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FINAL

ENVIRONMENTAL IMPACT STATEMENT

BUCKHORN-MESA WATERSHED

FLOOD CONTROL DISTRICT  
OF  
MARICOPA COUNTY  
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BUCKHORN-MESA WATERSHED PROJECT

Maricopa and Pinal Counties, Arizona

ENVIRONMENTAL IMPACT STATEMENT

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February 1976

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# USDA ENVIRONMENTAL IMPACT STATEMENT

## BUCKHORN-MESA WATERSHED PROJECT

Maricopa and Pinal Counties  
Arizona

Prepared in accordance with Sec. 102 (2) (C)  
of P.L. 91-190

### Summary Sheet

- I. Final
- II. Soil Conservation Service, United States Department of Agriculture
- III. Administrative
- IV. Project Purpose

A watershed protection and flood prevention project located in Maricopa and Pinal Counties, Arizona, to be carried out by the sponsoring local organizations with federal assistance under provisions of Public Law 83-566, 83rd Congress, 68 Stat. 666, as amended. The purposes of the project are to reduce flooding and associated flood damages occurring within the flood-prone area to reduce erosion and sediment throughout the watershed, to increase efficiency of irrigation water use, and to afford flood protection to lands now undergoing rapid urbanization. The land treatment measures as shown in the work plan have been essentially installed. The flood prevention purposes will be realized by installing five single-purpose floodwater retarding structures with associated structure outlets and floodways and implementing a nonstructural program.

- V. Summary of Environmental Impacts

Five floodwater retarding dams are designed to trap 823 acre-feet of sediment over a 100-year design life of the structures. Downstream sediment damage to cropland, urban land, and other developments will be reduced. Floodwater and sediment damage will be reduced by 64 percent by the structural program. The runoff originating above the floodwater retarding structures and floodways from a 100-year frequency flood will be completely controlled. For specific areas downstream, the degree of flood protection will vary with the distance from the structures.

Installation of the structural measures will have on-site direct effect on 1,316 acres of desert vegetation. Of these, construction activity will result in loss of 164 acres of desert riparian and 799 acres of desert upland vegetation. The remaining acreage will be affected by periodic inundation.

The structures will have a visual impact on the local area. Landscaping of the structures will lessen these effects.

Installation of the structures will require the relocation of four families. A portion of the Central Arizona Project aqueduct will receive protection from flooding. The flood peaks along a section of the Superstition Freeway will be reduced.

Cost savings will improve the health, welfare, safety, and quality of living for watershed residents because funds formerly used for flood damage repair will be used for other community purposes.

When project measures are installed the watershed economy will be stimulated by allowing more efficient use of agricultural lands, eliminating market delays, and creating 272 man-years of employment and two permanent jobs.

#### VI. Alternatives Considered

1. No project.
2. Structural protection for existing urban developments only, with further urban build-up prevented.
3. Structural protection for all flood-prone areas, but with further urban build-up prevented on prime irrigated cropland.
4. Alternative to the Spook Hill Floodwater Retarding Structure.
5. Accelerated land treatment and floodways.
6. Accelerated land treatment and floodwater retarding structures.

#### VII. Comments were received from the following groups and individuals:

##### Federal Government

Department of Agriculture  
Department of the Army  
Department of Commerce  
Department of Health, Education, And Welfare  
Department of Housing and Urban Development  
Department of the Interior

Federal Government (Cont'd)

Department of Transportation  
Environmental Protection Agency  
Advisory Council on Historic Preservation

State and Local Government

Governor of Arizona  
Arizona Commission of Agriculture and Horticulture  
Arizona Office of Economic Planning and Development  
Arizona Department of Transportation  
Arizona Game and Fish Department  
Arizona State Parks Board  
Arizona State Land Department  
Arizona Department of Health Services  
Arizona State University  
University of Arizona  
Arizona Water Commission  
Arizona Department of Economic Security  
Flood Control District of Maricopa County  
Maricopa County Board of Supervisors  
Pinal County Board of Supervisors  
Indian Affairs Commission  
Prescott Historical Society  
Arizona Power Authority  
Arizona Outdoor Recreation Coordinating Commission  
Museum of Northern Arizona  
Central Arizona Association of Governments  
Southwestern Minerals Exploration Association  
Civil Rights Division

Other Groups

Salt River Project  
Archaeological Research Services

Individuals

Mrs. Nonna L. Beaugureau  
Mr. T. S. Bollack  
Dr. Truman Davis  
Mrs. Bernard Erickson  
Mr. and Mrs. Olin Goldman  
Mr. and Mrs. John Kodatt  
Mr. John F. Octigan, Jr.

VIII. Draft statement transmitted to Council on Environmental Quality  
on September 3, 1975.

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- APPENDIX B - Project Map
- APPENDIX C - Letters of Comment Received on the Draft Environmental Impact Statement
- APPENDIX D - Avifauna, Mammals, Fishes, and Herpetofauna
- APPENDIX E - Land Status, Land Use, and Resource Unit Map

USDA SOIL CONSERVATION SERVICE  
FINAL ENVIRONMENTAL IMPACT STATEMENT

Prepared in Accordance with  
Sec. 102(2)(C) of P.L. 91-190

BUCKHORN-MESA WATERSHED PROJECT  
Maricopa and Pinal Counties, Arizona

Installation of the project constitutes an administrative action. Federal assistance will be provided under authority of Public Law 83-566, 83rd Congress, 68 Stat. 666, as amended.

The Sponsoring Local Organizations are:

The Flood Control District of Maricopa County,  
The Pinal County Board of Supervisors, and  
The East Maricopa Natural Resource Conservation  
District

## PROJECT PURPOSES AND GOALS <sup>1/</sup>

### Watershed Protection (Conservation Land Treatment)

The Sponsors' goals for installing land treatment and protection of watershed lands during the project installation period include the following:

- a. Reduction of erosion rates to an allowable limit on rangeland, cropland, and land being urbanized.
- b. Increased infiltration rates of the soils.
- c. Better agricultural water management.

### Flood Prevention

The goals the local sponsors have set for flood prevention include:

- a. Alleviated damage to highly productive irrigated lands within the watershed.
- b. Alleviated inundations of residences, retail-commercial properties, roads, and highways.
- c. Protection of the existing Salt River Project and Roosevelt Water Conservation District's (RWCD) canals and on-farm irrigation facilities.
- d. Reduction of flood plain scour and erosion.
- e. Protection to lands now undergoing rapid urbanization.

The overall objective of the plan is to restore, maintain, and enhance the quality of the human environment through watershed protection and flood prevention. However, it is recognized that the planned project may not provide for all of these goals.

## PLANNED PROJECT

The authorized project, which is described in the Watershed Work Plan, Buckhorn-Mesa Watershed, Maricopa and Pinal Counties, Arizona, 1963, includes both land treatment measures and structural measures. The land treatment measures as described in that plan have been essentially installed; the structural measures have not been installed. The structural program included four floodwater retarding structures that would have controlled 42 percent of the watershed area. The structures were to be constructed in series with interconnecting floodways having one common outlet to a safe disposal point. A debris basin and diversion structure were proposed in the common outlet floodway so that a portion of the floodwater originating in the watershed may be safely used for irrigation purposes. The modified structural program is described in the work plan supplement and in the structural measures section of this document beginning on page 4.

### Land Treatment Measures

Technical assistance for installation of soil and water conservation measures on private and state lands in the watershed is available. Individual farmers, ranchers, and other land users voluntarily request the technical assistance provided. The East Maricopa Natural Resource Conservation District, in accordance with its long-range plans and objectives, has the responsibility for coordinating the land treatment program within its boundaries. The District requests assistance from the Soil Conservation Service and other agencies.

Sufficient measures have been installed to control erosion on the irrigated cropland, and only small areas have readily apparent evidence of soil movement. A continuing program of irrigation water management is in effect. This will result in more efficient use of irrigation water.

The practices and measures that have been installed include conservation cropping systems, cover and green manure crops, crop residue use, irrigation water management, minimum tillage, land leveling, field ditch installation, irrigation pipelines, and irrigation ditch lining. Installation of the land treatment program has increased efficiency of irrigation water use by 10 percent to an overall efficiency of 65 percent.

Of the present urban land, 14,375 acres of the total 18,095 acres are developed with design features which overcome the soil limitations. Erosion problems are created during construction when the vegetation and soil armoring are disturbed. This protection is usually reestablished and erosion reduced once buildings are occupied.

Continuing conservation programs of proper range use exist in the upland drainage area of the watershed, and land treatment measures have been installed on the Tonto National Forest lands. Rangeland treatment measures below the Tonto National Forest are limited by climatic conditions to the existing management programs. The national resource land is managed by the Bureau of Land Management under the multiple-use concept. This land is presently used mostly by outdoor recreationists and hunters.

Land treatment measures installed on the Tonto National Forest have reduced sediment yield, which will help prolong the life of floodwater retarding structures to be installed. The measures installed under this plan were fencing, water bars, seeding, and erosion control structures.

Fence construction enables the operator to control grazing. Closure of the treated areas has been sufficient to establish a protective vegetative cover.

