the area varies with elevation, which ranges from 6,800 to 10,500 feet. Coniferous vegetation occurs over 70 percent of the area with the Douglas-fir type being most predominant (50 percent of total area); spruce-fir is second (17 percent of total area); and ponderosa pine, although common at lower elevations, is the least common coniferous type (three percent of total area). Aspen stands are scattered throughout, and these cover approximately 25 percent of the total area. Table 12, which lists frequency of occurrence of various ecosystem types on the Piedra WSA in comparison with other wildernesses, points out the uniqueness of the vegetation composition of the Piedra WSA. Alpine and subalpine types, which are common on the other four areas, are not represented on the Piedra WSA. Conversely, Douglas-fir and aspen types, which are uncommon on all four other areas, are extensive or common on the Piedra WSA.

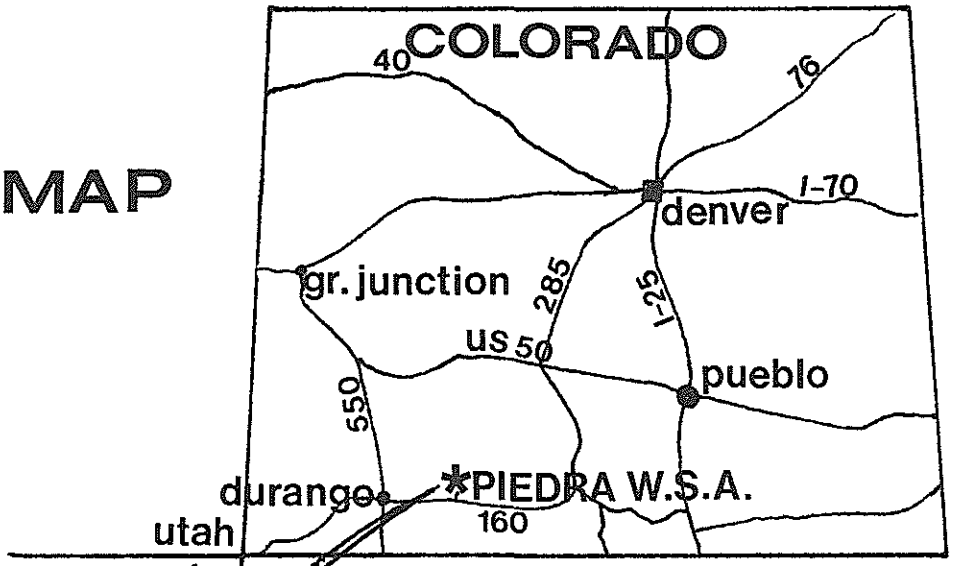
The non-timbered portion of the study area (five percent) is covered by grasses, rock, or riparian vegetation. Browse is represented in only a few scattered areas, mostly at lower elevations. There are no known threatened or endangered plants present.

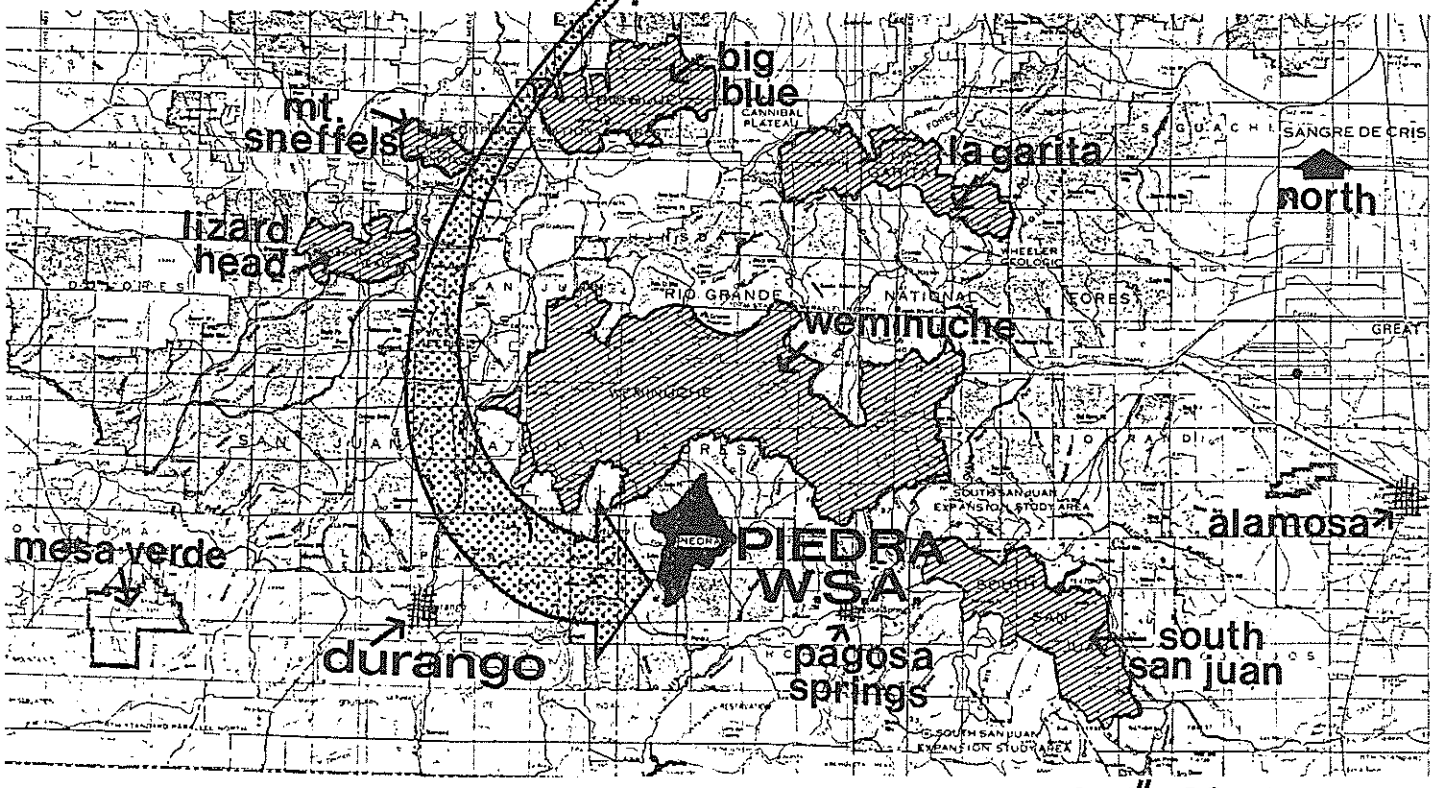
LANDFORM

The area lies on the northern edge of the Navajo Section of the Colorado Plateau. The general landform is characterized by south-facing slopes that are deeply dissected by the Piedra River and associated side drainages. A few isolated plateau-like areas are scattered throughout. The Piedra River is the dominant drainage feature of the WSA.

FIGURE 4 - Location Map of the Piedra Wilderness Study Area

LOCATION MAP





scale 1"=23miles

OTHER NEARBY WILDERNESSES

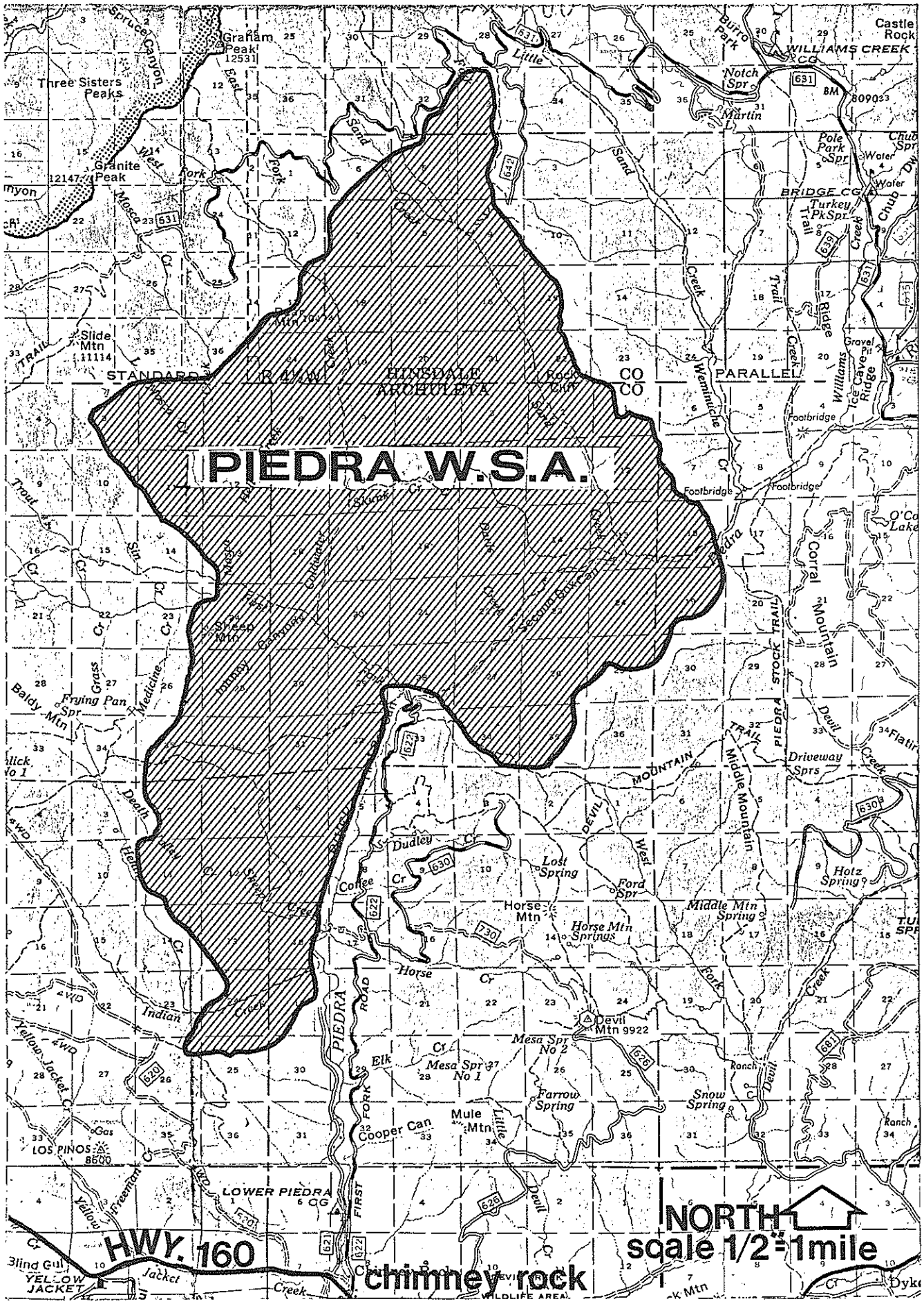

PIEDRA W.S.A.
HWY. 160
chimney rock
NORTH
scale 1/2"=1mile
STANDARD
PARALLEL
HINSDALE CO
ARCHULETA CO
Graham Peak 12531
Three Sisters Peaks
Granite Peak 12147
Slide Mtn 11114
Sheep Mtn
Frying Pan Spr
Baldy Mtn
Horse Mtn
Horse Mtn Springs
Lost Spring
Ford Spr
Middle Mtn Spring
Hotz Spring
Driveway Sprs
Devil Mtn 9922
Mesa Spr No 2
Mesa Spr No 1
Farrow Spring
Snow Spring
Mule Mtn
Cooper Can
Corral Mountain
Middle Mountain
Castle Rock
WILLIAMS CREEK CG
BRIDGE CG
Turkey Pk Spr
Pole Park Spr
Notch Spr
Martin L
Footbridge
Ice Cave Ridge
Williams Creek
Devil Creek
Dudley Cr
Coffee Cr
Horse Cr
Elk Cr
Indian Creek
Yellow Jacket Cr
Freeman Cr
Yellow Jacket Creek
Blind Gul
YELLOW JACKET
LOS PINOS 8600
LOWER PIEDRA CG
PIEDRA ROAD
FIRST FORK
PIEDRA STOCK TRAIL
DEVIL MOUNTAIN TRAIL
Second Box Can
Skunk Cr
Trout Cr
Sin Cr
Grass Cr
Medicine Cr
Death Cr
Hell Cr
Mosca Cr
Sand Creek
Little Sand Creek
Weminuche Cr
Trail Creek
Ridge
Chub Dw
Water
Gravel Pit
Burro Park
Little
Sand
Fork
East
West
Mosca
Cr
Creek
Devil
Ranch
Dyke
WILDLIFE AREA

TABLE 12

Representative Ecosystems in the Piedra Wilderness Study Area and Nearby Wildernesses

Ecosystem	Piedra WSA	Weminuche Wilderness	South San Juan Wilderness	Lizard Head Wilderness	La Garita Wilderness
Alpine	None	Common	Common	Common	Extensive
Subalpine	None	Common	Common	Common	Common
Spruce-fir	Common	Common	Common	Uncommon	Common
Douglas-fir	Extensive	Uncommon	Uncommon	Uncommon	Uncommon
Aspen	Common	Uncommon	Uncommon	Uncommon	Uncommon
Ponderosa pine	Uncommon	Uncommon	None	None	None
Lodgepole pine	None	None	None	None	Uncommon

KEY
Extensive - Type occurs on more than 50 percent of the area.
Common - Type occurs on 10 to 40 percent of the area.
Uncommon - Type occurs on less than 10 percent of the area.
None - Type does not occur in area.

GEOLOGY

The geological setting of the Piedra Wilderness Study Area (WSA) consists of a sequence of sedimentary rock layers overlying a Precambrian basement of granite and quartzite. One major and several minor northwest-trending faults cut the entire sequence of rocks. The sedimentary series of rocks is made up of about 2,600 feet of limestones, sandstones, siltstones and shales ranging in age from Cambrian to Early Cretaceous. The sequence is exposed in several canyons, most notably that of the Piedra River. Portions of the Piedra canyon floor contain exposures of the Precambrian granite and quartzite; most canyons have been cut into the lowest sedimentary formation overlying the Precambrian rocks and are enclosed by walls of limestone ledges and slopes of softer rock and soil. Areas between the stream valleys consist of moderate to steep slopes and ridges, capped by hard sandstone in the northern part of the WSA and topped by less resistant sandstone and siltstone to the south. Slopes throughout the WSA are unstable and

subject to failure ranging from rockfall in most of the area to landslides, mudslides, and soil creep in small, particularly hazardous areas. There are no known intrusive igneous rocks or volcanic rocks within the WSA.

SOILS

Soil productivity varies considerably within the WSA as a function of landform, slope, and parent material. The Soil Survey of the Piedra Area, Colorado, (Bauer, R.F. USDA Soil Conservation Service and Forest Service, April, 1981) has identified three major soils series comprising about 75 percent of the Piedra WSA. These are:

The Carracas Soils - These soils occur mainly in the southern portion of the area, on ridge tops and steep canyon sideslopes. They are medium textured, forming from materials weathered from the interbedded shale and sandstone of the area. These soils have low inherent fertility level and are not very productive from a range or timber standpoint. Due to slope and runoff characteristics, they will erode easily if disturbed. They will not vegetate readily due to low fertility levels and the low rainfall zone in which they are found.

The Chris Soils - These soils make up a major portion of the area and occur on the steep canyon sides in the central and northern portions of the unit. They are deep soils with gravely or stony loams over clayey textured subsoils. Depth to sandstone or shale varies from 40 to 80 inches. They also are forming from shales and sandstones in the area. These soils have limited timber productivity. Neither are they very productive from a range standpoint. Erosion hazard is high, and most importantly, these soils are prone to mass slumping and sliding.

The Dunton Soils - These soils occur on the lesser sloping upland areas. They are moderately deep, medium to fine textured soils that have developed over sandstone. Depth to hard sandstone bedrock varies from 30 to 40 inches. These soils are fairly productive from a timber and range standpoint. Erosion is usually not a serious problem, but these soils are easily compacted when wet. They have a high windthrow hazard and reforestation can be rather difficult.

Included among the soils described above are bare rock outcrops of shale, sandstone, and interbedded shales and sandstones. These areas are typically on extremely steep slopes and support little or no vegetation.

SOCIAL AND ECONOMIC SETTING

The Piedra Wilderness Study Area is within the Pagosa Human Resource Unit (HRU), one of three areas of analysis within the area of social and economic influence of the San Juan National Forest. A Human Resource Unit is an area characterized by particular patterns of lifestyles, economic conditions, institutional arrangements, and topography. HRU's vary in size but are typically larger than individual towns and communities, and they may cross political jurisdictions.

The Pagosa HRU contains portions of Hinsdale and Mineral Counties, and virtually all of Archuleta County. Archuleta County's population grew by 33 percent between 1970 and 1980, from 2,733 to 3,631. State projections call for the population to double by the year 2010. Employment in the area is primarily in ranching, logging, retail trade and tourism sectors; therefore, much of this employment is seasonal. Unemployment, a chronic problem, was nearly 12 percent in 1980. The average per-capita income in Archuleta County in 1980 was $5,222.

Lifestyle - The predominant lifestyle in the Pagosa HRU is characterized by its rural mountain setting, with many of the residents dependent on the National Forest for part or all of their livelihoods. Ranching, logging and tourism, including outfitter-guide operations, are all occupations closely associated with management of the Forest. Many newer residents of the HRU are either retirees or "emigrants" from urban areas who moved to the area specifically to enjoy the rural mountain lifestyle. These newer residents tend to be more oriented toward recreational uses of the National Forest rather than toward commodity production.

Attitudes, Beliefs, and Values - Public awareness of the recreational environment of the National Forest is increasing with immigration to the area. There is a changing public attitude toward protecting and preserving rather than developing and using Forest resources such as timber, forage and minerals. In the future, direct conflicts can be anticipated between those who hold "preservation" attitudes and those who believe resources should be developed to meet local income and employment needs.

Social Organization - While most of the community services found in other areas are available in the Pagosa HRU, rapidly rising populations are placing strains on school systems, medical facilities, street and road maintenance, and law enforcement capabilities.

Population and Land Use - Until a few years ago, Hispanics constituted a majority of Archuleta County's population. Recent population growth has changed this mix, but the Hispanic influence is still extremely strong. Population growth has created a significant shift in land uses, with increasing conversions of ranchland into housing subdivisions and resorts.

RESOURCE AND SUPPORT ELEMENTS

RECREATION

Dispersed Recreation

Developed recreation within the area is non-existent as there are no structures and no developments other than 55 miles of trails. Dispersed recreation use is light. Current use, which is approximately 6,100 recreation visitor days (RVD's) annually over the 41,500 acre area (0.15 RVD's per acre per year) is low compared to nearby wildernesses and dispersed recreation areas in the San Juan National Forest.

Recreation activities include big game hunting, fishing, hiking, horseback riding (with associated camping), viewing scenery, nature study, and cross-country skiing. Other activities occur in limited amounts, including river rafting, kayaking, and motorcycle riding on trails.

The Piedra WSA has 21,700 acres available for primitive recreation opportunities and 19,800 acres available for semi-primitive non-motorized opportunities. Current use is approximately 12 percent of capacity.

Visual Resource

Visual resources of the area are moderately varied resulting from the preponderance of broad slopes and valleys with lateral canyons. Aspen and other vegetation form colorful displays during the fall that add contrast among dark spruce and fir. The Piedra River Canyon contains a variety of rapids, pools, and small waterfalls and constitutes the outstanding visual feature of the area. Water is clear with a high degree of clarity except following heavy rains. About 10 percent of the WSA can be characterized as having distinctive or outstanding scenic quality. The remainder is common and similar to the landscape characteristics of the surrounding area.

Cultural Resource

Although no extensive cultural resource surveys have been undertaken in the WSA, one significant archaeological site, an aboriginal camp, has been identified. Other camps may be discovered in the area although it is unlikely that finds will be numerous or that any structural ruins exist. The area was apparently not desirable for permanent settlement by native peoples. No important historic properties are known to exist either within or in the vicinity of the WSA. Generally, the area is considered to be of low historical interest.

The WSA is situated in the historic territory of the Ute Indians, but archival research and contacts with members of the Southern Ute and Ute Mountain Ute Tribes have failed to identify any specific sites important to the Ute peoples.

WILDERNESS

The Piedra WSA is primarily natural in character. There are no major "imprints of man" that would require rehabilitation. Portions of the area have been used for grazing of livestock, but this is not evident to the casual observer. The area provides opportunities for primitive recreation at elevations between 6,800 and 10,500, far lower than most designated wildernesses in Colorado. The WSA also has numerous broad slopes with open parks, and many streams which are attractive to fishermen, hunters, horseback riders and hikers. Many opportunities for solitude exist, although along the Piedra or Sand Creek Trails use can be heavy at times.

FISH AND WILDLIFE

Big Game

Big game species within the area include elk, mule deer, black bear and mountain lion. Primary use is for spring-summer and fall range. However, isolated south and west facing slopes are used as winter range by deer and elk, especially during years of light snowfall. Many of the open points and ridges are considered suitable elk calving areas by the Colorado Division of Wildlife. The area includes an important migration corridor between summer and winter range for deer and elk.

Small Game

Small game species occupying the area include cottontail rabbit, band-tailed pigeon, snowshoe hare, and blue grouse. Low-elevation pine areas provide habitat for Abert's squirrel, and the area is well populated with them. Turkeys have been reported on First Fork Creek, and mallard and cinnamon teal ducks are occasionally observed.

Non-game and Furbearers

Various song birds, raptors, and small mammals are common. Observed species include chipmunk, pine squirrel, ground squirrel, badger, coyote, weasel, porcupine, pine marten, marmot, bobcat, raven, gray jay, mountain bluebird, beaver, and water ouzel.

Threatened and Endangered Species

There are no known federally-listed threatened or endangered species presently occupying the unit. River otter, a species listed by the State of Colorado as threatened, was reintroduced in 1978. The initial transplant site was at the mouth of Sand Creek on the Piedra River which lies within the WSA. Reintrodution plans call for continuing transplants. Acceptable habitat is located along the Piedra River and most of the larger tributary streams. A limited amount of grizzly bear habitat exists, although there is generally not enough wet feeding areas for good quality habitat. One possible nesting site for peregrine falcon exists at the south end of the WSA, but it is presently unoccupied.

Suitable habitat for wolverine, another species listed as threatened by the State of Colorado, also exists within the area, although no confirmed sightings have been reported.

Fish

The Piedra River and its major tributaries within the WSA provide cold water fish habitat ranging from fair to excellent quality. Included are cutthroat, rainbow, brown, and brook trout, although not generally in mixed populations.

In addition, the Piedra River contains non-game fish, including dace, sculpin, and suckers. Tributaries of First Fork Creek support the Snake

River variety of cutthroat trout. Although several streams in the area contain habitat suitable for natural reproduction, periodic stocking is necessary to maintain fishable populations under present harvest regulations.

RANGE

Cattle and recreation horses graze approximately 70 percent of the area, with concentrations of grazing areas along drainages and bottoms. Most range is in satisfactory condition. There are nine spring developments and four miles of drift fences in the southern half of the area. Current livestock grazing is 2,860 animal unit months per year, and occurs on portions of five different allotments. Four of these are cattle allotments and one is a sheep allotment, which is currently vacant. Of the cattle allotments, three are intensively grazed (deferred and rest-rotation systems) and one is extensively grazed under a continuous grazing system.

TIMBER

Of the 41,500 acres within the WSA, 40,018 acres or 96 percent is classified as "capable" of timber production. Capable forest land is defined as land having the biological growing potential to produce at least twenty cubic feet of wood per acre per year. Ninety-five percent of the capable timber land is sawtimber. Productivity of this land ranges from average to below average for the Forest, and no harvesting has taken place in the WSA. The predominant timber type is Douglas-fir which covers 52 percent of the capable forest land. The distribution by timber type and size class is shown in Table 13.

TABLE 13

Acres Capable of Timber Production by Type and Stand Size Class

Timber Type	Stand Size Class: Non-stocked	Seedling/ sapling	Pole timber	Saw-timber	Total
Ponderosa pine	37	-	295	692	1,024
Spruce-fir	-	7	1,604	5,453	7,064
Douglas-fir	-	-	258	20,728	20,986
Aspen	-	-	-	10,944	10,944
Total	37	7	2,157	37,817	40,018

The current inventory on capable forest lands is 89.9 million cubic feet or 309 million board feet of timber. Most volume is in the Douglas-fir type. The distribution of inventory volume is shown in Table 14.

