

ADDITIONS TO THE NATIONAL WILD AND SCENIC RIVERS  
SYSTEM AND THE NATIONAL WILDERNESS PRESERVATION  
SYSTEM

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MESSAGE

FROM

THE PRESIDENT OF THE UNITED STATES

TRANSMITTING

PROPOSED LEGISLATION TO DESIGNATE ADDITIONAL RIVERS AS  
COMPONENTS OF THE NATIONAL WILD AND SCENIC RIVERS SYSTEM,  
AND FOR OTHER PURPOSES



PART 11

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## LETTER OF TRANSMITTAL

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*To the Congress of the United States:*

One of the greatest challenges facing our Nation is to make careful and wise use of our natural resources. At the same time, we must protect other national treasures—wild, free-flowing rivers and wilderness areas—for this and future generations to enjoy in their natural, undeveloped state.

To further this effort and pursuant to the Wild and Scenic Rivers Act of 1968 and the Wilderness Act of 1964, I am today proposing, at the recommendation of the Secretary of Agriculture and the Secretary of the Interior, eight additions to the National Wild and Scenic Rivers System and three additions to the National Wilderness Preservation System. These additions total some 45 miles of rivers and over 21,000 acres of wilderness.

Briefly described, the proposed additions to the Rivers System are:

- (1) The Clarks Fork of the Yellowstone River, Wyoming—21.5 miles of the river in the Shoshone National Forest.
- (2) The Elk River, Colorado—29 miles of the river in the Routt National Forest.
- (3) The Conejos River, Colorado—36.8 miles of the river in the Rio Grande National Forest.
- (4) The Los Pinos River, Colorado—54 miles of the river in the Weeminuche Wilderness, San Juan National Forest.
- (5) The Verde River, Arizona—39.5 miles of the river in the Prescott Coconino, and Tonto National Forests.
- (6) The Au Sable River, Michigan—23 miles of the river in the Huron Manistee National Forest.
- (7) The Snake River, Wyoming—13 miles of the river in the Bridger-Teton National Forest.
- (8) The Piedra River, Colorado—28.4 miles of the river in the San Juan National Forest.

The comprehensive bill that I am transmitting today to add these rivers to the System will also make changes to the Wild and Scenic Rivers Act to enhance our ability to manage such rivers efficiently and effectively.

In addition, I am transmitting three legislative proposals to designate the following areas as additions to the Wilderness System:

- (1) The Spruce Creek addition to the Hunter-Fryingpan Wilderness, Colorado—the 8,000-acre Spruce Creek Wilderness Study Area, to be added to this Wilderness in the White River National Forest. The area offers outstanding opportunities for solitude and back-country recreation.
- (2) The Paddy Creek area, Missouri—6,728 acres in the Mark Twain National Forest. This area of the Ozarks contains an unusual assortment of rock formations, including caves, crevasses, and fissures.
- (3) The Aravaipa Canyon Primitive Area, Arizona—6,670 acres in Graham and Pinal Counties. Aravaipa Creek provides the canyon, which is bordered by high mesa-like cliffs, with lush vegetation and a variety of wildlife that is seldom seen in the surrounding Sonoran Desert.

After reviewing the suitability of three other rivers for possible designation, the Secretary of Agriculture has found them not to be suitable for inclusion in the National Wild and Scenic Rivers System. These include portions of the San Francisco River in Arizona, the Movie River in Idaho, and the Salt River in Arizona. Finally, after reviewing the Elkhorn Wilderness Study Area in Montana, the Secretary of Agriculture has determined that this area is not suitable for inclusion in the National Wilderness Preservation System.

I am also transmitting to the Congress today letters and reports from the Secretaries of the Interior and Agriculture regarding all of these rivers and wilderness proposals. I concur in all of these recommendations, and urge the Congress to act expeditiously and favorably on the proposed legislation, so that the natural resources of these areas may be protected and preserved.

**RONALD REAGAN.**

The WHITE HOUSE, *September 13, 1982.*

A B I L L

To designate additional rivers as components of the National Wild and Scenic Rivers System, and for other purposes,

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Wild and Scenic Rivers Act of October 2, 1968 (82 Stat. 906; 16 U.S.C. 1271-1287) as amended, is further amended as follows:

TITLE I - AMENDMENTS TO SECTION 3 RELATING TO COMPONENTS  
OF THE NATIONAL WILD AND SCENIC RIVERS SYSTEM

SEC. 101. Subsection 3(a)(16) is amended by adding the following sentence at the end thereof:

"Notwithstanding any other provision of this Act, the installation and operation of facilities or other activities within or outside the boundaries of the Pere Marquette Wild and Scenic River for the control of lamprey eel shall be permitted subject to such restrictions and conditions as the Secretary of Agriculture may prescribe for the protection of water quality and other values of the river."

SEC. 102. Subsection 3(a)(21) North Fork American is amended by striking out "agencies of the Departments of the Interior and Agriculture as agreed upon by the Secretaries of such Departments or as directed by the President." and substituting "the Secretary of Agriculture. Public lands administered by the

Secretary of the Interior through the Bureau of Land Management within the Wild and Scenic River corridor west of Range 11 East, Mount Diablo Meridian, shall hereafter be National Forest System lands to be administered by the Secretary of Agriculture as part of the Tahoe National Forest, the boundary of which is modified as generally depicted on a map entitled 'Tahoe National Forest inclusion of North Fork American Wild and Scenic River, September 1980'."

SEC. 103. Section 3(a) is amended by inserting the following new paragraphs at the end thereof:

"(51) CLARKS FORK, WYOMING. --The segment from the property line between private and National Forest System lands approximately one-half mile below the Crandall Bridge downstream to the boundary of the Shoshone National Forest as generally depicted on a map entitled 'Proposed Clarks Fork Wild River' which is on file and available for public inspection in the Office of the Chief, Forest Service, United States Department of Agriculture, and is also part of a document entitled 'Clarks Fork of the Yellowstone, Wild and Scenic River Study'; to be administered by the Secretary of Agriculture.

"(52) ELK, COLORADO. --The main stem upstream from the confluence with the South Fork, the North and South Forks to their headwaters, and the Middle Fork to the confluence of Gilpin Creek and Gold Creek as generally depicted on a map entitled 'Proposed Elk Wild and Scenic River' which is on file and available for public inspection

in the Office of the Chief, Forest Service, United States Department of Agriculture, and is also part of a document entitled 'Elk Wild and Scenic River Environmental Impact Statement and Study Report'; to be administered by the Secretary of Agriculture.

"(53) CONEJOS, COLORADO. --The North, Middle, and El Rito Azul Forks from their sources to their confluence with the Conejos River, thence the Conejos River to its confluence with the South Fork (but excluding the Platoro Reservoir as authorized by Public Law 485 and Public Law 76-260 and the segment of river downstream from the Platoro Reservoir to the boundary between Section 23 and 24, Township 26 North, Range 4 East, New Mexico and Sixth Principal Meridians) and the South Fork from Glacier Lake to its confluence with the Conejos River as generally depicted on a map entitled 'Preferred Alternative, Proposed Wild and Scenic River Area Boundary' which is on file and available for public inspection in the Office of the Chief, Forest Service, United States Department of Agriculture, and is also part of a document entitled 'Conejos Wild and Scenic River Study - Final Environmental Impact Statement'; to be administered by the Secretary of Agriculture.

"(54) LOS PINOS, COLORADO. --The segment from the confluence of the North Fork and Rincon La Vaca downstream to the Northern boundary of the Granite Peak Ranch; and, the tributaries, Lake Creek, Flint Creek, Rincon La Vaca, Rincon La Osa, Snowslide Canyon Creek, and Sierra Vandera from their headwaters to their point of confluence

with the Los Pinos River as generally depicted on a map entitled 'Los Pinos - Wild and Scenic River' which is on file and available for public inspection in the Office of the Chief, Forest Service, United States Department of Agriculture; to be administered by the Secretary of Agriculture.

"(55) VERDE, ARIZONA. --The segment beginning at the boundary between National Forest and private land in Sections 26 and 27, Township 13 North, Range 5 East, Gila-Salt River Meridian, downstream to the vicinity of Table Mountain approximately 14 miles upstream from Horseshoe Reservoir, as generally depicted on a map entitled 'Verde River - Wild and Scenic River' which is on file and available for public inspection in the Office of the Chief, Forest Service, United States Department of Agriculture; to be administered by the Secretary of Agriculture: Provided, That this designation shall not prevent water users receiving Central Arizona Project water allocations from diverting that water through an exchange agreement with downstream water users in accordance with Arizona water law.

"(56) AU SABLE, MICHIGAN. --The segment of the main stem from the project boundary of the Mio Pond project downstream to the project boundary at Alcona Pond project as generally depicted on a map entitled 'Au Sable River' which is on file and available for public inspection in the Office of the Chief, Forest Service, United States Department of Agriculture; to be administered by the Secretary of Agriculture.

"(57) SNAKE RIVER, WYOMING. --The segment beginning about one mile below Astoria Hot Springs downstream to the entrance to Palisades Reservoir as generally depicted on a map entitled, 'Potential Classification Boundary' in a document entitled 'Snake River - Wyoming, A Potential Wild and Scenic River' which is on file and available for public inspection in the Office of the Chief, Forest Service, United States Department of Agriculture; to be administered by the Secretary of Agriculture.

"(58) PIEDRA, COLORADO. --The segment from its confluence with Indian Creek upstream to the boundary between Sections 8 and 9, Township 36 North, Range 3 West, New Mexico Principal Meridian, and the Middle Fork from the boundary between Sections 10 and 15, Township 37 North, Range 3 West, New Mexico Principal Meridian to its headwaters as generally depicted on a map entitled 'Proposed Piedra Wild and Scenic River' which is on file and available for public inspection in the Office of the Chief, Forest Service, United States Department of Agriculture, and is also part of a document entitled 'Piedra River Final Environmental Impact Statement and Wild and Scenic River Study'; to be administered by the Secretary of Agriculture.

## TITLE II - STUDY RIVERS

SEC. 201 Section 5(a) is amended by deleting subsection 5(a)(71).

SEC. 202. Section 5(b) is amended as follows:

- (a) Add the following proviso at the end of Subsection 5(b)(1):  
"Provided further, That effective on the dates of designation for potential addition, studies of the rivers named in Subparagraphs (31), (34), (38), (44), (49), and (55) shall be completed and

the reports thereon transmitted to the Congress not later than January 1, 1986."

(b) Delete the wording of the first Subsection 5(b)(4) beginning with "There are authorized..." and insert in lieu thereof the sentence "For the purposes of conducting the studies of rivers named in Section 5(a), there are authorized to be appropriated such funds as are necessary."

(c) Renumber the second Subsection 5(b)(4) beginning with "The studies of the river..." as 5(b)(5) and renumber Subsection 5(b)(5) as Subsection 5(b)(6).

### TITLE III - AMENDMENTS TO P.L. 90-542, AS AMENDED

SEC. 301. The first sentence of Section 3(b) is amended as follows:

(a) Delete the words "date of this Act" and insert in lieu thereof the words "date of such designation";

(b) Delete the second parenthetical statement and insert in lieu thereof the parenthetical statement, "(which boundaries shall include an average of not more than three hundred and twenty acres of land per mile measured from the ordinary high water mark on both sides of the river)".

(c) Delete the semicolon and the remainder of the sentence after the words "its various segments" and insert in lieu thereof a period.

SEC. 302. The second sentence of Section 3(b) is amended as follows:

(a) Delete the words "Said boundaries," and insert in lieu thereof the words "Notice of the availability of said boundaries and".

(b) Delete the words "and development plans".

SEC. 303. Add a new Subsection 3(c)(i) as follows:

"3(c)(i) The Federal agency charged with the administration of each component of the National Wild and Scenic Rivers System shall prepare a comprehensive management plan for such river which shall provide for the protection of the river values. The plan shall address the costs and effects of resource protection alternatives, necessary development of lands and facilities, appropriate user capacities, and other management practices or techniques necessary to achieve the purposes of the Act. The plan shall also identify alternatives to protect the wild and scenic river values by means other than land acquisition. Where the river flows through Federal lands, the plan shall be coordinated with resource management planning for these adjacent Federal areas. Such plans shall be prepared after consultation with State and local governments and the interested public, and may be prepared in conjunction with plans prescribed by law for adjacent Federal lands. For rivers designated after January 1, 1982, the plans required by this subsection shall be prepared within three full fiscal years after the date of designation, and notice of the completion and availability of such plans shall be published in the Federal Register. For rivers designated in Subparagraphs (1) through (50) inclusive, all boundaries, classifications, and plans completed as of the date of enactment of this Subsection shall be valid and shall be reviewed for conformity

with the requirements of this Subsection within eight years through regular agency planning processes. Notice of modifications to the boundaries and classifications for designated rivers shall be published in the Federal Register as provided in Subsection (b) of this Section."

SEC. 304. Add a new Subsection 3(c)(ii) as follows:

"3(c)(ii) For rivers designated in Subparagraphs (51) through (58) of Section 3(a), no money shall be appropriated for the acquisition of lands or interests in lands until the comprehensive management plan required by this subsection is prepared:

Provided, That there is authorized to be appropriated such sums from the Land and Water Conservation Fund as may be necessary for the acquisition of lands and interests in lands identified for acquisition by the comprehensive management plans for said rivers, and for interim emergency acquisitions of lands or interests in lands as determined by the appropriate Secretary to be necessary to protect the values of said rivers, but such sums for emergency acquisitions shall not exceed a total of \$500,000 for each of said rivers."

SEC. 305. Section 4(c) is amended as follows:

(a) Insert after the first sentence the following new sentence: "When five percent or more of the lands within one-quarter mile of a river proposed for designation are under the jurisdiction of another Federal Department or

agency, the Secretary of the Interior, in exercising his authority pursuant to the provisions of Subsection 2(a)(ii) of this Act, shall not approve the designation without the concurrence of the head of such Department or Federal agency."

SEC. 306. Section 4 is amended by adding a new Subsection (d):

"(d) For study purposes, the study area of any river proposed in Section 5(a) of this Act for potential addition to the National Wild and Scenic Rivers System, unless otherwise provided, shall comprise that area measured within one-quarter mile from the ordinary high water mark on both sides of the river: Provided, This section shall not be construed to limit the possible scope of the study report to address areas which may lie more than one-quarter mile from the river."

SEC. 307. Section 5 is amended by adding a new Subsection (e):

"(e) If a river or portions thereof designated for study under this section are not designated as components of the National Wild and Scenic Rivers System before the end of the time period provided in Section 7(b), then study status shall terminate."

SEC. 308. (a) Section 6(a) is amended as follows:

Add the following sentence at the end thereof:

"When a tract of land lies partly within and partly outside the boundaries of a component of the National Wild and Scenic Rivers System, the appropriate Secretary may, with the consent of the

landowner for the portion outside the boundaries, acquire the entire tract and the land or any interest therein so acquired outside the boundaries shall not be counted against the 100 acres fee title limitation. If not needed for outdoor recreation, administrative, or other purposes in furtherance of this Act, such lands or interests, may be disposed of by sale, lease, or exchange as provided in Section 14A."

(b) Section 6(b) is amended by inserting in the first sentence the words "outside the ordinary high water mark on both sides of the river" after the word "acreage", and inserting the words "in fee title" after the word "owned."

SEC. 309. (a) The second sentence of Section 7(a) is amended by deleting the words "approval of this Act" and inserting in lieu thereof the words, "designation of a river as a component of the National Wild and Scenic Rivers System".

(b) Section 7(b) is amended as follows:

(1) In the first sentence after Subparagraph (i) insert a new Subparagraph (ii) as follows:

"(ii) during such interim period from the date a report is due and the time a report is actually submitted to the Congress."

(2) Redesignate existing Subparagraph (ii) as Subparagraph (iii).

(3) In the second sentence, insert the word "unreasonably" before the word "diminish".

(4) At the end of the second sentence, delete the words "approval of this Act" and insert in lieu thereof the words, "designation of a river for study as provided for in Section 5 of this Act".

SEC. 310. Section 8(a) is amended by deleting the period at the end of the sentence and inserting in lieu thereof a colon, followed by the words: "Provided, That this provision shall not be construed to limit the authorities granted in Section 6(d) or Section 14A of this Act."

SEC. 311. Section 12(c) is amended by deleting the words "Secretary of the Interior" and inserting in lieu thereof the words "Administrator, Environmental Protection Agency".

SEC. 312. Section 14 is amended by designating the existing section as Subsection (a) and adding a new Subsection (b) as follows:

"(b) For the conservation purposes of preserving or enhancing the values of components of the National Wild and Scenic Rivers System, and environs thereof as determined by the appropriate Secretary, landowners are authorized to donate or otherwise convey qualified real property interests to qualified organizations consistent with Subsection 170(h)(3) of the Internal Revenue Code of 1954, as amended, including, but not limited to, right-of-way, open space, scenic, or conservation easements, without regard to any limitation on the nature of the estate or interest otherwise transferable within the jurisdiction where the land is located."

SEC. 313. Delete the existing Section 14A and substitute in lieu thereof the following revision:

"Where necessary or desirable to achieve the purposes of this Act, the appropriate Secretary may sell, lease, or exchange Federally owned lands or interests therein which are within or adjacent to the boundaries of any component of the National Wild and Scenic Rivers System: Provided, that such sale, lease, or exchange shall be subject to such reservations, restrictive covenants, or other terms and conditions as may be necessary or desirable to achieve the purposes of the Act. In the exercise of this sale or lease authority, the Secretary shall utilize the standards and procedures provided at Section 5(a) of Public Law 90-401 including the provision for a right of first refusal by the last owner of record. The exercise of the exchange authority shall be consistent with the value provisions of Section 6(d) of this Act. The proceeds received from any conveyance under this section shall be credited to the appropriation account bearing the costs of such land acquisition for the affected Wild and Scenic River, and shall be available for expenditure only to the extent, and in such amounts, as may be provided in advance in appropriation Acts. Any proceeds remaining in such accounts shall be covered into miscellaneous receipts of the Treasury upon completion of such land acquisition for the affected wild and scenic river.

SEC. 314. Section 16(c) is amended by adding a new sentence at the end thereof, "For any designated Wild and Scenic River the appropriate Secretary may deem the acquisition of fee title with the reservation of regular existing uses to the owner, as a scenic easement for purposes of this Act, and such an acquisition will not constitute fee title ownership for purposes of Section 6(b)."

TITLE IV - AMENDMENTS PERTAINING TO STATE COMPONENTS  
OF THE NATIONAL WILD AND SCENIC RIVERS SYSTEM

SEC. 401. Section 2(a) of the Act is amended as follows:

(a) In the first sentence, clause (ii), add the phrase "authorized for inclusion in the national system and" before the word "designated".

(b) After the first sentence, insert the following new sentence: "Any river included within the National Wild and Scenic Rivers System under the provisions of clause (ii) shall be removed from the National System by the Secretary of the Interior if requested to do so by a resolution of the affected legislature or legislatures of the State or States through which the river flows, and if the Secretary of Agriculture concurs in such removal for those portions of rivers flowing through National Forest System lands."



Section by Section Analysis of Proposed Amendments  
to the Wild and Scenic Rivers Act  
(82 Stat. 906; 16 U.S.C. 1271-1287)

TITLE I - Components of the Wild and Scenic Rivers System

1. Section 101 amends Subsection 3(a)(16) of the Act pertaining to management of the free-flowing characteristics of the Pere Marquette River in Michigan. The amendment would allow the Secretary of Agriculture to permit the construction of facilities to control the spawning migration of the lamprey eel. The lamprey eel is a major parasitic threat to commercial and sport fisheries in the Great Lakes. The prohibition under the Act of any form of impoundment precludes the utilization of structures which prevent passage to spawning lamprey. The amendment would conditionally allow for such control mechanisms.

2. Section 102 amends Subsection 3(a)(21) of the Act to place management responsibility for the entire segment of the American Wild and Scenic River with the Secretary of Agriculture and provide for the transfer of public lands within the area to the Tahoe National Forest.

3. Section 103 amends Section 3(a) by designating segments of the following rivers as units of the National Wild and Scenic Rivers System:

<u>River and State</u>	<u>Administering Department</u>
Clarks Fork (Wyoming)	USDA
Elk (Colorado)	USDA
Conejos (Colorado)	USDA
Los Pinos (Colorado)	USDA
Verde (Arizona)	USDA
Au Sable (Michigan)	USDA
Snake (Wyoming)	USDA
Piedra (Colorado)	USDA

## TITLE II - Study Rivers

4. Section 201 amends Section 5(a) by eliminating the study of the Soldiers Creek River in Alabama. This very short segment has an inadequate resource base and clearly is an unsuitable candidate for inclusion in the system.

5. Section 202(a) extends the time for completion of six studies. Several studies for rivers previously designated as potential additions to the system have been delayed beyond the date originally provided. Delays for some of these studies are due to their interrelationship with other studies being conducted for land and water resources, and full evaluation would require completion of all studies underway for given river areas. The section would extend the study period until January 1, 1986.

6. Section 202(b) deletes specific funding authorization for certain studies which are largely completed and provides for general authorization of funding of studies.

7. Section 202(c) is a necessary stylistic change.

## TITLE III - Generic Amendments to the Wild and Scenic Rivers Act

8. Section 301 amends Section 3(b) by modifying the requirements for preparing a management plan within 1 year, and clarifies the area encompassed by the boundaries of a designated river to include the water area with islands in addition to a land area averaging 320 acres per mile measured from the ordinary high water mark on both sides of the river.

9. Section 302 eliminates the requirement that boundary descriptions be published in the Federal Register; rather, the administering agency must publish notice of the availability of the description. This change will not affect the public information objective, yet will result in the saving of considerable publication expenses for lengthy boundary descriptions.

10. Section 303 provides for a comprehensive management plan to be prepared within 3 fiscal years. This comprehensive plan replaces the 1 year requirement for development plans now in Section 3(b) of the Act. To promote efficient planning and avoid possible duplication, the comprehensive plan will be coordinated with ongoing resource management planning for adjacent Federal lands. Such plans will address alternative means of river protection, development of lands and facilities, appropriate user capacities and other management practices and techniques to achieve the purposes of the Act. Most significantly, the modified planning requirement will emphasize alternative techniques other than land acquisition for preserving the river values. For already designated rivers, existing boundaries, classifications and plans will remain valid, but will be reviewed within 8 years through regular agency planning processes.

11. Section 304 represents a major shift in approaches to river protection. No land acquisition funds would be appropriated until after completion of the comprehensive management plan. This will insure that alternatives to land purchases are fully examined and implemented. The provision does recognize that adverse development may occur on rivers while the comprehensive plan is being prepared; and, therefore, authorizes up to \$500,000 per river for emergency land acquisitions to prevent such problems.

12. Section 305 provides a limitation on the authority of the Secretary of the Interior to designate State rivers. No State-designated river shall be administratively designated under the authority of Subsection 2(a)(ii) if the designation affects Federally owned lands and the administering Department or agency objects to such designation. This will prevent designations which could severely impact the fulfillment of management responsibilities by other agencies for lands under their jurisdiction.

13. Section 306 establishes the study area of study rivers as being one-quarter mile on both sides of the river. This clarifies the extent of the applicability of various protections contained in Section 7(b) of the Act and Subsection 522(e)(1) of the Surface Mining Control and Reclamation Act of 1977.

14. Section 307 provides for the eventual termination of study status for rivers after studies have been completed and sent to the Congress, and for which the Congress has not acted upon the recommendations within the 3-year period now provided by Section 7(b)(ii). The Act protects study rivers from water resource development (Sec. 7); entry and disposition under the public land laws (Sec. 8); and mineral entry (Sec. 9). However, these protections are only for a specific term and expire 3 years after submission of a study to Congress. The proposed amendment merely ends study status for a river at the same time the statutory protections of sections 7, 8, and 9 are ended.

15. Section 308(a) amends Section 6(a) to provide for whole tract acquisition when a land acquisition is deemed necessary to preserve river values. Whole tract acquisition involves the purchase of an entire property rather than just that portion lying within a river boundary line. This

provision will eliminate the need to pay severance charges, will avoid uneconomic remnants which by existing law must be acquired anyway (P.L. 91-646), and gives the landowner the option of conveying all holdings. If a whole tract is acquired, the Secretary may dispose of surplus portions by sale, lease or exchange, and thereby minimize any Federal investment in unneeded interests in land.

16. Section 308(b) amends Section 6(b) of the Act to clarify the scope of potential Government ownership within the designated boundaries of wild and scenic rivers. Partial interests, such as easements, and submerged lands are not included in the 50 percent public ownership proportion. This amendment reaffirms longstanding administrative interpretations of the 50 percent proportion of land ownership.

17. Section 309(a) would amend Section 7(a) of the Act dealing with water resource projects on designated rivers. The amendment would change the baseline date for determining impacts on resource values by water projects above or below a designated portion of a river. A 1968 date has been applicable to all rivers designated to date. We believe, however, the 1968 date is not appropriate for rivers designated after that date. The appropriate date should be the date of designation.

18. Section 309(b) provides that the protections for study rivers including the deferment of water resources projects extend to the date that a study report is actually submitted to the Congress. The Act is currently ambiguous on the question of whether projects can be authorized on rivers when the submission of a study report is delayed beyond the time mandated

for completion. This provision clarifies the time periods of the protections as being from the date of designation for study until 3 years after submission of the report to Congress. This provision insures that the options of Congress are not preempted by incompatible activities until there is adequate time for congressional consideration. This provision does not condone administrative delays in preparing studies by the appointed date, but does recognize that delays do sometimes occur. Note that a companion provision in Section 308 of the bill would terminate study status after 3 years from the date a report is submitted to the Congress if no legislative action is taken.

Section 309(b) also amends Section 7(b) and makes changes similar to those made to Section 7(a) dealing with the date of designation being the date from which diminishment of values is judged. In addition, the existing standard for evaluating effects on scenic, recreational, and fish and wildlife values for water projects on study rivers ("diminish"), is revised to be the same as the standard for evaluating effects on those values for water projects on designated rivers ("unreasonably diminish"). By this change, a study river would not be subject to more stringent protections than are provided for rivers already designated as components of the System.

19. Section 310 amends Section 8(a) to allow for exchange, lease or other disposition of lands as provided in Section 6(d) and Section 14A of the Act. The withdrawal of lands within the boundaries of a wild and scenic river from disposition under the public land laws is otherwise unchanged.

20. Section 311 amends Section 12(c) to reflect the responsibility of the Environmental Protection Agency for water pollution control.

21. Section 312 amends Section 14 to encourage the donation of lands and interests in lands within wild and scenic rivers. The amendment incorporates the provisions of the Tax Extension Act of 1980 (P.L. 96-541), which allows for donors to receive tax deductions for interests in lands, including conservation easements, given to charitable organizations such as the Nature Conservancy.

22. Section 313 amends Section 14A to expand the Secretaries' authority to sell, lease, or exchange lands within or adjacent to the boundaries of a river. However, such a sale, lease, or exchange shall be subject to such reservations or restrictive covenants as the Secretary determines to be necessary to achieve the purposes of the Act. This authority would permit a more efficient use of limited Federal funding and maximize the utilization of unneeded property rights toward the goal of preserving the river values. This section would also permit leasing for continued cultivation or pasturing operations on Federal land suited for such activities if they can be performed without harming the values of the river. The provision states that in the event of a sale, exchange or lease, the previous private owner has the right of first refusal. Any revenue derived from a sale, exchange, or lease-back shall be available for future land acquisition for that river. This will encourage Federal land managers to adopt innovative sale or lease-back programs so as to maximize the quantity and quality of compatible land use within the wild and scenic river boundary.

23. Section 314 clarifies the scope of scenic easements to encompass the reservation by a landowner of all regular existing uses of the land while allowing the conveyance of the remaining interests to the Secretary. This mechanism utilizes reserved interest deeds which are a more definitive

and more easily administered form of conveyance of partial interests in lands. The amendment allows the administering Secretary an option as to whether to use reserved interest deeds on a given river; it may be desirable to continue to utilize the more established easement forms on existing rivers for reasons of continuity.

#### TITLE IV - State Recommended Rivers

24. Section 401(a) amends Section 2(a) of the Act to provide for the concurrent approval of the State legislature whenever a governor recommends to the Secretary of the Interior that a State wild and scenic river be included in the National Wild and Scenic Rivers System.

25. Section 401(b) amends Section 2(a) of the Act to allow for the removal from the National System of State components designated under clause (ii). The question of including a State river in the National System is principally a matter of State law and policy which should be subject to the changing needs and conditions of the States. The controversy that has arisen from the Secretary of the Interior's 1981 designation of five rivers in northern California has indicated, among other things, that the State legislature should exercise oversight over components of State river systems, and the legislatures should be consulted as to whether a State river should be added to the National System by administrative action. Since wild and scenic river designation affects long range planning for the National Forests, the amendments provide that the Secretary of Agriculture is required to approve any removals of State rivers which might affect National Forest lands. Although this amendment would make Section 2(a)(ii) designations more responsive to State legislatures, it would not affect the ability of the Congress to permanently designate such State rivers as components of the National System pursuant to an Act of Congress.



# United States Department of the Interior

OFFICE OF THE SECRETARY  
WASHINGTON, D.C. 20240

The President  
The White House  
Washington, D.C. 20500

January 19, 1982

Dear Mr. President:

I am pleased to recommend designation of the Aravaipa Canyon Wilderness, consisting of public lands in Graham and Pinal Counties, Arizona, as a unit of the National Wilderness Preservation System.

Aravaipa Canyon is an outstanding natural area of many contrasts. A gem of the southwestern desert, the canyon landscape consists of high mesa-like cliffs through which courses a freeflowing stream that provides lush vegetation and a habitat for birds and animals that are seldom seen in the surrounding desert. Opportunities abound for scientific study, wildlife observation, photography and primitive recreation. These values have long been recognized by the Bureau of Land Management, and approximately 4,044 acres of the proposed wilderness area were previously designated as the Aravaipa Canyon Primitive Area on January 6, 1969, and April 28, 1971.

Section 603 of the Federal Land Policy and Management Act of 1976 (FLPMA, 43 U.S.C. 1782) directs the Secretary of the Interior to review those areas of the public lands which the Secretary had, prior to November 1, 1975, formally identified as natural or primitive areas, and to report his recommendations to the President as to the suitability or nonsuitability of those areas for preservation as wilderness. This Department has recently completed its review of the Aravaipa Canyon Primitive Area and contiguous roadless public lands. Based on this review, I recommend wilderness designation of approximately 6,670 acres. Wilderness designation would not conflict significantly with any existing or potential uses of the area.

Mineral surveys conducted by the Geological Survey and Bureau of Mines indicate that the proposed wilderness area probably contains no significant mineral deposits. While these are surveys rather than exploration programs -- and as such are based primarily on reviews of available data and literature, and on various geologic, geochemical and other investigations -- they do suggest that wilderness designation of the Aravaipa Canyon area should result in no adverse impacts on the Nation's security, mineral needs or economic well-being. The mineral survey report is enclosed.

I concur with the BLM's recommendation that continuation of the limited use of motor vehicles and a motorized pump, as necessary for livestock grazing, be recognized as a permissible temporary use until an alternative source of water has been developed outside the wilderness boundary. This is discussed further in the wilderness suitability report and is provided for in the enclosed draft bill.

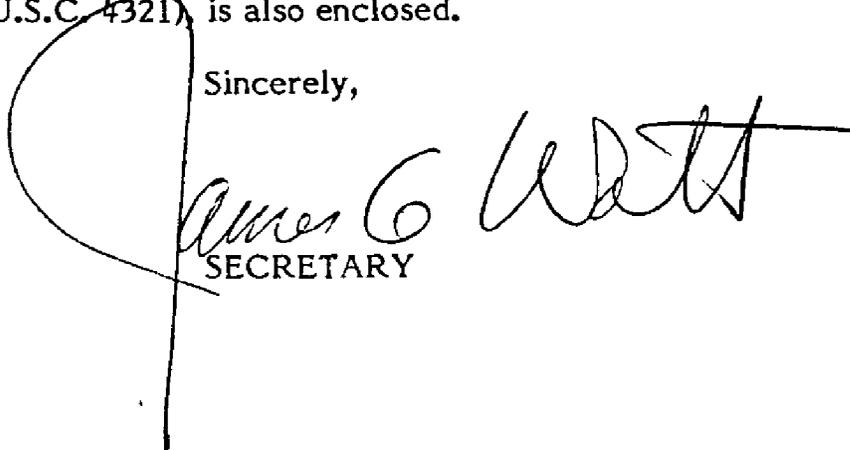
In accordance with the requirements of the Wilderness Act of 1964, a public notice was issued on September 27, 1979, on the proposed wilderness recommendation, and public hearings were held in Arizona at Safford, Tucson and Phoenix on November 5, 6 and 7 of that year. The hearing record was held open until December 6, 1979, to allow additional opportunity for written expressions by interested citizens. The statements presented at the public hearings and the written expressions received are summarized in the enclosed summary and analysis of comments.

Governor Bruce Babbitt, the Graham and Pinal County boards of supervisors, and all interested elected officials, as well as Federal and State agencies, were notified of the proposed recommendation, in accordance with the requirements of the Wilderness Act. Their views are also included in the enclosed summary and analysis of comments.

A complete record has been compiled, including written statements and oral testimony, in response to our announcement of public hearings. This record, of course, is available for inspection.

Aravaipa Canyon is eminently qualified for designation as wilderness, and I recommend submission to the Congress of the enclosed draft legislation to incorporate 6,670 acres into the National Wilderness Preservation System. A final environmental impact statement, as required by section 102(2)(C) of the National Environmental Policy Act (42 U.S.C. 4321), is also enclosed.

Sincerely,



James C. Wright  
SECRETARY

Enclosures

## A B I L L

To designate the Aravaipa Canyon Wilderness in the State of Arizona.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That, in furtherance of the purposes of the Wilderness Act of 1964 (78 Stat. 890; 16 U.S.C. 1331 et seq.) and consistent with the policies and provisions of the Federal Land Policy and Management Act of 1976 (90 Stat. 2743; 43 U.S.C. 1701 et seq.), certain public lands in Graham and Pinal Counties, Arizona, which comprise approximately six thousand six hundred and seventy acres, as generally depicted on a map entitled "Aravaipa Canyon Wilderness -- Proposed" and dated May 1980, are hereby designated as the Aravaipa Canyon Wilderness and, therefore, as a component of the National Wilderness Preservation System.

SEC. 2. Subject to valid existing rights, the Aravaipa Canyon Wilderness shall be administered by the Secretary of the Interior in accordance with the provisions of the Wilderness Act governing areas designated by that Act as wilderness. For purposes of this Act, any reference in such provisions to the effective date of the Wilderness Act shall be deemed to be a reference to the effective date of this Act; any reference to the Secretary of Agriculture with regard to administration of such areas shall be deemed to be a reference to the Secretary of the Interior; and any reference to wilderness areas designated by the Wilderness Act or designated national forest wilderness areas shall be deemed to be a reference to the Aravaipa Canyon Wilderness. For purposes of this Act, the reference to national forest rules and regulations in the second sentence of section 4(d)(3) of the Wilderness Act shall be deemed to be a reference to rules and regulations

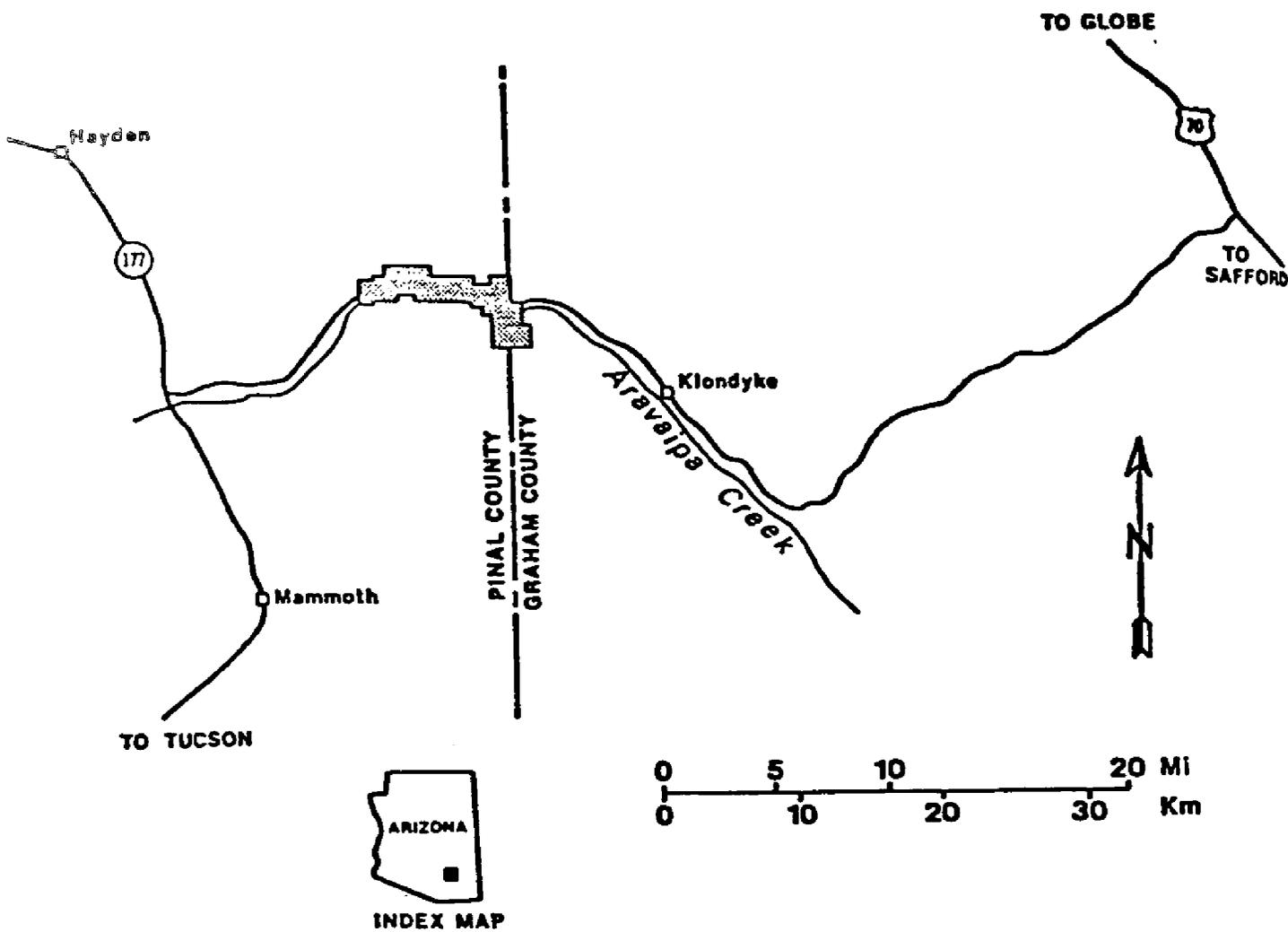
applicable to public lands, as defined in section 103(e) of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701, 1702).

SEC. 3. As soon as practicable after this Act takes effect, the Secretary of the Interior shall file a map and a legal description of the Aravaipa Canyon Wilderness with the Committee on Energy and Natural Resources of the United States Senate and with the Committee on Interior and Insular Affairs of the United States House of Representatives, and such map and description shall have the same force and effect as if included in this Act: Provided, That correction of clerical and typographical errors in the legal description and map may be made. The map and legal description shall be on file and available for public inspection in the offices of the Bureau of Land Management, Department of the Interior.

SEC. 4. Except as further provided in this section, the Aravaipa Primitive Area designations of January 16, 1969 and April 28, 1971, are hereby revoked. Prior to promulgation of rules and regulations to provide for their administration as a component of the National Wilderness Preservation System, subject to existing withdrawals, public lands comprising the Aravaipa Canyon Wilderness shall be administered under rules and regulations of the Secretary of the Interior applicable to designated primitive areas to the extent consistent with the provisions of this Act.