Check dams have been constructed to control erosion. Loose rock check dams in gullies have reduced water velocities and have trapped sediment.

Seeding has speeded up the vegetative process and retarded soil movement; both are essential to good watershed conditions.

Section 3(b) of Public Law 93-291 which became effective on May 24, 1974, outlines the responsibilities and the process of the land treatment program on archeological resources. This process will be followed.

The land treatment program is flexible and accommodates changes in land use. The Natural Resource Conservation District (NRCD) will continue to provide technical assistance through the ongoing program for non-federal lands when individual property owners seek assistance.

### Nonstructural Measures

Nonstructural measures were considered in project formulation. Because the damage area is on an alluvial fan, each acre has approximately an equal chance of being inundated by a specific flood. It is impossible to protect the area developed without protecting the undeveloped areas.

As new subdivision plats are approved by the County Planning and Zoning Departments, they are checked to see that the developer has provided an adequate drainage system. This system should be of sufficient size to pass water through or around the subdivision without damage to housing.

The Maricopa County Board of Supervisors recently approved changes to the subdivision regulations that require detention facilities be included in all new subdivision plats to detain a 100-year, two-hour storm. The Board of Supervisors will enforce these regulations in such a manner that the volume of storm water to be stored, for the area between the system of floodwater retarding structures and the Roosevelt Water Conservation District Floodway, will equal or exceed one (1) inch over the newly developed area.

The city of Mesa recently passed regulations that require developers to make provisions in all new subdivisions to store on-site runoff. The amount required to be stored for a minimum of 24 hours is the runoff from a 50-year, 24-hour storm.

### Structural Measures

The works of improvement in this plan reflect the desires of the sponsors. These structural measures consist of five reservoir-type structures with associated structure outlets and floodways. All structural measures are for flood prevention. The location of all dams and floodways can be seen on the Project Map (Appendix B). Land status for planned structural measures can be seen on the Land Status, Land Use, and Resource Unit Map (Appendix E).

All reservoir-type structures are designed for a 100-year life and will control 42.5 square miles, or 27,200 acres (about 39 percent of the watershed area). They are designed with 3,551 acre-feet of floodwater capacity. The capacity is equivalent to 1.6 inches of runoff from the controlled drainage area. This is based on a 100-year, 10-day storm and a 10-day rainfall of about 6 inches. Designed sediment capacity is based upon the expected sediment accumulation at each site over the 100-year design life and amounts to 823 acre-feet.

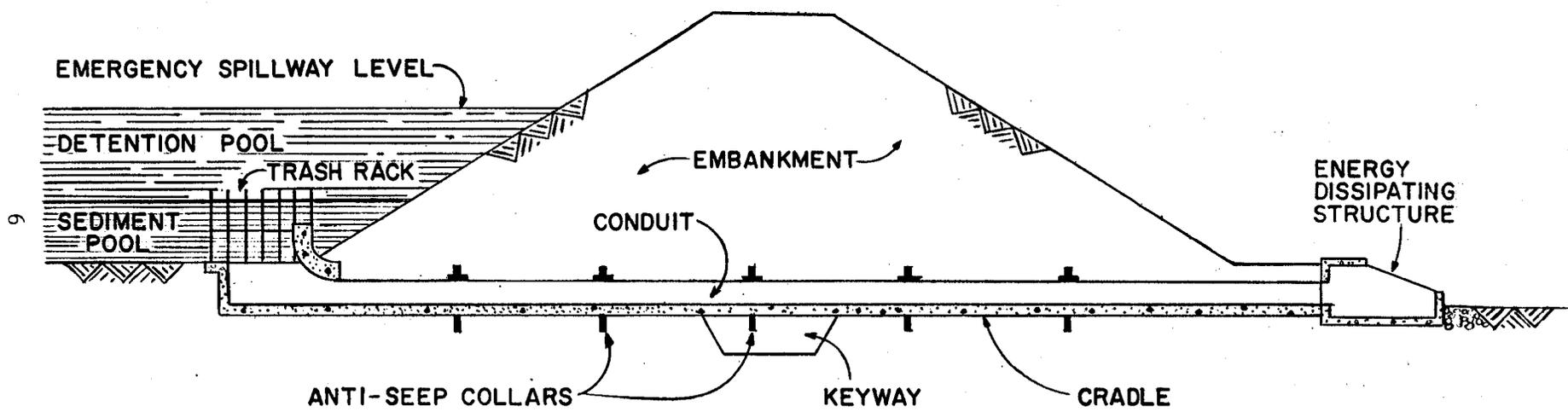
The dams are planned as earth and caliche or earth and rock-filled structures with concrete pipe principal spillways and emergency spillways cut in hard caliche or rock around one end of each dam. Each of the earth and rock-filled dams is designed to fit the foundation and topographic conditions of the site. To best utilize available material, the embankment fill material will be zone-constructed. The dams will range in height from 21.9 feet to 56.7 feet. Four of the dams will be less than 38.0 feet in height. The table on page 5 summarizes pertinent data relating to the dams.

The foundations of all floodwater retarding structures, except No. 7, consist of converging alluvial fan deposits. These deposits contain thick indurated caliche and calcareous siltstone which generally occur at depths ranging from two to ten feet. The emergency spillways of Sites Nos. 1, 2, and 3 are planned to be excavated into these materials. The emergency spillway and outlet channel of Site No. 4 is within the outcrop

BUCKHORN-MESA WATERSHED

Pertinent Data About Floodwater Retarding Structures

Item	Units	Structure Number and Name				7 Weekes Wash
		1	2	3		
		Apache Junction	Signal Butte	Pass Mountain		
Drainage Area Controlled	Sq.Mi.	6.3	6.8	4.31	10.55	8.72
Portion of Watershed Controlled	%	5.8	6.3	4.0	15.2	8.1
Maximum Height of Structure	Ft.	21.9	37.4	31.7	25.3	56.7
Average Height of Structure	Ft.	19	28	16	21	41
Length of Structure	Ft.	8,400	7,600	8,400	22,000	5,100
Volume of Earth Fill	Cu.Yds.	345,000	540,000	375,000	1,650,000	560,500
Size of Principal Spillway	Ft.	3	3	3	9 X 6	2.5
Frequency of Storm Controlled by the Principal Spillway	% Chance	1	1	1	1	1
Design Life of Structure	Yrs.	100	100	100	100	100
Sediment Pool	Ac.	57	61	36	167	40
Temporary Retarding Pool	Ac.	110	130	78	305	112
Land Committed to the Installation of Structure	Ac.	80	70	40	160	50
Slopes and Top of Dam to be Revegetated	Ac.	40	35	35	145	25
Borrow Area	Ac.	100	100	85	230	20
Minimum Land Rights	Ac.	270	290	270	1,850	290
Land Ownership						
Private	Ac.	0	0	0	1,350	0
Public	Ac.	270	290	270	500	290



*TYPICAL FLOODWATER RETARDING STRUCTURE CROSS SECTION  
BUCKHORN-MESA WATERSHED*

of Precambrian granite which is in various stages of decomposition. Site No. 7 is located on the outcrop of Cretaceous-Tertiary volcanic rocks, including andesite, welded tuff, basalt, and agglomerate. It is planned that the emergency spillway will be cut into andesite and welded tuff. Along the main stream, alluvial deposits extend to an estimated depth of 25 feet in the site area.

The foundations have no critical earthquake hazards. Residual and alluvial soils in the foundation and pool areas are shallow and represent no landslide hazard. Principal spillways at all floodwater retarding structure sites will be placed on materials having low consolidation potential.

The principal spillways are designed to regulate and control the runoff resulting from storms up to and including the 100-year-frequency flood event. Flows greater than the 100-year-frequency flood will pass safely through the emergency spillway around the end of each dam. The principal spillway at each dam will consist of a reinforced concrete drop inlet structure and a reinforced concrete outlet conduit. Drop inlet structures will be constructed at or near ground level at Structures Nos. 1, 2, and 3. From these inlets, floodwaters will flow into reinforced concrete pipe principal spillways and then will be discharged into reinforced concrete-lined outlet channels or floodways. Principal spillway outlet channels and floodways will connect Structures Nos. 1, 2, 3, and 4 in a series. The principal spillway inlet at Structure No. 4 will have a concrete drop inlet with a covered top riser inletting into a 9-foot by 6-foot reinforced concrete box culvert which outlets into a St. Anthony Falls (SAF) discharge stilling basin. An unlined channel, parallel to and upslope of the authorized Central Arizona Project aqueduct, is used to convey floodwater from Structure No. 4 to a point where it will flow down a natural wash to the Salt River. Use of the natural wash as an outlet is temporary.

It has been determined that the granite lying beneath a thin bedload in the natural wash is stable and that there is sufficient capacity to carry the discharge from a 100-year-frequency storm. The natural wash passes under Bush Highway through two 7-foot by 10-foot concrete box culverts. These culverts have sufficient capacity to carry the 100-year discharge through the highway.