TABLE 14

Inventory Volume by Timber Type

Timber Type	Million Cubic Feet	Million Board Feet
Ponderosa pine	1.5	4.1
Spruce-fir	23.7	90.2
Douglas-fir	43.8	186.2
Aspen	20.9	28.5
Total	89.9	309.0

Capable forest land occurs on all slopes, although over half (52 percent) occurs on 30 to 60 percent slopes. This breakdown is shown in Table 15.

TABLE 15

Capable Forest Land Acres by Type and Slope Class

	Slope Class			
Type	Less than 30%	30 - 60%	More than 60%	Total
Ponderosa pine	70	907	47	1,024
Spruce-Fir	2,513	4,462	89	7,064
Douglas-fir	7,683	9,953	3,350	20,986
Aspen	4,735	5,350	859	10,944
Total	15,001	20,672	4,345	40,018

WATER

Water Yield

Water yield is estimated at 41,500 acre-feet on an average annual basis or one acre-foot/acre/year. All of this water drains into the Piedra River which flows through the WSA. Primary tributaries of the Piedra River within the WSA include First Fork, Sand Creek, Sheep Creek, and

Indian Creek. Although the Piedra River is the major river of the WSA, a major portion of its flow is generated from tributaries upstream from the WSA. Consumptive water uses within the WSA include water developments for domestic livestock and wildlife. Non-consumptive uses of water include fishing, river floating, and maintenance of aquatic and riparian habitat. Outside of the Piedra WSA, upstream and downstream uses of water from the Piedra River include pasture irrigation, livestock and wildlife drinking, and domestic home use. Non-consumptive uses include fishing and aquatic-riparian habitat maintenance.

Water Quality

Water quality within the Piedra WSA was monitored during 1975 in preparation for the Piedra Wild and Scenic River Study (Sullivan, Water Quality Survey of the Piedra River, San Juan National Forest, p. 69, 1975). Data from 17 stations (six in the WSA) indicate good to excellent water quality and compliance with State of Colorado water quality standards.

MINERALS

Mining and Mineral Leasing Activity

Mining and mineral leasing activity in the Piedra WSA is at relatively low levels. Table 16 summarizes current mineral activity.

TABLE 16

Current (As of April 30, 1982) Mineral Activity

Activity	Number	Acres
Patented Mining Claims	0	0
Unpatented Mining Claims	12	240
Producing Sites or Known Reserves	0	0
Federal Oil & Gas Lease Applications	5	1,024
Federal Oil & Gas Leases	0	0

Unpatented mining claims located between 1966 and 1968 may contain uranium deposits. About 1,000 acres in the extreme southern tip of the WSA and about 25 acres along the western edge are presently under application for Federal oil and gas leases. Five lease tracts have been applied for but no leases have been issued and no geophysical exploration activity has been proposed.

Mineral Potential

The potential for significant development of locatable and leasable minerals in the WSA is relatively low. This is evidenced in part by the low level of exploration activity taking place. Table 17 summarizes the initial assessment of potential for locatable and leasable minerals in the WSA.

TABLE 17

Potential for Locatable and Leasable Minerals

Area Rated As Having High/Moderate Potential for:	Acres	Percent of Study Area
Locatable minerals	910	2.2
Leasable minerals	1450	3.5

This assessment of relatively low potential is substantiated in the preliminary open file of the U. S. Bureau of Mines 1983 mineral investigation report which concludes: "In the Piedra Wilderness Study Area, no mineral resources were identified by Bureau of Mines personnel during their field investigation."

Of the locatable and leasable minerals occurring within the area, those most likely to be economically recoverable include uranium, oil and gas, limestone, gravel, and geothermal resources. Uranium may occur in sandstones and limestones along the north, east, and southeast edges of the WSA. The most probable areas are located in the north, where present mining claims are staked, and to the southeast, just outside the WSA boundary.

The potential for oil and gas exists in the southern portion of the WSA. Four lease applications are pending on the southern portion and one on the western boundary of the WSA. No drilling or geophysical exploration activity has been undertaken.

Both limestone and stream gravel aggregate may represent recoverable resources although the quality and extent of these materials have not been evaluated and no interest in exploration for these resources has been shown to date. Potential for geothermal resources exists at First Box Canyon on the Piedra River along the WSA boundary, although no interest in study or exploration has been evidenced.

LANDS

Lands Ownership

All lands within the 41,500-acre Piedra WSA are Federal lands administered by the U. S. Department of Agriculture, Forest Service. All surface and mineral rights are owned by the United States.

Special Land Uses

Although there are no improvements under special land use permit, there are several outfitter-guide permits for the area. These fall under the category of recreation-type permits and provide a long-established use on the Piedra WSA. These permits are the source of livelihood for several local residents, and provide a needed service in the area. They are distributed fairly evenly throughout the WSA.

Power Withdrawals

A power withdrawal (Power Site Classification No. 357 - withdrawn October 24, 1944) occurs within the WSA along the length of the Piedra River. It encumbers approximately 2,200 acres. No further action has been taken since the withdrawal, and there is little likelihood of development taking place. The Federal Energy Regulatory Commission is scheduled to review this withdrawal for possible revocation within the next three years.

Proposed Impoundments

A potential hydroelectric site exists in the First Box Canyon of the Piedra River and has the capacity for generating 40,000,000 kilowatt hours annually (USDI-Bureau of Reclamation, O'Neal Park Project-Colorado, Reconnaissance Report, p. 2, 1956). Costs determined at the time of the USDI report indicated a benefit/cost ratio of 0.86/1. No further action has been taken since the reconnaissance report which established the project. A letter from the Federal Energy Regulatory Commission confirms that no plans exist for development of the First Fork hydroelectric site. This document is available for review in the Forest Supervisor's office in Durango.

FACILITIES

There are nine livestock water developments in the Piedra WSA consisting of small spring developments. There are also a total of four miles of barbed wire drift fences for livestock management purposes.

Approximately 55 miles of trails are located within the WSA. The official names and numbers of these are listed as follows:

Trail Name	Number
Baldy Mountain Trail	536
Coldwater Stock Trail	598
Coldwater Trail	597
First Fork Trail	538
Indian Creek Trail	588
Piedra Trail	596
Sand Creek Trail	593
Sheep Creek Trail	599

Access to the Piedra WSA from the south is provided via the First Fork Road (Forest Road 622) and First Notch Road (Forest Road 620), both of which come within one-fourth mile of the boundary. Access from the north is provided via Piedra Road (Forest Road 631) and Sand Creek Bench Road (Forest Road 642), both of which come within one-eighth mile of the boundary.

PROTECTION

Air Quality

The Piedra Wilderness Study Area is designated as a Class II air quality area. This classification allows only moderate degradation over base-line concentrations of sulfur oxides and particulate matter.

Fire

Fire has always been a natural component of the ecosystems in the area. A naturally occurring fire regime has the effect of reducing fuels, maintaining wildlife habitat diversity, creating browse, and preventing the attainment of climax vegetation across large areas of land. In recent years, natural fires have generally been excluded from the area by intensive control and suppression efforts. In 1956, the First Fork fire burned 1,200 acres and in 1943, the Coffee Creek fire burned 135 acres, but since then, there have been no major fires. Most fires result from lightning strikes and are controlled at less than 10 acres in size.

ALTERNATIVES AS THEY RELATE TO THE PIEDRA WSA

Six separate alternatives concerning the suitability or unsuitability for wilderness designation of the WSA were incorporated within the ten alternatives considered in detail in the Forest Plan EIS. One WSA alternative is a suitable recommendation for wilderness designation of the Piedra WSA which is included in Alternatives A, E, G, H, and I. The others are a no action alternative (Alternative F) and four unsuitable for wilderness alternatives (Alternatives B, C, D, and J). The no action alternative maintains the qualities of the area which make it possible for inclusion in the National Wilderness Preservation System without a determination as to its suitability or unsuitability. The other four are resource development alternatives which emphasize unique combinations of market and non-market commodities.

The Wilderness Act of 1964 provides that all components of the National Wilderness Preservation System will be withdrawn from mineral entry on December 31, 1983. Additionally, the legislative history of the Colorado Wilderness Act of 1980 indicates that there is no intention to extend that date (Congressional Record, June 30, 1980, pages S9000-S9001). It was, therefore, assumed in both the alternative formulation and the analysis that the WSA would be withdrawn from mineral entry if and when it was designated wilderness by Congress.

Table 18 shows acres by each management area prescription for each alternative. Full descriptions of each prescription are found in Chapter III of the Forest Plan. The areas to which the management prescriptions are applied in the respective alternatives are shown on maps in the back of this document.

ALTERNATIVES A, E, G, H, AND I - SUITABLE FOR WILDERNESS DESIGNATION

Alternatives A, E, G, H, and I recommend to Congress that the Piedra WSA, in its entirety, is suitable for inclusion in the NWPS. Total area recommended as suitable is 41,500 acres.

Under the suitable alternatives, 30,940 acres would be managed for pristine wilderness opportunities under the prescription for Management Area 8A. This prescription emphasizes protection and perpetuation of pristine biological and physical conditions and a high degree of solitude. Evidence of past human use is not perceptible.

On 9,920 acres the WSA would be managed for primitive wilderness opportunities under the prescription for Management Area 8B which emphasizes protection and perpetuation of essentially natural biological and physical conditions. On-site regulation of recreation use would be minimal, and travel would either be cross-country or over a low-density constructed trail system.

On the remaining 640 acres, management would be for semi-primitive wilderness opportunities under the prescription for Management Area 8C, which also emphasizes protection and perpetuation of essentially natural biological and physical conditions. Solitude and the absence of any evidence of past use are not essential ingredients in these areas. Human travel would be principally on system trails.

All resource management activities would be integrated so that evidence of current use, including permitted and recreation livestock, would not be noticeable the following season and so that natural biological processes would not be adversely or permanently changed by human use.

ALTERNATIVE F - NO ACTION

This alternative continues current management on the WSA by maintaining the qualities of the area which make it possible for inclusion in the NWPS. This accommodates the requirements of the Colorado Wilderness Act

TABLE 18

Piedra WSA Acreage Allocation by Management Area Prescription for Each Alternative

Management Area Prescription	Emphasis	Alternatives					
		A, E, G, H, and I (Suitable)	F (No Action)	B	C (Unsuitable - Resource Development)	D	J
2A	Semi-primitive motorized recreation opportunities			1,899		6,250	18,716
3A	Semi-primitive non-motorized recreation opportunities				28,087		12,815
6B	Livestock grazing			495		2,095	6,607
7B1	Wood-fiber production and utilization through improved genetic stock			11,322	1,390	6,894	
7C	Management of forested areas for wood-fiber production and utilization on steep slopes			5,888	4,420	3,099	
7E	Management of forested areas for wood-fiber production and utilization on gentle slopes			5,707	4,241	3,915	
8A	Pristine wilderness opportunities	30,940					
8B	Primitive wilderness opportunities	9,920					
8C	Semi-primitive wilderness opportunities	640					
N/A	Maintenance of the qualities of an area which make it possible for inclusion in the National Wilderness Preservation System		41,500				
9A	Riparian areas			1,356	1,356	1,356	1,356
9B	Increased water yield			12,827		15,885	
10D	Wild and Scenic River corridors			2,006	2,006	2,006	2,006
Total		41,500	41,500	41,500	41,500	41,500	41,500

that the wilderness potential of the Piedra WSA be maintained until Congress acts on the Administration's recommendation regarding the suitability or unsuitability of the area. Emphasis would be on perpetuating natural conditions. Primitive recreation experiences would be provided throughout most of the area, although motorized use would be permitted as long as the wilderness potential is not jeopardized. Management activities would be carried out without leaving any permanent or long-lasting evidence. No permanent structures would be allowed other than corrals, fences, and water developments.

RESOURCE DEVELOPMENT ALTERNATIVES (UNSUITABLE)

Under four alternatives (Alternatives B, C, D, and J), the WSA is managed to provide a mix of market and non-market outputs. These alternatives recommend the WSA as unsuitable for wilderness designation and allow resource development which may be incompatible with wilderness values. On the Piedra WSA, there is rather significant difference between the four resource development alternatives because the terrain, vegetation, and potential access to the area allows a variety of management area prescriptions to be applied. The four alternatives discussed below cover a wide range of resource development possibilities.

Alternative B

Alternative B is the maximum resource development alternative on the WSA and has a high emphasis on market outputs. This is reflected in the allocation of management area prescriptions shown in Table 18. Over half of the WSA is allocated to management area prescriptions emphasizing wood-fiber production (Management Areas 7B1, 7C, and 7E). This would involve development of a transportation network over a significant portion of the WSA which would provide access for a variety of Forest uses, including livestock grazing, hunting, fishing, rafting, firewood gathering, and motorized recreation. On approximately 30 percent of the WSA, emphasis would be placed on increasing water yield through vegetation treatments, including commercial timber harvesting (Management Area 9A). The remainder of the area (approximately 15 percent) would be managed for a variety of emphases including riparian area protection, semi-primitive motorized and non-motorized recreation, and Wild and Scenic River Corridor protection.

Alternative C

Alternative C emphasizes a mixture of market and non-market outputs, and this is reflected in the allocation of management area prescriptions shown in Table 18. Approximately two-thirds of the WSA is managed for semi-primitive non-motorized recreation opportunities (Management Area 3A).

A variety of opportunities such as hiking, horseback riding, hunting and cross-country skiing would be available on these lands. Vegetation treatment activity would be low and management activities would not be visually evident or would remain visually subordinant. Investments in

livestock grazing would be permitted and timber harvests would occur only to enhance visual quality or diversity and for insect and disease control. All roads would be closed to public use.

Approximately one-fourth of the WSA would be managed for the production of wood fiber (Management Areas 7B1, 7C, and 7E). A variety of silvicultural systems would be applied, depending on slope class and timber species. Development of a transportation system would take place on part of the WSA to access timber stands, and this would also provide access for additional Forest uses including livestock grazing, hunting, fishing, rafting, firewood gathering, and motorized recreation.

The remaining 10 percent of the WSA is mainly riparian ecosystem on which protection and management of the Wild and Scenic River Corridor would be emphasized.

Alternative D

Alternative D emphasizes production of market outputs such as timber and livestock grazing under conditions of reduced administrative regulation and oversight and reductions in budget levels ranging from 15 to 25 percent during the first five decades. This translates into the allocation by management area prescriptions shown in Table 18. Alternative D is the second highest resource development alternative, although it actually emphasizes a balanced mix of market and non-market outputs.

Approximately a third of the area would be managed with emphasis on wood-fiber production. This would involve applying a variety of silvicultural systems on lands of different slope and vegetative type. Treatment of vegetation would be designed to achieve a variety of multiple use objectives. A transportation network would be developed over portions of the WSA, thus allowing access for timber, grazing, and a variety of recreational uses.

On an additional one-third of the area, prescription for Management Area 9B would be applied. Emphasis would be on increased water yield through commercial timber harvest and other vegetation treatment.

On one-fifth of the area, emphasis would be upon providing semi-primitive motorized and non-motorized recreation opportunities (Management Areas 2A and 3A). A variety of recreation opportunities would be provided both for motorized uses such as off-road vehicles (ORV's) as well as for hiking, fishing, hunting, and cross-country skiing. Investments in market outputs would be lower than elsewhere on the WSA.

The remainder of the area would be managed for riparian and Wild and Scenic River corridor protection.

Alternative J

Alternative J is an output alternative which emphasizes market outputs having potential to produce income to the United States Treasury. On the WSA, this emphasis is not necessarily reflected in the allocation as

75 percent of the area is managed for semi-primitive motorized and non-motorized recreation opportunities (Management Areas 2A and 3A). Only a portion of the area would be managed for wood-fiber production, and therefore development of a transportation system would be limited. Recreation opportunities provided would include hiking, fishing, hunting, use of trail bikes and ORV's. Access by automobile would be limited.

Approximately 15 percent of the area would be managed for livestock grazing (Management Area 6B). Intensive grazing systems would be used, combining both structural and non-structural improvements to enhance forage production and utilization. Roads would be constructed mainly to accommodate this use although other resource uses would also be allowed.

The remainder of the area, less than 10 percent, would be managed to maintain and protect riparian areas as well as the Wild and Scenic River corridor.

RESOURCE ENVIRONMENTAL CONSEQUENCES

This section describes environmental consequences as they relate to individual resources. All alternatives are discussed in the narrative, although only Alternatives A, E, G, H, and I (suitable), Alternative F (no action), and Alternative B (the alternative which would have the maximum resource development on the WSA) are compared in tables and in the economic analysis. These "comparison" alternatives serve to articulate the full range of outputs and environmental consequences resulting from any alternative.

RECREATION

Under Alternatives A, E, G, H, and I, which are suitable recommendations to Congress, the WSA would be managed for pristine wilderness opportunities on 30,940 acres, for primitive wilderness opportunities on 9,920 acres, and for semi-primitive wilderness opportunities on 640 acres. The WSA could theoretically accommodate 54,000 recreation visitor days (RVD's) of wilderness recreation per year while still meeting desired wilderness experience objectives and protecting wilderness resource values. The WSA's relatively easy access from U. S. Highway 160 would draw visitors for trips of one day or less as well as for longer periods. The coniferous forest cover that characterizes the WSA and the well distributed trail system would provide opportunities for a high degree of solitude and low levels of contact with other visitors. Recreation activities would include hunting, fishing, backpacking, hiking, horseback riding, viewing scenery and rafting on the Piedra River.

Under Alternative F, the no action alternative, the WSA would be managed for semi-primitive non-motorized recreation opportunities on approximately 31,500 acres, and for semi-primitive motorized recreation opportunities on approximately 10,000 acres. Theoretically, the area could accommodate 58,000 RVD's of dispersed recreation use annually. Motorcycle use along trails would be permitted to continue where such use now

occurs. All recreation use of the WSA would be controlled if maintenance of wilderness qualities were jeopardized. Other recreation activities similar to those under Alternatives A, E, G, H, and I would occur.

Alternative B provides for maximum resource development. Under this alternative the WSA would be managed for semi-primitive non-motorized recreation opportunities on approximately 2,006 acres of the Piedra Wild and Scenic River Corridor, for semi-primitive motorized recreation opportunities on approximately 1,899 acres, and for roaded natural recreation opportunities on approximately 37,595 acres. The theoretical recreation capacity of the WSA as a result of this form of management would be approximately 278,000 RVD's annually. Major uses would include road oriented recreation, particularly for big game hunting, fishing, camping and viewing scenery. Motorcycle use and snowmobiling would occur along both roads and trails. There would still be opportunities for hiking, backpacking, horseback riding, and cross-country skiing, as well as for rafting and kayaking on the Piedra River. Some user conflicts between these semi-primitive forms of recreation and road oriented recreation could develop under Alternative B.

Alternative D would provide for a theoretical annual recreation capacity slightly lower than that of Alternative B; however, the types of recreation opportunities and predicted levels of use would be approximately the same due to similarities in road development. Alternative J would provide for approximately one-fourth of the theoretical capacity of Alternative B, and would result in the largest acreage managed for semi-primitive motorized recreation opportunities of any alternative. Types of uses would be more nearly those of Alternative F, but predicted use levels would be between those of Alternatives D and F. Alternative C would provide for a theoretical capacity nearly equal to that of Alternative F; however, the predicted levels of use would be slightly higher than those under Alternative F due to a moderate amount of roaded natural opportunities provided under Alternative C.

Table 19 compares the predicted recreation use for the "comparison" alternatives. While Alternative F results in predicted levels of use only slightly higher than those of Alternatives A, E, G, H, and I (suitable), the predicted use under Alternative B is nearly three times as great as that of the suitable alternatives in the latter years of the 50-year period. This is due to the easy access and greater variety of recreation opportunities provided by the roads associated with the maximum resource development that would occur under Alternative B. Over 90 percent of the area would be managed for roaded recreation opportunities under Alternative B. Alternative F would provide for nearly one-fourth of the area being managed for semi-primitive motorized recreation, and this would result in predicted use levels slightly higher than those of Alternatives A, E, G, H, and I.

Cultural and Historic Resources

Although one significant cultural site has been identified in the WSA, the potential for other significant cultural and historical sites to exist in this area is low. Therefore, environmental consequences on these resources should be limited under all alternatives.

TABLE 19

Predicted Recreation Use by Alternative in Thousand Recreation Visitor Days

Alternative	1980	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
A, E, G, H, and I (suitable)		8.0	9.0	12.0	14.0	17.0	20.0
F (no action)	6.1	8.0	10.0	13.0	15.0	19.0	22.0
B (unsuitable - maximum resource development)		8.0	12.0	20.0	30.0	42.0	56.0

Under Alternatives A, E, F, G, H, and I, resources would not be subject to potentially damaging resource development and potential adverse consequences would be extremely low. Management activities such as road construction under Alternatives B, C, D, and J have the potential to damage these resources; however, the probability of adverse consequences would be low because of the limited potential for significant sites to exist.

There are no known effects on Native American religious values under any alternative.

Visual Resource

Under Alternatives A, E, F, G, H, and I, the natural landscape character would be maintained primarily by natural ecological forces. The visual quality objective of preservation would be prescribed for the area to assure naturalness.

Under Alternative B, the maximum resource development alternative, various management practices could impact the existing visual quality on approximately 37,595 acres, or about 90 percent of the WSA. For example, road construction would be required for vegetation treatment and the vegetation treatment itself would alter the visual quality. Mitigation measures described in the Forest and Management Area Direction (Chapter III of the Forest Plan) would keep the impacts within the visual quality objectives for the area. Under the other unsuitable alternatives, the effects of Alternative D would be similar to those of Alternative B, although slightly fewer acres would have the potential for vegetation treatment. Alternative J provides for vegetation treatment and road building on acreage approximately two-thirds that of Alternative B, and Alternative C provides for such activities to occur on acreage approximately one-third that of Alternative B. Alternatives C and J would therefore have proportionately less adverse effects on the visual resource than Alternative B.

Mineral development of valid mineral claims and leases under all alternatives could result in localized site degradation and in landscape alteration. Mitigation measures described in the Forest and Management Area Direction would keep these impacts at a level commensurate with the form of management prescribed under all alternatives.

WILDERNESS

The entire Piedra WSA has been managed to retain its wilderness character since its designation as a WSA. The proximity of the WSA to a major, heavily traveled highway, and to a major southwest Colorado population center, would provide access to additional wilderness opportunities under Alternatives A, E, G, H, and I, in an area where localized portions of existing wilderness are being heavily used.

Under Alternatives A, E, G, H, and I, all current motorized recreation use would be prohibited, and mineral exploration would not be permitted subsequent to the area's designation as wilderness.

Under Alternative F, the no action alternative, mineral exploration would be permitted to continue on the entire area after December 31, 1983. Road building associated with mineral development could adversely affect the natural integrity, apparent naturalness, and the opportunities for solitude and primitive recreation which presently characterize the area. The loss of these attributes would lower the area's potential for future wilderness designation. Mineral exploration and development opportunities and consequences are more fully described in the Minerals section of this chapter. Under this alternative, a relatively minor amount of motorcycle and snowmobile use would continue to occur on approximately 10,000 acres within the area. This semi-primitive motorized recreation use would not of itself result in a loss of wilderness attributes, and would not lower the area's potential for future wilderness designation. Management of the remaining 31,500 acres for semi-primitive non-motorized recreation would maintain wilderness attributes on that portion of the area.

Under Alternative B, the maximum resource development alternative, the potential effects of mineral development and associated road building would be similar to those under Alternative F. In addition, vegetation treatment activities, and roads associated with such activities, could occur on approximately 37,595 acres. Such activities would have a significantly adverse effect on the natural integrity, apparent naturalness, and on the opportunities for solitude and primitive recreation that now characterize the WSA; therefore, the potential for future wilderness designation would be reduced on that portion of the WSA. Management of the remaining 3,905 acres for semi-primitive recreation opportunities would likely maintain wilderness attributes on that portion of the area.

Under Alternative D, these consequences on the area's potential for future wilderness designation would be similar to those of Alternative B, but slightly less adverse. Alternative D provides for vegetation treatment with roads which would result in a potential loss of

wilderness attributes on approximately 33,244 acres. Semi-primitive non-motorized recreation opportunities would be provided on about 8,256 acres.