SEC. 5. Notwithstanding any other provisions of law or regulations to implement them, nothing in this Act shall be construed to prohibit the continuation of the existing use of motorized vehicles and a motorized pump within the Aravaipa Canyon Wilderness as necessary for the continuation of

existing grazing uses outside the Aravaipa Canyon Wilderness: Provided,  
That such use of motorized vehicles and pump shall cease immediately upon  
notification by the Secretary that an alternative source of water outside the  
wilderness is available.



Index map showing location of the Aravaipa Canyon Instant Study Area, Arizona. (shaded)

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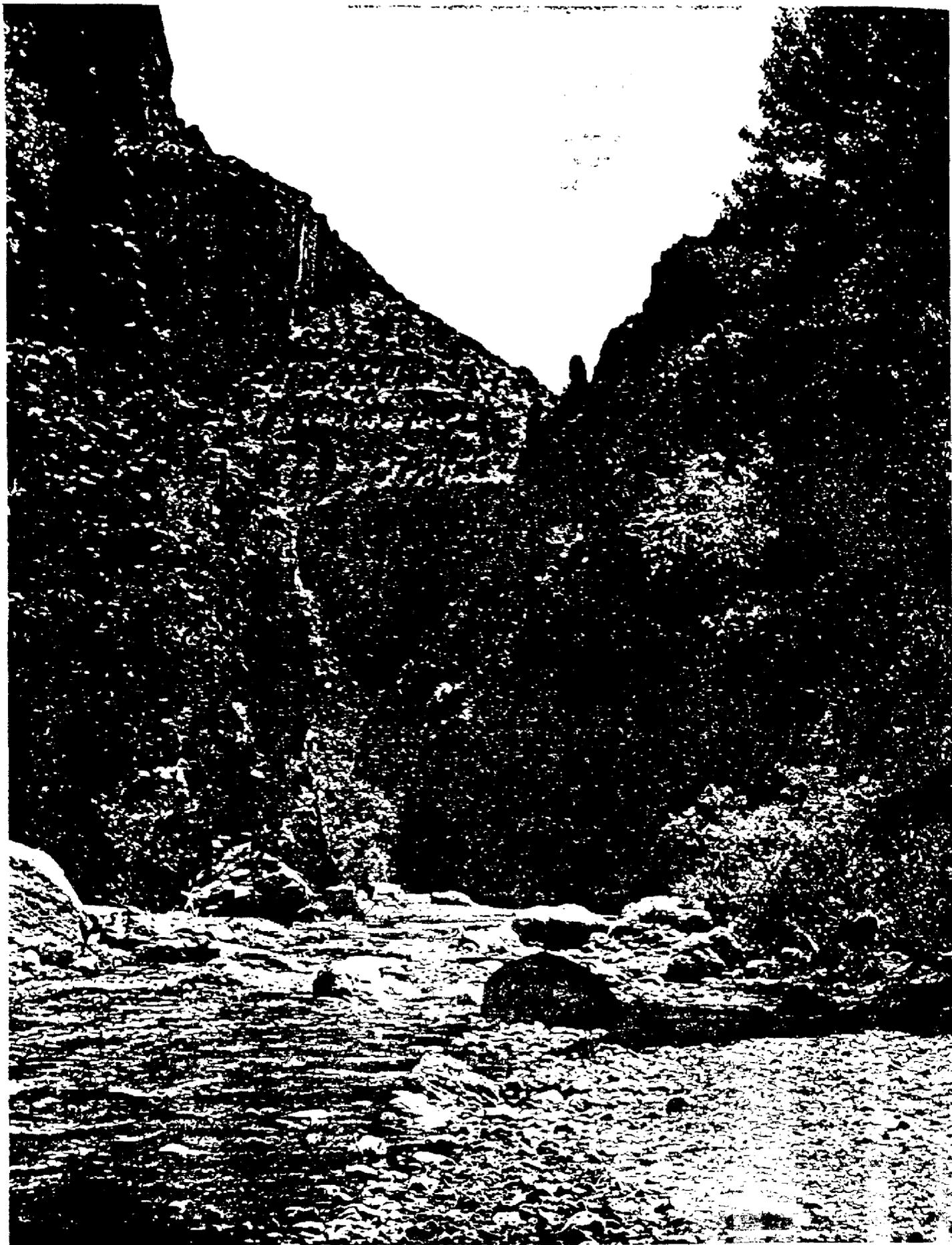
WILDERNESS SUITABILITY RECOMMENDATION

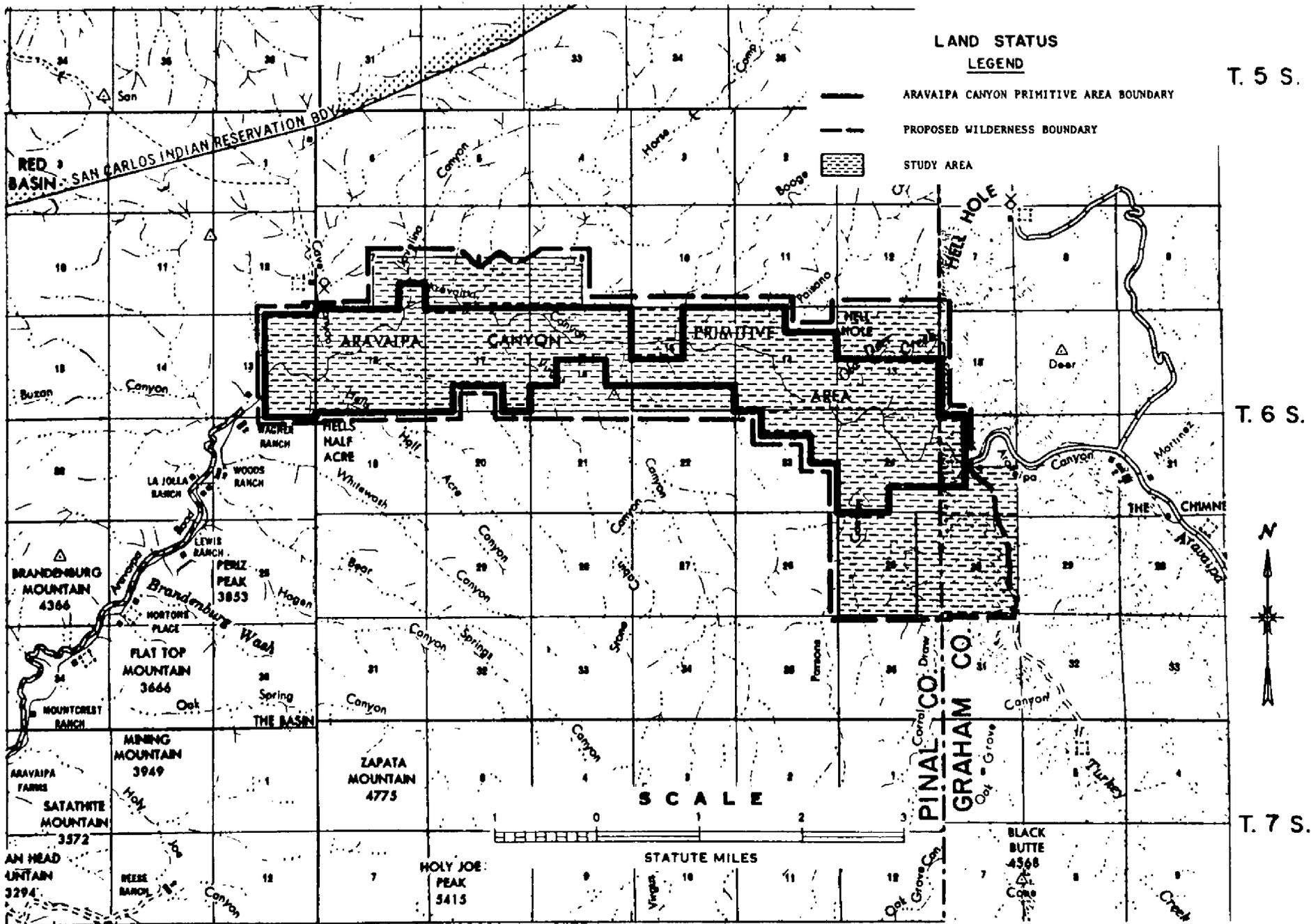
The Bureau of Land Management (BLM) recommends that Congress incorporate Aravaipa Canyon Primitive Area and all contiguous public lands having wilderness characteristics into the National Wilderness Preservation System. Aravaipa Canyon Primitive Area contains a unique southwestern desert canyon of outstanding natural beauty, which provides an exceptional opportunity for primitive and unconfined recreation.

The area meets the criteria of Section 2(c) of the Wilderness Act of 1964, and multiple use resource analysis revealed no significant resource conflicts resulting from a wilderness designation. A draft environmental statement (DES) on wilderness status for Aravaipa Canyon analyzed three alternatives: (1) wilderness designation of the primitive area and adjacent public lands, (2) wilderness designation of only the established primitive area, and (3) no action. The ES identified no significant adverse impacts for any alternative and concluded that the beneficial impact of permanently preserving the wilderness values through wilderness designation would outweigh the minimal adverse impacts. BLM has identified alternative (1) as the best choice for preserving the wilderness values of the Aravaipa Canyon.

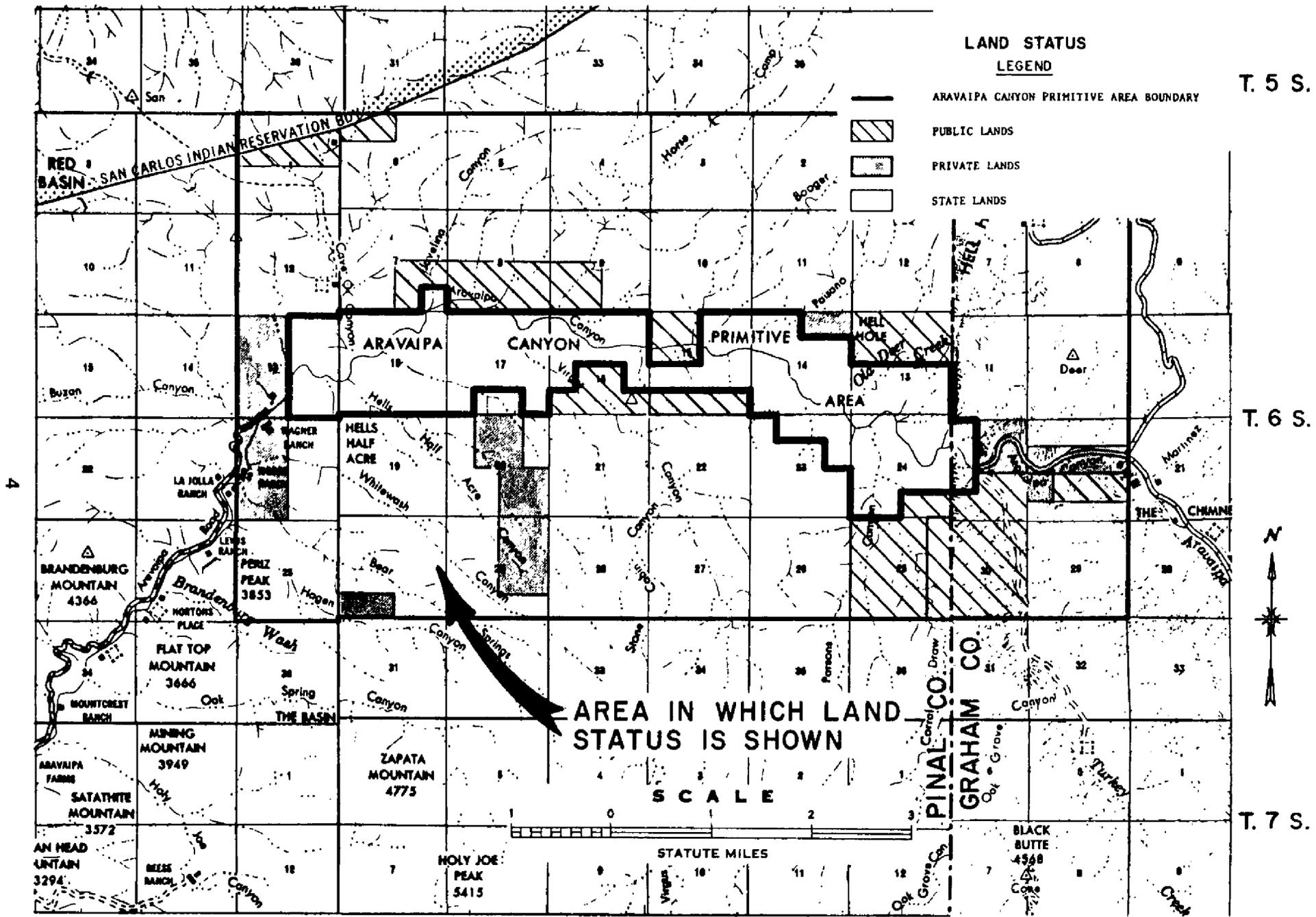
BLM further recommends that Congress recognize the present livestock operator's (Salazar) use of motorized vehicles within the proposed wilderness area and grant specific authorization for that rancher to continue such use as identified in the Management Compromises and Constraints sections. Such vehicles would be used to haul a pump for pumping water from the creek for livestock use. To protect wilderness values, the authorized BLM officer will strictly control this use until the proposed alternative source of water is developed. Funding will be proposed for fiscal year 1982. At such time, the authorization of such use will be rescinded.

Recommendation	<u><i>Guy C. Baier</i></u> District Manager	<u>8-24-79</u> Date
Approved	<u><i>G. B. Hargrett</i></u> State Director	<u>8-28-79</u> Date
Approved	<u><i>Robert J. Benford</i></u> Director	<u>1/19/82</u> Date





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R. 17 E.

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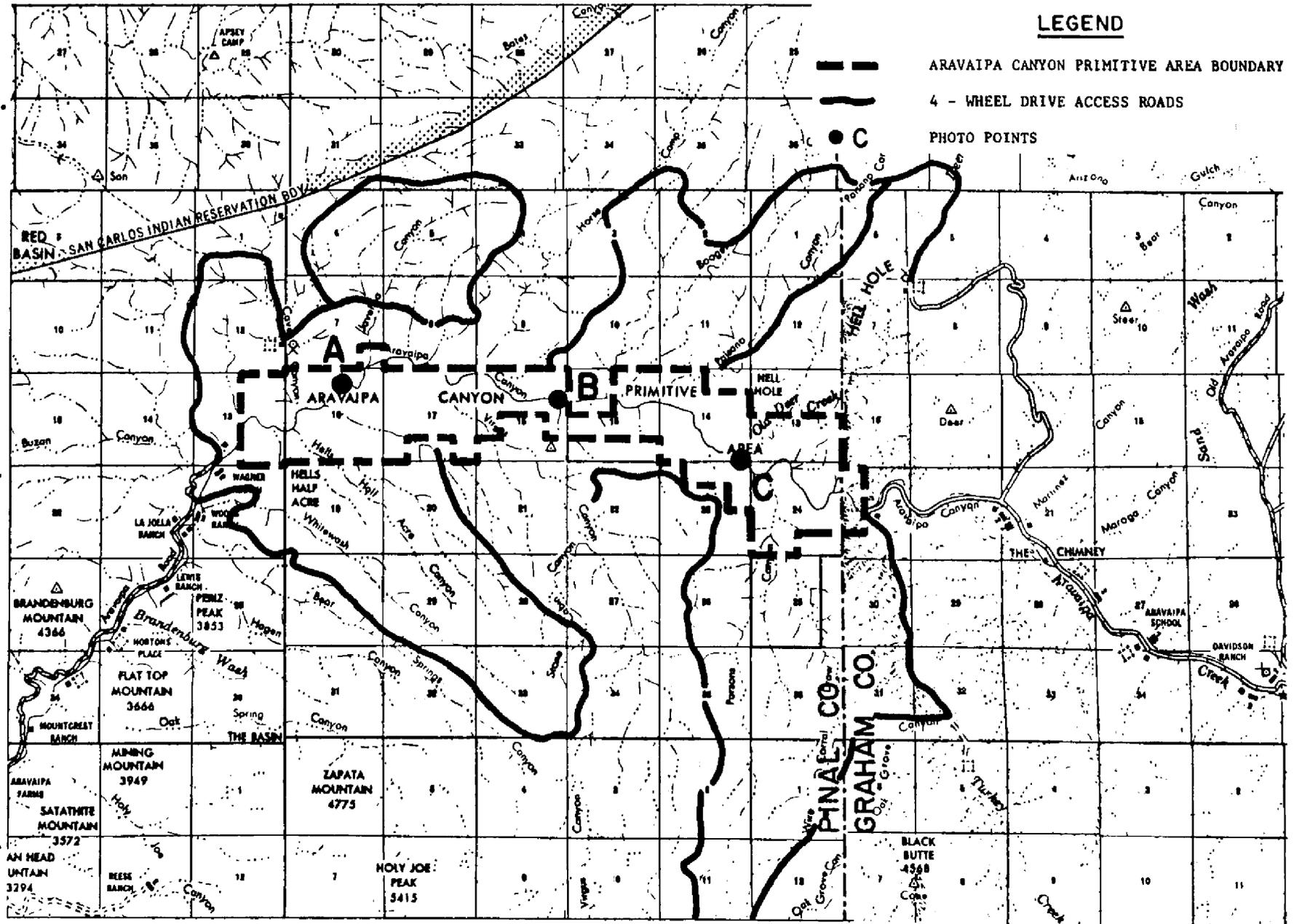
**LEGEND**

-  ARAVAIPA CANYON PRIMITIVE AREA BOUNDARY
-  4 - WHEEL DRIVE ACCESS ROADS
-  PHOTO POINTS

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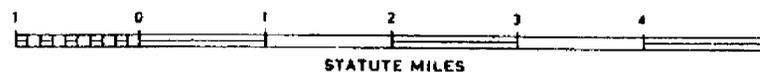
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 the Arizona Department of Transportation.

**SCALE**





## ARAVAIPA CANYON WILDERNESS SUITABILITY REPORT

### Previous Designation

On January 10, 1969 the Secretary of the Interior designated approximately 3,957 acres of public lands in Aravaipa Canyon, Arizona as Aravaipa Canyon Primitive Area. BLM has made several land tenure adjustments since 1969, designating a present primitive area of 4,044 acres. The designation resulted from a BLM proposal, which was widely supported by the people of Arizona. BLM held public meetings in Phoenix, Winkelman, and Safford, which were attended by several hundred people. The majority of the comments received supported the primitive area designation. Hunting and ORV interests expressed some opposition to the designation. BLM also developed and implemented a management plan as required by the Secretarial Order that established the primitive area.

### Summary of Inventory

BLM has completed a wilderness inventory and study of Aravaipa Canyon as directed by the Federal Land Policy and Management Act of 1976, conducting the inventory for wilderness characteristics according to its

Wilderness Inventory Handbook. An open house was held at the Safford District BLM office on January 10, 1979, to obtain comments on the inventory of Aravaipa Canyon. Civic and special interest groups were briefed and informed of the wilderness review. Information was also disseminated Statewide through the news media. Comments received during the open house were helpful in identifying additional inventory data and in identifying potential environmental conflicts that might result from a wilderness designation. The areas inventoried consisted of the primitive area and all contiguous public lands. (See maps 1 and 2).

One small parcel of land within the proposed wilderness area has a structure and evidence of cultivation resulting from unintentional trespass by an adjacent land owner. The 1.5 acre parcel lies just inside the west boundary of the primitive area and will rehabilitate naturally after the removal of the structure.

On the basis of inventory data, BLM excluded from further wilderness consideration two areas containing roads and other impairments of the wilderness character, totaling approximately 229 acres. These areas cannot return to their natural state through natural processes.

The remaining 6,670 acres of public land inventoried meet all wilderness criteria. BLM judged any remaining intrusions to the wilderness character to be substantially unnoticeable.

#### Summary of Study Process

BLM incorporated data gathered through the intensive inventory into its planning system. Specialists described wilderness, recreation, wildlife, geology, visual, and vegetative resources of the study area, and identified the maximum potential for each resource. They identified present and future demand levels and concluded that the only potential for increasing the quality of the wilderness resource is to further restrict visitor use.

This analysis established a basis for resource recommendations. The recommendations were compared to resolve competing use problems in resource allocation. The recommendation to designate as wilderness the primitive area and adjacent public lands with wilderness characteristics did not significantly conflict with other resources. Livestock use can continue as in the past four years. In 1974, livestock grazing was discontinued within the canyon bottom to allow for the reproduction of riparian vegetation. Ancillary recreation facilities outside the proposed wilderness area would be limited to those needed to support the existing use without attracting additional use.



The result of the study process was a decision to propose wilderness designation for Aravaipa Canyon Primitive Area and contiguous public lands having wilderness characteristics. Preservation of identified wilderness characteristics will continue through primitive area management under existing policies and objectives.

A lands resource recommendation that identified lands within the proposed wilderness area for exchange or sale conflicted with the recommendation to propose the area for wilderness designation. Since these lands have wilderness characteristics, the provisions of the management policy apply and lands can neither be exchanged or sold until Congress acts on the wilderness recommendations. Therefore, the lands recommendation was changed to delete those public lands in Aravaipa Canyon.

Management of all other resources within the proposed wilderness was found not to conflict with interim management policy.

#### Description of the Report Area

The area surrounding Aravaipa Canyon is rural and sparsely populated by ranch and farm families living along Aravaipa Creek and the main access routes to the canyon. Ranching is the primary land use of this area, but copper exploration, extraction, and processing produce most of this area's income.

The study area may be reached by two county roads. The west end of the study area, in Pinal County, is served by the Aravaipa Canyon Road, which begins at State Route 77, approximately 10 miles south of Winkelman.

This road, the first 5 miles of which are paved, follows Aravaipa Creek to the Aravaipa Canyon west end trail head. On the east side, the Klondyke-Aravaipa Road connects with U.S. 70 in Graham County, 6 miles west of Pima. Both roads are maintained by the respective counties.

### Significant Resource Data

Aravaipa Canyon provides a high degree of solitude and isolation because improved public access is restricted to the east and west ends of the canyon. The opportunity for solitude, which is diminished somewhat in the main canyon where visitor use is congested, increases as one moves deeper into the major side canyons, the arroyos, and limestone and sandstone ridges of the tablelands.

The topography and the abundant vegetation both enhance one's opportunity to find isolation and a feeling of solitude.

The area offers outstanding opportunities for many types of unconfined recreation, including backpacking, hiking, horseback riding, hunting (outside canyon bottoms), mountain and rock climbing (though highly dangerous due to instability of the rock structure), bird watching, photography, and sight-seeing. Many of the activities represent some of the most outstanding opportunities within the region.

Aravaipa Canyon has been the subject of many pictorial reviews in periodicals with nationwide circulation; the birding opportunities are widely recognized; visitors come from all over the nation to backpack and hike the area.

The remaining discussion in this section identifies wildlife, vegetation, water, geology, and cultural values that supplement the outstanding wilderness character of the area.

**Threatened or Endangered Wildlife Species:** Three animal species identified by the U.S. Fish and Wildlife Service as endangered, and published in the Federal Register (Vol. 44, No. 12, January 12, 1979) occur within Aravaipa Canyon Primitive Area. The southern bald eagle occurs as an uncommon and unpredictable winter visitor. The peregrine falcon historically nested in the area but now occurs only as an uncommon winter visitor. The Gila topminnow was reintroduced into Aravaipa Creek in early 1978 by the Arizona Game and Fish Department (AG&FD), but none have been reported in the creek since. The reason for the unsuccessful reintroduction is unknown.

Wildlife species found in the primitive area and designated by AG&FD as threatened in Arizona are listed in the following table. In addition, the aplomado falcon, designated by the AG&FD as a Group I species, (species or sub-species extirpated from Arizona that may possibly be re-established) was once sighted.

#### THREATENED ANIMAL SPECIES

Category	Birds	Mammals	Reptiles and Amphibians	Fish
Group II	Gray Hawk Southern Bald Eagle Peregrine Falcon			
Group III	Snowy Egret Zone-tailed Hawk Black Hawk Beardless Flycatcher	Desert Bighorn Sheep	Desert Tortoise Gila Monster	Loach Minnow
Group IV	Buff-breasted Flycatcher	Coati	Rock Rattlesnake	Round-tailed Chub Spikedace

Group II: Species or subspecies in danger of being eliminated from Arizona.  
 Group III: Species or subspecies whose status in Arizona may be in jeopardy in the foreseeable future.  
 Group IV: Species or subspecies of special interest because of limited distribution in Arizona.

Threatened or Endangered Plant Species: The Federal Register, Vol. 40, No. 127, July 1, 1975 listed possible candidates for the threatened or endangered plant species list. Three species are confirmed to occur in the study area: Echeveria rusbyi, Perityle lemmoni, and Choisya arizonica. In addition, six listed species probably occur in the study area and seven listed species possibly occur. A copy of the botanist's report on threatened and endangered species is on file in the Safford District Office.

Three distinct vegetation types (desert shrub, mountain shrub, and riparian) occur within the study area and provide potential for biological research.

Water Resources: The water of Aravaipa Creek is the key resource of the area, which has created and sustained this outstanding natural ecosystem. The relative abundance of water in Aravaipa Creek supports

the lush riparian vegetation, provides water for wildlife, provides a suitable habitat for 12 fish species (two of which are threatened and endangered), and is in itself a scenic attraction. Streamflow varies from a minimum flow of approximately 2.7 cubic feet per second to peaks during flash floods in excess of 10,000 cubic feet per second.

**Geological Features:** The geological features of Aravaipa Canyon are not only scenic but represent an important scientific, educational, and recreational resource. Visitors who walk through Aravaipa Canyon are exposed to beautiful multicolored cliffs rising as high as 1,000 feet above the canyon bottom. Within the canyon they can study a cross-section of earth's history representing nearly 2.6 billion years. The side canyons are narrow and rugged, displaying interesting erosional formations, including pinnacles and pools.

**Cultural Resources:** The Aravaipa Canyon area has been inhabited for perhaps the past 9,500 years. The primary prehistoric remains include Hohokam and Salado Sites. Historical remains are sparse. Indications of Cochise Archaic, Apache, and Spanish explorer occupation occur near the proposed wilderness area and are believed to occur within it.

Of 18 known sites, one has been determined to be eligible for nomination to the National Register of Historic Places, and one prehistoric site is believed to be of National Register quality.

The San Carlos Apache Tribe of Southeastern Arizona has identified no Native American social, cultural, or sacred values in the area. In recent times no other tribes have used the area.

### Regional Analysis

Aravaipa Canyon lies in the east end of an arid portion of the Sonoran Desert, a region that extends generally south from the Phoenix area, includes most of the southern third of Arizona, and extends into northern Sonora, Mexico. The region contains few perennial streams except in the higher mountains.

Eight designated wilderness areas occur within this region:

<u>Wilderness Area</u>	<u>Acres</u>	<u>Managing Agency</u>
Chiricahua National Monument	9,440	National Park Service
Chiricahua	18,000	U.S. Forest Service
Galiuro Mountains	52,717	U.S. Forest Service
Organ Pipe Cactus National Monument	313,840	National Park Service
Pusch Ridge	56,430	U.S. Forest Service
Saguaro National Monument	71,400	National Park Service
Sierra Ancha	20,850	U.S. Forest Service
Superstition Mountains	124,140	U.S. Forest Service

The region supports approximately 1.9 million residents, which represent about 76 percent of Arizona's population. The existing wilderness areas are within 100 to 270 miles driving distance of that population. Aravaipa Canyon is generally more centrally located to most population centers within the region than any of the existing wilderness.

Aravaipa Canyon provides a riparian environment with a perennial stream that supports a wide variety of plants and animals. These factors, coupled with all-weather access for passenger vehicles, make Aravaipa Canyon a popular place for backpackers and hikers.

### Management Compromises and Constraints

Upon designation as wilderness Aravaipa Canyon will be managed under the same objectives as those established for management of the area as a Primitive Area. Appendix 1 summarizes the management objectives of the Primitive Area Management Plan.

To achieve the primary objective of protecting, enhancing, and maintaining the natural beauty and primitive character of the land, certain steps are required to reduce man's influence upon natural, cultural, visual, and wilderness values. Such steps should go beyond closing the area to motorized vehicles and prohibiting the discharge of firearms in the confines of Aravaipa Canyon and its side canyons within the boundary. Rather, each significant resource in the area must be protected so that the public can enjoy it without diminishing its inherent value. Protection of the natural environment is of paramount importance.

Continuous livestock grazing has been suspended in the canyon bottom since 1974 to allow for the recovery and natural succession of the riparian vegetation. Livestock graze public lands on the canyon rim under BLM permit.

Although grazing is not prohibited in wilderness areas (Wilderness Act of 1964), grazing will continue to be controlled in the canyon bottoms but permitted on the tablelands above the canyon.

During severe drought one operator is authorized to use a motor vehicle to haul a portable pump 3 miles into the proposed wilderness area to pump water from Aravaipa Creek through an existing steel pipeline to an earthen reservoir on the south rim. The operator must drive through the streambed to get to the pipeline. Although use of the pipeline has only been required twice over the past seven years, adverse impacts on the aquatic habitat and damage to vegetation and soil structure along the streambed have been unavoidable and highly visible for several weeks or months after. The primitive area management plan recommends that BLM provide an alternative source of water near the earthen reservoir. Since the only feasible location for this alternative water source is

on Arizona State lands, additional coordination between agencies will be necessary to complete the project. Funding will be requested for FY 1982 to construct the water development.

BLM will continue to regulate visitor use levels to preserve the area for future use and enjoyment as wilderness.

The Aravaipa Canyon Primitive Area has been closed to mining claim location by a combination of Classification and Withdrawal Orders in 1968 and 1972.

### Economic and Social Impacts

The proposed wilderness designation would not significantly impact economic conditions.

Economic impacts to the recreation resource use would relate to possible increased demand. Since visitation trends show that most use occurs on weekends and holidays, demand will probably not result in increased use unless that use occurs during the week.

An impact to the livestock grazing in the canyon may result from a change in the allowable method of maintenance of range improvements and the use of vehicles versus horses for tending livestock. Since the use of vehicles is presently prohibited under the primitive area designation only the additional 2,626 acres contiguous to the primitive area would be affected. This area is roadless and lacks existing range improvements; therefore, economic impact should be slight. A wilderness designation would not change livestock numbers.

Wilderness designation would preclude mining (after December 31, 1983) on 880 acres now open to exploration and mining. Since the mineral potential of the Aravaipa Canyon area is low (see USGS and Bureau of Mines Mineral Report 79-291 for Aravaipa Canyon) wilderness designation would not significantly affect mineral resource development.

**Social Conditions:** User groups and the public have generally accepted and approved of the existence of the primitive area. The proposed wilderness designation will not directly impact social values.

Although the additional lands that would be designated wilderness are public, user groups and the Arizona public know that a wilderness designation represents a narrowing of options for use. User groups, such as hunters, hikers, and nature studiers could, in principle, support the expansion, but some groups might oppose it.

This resistance has resulted in opposition by some Arizonans (and a few westerners) to increases in government regulations. In some cases,

such as the management plan for the Aravaipa Canyon Primitive Area, the public accepts governmental regulations because such regulations are consistent with what the public feels needs to be done: visitor use regulation to protect the canyon. The public, in this case, seems to have similar desire for such controls on the public lands adjacent to the primitive area.

### Impact Analysis of Long-Term and Short-Term Effects

A wilderness designation of Aravaipa Canyon and adjacent public lands would preserve or improve the resources identified in previous sections of this report in both the short and long term. Resource commitments would be the same for the 4,044 acres that have been managed as primitive for the past ten years.

In general most resources on the 2,626 acres of contiguous public land would benefit from wilderness designation. Additional protection would be afforded to all wildlife habitat including 600 acres of crucial desert bighorn sheep habitat. Seven additional known prehistoric sites and some undiscovered sites would be placed under wilderness management. Wilderness values on adjacent public lands would permanently benefit. Recreational activities such as backpacking, hiking, and sightseeing would benefit in both the short and long term. Although off-road vehicle (ORV) use would be adversely impacted in the short and long term, the overall impact would be slight since the highly dissected rocky topography of much of the adjacent land is unsuitable for ORV use.

In the long and short term, wilderness designation would have a slightly adverse impact on mineral resources, as identified in the preceding section. A wilderness designation would protect geologic resources.

### Special Legislative Needs

No special legislative needs have to be addressed in conjunction with a wilderness designation for Aravaipa Canyon.

### Options Foregone

The exploration of subsurface or surface minerals will continue to be foregone on the 6,019 acres presently withdrawn from mineral entry unless Congress restores those uses in the national interest. Wilderness designation might also hamper exploration and development after December 31, 1983 on the 880 acres not presently withdrawn. After that date, only existing valid claims may be developed. Restrictions on the methods of extracting known mineral deposits within the wilderness could increase costs of development. Mining might also adversely impact wilderness resources.

A mineral study conducted by U.S. Geological Survey and Bureau of Mines, however, concluded that no mineable ore deposits are known in Aravaipa Canyon Primitive Area. No mineral commodity has been produced.

Zeolite deposits have been found in parts of the primitive area. Although natural zeolite has great potential value, the zeolite in the instant study area does not appear to constitute a significant resource, because of mining costs that would probably be prohibitive compared with the cost of mining other near-surface deposits elsewhere. The zeolite beds in Cave Canyon and Aravaipa Canyon lie in inaccessible positions, in vertical cliffs on canyonland topography, under large amounts of overburden. Although an estimate of the cost of mining was not made, it could be many times greater than the \$8 to \$20 per ton (\$9 to \$22 per mt) average mining cost for other zeolite deposits.

The area appears to have low mineral potential for metallic minerals. Since the latest known mineralization in the region occurred before the deposition of the upper sequence of the Galiuro Volcanics, any possible ore deposits would occur only below the upper sequence, at depths of at least 600 feet (180) near the single deep drill hole, and probably greater elsewhere inside the instant study area. Only sporadic high values for some base and precious metals were discovered in the course of this investigation; the minor geochemical anomaly perceived near the north-trending fault in the eastern part of the area may indicate leakage from an undetermined mineralized area at unknown depth. However, no anomalous values were observed in the only drill hole to penetrate the thickness of the volcanics and sample the underlying Precambrian rocks.

No known leases or mining claims occur within the proposed wilderness boundary.

#### Time Frame for Designation

This suitability report reflects a minimum of conflict with existing and future uses of Aravaipa Canyon. A lack of significant adverse impacts from the proposed wilderness designation and the overall widespread public support of such a designation provide an opportunity for Congress to serve Arizonans as well as all Americans by an expeditious consideration of this recommendation.

#### Public Participation

BLM issued news releases in late December 1978 announcing the proposed study of Aravaipa Canyon Primitive Area and adjacent public lands for their wilderness character. The BLM, Safford District Office held an open house on January 10, 1979 to receive comments related to the study. BLM has provided information, as requested, to the interested publics by attending both private and public meetings and has kept the

public abreast of progress of the study. Notice was published in the Federal Register, Vol. 44. No. 189, Thursday, September 27, 1979. Notices announcing the proposed recommendation for Aravaipa Canyon, and three public hearings will be held in Arizona at Safford, Tucson, and Phoenix on November 5, 6 and 7, 1979 to allow for comment on the proposed designation and related environmental statement. The Governor of Arizona and Federal agencies were notified 30 days before the public hearings and asked to comment on the proposed designation within 30 days after the hearings. A transcript of comments made at each hearing will be included with the final report submitted to the President.

The majority of comments received on the draft environmental statement approve of BLM's proposal to include Aravaipa Canyon and adjacent public lands having wilderness character within the National Wilderness Preservation System. The Safford District Office's permanent documentation file has a copy of all comments received regarding Aravaipa Canyon.

STATISTICAL SUMMARY

ARAVAIPA CANYON PRIMITIVE AREA  
BLM, SAFFORD DISTRICT

PINAL & GRAHAM COUNTIES, ARIZONA

	Aravaipa Canyon Primitive Area	Contiguous Public Land	Total
Acres Without Wilderness Characteristics	---	229	229
Acres With Wilderness Characteristics			
Recommended For Designation	4,044	2,626	6,670
Recommended Against Designation	---	---	---
TOTAL	4,044	2,855	6,899
Ownership In Study Area			
Bureau of Land Management	6,899 acres		

Boundary Description: Proposed Aravaipa Canyon Wilderness

The proposed Aravaipa Canyon Wilderness is in Graham and Pinal Counties in the State of Arizona. The following description refers to Map #1. All land hereinafter described is in surveyed townships.

Gila and Salt River Meridian

Township 6 South, Range 17 East  
Section 13, Lots 1 through 8 inclusive.

Township 6 South, Range 18 East  
Section 7, SE $\frac{1}{4}$

Section 8,  $S\frac{1}{2}$ , including all land except that portion lying north of the following described line:

Beginning at a point 1900.0 feet N  $89^{\circ} 54'$  E of the Quarter corner common to Sections 7 and 8, Township 6 South, Range 18 East; Gila and Salt River Meridian; thence S  $29^{\circ} 0'$  E a distance of 450.00 feet; thence S  $57^{\circ} 0'$  E a distance of 960.0 feet; thence N  $52^{\circ} 0'$  E a distance of 425.0 feet; thence N  $35^{\circ}$  E a distance of 355.0 feet; thence S  $79^{\circ} 0'$  E a distance of 735.0 feet; thence N  $72^{\circ} 0'$  E a distance of 345.0 feet; thence N  $29^{\circ} 0'$  E a distance of 460.00 feet to a point which is 548.0 feet S  $89^{\circ} 54'$  W of the Quarter corner common to Sections 8 and 9, Township 6 South, Range 18 East, Gila and Salt River Meridian.

Section 9, SW $\frac{1}{4}$ .

Section 13.

Section 14, S $\frac{1}{2}$ NE $\frac{1}{4}$ , W $\frac{1}{2}$ , SE $\frac{1}{4}$ .

Sections 15 and 16.

Section 17, N $\frac{1}{2}$ , N $\frac{1}{2}$ S $\frac{1}{2}$ , SW $\frac{1}{4}$ SW $\frac{1}{4}$ , SE $\frac{1}{4}$ SE $\frac{1}{4}$ .

Section 18.

Section 23, N $\frac{1}{2}$ NE $\frac{1}{4}$ , SE $\frac{1}{4}$ NE $\frac{1}{4}$ , NE $\frac{1}{4}$ NW $\frac{1}{4}$ .

Sections 24 and 25.

Township 6 South, Range 19 East

Section 19, Lots 1 through 4 inclusive, and all of that portion of the W $\frac{1}{2}$ SE $\frac{1}{4}$  lying west of Turkey Creek Canyon contained within the following described boundary:

Beginning at a point of 1320 feet West of the corner common to Sections 19, 20, 29, and 30, Townships 6 South, Range 19 East, Gila and Salt River Meridian; thence N  $19^{\circ} 00'$  W a distance of 290.0 feet; thence N  $13^{\circ} 0'$  E a distance of 365.0 feet; thence N  $47^{\circ} 00'$  W a distance of 200.0 feet; thence N  $4^{\circ} 30'$  E a distance of 620.0 feet; thence N  $56^{\circ} 00'$  W a distance of 1462.0 feet; thence S  $0^{\circ} 03'$  E a distance of 2202.0 feet; thence East a distance of 1320 feet, to the point of beginning.

Section 30, Lots 2 through 6 inclusive, SW $\frac{1}{4}$ NE $\frac{1}{4}$ , W $\frac{1}{2}$ SE $\frac{1}{4}$ , and all of that portion of Lot 1 and the E $\frac{1}{2}$ SE $\frac{1}{4}$  lying west of Turkey Creek Canyon contained within the following described boundary:

Beginning at a point 550.0 feet N  $89^{\circ} 51'$  W of the corner common to Sections 29, 30, 31, and 32, Township 6 South, Range 19 East, Gila and Salt River Meridian; thence N  $42^{\circ} 00'$  W a distance of 210.0 feet; thence N  $47^{\circ} 30'$  E a distance of 875.0 feet; thence N  $43^{\circ} 30'$  W a distance of 1125.0 feet; thence N  $4^{\circ} 00'$  E a distance of 2302.0 feet; thence N  $58^{\circ} 00'$  W a distance of 425.0 feet; thence N  $19^{\circ} 00'$  W a distance of 1000.0 feet; thence S  $0^{\circ} 17'$  E a distance of 5028.29 feet; thence S  $89^{\circ} 51'$  W a distance of 770.0 feet, to the point of beginning.