It is proposed that stabilization measures will be designed to protect the concrete box culverts from headcutting. These measures could include a short section of rock riprap channel or grade stabilization structures of reinforced concrete, gabion, or timber. Downstream of the stabilization structure a sediment basin will be constructed to trap bedload material. From this point to the Salt River water's edge, floodwater carrying suspended sediment will spread over the river flood plain and flow through a three-acre marsh. Flows will enter the river about one-half mile upstream of the Granite Reef Dam. A U. S. Forest

Service campground is located on the Salt River flood plain immediately upstream of where the flows from the outlet enter the river. A low dike on the east side of the channel is proposed to direct floodwater flows away from this area. However, the campgrounds will remain subject to inundation from the Salt River.

When the Central Arizona Project aqueduct is built, the outlet flows will be diverted into a floodway immediately upstream and parallel to the aqueduct. The CAP floodway will then divert the outlet flows behind Orme Dam or a suitable alternative.

The principal spillway inlet at Structure No. 7 will have a concrete drop inlet with a covered top riser inletting into a reinforced concrete pipe that discharges into an impact basin. It is planned to allow floodwaters to be discharged into the natural channel at non-erosive velocities. The release of floodwater down the natural channel over the extended time period will increase the amount of floodwater that will percolate into the channel bed.

Floodwater retarding structures requiring special consideration are those planned for Sites Nos. 4 and 7. The drainage area of Site No. 4 is greater than 10 square miles, and special consideration in planning the emergency spillway to provide protection against dam breaching is required. Therefore, a reinforced concrete crest control structure is planned for this site.

At Site No. 7, there is a shortage of suitable fill material from which to construct a dam. Rippable welded tuff and andesite occur at the site in abundance. Therefore, a rock shell is planned, having 3:1 sideslopes upstream and downstream. The central core is planned to be constructed of low to medium plasticity silts and clays.

Fill material for all dams will come from borrow areas upstream of the structure. Embankment material also will come from the emergency spillway excavation. This source of borrow consists of low plasticity silts. Minor amounts of clay occur in other borrow areas. A portion of the fill material for Structure No. 4 will come from excavation for the CAP aqueduct. The characteristics of the borrow material have been considered in the design of the embankments to minimize earthquake hazards.

To insure that habitat is available for wildlife upon completion of project structural measures, existing habitat will be preserved where possible. Where preservation is impossible or clearly not feasible, lost habitat is to be replaced by revegetating disturbed areas. The table entitled "Changed Land Use Resulting From Project Installation" (found in the Environmental Impact Section) lists the location and amount of habitat that will be affected.

Construction and borrow areas will be cleared and grubbed. Preceding this operation, native desert vegetation such as ocotillo, barrel, saguaro, and cholla cacti, will be salvaged and stored until they can be reestablished in disturbed areas around the completed dam. Plants such as mesquite and palo verde that cannot be stored will be sold or disposed of. At the time of revegetation, these plants will be replaced through purchase. The exact location and selection of vegetative measures will be determined during the final design stage.

To minimize effects on wildlife habitat and esthetics, the following will be done. The borrow for the enlarged sections of fill will come primarily from excavation of the emergency spillways. Surface soil will be spread over the entire dam to help insure the establishment of native vegetation. Also, a drip irrigation system will be installed on the dams, borrow, and construction areas to irrigate these plants through a two-year establishment period. The system will be left in place for any needed supplemental irrigation by the sponsors after the establishment period. Borrow for the fill will be taken at random locations and about two feet of soil left in place in borrow pits. Borrow areas and other disturbed areas will be revegetated to native desert plants. These areas and the dam will be fenced to help insure the establishment of plants.

The five floodwater retarding structures will be landscaped to blend into the natural environment. Typical measures include fill sections with 6:1 sideslopes, top width of 25 feet, height of 5 feet above established top of dam, and length of 50 feet along dam centerline. Gated pipes will be installed through the dam if in final design it is determined that there is a need to allow water to flow down existing washes.

*But not  
Spade Hill*

Sufficient costs have been included in the structural cost estimates for landscaping features. A landscape architect has been hired to work with design engineers, local sponsors, interested local groups, and individuals in planning these features.

The outlet channels and floodways that will connect Structures Nos. 1, 2, 3, and 4 not only convey principal spillway releases but also are designed to convey floodwaters resulting from a storm occurring on the average of once every 100 years for the intervening areas.

The desert soils along proposed channel alignments are primarily alluvial fan deposits consisting mainly of sandy silts, silty sand, and sandy gravel. These highly erodible soils range in depth from 5 to 10 feet and overlie indurated caliche. ~~All floodways will be concrete-lined.~~ All floodways and Structure No. 3 outlet channel will terminate at the emergency spillway crest elevation of the downstream dam. At this point, energy dissipators are designed to drop floodwaters to an elevation where water will flow to the sediment pool at non-erosive velocity.

To allow runoff to enter the channels, corrugated metal pipe inlets will be placed intermittently along the length of the channel and

through the upstream dike which serves as a maintenance road. A collector ditch will convey floodwaters to the pipe inlets. The excavated material coming from the construction of all other floodways and dam outlets will be placed adjacent to the floodway. The disturbed area within the construction limits of each channel reach will be revegetated and irrigated in a manner similar to that proposed for dams and borrow areas.

The Roosevelt Water Conservation District (RWCD) Floodway, which will traverse the Apache Junction-Gilbert and Williams-Chandler Watersheds and is a project measure in those watersheds, will be extended into the Buckhorn-Mesa Watershed a distance of approximately 9,230 feet. This extension has been found necessary to achieve the effects and benefits evaluated for the floodway in the two downstream watersheds. The floodway will begin about 230 feet north of Brown Road and parallel the RWCD Canal on its east side. The planned work terminates north of Apache Boulevard; however, the outlet is at the Gila River. The location of all floodways can be seen on the project map. Pertinent data about floodways and the dam outlet channels can be seen on the following table. The area that is affected from flooding is shown on the Areas Affected Map in the Environmental Impact Section.

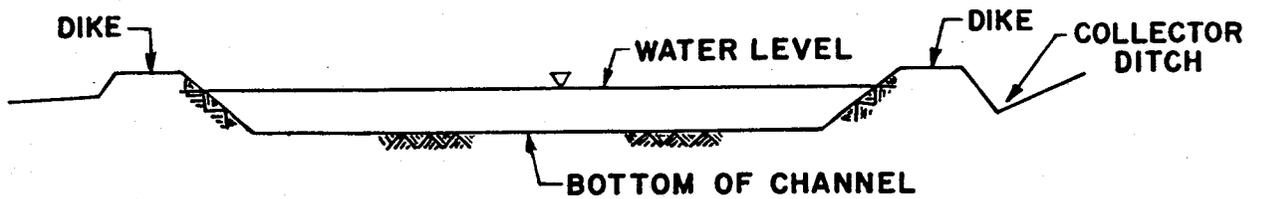
The proposed RWCD Floodway work will enlarge and deepen the existing floodway. Maximum water depth of this earthen floodway is 7.5 feet. This floodway is to be excavated in very uniform sandy to very sandy clay with only minor occurrence of clayey sand. The fine textured fraction of these soils possess low to medium plasticity. The soil consistency is stiff to very stiff with the very stiff soils generally occurring below five feet in depth. Another important factor in channel stability is the presence of weak calcium carbonate cementation which also increases with depth. The maximum design velocity is well below that at which scour would occur. A program environmental impact statement will be written for the entire RWCD Floodway.

Spoil material coming from the excavation of the RWCD Floodway will be placed adjacent to the floodway. The purchase of about 20 acres adjacent to the RWCD Floodway is planned to be used as a disposal area for the major portion of the excavated material. This area will be shaped and revegetated to native grasses.

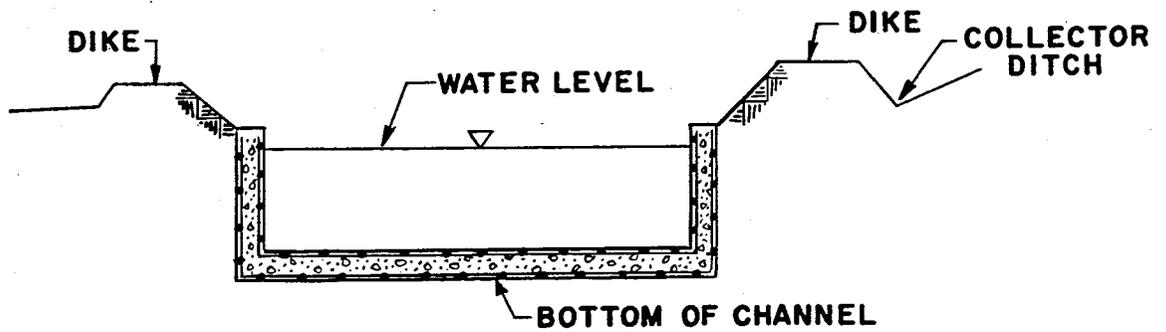
Installation of all channel work will require easements or purchase of 223 acres of land. It will be necessary to replace approximately 900 linear feet of telephone cable, 10,100 linear feet of electric lines, 600 linear feet of water pipeline, and 1,800 linear feet of gas pipeline.