Under Alternative C, approximately 30,093 acres, or about 73 percent of the area, would be managed for semi-primitive non-motorized recreation. Under Alternative J, approximately 14,821 acres, or about 36 percent of the area, would be managed for semi-primitive non-motorized recreation. The attributes of natural integrity, apparent naturalness, and opportunities for solitude and primitive recreation which currently characterize the WSA would probably would not be adversely affected on these areas. Vegetation treatment would occur only to enhance visual quality or diversity, and for insect and disease control.

In summary, the no action and unsuitable alternatives (Alternatives F, B, C, D, and J) have varying potential adverse effects on wilderness attributes and subsequent reduction in the area's potential for future wilderness designation. Ranked in order from most adverse to least adverse affects, they are B, D, J, C, and F.

WILDLIFE

As a general rule, the more human activity or development in an area, the greater will be the impacts on wildlife. Conversely, those alternatives having the least development or human activity will also provide the least opportunities for vegetation treatment to benefit wildlife. Under Alternatives A, E, G, H, and I, any benefits to wildlife would result from natural fire or natural succession as no treatment activities would take place. Little or no increases from present use levels in recreation and grazing would result from either Alternatives A, E, G, H, and I or Alternative F, and therefore, consequences on wildlife would be minimal.

Under all resource development alternatives, opportunities are available to use vegetation treatment, including timber harvesting and prescribed burning, to benefit wildlife. Opportunities to improve habitat are numerous in areas of productive soils, moderate slopes, and dense, relatively homogeneous tree cover that exist on the WSA. Alternative B has the largest area managed for timber production and therefore the greatest opportunities for vegetation treatment to benefit wildlife. Alternatives C and D have somewhat less area managed for timber production, whereas Alternative J has no area on which wood-fiber production is emphasized. Vegetation treatment can take place under many other management area prescriptions, including those emphasizing livestock grazing and semi-primitive recreation, although wildlife habitat improvement is most prevalent in coordination with timber management.

RANGE

Alternatives A, E, F, G, H, and I would not significantly alter the current livestock use levels of 2,860 animal unit months (AUM's) per year. Alternative B, the unsuitable alternative with maximum resource

development, would provide for vegetation treatment primarily to maintain a healthy forest cover, and this treatment would result in increased transitional livestock forage sufficiently to support 3,875 AUM's annually by the year 2030. Table 20 shows the estimated grazing use for Alternative B by time period.

TABLE 20

Estimated Grazing Use for Alternative B (Animal unit months)

	Time Periods					
	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Estimated Grazing Use	2,860	2,860	3,110	3,360	3,615	3,875

Under the other resource development alternatives, Alternative J would provide for emphasis on domestic livestock grazing on approximately 6,607 acres, and Alternative D would provide for such emphasis on 2,095 acres. The effect of Alternative J would probably be to provide slightly more AUM's per year than would be provided by Alternative B, and Alternative D would provide approximately the same amount of increased capacity. Alternative C, the remaining resource development alternative, does not provide for any specific emphasis on livestock grazing, but other vegetation treatment activities and associated road building could serve to improve useability and range condition to a capacity level between that of Alternative B and the current level. Structural range improvements could be provided under all resource development alternatives to improve utilization of the increased forage.

TIMBER

Alternatives A, E, F, G, H, and I would preclude management for timber production on the entire 41,500 acres. This timber foregone represents an opportunity cost of these alternatives.

All resource development alternatives could theoretically permit timber management on the entire 40,018 acres of capable forest land identified in Chapter III. On a portion of this area, timber harvesting would not be considered technically or economically feasible because of steep slopes, fragile soils and low timber stand volumes. Actual timber yield from the WSA would be governed by land use allocation since some management prescriptions preclude management for timber production.

Yield estimates are based on Alternative B, which represents maximum resource development. This allocation classifies 33,941 acres as suitable for timber production, which is 85 percent of the capable forest land within the WSA. Most of the suitable forest land (52 percent) is in the Douglas-fir timber type. Ninety-five percent of the suitable forest land is presently occupied with sawtimber size trees. Table 21 displays acres of suitable timber by type and size class under maximum resource development (Alternative B).

TABLE 21

Area of Suitable Timber by Type and Stand Size Class (Alternative B)

Timber Type	Stand Size Class				
	Non-stocked (Acres)	Seedling/ sapling (Acres)	Pole timber (Acres)	Saw-timber (Acres)	Total
Ponderosa pine	-	-	-	55	55
Spruce-fir	-	7	1,554	5,020	6,581
Douglas-fir	-	-	247	17,549	17,796
Aspen	-	-	-	9,509	9,509
Total Acres	-	7	1,801	32,133	33,941

Long-term sustained yield on this suitable timberland is computed from the estimated growth rate of managed stands multiplied times the number of suitable forest acres. These estimates by timber type are shown in Table 22.

TABLE 22

Long-Term Sustained Yield of Suitable Forest Land by Timber Type (Alternative B)

Timber Type	Thousand Cubic Feet Per Year	Thousand Board Feet Per Year
Ponderosa pine	2	8
Spruce-fir	355	1,420
Douglas-fir	961	3,844
Aspen	190	760
Total	1,508	6,032

Actual timber production during the first five decades under Alternative B is somewhat less than long-term sustained-yield. This is due mainly to the uneven distribution of timber size classes on suitable land. Long-term sustained-yield is estimated based on the assumption of an even distribution of size classes such that annual harvest volume closely approximates annual growth. With over 95 percent of the suitable land in the sawtimber size class, estimated harvest volume is significantly less than long-term sustained-yield. Estimated timber harvest is shown in Table 23.

TABLE 23

Estimated Annual Timber Volume for Alternative B (Million board feet)

	Time Periods					
	1981-1985	1986-1990	2991-2000	2001-2010	2011-2020	2021-2030
Estimated Annual Volume	0	2.74	4.17	4.17	4.17	4.17

By placing approximately 34,000 acres under timber management, additional non-timber benefits would also accrue. Timber harvesting results in increased forage available to both domestic livestock and wildlife, and also affords opportunities for fuels treatment for fire hazard reduction. Increased water yield is also a result of timber management. Alternatives C, D, and J represent less resource development and therefore would have less area of suitable timber as well as lower timber outputs than Alternative B.

There are additional assumptions concerning the timber volume that could be produced under the resource development alternatives. One is that, although this volume would be added to the long-term productive capacity of the Forest, it would not necessarily be immediately available for harvest. The area would require an extensive and well-planned road system. Logistics and budgetary restrictions could cause such a project to span several years or more. Also, timber estimates are not to imply that every year a fixed amount of timber would be harvested from the Piedra WSA. Harvesting could take place elsewhere on the Forest at higher levels now because at some future point, volume from the Piedra WSA would be harvested. The area represents one of the few contiguous blocks of land on the Forest heretofore uncut yet fairly accessible from a timber management standpoint.

WATER

Water Yield

Under Alternatives A, E, G, H, and I, future water management activities in the Piedra Wilderness Study Area, except for cloud seeding, would be precluded unless specific project approval is given by the President of the United States. Most snowpack management activities, such as small clearcuts, are incompatible with wilderness management. Under the resource development alternatives, the area would be available for a range of water management activities. Although the spruce-fir and aspen zones of the Piedra WSA are near the optimum elevation zone for water yield increases, the predominately southern aspect of the WSA would reduce the potential to effect significant yield increases.

Average annual water yield under Alternative B (maximum resource development) is shown in Table 24. Alternatives A, E, G, H, and I (suitable) are also shown for comparison purposes.

TABLE 24

Average Annual Water Yield (Acre-feet)

	Time Periods					
Alternatives	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
A, E, G, H, and I (suitable)	41,500	41,500	41,500	41,500	41,500	41,500
B (maximum resource developed)	41,500	41,670	42,157	42,644	43,133	43,620

The increases in water yield under Alternative B result from applying prescription for Management Area 9B on approximately 30 percent of the area plus managing for timber production on an additional 55 percent of the area. On areas having emphasis on wood-fiber production as well as on increased water yield, clearcuts in the appropriate vegetation zones would be used in conjunction with structures such as snow fences to maximize water runoff. Alternatives C, D, and J, with less combined area managed for wood fiber and increased runoff, would have somewhat lower water yields than Alternative B.

Water Quality

Under Alternatives A, E, G, H, and I (suitable) the risk of pollution caused by recreation is slightly lower than Alternative F due to higher

anticipated use in the no action alternative. The risk caused by surface disturbing activities is significantly lower. Overall water quality would be maintained at existing high levels although some localized degradation could occur from concentration of wilderness users along streams in the area. Mitigation measures could include camping restrictions and limitations on number of users.

Alternative B has increased risk of pollution caused by both recreation and surface disturbing activities such as road construction and timber harvesting. Such uses could be expected to increase sediment yield by 10 percent to 35 percent depending on the type and amount of road construction and timber harvests. Increased sediment should not necessarily be considered an unacceptable consequence; however, because through proper mitigation measures, sediment yield could be maintained within allowable limits.

Alternatives C, D, and J would have overall water quality intermediate between the suitable alternatives and Alternative B, although all resource development alternatives would be similar in this respect.

Water Uses and Water Rights

No alternative would significantly affect existing water uses. Alternatives A, E, G, H, and I would preclude development of a hydro-electric site along the Piedra River unless special approval were given by the President of the United States, although it is unlikely that such a project would ever be seriously proposed. The potential to increase water yield for downstream uses would be virtually eliminated under the suitable alternatives. Water development needs for livestock grazing could be provided for under the resource development alternatives but opportunities to do so would be limited under the suitable alternatives.

There would be no significant difference between Alternative B and the other resource development alternatives from the standpoint of water uses and rights.

MINERALS

The alternatives differ somewhat in their effects on the various stages of mineral exploration and development. Mineral exploration activities can legally take place under any alternative and may be undertaken regardless of designation, at least until the end of 1983. If an operator has adequate time to do the required exploration and is not unreasonably restricted in access and movement within the area, the feasibility of developing a mineral resource will be based on the normal costs of doing business. This will be the case under Alternatives B, C, D, F, and J. If, on the other hand, an operator foresees that there will not be time to validate claims prior to designation, or that access and movement will be severely restricted, he may be discouraged from further investment in the exploration effort. The additional costs of mitigation and restoration for exploration and development might make a feasible project uneconomical under the suitable alternatives.

Rehabilitation of disturbed sites to a condition suitable for semi-primitive, non-motorized recreation under the unsuitable alternatives would generally be feasible and reasonable. This would involve regrading, revegetating, and restoring production of the land but not necessarily restoring the original contours of the land surface. Large flat areas could remain as evidence although the area would be essentially natural in character. Rehabilitation of disturbed sites to a condition suitable for wilderness would mean restoration of natural ecosystems. In many cases, this degree of restoration is probably not technically or economically feasible in the short-term.

As of April 30, 1982, there were 12 unpatented mining claims, comprising approximately 240 acres, and 5 oil and gas lease applications, comprising approximately 1,024 acres, located on the WSA. About 2 percent of the WSA is rated as having a high to moderate potential for locatable minerals and 3.5 percent for leasable minerals. Although mineral exploration and development may legally take place under any alternative, feasibility under Alternatives A, E, G, H, and I may be limited by increased access costs as well as environmental constraints and mitigation measures required in the operating plan. There is also the possibility that mineral discoveries could be foregone following withdrawal of the WSA from mineral location and leasing.

LAND STATUS

Alternatives A, E, G, H, and I would result in withdrawal of the area from mineral entry after December 31, 1983 under provisions of the 1964 Wilderness Act. Because of this, the other alternatives would have a greater possibility of land being taken to patent under provisions of existing mining laws. None of the alternatives would have apparent effects upon special land uses in the WSA.

LANDFORM AND SOILS

Under Alternatives B, C, D, and J, a number of soil disturbing practices associated with vegetation treatment and road building activities could occur. With the steep slopes and sensitive soils (Chris and Carracas) there is a great potential for accelerated erosion. Even with mitigating measures, erosion rates could surpass tolerance level limits. Also, major disturbances could stimulate land slumps and slides on the Chris soil areas, which would increase maintenance costs on roads and cause potential increases in sedimentation. Due to the long steep slopes, soil loss due to erosion has a high probability of becoming sediment in streams.

Alternatives A, E, G, H, and I would essentially have little effect on the soils resource. Natural forces and erosion rates that are presently acting on the area would continue, and there would be no major increases in erosion or sedimentation.

PROTECTION

Air Quality

There is no evidence to indicate that selection of any alternative would impact either the current Class II air quality designation or air quality protection requirements within or without the area.

Fire

Under Alternatives A, E, G, H, and I, the suitable alternatives, fire could potentially resume its natural role in the ecology of the area. Because of the area's limited size, as well as the need to protect adjacent areas from wildfire, it would not be possible to implement a complete natural fire policy. Nevertheless, a fire management policy incorporating the use of naturally occurring fires burning within prescription could be implemented to promote a wilderness environment truly shaped by naturally-occurring phenomena. Without such a policy, wildfire occurrence and intensity would increase in the long-run due to natural accumulation of ground fuels. As the possibility of major fires increases, adjacent lands would be increasingly threatened as well. Under this alternative, transportation of personnel to fires, as well as suppression efforts, would be generally restricted to non-mechanical means. This would increase response time and enhance the likelihood of larger fires.

Under the other no action and unsuitable alternatives, a more aggressive fire management program would be in effect. The primary differences would be that the option of using mechanical means for transportation and suppression exists in areas where the terrain would permit. Increased use of the area under any alternative could increase the occurrence of man-caused fires.

Integrated Pest Management

Under Alternatives A, E, F, G, H, and I, opportunities for utilizing an integrated approach to pest management would be very limited. Prevention and control of insect and disease outbreaks using integrated pest management would be limited to those situations in which non-wilderness values on adjacent lands are threatened.

Under the resource development alternatives, opportunities would be available to coordinate pest management with other resource management activities. Chemical control of noxious weeds and removal of high risk stands through timber sales for prevention and control of insect outbreaks are examples of such activities.

VEGETATION

Under Alternatives A, E, F, G, H, and I, vegetation within the WSA would continue to be influenced mainly by natural ecological forces. Livestock grazing and dispersed recreation will continue to be the major man-caused impacts unless major mineral developments occur, which could

remove some land from production. Though reclamation can return disturbed areas to production, vegetation composition and productivity could be influenced over a long period of time due to the slow recovery of fragile alpine and sub-alpine ecosystems. Natural fire burning under prescription would perpetuate aspen vegetation.

Under all resource development alternatives, vegetation could be modified in order to improve or maintain a healthy forest cover and to improve wildlife habitat and domestic livestock range. The greatest amount of such vegetation treatment would occur under Alternative B, which provides for these activities to occur on approximately 37,595 acres. Under Alternative D, vegetation treatment activities would be provided for on 33,244 acres. Alternatives C and J would provide for vegetation treatment on significantly fewer acres; approximately 26,679 acres would be allocated to such treatment under Alternative J and about 11,407 under Alternative C.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Table 25 summarizes the environmental consequences of Alternatives A, E, G, H, and I (suitable) and the unsuitable alternative representing the maximum resource development on the WSA (Alternative B). Consequences of Alternative F, the no action alternative, are also shown as a standard of comparison.

ECONOMIC AND SOCIAL IMPACTS

ECONOMIC EFFECTS

While there is a significant difference between alternatives for the Piedra WSA, in relation to overall management of the Forest, none of the alternatives would have significant impacts either on cost-efficiency of the Forest or on the social and economic integrity of nearby residents and communities. Economic impacts of Alternatives A, E, G, H, and I (suitable) and Alternative B (maximum resource development) were estimated using a regional Input-Output (I-O) model (IMPLAN). The analysis was based on estimates of outputs in 1995 which were used to determine total income, employment, and population that can be directly or indirectly associated with resources produced on the WSA. Cost-efficiency of these same two alternatives was also analyzed to arrive at a present net value incremental from Alternative F (no action). These were based on estimating outputs and costs and discounting all dollar values to the present. Economic effects of Alternatives C, D, F, and J would be intermediate between the extremes represented by the analyzed alternatives.

Income, Employment, and Population

The IMPLAN model used to estimate effects on income, employment, and population is based on historic data and therefore is not responsive to changes in exogeneous variables such as national markets, interest rates, inflation, and other changes outside the economic impact area. Input-output models are most adapted to estimating short-term effects in

TABLE 25

Summary of Environmental Consequences (Outputs are average annual - summary of all periods unless otherwise noted)

Resource	Unit of Measure	F (No Action)	Alternatives A, E, G, H, and I (Suitable)	B (Unsuitable - Maximum Resource Development)
WILDERNESS				
Potential loss of wilderness character 1/		Very Low	None	Increased
Change in wilderness attributes 1/				
Natural Integrity		No Change	No Change	Decreased
Apparent Naturalness		No Change	No Change	Decreased
Solitude		No Change	Increased	Decreased
Primitive Recreation Opportunity		No Change	Increased	Decreased
Supplementary Attributes		No Change	No Change	Decreased
Scenic Value		No Change	No Change	Decreased
Addition to the National Wilderness Preservation System	Acres	-0-	41,500	-0-
RECREATION OPPORTUNITY				
Dispersed recreation capacity	Thousand Visitor Days 2/	58	-0-	278
Projected dispersed recreation use	Thousand Visitor Days	15.6	-0-	31.6
Wilderness recreation capacity	Thousand Visitor Days	-0-	54	-0-
Projected wilderness recreation use	Thousand Visitor Days	-0-	14.3	-0-
Area open to motorized use	Acres	10,000	-0-	39,494
FISH AND WILDLIFE				
Habitat improvement opportunities 1/		Low	Very Limited	Greatly Increased
RANGE LIVESTOCK				
Grazing use	Animal Unit Months 3/	2,860	2,860	3,364
Grazing capacity 1/		No Change	No Change	Increased
TIMBER				
Forest land capable and available for timber production	Acres	-0-	-0-	40,018
Forest land suitable for timber management		-0-	-0-	33,941
Long-term sustained yield potential	Million Board Feet	-0-	-0-	6.0
Annual sales offerings	Million Board Feet	-0-	-0-	3.3

TABLE 25 (Continued)

Summary of Environmental Consequences (Outputs are average annual - summary of all periods unless otherwise noted)

Resource	Unit of Measure	F (No Action)	Alternatives A, E, G, H, and I (Suitable)	B (Unsuitable - Maximum Resource Development)
WATER QUALITY				
Risk of pollution caused by recreation and other use 1/		No Change	Decreased	Increased
Risk of pollution caused by surface disturbing activities 1/		No Change	Decreased	Increased
WATER USES				
Feasibility of planned or proposed water developments		Not feasible at this time.	Not feasible at this time.	Not feasible at this time.
Likelihood of development of water storage facilities		Low	None 4/	Low
Effects on existing water uses		None	None	None
WATER QUANTITY				
Water yield	Acre-Feet	41,500	41,500	42,645
MINERALS				
Cost of Exploration 1/		No Change	Increased	Decreased
Likelihood of significant mineral discovery and development		Low	Low	Low
Costs of administering mineral activity 1/		No Change	Increased	Decreased
LANDOWNERSHIP				
Likelihood of future private ownership under mineral patents 1/		No Change	Decreased	No Change
PROTECTION				
Integrated pest management opportunities 1/		No Change	Decreased	Increased
SOCIAL AND ECONOMIC				
Present net value (4 percent discount rate) 5/	Thousand Dollars	N/A	-3,050	-4,397
Income 5/ and 6/	Million Dollars	Not Calculated	0.92	2.13
Employment 6/	Jobs	Not Calculated	50	120
Population 6/	Persons	Not Calculated	120	270

1/ Changes are estimated using the No Action Alternative as a basis of comparison.

2/ Recreation Visitor Day = 12 hours of recreation for one person or one hour of recreation for 12 persons or any combination thereof.

3/ Animal Unit Month = The amount of forage consumed by one mature cow or its equivalent in a one-month period.

4/ Except as provided for under authority of the President in the 1964 Wilderness Act.

5/ Expressed in terms of 1978 dollars.

6/ Based on the total estimated outputs in index year 1995 which are directly or indirectly attributed to Piedra WSA outputs and activities.

local economies, and application of the model was based on the assumption that historic relationships between forest outputs and income, population, and employment levels will remain unchanged through the year 1995.

The IMPLAN model was run based on estimated outputs from the WSA in index year 1995. Total rather than incremental outputs were used to figure the total income, employment, and population levels that are either directly or indirectly associated with resources produced on the WSA. Results are shown in Table 26.

TABLE 26

Income, Employment, and Population Associated With Total Resource Outputs from the Piedra WSA

	Alternative	
	A, E, G, H, and I (Suitable)	B (Maximum Resource Development)
Income (million 1978 dollars)	0.92	2.13
Employment (number of jobs)	50	120
Population	120	270

Under Alternatives A, E, G, H, and I, approximately 50 jobs are either directly or indirectly associated with the recreation and grazing outputs from the WSA. Recreation use would be mostly backpacking, dayhiking, hunting, and fishing, all of which support jobs in local sectors such as retail trade and lodging. Under Alternative B (maximum resource development), not only are grazing and recreation uses higher, but timber is also produced, which is associated with jobs in both the logging and sawmilling sectors. Because of these higher outputs, both income and employment associated with the WSA are more than twice as high as the suitable alternatives.

A caution is in order with respect to interpreting these data. Table 26 indicates that approximately 120 jobs are associated with outputs from the WSA under Alternative B, but only 50 under Alternatives A, E, G, H, and I. This is not equivalent to stating that if the Piedra WSA is designated wilderness, 70 jobs will be lost. One reason for this is that in the event of such designation, the short-term harvest level of the Forest will not necessarily decrease by an amount equivalent to the

estimated harvest volume from the WSA. Cutting will likely occur in different areas of the Forest to make up for the timber that would otherwise have been removed from the Piedra WSA. This volume may have to be removed from a distant area of the Forest, and this may tend to shift the geographic location of jobs within the economic impact area. But the actual total loss of jobs in the region, if any, cannot be estimated from this analysis. A similar argument can also be made with respect to recreation in that the overall number of related jobs in the region will not likely change as a result of a suitable or resource development recommendation for the WSA.

Although the effects of minerals development were not estimated, the unlikely event of significant development could impact both employment and income patterns in the area.

Cost-Efficiency Analysis

A cost-efficiency analysis was carried out to determine the effects that both wilderness designation and maximum resource development would have on present net value. This involved estimating resource outputs and costs for the suitable alternatives (Alternatives A, E, G, H, and I) and Alternative B. In order that the analysis be incremental from what would take place in the absence of a suitability or unsuitability determination, all effects are incremental from Alternative F (no action). Benefit values were the same as those used in the total alternative analysis, and both 4 percent and 7 1/8 percent discount rates were applied. Results are shown in Table 27.

The incremental PNV is negative for all alternatives under either discount rate. In Alternatives A, E, G, H, and I the non-wilderness recreation benefits foregone exceed the wilderness benefits accrued resulting in negative incremental benefits. When costs are subtracted from this negative benefit value, the resultant PNV is even more negative. Although Alternative B has positive net benefits, management costs are of such a magnitude that the PNV is even more negative than for Alternatives A, E, G, H, and I. Therefore, based on the set of outputs and costs considered in the analysis, Alternative B would lower the cost-efficiency of managing the Forest more so than the suitable alternatives.

This is qualified by the fact that certain intangible benefits and costs, for which quantification was not possible, were not included in the analysis. An example of such an intangible benefit is the vicarious satisfaction derived by some individuals in knowing that the area is protected under a wilderness designation even though they personally have no intention of ever visiting the area. The higher estimated recreation use under the maximum resource development alternative accounts for a large portion of the difference in PNV between alternatives. Minerals benefits were not included in the analysis because of lack of accurate data on the resources and dollar values involved.

TABLE 27

Cost-Efficiency Analysis for the Piedra WSA Based on 4 Percent and 7 1/8 Percent Discount Rates (Costs and benefits are in thousands of 1978 dollars, incremental from the no action alternative)

Resource/Cost	Alternatives			
	A, E, G, H, and I (Suitable)	B (Maximum Resource Development)	A, E, G, H, and I (Suitable)	B (Maximum Resource Development)
	4 Percent Discount Rate		7 1/8 Percent Discount Rate	
Timber	0	1,880	0	940
Increased Water Yield	0	320	0	149
Recreation				
Wilderness	2,361	0	1,286	0
Non-Wilderness	-3,128	1,747	-1,676	702
Range	0	17	0	29
Discounted Benefits	-767	4,018	-390	1,820
Discounted Costs	2,283	8,415	1,151	4,185
Incremental PNV	-3,050	-4,397	-1,541	-2,365

SOCIAL EFFECTS

Additional impacts not within the realm of quantitive economic analysis may also result from a suitable or unsuitable designation for the WSA. These are discussed below.