The parcel of land to which the above description applies contains approximately 6670.18 acres, more or less.

## APPENDIX 1

### ARAVAIPA CANYON PRIMITIVE AREA

#### MANAGEMENT SUMMARY

The Aravaipa Canyon Primitive Area Management Plan, widely endorsed by the public, establishes the following management objectives, providing for public recreation while protecting wilderness values:

(1) to protect, enhance, and maintain the natural beauty and primitive character of the land while providing visitors with a meaningful and quality primitive experience through proper resource and visitor management;

(2) to identify recreation facility requirements and limitations commensurate with protection of the environment and to identify public needs;

(3) to identify and regulate an acceptable level of recreation use to preserve and protect other resources, particularly wildlife habitat;

(4) to develop an interpretation and information program for the protection and identification of natural and cultural values for the benefit of visitors;

(5) to ensure that the common goals for the implementation of the plan are carried out through coordination with other BLM resource activities; Federal, State, and local governments; and the general public;

(6) to the extent feasible, to allow free and natural ecological succession for scientific and other study;

(7) to manage the cultural resources for their scientific and recreation value and protect them from intentional or inadvertent loss or damage.

To achieve the primary objective of protecting, enhancing, and maintaining the natural beauty and primitive character of the land, positive steps are required to limit man's influence upon natural, cultural, visual, and primitive values:

o To protect the natural environmental and primitive values the primitive area is closed to motorized vehicles.

o For visitor safety, the shooting of firearms is prohibited on public lands within the confines of Aravaipa Canyon and adjoining side canyons, below the rims. The closure does not apply to public lands above the rims of the canyons.

o To allow for natural reproduction of the riparian vegetation and to eliminate conflicts with visitors, livestock grazing has been terminated in the canyon bottoms and continues under custodial management on the canyon rims.

o Mineral prospecting and mining under the 1872 Mining Law are prohibited within the primitive area.

o Visitor use is restricted by the following regulations. A permit system limits visitors to 50 persons per day. Length of stay is limited to 3 days and 2 nights. Horses can be used for day use only. Group size is limited to 10 per group for hikers and 5 per group for horseback riders. Recreationists are prohibited from collecting, disturbing, or destroying vegetation, animals, rocks, or cultural artifacts.

o Resource study and research will continue to monitor and evaluate the condition of each natural element. Water quality tests, vegetation trend studies, wildlife research, and visitor carrying capacity studies will be initiated or continued to insure preservation of the wilderness values and maintenance of maximum recreational enjoyment.

o An information and interpretation program will be continued to educate visitors and assist them in achieving the maximum enjoyment and benefit from the area.

o The primitive area will continue to be managed by a fulltime supervised staff of two, one residing at the east administrative site and the other at the west administrative site. This staff provides for visitor safety and protection through regular patrols in the canyon. They are trained in first aid and rescue procedures. They maintain trailhead and support facilities at either end of the canyon and continuously monitor visitor use and resource conditions. Radio communications between the canyon and District office ensure fast and direct response to any situation.

o Support facilities will be limited to those required to meet visitor needs and to protect the fragile resources within the primitive area.



# United States Department of the Interior

IN REPLY REFER TO

BUREAU OF LAND MANAGEMENT

1792 (920)

ARIZONA STATE OFFICE  
2400 VALLEY BANK CENTER  
PHOENIX, ARIZONA 85073

Attached is the Aravaipa Canyon Wilderness Final Environmental Statement.

The preparation of this final statement has differed from our usual procedure of reprinting a draft statement to incorporate changes resulting from public review. Since relatively few and minor changes are necessary, the draft statement and comments in this document constitute the final environmental statement. This revised procedure has saved substantial time, money and paperwork.

The Safford District of the Bureau of Land Management prepared this environmental statement pursuant to Section 102(2)(c) of The National Environmental Policy Act of 1969. The statement describes and analyzes impacts that would result from incorporation of Aravaipa Canyon Primitive Area into the National Wilderness Preservation System along with the alternatives of: Increasing the Size of the Proposed Wilderness Area and No Action.

Thank you for your interest in this environmental statement.

Glendon E. Collins  
Acting State Director



DEPARTMENT OF THE INTERIOR  
FINAL  
ENVIRONMENTAL STATEMENT  
(TO BE USED WITH DRAFT)

ARAVAIPA CANYON  
WILDERNESS

Prepared by

BUREAU OF LAND MANAGEMENT  
DEPARTMENT OF THE INTERIOR



Director, Bureau of Land Management

November 1979

SUMMARY

Draft ( )

Final (x)

Environmental Statement

Department of the Interior, Bureau of Land Management

1. Type of Action: Administration ( ) Legislative (x)
2. Brief Description of Action: The proposal discusses the incorporation of Aravaipa Canyon Primitive Area (designated in 1969) into the National Wilderness Preservation System. The area contains approximately 4,044 acres and is located in Pinal and Graham Counties, Arizona.
3. Summary of Environmental Impacts: Wilderness designation would cause no significant immediate or long-range environmental changes. BLM manages Aravaipa Canyon Primitive Area for the retention of primitive and wilderness values and the regulation of public use and has no plans to change its present management. Wilderness designation would afford these lands added legislative protection.
4. Alternatives Considered:
  1. Increase the Size of the Proposed Wilderness Area
  2. No Action
5. Comments Have Been Requested From the Following:

Federal Agencies

Advisory Commission on Historic Preservation

Army Corps of Engineers

Department of Agriculture

Agricultural Stabilization and Conservation Service

Forest Service

Soil Conservation Service

Department of the Interior

Bureau of Indian Affairs

Bureau of Mines

Bureau of Reclamation

Fish and Wildlife Service

Geological Survey

Historic Conservation and Recreation Service

National Park Service

Environmental Protection Agency

Federal Energy Regulatory Commission

State Agencies

Arizona State Clearinghouse

Governor of Arizona

Other

Organizations and Individuals expressing interest in the proposed action

6. Date Statement Made Available to EPA and the Public:  
Draft Statement August 1979  
Final Statement November 1979

## INTRODUCTION

The Aravaipa Canyon Wilderness Draft Environmental Statement was filed with the Environmental Protection Agency and released to the public on August 15, 1979. The public review period ended on October 1, 1979.

Comments received during the review period required only minor changes in the draft statement. To save time and money and reduce paperwork the draft statement is incorporated by reference into the final environmental statement.

Approximately 880 draft statements were distributed for review. From this review a total of 40 comment letters were received. The majority of the comment letters expressed a preference for implementation of either the proposed action or one of the alternatives. These letters are summarized on the following table but are not reproduced here. Those letters commenting on the adequacy, completeness, and accuracy of the statement are reproduced, with each substantive comment identified and numbered. Responses to these specific comments are listed in the attached Comment Responses. Finally, an errata sheet identifies changes in the draft statement resulting from these comments and BLM's internal review.

SUMMARY OF LETTERS RECEIVED

The following table lists letters received and indicates if a preference is expressed for the proposed action, increasing the size of the proposed wilderness area (alternative 1), or no action (alternative 2). Letters reproduced in this FES are noted. Letters received after October 1 will be considered in decisionmaking, although they are not summarized or reproduced here.

Letter #	From	Preference			Reproduced in FES
		None	Proposal	Alternate 1 Increase Size of Wilderness	
1	William F. Griney, Isaak Walton League of America-Prescott Chapter			x	
2	Arizona State Assn. of 4 Wheel Drive Clubs				x
3	Bruce Babbitt, Governor of Arizona		x		
4	Bill Gold, Occi- dental Life Insurance Co. of California				x
5	Kathryn E. Weber		x		
6	Mike Anthony				x
7	Phil Ovenheimer, Pres. AZ Desert Racing Assn.		x		
8	Magna Copper Company		x		
9	Michael D. Barry			x	
10	Allen Cockle		x		
11	Thomas W. DeMono			x	
12	Dave Foreman, Southwest Rep, The Wilderness Society			x	
13	Daniel A. Poole, Pres. Wildlife Management Institute			x	x
14	Joni Bosh			x	
15	James E. Posedly			x	
16	Fred D. Wood			x	x
17	Al Necas			x	
18	David E. Creighton Jr. x				x
19	Mr. & Mrs. George T. Morrison			x	x
20	Walter R. Rist			x	

Letter From #		Preference			Alt. 2 No Action	Reproduced in FES
		None	Proposal	Alternate 1 Increase Size of Wilderness		
21	Michael Barry, Conservation Chairman, Southern Arizona Hiking Club			x		
22	Arizona State Clearinghouse	x				
23	Marie C. Burling			x		
24	Los Angeles Dist. Corps of Engineers	x				
25	Tom Wright			x		
26	Linda Lewis			x		
27	Bob Langsenkamp			x		
28	Clifton E. Merit, Exec. Dir., American Wilderness Alliance			x		
29	Dave McHenry			x		x
30	Mary Caldwell, Chairman of Wilderness Committee, Tucson Audubon Society			x		
31	William A. Facinelli			x		
32	John Leonard, et al. (79 others)			x		
33	Phelps Dodge Corp.				x	x
34	Arizona Wildlife Federation			x		
35	Arizona Wild & Scenic Rivers			x		
36	Thoren Lane			x		
37	Sierra Club, Grand Canyon Chapter			x		
38	Roy M. Emrick			x		
39	G. Donald Kucera			x		
	Total Responses	3	5	27	4	

The following letters were received after October 1, 1979:

- 40 National Park Service
- 41 Arizona Game and Fish Department



# Wildlife Management Institute

709 Wire Building, 1000 Vermont Ave., N.W., Washington, D.C. 20005 - 202 / 347 1774

RECEIVED

B.L.M. AZ STATE OFFICE

AUG 31 1979

10:00 A.M.  
PHOENIX, ARIZONA

August 28, 1979

DANIEL A. POOLE  
President  
L. B. JACOB  
Vice President  
L. L. WILLIAMSON  
Secretary  
JACK S. PENDER  
Board Chairman

Bureau of Land Management  
Arizona State Director  
2400 Valley Bank Center  
Phoenix Arizona 85073

Dear Sir:

The Wildlife Management Institute is pleased to comment on ARAVAIPA CANYON, WILDERNESS DRAFT ENVIRONMENTAL STATEMENT

We urge adoption of Alternative 1 rather than the proposed plan. Alternative 1 will add 2,325 acres to the area, including 150 acres of riparian vegetation and 600 acres of crucial big horn sheep concentration area. Those alone are sufficient reasons for establishing a larger wilderness, especially since impacts of expansion are negligible.

There are no reasons or rationale given for accepting the proposed plan and rejecting Alternative 1. This section should be added.

13-1 The list of "no impacts" on page 13, #5 should also include wildlife and fish.

These remarks have been coordinated with William B. Morse, the Institute's Western Representative.

Sincerely,

Daniel A. Poole  
President

DAP:1bb

Mr. Secretary, my family and I and many others would be greatly pleased to see that the Wood Brothers ranch here in the canyon would be preserved by including it in the Wilderness area as it has been in existence since 1880. We hope that this will be consummated very soon.

We thank you for your kind consideration.

With kindest regards,

Yours very sincerely,

c.c. to Louia Barassi, D.O.M.  
Director, State B.L.M.

DEDICATED TO WILDLIFE SINCE 1971

WOOD BROTHERS  
Pancake Ranch

Box 207  
Winkelman Arizona 85391

September 4, 1979

Honorable Cecil R. Andrus, Secretary  
Department of the Interior  
Washington, D.C.

Dear Mr. Secretary:

I am very concerned about the proposed wilderness Area in the Aravaipa Canyon here in Arizona.

My home has been at the West end of the primitive area here in Aravaipa Canyon for 60 years. I have been a cattle rancher all of my life so I know the area very thoroughly and know the facts well about the situation of the area.

I am sure these are new ventures for the Bureau of Land Management in designating Primitive and Wilderness areas on B.L.M. lands.

It seems very unusual that B.L.M. has requested that there is to be a Wilderness area of 4040 acres in Aravaipa Canyon without any ingress or egress at either end of the proposed wilderness area. It seems to me they have the cart before the horse.

When my brother and I were ready to retire we spent 4 years finding a group who would buy our ranch and preserve it next to the Primitive area which was part of our leased land for many years. The Defenders of Wildlife did purchase our ranch in 1971. I have fervently hoped that our home ranch at the West end of the proposed Wilderness area would be included in this new proposal as it is a natural entrance to the area, and we hoped that it would be included as it deserves Wilderness status and could be headquarters for B.L.M. Wilderness personnel.

16-1 The Defenders of Wildlife owns the property at both ends of the proposed wilderness area. I believe that Defenders of Wildlife would be very cooperative in selling property for ingress and egress if certain requests were fulfilled—ones of them being the expanding of the Wilderness area into Turkey Creek Canyon as it was in the original primitive area proposal. Within this Turkey Creek area are very old Indian villages, artifacts, and petroglyphs in a deep canyon that has no other particular value other than great history and man's enjoyment. There has been some controversy here by hunters claiming they would be cut off from the high country above the rim of the canyon. This is not so as there are good entrances from the south and east to the Aravaipa table lands.

David E. Creighton, Jr.  
7306 E. Millmore St.  
Scottsdale, Arizona 85257

Sept. 8, 1979

Attention: 911

State Director  
Bureau of Land Management  
2400 Valley Bank Center  
Phoenix, Arizona 85073

Dear Sir:

After reviewing your draft environmental statement for the Aravaipa Canyon Wilderness proposal, I have the following comments which I believe will increase the accuracy and validity of the environmental statement.

- 18-1 Page 1, par. 5. While BLM is the logical agency for the Secretary to use, the language of this paragraph indicates that BLM is specifically referred to in 501. I can find only reference to Geological Survey and Bureau of Mines in 501 (a). Section 101 (a) refers to administration but study would be by Secretary designation, not statute.
- 18-2 Pg. 3-4, Water Resources. The magnitude of the annual flow, length of record, and peak flood flows should be quantified to the extent possible and the relationship of Aravaipa Creek to the San Pedro River and its system hydrology. The relationship of the base flow supply of Aravaipa Creek as groundwater basin outflow from the northern Sulphur Springs Valley should also be indicated. The seasonal occurrence or sampling point of mercury positive samples would be informative and assist in environmental background understanding.
- 18-3 Pg 4, Air Quality. Is Hayden to be considered as one scatter or one complex for the Winkelman-Hayden area. Identification of Kennecott and AMARCO IN association with Christmas would be helpful. The broad statement concerning counties not meeting particulate standards when a very great proportion is dust created by natural forces from desert soils is too consistently used in environmental statements and biases opinion and creates unwarrented impressions gratuitously.
- 18-4 Pg 4, Noise. It appears that a differentiation or explanation of high and low altitude flights should be made for credibility. The implication that high altitude flights create ear shattering sound needs some type of supporting if it is not corrected.
- 18-5 Pg 5, Animals. Where may list of the species be found? How many on the list are extirpated or introduced species? What is the breakdown on birds as to breeding, summer or winter transients, occasional or seasonal visitors or wanderers? The 20% "inhabit" to many will mean resident breeding species which obviously is not the case. The bighorn sheep should be identified as reintroduced into the area to the extent that the 32 are not a possible viable surviving strain.
- 18-6 Pg 6, Threatened and Endangered Species. A member of the Southwest Bald Eagle Recovery Team is on the staff of the State Director and located in that office. The Bald Eagle has been officially listed as a single species with no validity to subspeciation (southern/northern) and as unsubspciated published in the Federal Register. To continue to refer to a discredited subspecies designation does not appear to be within the quality of a professional cooperating and coordinated staff.

Sept. 8, 1979 - p. 3

- 18-16] of water power development appear to have been overlooked.
  - 18-17 Pg 11, Land Use Controls. The conclusion relative to power site development has no support within this document. Even though it could be simply demonstrated it hasn't been.
  - 18-18 Pg 11, Mineral Resources. Mention of the specific minerals should be made to indicate their relative importance.
  - 18-19 Pg 15, Alternatives. The Alternative 1 does not clearly indicate the difference between the Study Area of the environmental statement and the Alternative 1. DES 1000 acres plus 2500 acres for 6527 acres total, Alternative 1 appears to contain 1000 acres but only 2225 acres which appears to be 216 acres less of mountain shrub vegetation type. There appears to be no change in the desert shrub and the broadleaf riparian acreages. Specific delineation on map 3 of the acquisition would be helpful. A map of the vegetation type areas would be helpful also.
  - 18-20 Pg 19, Coordination Comments Requested. The San Carlos Apache Tribe, Kennecott Copper Corp, and ASARCO do not appear on the list to be requested to make comments. Was this an oversight?
- As general comments on the report, the quality of color photo illustration could be appreciably more helpful to the reviewer if descriptive captions were used to describe areas and significant factors which prompted the selection of the picture. The frequency of misspelling in the text counters much of the care in producing the report. The slick style while popular with many as producing a good EIS, the deficiency of more specific information leads to a feeling that emotions are a primary target rather than a reasoned analysis based on reasonable accurate and sufficient information.
- Thank you for the opportunity to review the DES. I would like to receive a copy of the Final EIS.

Sincerely yours,  
*[Signature]*  
D.E. Creighton, Jr.

Sept. 8, 1979 - pg.2

- 18-9 Pg 6, Cultural Resources. In attempting to make some sense out of the numbers given presented for systematic/unsystematic, primitive areas/outside p.a.s., archeologist/staff factors, and resorting to the pgl-5 vegetation type data it appears that there is a 50 acre error (probably typographical) in the p.a. desert shrub vegetation type. In the absence of any descriptive to cultural period or type of site, the habitat location association is also not possible. With only 18 sites of record to resort to percentages for reporting 4 sites (22%), 7 sites (39%), 6 sites (33%), and 1 site (5%) as to condition is definitely a smoke-screen action to mislead the casual and impressionable (gullible, unthinking) reader. This type of statistical manipulating will be considered morally reprehensible conduct for professional and civilservice public employees intent on making insignificant numbers appear to be an important and significant multitude. I appreciate reading the statement relative to the absence of identified native American values in the area. This statement could well trigger some new mythology.
- 18-10 Pg 7, Landscape Character. The enshrinement of landscape esthetics and the notion of "modifications" should be placed in perspective with cultural resources. If time has already muted the road and (is it a stock tank?), how close is the time threshold to these "manifestations of an earlier and historic cultural use forcibly abandoned in the face of an aggressive outside pressure" being eligible for site designation. The archeologists of the future may well be baffled by these cultural remains when attempts are made to place them in contact without other artifacts of a long gone by culture.
- 18-11 Pg 7, Table 4 and General Leisure. Has any attempt been made to correlate water use with accessibility restrictions due to high rainfall and large runoff periods.
- 18-12 Pg 11-12, Mineral Resources. The required study (Section 503) of mineral resources appears to have been documented as being made but the absence of a brief summary of the mineralization present or salient conclusions from the USGS and Bureau of Mines reports leaves this item deficient for disclosure. If there had been an absence of mineral resources important to the nation, I'm sure such a statement would be prominently displayed. The complete absence of any other information and a statement to go to Bafford to look at a file copy of a report not even listed in the References appears to be a specific non-compliance with the intent of providing a reasonable amount of information to form some sort of informed opinion.
- 18-13 Pg 12, Land Use Plans. Information on the volume of water flow and head would provide a rational basis to demonstrate the improbable character of water power development even in these days of energy crisis. Water power is a clean and renewable resource. In light of the WaterPower Designation the omission of this topic as a Natural Resource leaves the statement not fully responsive to all significant environmental impacts.
- 18-14 That environmental statement reported and displayed the impacts of this State-Federal Land Exchange? A reference to documents should be given to demonstrate agency compliance with the NEPA process for this action which preceded this statement?
- 18-15 Pg 13, Social Conditions. Did BLM and the sociologist conform to Federal regulations concerning approval from OEB before conducting the indicated number for such a comprehensive interview?
- 18-16 Pg 13, Environmental Impacts. Potential negative impacts upon Energy resources

Mr. & Mrs. George J. Whelan  
220 Franklin St. & W  
Los Angeles, Calif. 90001

19  
RECEIVED  
BLM, AZ STATE OFFICE  
SEP 6 1979  
1000 A.M.  
PHOENIX, ARIZONA

State Director  
Bureau of Land Management  
Arizona State Office  
2400 Valley Bank Center  
Phoenix, Arizona, 85073

Dear Sir,  
I just had a opportunity to review the draft EIS for Aravaipa Canyon. While I enjoyed the color photographs, I wonder about the sequence of color photographs in a draft statement if anything. Regardless, I heartily endorse your proposed expansion of the wilderness area. Preservation efforts now are simply putting money into the bank and wish more of that could be done.

Sincerely,  
*[Signature]*





Moroni Branch Moroni, Arizona 86040

September 25, 1979

SEARCHED	INDEXED
SERIALIZED	FILED
SEP 26 1979	
FBI - PHOENIX	

Bureau of Land Management  
Arizona State Director (911)  
2400 Valley Bank Center  
Phoenix, Arizona 85073

Dear Sir:

I would like to take this opportunity to comment on the Aravaipa Canyon Wilderness Draft Environmental Statement. I have reviewed the Draft Statement and the supplementary U.S.G.S Open File Report 79-291 which addresses the mineral resources of the Aravaipa Canyon Instant Study Area.

I am concerned about the potential social and economic impact of the Clean Air Act classification of the Instant Study Area on the communities in the Safford Valley. This rapidly growing region of the state is expanding in population and industry, and the specific implications of Class II and potential future Class I designation (after review by the State of Arizona) upon the local economy has not been properly addressed in the draft statement.

A constant theme is present throughout much of the report indicating that the present management (since 1980) is consistent with wilderness management. In addition, it is mentioned several times that the formal designation of the area as a "wilderness" would increase the desire of people to visit the area, would increase use, and would increase vandalism.

However, on page 14 of the statement under the heading of "Recreation Uses, Use Areas, and Amounts" the draft indicates that "Recreation quality or opportunities would not change, and visitor use changes would be minimal." (emphasis added) This statement appears to be inconsistent with others in the main body of the report. On the same page of the Environmental Impact section, it is stated that "The additional exposures by the new media and wilderness guide books might increase demand for permits to use the area and increase visitor use." (emphasis added) The report

33

SEARCHED	INDEXED
SERIALIZED	FILED
OCT 1 1979	
FBI - PHOENIX	

Sept. 25, 1979

BLM  
ARIZONA STATE DIRECTOR (911)  
2400 VALLEY BANK CENTER  
PHOENIX, AZ. 85073

RE: ARAVAIPA CANYON WILDERNESS DES

I would like to support the adoption of Alt. A - designate Aravaipa Canyon and certain surrounding lands as Wilderness. As you have identified in the DES, it would benefit the administration of the Canyon and most resources would either be positively impacted or not affected.

29-1 | What is the purpose of the earthen reservoir mentioned on p. 7?

29-2 | I strongly urge that BLM not allow mineral leasing in a Wilderness Area as alluded to on p. 11.

All in all I like the study - it was short, to the point, very well written, and not complicated by so many charts, graphs, and tables as are so many ES's.

Sincerely yours,

*Dave McHenry*  
LANDSCAPE ARCHITECT  
1704 FLORIDA RD  
DURANGO, CO. 81301  
(303) 247-5996

Bureau of Land Management  
September 25, 1979  
Page 2

33-3 | does not address the potential increase of unauthorized use of private lands and attendant harassment and vandalism experienced by residents in the area. Conversations with several of the local residents near the I S A indicate that public misuse of their private lands which border the Primitive Area has consistently increased with the rising notoriety of the area. This matter should be investigated, documented, and reported in the final environmental statement.

33-4 | The mineral resource survey appears to have been fairly complete within the limitations placed upon the program. The wisdom of effectively closing the area to further reasonable mineral investigation prior to the resolving of the nature of the sources of the various base-metal geochemical anomalies and the economic potential of the surrounding zeolite deposits seems lacking.

33-5 | The Draft Statement indicates on page 15 that "The designation of lands as wilderness constitutes a long-term commitment of resources and land." This statement is very true and reflects, to some degree, the inflexibility of the Wilderness Program. A discussion should be included in the Final Statement in this section which further outlines the enormous leadtime necessary to explore for and develop mineral resources in a designated Wilderness if, at some time in the future, Congress decides that the area should be reopened for such activities due to national shortages of particular minerals.

In light of the fact that the Primitive Area has been administered in a manner consistent with Wilderness management in the past, I feel that Alternative Action No. 2, "No Action," is the proper choice for this area at this time.

Sincerely,  
*E. M. Schern*  
E. M. Schern  
Chief Geologist

EMS:tlw

## COMMENT RESPONSES

- 13-1 We agree. See errata sheet.
- 16-1 Some of the land that the Defenders of Wildlife purchased from Mr. Wood would benefit the management and protection of the area considered in Alternative 1. BLM, however, cannot identify and evaluate wilderness values on private lands. Inclusion of these lands in the proposed Aravaipa Canyon Wilderness would have to be considered under a separate analysis.
- 18-1 Acting for the Secretary of the Interior, BLM had the Geological Survey and Bureau of Mines conduct a mineral survey of the wilderness study area.
- 18-2 The requested hydrological data are on file in the Safford District office. They were not included in the text because no hydrological impacts are expected.
- 18-3 Hayden was considered as a complex for the Winkelman-Hayden area.
- 18-4 The text is correct. No information exists on sources of particulates.
- 18-5 See errata sheet.
- 18-6 In 1975 BLM published an Aravaipa Canyon bird species list, identifying seasonal use. BLM will prepare and distribute an Aravaipa Canyon vertebrate list in 1981.
- 18-7 When desert bighorn sheep were reintroduced to Aravaipa Canyon over 20 years ago, no bighorns inhabited the area.
- 18-8 The text is incorrect. (See errata sheet.) In 1978 the Fish and Wildlife Service reclassified all bald eagles in the contiguous United States as one species and accordingly corrected the endangered and threatened species list.
- 18-9 Vegetation type acreages were incorrect. See errata sheet.
- 18-10 The Landscape Character section of the statement does not pertain to cultural resources, which are treated separately. Recent land changes may be of historic interest at some future time; known and recorded origins and functions distinguish these recent modifications from those of the more remote historic or prehistoric past.
- 18-11 Although visitor use has not been correlated to high rainfall and heavy runoff, weather conditions do affect visitor use.

- 18-12 See errata sheet.
- 18-13 BLM's request for the revocation of the two power site withdrawals has been approved by the Geological Survey. The Federal Energy Regulatory Commission (FERC) has indicated no objections to the revocation. Since FERC's revocation concurrence is imminent, BLM does not consider the loss of potential water power development an impact.
- 18-14 An environmental assessment on the land exchange is on file in the BLM Arizona State Office in Phoenix.
- 18-15 The gathering of social data conformed to regulations in OMB Circular A-40, revised, September 1976.
- 18-16 See response to comment 18-13.
- 18-17 See response to comment 18-13.
- 18-18 See response to comment 33-4.
- 18-19 The wilderness study area (WSA) includes only the existing primitive area, whereas the ES study area includes the WSA and adjacent public lands. A total of 229 acres of adjacent public lands were found not to meet wilderness criteria, and were not proposed for wilderness designation under Alternative 1. Acreage discrepancies are addressed on the errata sheet.
- 18-20 Draft ES copies were sent to the San Carlos Apache Tribal Council, Kennecott Corporation, and ASARCO, although these organizations were not listed in the draft ES.
- 19-1 We believe that color photographs provide the best means of portraying the character of Aravaipa Canyon. Moreover, the Safford District already had these photographs on file, and extensive field work would have been needed to obtain quality black and white photographs. The additional cost of color photos is not known, although the cost of printing and distributing 1,500 copies of the Aravaipa Canyon ES amounted to less than \$5,000.
- 29-1 The earthen reservoir's purpose was to provide water for livestock and wildlife.
- 29-2 Mineral leasing would be allowed only where it would not impair the wilderness character of the area.

- 33-1 The Department of the Interior has recommended that Aravaipa Canyon Primitive Area not be considered for Class I status. "A review of the area has not identified air quality related values of sufficient importance to require protection beyond that afforded the surrounding region in order to realize the purpose for which it was set aside." 44 FR 52582, September 7, 1979. National Monuments, Preserves and Primitive Areas: Review for Class I Redesignation Recommendation.
- 33-3 Since we expect little increase in visitor use, we expect little change in visitor attitudes and behavior. Land bordering the primitive area in the canyon is owned by the Defenders of Wildlife.
- 33-4 The mineral report states that the geochemical anomaly is minor, that the area has low mineral potential, and that the costs of mining zeolite would be prohibitive when compared to the costs of mining zeolite deposits elsewhere.
- 33-5 Estimates of the time required for exploration and development of minerals and for congressional action would be too speculative to be reliable.

Page 42INTRODUCTION

## Paragraph 1

Line 5 - Change acreage of adjacent public lands to 2,855 acres.

Line 7 - Change acreage of combined areas to 6,899 acres.

Page 45NOISE (comment 18-5)

## Paragraph 2

Line 2 - Delete "high and."

VEGETATION TYPES (comment 18-9)

## Paragraph 2

Change acreages to read - The study area has 2,291 acres of desert shrub type, 1,380 acres within the primitive area and 911 acres on adjacent lands.

## Paragraph 3

Change acreages to read - This vegetation type comprises 2,244 acres within the primitive area and 1,765 acres on adjacent lands, for a total of 4,009 acres.

Page 45VEGETATION TYPES (comment 18-9)

## Paragraph 1

Change acreages to read The study area has 599 acres of the riparian vegetation type.....and the adjacent lands contain 179 acres.

THREATENED and ENDANGERED PLANT SPECIES

## Paragraph 1

Last sentence - Change to read "Of the 9 species listed, 3 are confirmed to exist in the study area, 4 probably exist, and 2 possibly exist."

## Table 1

Delete the following plant species from the list:

Plumeria ambigens

Gutierrezia linoides

Plummera floribunda

Echinocereus ledingii

Mammillaria orestera

Neolloydia erectocentra var. erectocentra

Eriogonum apachense

Page 51

THREATENED AND ENDANGERED SPECIES (comment 18-8)

Paragraph 1

Sentence 2 - Delete "southern."

Table 2

Group II - Delete "southern."

Page 61

MINERAL RESOURCES (comment 18-12)

Paragraph 3

Delete sentence 1 and substitute the following: "The U.S. Geological Survey and the Bureau of Mines Mineral Survey of Aravaipa Canyon stated that 'no mineable ore deposits are known in the Aravaipa Canyon Primitive Area. There has been no production of any mineral commodity'."

Page 62

ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION (comment 13-1)

Paragraph 2

Sentence 2 - Add "wildlife and fish" after "no impacts to."

Page 64

SOCIAL CONDITIONS

Sentence 1 - Change "administrative" to "legislative."

ALTERNATIVE 1 (comment 18-19)

Sentence 1 - Change acreage to 2,626 acres.

After sentence 1, add the following: "A total of 229 acres of adjacent public lands were found unsuitable for wilderness designation." See appendix 2 and changes to appendix 2 on errata sheet.

VEGETATION (comment 18-19)

Sentence 1 - Replace sentence 1 with following: "The Additional lands found to have wilderness characteristics contain approximately 811 acres of desert shrub vegetation type, 1,665 acres of mountain shrub vegetation type, and 150 acres of broadleaf riparian vegetation type."

ANIMALS

Sentence 2 - Change acreage to 2,626 acres.

Page 65

RECREATION

Sentence 1 - Change acreage to 2,626 acres.

MINERAL RESOURCES

Sentence 1 - Change acreage to 880 acres.

Page 73

APPENDIX 2

1. Size: 6,899 acres  
Narrative: 2nd line - 2,855 acres contiguous...  
4th line 213 acres

Paragraph 2

2nd line - 16 acres +  
3rd line - 6,670 + acres

Page 74

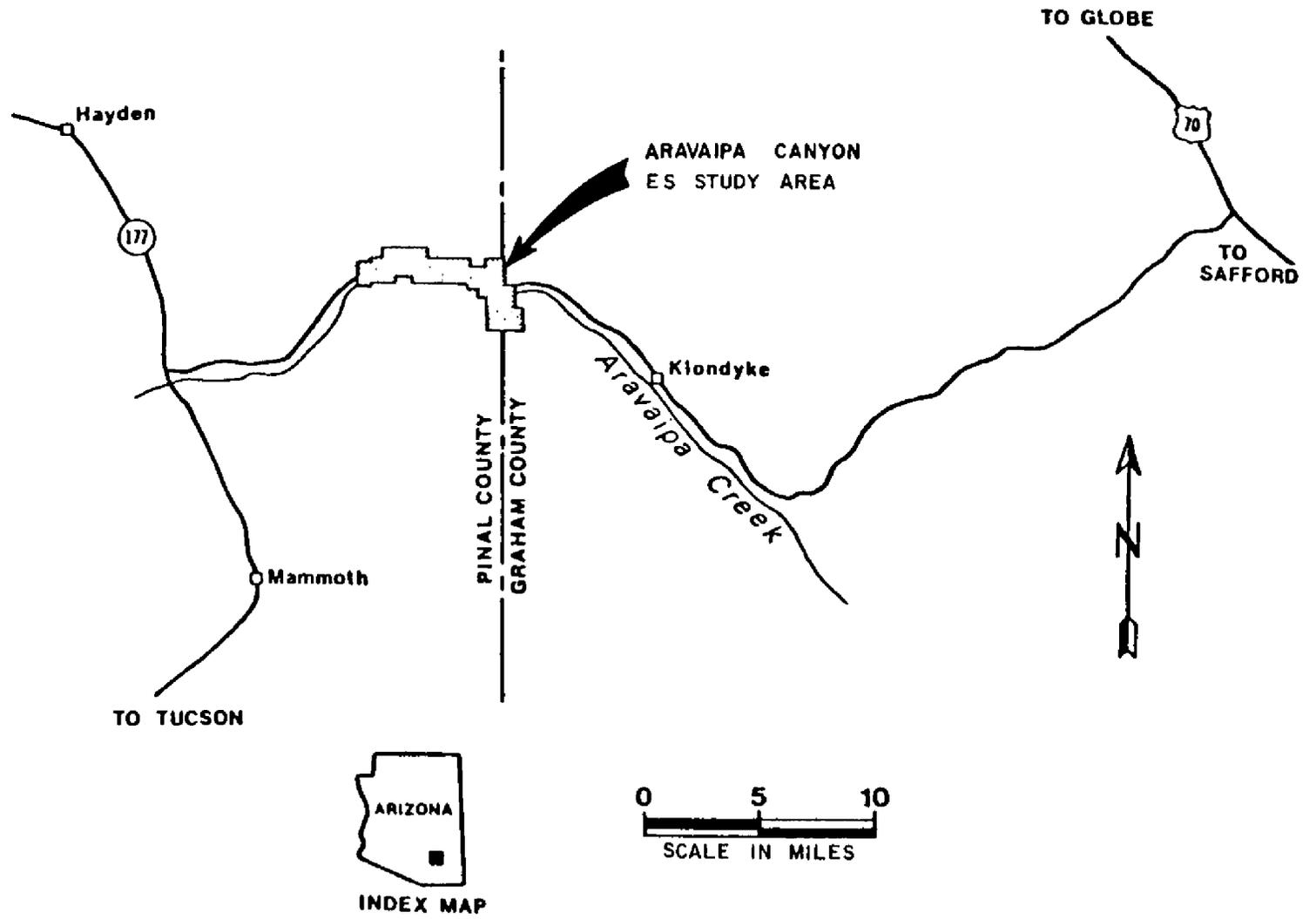
4. Narrative:  
Line 4 - Change million to billion
5. Narrative:  
Paragraph 7  
Line 1 - The water pipeline is in Sec. 23 rather than Sec. 25.

Summary:

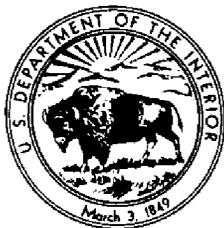
Paragraph 1  
Line 3 - 229 + acres

Paragraph 3

Line 1 - 6,670 + acres



ARAVAIPA CANYON LOCATION MAP



# United States Department of the Interior

## BUREAU OF LAND MANAGEMENT

ARIZONA STATE OFFICE  
2400 VALLEY BANK CENTER  
PHOENIX, ARIZONA 85073

Enclosed for your review and comment is the draft environmental statement for the proposed Aravaipa Canyon Wilderness.

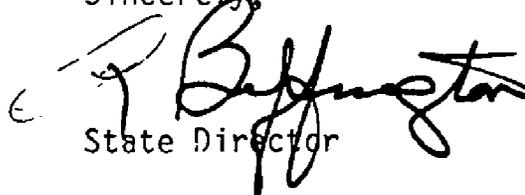
The statement is based on information from Bureau of Land Management and other sources, including information supplied by and in consultation with Federal, State, and local agencies, and interested private organizations and individuals. The purpose of the statement is to disclose in advance the probable environmental impacts of the proposed action and alternatives and to assure that the decisionmaking process considers environmental as well as economic, technical, and other factors.

We would appreciate receiving your comments on the adequacy, completeness, and accuracy of this analysis. The comment period will run for 45 days after the draft is filed with the Environmental Protection Agency and the notice of receipt is published in the Federal Register. Comments received after the 45-day review period will be considered in the subsequent decisionmaking process, even though they may arrive too late for inclusion in the final environmental statement.

Your comments should be sent to:

Bureau of Land Management  
Arizona State Director (911)  
2400 Valley Bank Center  
Phoenix, Arizona 85073

Sincerely,

  
State Director

**DEPARTMENT OF THE INTERIOR  
DRAFT  
ENVIRONMENTAL STATEMENT**

**ARAVAIPA CANYON  
WILDERNESS**

**Prepared by**

**BUREAU OF LAND MANAGEMENT  
DEPARTMENT OF THE INTERIOR**

 *Edward F. Spang*, Acting

**State Director, Arizona State Office**

SUMMARY

Draft (x)                      Final ( )                      Environmental Statement

Department of the Interior, Bureau of Land Management

1. Type of Action:            Administrative ( )            Legislative (x)
2. Brief Description of Action: The proposal discusses the incorporation of Aravaipa Canyon Primitive Area (designated in 1969) into the National Wilderness Preservation System. The area contains approximately 4,044 acres and is located in Pinal and Graham Counties, Arizona.
3. Summary of Environmental Impacts: Wilderness designation would cause no significant immediate or long-range environmental changes. BLM manages Aravaipa Canyon Primitive Area for the retention of primitive and wilderness values and the regulation of public use and has no plans to change its present management. Wilderness designation would afford these lands added legislative protection.
4. Alternatives Considered
  - A. Increase the Size of the Proposed Wilderness Area
  - B. No Action
5. Comments Have been Requested From the Following:

Federal Agencies

Advisory Commission on Historic Preservation  
Army Corps of Engineers  
Department of Agriculture  
    Agricultural Stabilization and Conservation Service  
    Forest Service  
    Soil Conservation Service  
Department of the Interior  
    Bureau of Indian Affairs  
    Bureau of Mines  
    Bureau of Reclamation  
    Fish and Wildlife Service  
    Geological Survey  
    Historic Conservation and Recreation Service  
    National Park Service  
Environmental Protection Agency  
Federal Energy Regulatory Commission

State Agencies

Arizona State Clearinghouse  
Governor of Arizona

See Consultation and Coordination section for complete listing.

6. Date Draft Statement Made Available to EPA and the Public:  
July 1979

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# DESCRIPTION OF THE PROPOSED ACTION

## INTRODUCTION

This draft environmental statement (DES) discusses the wilderness character of Aravaipa Canyon and the impacts of the possible designation of Aravaipa Canyon Primitive Area (4,044 acres) and adjacent public lands (2,543 acres) to the National Wilderness Preservation System. The statement refers to these combined areas (6,587 acres) as the "study area."

Over the years Aravaipa Canyon has gained national recognition for its outstanding natural beauty. Visitors are attracted by the canyon's unique perennial stream, flowing at the base of 1,000-foot high multi-colored cliffs. Contrasting with the riparian community and enhancing the area's scenery and interest are the desert plant communities of the canyon slopes, side canyons, and the tablelands above the canyon. Riparian and desert communities, in turn, provide habitat for diversified wildlife species. Together, the stream, varied vegetation, and rugged terrain create an aura of isolation and solitude.