In the reservoir area of Structures Nos. 4 and 7 and within the right-of-way limits of the Signal Butte Floodway, there is a total of four families to be relocated. No other relocations such as businesses or farm operations will be necessary.

# TYPICAL CHANNEL CROSS SECTIONS BUCKHORN-MESA WATERSHED



TYPICAL CROSS SECTION  
TRAPEZOIDAL CHANNEL



TYPICAL CROSS SECTION  
RECTANGULAR CHANNEL

BUCKHORN-MESA WATERSHED

Pertinent Data About Floodways and Floodwater Retarding Structure Outlets

Item	Approximate Length Ft.	Capacity CFS	Channel Dimensions			Type Lining	Velocity Ft./Sec.	Floodway Ac.	Total Min. Land Rights Ac.	Revegetated Ac.
			Bottom Width Ft.	Depth Ft.	Side Slopes					
Floodways										
Apache Junction	1,700	1,120	16	5.8	1.5:1	concrete	7.8	1.5	8.8	7.3
Total	1,700							1.5	8.8	7.3
Bulldog	710	115	4	2.7	0:1	concrete	10.5	0.2	3.3	3.1
	3,460	630	12	4.2	"	"	12.9	2.4	15.9	13.5
	1,570	1,995	22	5.0	"	"	18.1	1.5	7.1	5.6
Total	1,605	3,100	28	5.6	"	"	20.1	1.6	6.1	4.5
	7,345							5.7	32.4	26.7
Signal Butte	1,150	155	4	5.0	0:1	concrete	7.8	0.4	5.8	5.4
	2,300	395	8	4.8	"	"	10.6	1.0	11.8	10.8
	3,674	1,055	18	4.5	"	"	13.0	2.6	19.0	16.4
	3,826	2,095	20	4.5	"	"	23.7	3.7	19.7	16.0
	1,150	2,095	24	4.6	"	"	19.0	1.2	5.9	4.7
Total	850	3,110	34	4.6	"	"	20.1	1.0	4.4	3.4
	12,950							9.9	66.6	56.7
RWCD	230	500	26	7.5	3:1	earth	1.9	0.7	1.4	0.7
	5,800	1,200	80	7.5	"	"	2.2	16.5	35.1	18.6
Total	3,200	2,000	110	7.5	"	"	2.4	11.3	16.5	5.2
	9,230							28.5	53.0	24.5
Floodwater Retarding Structure Outlets										
Apache Junction	1,128	115	2	2.0	1.5:1	concrete	12.7	0.4	3.9	3.5
Total	1,755	115	2	2.2	"	"	11.2	0.2	6.0	5.8
	2,883							0.6	9.9	9.3
Pass Mountain	240	160	2	2.2	1.5:1	concrete	15.8	0.1	0.8	0.7
Total	2,457	160	2	2.7	"	"	12.4	1.0	8.5	7.5
	2,697							1.1	9.3	8.2
Spook Hill	4,000	905	28	4.0	2:1	earth	6.3	11.0	16.5	5.5
Total	6,330	1,600	50	4.4	"	"	6.3	17.0	26.2	9.2
	10,330							28.0	42.7	14.7
GRAND TOTAL	47,135							75.3	222.7	147.4

During construction, appropriate measures will be taken to minimize soil erosion and water and air pollution. On a site-by-site basis, plans and specifications will be developed for each structural measure. These plans will include watering haul roads and earth fills to suppress dust, reduce erosion by temporary vegetation or mulching of exposed areas, and bury unsalvageable material. State and federal laws and regulations will be observed in minimizing air and noise pollution.

The Soil Conservation Service has complied with Executive Order 11593 and Section 106 of the National Historic Preservation Act, PL-89-665. Our compliance includes consultation with the State Historic Preservation Office about this project. A detailed archeological survey of all locations where surface disruption is likely to occur was conducted by qualified archeologists. One site, AZ U:10:51(ASU), was significant enough to warrant further investigation. This investigation has been completed. AZ U:10:51(ASU) is in the vicinity of the Spook Hill Floodwater Retarding Structure.

The archeological studies concluded that construction of the proposed structural measures could be initiated without adversely affecting the cultural resources. In the opinion of the investigators, none of the sites qualified for inclusion on either the Arizona or Federal Register of Historic Places. Coordination with the state's Historic Preservation Office was maintained throughout this investigation. No Federal Register properties will be affected by this project. No existing or proposed units of the National Park system or any existing, proposed, or known potential sites or properties listed or to be listed as national landmarks will be affected.

Should anything of archeological or historical value be discovered during construction, the National Park Service and the State Historic Preservation Office (or State Archeologist) will be notified.

### Operation and Maintenance

The Flood Control District of Maricopa County will be responsible for operation and maintenance of Floodwater Retarding Dams Nos. 1, 2, 3, and 4, dam outlets, and all floodways, and a sediment basin. The operation, maintenance, and replacement cost is estimated to be \$7,400 annually for the dams and the sediment basin, and \$44,800 annually for dam outlets and floodways. The Pinal County Board of Supervisors will be responsible for the operation and maintenance of Floodwater Retarding Dam No. 7. This annual cost is estimated to be \$1,600. These figures have been adjusted to current cost. All necessary funds for operation, maintenance, and replacement will be obtained from taxes levied by the sponsors.

An operation and maintenance agreement will be entered into between the sponsoring local organizations and the Soil Conservation Service prior to the signing of a land rights or project agreement. An operation and maintenance plan will be prepared for each structural measure. All phases of operation and maintenance of the structural measures will comply with applicable local, state, and federal regulations.

The Soil Conservation Service and the sponsoring local organizations will make a joint annual inspection of the structures during the first three years after installation. After the three-year period, annual inspections will be made by the sponsors; and a report will be sent to the Service. Also, inspections will be made after unusually large floods. The Soil Conservation Service will assume the responsibility for establishing native desert vegetation for a two-year period after completion of structural measures. The sponsoring local organizations will be responsible for maintaining established desert vegetation after the two-year installation period for all structural measures. It is agreed that representatives of the federal, state, and county governments shall have free access at all times to the structural works of improvement for official activities.

#### Reservoir Type Structures

Some items considered necessary for proper functioning of dams include periodic repairs or replacements as needed and the removal of trash and obstructions from the principal spillway inlet during and after storm events.

Usefulness of the planned floodwater retarding dams for protecting downstream areas will continue beyond the 100-year effective economic life of the sediment pools. The dams will become slightly less efficient as sediment accumulates in the space reserved for flood storage. Flood protection will not decrease significantly after the 100-year period because the rate of sediment accumulation will be low, and the amount of the flood storage is high. Most of the sediment will pass through the dam after its economic life. However, periodic removal of sediment from the sediment pools could restore the trap efficiency of a dam, thereby allowing it to continue to function as a sediment trap and flood prevention dam indefinitely.

#### Sediment Basin

To insure adequate trap efficiency of the sediment basin, bed-load material will be removed periodically. This material will be trucked away and used for commercial purposes.

### Channels

The items considered necessary for proper functioning of the floodways include the periodic removal and disposal of sediment and debris. Sediment will be spread within the right-of-way of the channel or in soil disposal areas where, if practical, it will be seeded to native grasses. Debris will be removed to offsite locations and disposed of. Pipe inlets will be maintained and replaced as necessary.

Further guidelines regarding operation and maintenance procedures are given in the Arizona Watershed Operation and Maintenance Handbook. Sponsors of the project have copies of the handbook on file.

### Project Costs

The following tabulation summarizes total project costs. For a further breakdown of cost detail, refer to the Watershed Work Plan Supplement.

	<u>P.L. 566 Funds</u>	<u>Other</u>	<u>Total</u>
	\$	\$	\$
Total Project	25,634,400	9,794,460	35,428,860
Land Treatment	(36,100)	(384,760)	(420,860)
Structural Measures	(25,598,300)	(9,409,700)	(35,008,000)

# ENVIRONMENTAL SETTING

## Physical Resources

### General

The 69,172-acre watershed is located in eastern Maricopa and northwestern Pinal Counties, Arizona, or the south central portion of the state. Included within the watershed are a portion of Apache Junction, 1970 population 2,390, and the northeastern quadrant of Mesa, whose total population was 62,853 in 1970. Both of these towns are within the greater Phoenix metropolitan area. Tempe, located between Mesa and Phoenix, joins Mesa directly to the west; Tempe had a 1970 population of 63,550. The city limits of Phoenix are only nine miles west of the watershed boundary. The metropolitan area of Phoenix contained about 1,000,000 people in 1970. In 1974, the estimated population of the watershed was 54,000. About 85 percent of the population in the watershed is classified as urban and 15 percent as rural. 2/

The watershed is located in the Lower Colorado Region, as designated by the Water Resources Council. The Lower Colorado Region includes most of Arizona, and parts of Nevada, Utah, and New Mexico. The population of the Region is concentrated principally in south central Arizona and southern Nevada. The remainder of the Region's population is located in small, widely scattered communities.