Lifestyle

None of the alternatives would significantly alter lifestyles in the area unless major mineral activity occurred. This is unlikely in the Piedra WSA.

Attitudes, Beliefs, and Values

Many people in the area, especially newer residents, tend to favor preservation of natural areas such as those within the Piedra WSA. Others more oriented toward land-based economies such as agriculture,

feel that resources in the WSA should be used to support jobs and improve standards of living in the area. A certain amount of conflict and resentment could result from implementing any alternative.

Social Organization

None of the alternatives would significantly affect the level or type of social services available in the area. Alternatives A, E, G, H, and I could result in slightly less payments to counties in the long-run as a result of potentially lower timber and livestock resource outputs, but this reduction would be slight.

Population and Land Uses

None of the alternatives would significantly affect land uses and population distribution.

WILDERNESS SUITABILITY OR UNSUITABILITY

OVERVIEW

Standards to be met by components of the National Wilderness Preservation System (NWPS) were established in the Wilderness Act of 1964. Forest Service policy requires that capability, availability and need for wilderness be analyzed prior to determining the suitability or unsuitability of an area for inclusion in the NWPS. These three criteria are discussed below.

WILDERNESS CAPABILITY

Wilderness capability is analyzed without regard to either the need for more wilderness or the availability of the area for wilderness designation. It is determined by both the degree to which an area possesses the basic characteristics necessary for wilderness designation as well as the degree to which an area can be managed for wilderness.

With respect to the first of these two criteria, the Wilderness Attribute Rating System (WARS) was developed during RARE II to indicate the degree to which an area possesses wilderness attributes. The system involves a rating for each of several attributes, which are then summed to arrive at a composite WARS rating. Possible scores range from 4 to 28, with 28 indicating possession of optimum wilderness characteristics. Table 28 is a summary of the WARS rating for the Forest Service portion of the Piedra Wilderness Study Area (RARE II Area No. A2292). Detailed worksheets are in the planning records on file in the Forest Supervisor's Office in Durango, Colorado. These ratings were reconfirmed during the Forest Planning process.

The rating of 24 is the highest rating of any Wilderness Study Area on the San Juan National Forest. Of all 300 RARE II areas in Colorado the median rating was 19. Thus, basic wilderness characteristics are well represented on the Piedra WSA.

TABLE 28

Summary of Piedra WSA Wilderness Attributes Ratings

Wilderness Attribute	Rating
Influence on Natural Integrity	6
Influence on Apparent Naturalness	6
Solitude Opportunity	6
Primitive Recreation Opportunity	6
Composite WARS Rating	24
Supplementary Wilderness Attributes	3
Scenic Value	3

The second element of wilderness capability is "Manageability," the most uncertain aspect of which involves conflicts that might result from future development of mineral resources in the area. The following factors relate specifically to manageability of the area for wilderness:

Ability to Manage the Area as an Enduring Resource of Wilderness and to Protect and Manage its Natural Character

Recreation, grazing and most other resource uses could easily be managed on the Piedra WSA while protecting wilderness character. Surface disturbances relating to mineral development could be controlled under Forest Service Surface Protection Regulations (36 CFR 228), but some impacts should be expected. Impacts from previous exploration are minimal, but if a major discovery were made, impacts could be severe. A roading system necessary to access mineral development could also have significant impacts on the wilderness character of the area. Otherwise, there would be no problems in managing the area to perpetuate in natural character.

Size and Shape of the Area

The Piedra WSA contains 41,500 acres and is relatively compact. The boundary of the area is determined by well defined topographic features, on about one-third of the proposed area. The other two-thirds of the boundary crosses drainages or follows broad ridges where precise topographic features do not exist. These boundary areas will be difficult, but not impossible to locate on the ground. The area, in order to be managed as wilderness, would require significant boundary location and maintenance to prevent conflicts with other land management activities.

Location Relative to External Influences

The Piedra WSA is located three and one-half miles from U. S. Highway 160 at its nearest point. Forest Road No. 620-622 is within one-quarter mile of the southern boundary and Forest Road No. 631-642 within one-eighth mile of the northern boundary. Considerable timber activity occurs to the north of the WSA. There are minimal external influences that would impair manageability of the area as wilderness. Access is such that users could readily get to the area, yet it is not so close to a major highway as to detract from the wilderness environment.

Boundaries

The following points can be made concerning boundaries on the WSA:

-They can be located to avoid conflict with important existing or potential public uses and developments.

-They can be sufficiently described to be posted on the ground, although location and maintenance will be difficult in some areas of the WSA.

-They can be located in some areas to utilize features that constitute a barrier to prohibited use and act as a shield to protect wilderness environment.

-They can be located to provide an opportunity for access and trailhead facilities.

Therefore, boundary location does not pose a major problems with respect to manageability of the area as wilderness.

Based on analysis of both manageability and possession of wilderness characteristics, the Piedra WSA is determined capable for wilderness.

WILDERNESS AVAILABILITY

Value comparison

Availability of an area for wilderness designation is determined, in part, by comparing the value of the wilderness resource with the value of the non-wilderness resources foregone under the suitable alternatives. The value of tangible and intangible wilderness resources should be greater than the values foregone if a suitable alternative is to be recommended. However, the highest and best use of an area with respect to wilderness designation is difficult to assess in such terms because of the difficulty of attaching precise values to the intangible benefits involved.

Wilderness values on the Piedra Wilderness Study Area include:

-potential to provide an opportunity for wilderness recreation experiences for an optimum number of 224 people at one time (PAOT); and

-special protection of rather unique natural ecosystems, wildlife, water quality, and other resources.

Timber, minerals, and recreation represent significant values to be foregone under the suitable alternatives. Alternative B, the maximum resource development alternative, includes almost 34,000 acres of land suitable for timber production from which an estimated 3.3 million board feet could be harvested annually.

The potential for significant mineral discoveries in the WSA is low, and no attempt has been made to quantify the values involved. Under Alternatives B, C, D, F, and J, mineral exploration would be allowed with appropriate safeguards. Alternatives A, E, G, H, and I would place additional constraints on exploration by increasing costs to the operator. There is also the slight possibility that a significant mineral discovery would be foregone if the area is withdrawn upon designation.

Although recreation would constitute a major use of the WSA under any alternative, wilderness recreation, by its very nature, results in lower capacity than would otherwise be the case. Therefore, total recreation contribution to overall value is less in Alternatives A, E, G, H, and I than under Alternative B (maximum resource development).

Alternatives A, E, F, G, H, and I would preclude projects designed to increase water yield in the WSA. Alternative B provides for an additional 2,120 acre-feet of water by the year 2030 which would be foregone. Alternatives A, E, G, H, and I would also decrease the opportunity to construct water storage and related facilities in the WSA since water improvements in wilderness require Presidential approval.

Existing Constraints and Encumberances

All land within the Piedra Wilderness Study Area is National Forest System land. Activities on unpatented mining claims would be governed by Forest Service Surface Protection Regulations (36 CFR 228), but any surface impacts and access routes could reduce wilderness values.

Effect of Wilderness Designation and Management on Adjacent Lands

The area is topographically well defined in some areas and less so elsewhere. No transportation or utility corridors are proposed through the area. Trailhead and access facilities would be similar with or without wilderness designation. There would be no anticipated adverse effects of wilderness designation on the management of adjacent lands.

Summary

The Piedra WSA is available for wilderness. Values foregone under the suitable alternatives are greatest with respect to timber, minerals, and recreation. There are sufficient opportunities to harvest timber outside the WSA to meet foreseeable needs of local industry for the next

fifty years. The overall low mineral potential of the area makes the probability of mineral discovery unlikely. Recreation values foregone are more than offset by the preservation value of wilderness land.

WILDERNESS NEED

The RARE II process dealt with "wilderness need" on a National basis, and the process included extensive public involvement. The San Juan National Forest Land and Resource Management Planning process considered the current and future public need for additional designated wilderness in the general vicinity of the Piedra Wilderness Study Area.

In considering the need for wilderness, certain assumptions were made:

-Visits to designated wilderness will increase with both increasing population and a growing awareness of wilderness.

-Some undeveloped lands provide opportunities for a primitive type of recreation experience outside wilderness.

-Within social and biological limits, management increases the capacity of established wildernesses to support human use without unacceptable depreciation of wilderness resources.

The following factors were considered in determining the need for designated wilderness on the Piedra WSA:

Location, Size, and Type of Other Wildernesses in the General Vicinity and Their Distance From the Study Area

Prior to 1980, there were seven wildernesses within a 100-mile radius of the Piedra WSA, with a total of 610,057 acres. Four are administered by the Forest Service and three are administered by the National Park Service. With passage of the New Mexico Wilderness Act of 1980 and the Colorado Wilderness Act of 1980, Congress increased the size of three of these National Forest System wildernesses and established seven new wildernesses within such a radius. The new wildernesses are all within the National Forest System and contain a total of almost 700,000 acres. Therefore, there are now fifteen wildernesses with over 1.3 million acres within the 100-mile radius of the Piedra WSA. Twelve are in the National Forest System and three are in the National Park System.

Figure 6 shows the location of the wildernesses within a 100-mile radius of the Piedra WSA. Table 29 lists acres and recreation use on wilderness in the vicinity of the WSA. The table indicates that there are a number of designated wildernesses in the vicinity of the Piedra WSA, representing a large acreage base. These cover a diversity of ecosystem and landform types, including canyons, sand dunes, and mountainous alpine areas.

FIGURE 6 - Piedra Wilderness Study Area and Nearby Wilderness

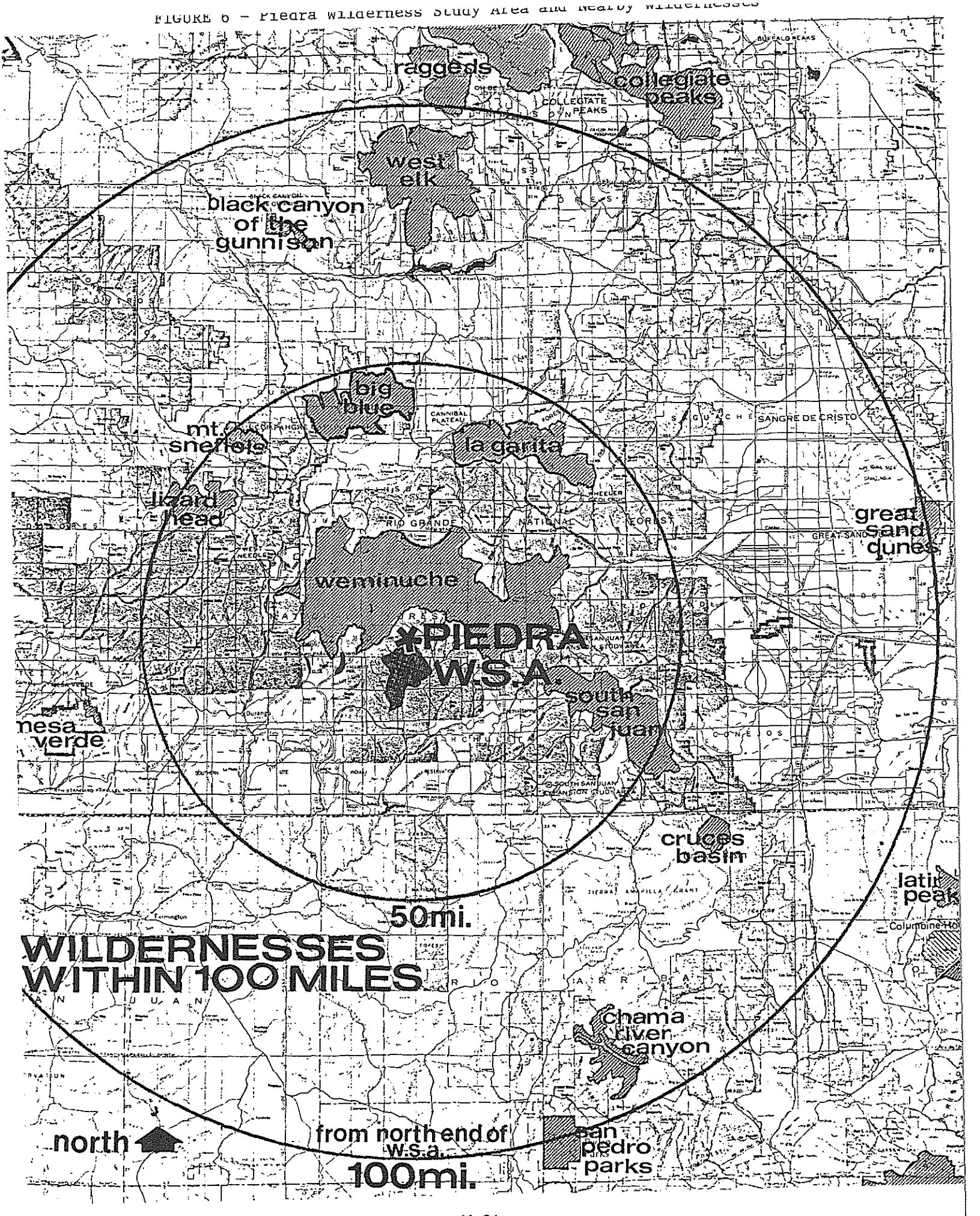


TABLE 29

Wildernesses Within a 100-Mile Radius of Piedra WSA, Showing Size, Total Recreation Visitor Days and Relative Use Ratings

	Acres	1980 Use	Recreation Visitor Days Acre/Year	Relative Use Rating
Big Blue	97,700	NA	NA	Low*
Black Canyon of the Gunnison (NPS)	11,180	NA	NA	Low*
Chama River Canyon	50,260	5,600	.11	Low
Cruces Basin	18,000	1,600	.09	Low
Great Sand Dunes (NPS)	33,450	NA	NA	Low*
La Garita	108,486	32,300	.30	Low
Latir Peak	20,000	1,500	.08	Low
Lizard Head	40,000	21,000	.53	Moderate
Mesa Verde (NPS)	8,100	NA	NA	Low*
Mt. Sneffels	16,200	11,100	.69	Moderate
Raggeds	68,000	19,000	.28	Low
San Pedro Parks	41,130	50,200	1.22	High
South San Juan	133,463	41,500	.31	Low
Weminuche	463,224	255,400	.55	Moderate
West Elk	194,412	101,500	.52	Moderate
Total	1,303,605			

NPS - Administered by the National Park Service, U.S. Department of the Interior
NA - Data not available
* - Estimated relative use rating.

Relative Use Ratings Based on:

0-.35 Recreation Visitor Days/Acre/Year	Low
.36-.70 Recreation Visitor Day's/Acre/Year	Moderate
.70+ Recreation Visitor Day's/Acre/Year	High

Present Visitor Pressure on Other Wildernesses, Trends in Use, and Changing Patterns of Use

Because of the large land area represented by designated wildernesses within a 100-mile radius of the Piedra WSA, as well as the relatively low population density in this part of the Southwest, overall visitor pressure on other wildernesses is relatively low. (See Table 29.) This can be partially explained by the fact that wilderness recreation

experiences, by definition, require low user density per unit area. Therefore, the low visitor pressure on nearby wildernesses can be interpreted to indicate that existing areas are indeed fulfilling their purpose in providing "opportunities for solitude in areas untrammeled by man." But demand for and use on wildernesses is expected to increase in the immediate future. Trends indicate that individuals and families will tend to spend more of their vacation time in one location rather than on the road. Wilderness trips provide an opportunity to experience the outdoors in a natural setting, along with a unique type of challenge not available in urban areas. More people are realizing this, and wilderness visits are expected to increase accordingly. Increases in leisure time as well as a growing national awareness of environmental matters will influence this trend as well.

The overall low visitor pressure on nearby wildernesses does not mean that localized overuse is not occurring. Many areas within the San Juan National Forest are very popular, and during summer months use is at such levels that wilderness experiences may be impaired.

Lands' Ability to Provide Opportunities for Unconfined Outdoor Recreation Experiences

While the Piedra Wilderness Study Area has high potential to provide opportunities for unconfined outdoor recreation experiences, these opportunities are not in short supply in the surrounding area.

Ability of Plant and Animal Species to Compete with People and Projects

Natural ecological forces will continue relatively undisturbed under all alternatives. Plant and animal species native to the area will be maintained under all alternatives as well.

The Need to Provide Sanctuary for Species that Have Demonstrated an Inability to Survive in Less Primitive Surroundings

No species have been identified on the WSA that require a wilderness environment for survival.

Provide for Preservation of Unique Landform Types and Ecosystems

Table 12 compares the occurrence of various ecosystem types found on the Piedra WSA with those of nearby wildernesses. The Piedra WSA includes a significantly higher representation of Douglas-fir, aspen, and ponderosa pine ecosystems than in nearby wildernesses, resulting from the relatively low elevation of the area. This, combined with the fact that the WSA has a river as its dominant landform characteristic, makes the area rather unique with respect to many other Colorado wilderness areas.

Summary

The shows that the area is needed as designated wilderness not mainly because it would reduce pressure on other areas or because additional acreage is called for, but rather because it would add physical and

ecological diversity to the NWPS. Lower mountain ecosystems would be preserved in an unmodified setting and would be made available to a variety of recreationists including hunters, fishermen, backpackers, hikers, and horseback riders.

OTHER CONSEQUENCES

None known.

SHORT-TERM USES OF MAN'S ENVIRONMENT VS. THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

There would be no direct effects on long-term productivity or renewable resources under either alternative. The increased likelihood of mineral activity under all alternatives except Alternatives A, E, G, H, and I, the suitable alternatives, could increase the possibility of long-term effects on the renewable resource productivity of the land actually disturbed by mining. However, most of the surface resource effects caused by mining could be mitigated under Federal Surface Protection Regulations.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

With the exception of lost wilderness opportunities and extraction of minerals, there would be no irreversible or irretrievable commitment of resources under the unsuitable alternatives. "Irretrievable" refers to a loss of resource production or use of renewable resources resulting from management decisions, whereas "irreversible" refers to long-term unavailability of a resource. Mining represents an irreversible commitment of non-renewable mineral resources. Mining activity would also involve minimal commitments of livestock forage and timber as areas become disturbed. By using proper reclamation techniques, however, losses of production can be made short-lived and insignificant in quantity. The wilderness resource could be irreversibly committed, depending on how the area was to be managed under the unsuitable alternatives. Development could impact the area to the extent that it no longer qualified for wilderness designation, in which case the wilderness resource would be irreversibly lost.

Under Alternatives A, E, G, H, and I, mineral resources could be irreversibly lost following the minerals withdrawal deadline of December 31, 1983. Certain amounts of other resources, including water, livestock forage, and timber, would be irretrievably lost as a result of the inability to carry out various management activities in a wilderness area. Irretrievable resources are limited to the difference between quantities produced under the suitable alternatives and the unsuitable alternatives.

PROBABLE ADVERSE EFFECTS THAT CANNOT BE AVOIDED

SUITABLE ALTERNATIVES (ALTERNATIVES A, E, G, H, AND I)

-There would be reduced opportunities and an increase in the cost of mineral exploration and development because of the need for more stringent mitigation and restoration measures.

-Opportunities for vegetation treatment will be lost.

-There would be less opportunities for developing a variety of uses. There would be a loss of motorized recreation opportunities.

-Various amounts of water and livestock forage would be foregone.

NO ACTION ALTERNATIVE (ALTERNATIVE F)

-Opportunities for vegetation treatment would be lost.

-Mineral resources could be developed. This development with associated roads could reduce opportunities for solitude and affect the natural integrity and the scenic values.

UNSUITABLE ALTERNATIVES (ALTERNATIVES B, C, D, and J)

-There could be an eventual irreversible loss of wilderness character through mining, and recreation activities in the area.

-There would be reductions in wilderness values and wilderness recreation opportunities.

CONFLICT WITH OTHER GOVERNMENT AGENCY PLANS

There are no known conflicts with plans of other government agencies under any alternative.

SOUTH SAN JUAN WILDERNESS EXPANSION STUDY AREA

VICINITY

The South San Juan Wilderness Expansion Study Area is actually composed of two separate areas, one adjoining the north and one adjoining the south side of the South San Juan Wilderness. Both areas lie entirely within the Pagosa Ranger District of the San Juan National Forest. The northern portion is referred to as the Montezuma Peak area and consists of 13,000 acres in Rio Grande, Archuleta, Mineral, and Conejos Counties. The southern portion is referred to as the V-Rock Trail area and consists of 19,800 acres mostly in Archuleta County. A small portion lies within Conejos County. Figure 7 is a vicinity map for the WSA, showing its location in relation to the Four Corners Area. Figure 8 is an area map showing the boundaries of the WSA. The area lies approximately 20 miles east of the town of Pagosa Springs and entirely to the west of the Continental Divide.

PHYSICAL SETTING

The WSA is composed of two separate geographic entities, the Montezuma Peak area on the north and the V-Rock Trail area on the south. These are separated from one another by the 127,685 acre South San Juan Wilderness. These two areas are similar with respect to physical, biological, social and economic aspects, and for the most part, the following discussion applies equally to both areas. Where distinctions exist, these are discussed.

VEGETATION

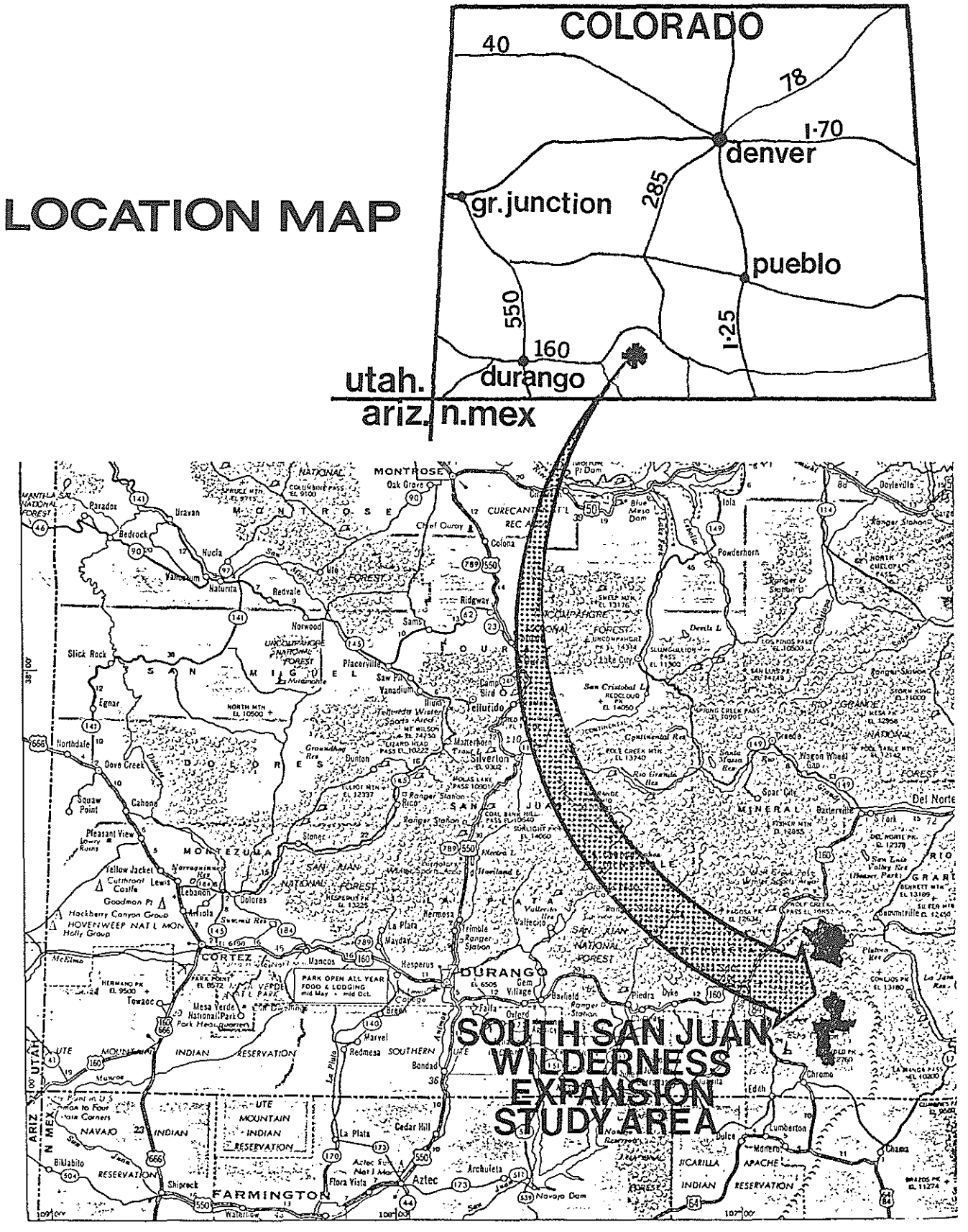
Vegetation on the area varies with elevation which ranges from 8,200 feet to over 13,000 feet. Coniferous vegetation occurs over 30 percent of the area, with Engelmann spruce being the most predominant species. Aspen is prevalent below timberline, covering approximately 17 percent of the area. Another 10 percent of the area is grassland, with the remainder being mostly rocky or barren areas, interspersed with patches of brush or bogs. Thurber fescue is the most abundant vegetation in non-timbered areas below 10,500 feet elevation. Forbs and grasses comprise the understory in timbered areas, whereas above timberline, alpine grasses, forbs, and willows prevail. Table 30 lists the frequency of occurrence of various ecosystem types on the WSA in comparison with nearby wildernesses. The table indicates that the area is not unique with respect to vegetation composition, with the possible exception that the aspen type is more prevalent.