Aravaipa Canyon was first proposed for retention in Federal ownership and primitive area status in August 1968. After a public hearing that showed strong local, State, and national support, Aravaipa Canyon Primitive Area was established by order of the Secretary of the Interior on January 16, 1969.

The Bureau of Land Management (BLM) initiated a management plan study in October 1969 and announced management plan decisions one year later after considerable public involvement and hearings on the plan. BLM has managed Aravaipa Canyon under those plans as a de facto wilderness for the past 10 years.

The Aravaipa Canyon Wilderness is proposed in response to a congressional mandate in Section 603 of the Federal Land Policy and Management Act (FLPMA) of 1976. FLPMA directs the Secretary of the Interior to have BLM study all public lands under its jurisdiction for their wilderness potential. FLPMA further provides that BLM review the wilderness potential of its natural and primitive areas designated before November 1, 1975 (wilderness instant study areas), using guidance in Section 3(d) of the Wilderness Act of 1964. The Secretary of the Interior is then required to report to the President his recommendations on the wilderness suitability of these instant study areas.

BLM specialists used procedures outlined in the Wilderness Inventory Handbook (BLM, 1978) to inventory Aravaipa Canyon for wilderness characteristics. They incorporated data gathered through the intensive inventory into the BLM planning system. They then updated the inventory data to identify and include the study area's wilderness values. They also identified the wilderness potential of adjacent public lands.

Considering the identified wilderness values and the lack of significant resource conflicts, these specialists recommended that Aravaipa Canyon be proposed for wilderness designation. They also recommended that livestock use continue as under the previous designation, and that recreation facilities be limited to those needed to support the existing use without attracting additional use.

## DESCRIPTION OF THE PROPOSED ACTION

The proposal is to establish a 4,044-acre wilderness area north of the Galiuro Mountains in southeastern Arizona on public lands presently designated as Aravaipa Canyon Primitive Area (map 1). The primitive area includes canyon bottoms, walls, and portions of tablelands adjoining the rim. The proposal's objective is to protect wilderness values through legislative designation.

BLM would implement this proposal in three stages: interim management, designation as wilderness, and management as wilderness. During interim management and after designation BLM would continue to use the approved management plan, since its guidelines and policies conform to the guidelines for interim management of wilderness study areas and requirements of Section 4 of the Wilderness Act. (Refer to Aravaipa Canyon Management Plan Summary--appendix 1--for specific management objectives.)

FLPMA requires that a recommendation be made to the President by July 1, 1980 and that the President submit his recommendations to Congress within 2 years of receipt of this report. Congress, however, has no time limit in which to act upon the President's recommendation. The designation by Congress will be permanent, subject only to change by act of Congress.

The only authorizing actions will be congressional designation of Aravaipa Canyon to the National Wilderness Preservation System.



# DESCRIPTION OF THE ENVIRONMENT

This section describes the environment of the ES study area, which includes Aravaipa Canyon Primitive Area and adjacent public lands.

## CLIMATE

Aravaipa Canyon is located in a desert region of long hot summers, short mild winters, low annual rainfall, low relative humidity, high evaporation rates, and a high percentage of sunshine. Aravaipa Creek, however, somewhat modifies the desert climate by increasing humidity, supporting riparian vegetation that produces shade, and by reducing air temperatures.

Clear skies and a dry atmosphere cause surface heating during the day and rapid radiational cooling at night, producing daily temperature variations averaging 40 degrees F. During summer (mid-May to mid-October) maximum temperatures commonly exceed 100 degrees F. Winter temperatures typically reach daily maximums in the 60's.

Annual precipitation fluctuates highly, and periodic droughts are common. Annual precipitation averages 15 inches, 40 percent occurring during July, August, and September. Summer storms, typically short and intense, cover only small areas but occasionally produce flash floods. Relative humidity ranges from 20 to 60 percent in the summer and from 40 to 60 percent in the winter. The mean annual pan evaporation rate is estimated to be over 7 feet.

## TOPOGRAPHY

The study area lies in the Basin and Range physiographic province, an area of broad, flat valleys and high, block-shaped mountains. The Galiuro Mountains--one such block--consist of series of flat-lying volcanic rocks fractured by numerous faults. Aravaipa Canyon crosses the Galiuros from Aravaipa Valley to the San Pedro Valley, creating a combination of mesa-type high cliffs, precipitous and colorful canyon walls, and narrow, twisting canyon floors.

Canyon floor elevations range from 3,060 feet at the east end to 2,640 feet at the west end. The top of the mesas, however, gently increase in elevation toward the west. The increase in canyon-wall elevation, aided by the change in the erosional characteristics of the different rock types, creates a variety of spectacular cliffs (figures 1 and 2).

## GEOLOGY

Aravaipa Canyon provides an outstanding opportunity for the study of geology. The walls of the canyon's western end consist of Galiuro volcanics--ash and lava flows up to 3,000 feet thick and 22-25 million years old. Beneath the volcanics, the Whitetail conglomerate lies on Precambrian diabase, a contact representing over 500 million years. In places, the volcanics rest directly on older Precambrian porphyry, dated at more than 2.6 billion years (Krieger, 1968). At the east end of the canyon, the Hell Hole conglomerate, which is up to 2,000-feet thick, overlies the Galiuro volcanics. This formation's erosional characteristics give the cliffs a pitted, rough veneer (figure 3).

## SOILS

The soils of the study area may be divided into two major groups: shallow soils of the uplands and deep alluvial soils of the canyon bottoms.

The shallow soils of the uplands have formed primarily of volcanic parent material of weathered andesite, tuff, rhyolite, and conglomerate. These soils have a dark gravelly clay loam or gravelly loam surface over a gravelly clay subsurface horizon. The gravelly clay subsurface overlies weathered bedrock. These soils are generally 20 inches or less to bedrock.

Hillsides have pockets of soil deeper than 20 inches, but these pockets occur on less than 15 percent of the area.

The alluvial soils in the canyon bottoms generally exceed 60 inches in depth and have a gravelly fine sandy loam surface and a gravelly sandy loam, loamy sand, or gravelly sand subsurface. These soils have a rapid or very rapid permeability, and their location next to Aravaipa Creek makes them unsuitable for sewage disposal. These soils are also highly susceptible to water erosion.

## WATER RESOURCES

The water flowing through Aravaipa Canyon is a key natural resource upon which the recreational value of the primitive area is based (figures 4 and 5). Aravaipa Creek, the main water course through the canyon, with a drainage area of 541 square miles, is a free-flowing perennial stream for 15 miles. It has maintained a relatively constant and dependable flow, although its level recedes during extreme dry periods. A small acreage of irrigated croplands and pastures lies upstream from the study area, but topography limits expanding the irrigable land by more than 100 acres.

Of the 14 major tributaries of Aravaipa Creek in the study area, 4 flow perennially. The others flow only intermittently or are ephemeral (storm flow). Ten perennial springs exist in the canyon bottom or in side canyons. The study area also has an unknown number of seeps.

Frequently, flooding after heavy rain damages primitive area signs and trail counters and threatens visitors in the canyon. A study of the canyon in 1972 found high water marks at least 12 meters above its normal surface (Minckley, 1972).

Untreated surface water is unfit for human consumption because of bacterial contamination, thereby requiring visitors to carry potable water during their stay.

A microchemical analysis of Aravaipa Creek found all dissolved element concentrations except mercury within recommended water quality standards. Mercury concentrations often exceeded recommended maximum levels for drinking water and for freshwater aquatic life and wildlife (Minckley, 1972). The points where mercury is entering the system have not been identified.

#### AIR QUALITY

Although never measured, the air quality over the canyon seems good. Prevailing winds from the west generally provide good air drainage, which dissipates air pollution. Smoke from nearby smelters, however, has been observed over the canyon. Fugitive dust or smoke (from either wildfires or one of the three smelters within 50 miles of the primitive area) could be the major degraders of the air quality.

The distance and direction of these smelters from the study area are as follows: San Manuel, 40 miles south-southwest; Hayden, 28 miles west-northwest; Christmas (not operating), 29 miles northwest.

The study area was designated Class II under the Clean Air Act. (See glossary: Air Quality Classes). Neither Pinal nor Graham County meets primary standards for particulates, and Pinal County fails to meet primary standards for sulfur dioxide.

Aravaipa Canyon Primitive Area was reviewed in accordance with requirement of the Clean Air Act for redesignation to a higher air quality class (Class I). Reviewers recommended that the area remain in Class II.

A wind frequency of occurrence study (2.3 years of data) indicates that 47 percent of the time the prevailing winds at the San Manuel smelter blew from the west, west-northwest, and northwest (Arizona Dept. of Health Services, 1979). A similar study (3.9 years of data) for the Hayden smelter revealed no prevailing wind direction but an even scattering in all directions (Arizona Dept. of Health Services, 1979).

The studies indicate that smoke and particulates from either smelter would float toward the canyon approximately 15 percent of the time. Smoke only slightly impairs visibility over the tableland. A number of mountain peaks, higher than the smoke stacks and the tablelands around Aravaipa Canyon and lying in direct line between them, should redirect the flow of smoke, somewhat dissipating it over the tablelands and the canyon.

Data are lacking on the movement and effect of blowing dust in the area surrounding Aravaipa Canyon.

#### NOISE

Noise within the primitive area is primarily natural: insects, flowing water, foraging wildlife. Any interruption of these natural sounds occurs only sporadically, primarily from aircraft.

Aircraft, mainly military jets and helicopters, have been observed flying at high and low altitudes directly over the canyon. Though brief, such noise can be ear shattering as the sound waves reverberate along canyon walls. On rare occasions, planes have been seen flying on "wing tip" between the canyon walls.

#### VEGETATION

##### VEGETATION TYPES

A variety of parent materials, exposures, and microclimates allow a diversity of vegetation in the study area (figures 6 and 7).

The lower, southern and western exposures contain typical Sonoran Desert vegetation (desert shrub vegetation type) such as

jojoba	mesquite	black grama
burroweed	cholla	sideoats grama
brittlebush	prickly pear	

The study area has 2,191 acres of the desert shrub type, 1,330 acres within the primitive area and 811 acres on adjacent lands.

The northern and eastern exposures support plants requiring more moisture--the mountain shrub vegetation type. This vegetation type comprises 2,244 acres within the primitive area and 1,582 acres on the adjacent lands, for a total of 3,826 acres. Common plant species include

Emory Oak	sideoats grama
shrub oak	Wright's buckwheat
juniper	hairy grama



Figure 1

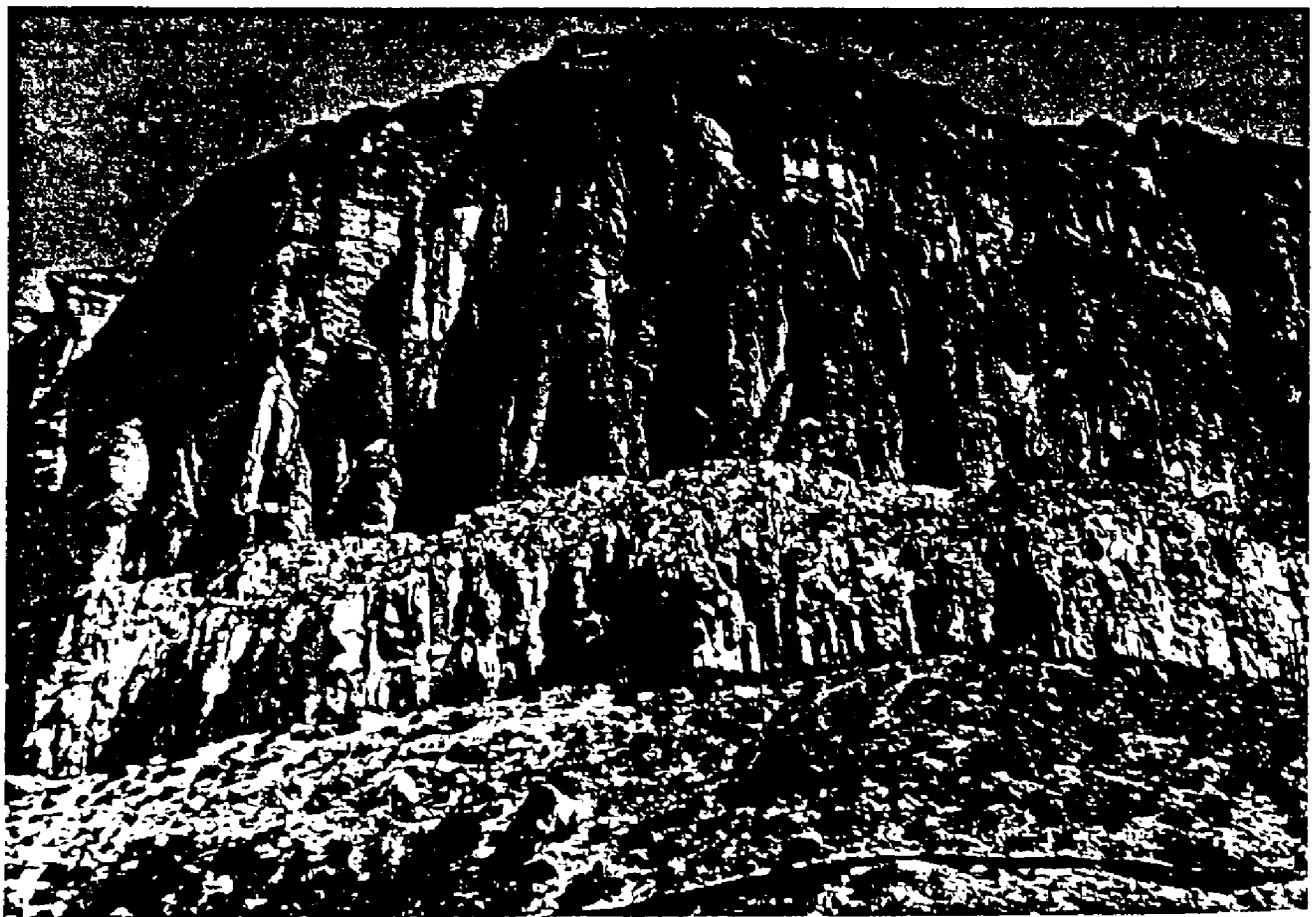


Figure 2

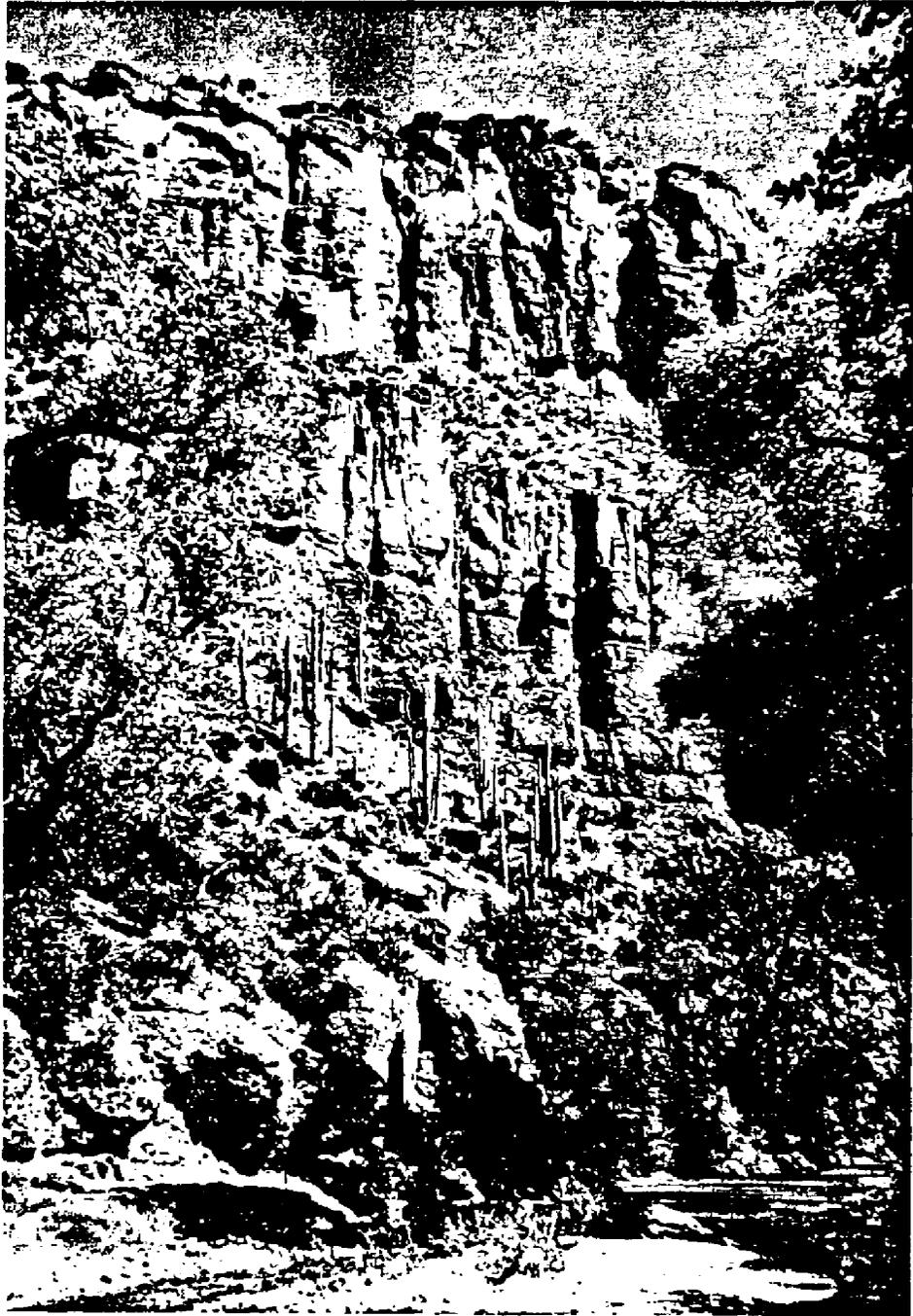


Figure 3

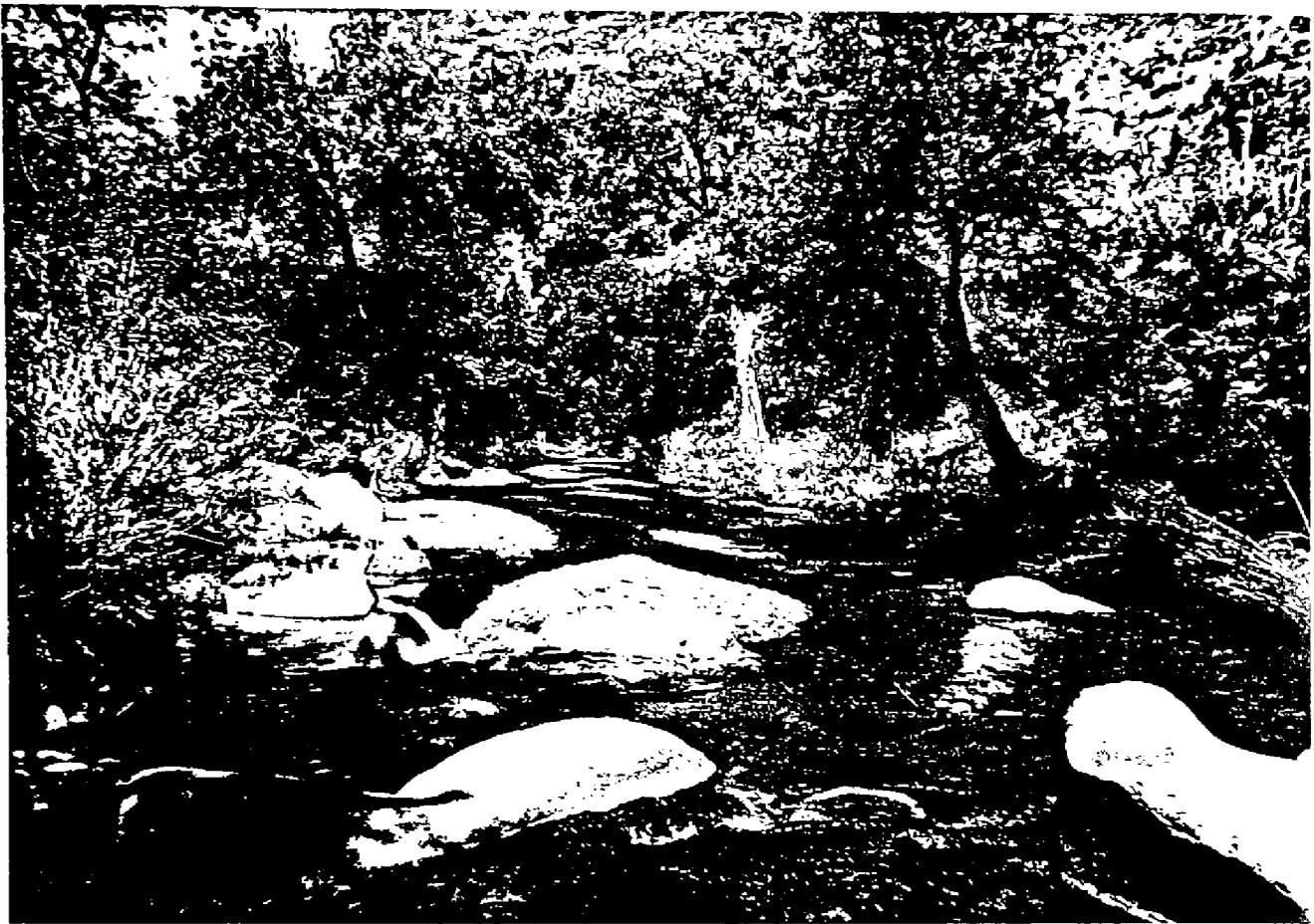


Figure 4

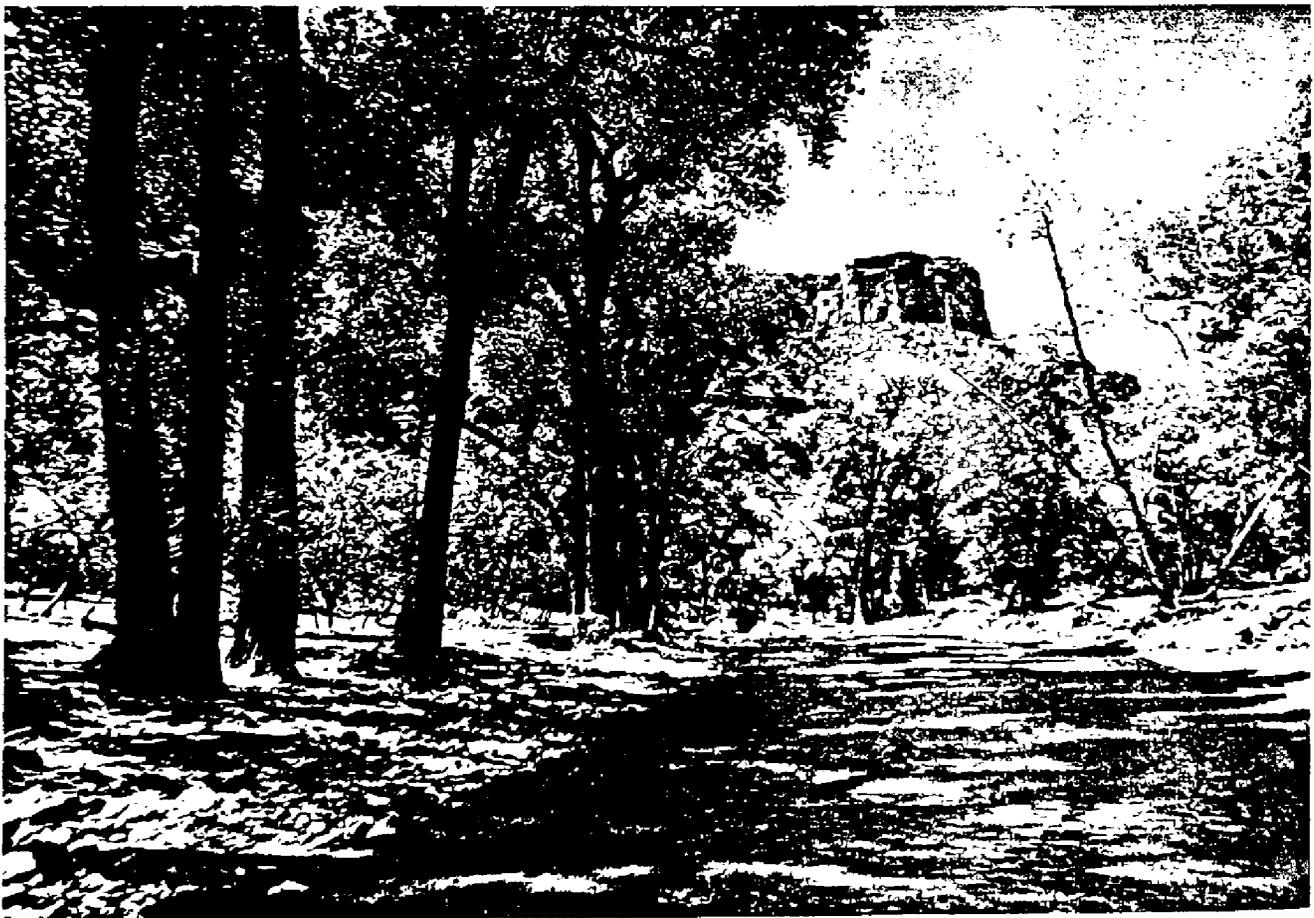


Figure 5



Figure 6



Figure 7

The Aravaipa Canyon bottom and major side canyons contain riparian plant species (broadleaf riparian vegetation type) such as

cottonwood	batamote
Arizona walnut	chuparosa
netleaf hackberry	junegrass
Arizona sycamore	bermuda grass
velvet ash	

The study area has 570 acres of the riparian vegetation type. The primitive area contains 420 acres, and the adjacent lands contain 150 acres.

Through management agreement with livestock operators, livestock grazing has been removed from the bottom of Aravaipa Canyon since August 1974, allowing vegetation to undergo normal plant succession. Livestock continue to graze areas above the canyon rims.

### THREATENED AND ENDANGERED PLANT SPECIES

The Federal Register, Volume 40, Number 127, July 1, 1975, listed possible candidates for threatened or endangered status. BLM conducted a survey to determine the status of such species whose range, habitat, and altitudinal distribution indicate their possible presence in the study area. Table 1 depicts the present known status of these species. Of the 16 species listed, 3 are confirmed to exist in the study area, 6 probably exist, and 7 possibly exist.

A copy of the botanist's report on the threatened and endangered plant species is on file in the Safford District office.

TABLE 1  
PROPOSED ENDANGERED AND THREATENED PLANTS  
OCCURRING OR POSSIBLY OCCURRING IN THE ES AREA

Species	Status*	Occurrence
<u>Pectis rusbyi</u>	E	Probable
<u>Plummera ambigua</u>	E	Probable
<u>Echeveria rusbyi</u>	E	Confirmed
<u>Eriogonum capillare</u>	E	Probable
<u>Erigeron lobatus</u>	T	Probable
<u>Gutierrezia linoides</u>	T	Possible
<u>Peritvia lemmoni</u>	T	Confirmed
<u>Plummera floribunda</u>	T	Possible
<u>Echinocereus ledingii</u>	T	Probable
<u>Mammillaria orestera</u>	T	Possible
<u>Neolloydia erectocentra</u>		
var. <u>erectocentra</u>	T	Possible
<u>Fraxinus anomala</u> var. <u>lowellii</u>	T	Possible
<u>Puccinellia parishii</u>	T	Probable
<u>Eriogonum spachense</u>	T	Possible
<u>Cheilanthes pringlei</u>	T	Possible
<u>Choisya arizonica</u>	T	Confirmed

\*E - Endangered, T - Threatened

Source: Botanist's report on threatened and endangered plant species, on file, BLM Safford District office.

### ANIMALS

Aravaipa Canyon has a high wildlife diversity. Nine species of fish, 6 species of amphibians, 35

species of reptiles, 25 species of mammals, and 202 species of birds are known to inhabit the study area.

### RIPARIAN HABITAT

Vegetation along Aravaipa Creek, Turkey Creek, Virgus Canyon, and other side canyons represents some of the finest riparian habitat in southern Arizona. Such habitat has a greater variety of wildlife, supports more animals, and is more productive per acre of biomass than the upland habitat types.

The riparian habitat in Aravaipa Canyon attracts a host of birds, predominantly during spring, summer, and fall. The riparian influence attracts all of the threatened birds identified in table 2. During studies of the black hawk in Aravaipa Canyon in 1978, Schnell (1979) documented six pairs of black hawks, two pairs of zone-tailed hawks, two pairs of prairie falcons, and one pair of golden eagles breeding in the primitive area. The high vertical diversity of this habitat type provides excellent habitat for warblers, vireos, sparrows, and raptors.

Of the 25 species of mammals identified in the primitive area, 21 species are known to use the riparian habitat. In addition, many mammals occurring predominantly in adjacent habitat types (bighorn sheep, mule deer, white-tailed deer, coyote, and mountain lion) use the riparian habitat for water, forage, and thermal cover.

Three species of reptiles and three species of amphibians in the primitive area are restricted to the riparian habitat type. Of the species known to inhabit the primitive area, four of five amphibian species and 21 of 35 reptiles species occur in the riparian habitat type.

### DESERT SHRUB-MOUNTAIN SHRUB HABITAT

The desert shrub-mountain shrub habitat types occur throughout the remainder of the primitive area next to the riparian type, but at higher elevations. Being less complex and more homogenous than the riparian type, these types do not support as great a diversity of birds as does the riparian type. Dominant species in these types include Gambel's quail, vesper sparrow, lark sparrow, black-throated sparrow, and Brewer sparrow.

Of the 25 mammal species identified in the study area, 22 occur in the desert shrub-mountain shrub habitat types, including three big-game species--javelina, mule deer, and bighorn sheep. Expanding in number and range, approximately 32 bighorn sheep inhabit the study area (Waddell, 1979).

In the study area 2 species of amphibians and 14 species of reptiles inhabit only the desert shrub-mountain shrub habitat types. Three of the six known species of amphibians and 31 of the 35 known species of reptiles occur in the desert shrub-mountain shrub habitat types.

### AQUATIC HABITAT

Flowing the 12-mile length of the study area, Aravaipa Creek supports 8 of the 12 known native fish species of the San Pedro River system, in addition to the introduced green sunfish. No other Arizona stream is known to support as large a number of native fish species in the absence of substantial numbers of introduced species (Minckley, 1977).

Collections by Minckley and others indicate that all eight native fish species occur in unusual abundance. Aravaipa Creek is dominated by longfin dace and speckled dace, which constitute more than 85 percent of all fishes collected (Minckley, 1977). Aravaipa Creek also supports the last reproducing population of loach minnow in southern Arizona (Kepner, 1979)

One large-mouth bass, believed to be illegally introduced into the Creek or a stock pond, was collected in the canyon. If these bass become established, they will be detrimental to native fish (Kepner, 1979).

### THREATENED AND ENDANGERED SPECIES

Three animal species identified by the U.S. Fish and Wildlife Service as endangered and published in the Federal Register (Vol. 44, No. 12, January 17 1979) occur within the study area. The southern bald eagle occurs as an uncommon and unpredictable winter visitor. The peregrine falcon historically nested in the area but now occurs only as an uncommon winter visitor. The Gila topminnow was reintroduced into Aravaipa Creek in early 1978 by the Arizona Game and Fish Department (AG&FD), but none have been reported in the creek since.

Wildlife species found in the primitive area and designated by AG&FD as threatened in Arizona are detailed in table 2. The aplomado falcon, designated by the AG&FD as a Group I species, (species or subspecies extirpated from Arizona that may possibly be reestablished) was once sighted (Troutman, 1978), but the sighting is considered to represent an accident rather than a range extension. One caracara designated to be in Group IV by the AG&FD has been reported to be using an area east of the primitive area.

TABLE 2  
THREATENED ANIMAL SPECIES

Category	Birds	Mammals	Reptiles and Amphibians	Fish
Group II	Gray Hawk Southern Bald Eagle Peregrine Falcon		W. Massasauga	
Group III	Snowy Egret Zone-tailed Hawk Black Hawk Beardless Flycatcher	Desert Bighorn Sheep	Desert Tortoise Gila Monster	Gila Topminnow Loach Minnow
Group IV	Buff-breasted Flycatcher	Coati	Rock Rattlesnake	Round-tailed Chub Spikedace

Group II: Species or subspecies in danger of being eliminated from Arizona.  
Group III: Species or subspecies whose status in Arizona may be jeopardy in the foreseeable future.  
Group IV: Species or subspecies of special interest because of limited distribution in Arizona.

### CULTURAL RESOURCES

The Aravaipa Canyon area has been inhabited for perhaps the past 9,500 years. The primary prehistoric remains include Hohokam and Salado sites. Historical remains are sparse. Cochise, Apache, and Spanish explorer remains occur near the study area and are believed to occur within it.

A systematic intensive survey yielding a 5.5 percent sample (Gilman and Richards, 1975) and unsystematic surveys by BLM rangers covering 8 percent of the primitive area have recorded nine prehistoric sites and two historic sites in the primitive area and seven prehistoric sites in the study area outside the primitive area. In addition, numerous unknown sites, primarily prehistoric, are believed to exist.

Of the 18 known sites, 1 has been determined to be eligible for nomination to the National Register of Historic Places (HS02-04-074-Salazar Homestead), and one prehistoric site is believed be of National Register quality (AR02-04-023).

Twenty-two percent of the cultural sites are in poor condition, 39 percent are in fair condition, and 33 percent are in good condition. The condition of the remaining 6 percent is unknown. Sources of damage to sites have been varied. One of the primary sources--trampling by cattle--has been eliminated in the canyon bottom. Camping, digging by vandals, and general visitor use account for 25 percent of the present damage.

Known sites have been evaluated, and the following uses are recommended: conservation for future use--15 sites; management use (a study area used to monitor and analyze impacts)--1 site (AR02-04-192); and recreation/visitor use--2 sites (HS02-04-074-Salazar Homestead and HS-1-DT-Horse Camp Ruins).

The San Carlos Apache Tribe of southeastern Arizona has identified no native American social, cultural, or sacred values in the area. In recent times no other tribes have used the area.

## LANDSCAPE CHARACTER

Aravaipa Canyon consists of irregularly eroded tuffs and conglomerates that form high mesa-type cliffs, which dominate the desert and mountain shrub and riparian vegetation communities. The subtle greys and greens of the lush riparian canopy contrast with the stark and often harsh buffs, tans, and whites of the canyon rock formations (figures 8, 9, and 10).

Aravaipa Creek, twisting and turning between the canyon walls, sends a mellowing, almost hypnotic sound up to the edge of the canyon rim, only to have it dissipated into the lonely solitude and quiet of the desert beyond the rimrocks.

Modifications of the natural landscape are few and highly subtle. They consist of two short lengths of abandoned road (approximately 1.5 miles) and one earthen reservoir. In each case the initial impacts have been reduced by natural changes, and, as a result, only portions of each modification remain noticeable and then only to one at or near the sites.

The visual resource management (VRM) classes established for the area are delineated on map 2.

## WILDERNESS VALUES

BLM inventoried the Aravaipa Canyon Wilderness Instant Study Area plus contiguous public lands using procedures outlined in Step 4 of BLM Wilderness Inventory Handbook (BLM, 1978). That intensive inventory revealed that these lands (map 3) meet the criteria established in Section 2(c) of the Wilderness Act of 1964 (figures 11 and 12), which states:

*"A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value."*

The intensive inventory is included as appendix 2.

## LAND USE

### RECREATION

Existing Designated Aravaipa Canyon Primitive Area

BLM has administered Aravaipa Canyon Primitive Area since January 10, 1969. Public land within the

primitive area has been withdrawn from all appropriations under existing agricultural and mining laws (see map 4). At the same time all of the adjacent public lands and the mineral rights on all but 880 acres of the study area were also withdrawn. To protect outstanding natural values, the canyon bottoms of the primitive area are not grazed. The area also has an established limit of 50 visitors per day.

### Off-Road Vehicles (ORV) Use

Aravaipa Canyon Primitive Area has been "closed" to ORV use as directed by Executive Order 11644. The public lands adjoining the primitive area have not been designated.

### Recreation Uses, Use Areas, and Amounts

Recreation resources in the ES area were identified through extensive inventories. The quality of the recreation resource is displayed on table 3.

TABLE 3  
RECREATION RESOURCE QUALITY FOR ARAVAIPA CANYON AREA

Recreation Activity	Class Value*	Comments
Hunting--Big Game	A	Deer, Javelina and Mountain Lion
Hunting--Small Game	B	Dove, Quail, and Rabbits
Sightseeing--Geological	A	Volcanics
Sightseeing--Zoological	B	Desert Bighorn Sheep, Birds, Reptiles, Small Mammals
Sightseeing--Scenery	A	Unique Primitive Area

\*Class A - Excellent; Class B - Good; Class C - Fair.

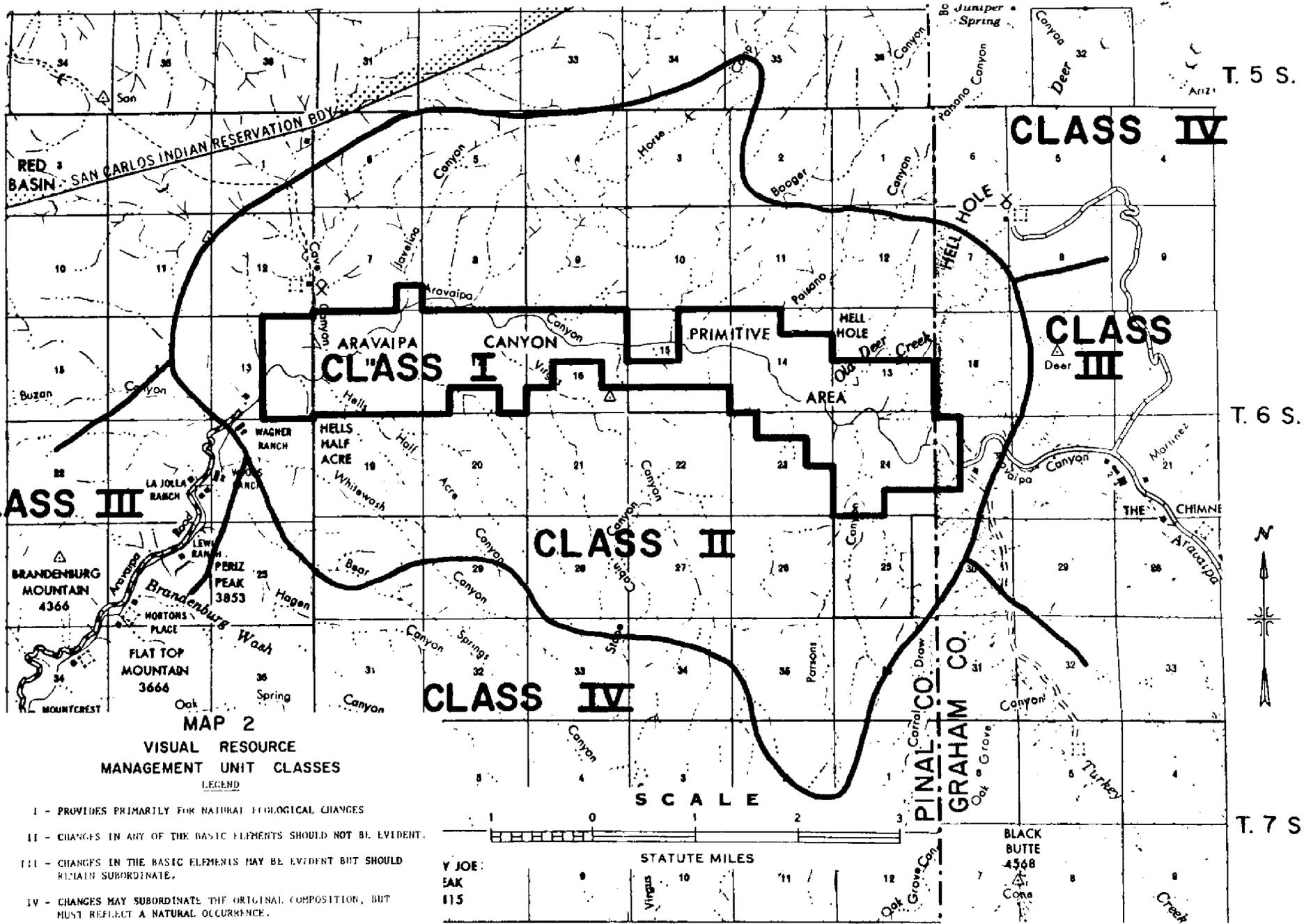
### General Leisure--Camping and Picnicking

Camping and picnicking account for the majority of recreation visitor days recorded in the study area. The majority of use occurs along the Aravaipa Creek in the main canyon, but some use appears to be dispersed into the major side canyons and up on the tablelands adjoining the canyon. Visitor use fluctuates from year to year (table 4).