The Region is divided into three subregions; the watershed is in the Gila Subregion. Terrain of the subregion varies from the open expanses of the Sonoran Desert to high, rugged mountains. Most development and population occurs in the desert valleys such as the one in which most of the watershed is located. The long growing season, good soils and water, and mild winters combine to make the irrigated croplands among the Nation's most productive. These factors also contribute to a thriving winter tourist industry.

The Buckhorn-Mesa Watershed area within Maricopa County is part of the Hohokam Resource Conservation and Development Project area.

Heading in the rough Utery Mountains, Goldfield Mountains, and western flanks of the Superstition Mountains, the watershed drains onto a wide alluvial fan on which valuable improvements, subdivisions, and commercial developments have been established. Of the total watershed area, nearly 60 percent (41,135 acres) is flood prone. The area that would be inundated by a 100-year flood is 17,310 acres (25 percent of the watershed). The specific area flooded varies depending on the amount and direction of flow. The 1974 land use in the area subject to flooding and in a characteristic 100-year flood plain is as tabulated on the following page.

## AREA AFFECTED BY FLOODING (Acres)

	<u>Cropland</u>	<u>Rangeland</u>	<u>Urban</u>	<u>Total</u>
Total area subject to flooding	10,905	15,510	14,720	41,135
100-year flood plain	3,820	7,715	5,780	17,310

This flood-prone area is undergoing a tremendous rate of population and development growth. The growth consists of the rapidly expanding residential and commercial developments along U. S. Highway 60-80-89 (Apache Trail) from the city of Mesa, east to the town of Apache Junction. Subdivision activity is occurring other than along the highway but is not as concentrated. The Arizona Office of Economic Planning and Development estimated that the population within one-half hour's driving time of Apache Junction in 1960 was 419,100. This had increased to 641,900 by 1970, and the rate of growth has not declined.

About 27 percent of the flood prone area is irrigated cropland. Crop distribution in 1974 was as follows: cotton, 580 acres; alfalfa, 600 acres; grains, 895 acres; vegetables, 80 acres; citrus, 7,750 acres, and miscellaneous crops, 1,000 acres.

Physiographically, the watershed is part of the Sonoran Desert section of the Basin and Range Province. The mountains are composed of igneous and metamorphic rocks, the most common being Tertiary dacite and Precambrian granite. Other rocks present in smaller outcrops are: Precambrian schist and quartzite; Tertiary andesite; and Tertiary-Cretaceous conglomerate, sandstone, and shale. Gentle alluvial slopes extend basinward from the mountains. The upper slopes, in places, are underlain at shallow depths by rock.

The elevations range from 1,200 feet at the Salt River to 5,100 feet in the Superstition Mountains. The general slope is to the south and southwest. The watershed can be separated into three general areas; mountains, valley slopes, and valley.

The mountainous area is strongly sloping to very steep, with rock outcrop and shallow, stony soils over rock. The soil texture ranges from loam to sandy loam with up to 75 percent bare rock or boulders. The land capability class for these dryland soils ranges from IV to VIII. The area has a well-defined drainage network with deep channels carrying high velocity surface runoff. Average annual rainfall is from 10 to 16 inches, and the frost-free period ranges from 200 to 300 days. This area comprises about 33 percent of the total watershed area.

The valley slopes are characterized by noncalcareous gravelly loam and sandy loam surface soils underlain by either sandy loam, loam, or sandy clay loam. Many of the soils with the sandy clay loam subsoils generally are underlain at 14 to 30 inches by a strongly cemented lime layer which extends to an undetermined depth. Slopes range from 3 to 10 percent. The land capability classes for these irrigated soils range from II to IV. Annual rainfall is from 8 to 10 inches, and the frost-free period is from 240 to 300 days. About 32 percent of the watershed is in the valley slopes area.

Comprising about 35 percent of the watershed, the soils of the valley are deep loams to clay loams and are moderately calcareous. Most of these soils are irrigated. Small areas have a strongly cemented lime layer at depths of 14 to 30 inches. The land capability class of this irrigated land is predominately Class I. The annual precipitation and the frost-free period are similar to that in the valley slopes area.

The climate of the watershed varies from arid in the valley and valley slopes to semi-arid in the mountains. In the arid section, which is about 85 percent of the total area, the average monthly precipitation exceeds one inch only in August and December. Winter precipitation is much less dependable than that of summer. Winter rains are generally associated with middle latitude storms that move eastward from the Pacific Ocean. Cloudy skies and intermittent showers are prevalent for several days. Snow is a rarity.

Summer rains are generally associated with thunderstorms that form over the eastern mountains during the afternoon and spread over the western valleys in the evening. Rainfall rarely lasts longer than 30 minutes. Gusty winds and blowing dust usually precede the rain. This "monsoon" season generally starts in early July and ends in early September. In some years, unusually heavy and prolonged summer precipitation may fall as a result of weak tropical disturbances moving northward from the Pacific Ocean. These storms often produce widespread disastrous flooding.

The summers are hot. From early June until late September the average daily temperature is about 80 degrees, with afternoon highs frequently exceeding 100 degrees. During the early part of this period, the air is extremely dry and solar heating is at a maximum. The evening temperature may fall into the low sixties. During the "monsoon" season, the humidity is relatively high; and the temperature may not fall below the high eighties.

From late fall until early spring, the climate is mild. During the winter months, the temperature ranges from the high thirties or low forties near daybreak to the high sixties in the afternoon. Afternoon highs sometime exceed 80 degrees. Freezing temperatures are uncommon, occurring on about 15 mornings during an average winter. Readings below 20 degrees are rare.

Winds are quite light, being gusty only during the summer thunderstorms. Sunshine averages about 86 percent of the total days ranging from a minimum monthly average of 77 percent in December and January to a maximum of 94 percent in June. Lake evaporation averages about 70 inches per year.

The most significant potential mineral resources within the watershed area are: (in order of importance) sand and gravel, gold, and building or decorative stone. The present and past courses of the Salt River along the northwest boundary of the project area contain large deposits of sand and gravel.

The far east end of the watershed area has produced important quantities of gold from mines in the Goldfield and/or Superstition Mining Districts. Topographic quadrangle maps indicate seven named mines: The Tomahawk, Golden Hillside, Black Queen, Goldfield, Bluebird, Palmer, and Bull Dog mines along with numerous other prospects and mining claims in the general area. All of these mines are outside of the areas where structural measures are to be constructed. Most, if not all, of the past prospecting and mining efforts have been directed toward gold and related silver.

The majority of the gold produced has come from two mines, the Bull Dog and the Goldfield, also known as the Young or Mammoth. The combined value of gold produced is set at \$170,000 with gold at \$20.67 an ounce. There are presently no mines operating in the Goldfield-Superstition District; however, a number of the old mine reports indicate the possibility of the existence of medium-size, low-grade, gold-silver deposits.

Modern trends in landscaping are making extensive use of nearly all types of rock for decorative purposes; and rock of any form texture, and color is used. Volcanic rocks, attractively weathered, outcrop above the alluvial fill in many places within the project area, but it is doubtful the occurrences within the project area are of any special quality.

The watershed is located near the outer fringes of a vast ground water reservoir, the Salt River Valley, which is about 1.6 million acres in size. Ground water storage in the reservoir is mainly in unconsolidated or poorly consolidated sediments. Relatively small quantities of ground water are stored in consolidated sedimentary rocks and crystalline igneous and metamorphic rocks which are present in much of the project area.

Depth to ground water generally is in excess of 400 feet in the sedimentary rocks. Depth to water in the igneous and metamorphic rocks is extremely variable, ranging from about 100 feet to several hundred feet. The depth to the water table increased as much as 60 feet in some portions of the Salt River Valley between 1964 and 1972 3/

It is estimated that about 1.2 million acre-feet of recoverable ground water is available above the 1,200-foot depth in the watershed.

Total dissolved solids concentrations range from less than 500 milligrams per liter (mg./l.) to 3,000 mg./l. Most of the ground water has total dissolved solids concentrations ranging from 500 to 1,000 mg./l. and a hardness of more than 150 mg./l. as calcium carbonate. An area of approximately seven square miles around the Buckhorn-Mesa Watershed has ground water in which the fluoride concentrations exceed 1.4 mg./l.

The total watershed area contains 69,172 acres, of which 10,905 acres (16 percent) are irrigated cropland; 18,095 acres (26 percent) are urban or built-up; and the remaining 40,172 acres (58 percent) are rangeland. Within the rangeland category are 130 acres of riparian vegetation along the Salt River and 7,101 acres of riparian vegetation along the desert washes.

At the present time much of the agriculture land and range land is available for upland game hunting. This area amounts to nearly 50,000 acres.

Wetlands in the watershed are restricted to a narrow strip along the Salt River upstream from Granite Reef Dam and cover an area of less than five acres. These five acres are included with the 130 acres of riparian vegetation along the river. This wetland as described in U. S. Fish and Wildlife Service Circular No. 39 is primarily of Type 5, shallow fresh marsh, and consists primarily of a narrow strip of cattails and bulrush vegetation along the river.

The Granite Reef Dam on the Salt River is about four miles downstream from the confluence of the Verde and Salt Rivers. It is the diversion point for the Salt River Project. The Salt River and the reservoir behind this dam forms a small section of the northern boundary of the watershed. Fishing within the watershed is restricted to the Salt River and Granite Reef Reservoir.