There are no known threatened or endangered plants on the area.

LANDFORM

The WSA is situated within the San Juan volcanic section of the Southern Rocky Mountains. In the Montezuma Peak area, landform is characterized by highly dissected drainages with steep canyon side slopes. The Continental Divide borders the area along the east, and drainages flow predominantly north to northwest. Much of the area is typical of alpine

FIGURE 7 - Location Map of the South San Juan Wilderness Expansion Study Area



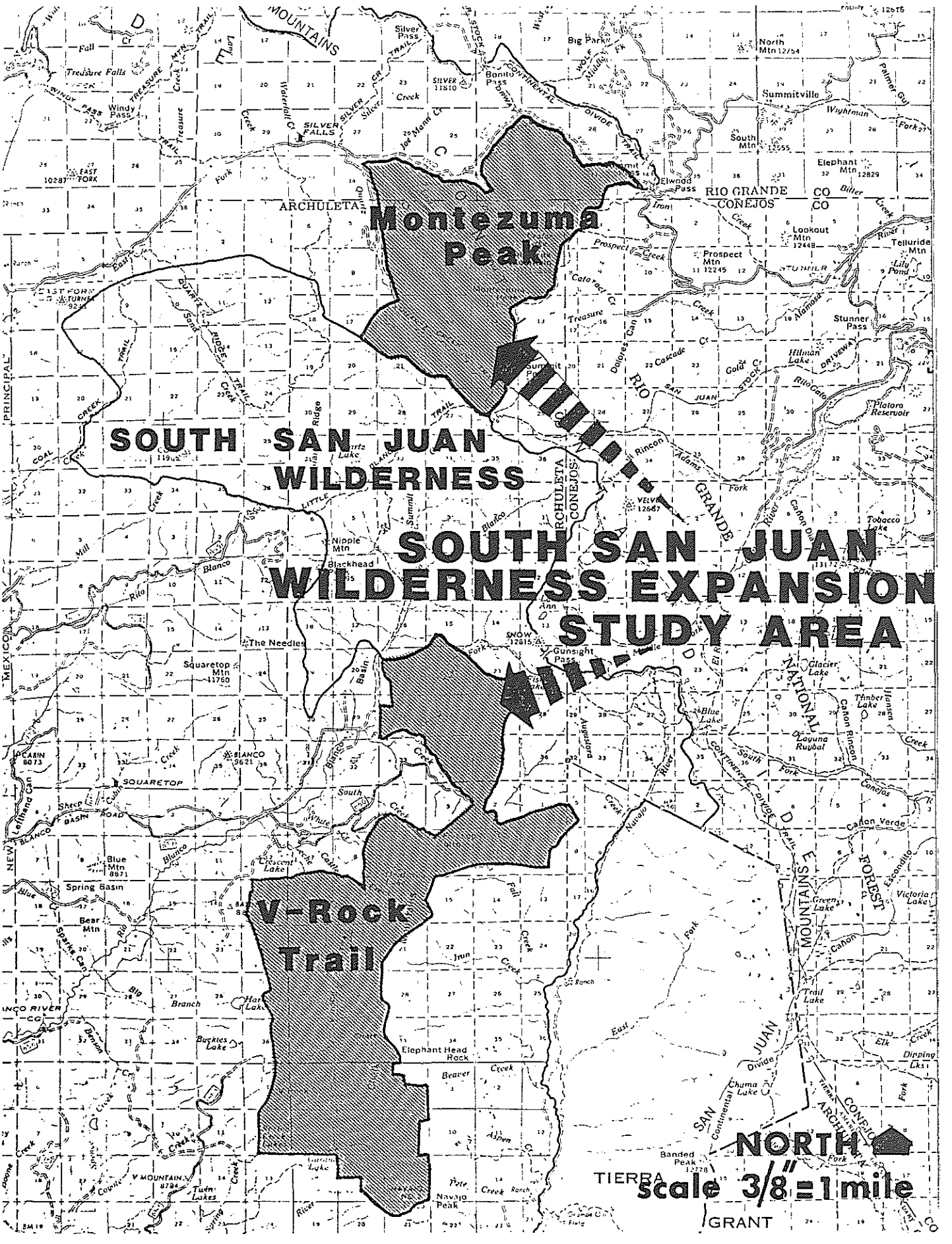

SOUTH SAN JUAN WILDERNESS
SOUTH SAN JUAN WILDERNESS EXPANSION STUDY AREA
Montezuma Peak
V-Rock Trail
ARCHULETA
RIO GRANDE
CONEJOS
CO
Summitville
Elwood Pass
Silver Falls
Silver Pass
Bonito Pass
Big Park
North Mtn
South Mtn
Elephant Mtn
Lookout Mtn
Prospect Mtn
Telluride Mtn
Stunner Pass
Platoro Reservoir
Rio Grande
Rio San Juan
Nipple Mtn
Blackhead
The Needles
Squaretop Mtn
Gunsight Pass
Glacier Lake
Blue Lake
Laguna Ruybal
Timber Lake
Cañon Verde
Green Lake
Victoria Lake
Trail Lake
Chama Lake
Banded Peak
Navajo Peak
Elephant Head Rock
Crescent Lake
Blue Mtn
Spring Basin
Bear Mtn
Buckles Lake
V Mountain
Twin Lakes
Squaretop
Blanco
Silver Creek
Continental Divide
Rio Grande National Forest
Cimarron Mountains
TIERRA
GRANT
NORTH
Scale 3/8" = 1 mile

TABLE 30

Representative Ecosystems in the South San Juan Wilderness Expansion Study Area and Nearby Wildernesses

Ecosystem	South San Juan Wilderness Expansion Study Area	Weminuche Wilderness	South San Juan Wilderness	Lizard Head Wilderness	La Garita Wilderness
Alpine	Common	Common	Common	Common	Extensive
Subalpine	Common	Common	Common	Common	Common
Spruce-fir	Common	Common	Common	Uncommon	Common
Douglas-fir	Uncommon	Uncommon	Uncommon	Uncommon	Uncommon
Aspen	Common	Uncommon	Uncommon	Uncommon	Uncommon
Ponderosa pine	Uncommon	Uncommon	None	None	None
Lodgepole pine	None	None	None	None	Uncommon

KEY
Extensive - Type occurs on more than 50 percent of the area.
Common - Type occurs on 10 to 40 percent of the area.
Uncommon - Type occurs on less than 10 percent of the area.
None - Type does not occur in area.

ecosystems. The V-Rock Trail area is bordered on the east by the Chalk Mountains, which form a hydrographic divide between the Rio Blanco drainage on the west and the Navajo River drainage on the east. Drainages flow north and south, and steep canyons are common.

GEOLOGY

The WSA is situated at the southern-most edge of the San Juan Mountains, which are the result of extensive volcanic activity covering thousands of square miles in the region. Extensive folding and faulting are responsible for the entrapment and retention of oil and gas in the vicinity of the WSA. More recently, surface characteristics have been modified by both piedmont and alpine glaciation. After the glaciers melted, oversteepened valley walls were subject to landsliding that broadened many of the valleys in the area. Rock outcrops and talus slopes are common throughout the area.

SOILS

Soil characteristics and potentials vary considerably as a function of landform, slope, and parent material.

Soils within the WSA have been mapped at a relatively high level of intensity as part of the National Cooperative Soil Survey project. Results of this survey appear in the Soil Survey of the Piedra Area (Bauer, R.F., USDA Soil Conservation Service and Forest Service, April 1981). The report identifies three major soil series within this area. A brief description of each of these follows:

The Leal Series - These soils occur on the steep mountain slopes and glacial troughs within the area. They are deep, coarse textured soils developing from materials weathered from andesite and quartz latite. Depth to bedrock varies from 40 to 60 inches. These soils are productive for timber, and there are no serious limitations on slopes less than 30 percent. On slopes above 30 percent, there is a high erosion hazard, and on slopes above 65 percent there is a very high erosion hazard along with a high hazard for mass slope failure.

The Grenadier Series - These soils are associated with the Leal soils and occur on similar landforms and slopes. They differ from the Leal soils in that they contain more rocks and stone and are only moderately deep. Depth to bedrock varies from 30 to 40 inches. These soils are also productive for timber. There are no serious limitations that would limit management activities.

The Castelleia Series - These soils occur mainly in the northwest portion of the V-Rock trail area around the vicinity of Opal Lake and Leche Creek. They are medium textured deep soils developing in old landslide materials that overlay shale and sandstone at depths of 5 to 50 feet. These are relatively productive soils for range and timber. There are no special limitations on slopes less than 25 percent. There is a moderate to high hazard of cut slope failure and mass wasting.

The above soils occur in relatively equal amounts throughout the Wilderness Study Area. Included with these soils are rock outcrops of igneous materials and talus slopes. These may make up 15 to 20 percent of the area. These areas are typically near vertical and support little or no vegetation.

SOCIAL AND ECONOMIC SETTING

The South San Juan Wilderness Expansion Study Area is within the Pagosa Human Resource Unit (HRU), one of three areas of analysis within the area of social and economic influence of the San Juan National Forest. A Human Resource Unit is an area characterized by particular patterns of lifestyles, economic conditions, institutional arrangements, and topography. HRU's vary in size but are typically larger than individual towns and communities, and they may cross political jurisdictions.

The Pagosa HRU contains portions of Hinsdale and Mineral Counties, and virtually all of Archuleta County. Archuleta County's population grew

by 33 percent between 1970 and 1980, from 2,733 to 3,631. State projections call for the population to double by the year 2010. Employment in the area is primarily in ranching, logging, retail trade and tourism sectors; therefore, much of this employment is seasonal. Unemployment, a chronic problem, was nearly 12 percent in 1980. The average per-capita income in Archuleta County in 1980 was $5,222.

Lifestyle - The predominant lifestyle in the Pagosa HRU is characterized by its rural mountain setting, with many of the residents dependent on the National Forest for part or all of their livelihoods. Ranching, logging and tourism, including outfitter-guide operations, are all occupations closely associated with management of the Forest. Many newer residents of the HRU are either retirees or "emigrants" from urban areas who moved to the area specifically to enjoy the rural mountain lifestyle. These newer residents tend to be more oriented toward recreational uses of the National Forest rather than toward commodity production.

Attitudes, Beliefs, and Values - Public awareness of the recreational environment of the National Forest is increasing with immigration to the area. There is a changing public attitude toward protecting and preserving rather than developing and using Forest resources such as timber, forage and minerals. In the future, direct conflicts can be anticipated between those who hold "preservation" attitudes and those who believe resources should be developed to meet local income and employment needs.

Social Organization - While most of the community services found in other areas are available in the Pagosa HRU, rapidly rising populations are placing strains on school systems, medical facilities, street and road maintenance, and law enforcement capabilities.

Population and Land Use - Until a few years ago, Hispanics constituted a majority of Archuleta County's population. Recent population growth has changed this mix, but the Hispanic influence is still extremely strong. Population growth has created a significant shift in land uses, with increasing conversions of ranchland into housing subdivisions and resorts.

RESOURCE AND SUPPORT ELEMENTS

RECREATION

Dispersed Recreation

Developed recreation is non-existent within the WSA. There are no recreation structures and no developments other than trails. Recreation use is light. Current use, which is approximately 5,200 recreation visitor days (RVD's) annually over the 32,800 acre area (0.152 RVD's per acre per year), is low compared to nearby wilderness and dispersed recreation areas in the San Juan National Forest. There are approximately 35 miles of trail within the WSA.

Recreation activities include big game hunting, hiking, horseback riding (with associated camping), viewing scenery, nature study, and cross-country skiing. Other activities occurring in limited amounts include fishing and motorcycle riding on trails. This latter activity is limited by rugged terrain and lack of suitable trails.

The South San Juan Wilderness Expansion Study Area offers approximately 6,300 acres of primitive recreation opportunities and approximately 26,500 acres of the semi-primitive non-motorized opportunities. Use is currently 32 percent of capacity.

Visual Resource

The landscape of the WSA is dominated by geologic formations including mountain peaks, talus slopes, cliffs, and deep canyons. Vegetation is highly varied with deciduous trees and brush contrasting with coniferous forest especially during the fall months. It is further diversified by natural openings and distinctive contrasts with bare rock. Alpine lakes, scattered ponds, and cascading streams comprise the water features of the WSA. Thirty to forty percent of the WSA can be characterized as having distinctive or outstanding scenic quality. The remainder is common to the characteristic landscape of the area.

Cultural Resource

There have been no extensive cultural resource surveys undertaken in the WSA, although various aboriginal camps have reportedly been discovered in the Quartz Creek area. This indicates a likelihood that other camps, activity areas, and associated evidence may exist within the WSA, although it is unlikely that such are numerous or extensive. The WSA is evaluated as being low to moderate in archaeologic sensitivity.

A travel corridor along the east fork of the San Juan River from Elwood Pass to the vicinity of the Silver Falls Guard Station is an important historic area existing in and adjacent to the WSA. This corridor forms the northern boundary of the Montezuma Peak portion of the WSA. It was the route of the first road and telephone line from the San Luis Valley to Pagosa Springs and was used from 1879 until 1911 when it was abandoned as a major travel route. There are some cabin ruins located in the corridor associated with a small, short-lived mining camp at Elwood. Some features associated with early seasonal livestock grazing and mining, such as aspen art and inscriptions, stock driveways, camps, and mining shafts are present. The WSA is evaluated as being of low historic sensitivity, with the exception of Elwood Creek on the east fork of the San Juan River, which is of high sensitivity.

The WSA is situated in the historic territory of the Ute Indians, although archival research and contacts with members of the Southern Ute and Ute Mountain Ute Tribes have failed to identify any specific sites important to the Ute peoples.

WILDERNESS

The WSA is primarily natural in character. There are no known "imprints of man" that would require rehabilitation under the suitable alternative. Certain areas have been used for grazing of livestock, but this is not evident to the casual observer.

Opportunities for primitive and unconfined recreation are plentiful. The WSA has a varied topography, with areas of high vegetation diversity, abundant wildlife, open parks, and portions of dense forest. These are attractive to backpackers, rock climbers, fishermen, hunters, horseback riders and hikers. Outstanding opportunities for solitude exist.

FISH AND WILDLIFE

Big Game

Big game species inhabiting the WSA include elk, mule deer, black bear, turkey, and possibly mountain lion. The area may contain winter den sites for black bear. Rocky Mountain bighorn sheep utilize portions of this WSA during summer months. Presently, winter range for bighorns within the WSA appears to be limited.

Small Game

Small game species include band-tailed pigeon, snowshoe hare, cottontail rabbit, blue grouse, white-tailed ptarmigan, and Abert's squirrel. Utilization is generally year round except for the band-tailed pigeon which is a summer resident.

Non-game

Species commonly found in the mixed conifer and spruce-fir zones of Colorado are found in this WSA. Commonly observed species include coyote, ground squirrel, marmot, pika, raven, Canada jay, mountain bluebird, and water ouzel. The more mobile species utilize the WSA primarily during spring, summer and fall. Most of the smaller rodents and some birds utilize the WSA year round.

Threatened and Endangered (T&E) Species

Although there are no known federally listed T&E species inhabiting the unit, most of this WSA is within the boundaries of a cooperative study between the Colorado Division of Wildlife, U.S. Forest Service, and U.S. Fish and Wildlife Service to determine the presence or absence of grizzly bear and to determine the extent of and suitability of the WSA for grizzly bear habitat. This study was prompted by the killing of a sow grizzly in 1979 at the head of the Navajo River.

Results of the study state that the presence of grizzly could not be verified. Some sign was observed the first year of the study that may have been made by grizzly; however, it was considered to be 2 to 4 years old at that time. It was determined that there is acceptable habitat

for grizzly in the area, but in units that are quite small for use by grizzly. These units are generally adjacent to areas with conflicting uses and the heavy presence of man. Consequently, it is unlikely that a grizzly bear population could ever again become established to the point that it could reproduce itself.

There is acceptable habitat for wolverine but no known confirmed recent sightings. The wolverine is on the Colorado list of threatened species.

Fish

Fish species in the area include cutthroat, rainbow, and brook trout. Some waters contain spawning habitat with some natural reproduction, although supplemental stocking by the Colorado Division of Wildlife is required on a periodic basis to maintain fishable populations under present harvest regulations.

RANGE

Cattle and recreation horses graze about 30 percent of the WSA. Most of the range is in satisfactory condition and the trend is for conditions to remain stable. Current grazing totals about 1,500 Animal Unit Months annually. There are relatively few range improvements in the area, and these are limited to allotment boundary fences, short drift fences, and spring developments.

In the Montezuma Peak area, grazing takes place on portions of two allotments, one of which is a sheep allotment being extensively managed, and one of which is a cattle allotment being intensively managed under a deferred rotation system. In the V-Rock Trail area, grazing is taking place on portions of seven allotments, one of which is a vacant sheep allotment. The other six are cattle allotments, one of which is being intensively managed under a deferred-rotation system. The remaining five are being extensively managed under continuous grazing systems.

TIMBER

Of the 32,800 acres within the WSA, 22,131 acres (67 percent) are classified as "capable" of timber production. Capable forest land is land that has the biological potential to produce at least 20 cubic feet of wood per acre per year. Productivity is average for the Forest, and there has been no past timber harvesting activity. Ninety-five percent of this capable timber land is sawtimber. The predominant timber type is spruce-fir, which covers 69 percent of the capable forest land. The distribution by timber type and size class is shown in Table 31.

The inventory of existing timber on capable forest land within the WSA is 63.9 million cubic feet or 260.5 million board feet. Most of the inventory volume is in the spruce-fir type. The distribution of inventory volume by timber type is shown in Table 32.

TABLE 31

Acres Capable of Timber Production by Type and Stand Size Class

Timber Type	Stand Size Class: Non-stocked	Seedling/ sapling	Pole timber	Saw-timber	Total
Ponderosa pine	-	-	-	-	0
Spruce-fir	197	-	905	14,180	15,282
Douglas-fir	-	-	-	1,852	1,852
Aspen	-	-	-	4,997	4,997
Total	197	0	905	21,029	22,131

TABLE 32

Inventory Volume by Timber Type

Timber Type	Million Cubic Feet	Million Board Feet
Ponderosa pine	-0-	-0-
Spruce-fir	56.6	234.4
Douglas-fir	3.9	16.6
Aspen	3.4	9.5
Total	63.9	260.5

Capable forest land occurs in roughly equal amounts on each slope class. However, in the Montezuma Peak unit, 65 percent occurs on slopes greater than 60 percent and in the V-Rock Trail unit, 54 percent occurs on slopes less than 30 percent. This breakdown is shown in Table 33.

WATER

Water Yield

Water yield from the WSA is estimated at 49,355 acre-feet per year, for an average of 1.5 acre-feet per acre per year. Water from the Montezuma

TABLE 33

Capable Forest Land Acres By Type And Slope Class

Timber Type	Slope Class 0-30%	30-60%	More Than 60%	Total
Ponderosa pine	-	-	-	0
Spruce-fir	3,774	6,174	5,334	15,282
Douglas-fir	683	1,136	33	1,852
Aspen	3,937	807	253	4,997
Total	8,394	8,117	5,620	22,131

Peak area flows into the east fork of the San Juan River via Quartz Creek, Lost Creek, Bear Creek, and Elwood Creek. The northern three-fourths of the V-Rock Trail area drains northward into the Rio Blanco River via Fish Creek, South Creek, Castle Creek, and Leche Creek. The southern fourth (below V-Rock Trail) is drained by the little Navajo River. Water uses within the study area include small amounts of domestic livestock and wildlife drinking and recreational and riparian habitat maintenance.

Downstream water uses on the East Fork of the San Juan, Rio Blanco, and Little Navajo Rivers include pasture irrigation, domestic livestock and wildlife drinking, and domestic (residential and campground) uses. Non-consumptive uses include recreation (fishing and scenic viewing) and maintenance of both aquatic and riparian habitat as well as stream channel stability. Anticipated future uses include additional domestic and irrigation use and potential energy development.

Maximum potential water yield increases could result from clearcutting 20 percent of the accessible spruce-fir and aspen stands (for transpiration reduction and snow catchment) and maintaining snowfences in 25 percent of the alpine area. Potential water yield increase could reach 1,450 acre-feet per year (1,125 in V-Rock Trail and 325 in Montezuma Peak) for an increase of 3 percent.

No water resource measurement sites (streamflow, climate, snow depth) occur within the WSA.

Additional potential for water yield increase may occur by cloud seeding with silver iodide crystals. A study by the Bureau of Reclamation (Ecological Impacts of Snowpack Augmentation in the San Juan Mountains of Colorado, Steinhoff and Ives, Bureau of Reclamation, U.S. Department of Interior, Denver, Colorado, 1976) indicates that streamflow increases of 10 percent are possible although snowfall variability in the San Juan makes it difficult to statistically verify water yield increases through this method.

Water Quality

The only water quality data for the WSA is from monitoring near mineral exploration activities by AMAX Exploration, Inc. on Quartz Creek and one of its tributaries. Indications are that water chemistry is highly influenced by the extrusive igneous parent material of the Quartz Creek area. Sediment discharge is low in streams flowing through volcanic formations but increases as streams flow into sedimentary formations (sandstones and shales) at the lower end of the WSA. Except for local acid water conditions, which are diluted out, streams meet Colorado water quality standards for recreation, aquatic life, and municipal and agricultural uses.

MINERALS

Mining and Mineral Leasing Activity

Mining and mineral leasing activity in the WSA is summarized in Table 34.

TABLE 34

Current (As of April 30, 1982) Mineral Activity

Activity	Number	Acres
Patented Mining Claims	2	30
Unpatented Mining Claims	165	3,399
Producing Sites or Known Reserves	0	0
Federal Oil & Gas Lease Applications	3	2,940
Federal Oil & Gas Leases	7	3,320

There has been active exploratory core drilling by two companies on claim blocks within the Montezuma Peak portion of the WSA. This activity may continue by at least two separate interests. There is seismic exploration activity adjacent to the boundary of the V-Rock Trail portion of the WSA as well as oil and gas production in nearby fields.

Mineral Potential

Potential for locatable and leasable minerals in the WSA is summarized in Table 35.

TABLE 35

Potential for Locatable and Leasable Minerals

Area Rated As Having High/Moderate Potential For:	Acres	Percent of Study Area	
Locatable minerals	12,081	36.9	(All of which is in Montezuma Peak Area.)
Leasable minerals	15,632	47.7	(All of which is in V-Rock Trail Area.)