TABLE 4  
ANNUAL VISITOR USE FOR ARAVAIPA CANYON PRIMITIVE AREA

	1973 July - Dec.	1974	1975	1976	1977	1978	2000*
<b>East End</b>							
Visits	514	902	1,026	1,618	1,277	1,054	
Visitor Days	1,028	1,804	2,051	3,233	3,123	2,657	
% of Total	34.15	28.94	39.16	43.36	31.00	32.55	
<b>West End</b>							
Visits	991	2,214	1,594	2,119	2,784	2,184	
Visitor Days	1,982	4,428	3,188	4,225	6,497	5,396	
% of Total	65.84	71.05	60.83	56.66	69.00	67.45	
<b>Total</b>							
Visits	1,505	3,116	2,620	3,737	4,061	3,238	
Visitor Days	3,010	6,232	5,240	7,456	9,620	8,053	17,000

\*Source for year 2000: Arizona Outdoor Recreation Coordinating Committee, 1972.



**MAP 2**  
**VISUAL RESOURCE**  
**MANAGEMENT UNIT CLASSES**  
**LEGEND**

- I - PROVIDES PRIMARILY FOR NATURAL ECOLOGICAL CHANGES
- II - CHANGES IN ANY OF THE BASIC ELEMENTS SHOULD NOT BE EVIDENT.
- III - CHANGES IN THE BASIC ELEMENTS MAY BE EVIDENT BUT SHOULD REMAIN SUBORDINATE.
- IV - CHANGES MAY SUBORDINATE THE ORIGINAL COMPOSITION, BUT MUST REFLECT A NATURAL OCCURRENCE.

R. 17 E.

R. 18 E.

R. 19 E.

Map base reproduced from Atlas of Graham County and Atlas of Pinal County with permission of the Arizona Department of Transportation.

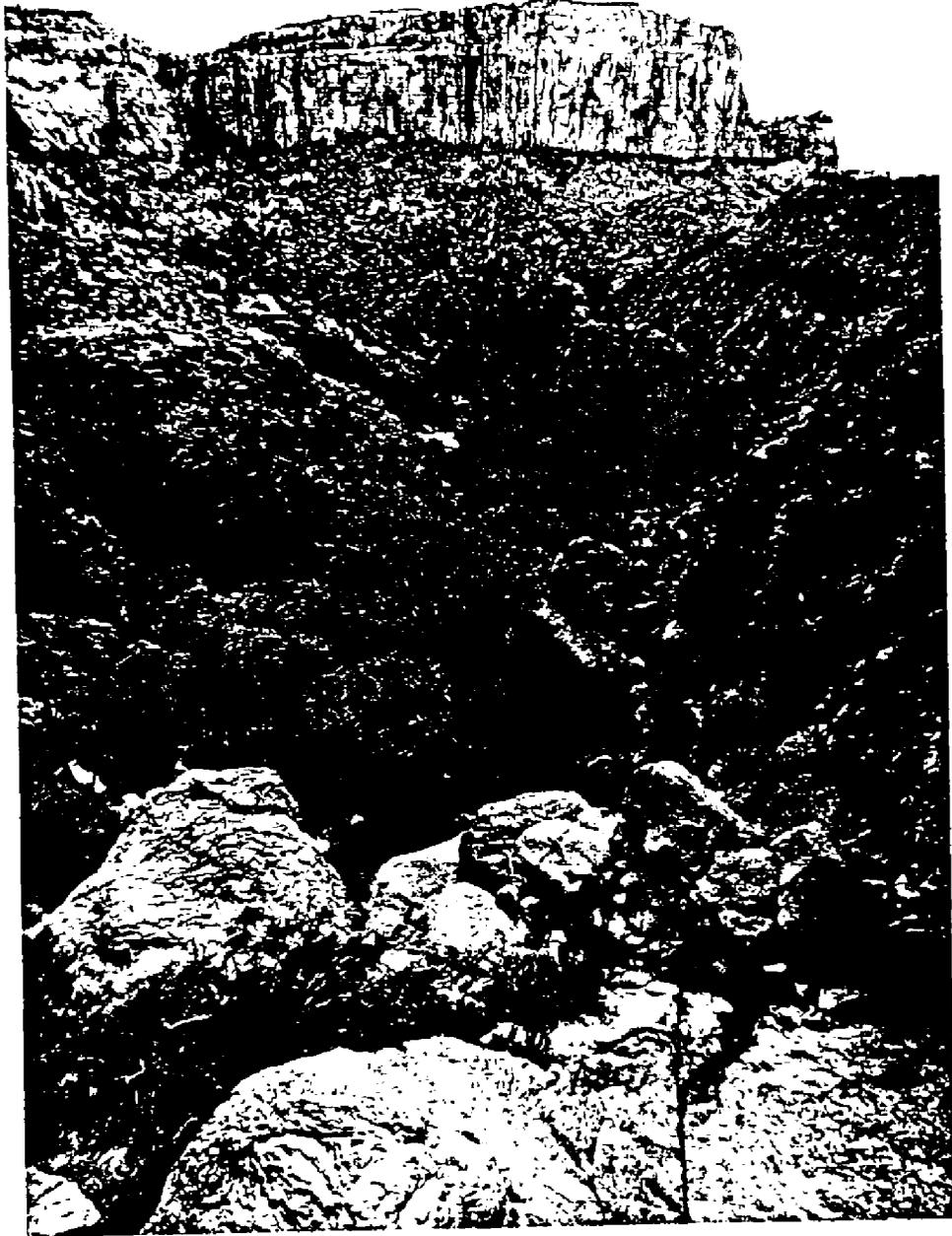


Figure 8



Figure 9

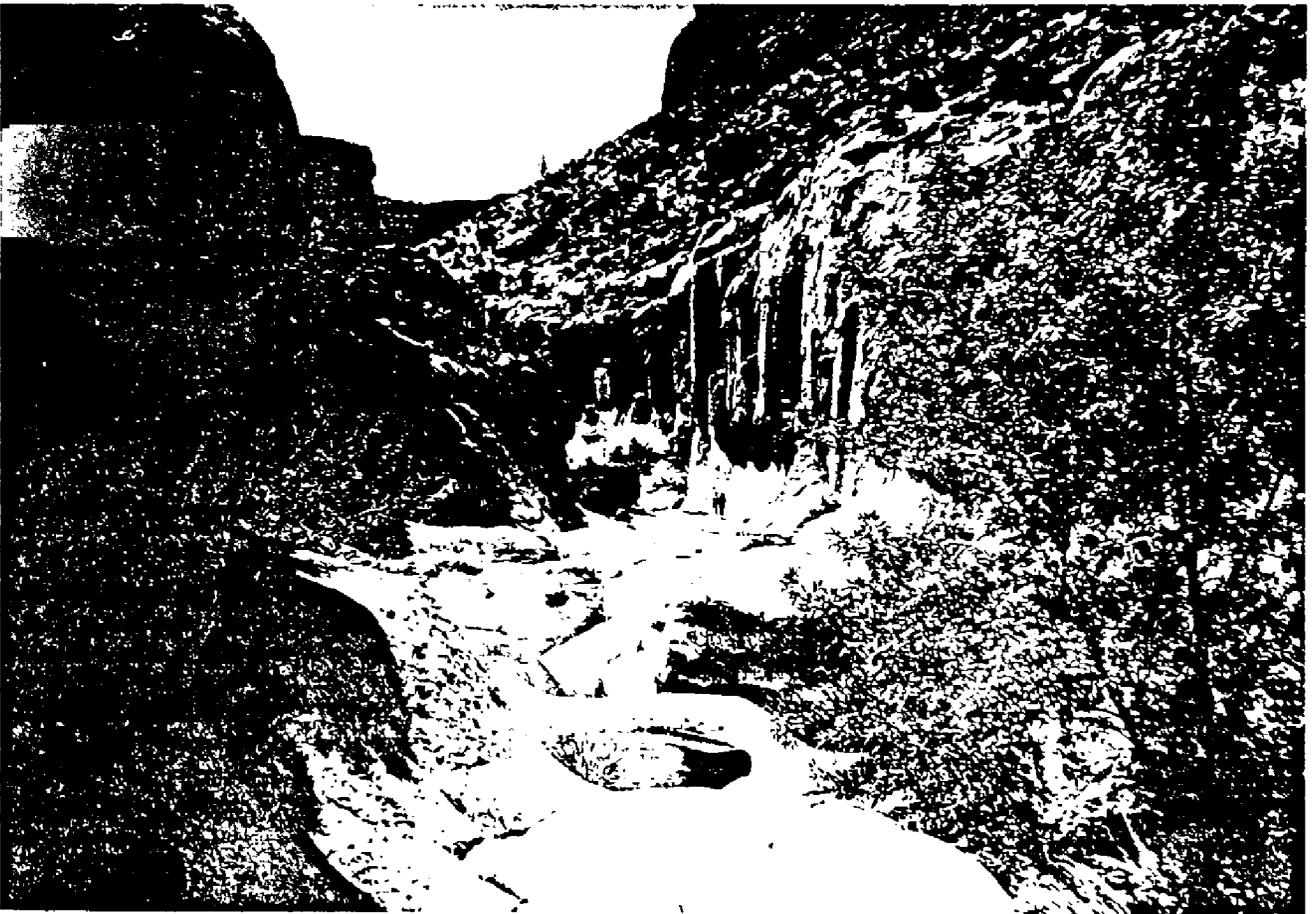


Figure 10



Figure 11

Courtesy of Stephen J. Krasemann



Figure 12

Courtesy of Stephen J. Krasemann



Figure 13

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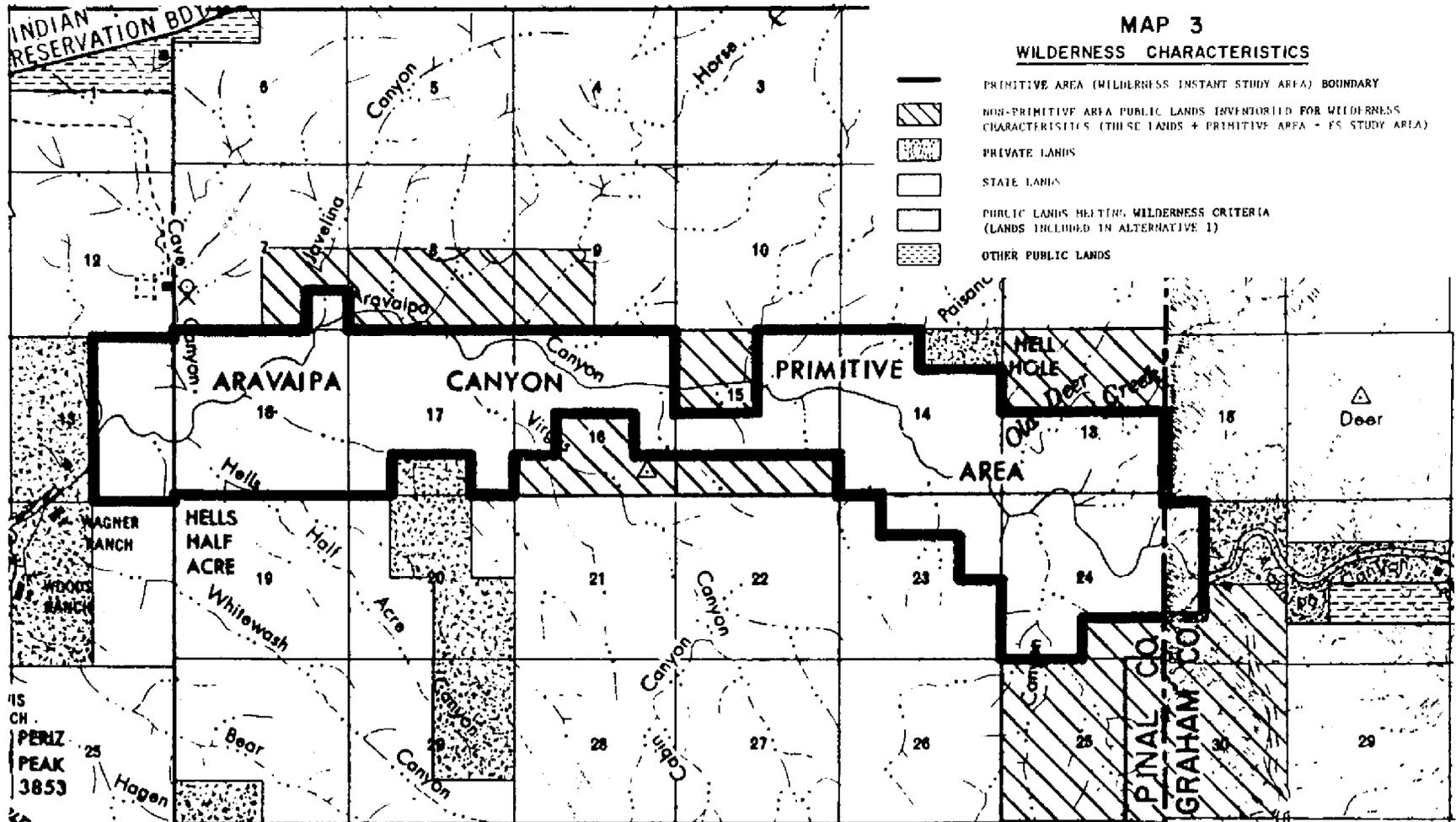
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MAP 3

WILDERNESS CHARACTERISTICS

-  PRIMITIVE AREA (WILDERNESS INSTANT STUDY AREA) BOUNDARY
-  NON-PRIMITIVE AREA PUBLIC LANDS INVENTORIED FOR WILDERNESS CHARACTERISTICS (THOSE LANDS + PRIMITIVE AREA = FS STUDY AREA)
-  PRIVATE LANDS
-  STATE LANDS
-  PUBLIC LANDS MEETING WILDERNESS CRITERIA (LANDS INCLUDED IN ALTERNATIVE 1)
-  OTHER PUBLIC LANDS

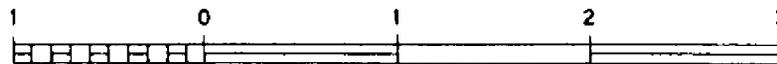


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T. 6 S.

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 the Arizona Department of Transportation

SCALE



STATUTE MILES

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R. 18 E.

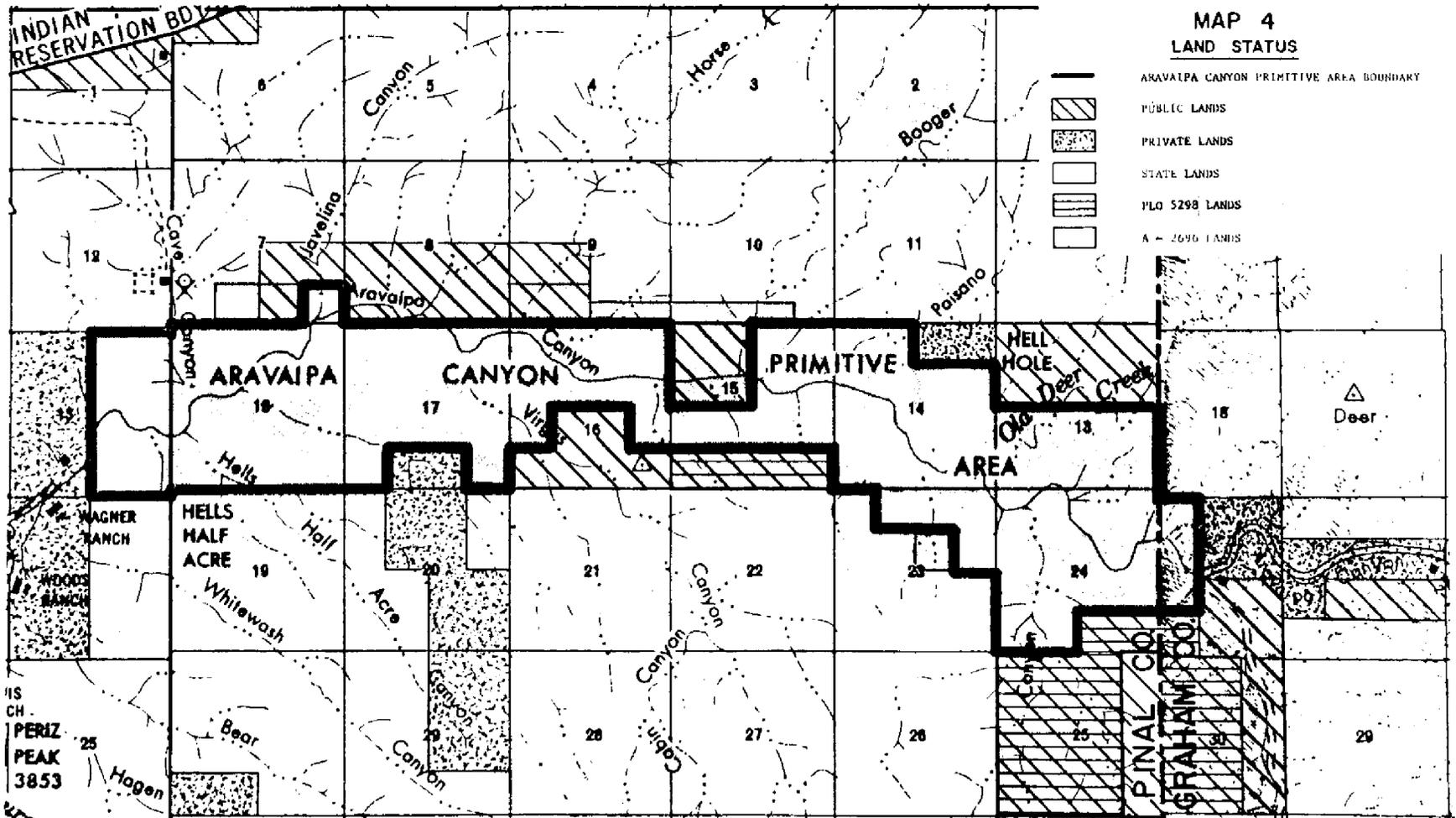
R. 19 E.

MAP 4  
LAND STATUS

-  ARAVAIPA CANYON PRIMITIVE AREA BOUNDARY
-  PUBLIC LANDS
-  PRIVATE LANDS
-  STATE LANDS
-  PLO 5298 LANDS
-  A - 2696 LANDS

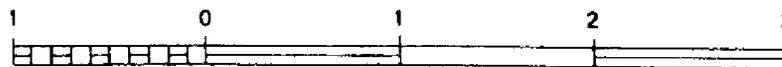


59 T. 6 S.



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the Arizona Department of Transportation.

SCALE



STATUTE MILES

## Hunting

Above-average deer and javelina populations on the north and south rims of Aravaipa Canyon add to the hunting quality of the study area. In addition, normally above-average quail, dove, and rabbit populations provide good hunting. Hunter pressure, however, is generally low because of extremely rough terrain and firearm restrictions in the canyon bottoms. Only the most determined and physically fit hunters meet the mental and physical challenge of the area.

## Sightseeing

Aravaipa Canyon's scenery probably attracts most sightseers to the area. The canyon's geology, flora, fauna and cultural sites form integral parts of the scenery. The riparian community provides a rare experience in the Southwest, creating high interest and curiosity in visitors (figure 13). The surrounding desert plant communities provide an interesting contrast and variety of color and species. Many wildlife species occur within the area, several of which are threatened or endangered. The canyon is a haven for birds, which are readily visible. Often the prime objective of a visit to the area is to observe wildlife. Aravaipa Canyon portrays a panorama of geologic formations and different aged strata exposed by wind and water, adding to the enjoyment and mystery visitors experience. A feeling of awe and wonderment enhances the experience of the hiker or camper discovering a cultural site such as a sherd scatter or an ancient cliff dwelling. Only in combination, however, can one fully realize the true recreational value of Aravaipa Canyon.

## Visitor Use and Facilities

Visitor use in Aravaipa Canyon has been recorded since 1973 and shows an upward trend through 1977 (table 4). An unknown amount of recreation use occurs near, but outside the primitive area. Visitors occasionally picnic and camp along Turkey Creek and in the areas between the primitive area boundaries and the trail heads. The west end of the canyon receives the greater percentage of visitors, being closer to Phoenix and Tucson, the origin of over half of the visitors to the canyon (table 5). Peak seasons of use occur from March through May, and from October through November. The majority of use occurs on weekends. Although 50 percent of the permits are reissued because of no-shows, visitor levels still approach the maximum allowable during peak use periods.

Minimal facilities are needed to provide for visitor health and safety. In certain cases facilities are used to protect a resource from disturbance. Table 6 identifies existing facilities.

TABLE 5  
ORIGIN OF VISITORS TO ARAVAIPA CANYON  
PRIMITIVE AREA

Origin	1973 July - Dec.	1974	1975	1976	1977	1978
Winkelman Planning Unit*	42	12	41	72	72	52
Arizona, outside Winkelman Planning Unit and Phoenix and Tucson metropolitan area	26	15	22	18	20	25
Outside Arizona	11.0%	9	12	10	16	9
Phoenix and Tucson metropolitan areas	59	75	62	65	57	61

Source: Visitor registers at east and west ends of primitive area. Approximately 80 percent of all visitors register.  
\*Winkelman Planning Unit includes the following towns or settlements: Bonita, Hayden, Kearney, Klondyke, Mammoth, San Manuel, and Winkelman.

TABLE 6  
RECREATION MANAGEMENT FACILITIES IN ES AREA

LOCATION	FACILITIES
All vehicle access points	9 Boundary signs
Near Virgus & Painted Cave Canyons	2 Portable toilets
Side canyons Dogway trails Sanitary facilities	15 Interior information and facility signs
Salazar homestead, near Hell Hole Canyon	280-foot wood rail fence for cultural site protection

## LIVESTOCK GRAZING

On lands being considered for wilderness designation, livestock graze only the tablelands above Aravaipa Canyon. Four livestock operations are involved, for which BLM authorizes an annual total of 1,060 animal unit months (AUMs) of forage. In each case, however, livestock grazed on public lands constitute less than 25 percent of the operation.

Under the existing management plan, one operator has permission to pump water from Aravaipa Creek to stock tanks on the south rim of the canyon during severe drought. The operator must drive 3 miles into the primitive area to set up a portable pump near an existing pipeline below Hell Hole Canyon. The operator has used this privilege only three times during the past 6 years.

## MINERAL RESOURCES

Little mineral exploration and development have occurred in the study area, and no mineral commodities have been produced. Prospecting and mining have been precluded from Aravaipa Canyon and some of the surrounding land, and no valid mining claims exist. Mineral leasing could be allowed at BLM discretion if it would not impair wilderness characteristics.

Mining is still allowed on 880 acres outside of the primitive area but within the study area. The lands open to mining are in Township 6, South, Range 18 East and include Section 7, N $\frac{1}{2}$ SE $\frac{1}{4}$ , Section 9,

N½SW¼. Section 13, N½, Section 16, S½S½, NW¼SW¼, and Section 25, E½E½.

The U.S. Geological Survey and the Bureau of Mines have conducted a mineral survey of Aravaipa Canyon. Their report is on file in the Safford District office and available for public inspection.

## LAND USE PLANS-CONTROLS-CONSTRAINTS

### Local planning and Zoning

Most of the study area is in Pinal County, the remainder is in Graham County. State land predominates in the area surrounding the ES area. Private and public land is scattered, making up a small percentage of land ownership (map 4).

Both Pinal and Graham Counties have adopted zoning ordinances. Both counties have zoned their respective portions of the study area as general rural, permitting residential, agricultural, and related uses.

### Governmental Controls - Constraints

Several withdrawals have been made within the study area. These withdrawals include Secretarial Order (SO) 602 for Water Power Designation No. 5 (Arizona No. 2), Power Project AR-730, Public Land Order (PLO) 5298, and A-2696, the withdrawal for Aravaipa Canyon Primitive Area and multiple use management.

The original A-2696, signed November 15, 1968, withdrew 5,297 acres of public land and State land with Federal mineral rights, segregating the public land from sale, exchange, selection, and appropriation under the agricultural and mining laws. The State land with Federal mineral rights was segregated only from appropriation under the mining laws. On January 9, 1969, the Secretary of the Interior designated 3,957 acres of the land withdrawn under the original A-2696 as the Aravaipa Canyon Primitive Area. In April 1971 the primitive area boundary was adjusted to exclude land in Turkey Creek and to include additional land along the north and south rims of the canyon. This final primitive area designation included 4,044 acres (see map 4).

On November 1, 1972, PLO-5298 withdrew an additional 1,063 acres from all appropriation under the public land laws for the expansion and protection of the primitive area.

The study area has two power site withdrawals. SO-602 for Water Power Designation No. 5 (Arizona No. 2), signed February 9, 1917, withdrew all lands within 0.25 miles of Aravaipa Creek for the potential development of water power. Power Project AR-730, dated September 23, 1930, was application by the Arizona Sodium Production Company. This application also withdrew all land within 0.25 miles of Aravaipa Creek for power production. BLM has initiated action to revoke both of these power site withdrawals.

In December 1978, BLM acquired through exchange an additional 1,480 acres of State land next to the primitive area. This acquisition culminated a management proposal, initiated in 1972, to improve management and protection of the primitive area.

### Transportation and Utilities

Two county roads provide access to the ES area. The west end of the ES area, in Pinal County, is served by Aravaipa Canyon Road, which leaves State Route 77, 10 miles south of Winkelman. This road follows Aravaipa Creek to the west end trail head. On the east side, the Klondyke-Aravaipa Road connects with U.S. 70, 6 miles west of Pima. Both roads are maintained by the respective counties. The first 5 miles of the Aravaipa Canyon Road are paved.

Although utility rights-of-way cross adjoining land, none cross the study area. The primitive area precludes issuing rights-of-way.

## ECONOMIC AND SOCIAL CONDITIONS

### POPULATION

The area surrounding Aravaipa Canyon is rural and sparsely populated. It is primarily inhabited by ranch and farm families living along Aravaipa Creek and the main access routes to the canyon.

### INCOME AND EMPLOYMENT

Although ranching is the primary land use of the area surrounding Aravaipa Canyon, copper exploration, extraction, and processing produce the most income for the area. The concentration of mining and mineral processing makes personal income higher near the study area than in surrounding non-mining areas.

### SOCIAL CONDITIONS

Archaeological and historical data indicate a long record of continuing human interest in and use of Aravaipa Canyon. Until the 1950's, this interest and use were limited to local residents, ranchers, miners, and hunters. Occasionally hikers and horseback riders also used the area.

During the 1950's, however, the popularity of the canyon soared as a result of publicity. Several articles in State and national magazines brought attention to its significance as a place for various kinds of recreation. Visitor demands on the canyon increased dramatically, leading to a growth of vandalism and litter and the destruction of some of the attractiveness of the canyon.

Valuing efforts to preserve the canyon from unrestricted visitor use, certain user groups were anxious for BLM to impose regulations. These groups were supported by some residents, who regretted what they had seen happen to the canyon

and who feared what might occur if visitor use were not controlled. The public widely accepted and approved BLM's management plan for the primitive area. The only strong opposition came from off-road vehicle (ORV) groups opposed to closing the canyon to motorized vehicles and from hunters opposed to banning the discharge of firearms in the canyon bottoms.

Local residents, user groups, and the public strongly support preserving Aravaipa Canyon's natural beauty and uniqueness from overuse and abuse. One of the former ranchers, for example, reported selling his ranch to an environmental organization because he felt its sale would help protect the canyon for future generations. Many of the letters and responses to the BLM management plan expressed this concern.

In January 1979 a BLM sociologist conducted non-directive interviews with hikers, hunters, ranchers, and students of nature from Tucson, Phoenix, Safford, and communities near Aravaipa Canyon. The interviewer selected interviewees by asking his first respondents for the names of others who might be interested in talking about Aravaipa Canyon. Each

interview required 20 to 60 minutes, for an average period of 30 minutes. The interviewer took no notes or recordings, but at its completion summarized each interview by topic.

Although the data collected are accurate, their use is limited because they were not obtained from a statistically valid sample of the user population. These data, however, are useful for illustrating attitudes of local residents and users of the canyon.

Of the 38 interviews held, all respondents expressed concern about visitor overuse of the canyon, and none of the respondents objected to permits being required for entering the canyon. Sixteen respondents mentioned publicity attracting visitors otherwise unaware of the canyon.

All of the respondents recognized that BLM had management responsibilities for the primitive area. Ten respondents (26 percent) felt that BLM should provide for more intensive care/protection of the area by assigning it a permanent staff of several rangers. (See appendix 1 for present staff working in canyon.) More than half of the respondents (22) mentioned knowing of others who had not visited the Canyon, but who wanted or planned to do so.

## ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

The analysis of impacts of the proposed action is based on the following assumptions:

1. BLM will continue to have the capabilities and resources to manage Aravaipa Canyon.

2. A wilderness designation will cause few, if any, management changes because present management is consistent with wilderness management.

3. Visitor demand will continue to increase, but the increase may intensify more rapidly with a wilderness designation. The number of users will be limited to the 50 visitors per day until a carrying capacity study is completed. At that point the limit may be adjusted to reflect the results of that study.

4. The President or Congress will not identify any higher and better use of the resources than that of designation as wilderness.

5. The proposed action will protect wilderness values only within the existing primitive area.

No impacts to topography, geology, soils, air quality, noise, water rights, vegetation, or livestock grazing were identified. Wilderness designation would have the following impacts on other resources.

### VISUAL RESOURCES

The replacement of existing facilities shown on table 6 would have involved minimal surface disturbance during construction, resulting in very short-term impacts. The minimal impact of the structures, however, will continue throughout their lives.

### WILDERNESS RESOURCES

The wilderness values previously mentioned will be impacted beneficially in the long-term. Under a wilderness designation, the area will not be subjected to future man-caused impairments.

Designating only the primitive area as wilderness would preclude the option of protecting values known to exist on public lands next to the primitive area. A later proposal to designate these adjacent lands is unlikely.

## LAND USE

### RECREATION

Recreation designations, facilities and uses were evaluated to determine whether the proposed action would enhance or be detrimental to their present management objectives, recreation quality, and level of visitor use.

#### Designations: The Aravaipa Canyon Primitive Area

The proposed action would benefit this area. Since the action is consummated through an act of Congress, a wilderness designation would be more permanent and less susceptible to future change than the present primitive designation.

#### Off-road Vehicle Designations

The proposed action would not affect ORV designations, since the areas "closed" designation would remain in effect.

#### Facilities

The proposed action would not impact the existing management facilities identified in table 6. Section 4 (c) of the Wilderness Act of 1964 allows for certain facilities to meet minimum requirements for the administration of the area.

#### Recreation Uses, Use Areas, and Amounts

The proposed action was evaluated to determine whether it would benefit or adversely affect the Recreation Information System (BLM Manual 6110) quality rating, recreation opportunity, or visitor use of each activity. The proposed action would have virtually no long-term impact (table 7). Recreation quality or opportunities would not change, and visitor use changes would be minimal.

TABLE 7  
LONG-TERM IMPACTS ON RECREATION

Activity	Quality	Opportunity	Visitor Use
Camping	0	0	L+
Picnicking	0	0	L+
Hunting	0	0	X
Sightseeing	L-	0	L+

L - Low, M - Moderate, H - High, (+) Beneficial Impact, (-) Adverse Impact, (X) Negligible Impact, (0) No Impact.

### General Leisure--Camping and Picnicking

A change in designation from primitive to wilderness would not impact the quality or opportunity for these activities, since they are legitimate uses of an established wilderness area. Visitor use, however, might change as a result of more widespread notoriety of the area during the decision making process and after designation as wilderness. The additional exposures by the news media and wilderness guide books might increase demand for permits to use the area and increase visitor use.

### Hunting--Big Game and Small Game

The quality and opportunity for hunting would not change nor would restrictions change on firearms discharge in the canyon bottoms. Applications for hunting permits for Game Management Units 31 and 32 (on either side of Aravaipa Canyon) might increase because of the additional exposure to the area in the media.

### Sightseeing

The proposed action would impact neither the quality nor the opportunity for sightseeing. Visitor use might increase slightly from the additional exposure in the news media and national recognition given to wilderness areas. This increased visitor use might slightly increase vandalism to cultural sites. Commonly accepted measures of preventing vandalism (8-to-10 foot high storm fence, total salvage of data) would probably not be allowed within the wilderness area, and less effective methods for site preservation would have to be used. Overall, a wilderness designation would have a slightly adverse impact on cultural sightseeing.

## MINERAL RESOURCES

The proposed action would further restrict the availability of the mineral resources but would not change their physical characteristics.

## LAND USE PLANS CONTROLS - CONSTRAINTS

Wilderness designation would largely preclude power site development, although economic and technical considerations have made such development unrealistic. A wilderness designation would also preclude transportation and utility rights-of-way and adopting other land uses.

## SOCIAL CONDITIONS

The public generally understands that the proposed action is an administrative reclassification and that the management of the wilderness area would be a continuation of the program used under the primitive area designation. Thus no direct impacts on social values and human attitudes would result.

## MITIGATING MEASURES

Routine management procedures will be developed as necessary to mitigate environmental disturbances should any occur.

## UNAVOIDABLE ADVERSE IMPACTS

Few adverse impacts have been identified. Many of those identified will be mitigated by management. If, in fact, Aravaipa's popularity increases through wilderness status, an increased demand may well be experienced. Such demand may cause periods of maximum use to be extended beyond the week-ends, thus reducing the recovery or resting time of certain impacted resources.

## RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY

The proposed action does not involve any losses to long-term productivity. Wilderness designation would tend to maintain long-term productivity and provide maximum protection to a unique ecosystem complex.

## IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The designation of lands as wilderness constitutes a long-term commitment of resources and land. Congress, however, can change the classification. Thus wilderness designation can be considered neither an irreversible nor an irretrievable commitment of resources.

# ALTERNATIVES TO THE PROPOSED ACTION

This section discusses two alternatives to the proposed action: (1) increasing the size of the proposed wilderness area, and (2) no action--continuing the present management of Aravaipa Canyon Primitive Area.

## ALTERNATIVE 1: INCREASE THE SIZE OF THE PROPOSED WILDERNESS AREA

Alternative 1 to the proposed action would designate Aravaipa Canyon Primitive Area and 2,325 acres of adjacent public lands determined to have wilderness characteristics to the National Wilderness Preservation System as Aravaipa Canyon Wilderness (map 3). Figures 14-17 show some of the adjacent public lands included in the alternative. The objective of this alternative is to protect the identified wilderness values through legislative designation. The stages of implementation would be the same under this alternative as under the proposed action: interim management, designation as wilderness, and management as wilderness.

This alternative's implementation time frame would be identical to the proposed action's, and, like the proposed action, the designations would be permanent, subject only to change by Congress. Authorizing actions and interrelationships under this

alternative would also be the same as under the proposed action. In addition, the existing environment and impacts on climate, topography, geology, soils, water resources, air quality, noise, landscape characteristics, livestock grazing, land use plans, controls, and constraints, and economic conditions under this alternative would be the same as under the proposed action.

## VEGETATION

The additional lands studied for inclusion as wilderness contain approximately 811 acres of desert shrub vegetation type, 1,364 acres of mountain shrub vegetation type, and 150 acres of broadleaf riparian vegetation type. The addition of these lands would afford a protective status these lands now lack.

## ANIMALS

The additional lands contain both riparian and desert shrub-mountain shrub habitat types, including 150 acres of prime riparian habitat and 600 acres of crucial desert bighorn sheep concentration area. The addition of 2,325 acres would benefit animals by permanently protecting habitats through wilderness designation.

## CULTURAL RESOURCES

This alternative would place seven additional known prehistoric sites under wilderness management as well as some unknown sites, providing additional administrative protection (figure 16). Visitor use and other sources of adverse impacts, however, would be primarily the same as under the proposed action.

## WILDERNESS VALUES

Wilderness values on the adjacent public lands would permanently benefit from a wilderness designation. Opportunities for solitude and primitive and unconfined recreation would increase supplemental values (such as geology and ecological and cultural resources) on adjacent public lands and reinforce and complement similar values within the primitive area.

## RECREATION

The addition of 2,325 acres of wilderness would facilitate the area's management. The lands next to the primitive area proposed for wilderness status include two portions of the main canyon (150 acres) and portions of two side canyons recently transferred from State to Federal ownership. Since these lands are unprotected by primitive area status, BLM cannot control their use, manage them consistently with the adjoining primitive area or future wilderness, or protect primitive and wilderness values. BLM, for example, cannot control camping in these areas as it can in the primitive area. Wilderness designation for these lands would remedy such management problems. The relative permanence of a wilderness designation would reduce the chances of future impairment of wilderness values. Table 8 summarizes the impacts of this alternative on outdoor recreation.

TABLE 8  
LONG-TERM IMPACTS OF ALTERNATIVE 1 ON RECREATION

Activity	Quality	Opportunity	Visitor Use
Camping	X	H+	L+
Picnicking	O	O	L+
ORV Use	O	L-	X
Hunting	X	L+	L+
Sightseeing	M+	H+	L+

L - Low, M - Moderate, H - High. (+) Beneficial Impact, (-) Adverse Impact, (X) Negligible Impact, (O) No Impact.

### General Leisure--Picnicking and Primitive Camping

The designation of additional land as wilderness would insure a wider selection and variety of camping areas, including high country, by protecting these

lands from conflicting and nonconforming uses. Certain areas with exceptional recreation values for camping would be added to the proposed wilderness, including Virgus and Horse Camp Canyon and two portions of Aravaipa Canyon (figure 17).

### Off-Road Vehicle (ORV) Use

Designating adjacent public land as wilderness would close to motor vehicles several "ways" leading to both the north and south rims of Aravaipa Canyon. Overall this impact would be minimal, however, because the highly dissected rocky topography of much of the adjacent land is unsuitable for ORV use.

### Hunting

Wilderness designation would generally improve hunting quality and opportunity by precluding uses that could disturb additional wildlife habitat. Designation may thus indirectly increase wildlife populations. Higher populations would increase hunting opportunity, provided the Arizona Game and Fish Department issues more hunting permits. The desert bighorn sheep population might increase enough to support an annual harvest of surplus rams. Hunting might also increase in the long term because of the national recognition and exposure by the news media. Banning the discharge of firearms in additional areas of the canyon bottoms, however, would slightly reduce hunting opportunity.

### Sightseeing

In the long term, this alternative would benefit general sightseeing. Although it would not affect the quality of geological sightseeing, it would protect the area's geology. The quality of vegetation and animals would benefit from the increased amount of riparian community protected by wilderness designation. With improved riparian and aquatic communities, birds are expected to increase as well as the opportunity to view them. The opportunity for viewing desert bighorn sheep might also increase, since almost all the suitable public land next to the primitive area is prime bighorn habitat.

## MINERAL RESOURCES

Increasing the size of the proposed wilderness area would preclude mining (after December 31, 1983) on 840 acres now open to exploration and mining. Since this additional acreage has low mineral potential, its removal from mineral entry would not adversely affect mineral resource development.