Surface water is brought to the irrigated lands from reservoirs located on the Salt and Verde Rivers. The Salt River system of dams almost completely controls flows in the river above Granite Reef Dam. The system has an impoundment capacity of 2,000,000 acre-feet of water. The Salt River is perennial above the Granite Reef Dam having an estimated average daily flow of 1,300 cubic feet per second. Flows below the dam are dependent on releases through the dam or runoff from drainages below.

Data to accurately determine suspended sediment concentrations in water reaching the Granite Reef diversion area on the Salt River is not available. A limited amount of data relative to suspended sediment concentrations in the lower reach of the Verde River is available 4/.

During the water year from October 1963 to September 1964, the average annual suspended sediment concentration was 510 parts per million. Maximum sediment concentration measured was 2,790 ppm. Existing records of turbidity tests on both the Salt and the Verde Rivers show that under present conditions these rivers periodically exceed Arizona State Department of Health water quality standards. There are no long term water quality records on the reach of the Salt River upstream of the Granite Reef Dam and below the confluence of the Salt and Verde Rivers. There are about 520 square miles of uncontrolled drainage area upstream of the Granite Reef Dam. Upstream of the dam is a dredging operation which continually dredges out the forebay of the Granite Reef Dam.

All streams in the watershed are ephemeral except the Salt River; streams that flow only during periods of surface runoff and are otherwise dry. Channels in the mountains are unmodified, well-defined and have steep grades. With the high runoff rates, a large volume of water is concentrated in the channels and develops sufficient energy to carry large amounts of sediment. As the water reaches the flatter slopes at the base of the mountains, the velocity of the water decreases rapidly; and the sediment is quickly deposited. The channels become shallower and less defined. Overbank flow occurs, and the water spreads onto the alluvial fan.

In addition to the Buckhorn-Mesa Watershed, two other P. L. 566 watersheds are authorized for construction in the eastern part of Maricopa County between the Salt River and Queen Creek (See Figure 1). Flood control structures in these watersheds intercept water flow on the alluvial fans and funnel it, by way of the built or planned floodways and outlets, through or around the intensively developed urban and cropland areas to the Gila River. The Buckhorn-Mesa Watershed (69,172 acres) covers the area between the Salt River and Apache Trail. The Apache Junction-Gilbert Watershed (89,983 acres) covers the area between Apache Trail and Ray Road. The Williams-Chandler Watershed (155,326 acres) covers the area between Ray Road and Queen Creek. Floodwater retarding structures in the Apache Junction-Gilbert and Williams-Chandler Watersheds, to the south, have been built. Capacity of the RWCD Floodway in all three watersheds is to be increased sufficiently to carry release flows from floodwater retarding structures plus runoff from the uncontrolled areas between the structures and the floodway from the 100-year event.

### Present and Projected Population

The State of Arizona, in general, and the Phoenix metropolitan area, in particular, are attracting migration from all areas of the nation. Arizona's growth rate is more than three times the U. S. rate, with the major portion of the population gain due to migration.

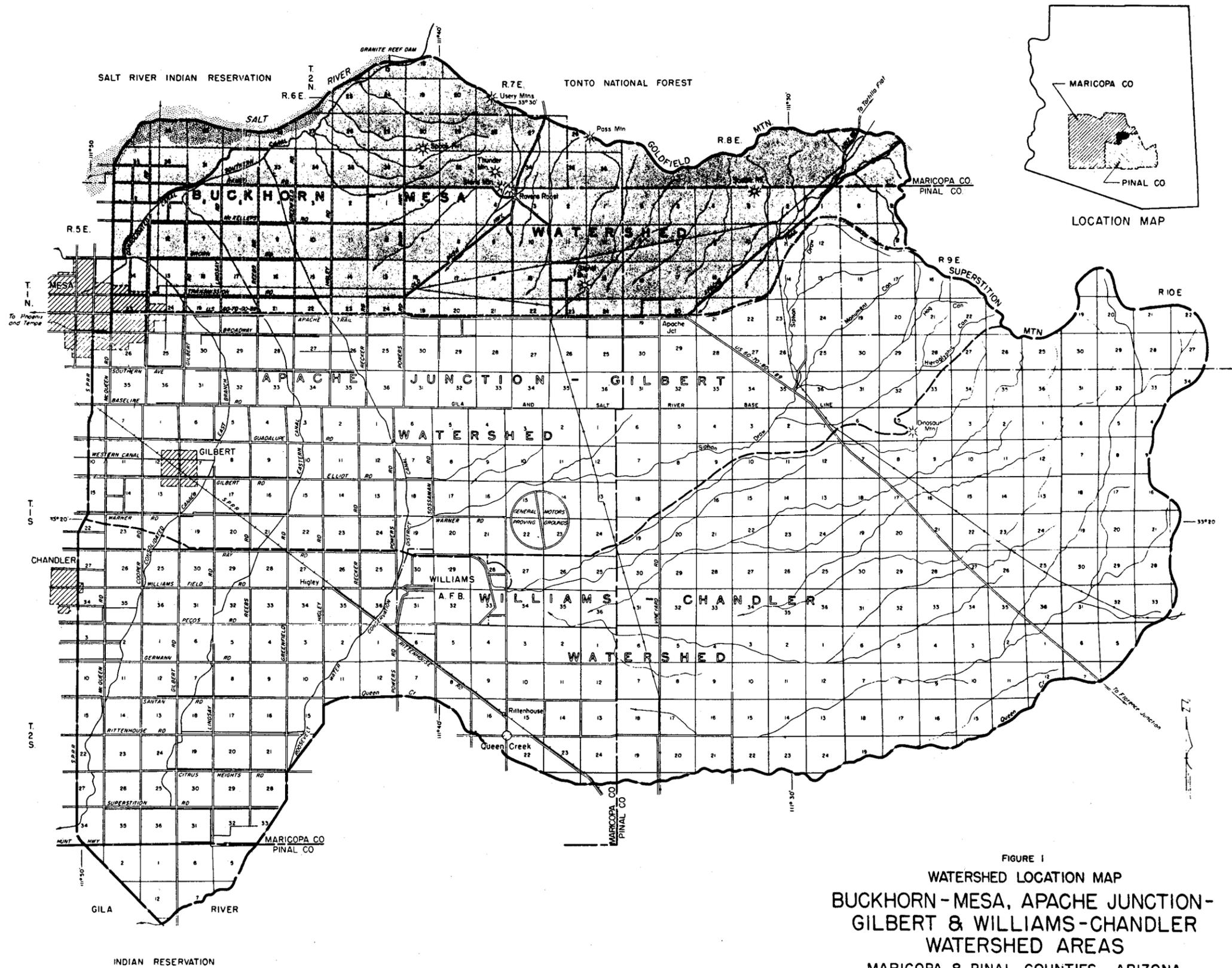


FIGURE 1  
 WATERSHED LOCATION MAP  
 BUCKHORN - MESA, APACHE JUNCTION -  
 GILBERT & WILLIAMS - CHANDLER  
 WATERSHED AREAS  
 MARICOPA & PINAL COUNTIES, ARIZONA

JUNE 1962  
 SCALE IN MILES

The reasons for the population growth are manifold and difficult to specifically isolate. The increased mobility of the American public has given this area more exposure. The area's mild winter climate brings tourists, and many a winter visitor has returned either for employment or retirement. The advent of home air-conditioning has made extreme summer heat tolerable. Aeronautic, space, and electronic related industries have located here, thus providing job opportunities.

Based on projections of the Maricopa Association of Governments and the Pinal County Planning and Zoning Department, the population in the project area will increase from 54,000 in 1974 to 130,000 by the year 2000. Regional, state and county projections were used in making the projections for the project area.

The number of minority residents within the Buckhorn-Mesa Watershed is estimated to be less than two percent of the present population or 1,080 people. About one-half of the minority residents are Negroes.

The percentage of low income residents is less in the watershed than the state as a whole. It is estimated that 1,400 families have an annual income of \$3,000 or less per year. 2/

### Economic Resources

The land ownership is based on a map compiled in 1973 by the U. S. Bureau of Land Management, U. S. Department of Agriculture, and the Arizona Water Commission. The present land ownership is: 43,875 acres, private and Indian trust; 5,140 acres, county and municipal; 3,600 acres, state; and 16,557 acres, federal (10,317 acres Tonto National Forest and 6,240 acres national resource lands). Public lands are located primarily in the upper portion of the watershed.

The agricultural segment of the economy is well established and highly developed. Farmers obtain irrigation water from the Salt River Project, the Roosevelt Water Conservation District, and private wells. There are 55 family-sized farms; the average size is 83 acres.

The urbanization of irrigated land will continue with or without a watershed project. The farmers sell agricultural land for many reasons; among these are rising land prices, increased taxes, and settlement of estates.

The deep alluvial soil is excellent for production of general farm crops. About 77 percent of the cropland is devoted to high valued crops such as citrus, cotton, and vegetables; while alfalfa and small grains comprise the remaining 23 percent.