The Montezuma Peak portion of the WSA contains hydrothermally altered rock and a few potentially economic veins containing zinc, silver, and lead. The hydrothermally altered area and an associated aeromagnetic anomaly suggests a large buried porphyry deposit of molybdenum or copper. Evidence also suggests the occurrence of a large porphyry-type sulfide deposit buried 5,000 feet or more below the surface. Associated with this is a chimney-type deposit containing copper above the porphyry-type deposit at an estimated depth of a few hundred feet. There are indications that the area also contains zinc, silver, and lead.

In the V-Rock Trail portion of the WSA, the potential for locatable minerals is low. However, potential for leasable minerals is moderate to high. Significant quantities of oil and gas may be trapped in buried structures. Two known oil fields are within 4 miles of the southern boundary of the WSA. Geologic factors that suggest significant oil potentials are: (1) proximity of source beds capable of generating oil and gas, (2) abundance of porous sands which permit migration and storage, and (3) presence of favorable structural traps similar to those in nearby fields.

The entire WSA is considered to have low or no potential for geothermal resources, uranium, coal or natural gas.

The study report that supports the above information on both portions of the South San Juan Wilderness Expansion Study Area is the preliminary Survey Report of the United States Geological Survey and U. S. Bureau of

Mines Open-File Report 77-309, 1977, Mineral Resources of the Chama-Southern San Juan Mountains Wilderness Study Area, Mineral, Rio Grande, Archuleta, and Conejos Counties, Colorado and Spencer, C. W., Map Showing Oil and Gas Potential of the San Juan, Gunnison, Grand Mesa, and Uncompahgre National Forests in Colorado. U. S. Geological Survey Map (Unpublished), 1980.

LANDS

Lands Ownership

Total land area within the South San Juan Wilderness Expansion Study Area is approximately 32,800 acres of which 13,000 acres are in the Montezuma Peak portion and 19,800 acres are in the V-Rock Trail portion. There are two patented mining claims covering 30 acres within the Montezuma Peak portion, on which the Forest Service controls surface rights. These have been identified by the Forest Service as land desirable for acquisition. Throughout the remainder of the WSA, lands are federally owned in both surface and mineral estate and are administered by the Forest Service.

Special Land Uses

Presently there are no improvements authorized by Special Use Permit in the WSA.

Power Withdrawals

There are no power withdrawals within the WSA.

Water Developments

No existing or proposed impoundments, irrigation reservoirs, or distribution systems are located within the WSA. According to Colorado Water Resource Division records, no decreed water rights exist.

FACILITIES

There are three livestock water developments within the WSA. These are relatively small spring developments. There are also approximately 10 miles of allotment boundary and short drift fences that exist for livestock management purposes. There are no additional facilities other than approximately 35 miles of trails, which are maintained by the Forest Service and which are used primarily for recreation and livestock management. The Quartz Creek Trail (No. 571) borders the western edge of the Montezuma Peak area, then traverses through the WSA to its junction with the Continental Divide Trail (No. 813). The Continental Divide Trail itself borders the eastern edge of the Montezuma Peak area. Several trails traverse into and through the V-Rock Trail portion. These are Fish Creek Trail (No. 575), Leche Creek Trail (No. 576), Navajo Peak Trail (No. 577), and V-Rock Trail (No. 578). Road access to the V-Rock Trail portion is provided via the Buckles Lake Road (No. 663) and the Castle Creek Road (No. 770).

PROTECTION

Air Quality

The WSA is designated a Class II air quality area. This classification allows only moderate degradation over baseline concentrations of sulfur oxides and particulate matter.

Fire

Fire has always been a natural component of the ecosystems in the area. A naturally occurring fire regime has the effect of reducing fuels, maintaining wildlife habitat diversity, creating browse, and preventing the attainment of climax vegetation across large areas of land. Although wildfire occurrence is generally low, in recent years natural fires have generally been excluded from the area by intensive control and suppression efforts. Most fires result from lightning strikes and are controlled at less than 10 acres in size.

ALTERNATIVES AS THEY RELATE TO THE SOUTH SAN JUAN WSA

Eight separate alternatives concerning the suitability or unsuitability for wilderness designation of the WSA were incorporated within the ten alternatives considered in detail in the Forest Plan EIS. One WSA alternative is a suitable recommendation for wilderness designation of the WSA which is included in Alternatives A, G, and I. The others are a no action alternative (Alternative F) and six unsuitable for wilderness alternatives (Alternatives B, C, D, E, H, and J). The no action alternative maintains the qualities of the area which make it possible for inclusion in the National Wilderness Preservation System without a determination as to its suitability or unsuitability. The other six are resource development alternatives which emphasize unique combinations of market and non-market commodities.

The Wilderness Act of 1964 provides that all components of the National Wilderness Preservation System will be withdrawn from mineral entry on December 31, 1983. Additionally, the legislative history of the Colorado Wilderness Act of 1980 indicates that there is no intention to extend that date (Congressional Record, June 30, 1980, pages S9000-S9001). It was, therefore, assumed during both alternative formulation and the analysis that the WSA would be withdrawn from mineral entry if and when it was designated wilderness by Congress.

Table 36 shows acres by management area prescription under each alternative. Full descriptions of each prescription are found in Chapter III of the Plan. The areas to which the management prescriptions are applied in the respective alternatives are shown on maps in the back of this document.

ALTERNATIVES A, G, AND I - SUITABLE FOR WILDERNESS DESIGNATION

Alternatives A, G, and I recommend to Congress that the WSA is suitable for inclusion in the NWPS. Total area recommended as suitable is 32,800 acres.

TABLE 36

South San Juan WSA Acreage Allocation by Management Area Prescription for Each Alternative

Management Area Prescription	Emphasis	Alternatives							
		A, G, and I (Suitable)	F (No Action)	B	C	D	E	H (Proposed Action; Unsuitable - Resource Development)	J (Unsuitable-Resource Development)
				(Unsuitable - Resource Development)					
2A	Semi-primitive motorized recreation opportunities			12,577					4,466
3A	Semi-primitive non-motorized recreation opportunities			5,393	32,037	29,507	32,097	21,301	15,787
4B	Wildlife habitat for management indicator species							3,717	
6B	Livestock grazing							4,429	10,672
7B1	Wood-fiber production and utilization through improved genetic stock			906	60				
7C	Management of forested areas for wood-fiber production and utilization on steep slopes			397				60	
7E	Management of forested areas for wood-fiber production and utilization on gentle slopes			6,521				2,590	
8A	Pristine wilderness opportunities	22,720							
8B	Primitive wilderness opportunities	8,000							
8C	Semi-primitive wilderness opportunities	2,080							
N/A	Maintenance of the qualities of an area which make it possible for inclusion in the National Wilderness Preservation System		32,800						
9A	Riparian areas			703	703	703	703	703	703
9B	Increased water yield			6,303		2,590			1,172
Total		32,800	32,800	32,800	32,800	32,800	32,800	32,800	32,800

Under the suitable alternatives, 22,720 acres would be managed for pristine wilderness opportunities under the prescription for Management Area 8A. This prescription emphasizes protection and perpetuation of pristine biological and physical conditions and a high degree of solitude. Evidence of past human use is not perceptible.

On 8,000 acres the WSA would be managed for primitive wilderness opportunities under the prescription for Management Area 8B which emphasizes protection and perpetuation of essentially natural biological and physical conditions. On-site regulation of recreation use would be minimal, and travel would either be cross-country or over a low-density constructed trail system.

On the remaining 2,080 acres, management would be for semi-primitive wilderness opportunities under the prescription for Management Area 8C, which also emphasizes protection and perpetuation of essentially natural biological and physical conditions. Solitude and the absence of any evidence of past use are not essential ingredients in these areas. Human travel would be principally on system trails.

All resource management activities would be integrated so that evidence of current use, including permitted and recreation livestock, would not be noticeable the following season and so that natural biological processes would not be adversely or permanently changed by human use.

ALTERNATIVE F - NO ACTION

This alternative continues current management on the WSA by maintaining the qualities of the area which make it possible for inclusion in the NWPS. This accommodates the requirements of the Colorado Wilderness Act that the wilderness potential of the South San Juan Wilderness Expansion Study Area be maintained until Congress acts on the Administration's recommendation regarding the suitability or unsuitability of the area. Emphasis would be on perpetuating natural conditions. Primitive recreation experiences would be provided throughout most of the area, although motorized use would be permitted as long as wilderness potential is not jeopardized. Management activities would be carried out without leaving permanent or long-lasting evidence. No permanent structures would be allowed other than corrals, fences, and water developments.

RESOURCE DEVELOPMENT ALTERNATIVES (UNSUITABLE)

Under six alternatives, the WSA would be managed to provide a mix of market and non-market outputs. These alternatives recommend the WSA as unsuitable for wilderness designation and allow resource development which may be incompatible with wilderness values. On the WSA there is rather significant difference between the six resource development alternatives because the geographical and vegetation diversity of the area allows a variety of management area prescriptions to be applied. The six alternatives discussed below cover a wide range of resource development possibilities.

Alternative B

Alternative B has a high emphasis on market outputs and this emphasis is reflected in the resource allocation on the WSA (Table 36). Over a third of the area is managed under the prescription for Management Area 2A, which emphasizes semi-primitive motorized recreation opportunities such as snowmobiling, four-wheel driving, and motorcycling both on and off roads and trails. Timber management and grazing can also take place on this management area, as well as any non-motorized forms of recreation.

A fourth of the area is managed under prescriptions for Management Areas 7B1, 7C, and 7E. These emphasize production of wood fiber by applying various silvicultural systems to land of various slopes and vegetation types. A transportation system would be developed over portions of the WSA, allowing access for timber, grazing, mining, and various recreation uses.

The remainder of the WSA is managed mainly for semi-primitive non-motorized use and increased water yield. In both management areas, vegetation treatment can be applied to benefit a variety of resources, although in semi-primitive non-motorized recreation areas, it would only be carried out for improving habitat diversity, enhancing visual quality, and controlling insect and disease infestations.

The integrity of riparian areas within the WSA would be maintained under the prescription for Management Area 9A.

Alternative C

Alternative C emphasizes a mixture of market and non-market commodities, which will be achieved through modest increases in outputs such as livestock grazing, wildlife habitat, and visual quality. This emphasis has been translated into an allocation in which almost all of the WSA (98 percent) has the prescription for Management Area 3A applied (Table 36). This prescription emphasizes semi-primitive non-motorized recreation opportunities such as backpacking, hiking, hunting, fishing, and cross-country skiing. Investments in market outputs would be relatively low, and vegetation treatments, using both commercial and non-commercial means, would be carried out to improve wildlife habitat, enhance visual diversity, and control insect and disease infestations. Very few roads would be constructed and all would be closed to public use after their immediate purpose had been served.

Almost all of the remaining area would be managed for protection and maintenance of the riparian areas within the WSA under the prescription for Management Area 9A.

Alternative D

Alternative D emphasizes production of market outputs such as timber and livestock grazing under conditions of reduced administrative regulation and reductions in budget levels ranging from 15 to 25 percent during the

first five decades. The allocation (shown in Table 36) is similar to Alternative C in that most of the WSA (90 percent) is managed for semi-primitive non-motorized recreation opportunities (Management Area 3A).

Of the remaining ten percent, most is managed for increased water yield under the prescription for Management Area 9B. A variety of vegetation treatments, including commercial and non-commercial timber harvests, would be applied under this prescription in the appropriate vegetation zones.

The integrity of riparian areas within the WSA would be maintained under the prescription for Management Area 9A.

Alternative E

Alternative E is the RPA alternative, formulated to meet goals for the Forest as described in the Rocky Mountain Regional Guide. This emphasis has been translated into the allocation shown in Table 36. Approximately 98 percent of the WSA would be managed under the prescription for Management Area 3A, which emphasizes semi-primitive non-motorized recreation opportunities. This allocation is almost identical to that of Alternative C.

The integrity of riparian areas on the WSA would be maintained under the prescription for Management Area 9A.

Alternative H

Alternative H is the proposed action which emphasizes production of market outputs such as timber and livestock grazing while slightly increasing water yield, dispersed recreation, wildlife habitat, visual quality, and mineral resources. The allocation for this alternative, which is shown in Table 36, involves a variety of prescriptions to achieve this mix of market and non-market outputs.

Approximately 65 percent of the WSA is managed under the prescription for Management Area 3A, which emphasizes semi-primitive non-motorized recreation opportunities. This management area would provide a variety of experiences including hiking, backpacking, hunting, fishing, and cross-country skiing. Opportunities to benefit other resources would be limited to vegetation treatment for improvement of wildlife habitat, enhancement of visual quality, and control of insect and disease infestations. Some investments in uses such as livestock grazing and minerals development may occur, although any roads constructed would be subsequently closed to public use.

Slightly less than 15 percent of the WSA would be managed under the prescription for Management Area 6B, which emphasizes livestock grazing. Intensive grazing systems would be used, combining both structural and non-structural improvements to enhance forage production and utilization. Limited road system development would occur specifically to accommodate this emphasis, although other resource uses would also be allowed.

Slightly less than ten percent of the WSA would be managed under the prescription for Management Area 4B, which emphasizes meeting the habitat requirements of one or more management indicator species with the goal of optimizing habitat capability. On these areas recreation use would be regulated to favor needs of designated wildlife species. Vegetation treatment, including both commercial and non-commercial means, would be used to accomplish wildlife objectives and, to a lesser extent, other resource objectives.

Approximately eight percent of the area would be managed for wood-fiber production (Management Area 7E), and most of the remaining area would be managed to retain the integrity of riparian areas (Management Area 9A).

Alternative J

Alternative J is an output alternative which emphasizes market outputs having potential to produce income to the U. S. Treasury. This emphasis is reflected in the allocation shown in Table 36.

Although almost half of the area is managed to emphasize semi-primitive non-motorized recreation opportunities (Management Area 3A) this is less under such an emphasis that any other resource development alternative except Alternative B. An additional one-third of the WSA is managed to emphasize livestock grazing (Management Area 6B) while almost 15 percent is under the prescription for Management Area 2A which emphasizes semi-primitive motorized recreation opportunities. Timber harvesting and livestock grazing would occur on both of these management areas. The remainder of the WSA would be managed to emphasize increased water yield (Management Area 9B) and to maintain the integrity of riparian areas (Management Area 9A).

RESOURCE ENVIRONMENTAL CONSEQUENCES

This section describes environmental consequences as they relate to individual resources. All alternatives are discussed in the narrative, although only Alternatives A, G, and I (suitable), Alternative F (no action), Alternative B (maximum resource development on the WSA), and Alternative H (proposed action) are compared in tables and in the economic analysis. These "comparison" alternatives articulate the full range of outputs and environmental consequences resulting from any alternative.

RECREATION

Under Alternatives A, G, and I, which are suitable recommendation to Congress, the WSA would be managed for pristine wilderness opportunities on 22,720 acres, for primitive wilderness opportunities on 8,000 acres, and for semi-primitive wilderness opportunities on 2,080 acres. The WSA could theoretically accommodate 37,000 recreation visitor days (RVD's) of wilderness recreation per year while still meeting desired wilderness experience objectives and protecting wilderness resource values. Some visitors would use the area for a wilderness experience of one day duration or less, while others would stay longer. Major activities would include backpacking, hiking, horseback riding, big game hunting, viewing scenery and cross country skiing.

Under Alternative F, the no action alternative, the WSA would be managed for semi-primitive non-motorized recreation opportunities on approximately 26,400 acres, and for semi-primitive motorized recreation opportunities on approximately 6,400 acres. Theoretically, the area could accommodate 46,000 RVD's annually. Motorcycle and snowmobile use would be permitted to continue in areas where such uses now occur, but use would be controlled if maintenance of wilderness qualities were jeopardized. Other activities similar to those under Alternatives A, G, and I would occur.

Alternative B provides for maximum resource development. Under this alternative the WSA would be managed for semi-primitive non-motorized recreation opportunities on approximately 6,096 acres, for semi-primitive motorized recreation on approximately 12,577 acres, and for roaded natural recreation opportunities on approximately 14,127 acres, resulting in a theoretical capacity of approximately 130,000 RVD's annually. Major uses would include road oriented recreation, particularly for big game hunting, and viewing scenery, and a significant amount of motorcycle use and some snowmobiling would also occur. There would still be opportunities for hiking, backpacking and horseback riding, but user conflicts between these semi-primitive forms of recreation and road oriented recreation could develop due to the limited area of the WSA.

Alternative H, the proposed action, is also a resource development alternative. Under this alternative, the WSA would be managed for semi-primitive non-motorized recreation on approximately 22,004 acres and for roaded natural recreation on approximately 10,796 acres, resulting in a theoretical capacity of approximately 73,000 RVD's annually. Major types of recreation uses would be similar to those under Alternative B.

Under the other resource development alternatives, Alternative J provides for a theoretical annual recreation capacity similar to that of Alternative B, while Alternatives C and B would have capacities between that of Alternative F (no action) and Alternative B (maximum resource development). All of these resource development alternatives would have similar types of recreation opportunities. Levels of predicted use would be proportional to the amount of theoretical capacity, so that Alternative J would have predicted use similar to that of Alternative B, while Alternatives C and D would have predicted use levels between that of Alternative F and Alternative H. Alternative E would provide for semi-primitive non-motorized recreation opportunities on the entire WSA. Since no road oriented recreation opportunities would be provided, predicted use levels under Alternative E would be similar to those under Alternative F (no action).

Table 37 compares the predicted recreation use for the "comparison" alternatives.

Alternative B (maximum resource development) provides for road oriented recreation opportunities on approximately 43 percent of the area, and for semi-primitive motorized recreation opportunities on approximately

TABLE 37

Predicted Recreation Use by Alternative in Thousand Recreation Visitor Days

Alternative	1980	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
A, G, and I (suitable)		7.0	8.0	10.0	11.0	13.0	14.0
F (no action)	5.2	7.0	8.0	11.0	12.0	14.0	16.0
B (unsuitable - maximum resource development)		7.0	10.0	13.0	16.0	20.0	23.0
H (proposed action)		7.0	9.0	12.0	14.0	16.0	19.0

38 percent of the area. Under this alternative, predicted use levels would be the highest of any alternative. Alternative H (proposed action) provides for road oriented recreation opportunities on about 33 percent of the WSA and, consequently, predicted use levels would be less than those of Alternative B. Alternative F (no action) provides for semi-primitive motorized recreation opportunities on only about 20 percent of the area; therefore, predicted use levels would be even lower than those of Alternative H. Under Alternatives A, G, and I, wilderness designation of the WSA, wilderness visitors would use the area for day trips as well as for longer trips.

Cultural and Historic Resources

There are no known cultural or historic sites in the WSA, and the potential for significant sites to exist in this area is low to moderate. Therefore, environmental consequences on these resources would probably be limited under all alternatives.

Under Alternatives A, F, G, and I, any existing cultural or historic sites would not be subject to potentially damaging resource development. However, the opportunity for major cultural history research and data recovery projects would also be low under these alternatives, and both the no action and the suitable alternatives would substantially constrain the opportunity to develop any major site as a recreational attraction. There is only a remote possibility that significant sites requiring such development exist in the WSA; therefore, potential adverse consequences under Alternatives A, F, G, and I are low. Management activities such as road construction and vegetation treatment activities under all the resouce development alternatives have the potential to damage these resources; however, the probability of adverse

consequences would be low because of the limited potential for significant sites to exist and the unlikelihood of significant development due to terrain and access problems.

There are no known effects on Native American religious values under any alternative.

Visual Resource

Under Alternatives A, F, G, and I, the natural landscape character would be maintained primarily by natural ecological forces. The visual quality objective of preservation would be prescribed for the area to assure naturalness.

Under Alternative B, the maximum resource development alternative, various management practices could impact the existing visual quality. These practices could occur on approximately 26,704 acres, or 81 percent of the WSA. For example, road construction would be required for vegetation treatment and the vegetation treatment itself would alter the visual quality. Mitigation measures described in the Forest and Management Area Direction (Chapter III of the Forest Plan) would keep the impacts within the visual quality objectives for the area.

Under Alternative H (proposed action), the types of impacts on visual quality would be similar to those under Alternative B, but the area allocated to resource development would be approximately 10,796 acres, or less than one-half the acres allocated to such development under Alternative B. Consequently, the total impact on the WSA would be significantly less.

The effects on visual quality of Alternative J would be similar to those of Alternative B, but would occur on slightly fewer acres. Alternative D would have effects significantly less than Alternative H (proposed action). Alternatives C and E would have the least adverse effects on visual quality of any of the resource development alternatives since these alternatives provide for the least amount of vegetation treatment.

Mineral development of valid mineral claims and leases under all alternatives could result in localized site degradation and in landscape alteration. Mitigation measures described in the Forest and Management Area Direction under all alternatives would keep these impacts at a level commensurate with the form of management prescribed.

WILDERNESS

The entire South San Juan Expansion WSA has been managed to retain its wilderness character since its designation as a WSA. Alternatives A, G, and I would provide additional wilderness opportunities in an area where localized portions of existing wilderness are being heavily used.

Under Alternatives A, G, and I, all current motorized recreation use would be prohibited, and mineral exploration would not be permitted subsequent to the area's designation as wilderness.

Under Alternative F, the no action alternative, mineral exploration would be permitted to continue on the entire area after December 31, 1983. Road building associated with mineral development could adversely affect the natural integrity, apparent naturalness, and the opportunities for solitude and primitive recreation which presently characterize the area. The loss of these attributes would lower the area's potential for future wilderness designation. Mineral exploration and development opportunities and consequences are more fully described in the Minerals section of this chapter. Under Alternative F, a relatively minor amount of motorcycle and snowmobile use would continue to occur on approximately 6,400 acres within the area. This semi-primitive motorized recreation use would not of itself result in a loss of wilderness attributes, and would not lower the area's potential for future wilderness designation. Management of the remaining 26,400 acres for semi-primitive non-motorized recreation would likely maintain wilderness attributes on that portion of the area.

Under Alternative B, the potential effects of mineral development and associated road building would be similar to those under Alternative F. In addition, vegetation treatment activities, and roads associated with such activities, could occur on approximately 26,704 acres. Such activities would have a significantly adverse effect on the natural integrity, apparent naturalness, and on the opportunities for solitude and primitive recreation that now characterize the WSA; therefore, the potential for future wilderness designation would be reduced on that portion of the WSA. Management of the remaining 6,096 acres for semi-primitive non-motorized recreation opportunities would likely maintain wilderness attributes on that portion of the area, where vegetation treatment might occur only to enhance visual quality or diversity and for insect and disease control.

Under Alternative H, the proposed action, the types of consequences on the area's potential for future wilderness designation would be similar to those of Alternative B, but substantially less adverse. Alternative H provides for vegetation treatment with roads which would result in a potential loss of wilderness attributes on approximately 10,796 acres. Semi-primitive non-motorized recreation opportunities would be provided on about 22,004 acres and such management would likely maintain wilderness attributes on that portion of the area.

Under the remaining resource development alternatives, Alternative J would provide for development on approximately 16,310 acres with a resulting potential loss of wilderness attributes on approximately one-half of the WSA. Management of the remaining 16,490 acres for semi-primitive non-motorized recreation opportunities would likely maintain wilderness attributes on that portion of the area. Alternative D would provide for resource development on approximately 2,590 acres, with the remaining acreage managed for semi-primitive non-motorized opportunities. Alternatives C and E would have the least potential adverse consequences on wilderness attributes, since virtually all of the WSA would be managed for semi-primitive non-motorized recreation under these alternatives. While some vegetation treatment might occur under Alternatives C and E, the management objectives of such treatment would be to enhance visual quality or diversity and for

insect and disease control. The attributes of natural integrity, apparent naturalness, and opportunities for solitude and primitive recreation which currently characterize the WSA would tend to be retained over large portions of the area under Alternatives C and E.

In summary, the alternatives other than Alternatives A, G, and I all have varying potential adverse effects on wilderness attributes and subsequent reduction in the area's potential for future wilderness designation. Ranked in order from most adverse to least adverse affects, the alternatives would be Alternatives B, J, H, D, C, E, and F.

WILDLIFE

As a general rule, the more human activity or development in an area, the greater the impacts on wildlife. Conversely, those alternatives having the least development or human activity will also provide the least opportunities for vegetation treatment to benefit wildlife. Under Alternatives A, G, and I, any benefits to wildlife would result from natural fire or natural succession as no treatment activities would take place. Consequences on wildlife from recreation and grazing would be minimal. The present natural diversity resulting from variations in landform, geology, and soil types across the WSA would continue to fulfill certain habitat niche requirements for the species present on the area.