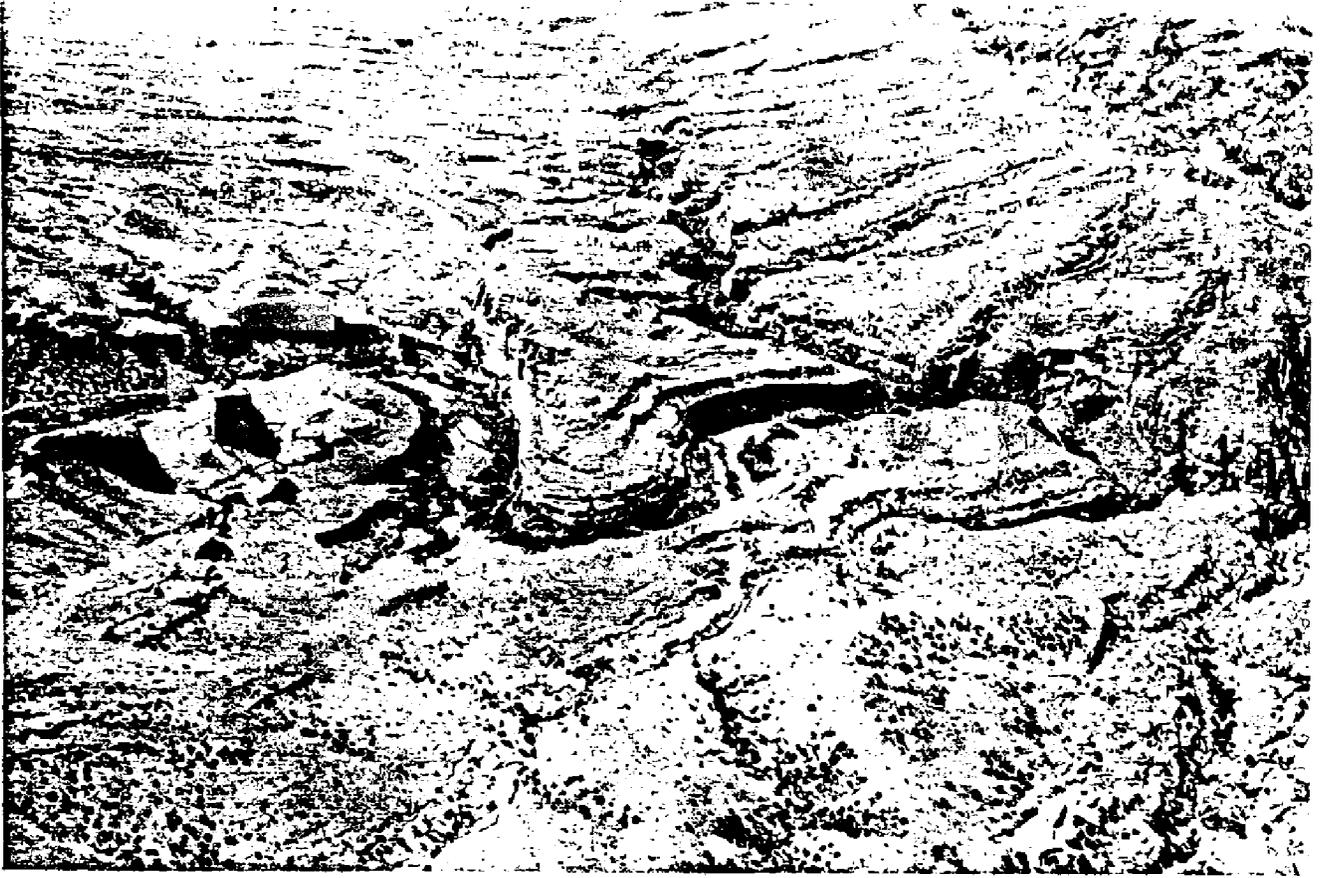


Figure 14

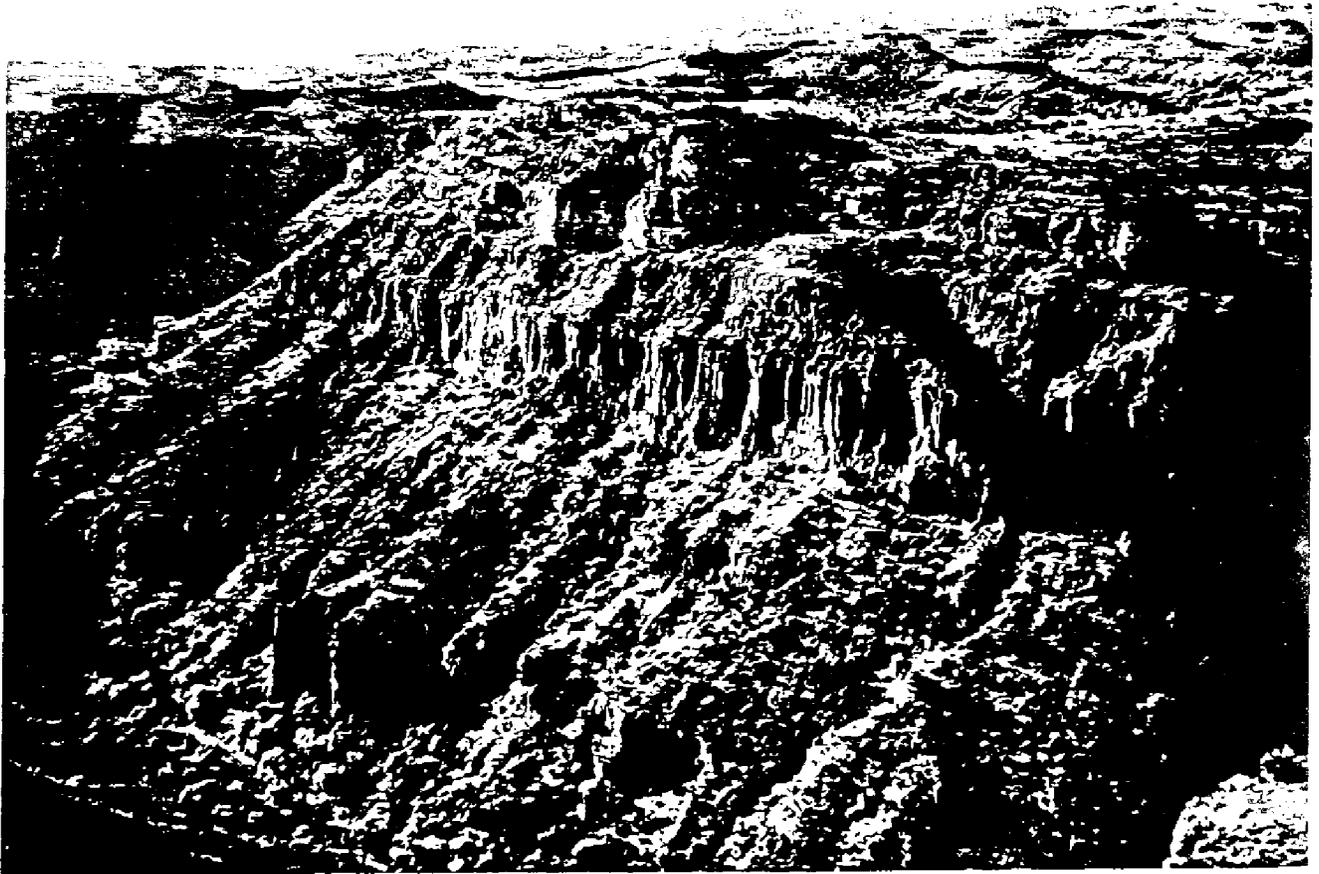


Figure 15



Figure 16

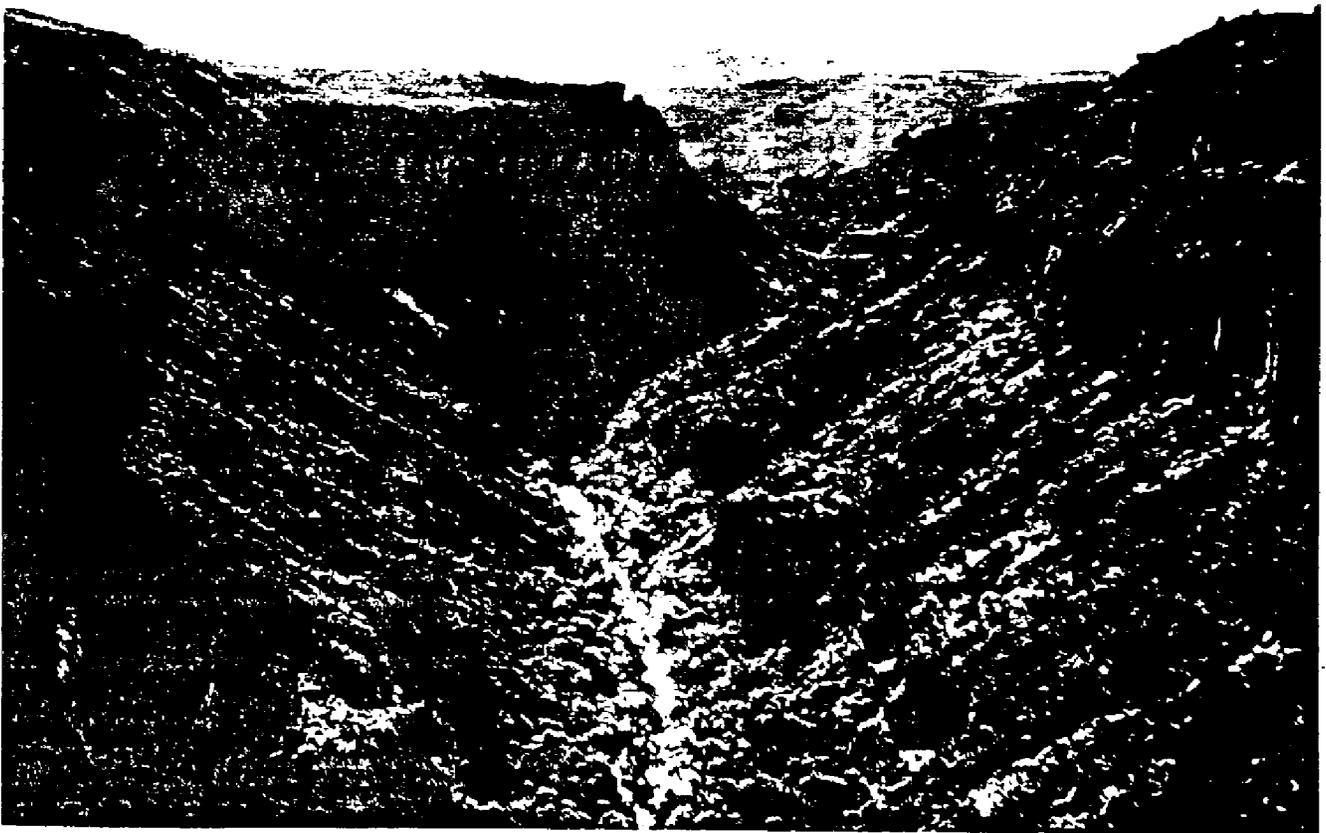


Figure 17

## ECONOMIC CONDITIONS

Increasing the size of the proposed wilderness area would have no known impacts on economic conditions.

## SOCIAL CONDITIONS

Although user groups and the public have generally accepted and approved of the existence of the primitive area and its proposed wilderness designation, attitudes might be different towards expanding the proposed wilderness area. User groups and the public in Arizona know that a wilderness designation represents a narrowing of options for use. Such groups as hunters, hikers, and nature studiers in principle could support the expansion. Informal interviews, however, indicate that some groups might oppose this alternative.

## ALTERNATIVE 2: NO ACTION

The no-action alternative would continue the administration of Aravaipa Canyon under its present management plan. The objective of this alternative would be to preserve the identified wilderness values under the present designation.

Under this alternative the study area is expected to remain unchanged in the future, although a few conditions would change.

The quality of the riparian habitat is expected to improve, increasing numbers of nongame birds.

Air quality is expected to improve slightly with improved pollution control technology, more stringent standards, and strict enforcement of the standards.

Increased air traffic may intensify noise, but improved technology and stricter controls may lessen such noise.

Grazing use will be determined by studies and levels determined by the Upper Gila-San Simon Grazing Environmental Statement (BLM, 1978b).

# CONSULTATION AND COORDINATION

## TEAM ORGANIZATION

A team of diverse resource specialists from BLM's Arizona State Office and Safford District office was assembled on November 27, 1978 in Safford, Arizona. BLM'S Washington Office and Arizona State Office provided periodic review.

## CONSULTATION AND COORDINATION IN PREPARATION OF THE DRAFT ENVIRONMENTAL STATEMENT

The public was extensively involved in events leading to the primitive area designation for the Aravaipa Canyon. Subsequently, the development of the activity plan for management of the primitive area and the Winkelman Planning Unit Management Framework Plan provided additional opportunities for public comment.

In preparing this draft ES, BLM carried out the following consultation and coordination measures:

(1) Issued a news release (dated December 20, 1978) to local and intrastate newspapers, announcing the start of the ES preparation.

(2) Informed the Bureau of Indian Affairs office in Phoenix and San Carlos and the Tribal Chairman of the San Carlos Apache Tribe by letter dated January 15, 1979 of the writing of the ES and requested information about sites of cultural value to the Apache Tribe.

(3) Held an open house at the Safford District office on January 10, 1979 to discuss the ES. Seven attended.

(4) Participated in a meeting in Tucson also attended by representatives of the Sierra Club, Southeast Arizona Hiking Club, and Audubon Society, where Aravaipa Canyon Wilderness was a major topic of discussion. Twenty-one attended.

(5) Made a presentation on Aravaipa Wilderness to the Safford Chamber of Commerce meeting on February 16, 1979. Thirty-five attended.

(6) Made a similar presentation to the Resource Conservation and Development Area monthly meeting at Sierra Vista on January 25, 1979. Twelve attended.

No public hearings are scheduled on this ES.

## COORDINATION IN THE REVIEW OF THE DRAFT ENVIRONMENTAL STATEMENT

Comments on the draft ES will be requested from the following agencies and interest groups.

Environmental Protection Agency

Advisory Council on Historic Preservation

Department of the Interior

Fish and Wildlife Service

Bureau of Reclamation

Heritage Conservation and Recreation Service

Geological Survey

Bureau of Mines

National Park Service

Bureau of Indian Affairs

Department of Agriculture

Agricultural Stabilization and Conservation  
Service

Forest Service

Soil Conservation Service

Army Corps of Engineers

Federal Energy Regulatory Commission

Congressional Delegation

Arizona State Agencies

Arizona Department of Library and Archives

Arizona Department of Property Valuation

Arizona Department of Public Safety

Arizona Department of Transportation

Arizona Indian Affairs Commission

Arizona Outdoor Recreation Coordinating  
Committee

Arizona Resource Information Systems

Arizona State Clearinghouse

Arizona State Museum

Arizona State Water Commission

Arizona Advisory Commission on Arizona  
Environment

Arizona Mineral Resources Department

Selected State Legislators

Bruce Babbitt, Governor of Arizona

State Land Department

State Game and Fish Department

State Parks Board

State Historic Preservation Officer

## County Commissioners

Gila County  
Graham County  
Pima County  
Pinal county

## Educational Institutes

Arizona College of Technology  
Arizona-Sonora Desert Museum  
Arizona State University  
Northern Arizona University  
University of Arizona  
Western Archaeological Center

## Conservation Organizations

Amerind Foundation  
Arizona Conservation Council  
Arizona Wilderness Coalition  
The American Scenic and Historic  
Preservation Society  
Environmental Clearinghouse  
Friends of the Earth  
Isaac Walton League of America  
National Association of Conservation  
Districts  
National Council of Public Land Users  
Natural Resources Defense Council, Inc.  
The Nature Conservancy  
New Mexico Wilderness Study Committee  
Pacific Legal Foundation  
Sierra Club  
Southern Arizona Environmental Council  
Wilderness Society

## Wildlife Organizations

Arizona Desert Bighorn Sheep Society  
Arizona Wildlife Federation  
Arizona Wildlife Society  
Audubon Society  
Defenders of Wildlife  
Friends of Animals, Inc.  
Graham County Wildlife Federation

## Recreational Organizations

Arizona State Four-Wheel Drive  
Association  
National Campers and Hikers Association  
ORV Monitor  
Road and Trail Association, Inc.  
Southern Arizona Biking Club  
Tuscon Four-Wheelers

## Other Economic Entities

Arizona Small Mine Operators Association  
Inspiration Copper Company  
Phelps Dodge Corporation  
Southwestern Environmental Consultants

## Others

Arizona Cattle Growers' Association  
Cochise-Graham County Cattle Growers'  
Association  
League of Arizona Cities and Towns  
Public Land Council  
State Conservation Commission

Copies of the ES will be sent to approximately 300 individuals who have requested copies; newspapers, radio and television stations; and repository and local libraries.

# APPENDIXES

## APPENDIX 1

### ARAVAIPA CANYON PRIMITIVE AREA

#### MANAGEMENT SUMMARY

The Aravaipa Canyon Primitive Area Management Plan, widely endorsed by the public, establishes the following management objectives, providing for public recreation while protecting wilderness values:

(1) to protect, enhance, and maintain the natural beauty and primitive character of the land while providing visitors with a meaningful and quality primitive experience through proper resource and visitor management;

(2) to identify recreation facility requirements and limitations commensurate with protection of the environment and to identify public needs;

(3) to identify and regulate an acceptable level of recreation use to preserve and protect other resources, particularly wildlife habitat;

(4) to develop an interpretation and information program for the protection and identification of natural and cultural values for the benefit of visitors;

(5) to ensure that the common goals for the implementation of the plan are carried out through coordination with other BLM resource activities; Federal, State, and local governments; and the general public;

(6) to the extent feasible, to allow free and natural ecological succession for scientific and other study;

(7) to manage the cultural resources for their scientific and recreation value and protect them from intentional or inadvertent loss or damage.

To achieve the primary objective of protecting, enhancing, and maintaining the natural beauty and primitive character of the land, positive steps are required to limit man's influence upon natural, cultural, visual, and primitive values:

- To protect the natural environmental and primitive values the primitive area is closed to motorized vehicles.

- For visitor safety, the shooting of firearms is prohibited in Aravaipa Canyon and adjoining side canyons.

- To allow for natural reproduction of the riparian vegetation and to eliminate conflicts with visitors, livestock grazing has been terminated in the canyon bottoms and continues under custodial management on the canyon rims.

- Mineral prospecting and mining under the 1872 Mining Law are prohibited within the primitive area.

- Visitor use is restricted by the following regulations. A permit system limits visitors to 50 persons per day. Length of stay is limited to 3 days and 2 nights. Horses can be used for day use only. Group size is limited to 10 per group for hikers and 5 per group for horseback riders. Recreationists are prohibited from collecting, disturbing, or destroying vegetation, animals, rocks, or cultural artifacts.

- Resource study and research will continue to monitor and evaluate the condition of each natural element. Water quality tests, vegetation trend studies, wildlife research, and visitor carrying capacity studies will be initiated or continued to insure preservation of the wilderness values and maintenance of maximum recreational enjoyment.

- An information and interpretation program will be continued to educate visitors and assist them in achieving the maximum enjoyment and benefit from the area.

- The primitive area will continue to be managed by a fulltime supervised staff of two, one residing at the east administrative site and the other at the west administrative site. This staff provides for visitor safety and protection through regular patrols in the canyon. They are trained in first aid and rescue procedures. They maintain trailhead and support facilities at either end of the canyon and continuously monitor visitor use and resource conditions. Radio communications between the canyon and District office ensure fast and direct response to any situation.

- Support facilities will be limited to those required to meet visitor needs and to protect the fragile resources within the primitive area.

APPENDIX 2

ARAVAIPA CANYON WILDERNESS INTENSIVE INVENTORY

WILDERNESS INTENSIVE INVENTORY

UNIT NO.: AZ-4-1 Instant Study

UNIT NO.: AZ-4-1 Instant Study

NAME OF AREA: Aravaipa Canyon

3. OUTSTANDING OPPORTUNITY FOR SOLITUDE OR A PRIMITIVE AND UNCONFINED RECREATION ANALYSIS

A. SOLITUDE:

Narrative:

Aravaipa Canyon provides a high degree of solitude and isolation because improved public access is limited to the east and west ends. The opportunity for solitude, which is diminished somewhat in the main canyon where visitor use is congested, increases as one moves deeper into the major side canyons and the limestone and sandstone ridges and arroyos of the tablelands.

The nature of the topography and the abundance of vegetation both enhance the opportunity for persons to seek out and find isolation and a feeling of solitude if so desired.

Even though the canyon bottom is relatively narrow and confined, it still possesses outstanding opportunities.

Explain by a concise narrative the following essential wilderness characteristics (for guidance see text in the Wilderness Inventory Handbook):

1. SIZE: 5,587 ± acres

Narrative:

4,044.33 acres are designated primitive. There are an additional 2,542.72 acres contiguous to the primitive area. An access road which lies in the bottom of Turkey Creek Canyon is clearly a regularly used road and will cause approximately 200 acres to be dropped from further consideration in Section 19 & 30, T. 6 S., R. 19 E.

Another access road to a livestock water development in Section 8, T. 6 S., R. 18 E. may exclude an additional 18 ± acres from consideration. The remaining 6,369 ± acres appear to have wilderness potential.

Summary: 1. Does the area have at least 5,000 acres of contiguous land and is it of sufficient size to make practicable its preservation and use in an unimpaired condition?

Circle one:  YES  NO

2. Does the island have sufficient size to make practicable its preservation and use in an unimpaired condition?

Circle one:  YES  NO

SIGNATURE: Harold Byrd, Jr. DATE: 1-16-78

Summary: Does the area have outstanding opportunities for solitude?

Circle one:  YES  NO

SIGNATURE: Harold Byrd, Jr. DATE: 1-16-78

-3-

UNIT NO.: AZ-4-1 Instant Study

UNIT NO.: AZ-4-1 Instant Study

2. NATURALNESS

Narrative:

There are some visible signs of the imprint of man's work within the area. They are:

- Roads (2.5 miles) provide access to improvements or private land.
- Trails (5-10 miles) used primarily for livestock management.
- Abandoned roads (approximately 1 1/2 miles) access to shallow test holes for mineral exploration.
- Ways - 1/4 mile on north rim east of Horse Camp Canyon.
- Historic homesteads (2) one homestead used during early 20th century. Other never completed.
- Fences (approximately .7 mile) livestock management.
- Fire rings (numerous) recurring from continuous backpacker use of the canyon.
- Trail signs (8) identify tributary canyons in the canyon.
- Portable toilets (2) one near Virgus, one near Painted Cave Canyon (generally hidden from view in dense vegetation).
- Wooden fence (280 ft.) protects and identifies the Salazar homestead.
- Pipeline (4-3/4 miles) water pipeline used to pump water from the Aravaipa Creek to a stock tank on the south rim; and 375' water pipeline from well to storage at west boundary of primitive area.
- Abandoned water pump used to pump water through pipeline.
- Water well used for irrigation and livestock water.
- Approximately 120 ft. of overhead powerline.

House report 95-540 allows the presence of most of the above and the cumulative impacts of those not covered (roads, toilets, pipelines, powerlines, etc.) is minimal with regard to the total area.

Summary: Does the area or island generally appear to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable?

Circle one:  YES  NO

SIGNATURE: Harold Byrd, Jr. DATE: 1-16-78

B. PRIMITIVE AND UNCONFINED RECREATION

Narrative:

The area offers outstanding opportunities for many types of unconfined recreation such as: backpacking, hiking, horseback riding, hunting (outside canyon bottoms), mountain and rock climbing (very dangerous due to unstable nature of rock structure), bird watching, photography, and sightseeing for geological, botanical, and zoological features.

Many of these activities represent some of the most outstanding opportunities available within the region. Aravaipa Canyon has been the subject of many pictorial reviews in periodicals with nationwide circulations; the birding opportunities are widely recognized; visitors come from all over the nation to backpack and hike the area; and students and scientific researchers use the canyon regularly for educational and scientific purposes.

Summary: Does the area have outstanding opportunities for a primitive and unconfined type of recreation?

Circle one:  YES  NO

SIGNATURE: Harold Byrd, Jr. DATE: 1-16-78

APPENDIX 2 (cont.)

UNIT NO.: AZ-4-1 Instant Study

4. SUPPLEMENTAL VALUES

Narrative:

The geological features of Aravaipa Canyon are not only scenic but represent an important scientific and educational resource. Within the canyon, there is opportunity to study a cross section of earth's history representing nearly 2.6 million years.

The ecological resources of the canyon are also considered outstanding. The area provides habitat for several Threatened and Endangered Species; it supports a substantial herd of Desert Big-horn Sheep, families of Coati mundi and numerous other species of wildlife. These different vegetative communities can be found within the area; the riparian community is generally the most heavily used by visitors.

The visual resource is considered to be Class I by Bureau standards as the canyon is comprised of rugged, deep gorges with a variety of vegetation and rich colors, and offers outstanding sightseeing and photography opportunities.

Aravaipa Canyon and the adjacent area contain numerous archaeological and historical sites. Several possess high recreational, educational, and scientific values. The Turkey Creek Cliff Dwelling is a unique archaeological site, and the Salazar homestead has been nominated to the National Register of Historical Sites.

Summary: The first two areas mentioned above, which contain roads and other impairments to the wilderness character, totaling approximately 218 ± acres must be excluded from any further consideration because they cannot be naturally or artificially returned to their natural state.

The 1.5 acres of land in E4, Section 13 adjacent to the west boundary of the primitive area contains unpermitted improvements which have been determined to be inadvertent or unintentional trespass on public land. These impairments will be rehabilitated through removal of structures and discontinuance of agricultural activities which have been carried on in the past. The area will be allowed to restore itself via natural processes in the future. By the time the area is considered by Congress for a wilderness designation, the impairment of its wilderness character will be insignificant.

The remaining 6,369 ± acres of public land inventoried contain all the necessary elements to meet the wilderness criteria. The remaining impairments to the wilderness character found within this area are judged to be substantially unnoticeable and will continue to be reduced by natural processes. This area is identified on the attached map as meeting all of the necessary criteria.

Circle one:  YES  NO

SIGNATURE: Thomas Lynch, Jr. DATE 1-16-70

Summary: Does the area contain ecological, geological, or other features of scientific, educational, scenic, or historical value?

Circle one:  YES  NO

SIGNATURE: Thomas Lynch, Jr. DATE 1-16-70

-5-

-7-

UNIT. NO.: AZ-4-1 Instant Study

WILDERNESS INVENTORY  
WILDERNESS SUMMARY SHEET

2. POSSIBILITY OF CERTAIN AREAS RETURNING TO A NATURAL CONDITION

Narrative:

There are several isolated areas where the natural condition of the land has been impacted by man's actions and visible signs of his work are noticeable.

-The 1.8 miles of road in the bottom of Turkey Creek Canyon unquestionably meets the definition of a road as defined in Wilderness Inventory Handbook. The alteration of land form and vegetation caused by the road can probably never be returned to natural condition.

-Approximately .5 mile of road traverses public lands in Sec. 8, T.6S., R.18E.. This road provides access to a livestock water development on state lands just north of the public land. The potential for the road to be rehabilitated back to a natural condition without leaving a permanent impairment to the land is low.

-Approximately 1.5 acres of land in E4 Section 13 adjacent to the west boundary of the primitive area have the imprint of man clearly evident. The natural land form has been permanently altered by leveling for agricultural purposes. A well has been drilled and associated storage tank and water pipeline have been constructed and used for many years. An overhead powerline to the well and pump crosses over the field. Approximately .2 mile of fence and road are presently maintained along the Aravaipa Creek. The possibility of this area being returned to its natural state is very remote.

-The area between Turkey Creek and Parson's Canyon (Sec. 25, T.6S., R.18E.; and Sec. 30, T.6S., R.19E.) has an old access road to mining exploratory drill holes. There has been no maintenance on the road for the past several years, and it is no longer passible by vehicle. It will probably remain as it presently is for many years.

-The fence which protects the Salazar homestead (Sec. 14, T.6S., R.18E.) from vandalism is another example of man's work which is visible. Its potential for removal and restoring the area to original form is very good.

-The water pipeline and old abandoned pump apparatus (Sec. 25, T.6S., R.18E.) could probably be removed without any evidence of its past presence.

I. LOCATION

Inventory Unit No.: AZ-4-1 Instant Study

Area/Island Name: Aravaipa Canyon Instant Study Area

District: Safford State: Arizona

II. SUMMARY

A. Results of wilderness characteristics analysis.

- 1. Does the area or island appear to be natural?  YES  NO
- 2. Does the area or island offer outstanding opportunities for solitude or a primitive and unconfined type recreation?  YES  NO
- 3. Does the area meet any of the size requirements?  YES  NO
- 4. Does the area or island have supplemental values?  YES  NO

B. Resulting map.

III. RECOMMENDATION

Check one:

- Area or island should be approved as USA.
- Area or island does not qualify for wilderness study.
- A portion of the area(s) or island(s) should be approved as a USA for further study and reported to the President. The restrictions imposed by Section 603 will no longer apply (reference to map) on the remainder of the area.

IV. APPROVAL

- A. Area Manager Thomas Lynch, Jr. Date 1-16-70
- B. District Manager Ray E. Bain Date 1-22-70
- C. State Director \_\_\_\_\_ Date \_\_\_\_\_

# GLOSSARY

The following abbreviations are used frequently in this statement. Those representing terms will be defined under respective entries in the glossary.

AG&FD	Arizona Game & Fish Department
AUM	animal unit month
BLM	Bureau of Land Management
ES	Environmental Statement
ORV	off-road vehicle
VRM	visual resource management

## TERMS

**Air Quality Classes:** Classes established by the Environmental Protection Agency that define the amount of pollution considered significant within an area. Class I applies to areas where almost any change in air quality would be considered significant; Class II applies to areas where the deterioration normally accompanying moderate well-controlled growth would be considered insignificant; and Class III applies to areas where deterioration up to the national standards would be considered insignificant.

**Alluvial:** pertaining to or composed of sediment deposited by flowing water as in a river bed.

**Andesite:** a fine-grained igneous rock containing quartz or orthoclase.

**Animal Unit Mont (AUM):** the amount of forage necessary for the sustenance of one cow or its equivalent for a period of 1 month.

**Biomass:** the sum total of living plants and animals above and below ground in an area at a given time (Range Term Glossary Committee, 1974).

**Climax Vegetation:** The final vegetation community that emerges after a series of successive vegetational stages. The climax community perpetuates itself indefinitely unless disturbed by outside forces.

**Conglomerate:** rock of rounded and waterworn stones cemented together in a finer material.

**Cultural Resources:** those fragile and nonrenewable remains of human activities, occupations, and endeavors as reflected in sites, buildings, structures, or objects, including works of art, architecture, and engineering. Cultural resources are commonly discussed as prehistoric and historic values, but each period represents a part of the full continuum of cultural values from the earliest to the most recent.

**Endangered Species:** any species in danger of extinction throughout all or a significant portion of its range. This definition excludes species of insects that the Secretary of the Interior determines to be pests and whose protection under the Endangered Species Act of 1973 would present an overwhelming and overriding risk to man. See Threatened Species.

**Ephemeral Stream:** a stream that flows only briefly after a storm.

**Fugitive Dust:** temporary transient dust, as from construction.

**Habitat:** a specific set of physical conditions that surround the single species, a group of species, or a large community. In wildlife management, the major components of habitat are considered to be food, water, cover, and living space.

**Hohokam:** a prehistoric culture group that dominated the Salt River Valley and spread over southeastern and south-central Arizona from about 300 B.C. to 1400 A.D.

**Igneous:** rock of interlocking minerals formed by the cooling and solidification of magma.

**Loam:** soil texture class for soil that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. See Soil Texture.

**Off-Road Vehicle (ORV):** any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain, excluding (a) any registered motorboat, (b) any fire, military, emergency, or law enforcement vehicle when used for emergencies, and any combat support vehicle when used for national defense, and (c) any vehicle whose use is expressly authorized by the respective agency head under a permit, lease, license, or contract.

**Pan Evaporation:** the depth of water that would evaporate from a still body of water during a year. Pan evaporation measurements are used to estimate annual evaporation losses from reservoirs.

**Particulates:** fine liquid or solid particles, such as dust, smoke, mist, fumes, or smog, found in the air or emissions.

**Perennial Stream:** a stream that flows throughout the year.

**Permeability, Soil:** the capacity of liquids, gases, or plant roots to penetrate the soil.

**Porphyry:** an igneous rock containing conspicuously large crystals and a fine-grained or glassy groundmass.

**Primitive Area:** a natural, wild, and undeveloped area, essentially removed from the effects of civilization.

**Public Land:** formal name for lands administered by the Bureau of Land Management.

**Public Land Order (PLO):** an order effecting, modifying, or revoking a withdrawal or reservation that has been issued by the Secretary of the Interior through his delegations of authority.

**Rhyolite:** a fine-grained igneous rock with a composition of granite.

**Riparian:** situated on or pertaining to the bank of a river, stream, or other body of water. Normally used to refer to plants of all types that grow along streams or around springs.

**Salado:** a prehistoric culture group that probably originated in the Tonto Basin of Arizona and spread throughout southeastern Arizona from about 1200 to 1400 A.D.

**Schist:** any of various medium- to coarse-grained metamorphic rocks composed of laminated, often flaky, parallel layers of chiefly micaceous minerals.

**Segregation:** any action such as a withdrawal or allowed application (exchange) that suspends the operation of the general public land laws. To separate or set apart; to remove lands from the operation of part or all the public land mineral laws.

**Site:** (archaeological) a physical location where human activities or events occurred.

**Soil Texture:** the relative proportions of sand, silt, and clay particles in a mass of soil. The different texture classes are commonly referred to in general terms.

**Succession:** the orderly process by which plant communities develop toward the climax plant association.

**Study Area:** the study area of this environmental statement includes Aravaipa Canyon Primitive Area and non-primitive area public lands inventoried for wilderness characteristics. See map 3.

**Threatened Species:** any species likely to become endangered within the foreseeable future throughout all or a significant part of its range.

**Tuff:** a rock of fine volcanic particles, usually fused together by heat.

**Visual Resource Management (VRM) Classes:** Classification of landscape according to the kinds of structures and modifications that are acceptable to meet established visual goals.

**Vegetation Type:** a plant community with distinguishable characteristics (Range Term Glossary Committee, 1974).

**Withdrawal:** an action that restricts the use of public land and segregates the lands from some or all of the public land or mineral laws.

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UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

MINERAL RESOURCES OF THE ARAVAIPA CANYON INSTANT STUDY AREA,

PINAL AND GRAHAM COUNTIES, ARIZONA

by

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U.S. Geological Survey  
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This report is preliminary and  
has not been edited or reviewed  
for conformity with Geological  
Survey standards and nomenclature



# United States Department of the Interior

GEOLOGICAL SURVEY  
RESTON, VA. 22092

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## Memorandum

To: Assistant Secretary--Land and Water Resources

Through: <sup>10/1</sup> Assistant Secretary--Energy and Minerals *10/12/79* JUN 19 1979  
<sup>Act 10/1</sup> Director, Geological Survey *10/12/79*

From: Wilderness Coordinator

Subject: Mineral resources of the Aravaipa Canyon Instant Study  
Area (Primitive), Arizona

Enclosed is a report by the Geological Survey and the Bureau of Mines on a mineral survey of the Aravaipa Canyon Instant Study Area (Primitive), Arizona. The investigation was made in response to the Federal Land Policy and Management Act and the Wilderness Act (Public Laws 94-579, 1976, and 88-577, 1964).

No mineral commodity has been produced and no minable ore deposits are known in the Aravaipa Canyon Instant Study Area. An estimated 1,250,000 tons of zeolite may exist on the west side of the Cave Canyon and an additional undetermined amount of zeolite may occur in other areas of the Cave Canyon and western part of the Aravaipa Canyon. The possibility that zeolite represents a significant resource will depend on mining costs and future establishment of a sustained market. The area appears to have low mineral potential for metallic mineral deposits. This assessment of the mineral potential is based upon geologic and geochemical studies, examination of prospects, and compilation of records and geologic literature.

Copies of the Open-file Report 79-291 are available for public inspection at several sites throughout the country.

*Gus H. Goudarzi*  
Gus H. Goudarzi

Enclosure

Copy to Assistant Secretary--Fish and Wildlife and Parks

**Mineral Surveys**  
**Related to Bureau of Land Management**  
**Instant Study Areas**

In accordance with the provisions of the Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976), the Geological Survey and the Bureau of Mines have conducted mineral surveys on certain areas, which formally had been identified as "natural" and "primitive" areas prior to November 1, 1975. This report discusses the results of a mineral survey of the Aravaipa Canyon Instant Study Area, Pinal and Graham Counties, Arizona.

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B. Computer listing of geochemical analyses of the rock samples with cumulative frequency and histogram calculations.	

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SUMMARY OF MINERAL RESOURCES

The Aravaipa Canyon instant study area comprises a sequence of Precambrian rocks containing no known mineral deposits that is overlain by Tertiary volcanic rocks locally containing zeolites. No mineral commodity has been produced in the area, nor are any minable deposits known. There is no current production from near the area. The closest areas of past production are about 10 km east and 13 km south, but the mineralization is in rocks of different type and age from rocks exposed in the instant study area.

No localities of hydrothermally mineralized or altered rocks are known. Although a few samples are somewhat anomalously high in metal content, none of the rocks sampled contains visible ore minerals. A small geochemical anomaly in the southeast part of the area is suggested by the presence of selected trace elements, but the anomaly is near a major fault and probably reflects transportation of trace metals along the fault from a remote source. Past exploratory drilling centered on an aeromagnetic anomaly for base-metal mineralization in the same area did not reveal any significant value in the Precambrian rocks and the Tertiary volcanic rocks penetrated.

Areas of zeolitized tuff within the instant study area include the west side of Cave Canyon and the western part of Aravaipa Canyon. An estimated 1,130,000 mt of zeolite may exist in one tuff unit on the west side of Cave Canyon, and an additional undetermined amount in other tuff units in Cave Canyon and the western part of Aravaipa Canyon. These zeolite tuff units lie in inaccessible positions in the vertical canyon cliffs and are under as much as 150 m of overburden; therefore, the actual lateral extent is unknown. Any discovery of minable-grade deposits of zeolite in the area would depend on drill core sampling through the overburden and possibly on bulk sampling to establish the quality and quantity of zeolite present. The possibility that zeolite represents a significant resource will depend on mining costs and on the possible future establishment of a sustained market.

## INTRODUCTION

A mineral survey of the Aravaipa Canyon instant study area, Arizona (fig. 1), was made in 1978 by the U.S. Geological Survey (U.S.G.S.) and the U.S. Bureau of Mines (U.S.B.M.). The area is located in the table lands across the north end of the Galiuro Mountains in southeastern Arizona about 65-airline km southeast of Globe, and consists of 26.7 km<sup>2</sup> or about 6,600 acres. The instant study area includes the 4,052 acres Aravaipa Canyon Primitive Area, one of several primitive areas established on U.S. Bureau of Land Management lands in Arizona and Utah by the Secretary of the Interior in 1969, plus an additional 2,545 acres of adjacent land.

### Regional Setting

The Aravaipa Canyon Primitive Area, a scenic wilderness gorge of outstanding beauty and historic interest, spectacularly exposes in its canyon walls many important aspects of volcanic geology. The area, located in Pinal and Graham Counties, southeastern Arizona, covers about 16 km<sup>2</sup> along an approximately 1.6 km-wide stretch of the canyon (fig. 2), and is administrated by the U.S. Bureau of Land Management as the Aravaipa Canyon Primitive Area. The instant study area extends the primitive area boundaries along the plateau to the north and to the south (fig. 2). An area bordering the instant study area, extending about 1.6 km beyond and comprising about 63 km<sup>2</sup> (16,800 acres) was also studied; it includes land of various ownership (fig. 2) along the plateau above the canyon and at the east and west ends.