Flood-free crop yields per acre are: citrus - over 400 cartons, cotton - over 2 bales, alfalfa hay - 6 tons, and small grain - 1½ tons.

Land values range from \$3,500 to \$12,000 per acre and are dependent on location relative to present development.

Accessibility of farms and ranches to markets is good. The installation of the proposed Superstition Freeway two miles south of the watershed will improve the existing situation.

The continuing influx of newcomers into the area has provided an adequate labor pool of both skilled and unskilled labor to meet commercial and industrial needs. The booming construction industry provides excellent opportunity for skilled workers. The amount of construction underway and planned should ensure a continuing demand for skilled workers.

The economy of the watershed is based heavily on retirement-recreational type development, and many people are engaged in employment in the service trades. Residents employed outside the watershed commute to the Mesa-Tempe-Phoenix area, and the mines in the Superior area.

Generally, employment rates tie to employment conditions in the Phoenix metropolitan area. The 1970 census reports the unemployed rate at 3.9 percent for the city of Mesa.

#### Plant and Animal Resources

The native vegetation is Sonoran Desert Type. On the eroding mountain slopes and the upper bajadas, the giant saguaro is associated with small trees, such as the palo verde, the desert ironwood, and the crucifixion-thorn, and with a host of other cacti and shrubs of the legume and sunflower families. Annual plants include the gramas, alfilaria, and Indian wheat.

At and above the upper limits of the saguaro, where minimum winter temperatures become effective in limiting the distribution of the frost-sensitive plants, the vegetation on rock slopes is dominated by shrubby members of the lily and amaryllis families, such as yuccas, agaves, bear grass, and sotol, and by leguminous shrubs such as acacias and mimosas. On the broad valleys the ubiquitous creosote bush dominates the landscape except along the drainage patterns which are marked by larger shrubs and trees, such as mesquite, ironwood, catclaw, and blue palo verde. <sup>5/</sup> The same annual grasses exist as in the higher bajadas.

THE MOST COMMON PLANTS INDIGENOUS TO THE PROJECT AREA 6/

<u>Common Name</u>	<u>Scientific Name</u>
Catclaw acacia	Acacia gregii
Ragweed	Ambrosia sp.
Fiddleneck	Amsinckia spp.
Milkweed	Asclepias sp.
Locoweed	Astragalus nuttallianus
Broom Baccharis	Baccharis sarothroides
Desert Baileya	Baileya multiradiata
Spiny hackberry	Celtis pallida
Blue paloverde	Cercidium floridum
Littleleaf paloverde	Cercidium microphyllum
Saguaro	Cereus giganteus
Desertwillow	Chilopsis linearis
Drummond clematis	Clematis drummondii
White brittlebush	Encelia farinosa
California buckwheat	Eriogonum fasciculatum
Filaree	Erodium cicutarium
Ocotillo	Fouquieria splendens
Ambrosia bursage	Franseria ambrosioides
Triangle bursage	Franseria deltoidea
Coville creosotebush	Larrea tridentata
Desert deervetch	Lotus tomentellus
Lupine	Lupinus spp.
Anderson wolfberry	Lycium andersonii
Little mallow	Malva parviflora
Tesota (ironwood)	Olneya tesota
Chollas, pricklypears	Opuntia spp.
Phacelia	Phacelia spp.
Desert Indian wheat	Plantago insularis
Wooly Indian wheat	Plantago purshii
Mesquite	Prosopis spp.
Mediterranean grass	Schismus barbatus
Globe mallow	Sphaeralcea spp.
Fivestamen tamarix	Tamarix pentandra
Tree tobacco	Nicotiana glauca

The only fishery resources of the watershed are those of the Salt River which form a portion of the northwesterly watershed boundary. Aquatic resources in this area extend from Granite Reef Dam upstream for approximately one and one-half miles and consist primarily of reservoir and reservoir headwaters conditions.

Fish species found in these waters generally represent those of a warm water fishery. 7/ Fish species may be observed, however, which typically represent a significantly different water condition.

Summer water temperatures, especially in warm shallow areas, may produce water conditions suitable for tropical fish species. Under these conditions, molly and tilapia populations may expand and become relatively abundant.

Winter temperatures bring about conditions conducive to the survival of cold water fish species. Under these conditions, rainbow trout may tend to move downstream from the trout fishing maintained in the cold outflow of Saguaro Lake.

Some fishing occurs in this area, but no attempt was made to quantify the use of this fishery for this report.

Wildlife species inhabiting the watershed include a wide variety of mammals, birds, amphibians, and reptiles.

Big game species are represented by small numbers of mule deer and javelina and an occasional mountain lion. In this area these species more commonly inhabit the desert mountains and foothill areas but may occasionally be seen in more open desert country.

Small game species include cottontail rabbits, mourning dove, white-winged dove, and Gambel's quail. These species are associated principally with riparian vegetation but may be seen throughout the watershed. These species also use agricultural crops and decorative landscape plants for food and cover. Small grain crops provide a ready food supply for doves and quail. Citrus and decorative woody plants provide some roosting and nesting cover for doves.

Populations of small game species are highly variable depending upon short-term climatic conditions and human intrusion.

Fur animals in this area generally are considered to include predatory animals. This group is hunted for fur or sport. Trapping for fur is seldom practiced in this area. Included in this group are: coyotes, foxes, bobcats, beaver, muskrat, ringtail cat, and raccoon. Species such as beaver and muskrat are closely associated with water and are found only along the Salt River. Most other species in this category are found throughout the desert, desert foothills, and mountains.

Waterfowl inhabiting the watershed, at least seasonally, include several species of ducks, geese, and shore and wading birds. These birds, for the most part, inhabit the open water and marshy areas associated with the Salt River. Duck and goose populations of the area are relatively low during season, while many shore and wading birds are relatively plentiful.

About 200 species of song and insectivorous birds and birds of prey inhabit the watershed during some or all of their life cycle. Many species live their entire life in the watershed, while others spend only the summer or winter there. Others stop over for short periods during their spring and fall migrations.

Hunting for big game in the watershed is extremely limited. Increased urbanization and associated human activity has severely reduced big game populations. The increased human habitation has also reduced the area usable for large calibre rifle hunting.

Shotgun hunting for small game remains relatively popular in the watershed. White-winged and mourning dove concentrate around grain-fields in the fall creating conditions for an impressive hunt during years of high populations. Gambel's quail and cottontail rabbit are abundant locally and taken by shotgun. Small-game hunting pressure is heavy locally and seasonally. Some shotgun hunting for waterfowl also occurs along the Salt River.

Nature study, bird watching, and photography are probably the most pursued wildlife oriented activities in this area. The watershed is one of the most diverse in terms of bird and animal species in the nation. The importance of this area for bird watching is exemplified by the fact that naturalists, both amateur and professional, venture from all parts of the nation to observe the over 200 species of birds using the area.

The more important bird watching areas in the watershed are those along the Salt River and those along the foothills of the Superstition Mountains. The type and distribution of vegetation in the watershed, in combination with climate, combine to create conditions which support a wide diversity of wildlife species, especially birdlife.

The primary factor regulating wildlife populations and diversity, however, is habitat. The major natural vegetative types in the watershed include mesquite-saltbush flats on low areas subject to overflow; creosote bush on gently sloping alluvial fans; and palo verde, bursage, saguaro on moderately sloping valleys and foothills. Desert washes supporting scattered to dense stands of mesquite, ironwood, and other woody riparian trees are interspersed at fairly regular intervals throughout the major vegetative types. This natural interspersion provides woody nesting and roosting cover within a very short traveling distance of feeding areas and open space.

A small area of stream riparian vegetation consisting primarily of salt cedar and mesquite parallels the Salt River along the north-westerly watershed boundary. This woody vegetation associated with an abundance of water adds dimension to the diversity of habitat; hence, to wildlife species composition.

Agricultural development tends to provide an abundance of a single habitat requirement over a large area. Fields of small grain provide an abundance of feed for some species, and citrus orchards provide woody tree nesting. These crops, however, are subject to short season production and/or intensive agricultural practices such as cultivation, spraying, and harvest activities, reducing their potential value to wildlife.

Desert shrub habitat makes up 32,941 acres of the watershed, with desert riparian habitat 7,101 acres, and stream riparian habitat 130 acres.

The most widely used wildlife management tool employed by game and fish agencies is the control of hunter use through seasons and bag limits of game species. Over a large area, wildlife management practices such as construction of watering devices, wildlife food plot plantings, and manipulation of nesting and cover, are prohibitive. No physical habitat management of significance has been applied within the watershed.

The following species list shows those threatened or endangered species potentially occurring in the watershed and their classification.

Species such as the bald eagle are highly mobile. While the species are not known specifically to nest in or regularly inhabit the watershed, observations of this species within the watershed would be possible.