Under the resource development alternatives a range of wildlife impacts are possible depending on the amount of road construction and other activities and developments in the WSA. Alternatives B, H, and J have the greatest potential to adversely affect wildlife because of developments associated with emphasizing wood fiber production, livestock grazing, and to a lesser extent motorized recreation opportunities. Alternatives C, D, and E have most of the area under management for semi-primitive non-motorized recreation, and therefore wildlife impacts would be significantly less. Mitigation measures outlined in Forest and Management Area Direction would be used to minimize the extent or duration of impacts.

The resource development alternatives also allow for an array of possible management activities that could improve wildlife habitat. Opportunities would be available to use timber harvesting, prescribed burning, and other vegetation treatments in proportion to the area managed under prescriptions providing for such activities. Alternatives B, H, and J would provide the greatest opportunities and Alternatives C, D, and E would provide the least. Most favored under Alternatives B, H, and J would be those species requiring some mix of early and late successional stages of vegetation and least favored would be those requiring large areas of homogeneous or late successional vegetation. Alternative H has approximately 3,700 acres managed specifically to emphasize wildlife habitat for indicator species, and this would further boost wildlife numbers in the WSA.

RANGE

In the short term, livestock use and management activities would not change significantly under Alternatives A, F, G, and I. Livestock use

levels would remain at approximately 1,740 animal unit months (AUM's) per year. Over an extended period of time, however, natural succession would replace deciduous trees and grasslands with coniferous vegetation. With increasing tree density and crown closure of stands of trees, the quantity of understory forage would decrease, with a resulting decrease in grazing capacity.

Under Alternative B, the unsuitable alternative with maximum resource development, vegetation treatment would be provided for on 26,704 acres of the WSA, primarily to maintain a healthy forest cover and to increase water yield. This treatment could increase transitional livestock forage sufficiently to support approximately 1,820 AUM's per year annually by the year 2030.

Under Alternative H, the proposed action, domestic livestock grazing would be emphasized on approximately 4,429 acres of the WSA. The management practices under this emphasis, along with vegetation treatment activities on an additional area of approximately 6,367 acres, could increase forage supplies sufficiently to support approximately 1,840 AUM's annually by the year 2030.

Table 38 displays the estimated grazing use in AUM's for Alternatives B and H by time periods.

TABLE 38

Estimated Grazing Use for Alternatives 3 and 7

	Time Periods					
Alternative	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Alternative B (maximum resource development)	1,740	1,740	1,760	1,780	1,800	1,820
Alternative H (proposed action)	1,740	1,740	1,765	1,790	1,815	1,840

Under the other resource development alternatives, Alternative J would provide for livestock emphasis and vegetation treatment for other purposes sufficiently to increase grazing capacity to a level higher than Alternative H. Alternative D does not provide for any specific emphasis on livestock grazing, but other vegetation treatment could serve to improve useability and range condition to capacity level between that of the current level and Alternative B. Alternatives C and E provide for virtually no vegetation treatment other than to enhance

visual quality and diversity, and for insect and disease control; therefore, grazing capacity levels under these two remaining resource development alternatives would probably remain at the current level. Structural range improvements could be provided under all resource development alternatives to improve utilization of forage.

TIMBER

Alternatives A, F, G, and I would preclude management for timber production on the entire 32,800 acres. This timber foregone represents an opportunity cost of these alternatives.

All resource development alternatives could theoretically permit timber management on the entire 22,130 acres of capable forest land identified in Chapter III. On a portion of this area, timber harvesting would not be considered technically or economically feasible because of steep slopes, fragile soils and low timber stand volumes. Actual timber yield from the WSA would be governed by land use allocation since some management prescriptions preclude management for timber production.

Table 39 shows area of suitable timber by vegetation type and size class for Alternative B (maximum resource development) and Alternative H (proposed action). All other resource development alternatives would have somewhat less suitable acres than Alternative B. This alternative classifies 13,580 acres as suitable for timber production, which is 61 percent of the capable forest land within the WSA. Most of the suitable Forest land (65 percent) under the suitable alternative is in the spruce-fir timber type and over 99 percent is in the sawtimber size class.

TABLE 39

Area of Suitable Timber by Type and Stand Size Class for Alternatives B and H

		Stand Size Class				
Alternative	Timber Type	Non-stocked (Acres)	Seedling/ sapling (Acres)	Pole timber (Acres)	Saw-timber (Acres)	Total
B (maximum resource development)	Ponderosa pine	-	-	-	-	-0-
	Spruce-fir	56	-	40	8,735	8,831
	Douglas-fir	-	-	-	814	814
	Aspen	-	-	-	3,935	3,935
	Total	56	-	40	13,484	13,580
H (proposed action)	Ponderosa pine	69	-	-	-	69
	Spruce-fir	54	-	41	4,000	4,095
	Douglas-fir	-	-	-	1,216	1,216
	Aspen	-	17	-	2,718	2,735
	Total	123	17	41	7,934	8,115

Under the proposed action Alternative H, 8,115 acres are classified as suitable, for timber production, representing 37 percent of the capable forest land. Approximately half of the suitable land is spruce-fir timber type, and over 97 percent of the land is in the sawtimber size class.

Table 40 shows long-term sustained yield for both Alternatives B and H. Long-term sustained yield is calculated by multiplying the estimated growth rate of managed stands by the number of suitable forest acres. This is the amount that could be produced if all suitable land were under full timber regulation such that harvest volume could equal growth. Actual timber harvest levels during the foreseeable future would be somewhat less than long-term sustained yield mainly because of the uneven distribution of timber size classes on suitable land. With over 95 percent of the suitable land in the sawtimber size class, under either alternative, estimated harvest volume is significantly less than long-term sustained yield potential. Estimated timber harvests for Alternatives B and H are shown in Table 41.

TABLE 40

Long-Term Sustained Yield of Suitable Forest Land by Timber Type for Alternatives B and H

Alternative	Timber Type	Thousand Cubic Feet Per Year	Thousand Board Feet Per Year
B (maximum resource development)	Ponderosa pine	2	8
	Spruce-fir	355	1,420
	Douglas-fir	961	3,844
	Aspen	190	760
	Total	1,508	6,032
H (proposed action)	Ponderosa pine	3	10
	Spruce-fir	221	885
	Douglas-fir	67	269
	Aspen	55	219
	Total	346	1,383

By placing up to 13,580 acres under timber management, additional non-timber benefits would accrue. Timber harvesting results in increased forage available to both domestic livestock and wildlife. It also affords opportunities for treating fuels for fire hazard reduction, increased water yield, improved visual quality and diversity, and for

TABLE 41

Estimated Annual Timber Volume for Alternative B (Million Board Feet)

Alternative	Time Periods 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Alternative B (maximum resource development)	0	1.00	1.50	1.50	1.50	1.50
Alternative H (proposed action)	0	0.60	0.77	0.80	0.84	0.88

insect and disease infestation. The other resource development alternatives would all have consequences of timber management less in intensity and magnitude than Alternative B. Alternative H (proposed action) is the only other alternative under which a significant portion of the area is managed for emphasis on wood fiber production. Alternative J has a significant area under prescriptions emphasizing other outputs but on which management for timber production is also planned. The remaining alternatives (Alternatives C, D, and E) have little or no land on which management for timber production will occur, and therefore consequences of timber production, including timber outputs, would be minor.

Additional assumptions are related to the timber volume estimates for the resource development alternatives. One is that, although volumes would be added to the long-term productive capacity of the Forest, they would not necessarily be immediately available for harvest. The WSA would require an extensive and well-planned road system. Logistics and budgetary restrictions could limit road system development to several years or more. Also, these timber estimates are not meant to imply that a fixed amount of timber would be harvested from the WSA every year. Harvesting could take place elsewhere on the Forest at higher levels now because, at some future point, volume from the WSA would be harvested.

WATER

Water Yield

Under Alternatives A, G, and I, water management activities in the WSA, with the exception of cloud seeding, would be precluded unless specific project approval were given by the President of the United States. Most alpine snowpack management activities such as snowfence construction and small clearcuts are incompatible with wilderness management. Under the resource development alternatives the WSA would be available for a range

of water management activities, most of which would be located in the spruce-fir and aspen vegetation zones. Table 42 shows average annual water yield for the "comparison" alternatives. Alternative B would have the highest water yield increases of any alternative. Not only does it have the largest area under management for increased water yield, but it also has the largest portion of the area under management for wood-fiber production. This results in a 1.5 percent increase in water yield by the end of the 50-year planning period. All other resource development alternatives would have somewhat less of an increase. The proposed action has almost a one percent increase, and Alternatives D and J would be expected to have slightly less water yield. Alternatives C and E, with no area under management for increased water yield or wood-fiber production would not be expected to have any significant water yield increase.

TABLE 42

Average Annual Water Yield (Acre-feet) by Alternative

	Time Periods					
Alternatives	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Alternatives A, G, and I (suitable)	49,360	49,360	49,360	49,360	49,360	49,360
Alternative B (maximum resource development)	49,360	49,420	49,590	49,760	49,940	50,110
Alternative H (proposed action)	49,360	49,390	49,480	49,580	49,690	49,800

Water Quality

Under Alternatives A, F, G, and I overall water quality could easily be maintained at existing high levels, although some local degradation could occur from recreation use along streams and around Opal and Crater Lakes. Mitigation measures, including user education programs, camping restrictions, and limitations on numbers of users, would be implemented as needed to maintain water quality.

Under the resource development alternatives, specifically Alternatives B, H, and J, road construction and timber harvesting could be expected to increase sediment yield by up to 20 percent. Increases would vary depending on the type and amount of road construction and

timber harvesting. Through application of mitigating measures, sediment yield could be maintained within allowable sediment limits.

Under the remaining resource development alternatives (Alternatives C, D, and E) the absence of any significant road development or other ground disturbing activities would result in high overall water quality for the WSA.

Water Uses and Water Rights

Neither the suitable alternatives nor the resource development alternatives would significantly affect existing water uses within the WSA. The suitable alternatives would preclude development of hydro-electric sites, although no interest in such projects is anticipated. The potential to augment water yield for increasing downstream industrial and agricultural needs would be eliminated. Opportunities to meet water development needs for livestock grazing within the WSA would be provided under the resource development alternatives, but would be more difficult under the suitable alternatives because of restrictions on use of mechanized equipment.

MINERALS

The alternatives differ somewhat in their effects on the various stages of mineral exploration and development. Mineral exploration activities can legally take place under any alternative and may be undertaken regardless of designation, at least until the end of 1983. If an operator has adequate time to do the required exploration and is not unreasonably restricted in access and movement within the area, the feasibility of developing a mineral resource will be based on the normal costs of doing business. This will be the case under all alternatives except Alternatives A, G, and I. If, on the other hand, an operator foresees that there will not be time to validate claims prior to designation, or that access and movement will be severely restricted, he may be discouraged from further investment in the exploration effort. The additional costs of mitigation and restoration for exploration and development might make a feasible project uneconomical under Alternatives A, G, and I.

Rehabilitation of disturbed sites to a condition suitable for semi-primitive, non-motorized recreation under the no action and resource development alternatives would generally be feasible and reasonable. This would involve regrading, revegetating, and restoring production of the land but not necessarily restoring the original contours of the land surface. Large flat areas could remain as evidence although the area would be essentially natural in character. Rehabilitation of disturbed sites to a condition suitable for wilderness would mean restoration of natural ecosystems. In many cases, this degree of restoration is probably not technically or economically feasible in the short-term.

As of April 30, 1982, there were 165 unpatented mining claims, comprising approximately 3,399 acres, seven oil and gas leases comprising approximately 3,320 acres, and three oil and gas lease applications,

comprising approximately 2,940 acres, located on the WSA. About 36.9 percent the WSA is rated as having a high to moderate potential for locatable minerals and 47.7 percent is so rated for leasable minerals. Although mineral exploration and development may legally take place under any alternative, feasibility under Alternatives A, G, and I may be limited by increased access costs as well as environmental constraints and mitigation measures required in operating plans. There is also the possibility that mineral discoveries could be foregone following withdrawal of the WSA from mineral location and leasing on December 31, 1983.

LAND STATUS

Alternatives A, G, and I would result in withdrawal of the area from mineral entry after December 31, 1983 under provisions of the 1964 Wilderness Act. Because of this, the remaining alternatives would have a greater possibility of land being taken to patent under provisions of existing mining laws. None of the alternatives would have apparent effects upon special land uses in the WSA.

LANDFORM AND SOILS

Under Alternatives B, C, D, E, H, and J a number of soil disturbing practices associated with vegetation treatment and road building activities could occur. On slopes less than 30 percent, soils in the WSA could support most resource development activities with little damage. Most soils on these gentle slopes are quite productive and recover quickly from disturbances. On steeper slopes, however, erosion hazard and risk of slope failures increase. This is especially true with Leal and Castellia soils, where application of mitigating measures would be necessary to maintain soil resource damage within tolerable limits.

Alternatives A, F, G, and I would essentially have little effect on the soils resource. Natural forces and erosion rates that are presently acting on the area would continue, and there would be no major increases in erosion or sedimentation.

PROTECTION

Air Quality

There is no evidence to indicate that selection of any alternative would impact either the current Class II air quality designation or air quality protection requirements within or without the area.

Fire

Under Alternatives A, G, and I, fire could potentially resume its natural role in the ecology of the area. Because of the area's limited size, as well as the need to protect adjacent areas from wildfire, it would not be possible to implement a complete natural fire policy. Nevertheless, a fire management policy incorporating the use of naturally occurring fires burning within prescription could be imple-

mented to promote a wilderness environment truly shaped by naturally-occurring phenomena. Without such a policy, wildfire occurrence and intensity would increase in the long term due to natural accumulation of ground fuels. As the possibility of major fires increases, adjacent lands would be increasingly threatened as well. Under these alternatives, transportation of personnel to fires, as well as suppression efforts, would be generally restricted to non-mechanical means. This would increase response time and enhance the likelihood of larger fires.

Under the no action and resource development alternatives, a more aggressive fire management program would be in effect. The primary differences would be that the option of using mechanical means for transportation and suppression exists in areas where the terrain would permit. Increased use of the area under any alternative could increase the occurrence of man-caused fires.

Integrated Pest Management

Under Alternatives A, F, G, and I, opportunities for utilizing an integrated approach to pest management would be very limited. Prevention and control of insect and disease outbreaks using integrated pest management would be limited to those situations in which non-wilderness values on adjacent lands are threatened.

Under the resource development alternatives, opportunities would be available to coordinate pest management with other resource management activities. Chemical control of noxious weeds and removal of high risk stands through timber sales for prevention and control of insect outbreaks are examples of such activities.

VEGETATION

Under Alternatives A, F, G, and I, vegetation within the WSA would continue to be influenced mainly by natural ecological forces. Livestock grazing and dispersed recreation will continue to be the major man-caused impacts unless major mineral developments occur, which could remove some land from production. Although reclamation can return disturbed areas to production, vegetation composition and productivity could be influenced over a long period of time due to the slow recovery of fragile alpine and sub-alpine ecosystems. Natural fire burning under prescription would perpetuate aspen vegetation.

Under all resource development alternatives, vegetation could be modified in order to improve or maintain a healthy forest cover, to improve wildlife habitat and domestic livestock range, and to increase water yield. The greatest amount of vegetation treatment would occur under Alternative B, which provides for these activities to occur on approximately 26,704 acres. Under Alternative J, vegetation treatment activities would be provided for on approximately 16,310 acres. Alternative H (proposed action) provides for vegetation treatment on approximately 10,796 acres. Under Alternative D, approximately 2,590 acres would be allocated to vegetation treatment activities. Alternatives C and E would provide for the least amount of vegetation treatment, since these alternatives provide for managing virtually all of the WSA for

semi-primitive non-motorized recreation opportunities. As in all other resource development alternatives, however, semi-primitive non-motorized recration management would provide for vegetation treatment where necessary to enhance visual quality and diversity and for insect and disease control.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Table 43 summarizes the environmental consequences of the suitable alternatives (A, G, and I), the unsuitable alternative representing the maximum resource development on the WSA (Alternative B) and the proposed action (Alternative H). Consequences of Alternative F, the no action alternative, are also shown as a standard of comparison.

ECONOMIC AND SOCIAL IMPACTS

ECONOMIC EFFECTS

While there is a significant difference between the alternatives for the South San Juan Expansion Wilderness Study Area in relation to overall management of the Forest, none would have significant impacts either on cost-efficiency of the Forest or on the social and economic integrity of nearby residents and communities. Economic impacts of Alternatives A, G, and I (suitable), Alternative B (maximum resource development), and Alternative H (proposed action) were estimated using a regional Input-Output (I-O) model (IMPLAN). The analysis was based on estimates of outputs in index year 1995 which were used to determine total income, employment, and population that can be directly or indirectly associated with resources produced on the WSA. Cost-efficiency of these three alternatives was also analyzed to arrive at present net values incremental from Alternative F (no action). These were based on estimating outputs and costs and discounting all dollar values to the present. Economic effects of Alternatives C, D, E, and J would be intermediate between the extremes represented by the suitable alternatives (A, G, and I) and Alternative B.

Income, Employment, and Population

The IMPLAN model used to estimate effects on income, employment, and population is based on historic data and therefore is not responsive to changes in exogeneous variables such as national markets, interest rates, inflation, and other changes outside the economic impact area. Input-output models are most adapted to estimating short-term effects in local economies, and application of the model was based on the assumption that historic relationships between forest outputs and income, population, and employment levels will remain unchanged through the year 1995.

The IMPLAN model was run based on estimated outputs from the WSA in index year 1995. Total rather than incremental outputs were used to figure the total income, employment, and population levels that are either directly or indirectly associated with resources produced on the WSA. Results are shown in Table IV-44.

TABLE 43

Summary of Environmental Consequences (Outputs are average annual - summary of all periods unless otherwise noted)

Resource	Unit of Measure	Alternatives			
		F (No Action)	A, G, and I (Suitable)	B (Unsuitable - Maximum Resource Development)	H (Unsuitable - Proposed Action)
WILDERNESS					
Potential loss of wilderness character 1/		Very Low	None	Increased	Increased
Change in wilderness attributes 1/					
Natural Integrity		No Change	No Change	Decreased	Decreased
Apparent Naturalness		No Change	No Change	Decreased	Decreased
Solitude		No Change	Increased	Decreased	Decreased
Primitive Recreation Opportunity		No Change	Increased	Decreased	Decreased
Supplementary Attributes		No Change	No Change	Decreased	Decreased
Scenic Value		No Change	No Change	Decreased	Decreased
Addition to the National Wilderness Preservation System	Acres	-0-	32,800	-0-	-0-
RECREATION OPPORTUNITY					
Dispersed recreation capacity	Thousand Visitor Days 2/	46	-0-	130	73
Projected dispersed recreation use	Thousand Visitor Days	12.1	-0-	17.1	17.1
Wilderness recreation capacity	Thousand Visitor Days	-0-	37	-0-	-0-
Projected wilderness recreation use	Thousand Visitor Days	-0-	11.1	-0-	-0-
Area open to motorized use	Acres	6,400	-0-	27,407	10,796
FISH AND WILDLIFE					
Habitat improvement opportunities 1/		Low	Very Limited	Increased	Increased

TABLE 43 (Continued)

Summary of Environmental Consequences (Outputs are average annual - summary of all periods unless otherwise noted)

Resource	Unit of Measure	Alternatives F (No Action)	A, G, and I (Suitable)	B (Unsuitable - Maximum Resource Development)	H (Unsuitable - Proposed Action)
RANGE LIVESTOCK					
Grazing use	Animal Unit Months 3/	1,740	1,740	1,780	1,790
Grazing capacity 1/		No Change	Decreased	Increased	Increased
TIMBER					
Forest land capable and available for timber production	Acres	-0-	-0-	22,131	22,131
Forest land suitable for timber management		-0-	-0-	13,580	8,115
Long-term sustained yield potential	Million Board Feet	-0-	-0-	2.4	1.4
Annual sales offerings	Million Board Feet	-0-	-0-	1.3	0.7
WATER QUALITY					
Risk of pollution caused by recreation and other use 1/		No Change	Decreased	Increased	Increased
Risk of pollution caused by surface disturbing activities 1/		No Change	Decreased	Increased	Increased
WATER USES					
Feasibility of planned or proposed water developments		Not feasible at this time.	Not feasible at this time.	Not feasible at this time.	Not feasible at this time.
Likelihood of development of water storage facilities		Low	None 4/	Low	Low
Effects on existing water uses		None	None	None	None

TABLE 43 (Continued)

Summary of Environmental Consequences (Outputs are average annual - summary of all periods unless otherwise noted)

Resource	Unit of Measure	Alternatives			
		F (No Action)	A, G, and I (Suitable)	B (Unsuitable - Maximum Resource Development)	H (Unsuitable - Proposed Action)
WATER QUANTITY					
Water yield	Acre-Feet	49,335	49,335	49,764	49,589
MINERALS					
Cost of Exploration 1/		No Change	Increased	Decreased	Decreased
Likelihood of significant mineral discovery and development		Low	Low	Low	Low
Costs of administering mineral activity 1/		No Change	Increased	Decreased	Decreased
LANDOWNERSHIP					
Likelihood of future private ownership under mineral patents 1/		No Change	Decreased	No Change	No Change
PROTECTION					
Integrated pest management opportunities 1/		No Change	Decreased	Increased	Increased
SOCIAL AND ECONOMIC					
Present net value (4 percent discount rate) 1/ and 5/	Thousand Dollars	N/A	-1,342	-1,752	-1,073
Income 5/ and 6/	Million Dollars	Not Calculated	0.66	1.23	1.05
Employment 6/	Jobs	Not Calculated	38	70	60
Population 6/	Persons	Not Calculated	86	156	134

1/ Changes are estimated using the No Action Alternative as a basis of comparison.
2/ Recreation Visitor Day = 12 hours of recreation for one person or one hour of recreation for 12 persons or any combination thereof.
3/ Animal Unit Month = The amount of forage consumed by one mature cow or its equivalent in a one-month period.
4/ Except as provided for under authority of the President in the 1964 Wilderness Act.
5/ Expressed in terms of 1978 dollars.
6/ Based on the total estimated outputs in index year 1995 which are directly or indirectly attributed to South San Juan Wilderness Expansion Study Area outputs and activities.

TABLE 44

Income, Employment, and Population Associated with Total Resource Outputs from the South San Juan Expansion Wilderness Study Area

	Alternative		
	A, G, and I (Suitable)	B (Maximum Resource Development)	H (Proposed Action)
Income (Million 1978 Dollars)	0.66	1.23	1.05
Employment (Number of Jobs)	38	70	60
Population	86	156	134

Under Alternatives A, G, and I approximately 38 jobs are either directly or indirectly associated with the recreation and grazing outputs from the WSA. Recreation use would be mostly backpacking, hiking, hunting, and fishing, all of which support jobs in local sectors such as retail trade and lodging. Under Alternative B (maximum resource development), not only are grazing and recreation uses higher, but timber is also produced, and this is associated with additional jobs in the logging and sawmilling sectors. Because of these higher output levels, income and employment are almost double what they are under the suitable alternative. Alternative H (proposed action) has associated income and employment levels intermediate between these two alternatives because timber and recreation outputs are themselves intermediate between the two alternatives.

A caution is in order with respect to interpreting these data. Table 44 indicates that approximately 60 jobs are associated with outputs from the WSA under Alternative H, but only 38 under Alternatives A, G, and I. This is not equivalent to stating that if the proposed action is implemented 22 jobs will be created within the region. One reason for this is that if the proposed action is implemented, the short term harvest level of the Forest will not necessarily increase by an amount equivalent to the estimated harvest volume from the WSA. In the short run, less cutting will likely occur in other areas of the Forest because of the timber that is removed from the WSA. This may cause minor shifts in the geographic location of jobs within the economic impact area, but any increase in jobs in the region cannot be estimated from this analysis. A similar argument can also be made with respect to recreation, in that in the short run the overall number of related jobs in the region will not likely change as a result of a suitable or resource development recommendation for the WSA.

Although the effects of minerals development were not estimated, such development could have a significant impact on both employment and income patterns in the area.