Aravaipa Canyon is a narrow steep-walled gorge cut east-west across the north end of the uplifted Galiuro Mountains block. Aravaipa Creek is a perennial stream flowing westward through the canyon. Flat-topped table lands dissected by steep-walled tributary canyons stretch north and south toward the canyon rim. Elevations in the area range from about 810 m where Aravaipa Creek leaves the west end, to 1,130 m away from the canyon rims. The canyon within the primitive area is bounded by steep slopes and vertical cliffs, some of them 120 m high. The 9.7-km-long canyon varies from 200 to 600 m in width between canyon rims and averages about 500 m. Most small side canyons enter over cliffs close to the bottom of the canyon. Large sycamore, ash, cottonwood, and willow trees grow along the creek. Cacti, including saguaro, and mesquite trees grow on grassy slopes between cliffs and on the plateau.

Access to both the west and east entrance is by graded road from major state and U.S. Highways (fig. 3). U.S. Bureau of Land Management Ranger Stations are located at the west entrance and at Klondyke, 15 km east of the east entrance. Driving within the primitive area part of the Aravaipa Canyon instant study area is prohibited; parts of the plateau areas north and south of Aravaipa Canyon can be reached by 4-wheel-drive vehicle. Power and telephone lines terminate within about 0.8 km from either end of the study area. The closest railroad follows the San Pedro River about 27-road km west of the canyon.

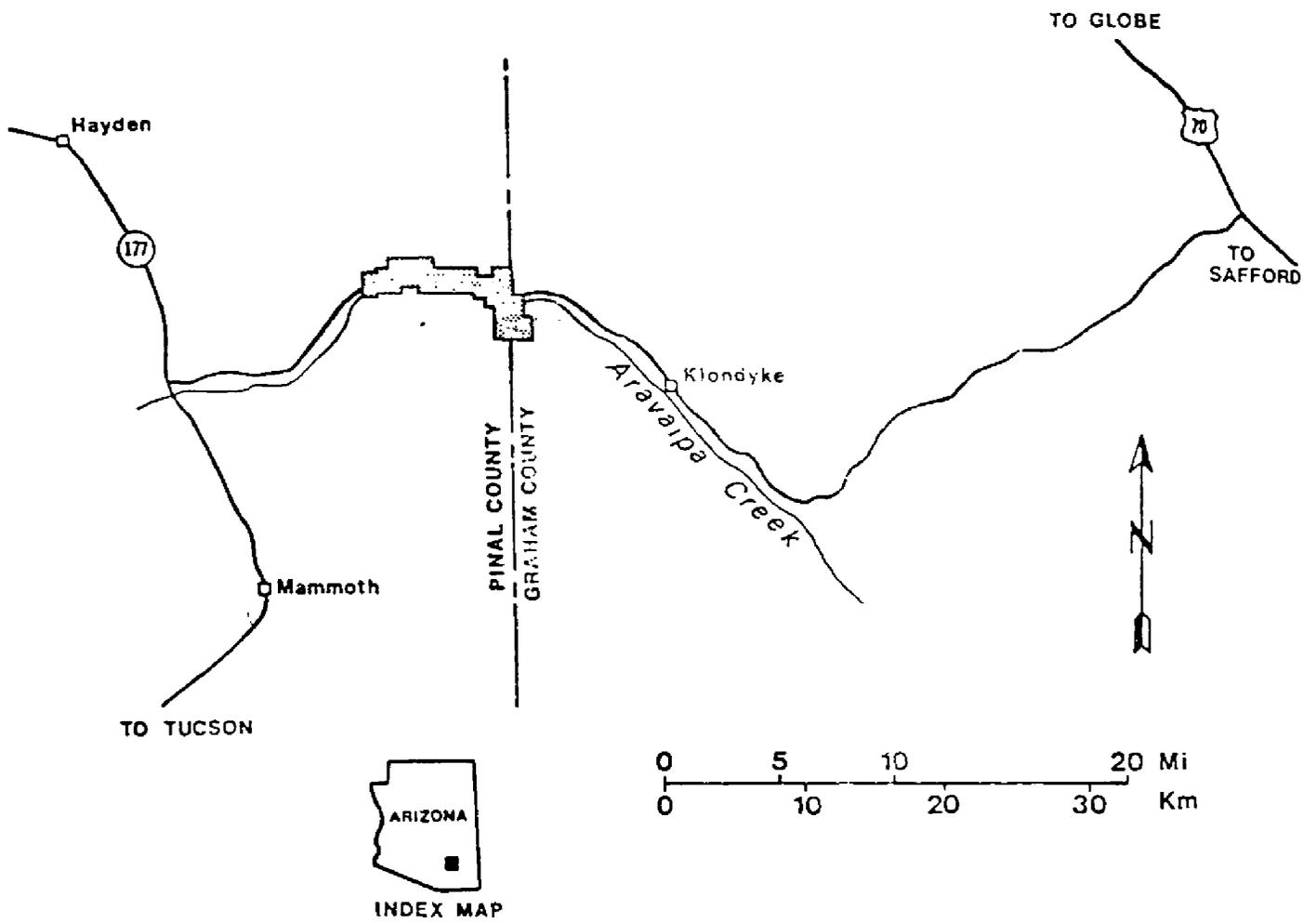


Figure 1.--Index map showing location of the Aravaipa Canyon instant study area, Arizona, (shaded)

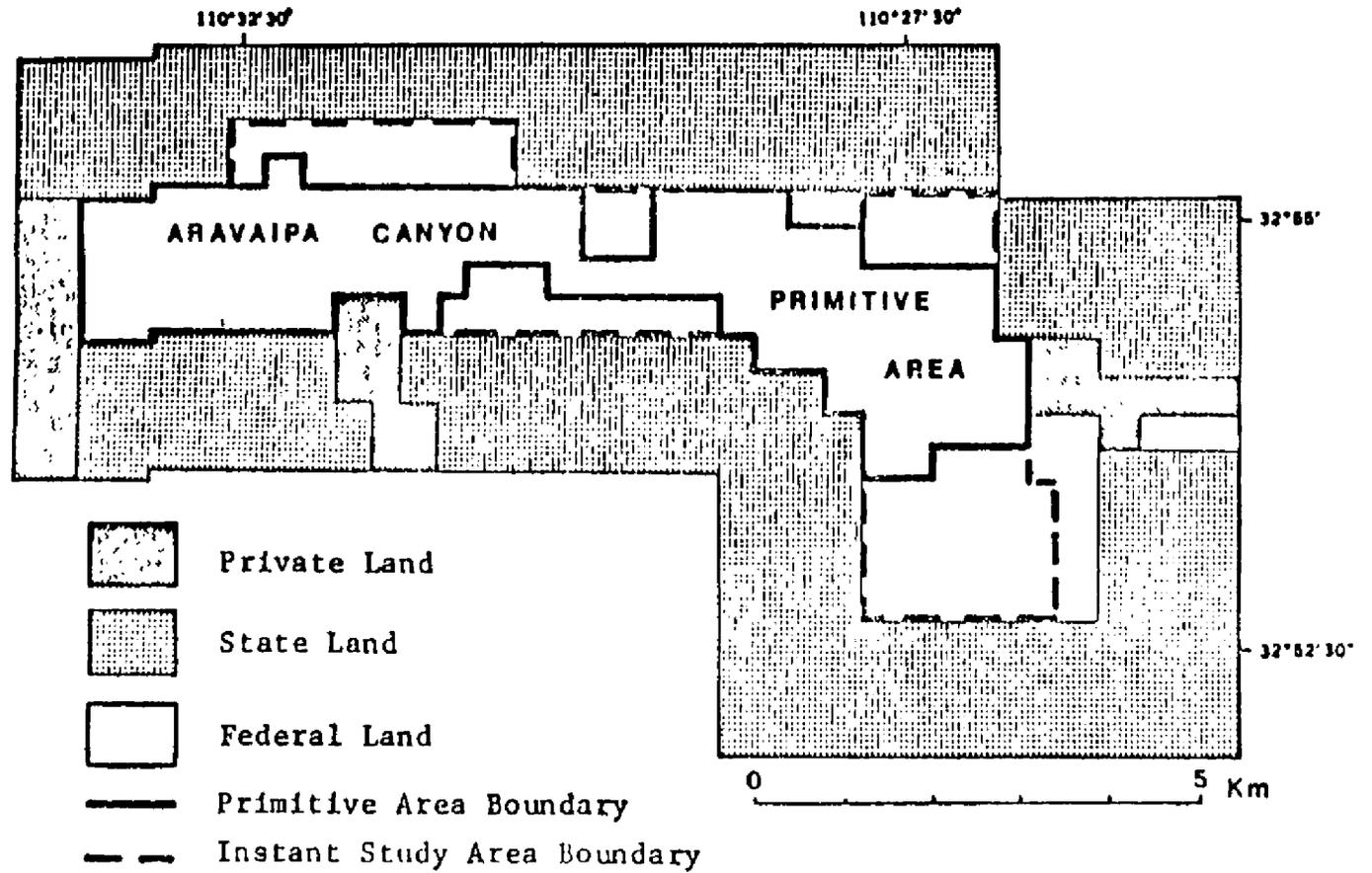


Figure 2.--Map showing land ownership in Aravaipa Canyon area.

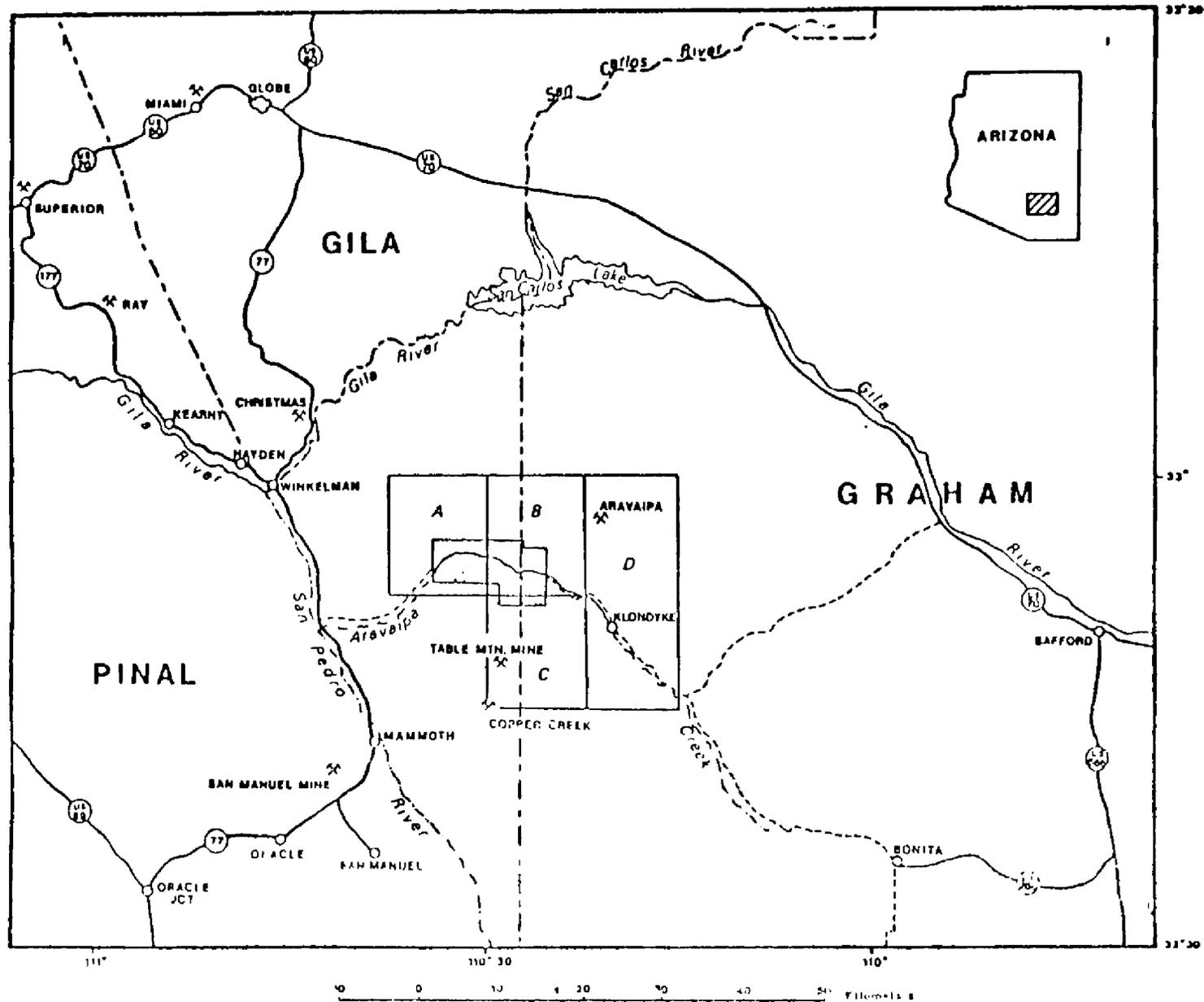


Figure 3.--Map showing location of Aravaipa Canyon area (shaded), access roads, 7-1/2-minute quadrangles: A, Brandenburg Mountain; B, Logger Canyon; C, Oak Grove Canyon; D, east half of Klondyke 15-minute quadrangle, and adjacent mining areas--Aravaipa, Christmas, Copper Creek, Globe-Miami, Ray, San Manuel, and Table Mountain mine.

The Aravaipa Canyon Primitive Area is used and enjoyed by day hikers, backpackers, and horseback riders, but the number of users is limited to protect the fragile environment. Access through the canyon bottom is along Aravaipa Creek, and, in places where the canyon walls narrow, is restricted to the creek itself, especially in the western end. Access up and into side canyons and to the rim top is made through steep rocky drainages.

The climate is warm and dry. Winter temperatures are cool, and summer temperatures are high but rarely oppressive. Total rainfall is about 40 cm per year, of which most is received in July and August, and December to February.

### Present Investigation

The field investigation of the instant study area and adjacent land was made during four weeks in March and April of 1978 by the U.S. Geological Survey and two weeks by the U.S. Bureau of Mines in the spring of 1978. This work consisted of reconnaissance in and around the area, examination of potential mineralized areas and a small number of mining claims, and sampling of rock formations, stream sediments, and several prospect workings.

In conjunction with the field investigation, an examination was made of land status records of the U.S. Bureau of Land Management (BLM) in Phoenix, Ariz., and a cursory search was made for mining claim location certificates in records of Pinal and Graham Counties. The U.S. Bureau of Land Management, local residents, and mining companies were contacted regarding mineral activity in the area.

### Acknowledgments

The cooperation of officials of the U.S. Bureau of Land Management is gratefully acknowledged, with special thanks extended to Robert Heidemann of the Safford District office. This investigation also benefitted from access allowed across private lands and information supplied by local residents Harold Reeb, Fred Wood, and Bill Salazar.

### Previous Studies

The first work specifically covering a part of Aravaipa Canyon was the geologic mapping and detailed description of the Klondyke quadrangle (Simons, 1964), which includes the east half of the area. The geology of the Brandenburg quadrangle, including the west half of the area, was mapped by Krieger (1968b). Creasey and Krieger (1978) published a summary description of the Galiuro Volcanics exposed in southeastern Arizona.

### GENERAL GEOLOGY

The remarkable canyon wall exposures along Aravaipa Canyon consist predominantly of Galiuro Volcanics. The Galiuro Volcanics is widespread throughout the Galiuro and Winchester Mountains, and extends southward to the north end of the Little Dragoon Mountains. It consists of a lower sequence dominated by lava flows and an upper sequence dominated by ash-flow tuffs; the entire formation has been summarized by Creasey and Krieger (1978).

Most of the upper sequence of the Galiuro Volcanics but only one member from the lower sequence is exposed in the instant study area. The upper sequence here consists of variously named ash-flow tuffs with intercalated flows, air-fall tuffs, and conglomerates of upper Oligocene and lower Miocene age (table 1). These rocks attain a maximum exposed thickness

Table 1. Potassium-argon ages of ash-flow tuffs in the Galiuro Volcanics, northern Galiuro Mountains (Cressey and Krieger, 1978) and a tuff bed in the Whitetail Conglomerate.

	Biotite	Sanidine
<b>Galiuro Volcanics</b>		
Hells Half Acre Tuff Member	<sup>1</sup> 25.2±0.7	23.1±0.7
Aravaipa Member	26.4±0.7	23.5±0.8
Tuff of Bear Springs Canyon	24.4±0.7	---
Holy Joe Member	27.2±0.8	26.3±0.8
<b>Whitetail Conglomerate</b>		
Tuff bed	<sup>2</sup> 33.5±0.6	---

<sup>1</sup>Ages recalculated using the new decay constants and isotopic abundance recommended by the International Subcommittee on Geochronology, 1976.

<sup>2</sup>E. H. McKee, 1978, written communication, (K<sub>2</sub>O-7.87 percent; <sup>40</sup>Ar<sup>rad</sup>3.829x10<sup>-10</sup> mole/g; <sup>40</sup>Ar<sup>rad</sup>57.6 percent).

of 250 m in the canyon. Rocks underlying the Galiuro Volcanics are exposed only on the west side of the area and include Oligocene Whitetail Conglomerate, Precambrian diabase, Dripping Springs Quartzite, and porphyry of the Pinal Schist. Rocks overlying the Galiuro Volcanics are exposed only on the east side of the area and consist of Miocene(?) Hell Hole Conglomerate. Quaternary alluvial deposits are sparsely distributed on the canyon floor. Large landslides composed of Galiuro Volcanics occurred near the west part of the canyon. Small areas of gravel and sand veneer cover pediment surfaces.

South of Aravaipa Canyon the Galiuro Volcanics dips gently north and northeast. North of the canyon the rocks apparently dip gently south, based on exposures of lower andesite of Virgus Canyon along the northwest border of the Booger Canyon quadrangle and in Aravaipa Canyon. No faults were observed cutting the Galiuro Volcanics, except on the east where the Galiuro Volcanics is in fault contact with the Hell Hole Conglomerate. About 7 km south and west in the area, southwest-facing, high-angle normal faults separate pre-Tertiary rocks, from which the volcanics have been stripped, from late Miocene or early Pliocene basin deposits. Small down-dropped exposures of the volcanics occur west of the faults.

Details of the geology of the Galiuro Volcanics and the older and younger rocks exposed in the area have been published by Krieger (1968b) and Simons (1964). These maps have been combined and constitute Plate 1. Detailed descriptions of the map units are included. More detailed descriptions of the volcanic rocks that cover most of the area and of zeolitization of the nonwelded part of one of the ash-flow tuffs are given by Krieger (1979). Zeolite occurs, mostly as clinoptilolite, in ash-flow and air-fall tuff beds in the Galiuro Volcanics, inside and also south of the west end of the instant study area. Inside the instant study area boundary, the area west of Cave Canyon appears to contain substantial amounts of zeolite in the distal margin of the Aravaipa Member. Most of the western part of the area may also contain significant zeolite alteration in the ash-flow tuff unit of the Hells Half Acre Member.

## ECONOMIC APPRAISAL

### Mining History

Mining and exploration activity inside the instant study area is limited to 2 adits in Aravaipa Canyon driven in an area covered by a sodium prospecting permit, and exploration drilling by Bear Creek Mining Company west of Turkey Creek. There are no zeolite leases nor applications for leases inside the instant study area.

The only mining activity was apparently for potassium nitrate (saltpeter) at 2 adits in Aravaipa Canyon between Horse Camp and Booger Canyons in 1927. The adits are driven in welded tuff of the Aravaipa Member. One adit is located in the SW-1/4NW-1/4, sec. 15 (sample nos. 1228-1231), the other is in the NW-1/4NW-1/4, sec. 16, T. 6 S., R. 18 E. (sample nos. 1232-1234). The mining was done under a federal sodium prospecting permit issued in April 1927. The work was abandoned when it was ascertained that only a coating of what had probably been bat guano on the surface of the rock had contained the potassium nitrate. The sodium permit was terminated in 1929.

The drill hole exploration activity west of Turkey Creek was mostly in the southeast part of the area where an areomagnetic anomaly was tested for base-metal mineralization (F. Blaine Greenhough and D. C. Bulmer, Bear Creek Mining Company, 1978, written commun.) The drilling was done by the Bear Creek Mining Company, the exploration subsidiary of Kennecott Copper Corporation, during 1970 and 1971, on mining claims inside the instant study area in secs. 24 and 25, T. 6 S., R. 18 E., and sec. 30, T. 6 S., R. 19 E., and outside the instant study area in secs. 22, 23, 26, and 35, T. 6 S., R. 18 E. One of the drill holes (TC-1) was a deep test, in the NE-1/4, sec. 26, T. 6 S., R. 18 E. The exploratory drill hole (TC-1, table 2, location shown on pl. 1) reached a depth of 2,647 ft (807 m) below the surface. The upper 600 ft (183 m) were in the upper sequence of the Galiuro Volcanics, underlain by 910 ft (277 m) of hornblende andesite and 280 ft (86 m) of basaltic andesite of the lower sequence of the volcanics. The top of the hole was close to the top of the Aravaipa Member. The lower 677 ft (206 m) were in Pinal Schist with interbedded sills of diabase from 20 to 177 ft (6 to 54 m) thick. Disseminated magnetite was discovered in multiple diabase intrusives in the Pinal Schist and was believed to be responsible for the anomaly. The Aravaipa Member maintains a dip of about 4° between the drill hole and Aravaipa Canyon to the north. If the underlying members

Table 2.--Core log of Bear Creek Mining Company's drill hole number TC-1, one-fourth mile (0.4 km) west of the Aravaipa Canyon instant study area, NE $\frac{1}{4}$  sec. 26, T. 6 S., R. 18 E.<sup>1</sup>

Depth in feet	Lithology
0-20	Tertiary volcanics--white tuff
20-180	Tertiary volcanics--Aravaipa member, upper welded tuff
180-240	Tertiary volcanics--lower tuff of Simons, pink rhyolite tuff
240-270	Tertiary volcanics--Olivine andesite
270-600	Tertiary volcanics--lower tuff of Simons, pink biotite tuff
600-1510	Tertiary volcanics--hornblende andesite
1510-1790	Tertiary volcanics--basaltic andesite
1790-1900	Pinal schist, extremely siliceous, local fine lamination at 60-70° dip, some red slickensided hematite on fractures, probably a metamorphosed siltstone. 1883-1887 ft pebble breccia, fragments largely of siliceous schist unit but also includes some fragments of porphyry.
1900-2073	Diabase--fine grained, massive, no alteration except chlorite on sheared fractures. Local trace disseminated pyrite. Contains estimated 5% disseminated magnetite.
2073-2103	Pinal schist--well bedded siliceous argillite. Thin streaks of hematite on fractures. Bedding dips 20-60°.
2103-2187	Diabase as above. Fault at 2113 ft. Stronger fracturing in vicinity of fault, healed with calcite.
2187-2224	Pinal schist--siliceous argillite as above with some thin diabase stringers. Soft red slickensided hematite on fractures. Foliation and bedding dip 50-70°.
2224-2346	Diabase--fine to medium-fine grained. Estimated +5% disseminated magnetite.
2346-2366	Pinal schist, with local thin diabase stringers. Foliation and bedding dip 60°. Irregular spotty patches of epidote and streaks rich in magnetite.
2366-2378	Diabase, with some thin schist inclusions. Local epidote in schists. Magnetite is disseminated. Trace disseminated pyrite.
2378-2397	Pinal schist, extremely fine grain siliceous unit. Bedding dips 55°.
2397-2426	Diabase, with included schist septa. Local epidote in irregular patches. Trace disseminated pyrite. Magnetite is disseminated.
2426-2447	Pinal schist, argillaceous unit. Bedding dips 60°. Local epidote and garnet in irregular patches and along bedding. Trace pyrite.
2447-2467	Diabase, similar to interval 2397-2426.

<sup>1</sup>F. Blaine Greenhough, written communication, 1978

Note: Average susceptibility of the volcanic section is  $635 \times 10^{-6}$  cgs units  
Average susceptibility plus remanence for the diabase of  $25,000 \times 10^{-6}$  cgs units.  
Average copper content of schist is 50 ppm. Average copper content of diabase is 100 ppm.

maintain the same thickness as in the drill hole, the top of the Precambrian should be 1,800 ft (550 m) below the bottom of the canyon.

Shallow percussion holes to validate their claims were drilled by Bear Creek in surrounding areas to a depth of about 50 ft (15 m). The location of those noted during the course of the study are shown on Plate 1. One of the holes, assumed to have been drilled by Bear Creek, appeared to be more than 200 ft (60 m) deep. The mining claims were subsequently relinquished and the exploration abandoned. Local ranchers reported some drilling in and near Turkey Creek, possibly for uranium, but no information on this drilling was obtained and no holes in or east of Turkey Creek were observed.

Two mining districts and two other mineralized areas are east and south of the area (fig. 3). The Aravaipa mining district, including the Grand Reef and the Aravaipa mine sites, is about 6 miles (10 km) to the east and northeast, along the Santa Teresa Mountains. The Copper Creek mining district is about 8 miles (13 km) to the south on the west flank of the Gallego Mountains. The Four Mile Creek mineralized area is about 7 miles (11 km) south of the study area. The Aravaipa and the Four Mile Creek mining districts have produced lead, zinc, copper, molybdenum, silver and gold, intermittently for about 100 years from the 1860's to the late 1950's. The total production from the Aravaipa mining district is about 60 million pounds (27 million kg) of totaled lead, zinc, and copper, and about 250,000 troy ounces (7,775 kg) of totaled silver and gold; total production from the Copper Creek mining district is about 20 million pounds (9 million kg) of totaled copper, molybdenite, and lead, and about 200,000 ounces (6,200 kg) of totaled silver and gold. The combined production from the 2 districts represents a value of about \$9 million (Simons, 1964).

### Mineral Commodities and Economic Considerations

#### Zeolite

Zeolites are hydrated aluminosilicate minerals with potential valuable industrial applications due to their cation exchange, reversible-dehydration, and molecular sieve capabilities. These capabilities result from a distinctive open-framework crystal structure enclosing interconnected cavities. The cavities are occupied by cations, chiefly sodium, potassium, and calcium, which balance a residual negative charge on the framework. Held only by electrostatic attraction and not part of the structural framework, cations are relatively free to move throughout the structure, and zeolite can be used to change the ion content of solutions passed through it. Water is also relatively free to move from the cavities, so the high sorptive heats of zeolite can be used to allow zeolite to function as a heat exchanger. The porous framework of the zeolites also allows them to act as molecular sieves to separate mixtures of molecules, depending on the size and shape of the molecules, and the size of the portals connecting the cavities.

The largest current use of the zeolite structure is as molecular sieves, catalysts, and desiccants, and industrial demand for these uses has been largely satisfied by synthetic zeolite. The present uses of natural zeolite in the United States is limited, mostly to the following: of clinoptilolite for removing cesium from radioactive waste, of chabazite and other zeolites for purifying natural gas, and of zeolitic tuff as a pozzolon in cement.

Total U.S. production of natural zeolite in 1977 was about 5,000 tons (4,500 mt) an increase from the several hundred tons (several hundred mt) produced in 1976 R. A. Clifton, 1979)

Although the production of natural zeolite is limited, the recognition of the many potential applications of natural zeolite has taken place only within the last 25 years. Potentially new and increased applications for natural zeolite include uses as fillers in paper, for removal of ammonia from sewage waters and industrial fumes, for upgrading low-BTU natural gas, as solar heat exchangers, and as dietary supplements for poultry and swine (Mumpton, 1977).

Since a sustained market for natural zeolite has not yet been established, no reliable estimate can be made of a representative price value for the commodity. Mumpton and Fishman (1977) have, however, demonstrated that certain potential agricultural uses of zeolite are such that a price of \$50 to \$75 per ton (\$55 to \$83 per mt) might be maintained. This price is quite favorable, considering that the average mining cost of natural zeolite deposits is about \$8 to \$20 per ton (\$9 to \$22 per mt) (A. J. Regis, 1978, pers. commun.).

#### Other Commodities

The sand and gravel deposit in the Aravaipa Creek bed contains material that would be deleterious as aggregate for high-quality concrete, and is too remote to have any commercial importance. Similarly, common-variety rock for construction purposes is too remote to be quarried economically.

No leases have been issued for parts of the study area for leaseable minerals, oil and gas, coal, and geothermal resources, and there are no known deposits of these resources in or near the study area.

#### U.S Geological Survey Sampling and Analytical Program

Stream sediment samples for semiquantitative spectrographic analyses of minor elements, and rock samples for both semiquantitative spectrographic analysis and X-ray diffractometer studies of zeolitization were collected for the geochemical investigation and surface alteration survey. Sample locations are shown on Plate 1.

Samples for geochemical studies included unsorted stream sediment samples from side canyons<sup>1</sup> and rock samples, including material from joints in Hells Half Acre Tuff Member. The samples were treated as follows:

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<sup>1</sup>No samples were collected from Aravaipa Canyon because it drains the Aravaipa mining district in the northeastern part of the Klondyke quadrangle. One sample was collected from the lower part of the Virgus Canyon, which drains the Table Mountain mine area and one from lower Deer Creek (Hell Hole) that heads in the Aravaipa mining area because side canyons were not accessible at the time of the study.

1. The 51 sediment samples consisted of (A) a concentrate of heavy minerals, obtained by panning a 4.5 kg (10 lb) sample, and (B) a 0.45 gr (1 lb) sample from the same site. The concentrates were treated as follows: Separation into magnetic and nonmagnetic fractions, the nonmagnetic fraction was treated with bromoform and the light fraction, discarded. The heavy fraction was separated on the Franz, at 1.0 amp. setting, into magnetic and nonmagnetic fractions; the original magnetic fraction was added to this magnetic fraction. Both fractions were examined with binoculars for major ore mineral content. The 0.45 gr samples were sieved to minus 80 mesh. Replicate semiquantitative spectrographic analyses<sup>2</sup> were made of each of these fractions; the results are shown in Appendix A.

2. Fifty-three rock samples were collected by the U.S. Geological Survey. Semiquantitative spectrographic analyses of 38 of the U.S. Geological Survey samples were obtained (Appendix B). X-ray diffractometer patterns were obtained of 34 of the tuffaceous rock samples collected by the U.S. Geological Survey<sup>3</sup> and of 25 tuff samples collected by the U.S. Bureau of Mines to determine content of glass, zeolite, or clay of nonwelded samples or type of devitrification if welded.

### Preliminary Results of Geochemical Investigation

Sporadic high values in both stream sediments and rock samples were detected through semiquantitative spectrographic analyses (Appendices A and B). Elements with apparently anomalous values in some samples include tin, copper, lead, zinc, and molybdenum. One sample (78AR040) showed 1.5 ppb silver. The sporadic high values are scattered throughout the area, and in themselves are probably not indicative of economic mineralization in the area.

However, analysis of the semiquantitative data by Henry Alminas<sup>4</sup> (1979, oral commun.) indicates a minor anomaly localized along the north-trending fault at the east side of the area in section 26; this anomaly is indicated by the distribution of Ba, Cu, Ni, La, and Y in the different fractions analyzed. The anomaly is interpreted to indicate leakage along the fault from a possible mineralized body at unknown, but great, depth. A similar but lesser anomaly occurs along the main Aravaipa Canyon in the vicinity of Paisano and Boogar Canyons and Deer Creek (Hell Hole). Copper values and molybdenum values are somewhat higher than normal over the entire area compared to other areas with similar geology (Henry Alminas, 1979, oral commun.)

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<sup>2</sup>Preparation of stream sediment samples and the semiquantitative spectrographic analyses were done in the Branch of Exploration Research, U.S. Geological Survey, Golden, Colo., by R. T. Hopkins, Don Risoli, and D. Siems.

<sup>3</sup>X-ray diffraction studies of U.S.G.S. samples were done in Western Mineral Resources laboratory, Menlo Park, Calif., by Dennis Wolohan.

<sup>4</sup>Geochemist, Branch of Exploration Research, U.S.G.S., Denver, Colo.

## Zeolites

### Aravaipa Member and tuff of Bear Springs Canyon

The zeolite clinoptilolite is present in the Aravaipa and tuff of Bear Springs Canyons members in the western part of the area, most of it south of the instant study area boundary. The zeolitization is believed to be due to percolation of ground water above the water table and not to hydrothermal alteration. Zeolitization occurred in the originally glassy nonwelded parts of the members. None occurred in the welded or partly welded recrystallized parts.

Complete zeolitization of the original glass in the Aravaipa Member occurred only at the western distal margin (fig. 4) where the entire 15-m-thick section was nonwelded. To the east, where the light gray slightly welded columnar-jointed tuff developed, only the underlying pink nonwelded section of the member is zeolitized. The horizontal and vertical change in zonation from the interior, densely welded part to the nonwelded distal margin is shown diagrammatically in Figure 5, which has been modified from Krieger (1979) to incorporate data from the present study. At all locations, except at columns 5 and 5A, the original slightly welded top of the Aravaipa Member was eroded before deposition of Hells Half Acre Tuff Member. The Aravaipa Member west of Cave Canyon is altered to clinoptilolite (table 3, nos. 1246-1250) in contrast to the section on the east side of Cave Canyon. There the member consists of nonwelded tuff altered to clinoptilolite at the top, underlain by columnar-jointed tuff with nonwelded tuff altered to mordenite at the bottom (Krieger, 1979, fig. 22). Zeolitization in the tuff of Bear Springs Canyon is similar to, but more extensive than, that in the Aravaipa Member. However, the tuff of Bear Springs Canyon is considerably thinner than the Aravaipa Member and locally was eroded before the Aravaipa Member was erupted.

Total amount of tuff that may contain at least 70 percent clinoptilolite is estimated to be 10 million mt in the Aravaipa Member and 3 million mt in the tuff of Bear Springs Canyon, but is mostly outside the instant study area boundary. Clinoptilolite also occurs in the tuff of Bear Springs Canyon in Parson and upper Virgus Canyons in the southern part of the area (no. 50, table 3), and may also occur in tuff of Oak Springs Canyon in the same area.

### Hells Half Acre Tuff Member

The Hells Half Acre Tuff Member consists of three units. The upper unit is an air-fall and water-laid tuff, the middle unit is ash-flow and probable ash-flow tuff, and the lower unit is water-laid tuff and tuffaceous sandstone. The upper unit is widely distributed north and south of Aravaipa Canyon. In canyon walls it forms the top of nearly unbroken inaccessible cliffs composed of the middle unit, and east of Javalina Canyon, the lower unit of the member.

The upper unit has been sporadically zeolitized; of 16 samples X-rayed, 4 are composed largely of clinoptilolite, 2 contain traces of it, the rest are vitric (table 3). The middle unit (fig. 6) is thickest along Aravaipa Canyon between Javalina and Horse Camp Canyons, but laps out against rhyolite-obsidian on the north side of the canyon, against Precambrian

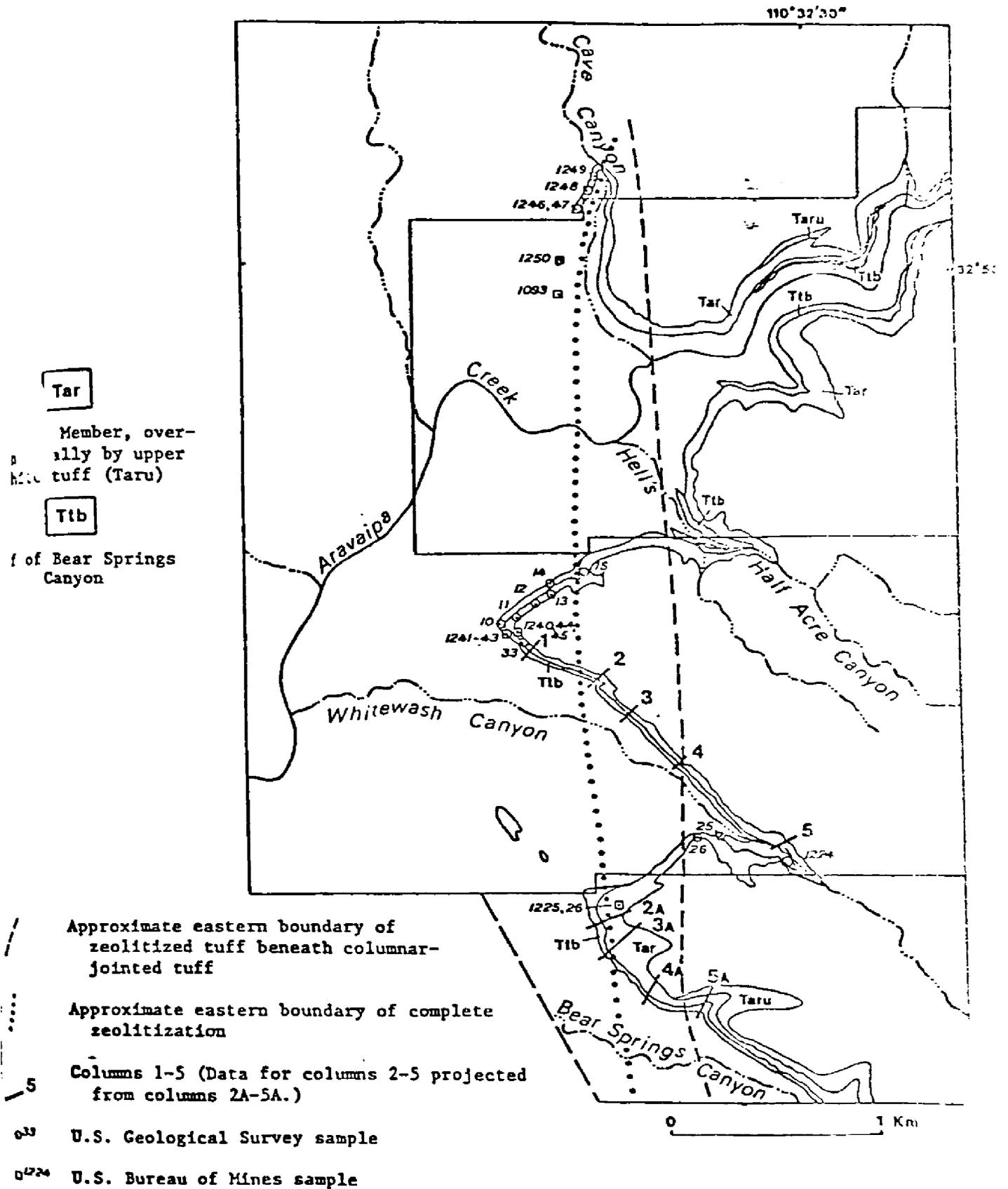
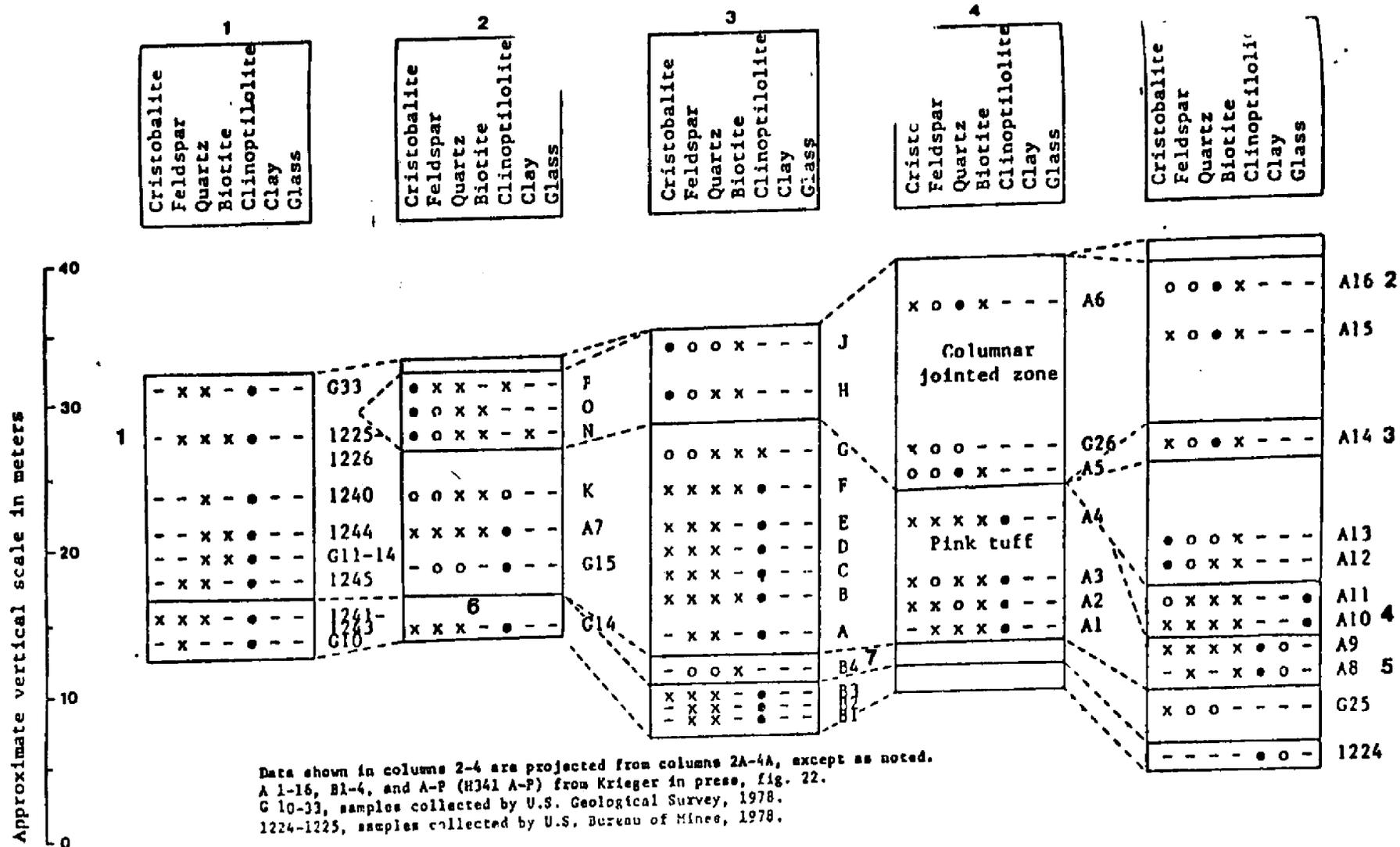


Figure 4.--Distribution of Aravaipa Member and tuff of Bear Springs Canyon in the western part of the area, showing extent of zeolitization and location of columnar sections and samples.



Data shown in columns 2-4 are projected from columns 2A-4A, except as noted.  
 A 1-16, B1-4, and A-P (H341 A-P) from Krieger in press, fig. 22.  
 G 10-33, samples collected by U.S. Geological Survey, 1978.  
 1224-1225, samples collected by U.S. Bureau of Mines, 1978.

- <sup>1</sup>Samples 1225-6 projected from north of column 2A
- <sup>2</sup>Upper partly welded tuff projected from column 5A
- <sup>3</sup>Platy-jointed zone
- <sup>4</sup>Microbreccia
- <sup>5</sup>Unwelded (realigned) to slightly welded base of Aravaipa Member
- <sup>6</sup>Pink welded tuff of Bear Springs Canyon
- <sup>7</sup>Columnar-jointed tuff of Bear Springs Canyon overlain by pink tuff. No samples collected at column 4, but pink tuff overlain by columnar-jointed zone observed at column 4A

Figure 5.--Approximate composition of Aravaipa Member and tuff of Bear Springs Canyon, superimposed on lithologic zones, showing change from interior zonation (5) to distal margin (1) (modified from Krieger, 1977, fig. 22). Symbols indicate mineral abundance estimated from X-ray diffractometer patterns of bulk samples: o, quartz; x, feldspar; •, cristobalite; ◊, biotite; ◊, clinoptilolite; ◊, clay; ◊, glass. Percentages are indicated in parentheses.

Table 3.—Approximate composition of tuffs in Aravaipa Canyon area.

apparent abundance estimated from X-ray diffractometer patterns of bulk samples: v, more than 50 percent; o, less than 50 percent; s, present but not abundant; tr, trace; -, looked for but not found. Crystallization: Z, zeolitized; V, vitric; VP, vapor phase, typical of columnar-jointed and upper white tuff zones, characterized by quartz and feldspar with or without cristobalite; D, devitrified, characterized by cristobalite and feldspar with or without quartz. Semiquantitative spectrographic analyses of all specimens except 13B, 14, 17A, s. s. 20, 21, 27-29, 72A, H180A-H410A, and U.S. Bureau of Mines samples, are shown in Appendix B.]

Hells Half Acre Tuff Member																					
Member	Upper unit															Middle unit				Lower unit	
	17A	17B	17C	17D	30	31	71	H180A	H410A	1216	1217	1218	1219	1220	1221	1222	H342A	H144	H-10	1095	43
Crystallization	V	V	V	Z	Z	V	Z	V	V	V	V	V	V	Z	V	V	Z	Z	Z	Z	Z
Cristobalite	tr	tr	tr	tr	-	-	-	-	x	-	tr	-	tr	tr	tr					tr	-
Feldspar	x	x	x	o	x	tr	x	x	x	x	x	x	x	x	o	x	o	x	x	x	x
Quartz	x	o	tr	o	o	x	x	x	x	o	o	x	o	o	o	x	o	o	x	x	o
Biotite	-	-				tr	tr	-				-	-	tr	-	tr	x	x	x	tr	
Clinoptilolite	tr	tr		o	o	-	o	x	x	x	tr			o			o	o	o	o	o
Clay	-	-		-	-	x	-	-	o	-	-					o	-				
Class	o	v	o	-	o	o	o	o	o	o	o	x	-	o	o						

Nonwelded distal margins																							
Sample number	Aravaipa Member													Tuff of Bear Springs Canyon member									
	11	12	13A	13B	15	33	1225	1226	1240	1244	1245	1246	1247	1248	1249	1250	10	14	50	1224	12-1	12-2	12-3
Crystallization	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z			Z
Cristobalite	tr	tr	tr	tr	-	-	-	-	-	-	-	-	-	-		tr	tr	x	x	tr			tr
Feldspar	x	x	tr	x	x	x	-	x	x	tr	tr	x	x	x	x	x	x	tr	x	x	x	x	x
Quartz	tr	tr	tr	x	x	x	tr	x	tr	tr	tr	x		x	tr	tr	tr	x	tr	tr	tr	tr	x
Biotite	-			-	-	tr	tr	tr	tr	tr	-	tr	tr	tr	-	tr			tr	tr	tr		
Clinoptilolite	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Clay	-	-	-	-	-	-	tr	-	-	-	-	-	-	-	-	tr			o				
Class	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sample number	Welded and partly welded parts											T <sub>10</sub> <sup>1</sup>	Tuff bed in Whitecall Cg				Well Hole Cg					
	Aravaipa Member										T <sub>11</sub> <sup>2</sup>											
	26	27	28	29	41	45	72A	72B	72C	72D	75		25	1223	20	21		22	1094	1095	49	
Crystallization	VP	VP	VP	VP	VP	VP	VP	VP	D	D	VP	VP	V	V	Z	Z	Z	Z	Z			Z
Cristobalite	tr	-	-	o	x	x	o	o	o	o	tr	tr	-				x					
Feldspar	o	o	o	o	o	o	o	o	o	o	o	o	tr	x	o	x	o	o				x
Quartz	o	o	o	x	o	o	o	o	x	o <sup>3</sup>	o	o	tr	tr	o	x	o	o				x
Biotite	tr	-	-	-	-	tr	tr	tr	tr	tr	-	tr	-		tr	-	x	x				tr
Clinoptilolite	-	-	-	-	-	-	-	-	-	-	-	tr	tr	o	o	o	o	o				o
Clay	-	x	x	-	-	-	-	-	x	-	-	-	o	o	-	tr	-	-				
Class	-	-	-	-	-	-	-	-	-	-	-	-	o	-	-	-	-	-	-	-	-	-

<sup>1</sup>Rhyolite-obsidian member

<sup>2</sup>Tuff of Bear Springs Canyon

<sup>3</sup>Abundance of quartz may indicate later silicification

## LOCATIONS AND DESCRIPTIONS:

## U.S. Geological Survey samples

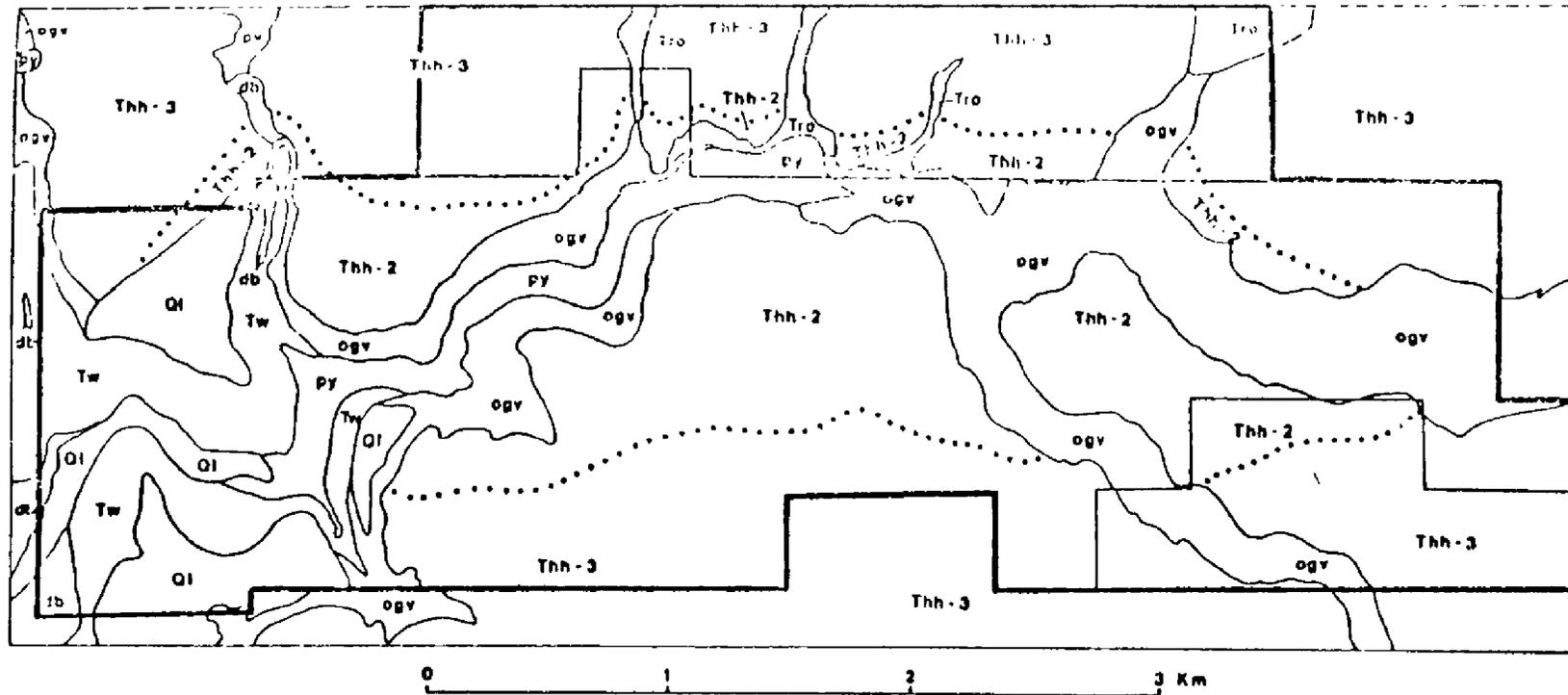
- 10 - Tuff of Bear Springs Canyon, pink tuff, zeolitized, east of Whitewash Canyon, northwest end of Hells Half Acre
- 11 - Aravaipa Member, pink tuff, zeolitized, same as 10
- 12 - Aravaipa Member, pink tuff, zeolitized, same as 10
- 13 - Aravaipa Member, overlain by columnar-jointed zone, same as 10, but farther east
- 14 - Tuff of Bear Springs Canyon, beneath 13, no columnar-jointed zone
- 15 - Aravaipa Member, pink tuff, zeolitized, overlain by columnar-jointed zone, east of 13
- 16 - Hells Half Acre Tuff Member, upper unit, 25 m section, A (top) to C vitric, D (bottom) zeolitized, Painted Cave Ranch
- 17 - Tuff bed in Whitetail Conglomerate, vitric, north of Wagner Ranch, near west boundary of study area
- 18 - Tuff bed in Whitetail Conglomerate, zeolitized, north of Aravaipa Canyon, west of Cave Canyon
- 19 - Tuff bed in Whitetail Conglomerate, zeolitized, south of Aravaipa Canyon, west of Cave Canyon
- 20 - Tuff of Bear Springs Canyon, pink tuff, zeolitized, overlain by columnar-jointed zone; same location as 25
- 21 - Aravaipa Member, columnar-jointed, vapor phase, Whitewash Canyon near south boundary of study area
- 22 - Aravaipa Member, upper white tuff, vapor phase, Whitewash Canyon, south of study area
- 23 - Hells Half Acre Tuff Member, upper unit, zeolitized, east branch Hells Half Acre Canyon
- 24 - Hells Half Acre Tuff Member, upper unit, vitric, east branch Hells Half Acre Canyon
- 25 - Aravaipa Member, pink tuff, zeolitized, top of cliff, northwest end of Hells Half Acre
- 26 - Aravaipa Member, upper white tuff, vapor phase, Horse Camp Canyon
- 27 - Hells Half Acre Tuff Member, lower unit, zeolitized, Horse Camp Canyon, down-dropped block
- 28 - Aravaipa Member, upper white tuff, vapor phase, Virgus Canyon, down-dropped block
- 29 - Hell Hole Conglomerate, concretionary tuffaceous sandstone, zeolitized, west of Turkey Creek
- 30 - Tuff of Bear Springs Canyon, zeolitized, Parsons Canyon
- 31 - Hells Half Acre Tuff Member, upper unit, zeolitized, west of Parsons Canyon, down-dropped block
- 32 - Aravaipa Member, upper white tuff, top 3 m, A (bottom) and B, vapor phase; C and D (top) densely welded, devitrified; west Parsons Canyon
- 33 - Aravaipa Member, upper white tuff, vapor phase, west of Parsons Canyon

## From Krieger, 1979, figure 29

- 400A - Hells Half Acre Tuff Member, upper unit, vitric, middle branch Hells Half Acre Canyon
- 400B - Hells Half Acre Tuff Member, middle unit, zeolitized, east side Cave Canyon, down-dropped block
- 400C - Hells Half Acre Tuff Member, middle unit, zeolitized, near mouth of Cave Canyon, down-dropped block
- 400D - Hells Half Acre Tuff Member, middle unit, zeolitized, near mouth of Cave Canyon, down-dropped block
- 400E - Hells Half Acre Tuff Member, upper or middle unit, vitric, Horse Camp Canyon, down-dropped block

## U.S. Bureau of Mines samples

- 1093 - Hells Half Acre Tuff Member, zeolitized, west side Cave Canyon, landslide breccia, probably from middle unit
- 1094 - Tuff bed in Whitetail Conglomerate, zeolitized, north side Aravaipa Canyon, west of Cave Canyon
- 1095 - Tuff bed in Whitetail Conglomerate, zeolitized, north side Aravaipa Canyon, west of Cave Canyon
- 1218 - Hells Half Acre Tuff Member, upper unit, vitric, Painted Cave Ranch
- 1219 - Hells Half Acre Tuff Member, upper unit, vitric, east side of Cave Canyon
- 1220 - Hells Half Acre Tuff Member, upper unit, zeolitized, east side of Cave Canyon
- 1221 - Hells Half Acre Tuff Member, upper unit, vitric, west of Javalina Canyon
- 1222 - Hells Half Acre Tuff Member, upper unit, vitric?, clay alteration, west side of Javalina Canyon
- 1223 - Rhyolite-obsidian member, vitric?, clay alteration, east side of Javalina Canyon
- 1224 - Tuff of Bear Springs Canyon, pink tuff, zeolitized, overlain by columnar-jointed unit, Whitewash Canyon
- 1225 - Aravaipa Member, pink tuff, zeolitized, east side Bear Springs Canyon
- 1226 - Aravaipa Member, pink tuff, zeolitized, east side Bear Springs Canyon
- 1240 - Aravaipa Member, pink tuff, zeolitized, east side Whitewash Canyon, northwest end of Hells Half Acre
- 1241 - Tuff of Bear Springs Canyon, pink tuff, zeolitized, same location as 1240
- 1242 - Aravaipa Member, pink tuff, zeolitized, same location as 1240
- 1250 - Aravaipa Member, pink tuff, zeolitized, west side Cave Canyon; 1250 from down-dropped block



Q1	Landslide composed largely of Hells Half Acre Tuff Member: upper unit south of Aravaipa Canyon, middle unit north of it
Thh-3	Upper unit of Hells Half Acre Tuff Member, largely vitric, see Table 2
Thh-2	Middle unit of Hells Half Acre Tuff Member, covered by upper unit except in inaccessible canyon cliffs
Tro	Rhyolite-obsidian member
ogv	Older members of the Galiuro Volcanics
Tw	Whitetail Conglomerate
db	Diabase
py	Porphyry

Figure 6.--Probable extent (shown by dotted lines) of massive middle unit of Hells Half Acre Tuff Member in the Aravaipa Canyon instant study area.

porphyry on the south side of the canyon just east of Javalina Canyon, and in Cave Canyon about 1.3 km north of its mouth. The middle unit is not present south of the canyon beneath the upper unit west of Hells Half Acre Canyon. Its extent up Virgus Canyon and up Aravaipa Canyon east of Horse Camp Canyon is uncertain, but probably not more than a couple of kilometers. Four specimens probably from the middle unit have been X-rayed; all are composed largely of zeolite (table 3). Three of the specimens were from down-dropped blocks, the fourth was from the landslide west of Cave Canyon<sup>5</sup>. This meager information is suggestive that the original glassy part of the middle unit could be completely zeolitized, and the tuff could contain over 50 percent clinoptilolite estimated to be between 170 and 270 million mt; however, 95 percent or more of the middle unit is buried under the sporadically zeolitized upper unit.

The lower unit is exposed along Aravaipa Canyon and forms the base of the cliff of the Hells Half Acre Tuff Member, 60-70 m above the canyon floor. It extends up Virgus Canyon and up Aravaipa Canyon east of Horse Camp Canyon for a kilometer or two. The one specimen X-rayed (table 3) has been zeolitized. It is probable that the whole lower unit has been zeolitized to some extent, at least, based on its general appearance and the fact that it was deposited in water.

#### U.S. Bureau of Mines Sampling and Analytical Methods

A total of 51 U.S. Bureau of Mines samples were taken from surface exposures, at the few prospects and mining claims in the instant study area, and from outcrops in and near the area. A part of the Hell Hole Conglomerate outcrop area was checked with a geiger counter for radioactivity.

U.S. Bureau of Mines chip samples were taken vertical to bedding in ash-flow tuff exposures across parts of rock material showing uniform texture or color. Chip samples were also taken across quartz veins in Precambrian porphyry, and at prospects in andesite and welded tuff. Grab samples were taken at the prospects by combining several pieces of rock taken at a specific grid interval. A panned concentrate of stream sediment was taken at the mouth of Deer Creek. The sample localities are shown on Plate 1.

All U.S. Bureau of Mines samples were fire-assayed for gold and silver, checked with a geiger counter for radioactivity, and were analyzed by 6-step semiquantitative spectrographic analysis for 42 elements. The samples of

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<sup>5</sup>Four additional samples of the middle unit of the Hells Half Acre Tuff were collected from a cliff west of Cave Canyon by the U.S. Bureau of Mines in December 1978, and x-rayed by the U.S. Geological Survey in January 1979. All appear to be composed largely of clinoptilolite.

volcanic tuff were analyzed by X-ray diffraction techniques for zeolite<sup>6</sup>. For each sample the locations and the gold and silver amounts determined by fire assay are shown in Table 4. The results of the spectrographic analyses are not presented in this report but are available on request. The results of the zeolite analyses of volcanic tuff samples are shown in Table 5.

#### Localities of Mineral Interest

Localities of zeolite mineralization are evident in and near the instant study area, most significantly, the west side of Cave Canyon, and also, the west portion of Aravaipa Canyon in the instant study area.

Other localities of possible mineral interest were investigated, at 2 adits in Aravaipa Canyon, drill holes west of Turkey Creek, claim locations and a prospect near Deer Creek, and quartz veins in Precambrian porphyry in the west end of Aravaipa Canyon but no significant mineral values were found.

#### West Side Cave Canyon

All of the distal margin of the Aravaipa Member exposed on the west side of Cave Canyon is a homogeneous uniform-textured pink-colored tuff. Four chip samples (nos. 1246, 1248-50) and one specimen (no. 1247) were taken at four locations on the west side of Cave Canyon. Since all samples were taken within uniform-appearing material, the thicknesses sampled were arbitrary. All the analyses indicate, at  $\pm 10$  percent accuracy, between 50 and 75 percent clinoptilolite (table 5). Samples numbers 1246, 1248-49 and specimen number 1247 were taken at 3 locations in approximately the same stratigraphic horizon in the west wall exposure along a distance within about 400 ft (120 m) north of the instant study area boundary. Sample number 1250 was taken inside the area from one of the two exposures of distal margin colluvium in the landslide material. The sample (no. 1248) with the highest zeolite content (75 percent) was taken across 12 inches (30 cm) of bed material; the sample (no. 1246) with the lowest zeolite content (50 percent) was across 20 inches (51 cm). The longest sample (no. 1249) was 36 inches (91 cm) and assayed 55 percent clinoptilolite.

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<sup>6</sup>X-ray diffraction studies of U.S. Bureau of Mines samples were done in their Salt Lake City Metallurgical Research Center as follows:  
"...The initial attempt to determine the zeolite content of the sample by weight loss during thermogravimetric analysis was abandoned when it was discovered that some of the samples contained opal, montmorillonite, and hydrated volcanic glass, all of which lose water over the same temperature interval as the zeolite.

"The method that was finally adopted was to determine how much of the weight loss was regained when the sample was cooled. Assuming that only the zeolite rehydrated and the rehydration was complete, the amount of zeolite in the sample could be calculated. Since the method was time consuming, only three determinations were done in this manner. The results of these determinations were used to standardize X-ray diffraction peak heights so the subsequent samples could be run by XRD.

X-ray diffraction patterns show all of the zeolite present in these samples to be clinoptilolite. The sum of the (020) and (400) peak heights were used to help compensate for preferred orientation of the (010) cleavage plates."

Table 4. Fire assay of all U.S.B.M. samples from the Aravaipa Canyon area, Arizona.

(The analyses were performed at the Reno Metallurgy Research Center, U.S. Bureau of Mines, Reno, Nevada. TRS designates location of sample by township (T) south, range (R) east, Gila and Salt River meridian, and section (S))

Sample	Location TRS	Fire assay troy oz/ton <sup>1</sup>		Remarks
		Au	Ag	
1219	6-18-18	-	0.1	Outcrop-chip-26 in (66 cm)
1220	do.	-	-	Outcrop-chip-17 in (43 cm)
1221	do.	-	-	Outcrop-chip-26 in (66 cm)
1223	6-18-7	-	-	Outcrop-chip-17 in (43 cm)
1222	do.	Tr	-	Outcrop-chip-8 in (20 cm)
1216	do.	Tr	-	Outcrop-chip-15 in (33 cm)
1217	do.	-	-	Do.
1218	do.	-	-	Do.
1249	do.	-	-	Outcrop-chip-36 in (91 cm)
1248	6-17-12	-	-	Outcrop-chip-12 in (30 cm)
1246	do.	-	-	Outcrop-chip-20 in (51 cm)
1247	do.	-	Tr	Outcrop-chip-specimen
1250	6-17-13	-	-	Outcrop-chip-12 in (30 cm)
1093	do.	-	-	Outcrop-chip-36 in (91 cm)
1095	do.	-	-	Outcrop-chip-24 in (61 cm)
1094	do.	-	-	Outcrop-chip-14 in (36 cm)
	6-17-24	Tr	-	Outcrop-chip-24 in (61 cm)
	do.	-	-	Outcrop-chip-26 in (66 cm)
1245	do.	-	-	Outcrop-chip-36 in (91 cm)
1241	do.	Tr	-	Do.
1242	do.	-	-	Do.
1243	do.	Tr	Tr	Do.
1225	6-18-30	-	Tr	Outcrop-chip-36 in (91 cm)
1226	do.	0.01	.1	Do.
1224	do.	Tr	-	Outcrop-chip-12 in (30 cm)
1213	6-17-13	-	Tr	Outcrop-chip-3 in (8 cm)
1214	do.	-	Tr	Do.
1215	6-18-18	-	Tr	Outcrop-chip-specimen
1238	do.	-	Tr	Outcrop-chip-6 in (15 cm)
1239	do.	-	Tr	Outcrop-chip-8 in (20 cm)
1237	do.	-	Tr	Outcrop-chip-specimen
1236	do.	-	Tr	Do.
1235	do.	-	.1	Do.
1227	6-18-8	.01	-	Talus-grab-every 3 ft (0.9 m)
1232	6-18-16	-	.1	Adit-portal-back-chip-4 ft (1.1 m)
1233	do.	-	Tr	Adit-face-chip-44 in (112 cm)
1234	do.	-	-	Adit-wall-chip-3 ft (0.9 m)
1228	6-18-15	-	-	Adit-face-chip-50 in (127 cm)
1230	do.	.03	-	Adit-portal-back-chip-41 in (104 cm)
1231	do.	.01	0.2	Adit-dump-grab-every 1 ft (0.3 m)
1096	do.	-	-	Outcrop-chip-specimen
1097	6-18-14	-	Tr	Do.
1098	do.	-	-	Do.
1099	do.	.01	Tr	Do.
1251	6-18-13	.01	Tr	Pit-dump-grab-every 1 ft (0.3 m)
1252	do.	-	-	Do.
1253	do.	-	-	Pit-wall-chip-2 ft (0.6 m)
1254	do.	-	.1	Outcrop-chip-1 ft (0.3 m)
1100	do.	-	-	Outcrop-chip-specimen
1255	6-18-14	-	Tr	Stream sediment pan-concentra

The consistently high zeolite analyses indicate that all the nonwelded distal margin is thoroughly zeolitized. This is supported by similar zeolite analysis results in 5 samples (nos. 1240, 1244-45, 1225-26) taken outside the instant study area at 2 outcrops of the distal margin, 1/4-mile (0.4 km) south of the area boundary in the northeast wall of Whitewash Canyon; and 1 mile (1.6 km) further south in Bear Springs Canyon (table 5), and by samples X-rayed by the U.S. Geological Survey (table 3; fig. 4). In the Whitewash Canyon wall 3 chip samples were taken; 2 (nos. 1244 and 1245, 36 inches (91 cm) and 24 inches (61 cm) long, respectively) near the base of the Aravaipa Member and 1 (no. 1240, 24 inches (61 cm) long) about 30 feet (9 m) above the base. The samples assayed between 60 and 75 percent clinoptilolite. In Bear Springs Canyon 2 chip samples (nos. 1225 and 1226) were taken; each 36 inches (91 cm) over a composite 72 inches (193 cm) at a stratigraphic horizon about 60 feet (18 m) above the base. They assayed 80 and 85 percent clinoptilolite.

The amount of Aravaipa Member distal margin present inside the instant study area is estimated to be about 1,000,000 cubic yards (760,000 m<sup>3</sup>), a little less than half of the estimated 2,500,000 cubic yard (1,900,000 m<sup>3</sup>) total volume of distal margin present along the entire west side of Cave Canyon (fig. 4). The total volume present is based on a judged 50-foot (15-m) thickness extending for 1,800 ft (550 m) along the northeast-trending west wall, wedging out to zero thickness 1,500 ft (460 m) to the northwest. A representative average amount for clinoptilolite is 70 percent, which is the weighted average of analyzed values of all 9 distal margin chip samples, including those in Whitewash and Bear Springs Canyons. At 70 percent clinoptilolite, the amount of clinoptilolite in the instant study area is 700,000 cubic yards (540,000 m<sup>3</sup>), which represents, at a 2.15 specific gravity, about 1,250,000 tons (1,130,000 mt); however, the actual amount present is something less due to the (undetermined) porosity of the rock.

In addition to the zeolitization of the distal margin Aravaipa Member, the analysis of 60 percent clinoptilolite in one sample (no. 1093, table 5) of the landslide composed predominately of Hells Half Acre tuff member in the west side of Cave Canyon shows that this material is also significantly zeolitized, at least at this location. The particular unit of the Hells Half Acre Tuff Member which is the major source of the landslide is probably the ash-flow (middle) unit. The total area covered by the landslide in the Cave Canyon area is about 65 acres (26 ha); the thickness is not known.

A 25-foot- (8-m)-thick layer of air-fall(?) tuff in the Whitetail Conglomerate also crops out to the west of Cave Canyon, at lower elevations, north and south of Aravaipa Creek. The Whitetail Conglomerate is stratigraphically directly beneath the Galiuro Volcanics. Two chip samples (nos. 1094 and 1095) were taken 1,000 ft (305 m) apart north of Aravaipa Creek; they assayed 45 and 50 percent clinoptilolite (table 5) and indicate that the tuff bed in the Whitetail Conglomerate is also zeolitized.

Table 3.--Zeolite analyses from U.S. Bureau of Mines of volcanic tuff samples from Aravaipa Canyon area, Arizona  
 All zeolite identifications made were of the mineral clinoptilolite. The analyses were performed by the Salt Lake City Metallurgy Research Center, U.S. Bureau of Mines, Salt Lake City, Utah]

Sample	Rock unit sampled	Percent zeolite (clinoptilolite) by weight <sup>1</sup>	Sample dimensions
1216	Hells Half Acre Tuff Member, air-fall tuff, upper unit	10	13 in (33 cm) chip
1217	do.	5	do.
1218	do.	5	do.
1219	do.	0	26 in (66 cm) chip
1220	do.	<sup>2</sup> 40	17 in (43 cm) chip
1221	do.	<sup>3</sup> 5	26 in (66 cm) chip
1222	do.	0	8 in (20 cm) chip
1223	Hells Half Acre Tuff Member, ash-flow tuff, middle unit	60	36 in (91 cm) chip
1224	Rhyolite-obsidian member	0	17 in (43 cm) chip
1225	Aravaipa Member	80	36 in (91 cm) chip
1226	do.	85	do.
1227	do.	70	24 in (61 cm) chip
1228	do.	75	36 in (91 cm) chip
1229	do.	60	24 in (61 cm) chip
1230	do.	50	20 in (51 cm) chip
1231	do.	65	Specimen, chip
1232	do.	75	12 in (30 cm) chip
1233	do.	55	36 in (91 cm) chip
1234	do.	70	12 in (30 cm) chip
1235	Tuff of Bear Springs Canyon	65	12 in (30 cm) chip
1236	do.	65	24 in (61 cm) chip
1237	do.	70	do.
1238	do.	70	do.
1239	do.	70	do.
1240	Tuff bed in Whitetail Conglomerate	45	14 in (36 cm) chip
1241	do.	50	24 in (61 cm) chip

<sup>1</sup>Estimated from relative X-ray diffraction peak intensity. An error of  $\pm 10$  percent is assumed.

<sup>2</sup>Considerably more than 50 percent of clinoptilolite appeared to be present in split of U.S. Bureau of Mines sample X-rayed by U.S. Geological Survey.

<sup>3</sup>U.S. Bureau of Mines samples were done at  $2^\circ/\text{min.}$ , X-ray diffraction studies of some of their samples and splits of many of them were done by the U.S. Geological Survey at  $1^\circ/\text{min}$  to obtain greater resolution (M. H. Steger, Everett Shock).

<sup>4</sup>No trace of clinoptilolite noted in split of U.S. Bureau of Mines samples X-rayed by U.S. Geological Survey.

## Western Aravaipa Canyon

The Hells Half Acre Tuff Member is present eastward from the west side of Cave Canyon throughout the west part of the instant study area north and south of Aravaipa Canyon, and although sampling was insufficient, also may contain significant amounts of zeolite. This member occupies a large part of the area; it consists of three units, air-fall and water-laid tuff, ash-flow tuff, and water-laid tuff. The ash-flow tuff crops out in cliff walls, and the air-fall and water-laid tuff occupies cliff tops and most of the surface away from the canyon rims. The top unit is a heterogeneous assemblage including accidental lithic fragments; it was sampled (nos. 1219-1222 and 1216-1218) at five locations east of Cave Canyon. One sample assayed 40 percent clinoptilolite (table 5), but most samples assayed nil or 5 percent clinoptilolite. The ash-flow tuff is the unit more likely to contain significant zeolite; however, it was not analyzed except for that (no. 1093) of the landslide material west of Cave Canyon which assayed 60 percent clinoptilolite (see footnote 5). The total area underlain by the ash-flow tuff unit inside the instant study area is about 645 acres (260 ha), and the thickness ranges between 100 and 160 ft (30 and 50 m); the volume present is therefore between 100 and 170 million cubic yards (75 and 130 million m<sup>3</sup>).

## Aravaipa Canyon, bat guano

Deposits of what was probably bat guano were mined in 1927 at two localities in Aravaipa Canyon, between Horse Camp and Booger Canyons, in the SW-1/4NW-1/4 sec. 15 and the NW-1/4NW-1/4 sec. 16, T. 6 S., R. 18 E. At these localities a substance was reportedly found which contained potassium, would burn when mixed with other materials, and was claimed to have value as fertilizer. A sodium prospecting permit on 2,080 acres (842.4 ha) including secs. 15, 16, and adjoining parts of adjacent sections was obtained in April 1927. Adits were driven where the substance was found; the adit in sec. 15 was 38 ft (12 m) long, 6 ft (1.8 m) high, and 5 ft (1.5 m) wide, and the adit in sec. 16 was 57 ft (17 m) long, 6 ft (1.8 m) high, and 4 ft (1.2 m) wide. The work was reportedly abandoned when it was finally certified that the mined rock did not assay the same as the first-dug material, and it was established that the potassium substance had only coated the surface and lined hollows in the rock. Three chip samples (nos. 1232-1234) were taken from the face, mid-point wall, and portal of the sec. 16 adit, and 3 similarly located chip samples (nos. 1228-1230) plus a grab sample (no. 1231) of the dump were taken at the sec. 15 adit. Anomalous values of up to 0.03 oz Au/ton (no. 1230) and 0.2 oz Ag/ton (no. 1231) were found in 4 of the samples, but no other significant values are shown (table 4).

The actual composition of the potassium substance mined is not known, but it was probably potassium nitrate (saltpeter). Saltpeter is known to form from the combination of potassium in volcanic rocks with nitrate from bat guano (Hutchinson, 1950). The nitrate originates as an enrichment product in bat excreta during the nitrification of ammonia.

No other bat guano deposits are known in the area. Although there are occasional cavelike hollowed-out portions in the walls in the canyons where such deposits might occur, no signs were detected.

#### West of Turkey Creek

The area west of Turkey Creek was once a target of exploration by the Bear Creek Mining Company, the exploration subsidiary of Kennecott Copper Corporation. This area is, like most of the surroundings, covered by Tertiary volcanics and sediments, but an aeromagnetic anomaly was known in the area. In 1970 Bear Creek located mining claims in and outside of the instant study area, in parts of secs. 22-26, and 35, T. 6 S., R. 18 E., and secs. 19 and 30, T. 6 S., R. 19 E. Numerous shallow holes were drilled over the claims, and one deep hole was drilled in the NE-1/4 sec. 26, T. 6 S., R. 18 E., 1/4 mile (0.4 km) west of the instant study area boundary. The deep hole broke through the volcanics at 1,790 ft (546.0 m) and then penetrated 677 ft (206.5 m) of interlayered Pinal Schist and diabase. The log of the hole is shown in Table 2. The average copper content was reported to be 100 ppm in the diabase and 50 ppm in the schist. The only mineralization encountered and believed to be accountable for the anomaly was amounts of approximately 5 percent magnetite disseminated in the diabase. The exploration was stopped and the mining claims relinquished in 1971.

#### Deer Creek

One-half mile (0.8 km) north of Deer Creek on the east side of the ridge east of Paisano Canyon a pit is dug 6 ft (1.8 m) deep and 8 ft (2.4 m) across, in what is apparently the upper andesite of Virgus Canyon. Abundant olivine phenocrysts, about 1 to 2 mm or less in size, are altered to iddingsite and show dark rust red in the rock, but no mineralization is present. Chip samples from the northwest wall of the pit (no. 1253) and from outcrop adjacent to the pit (no. 1254) and grab samples (nos. 1251 and 1252) from the dump were analyzed but no significant values were shown (table 4).

Two lode mining claims are located at the mouth of Deer Creek, by Lupe Salazar in 1963. Two specimens were taken from outcrops on the claims, from a welded tuff (no. 1099) north of Deer Creek and from Hell Hole Conglomerate (no. 1100) south of Deer Creek, and a panned concentrate (no. 1255) of stream sediment was taken at the mouth of Deer Creek. The sample analyses showed no significant values (table 4).

#### Western Aravaipa Canyon, Precambrian Porphyry

The Precambrian porphyry exposed in Aravaipa Canyon westward from a point midway between Javalina and Virgus Canyons contains many thin quartz veins. Mostly the veins are sinuous and erratic and terminate abruptly within the porphyry. Other veins appear ladderlike in outcrop, planar and parallel to faint foliation planes in the porphyry, but also terminate over short distances. Most veins are on the order of 3 inches (8 cm) thick; widest parts of the veins are about 10 inches (25 cm). The quartz is an opaque milky white, with occasional patches of specular hematite. Four specimens (nos. 1215 and 1235-1237) and four 3- to 8-inch chip samples (nos. 1213, 1214, 1238-1239) were taken across quartz veins at 6 locations and were assayed with no significant results (table 4). A grab sample (no. 1227) east of Javalina

Canyon taken at 3-foot- (0.9-m)-intervals across a 30- by 50-foot (9- by 15-m) tongue of porphyry talus, containing occasional pieces of vein quartz with hematite, was also assayed with no significant values (table 4).

### CONCLUSION

No minable ore deposits are known in the Aravaipa Canyon instant study area. There has been no production of any mineral commodity.

A deposit of about 1,250,000 tons (1,130 000 mt) of the zeolite mineral clinoptilolite appears to exist in the instant study area, west of Cave Canyon, in the distal margin of the Aravaipa Member ash-flow tuff. An additional undetermined amount of zeolite may occur in the air-fall tuff in the Whitetail Conglomerate, and in the Hells Half Acre ash-flow tuff landslide material. The presence of zeolite is further indicated, throughout the western part of the instant study area, in the middle unit (ash-flow tuff) of the Hells Half Acre Tuff Member.

Drilling on the plateaus north and south of the canyon would be necessary to delineate the actual extent of the middle unit and to collect samples for determination by X-ray diffraction and chemical analysis of the amount and quality of zeolite in it and in the lower unit.

Although natural zeolite has great potential value, the zeolite in the instant study area does not appear to constitute a significant resource, because of mining costs that would probably be prohibitive compared with the cost of mining other near-surface deposits elsewhere. The zeolite beds in Cave Canyon and Aravaipa Canyon lie in inaccessible positions, in vertical cliffs of canyonland topography, under large amounts of overburden. Although an estimate of the cost of mining was not made, it could be many be many times greater than the \$8 to \$20 per ton (\$9 to \$22 per mt) average mining cost for other zeolite deposits.

The area appears to have low mineral potential for metallic minerals. Since the latest known mineralization in the region was previous to the deposition of the upper sequence of the Galiuro Volcanics, any possible ore deposits would occur only below the upper sequence, at depths of at least 600 ft (180 m) in the vicinity of the single deep drill hole, and probably greater elsewhere inside the instant study area. Only sporadic high values for some base and precious metals were discovered in the course of this investigation; the minor geochemical anomaly perceived in the vicinity of the north-trending fault in the eastern part of the area may indicate leakage from an undetermined mineralized area at unknown depth. However, no anomalous values were observed in the only drill hole to penetrate the thickness of the volcanics and sample the underlying Precambrian rocks.

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Appendix A. Computer Listing of Geochemical Analyses of  
the Stream Sediment Samples with Cumulative  
Frequency and Histogram Calculations

Appendix A is on file in Room 5600, Department of the Interior,  
18th and C Streets, N.W., Washington, D.C., and may be viewed  
between the hours of 8:00 a.m. to 4:00 p.m., Monday through  
Friday.