Cost-Efficiency Analysis

A cost-efficiency analysis was carried out for Alternatives A, G, and I (suitable), Alternative B (maximum resource development), and Alternative H (proposed action). This involved estimating resource outputs and costs over a 50-year planning period. In order that the analysis be incremental from what would take place in the absence of a suitability or unsuitability determination, all effects are incremental from Alternative F (no action). Benefit values were the same as those used in the Forest planning effort, and both four percent and 7 1/8 percent discount rates were applied. Results are shown in Table 45.

TABLE 45

Cost-Efficiency Analysis for the South San Juan Wilderness Expansion Study Area Based on 4 Percent and 7 1/8 Percent Discount Rates (Costs and benefits are in thousand 1978 dollars, incremental from the no action alternative)

	Alternatives					
Resource/Cost	A, G, and I (Suitable)	B (Maximum Resource Development)	H (Proposed Action)	A, G, and I (Suitable)	B (Maximum Resource Development)	H (Proposed Action)
	(4 Percent Discount Rate)			(7 1/8 Percent Discount Rate)		
Timber	-0-	741	469	-0-	377	238
Increased Water Yield	-0-	115	65	-0-	53	30
Recreation						
Wilderness	1,891	-0-	-0-	1,059	-0-	-0-
Non-Wilderness	-2,453	628	273	-1,348	261	112
Range	-0-	5	7	-0-	3	4
Discounted Benefits	- 562	1,489	814	- 289	694	384
Discounted Costs	780	3,241	1,887	401	1,620	938
Incremental PNV	-1,342	-1,752	-1,073	- 690	- 926	- 554

The incremental PNV is negative for all alternatives under either discount rate. In Alternatives A, G, and I the non-wilderness recreation benefits foregone exceed the wilderness benefits accrued, resulting in negative incremental discounted benefits. When discounted costs are subtracted from this negative benefit value, the resultant PNV is even more negative. Although Alternative B (maximum resource development) has positive net discounted benefits, management costs are of such a magnitude that the PNV is even more negative than for Alternatives A, G, and I.

Alternative H (proposed action) has discounted costs and discounted benefits which are intermediate between Alternatives A, G, and I and Alternative B, resulting in the highest PNV of the alternatives analyzed. Based on the set of outputs and costs considered in the analysis, Alternative H would be more cost-efficient than the others.

This is qualified by the fact that certain intangible benefits and costs, for which quantification was not possible, were not included in the analysis. An example of such an intangible benefit is the vicarious satisfaction derived by some individuals in knowing that the area is protected under a wilderness designation even though they personally have no intention of ever visiting the area.

Alternative H appears to have a greater balance between discounted benefits and costs. It has the highest grazing outputs and moderately high timber and recreation in relation to the maximum resource development alternative. The moderate budget necessary to achieve these levels results in the highest PNV of the analyzed alternatives. Minerals benefits were not included in the analysis because of lack of accurate data on the resources and dollar values involved.

SOCIAL EFFECTS

Additional impacts not within the realm of quantitive economic analysis may also result from a suitable or unsuitable designation for the WSA. These are discussed below.

Lifestyle

None of the alternatives would significantly alter lifestyles in the immediate area unless major minerals activity occurred. Although this is possible in the WSA, it is unlikely.

Attitudes, Beliefs, and Values

Many people in the area, especially newer residents, tend to favor preservation of natural areas such as those within the WSA. Others more oriented toward land-based economies such as agriculture, feel that resources in the WSA should be used to support jobs and improve standards of living in the area. A certain amount of conflict and resentment could result from implementing any alternative.

Social Organization

None of the alternatives would significantly affect the level or type of social services available in the area. Alternatives A, G, and I could result in slightly less payments to counties in the long run as a result of potentially lower timber and livestock resource outputs, but this reduction would be slight.

Population and Land Uses

None of the alternatives would significantly affect land uses and population distribution.

WILDERNESS SUITABILITY OR UNSUITABILITY

OVERVIEW

The standards to be met by components of the National Wilderness Preservation System (NWPS) were established in the Wilderness Act of 1964. Forest Service policy requires that capability, availability and need for wilderness be established prior to determining the suitability or unsuitability of an area for inclusion in the NWPS. These three criteria are discussed below.

WILDERNESS CAPABILITY

Wilderness capability is analyzed without regard to either the need for more wilderness or the availability of the area for wilderness designation. It is determined by the degree to which an area possesses the basic characteristics necessary for wilderness designation as well as the degree to which an area can be managed for wilderness.

With respect to the first of these two criteria, the Wilderness Attribute Rating System (WARS) was developed during RARE II to indicate the degree to which an area possesses wilderness attributes. The system involves a rating for each of several attributes, which are then summed to arrive at a composite WARS rating. Possible scores range from 4 to 28, with 28 indicating possession of optimum wilderness characteristics. Table 46 is a summary of the WARS rating for the South San Juan Wilderness Expansion Study Area which is composed of two separate areas, Montezuma Peak and V-Rock Trail (RARE II Areas No. D-284 and E-284). Detailed worksheets are in the planning records on file in the Forest Supervisor's Office in Durango, Colorado. These ratings were reconfirmed during the Forest Planning process.

The rating of 20 for Montezuma Peak is 15th and V-Rock Trail rating of 17 is 25th among the 38 RARE II areas on the San Juan National Forest. The rating scale ranges from 4 to 28, with 28 indicating possession of optimum wilderness characteristics. Of the 300 RARE II areas in Colorado, the median rating was 19. Thus, there is only a moderate representation of wilderness characteristics on the WSA.

TABLE 46

Summary of South San Juan WSA Wilderness Attribute Ratings

Wilderness Attribute	Rating Montezuma Peak	V-Rock
Influence on Natural Integrity	6	5
Influence on Apparent Naturalness	6	4
Solitude Opportunity	4	4
Primitive Recreation Opportunity	4	4
Composite WARS rating	20	17
Supplementary Wilderness Attributes	3	2
Scenic Value	4	4

The second element of wilderness capability is its "manageability" as wilderness. The most uncertain aspect of manageability involves future development of mineral resources, primarily in the northern and western portions of Montezuma Peak and throughout the V-Rock Trail area. The following relate specifically to manageability of the area for wilderness:

Ability to Manage the Area as an Enduring Resource of Wilderness and to Protect and Manage its Natural Character

Recreation, grazing and other natural resource uses can be managed in the WSA to protect wilderness character. Although surface disturbances relating to mineral development would be controlled under Forest Service Surface Protection Regulations (36 CFR 228), mining impacts should be expected. Impacts from exploration operations would be minimal, but if major discoveries are made, impacts could be severe. Large scale mineral activity is not compatible with a wilderness environment. Roads necessary to access mineral development could also have significant impacts on the wilderness character of the area. Such developments would limit the ability to manage the area as an enduring resource of wilderness as well as the ability to protect and manage its natural character.

Size and Shape of the Area

The 32,800 acre WSA is composed of two separate areas, both of which adjoin the South San Juan Wilderness. The Montezuma Peak area is relatively compact, and boundaries are determined by well defined topographic features in most areas. The V-Rock Trail area is relatively long and narrow, and boundaries are determined by well defined

topographic features on the east and north but not on the west and south. With respect to size and shape, the WSA would generally be manageable as wilderness.

Location Relative to External Influences

The Montezuma Peak area is located approximately 10 miles from U. S. Highway #160 and is within 1/8 mile from Forest Roads #667 to the west and #684 to the north. Additional Forest Roads from the communities of Summitville and Platora on the Rio Grande National Forest come within 1/4 mile of the area on the north and east. The V-Rock Trail area is approximately five miles from U. S. Highway #84 and is within 1/2 mile of Forest Road #663 on the west and within 1/8 mile of Forest Road #660 on the north. Access to both areas is adequate, yet neither area is so close to a major highway as to detract from the wilderness environment.

Considerable activity is taking place on lands adjacent to the WSA. Timber activity and related roads are located to the west and south of V-Rock Trail. Exploratory core drilling has been conducted near Quartz Creek in the Montezuma Peak area as well as to the north of this area. Appreciable quantities of lead, zinc, silver, and gold have been produced from mining districts adjacent to the WSA as well.

In summary, the WSA is located adjacent to several areas of resource activity which have a moderate potential to detract from the manageability of the area as wilderness.

Boundaries

Boundaries of the WSA could be located on the ground to:

-Avoid conflict with important existing or potential public uses and developments.

-Be readily and accurately described.

-Utilize features in many areas that constitute a barrier to prohibited use and act as a shield to protect wilderness environment.

-Provide an opportunity for access and trailhead facilities.

Boundary location therefore does not pose a major problem with respect to manageability of the area as wilderness.

Based on an analysis of both manageability and possession of wilderness characteristics, the South San Juan Wilderness Expansion Study Area has a moderate capability for wilderness.

WILDERNESS AVAILABILITY

Value comparison

Availability of an area for wilderness designation is determined, in part, by comparing the value of the wilderness resource with the value

of the non-wilderness resources foregone under the suitable alternatives. The value of tangible and intangible wilderness resources should be greater than the values foregone if a suitable alternative is to be recommended. However, the highest and best use of an area with respect to wilderness designation is difficult to assess in such terms because of the difficulty of attaching precise values to the intangible benefits involved.

Wilderness values on the Wilderness Study Area include:

-potential to provide an opportunity for wilderness recreation experiences for an optimum number of 153 people at one time (PAOT); and

-special protection of rather unique natural ecosystems, wildlife, water quality, and other resources.

Timber, minerals, and recreation represent significant values to be foregone under the suitable alternatives. Alternative B, the maximum resource development alternative, includes approximately 13,580 acres of land suitable for timber production from which an estimated 1.3 million board feet could be harvested annually.

The potential for significant mineral discoveries in the WSA is moderate to high, and no attempt has been made to quantify the values involved. Under all alternatives except Alternatives A, G, and I, mineral exploration would be allowed with appropriate safeguards. Alternatives A, G, and I would place additional constraints on exploration by increasing costs to the operator. There is also the slight possibility that a significant mineral discovery would be foregone when the area is withdrawn.

Although recreation would constitute a major use of the WSA under any alternative, wilderness recreation, by its very nature, results in lower capacity than would otherwise be the case. Therefore, total recreation contribution to overall value is less in Alternatives A, G, and I than under Alternative B (maximum resource development).

Alternatives A, F, G, and I would preclude projects designed to increase water yield in the WSA. Alternative B provides for an additional 775 acre-feet of water by the year 2030 which would be foregone. Alternatives A, G, and I would also decrease the opportunity to construct water storage and related facilities in the WSA since water improvements in wilderness require Presidential approval.

Existing Constraints and Encumbrances

With the exception of 30 acres of patented mining claims in the Montezuma Peak Area, all land within the WSA is National Forest System land. Activities on unpatented mining claims would be governed by the Forest Service Surface Protection Regulations (36 CFR 228) although unavoidable surface impacts and access routes could have the effect of reducing wilderness values.

Effect of Wilderness Designation and Management on Adjacent Lands

The WSA is topographically well defined, with the exception of the western and southern boundaries of the V-Rock area, which adjoin privately owned land. No transportation or utility corridors are proposed through the area. Trailhead and access facilities would be similar with or without wilderness designation. There are no anticipated adverse effects of wilderness designation on the management of adjacent lands.

Summary

The South San Juan Wilderness Expansion Study Area cannot be considered available for wilderness. The most significant opportunities foregone under the suitable alternatives relate to minerals, timber, and wildlife habitat. The mineral potential of the WSA is such that the probability of a significant mineral discovery is fairly high under the unsuitable alternatives, but less so under Alternatives A, G, and I. Timber resource opportunities would be foregone under the suitable alternatives although the cost-efficiency of timber management would be low in many areas of the WSA. The opportunity to coordinate wildlife habitat improvement projects with other activities, such as timber harvesting, would also be foregone under the suitable alternatives. The suitable alternatives would forego the opportunity to manage for semi-primitive motorized recreation, thereby failing to address Colorado SCORP recommendations. The values that would be foregone appear to outweigh the benefits that would accrue under the suitable alternatives, and therefore, the area is not considered available for wilderness.

WILDERNESS NEED

RARE II dealt with "wilderness need" on a National basis and the process included extensive public involvement. The San Juan National Forest Land and Resource Management Planning process considered the current and future public need for additional designated wilderness in the general vicinity of the WSA.

In considering the need for wilderness, certain assumptions were made:

-Visits to designated wilderness will increase with both an increasing population and a growing awareness of wilderness.

-Some undeveloped lands provide opportunities for a primitive type of recreation outside wilderness.

-Within social and biological limits, management increases the capacity of established wildernesses to support human use without unacceptable depreciation of the wilderness resource.

The following factors were considered in determining whether the WSA is needed for wilderness:

Location, Size, and Type of Other Wildernesses in the General Vicinity and Their Distance from the Wilderness Study Area

Prior to 1980, there were twelve wildernesses within a 100-mile radius of the WSA, with a total of 1,026,720 acres. Eight are National Forest System wildernesses and four are administered by the National Park Service. With passage of the New Mexico Wilderness Act of 1980 and the Colorado Wilderness Act of 1980, Congress increased the size of the four National Forest System wildernesses and established seven new wildernesses. The new wildernesses are all within the National Forest System and contain a total of 616,420 acres. There are, therefore, nineteen wildernesses, totaling almost 1,667,000 within the 100-mile radius of the WSA. Fifteen are in the National Forest System, and four are within the National Park System.

Figure 9 shows the location of the wildernesses within a 100-mile radius of the WSA. Table 47 lists acres and recreation use on wildernesses in the vicinity of the WSA. The table indicates that there is a large acreage base in designated wildernesses (1.67 million acres) in the vicinity of the WSA. Included in the NWPS are a variety of ecosystem and landform types, including canyons, sand dunes, rugged peaks, and alpine meadows.

Present Visitor Pressure on Other Wildernesses, Trends in Use, and Changing Patterns of Use

Because of the large land area represented by designated wildernesses within a 100-mile radius of the South San Juan WSA, as well as the relatively low population density in this part of the Southwest, overall visitor pressure on other wildernesses is relatively low. (See Table 47.) This can be partially explained by the fact that wilderness recreation experiences, by definition, require low user density per unit area. Therefore, the low visitor pressure on nearby wildernesses can be interpreted to indicate that existing areas are indeed fulfilling their purpose in providing "opportunities for solitude in areas untrammeled by man." But demand for and use on wildernesses is expected to increase in the immediate future. Trends indicate that individuals and families will tend to spend more of their vacation time in one location rather than on the road. Wilderness trips provide an opportunity to experience the outdoors in a natural setting, along with a unique type of challenge not available in urban areas. More people are realizing this, and wilderness visits are expected to increase accordingly. Increases in leisure time as well as a growing national awareness of environmental matters will influence this trend as well.

The overall low visitor pressure on nearby wildernesses does not mean that localized overuse is not occurring. Many areas within the San Juan National Forest are very popular, and during summer months use is at such levels that wilderness experiences may be impaired.

FIGURE 9 - South San Juan Wilderness Expansion Study Area and Nearby Wildernesses

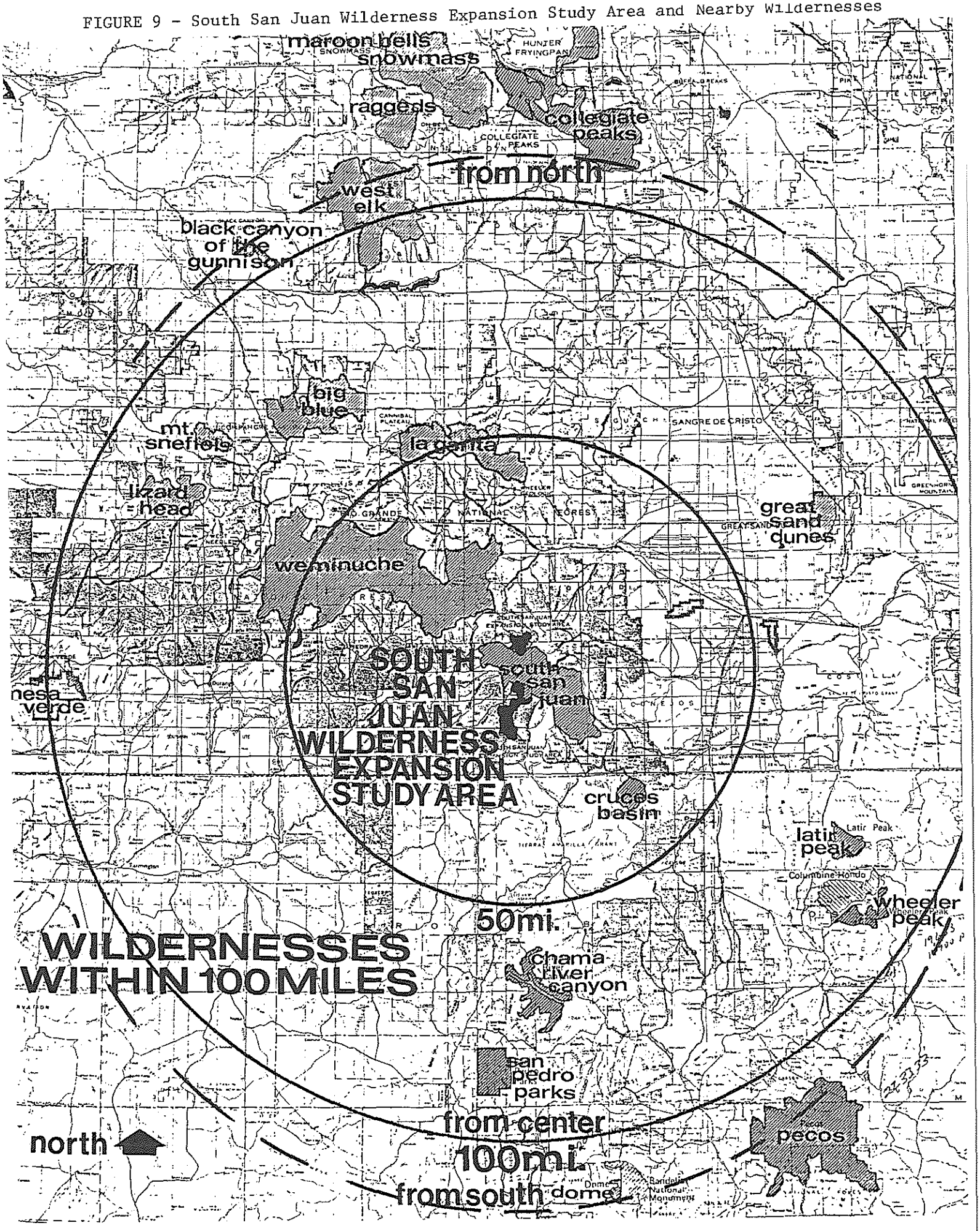


TABLE 47

Wildernesses Within a 100-Mile Radius of South San Juan Wilderness Expansion Study Area, Showing Size, Total Recreation Visitor Days, and Relative Use Ratings

Wilderness Area	Acres	1980 Use	Recreation Visitor Days Acre/Year	Relative Use Rating
Bandelier (NPS)	23,267	NA	NA	Low*
Big Blue	97,700	NA	NA	Low*
Black Canyon of the Gunnison (NPS)	11,180	NA	NA	Low*
Chama River Canyon	50,260	5,600	.11	Low
Collegiate	159,900	153,200	.96	High
Cruces Basin	18,000	1,600	.09	Low
Dome	5,200	NA	NA	Low*
Great Sand Dunes (NPS)	33,450	NA	NA	Low*
La Garita	108,486	32,300	.30	Low
Latir Peak	20,000	1,500	.08	Low
Lizard Head	40,000	21,000	.53	Moderate
Mesa Verde (NPS)	8,100	NA	NA	Low*
Mt. Sneffels	16,200	11,100	.69	Moderate
Pecos	223,333	198,300	.89	High
San Pedro Parks	41,130	50,200	1.22	High
South San Juan	133,463	41,500	.31	Low
Weminuche	463,224	255,400	.55	Moderate
West Elk	194,412	101,500	.52	Moderate
Wheeler Peak	19,663	9,500	.48	Moderate
Total	1,666,968			

NPS - Administered by the National Park Service, U.S. Department of the Interior
NA - Data not available
* - Estimated relative use rating.

Relative Use Ratings Based on:

0-.35 Recreation Visitor Days/Acre/Year	Low
.36-.70 Recreation Visitor Days/Acre/Year	Moderate
.70+ Recreation Visitor Days/Acre/Year	High

Lands' Ability to Provide Opportunities for Unconfined Outdoor Recreation Experiences

While the South San Juan Wilderness Expansion Study Area has high potential to provide opportunities for unconfined outdoor recreation

experiences, these opportunities are not in short supply in the surrounding area.

Ability of Plant and Animal Species to Compete with People and Projects

Natural ecological forces will continue relatively undisturbed under all alternatives. Plant and animal species native to the area will be maintained under all alternatives as well.

The Need to Provide Sanctuary for Species that Have Demonstrated an Inability to Survive in Less Primitive Surroundings

No species have been identified on the WSA that require a wilderness environment for survival.

Provide for Preservation of Unique Landform Types and Ecosystems

Table 30 (page M-92) compares the occurrence of various ecosystems found on the WSA with those found on nearby wilderness areas. The table indicates that the WSA is not unique relative to nearby wildernesses in ecosystem composition. There are no unique landforms in the WSA that are not represented in other wildernesses.

Summary

The analysis indicates that the WSA is not needed as an addition to the National Wilderness Preservation System. It includes ecosystems and landforms found in the Weminuche, the South San Juan, and other nearby wildernesses. There is no shortage of opportunities for unconfined recreation experiences or opportunities for solitude in the area.

OTHER CONSEQUENCES

None known.

SHORT-TERM USES OF MAN'S ENVIRONMENT VS. THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

There would be no direct effects on long-term productivity or renewable resources under either alternative. The increased likelihood of mineral activity under all alternatives except Alternatives A, G, and I, the suitable alternatives, could increase the possibility of long-term effects on the renewable resource productivity of the land actually disturbed by mining. However, most of the surface resource effects caused by mining could be mitigated under Federal Surface Protection Regulations.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

With the exception of lost wilderness opportunities and extraction of minerals, there would be no irreversible or irretrievable commitment of resources under the unsuitable alternatives. "Irretrievable" refers to

a loss of resource production or use of renewable resources resulting from management decisions, whereas "irreversible" refers to long-term unavailability of a resource. Mining represents an irreversible commitment of non-renewable mineral resources. Mining activity would also involve minimal commitments of livestock forage and timber as areas become disturbed. By using proper reclamation techniques, however, losses of production can be made short-lived and insignificant in quantity. The wilderness resource could be irreversibly committed, depending on how the area was to be managed under the unsuitable alternatives. Development could impact the area to the extent that it no longer qualified for wilderness designation, in which case the wilderness resource would be irreversibly lost.

Under Alternatives A, G, and I, mineral resources could be irreversibly lost following the minerals withdrawal deadline of December 31, 1983. Certain amounts of other resources, including water, livestock forage, and timber, would be irretrievably lost as a result of the inability to carry out various management activities in a wilderness area. Irretrievable resources are limited to the difference between quantities produced under the suitable alternatives and the unsuitable alternatives.

PROBABLE ADVERSE EFFECTS THAT CANNOT BE AVOIDED

SUITABLE ALTERNATIVES (ALTERNATIVES A, G, AND I)

-There would be reduced opportunities and an increase in the cost of mineral exploration and development because of the need for more stringent mitigation and restoration measures.

-Opportunities for vegetation treatment will be lost.

-There would be less opportunities for developing a variety of uses. There would be a loss of motorized recreation opportunities.

-Various amounts of water and livestock forage would be foregone.

NO ACTION ALTERNATIVE (ALTERNATIVE F)

-Opportunities for vegetation treatment would be lost.

-Mineral resources could be developed. This development with associated roads could reduce opportunities for solitude and affect the natural integrity and the scenic values.

UNSUITABLE ALTERNATIVES (ALTERNATIVES B, C, D, E, H, and J)

-There could be an eventual irreversible loss of wilderness character through mining, and recreation activities in the area.

-There would be reductions in wilderness values and wilderness recreation opportunities.

CONFLICT WITH OTHER GOVERNMENT AGENCY PLANS

There are no known conflicts with plans of other government agencies under any alternative.

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