#### ENDANGERED AND THREATENED FISH AND WILDLIFE 8/

<u>Common Name</u>	<u>Scientific Name</u>
Endangered	
Bald Eagle	<u>Haliaeetus leucocephalus</u>
Peregrine Falcon	<u>Falco peregrinus anatum</u>
Yuma Clapper Rail	<u>Rallus longirostris yumanensis</u>
Threatened	
Prarie Falcon	<u>Falco mexicanus</u>
Peripheral	
Coati	<u>Nasua narica</u>
Zone-Tailed Hawk	<u>Buteo albonotatus</u>
Black Hawk	<u>Buteogallus anthracinus</u>
Tropical Kingbird (possible)	<u>Tyrannus melancholieus</u>
Status Undetermined	
Gila Monster	<u>Heloderma suspectum suspectum</u>
Osprey	<u>Pandion haliaetus</u>

## Recreation Resources

Recreational development within the watershed includes the Lost Dutchman Recreational Area, developed by the Bureau of Land Management (BLM); Usery Mountain Park and Bush Highway Park, developed by the Maricopa County Parks and Recreation Department; and two undeveloped areas, Superstition Vista and an unnamed camping area near First Water Road, administered by the U. S. Forest Service.

The Bureau of Land Management's Lost Dutchman Recreational Site is only partially completed. When completed, this site will cover approximately 320 acres. The site will consist of about 400 camping units serviced with paved roads, drinking water facilities, and toilets with sewage treatment facilities. Demand studies for this area have been made, and it is estimated that when the site is completed it will receive about 300,000 recreation use days annually.

Maricopa County's Usery Park currently consists of eight ramadas, each with two picnic tables, and rustic toilet facilities. A 56-target archery range is under construction, and immediate future plans are to add 36 additional picnic tables without shade.

Maricopa County's Bush Highway picnic area consists of two ramadas with tables and drinking water. One restroom with sewage treatment facilities is also available at the site. A golf course is planned for future development at this facility.

The Forest Service areas provide camping and other outdoor activities, but no developed facilities are available.

## Archeological, Historical, and Unique Scenic Resources

The watershed area is rich in archeological sites of the Hohokams. A report was prepared by the Arizona State Museum, University of Arizona, Tucson, at the request of the Environmental Planning Division of the Arizona Highway Department as an aid in identifying the impact of the Superstition Freeway on the area. The following brief synopsis from this report explains the origin of the archeological resources of the Salt River Valley.

The Salt River Valley, in the vicinity of Phoenix, Tempe, and Mesa, is today the fastest growing and most densely populated area in the state. Homes, shopping centers, roads, airfields, and farms rest upon the remains of what was, by prehistoric standards, an equally important and densely populated part of Arizona. Known to many as the Hohokam, these people lived in the Salt River Valley for some 1500 years, developing a highly organized and complex culture.

Arriving in the valley about the time of Christ, the Hohokam lived in villages along the Salt and Gila Rivers. They were an agricultural people who made their living by gathering what they could from the natural vegetation and by farming the rich lands bordering the rivers. For the first 1,000 years of their occupation of the Salt River Valley, the Hohokam lived in villages of various sizes made of pithouses. Sometime around A. D. 1100 a change, possibly brought about by the arrival of a different group of people in the area, began to occur. Houses were constructed in blocks of rooms surrounded by large compound walls, and pit houses changed to surface rooms with joined walls. Large artificial mounds of earth, constructed in some cases over superstructures of adobe-walled rooms, began to appear in numbers. Sites became large, approaching city-like proportions, and were found in great density all over the valley. Irrigation systems were enlarged and expanded, bringing more land under cultivation. Then suddenly these great sites were abandoned; and by the middle of the 15th century, the population had diminished greatly - the cities and canals fell into disuse and ruin. 6/

An archeological survey of the structure locations was conducted by Thomas R. Cartledge and Donald E. Weaver, Jr., Department of Anthropology, Arizona State University (ASU). The conclusions reached were these.

The archeological materials recorded during this survey indicate that the area under investigation was never heavily utilized by prehistoric groups. Isolated artifacts and small concentrations of artifacts were probably the result of seasonal hunting and gathering activities. Such activities were probably primarily related to the harvesting of wild plant materials, with little indication of processing. Water availability was evidently not an important factor in activity location.

Cultural affiliation and period of occupation are difficult to evaluate because of the relatively few diagnostic artifacts recovered. Ceramic and lithic materials seem to be most similar to Hohokam artifacts and may indicate close ties to the large permanent Hohokam settlements along the Salt River to the north of the research area. The area was probably utilized most heavily during the Sedentary and Classic Periods, between A. D. 900 and 1450.

The significance of the archeological data recovered during this survey relates primarily to the formulation of an economic subsistence model for the Hohokam cultural tradition. Although inadequate in itself, the data, when used in conjunction with data from surrounding areas, does provide evidence to support previously formulated hypotheses. In particular, the data suggests considerable reliance on seasonal hunting and gathering by sedentary Hohokam agriculturalists. AZ U:10:51 (ASU) assumes considerable significance since it is the only site recorded within the research area which has the potential for producing definite evidence about cultural affiliation and period of occupation.

The investigators made the following recommendations.

Although all archeological resources possess a measure of significance, it is the opinion of the authors that further investigation of sites recorded or investigated during this survey is only warranted for AZ U:10:51 (ASU). The immediately surrounding area should be intensively surveyed to determine the extent and concentration of cultural material. Test excavations should be conducted to determine if sub-surface cultural deposits exist. The rock outline discussed previously should also be excavated to determine whether it is historic or prehistoric. If test excavations warrant, additional intensive investigation should be undertaken in areas with concentrations of cultural material.

None of the sites investigated during this survey appear, in the opinion of the authors, to qualify for inclusion in either the Arizona or National Register of Historic Places. None of the sites are being recommended for such nominations.

The above mentioned sites are not listed in the Federal Register of Historic Places. The Arizona State Historic Preservation Officer concurs that none of the cultural resources located and identified in the above mentioned reconnaissance surveys appear to meet the criteria for inclusion in the National Register.

Further investigation of site AZ U:10:51 (ASU) was completed in April, 1975 by the Department of Anthropology, Arizona State University. Their recommendations are as follows:

The cultural resources at AZ U:10:51 (ASU) have been thoroughly investigated, recorded, and preserved through collection. These materials have been integrated with those recovered by earlier survey teams, and no additional archaeological research at AZ U:10:51 (ASU) is warranted. The construction of the proposed retardation structure may, there-

fore, be initiated without adversely affecting the cultural resources. Neither the site itself nor any portion of it has been nominated or will be recommended for nomination to either the Arizona or National Register of Historic Places. The site has not been recommended for inclusion in either of the registers of historic places because the significant archaeological and historical data have been recovered, additional work is not warranted, and additional examples of such activity loci undoubtedly exist outside the project boundaries.

Archeological resources could be uncovered during construction. In such a case, archeologists will be notified for salvage.

The base camp and the trailhead of a significant trail system, namely, the Heber-Reno Sheep Drive, which eventually terminates in Springerville, Arizona, is located in the watershed. The Maricopa County Parks and Recreation Department has been consulted regarding the needed trail rights-of-way. These will be maintained through the flood control structure.

#### Soil, Water, and Plant Management Status

Land use changes from 1963 to 1974 consist of increases in urban and ranchette homesites. Ranchettes are homesites of one to ten acres.

#### LAND USE TRENDS (Acres)

<u>Land Use</u>	<u>1963</u>	<u>1974</u>
Cropland	13,232	10,905
Rangeland		
Upland	41,987	32,941
Riparian	8,155	7,231
Urban		
Residential & Commercial	5,798	15,175
Ranchettes	-	2,920
Total	69,172	69,172

About 9,100 acres of upland, 900 acres of riparian, and 2,300 acres of cropland were converted to ranchettes and residential and commercial use during this period.

Acreage used for the production of citrus and small grain crops has nearly doubled during the ten-year period. Land users on the smaller acreages grow various crops and in many cases concentrate on feed and

grain for horses. Sorghum has virtually disappeared from the list of crops except possibly on the smaller acreages. Vegetables grown commercially, cotton, and alfalfa acreages have decreased drastically.

The East Maricopa Natural Resource Conservation District (NRCD) provides technical assistance to cooperators in soil and water conservation programs. Private landowners operate 19,000 acres which are divided into 115 separate units. One hundred and nine of these units, or 95 percent representing 10,600 acres, are under cooperative agreements with the NRCD. The private land under agreement is nearly all cropland and represents about 15 percent of the total watershed area. Ninety-five land users have developed conservation plans on about 10,000 acres, or 53 percent of the private land.

Federal lands administered by the Forest Service, about 10,317 acres, and the Bureau of Land Management, 6,240 acres, are included in multiple-use management plans. The 3,600 acres of state-owned land are leased to private land users. The land use on state lands is periodic grazing by livestock.

The land treatment plan as originally outlined in the watershed work plan is essentially complete. There will be an on-going land treatment program. Participation is on a voluntary basis by individual farmers and ranchers. It is expected that the program will vary as land use, ownership, and technology change.

Improvement in the management of irrigation water is increasing. The opportunity exists to further increase the efficiency of irrigation water use. The present efficiency of irrigation water use is estimated to be 65 percent. The potential is 75 percent or more.

Two thousand one hundred and sixty acres are considered adequately treated. Conservation practices for control of erosion and to maintain proper soil condition are generally adequate. Continuing emphasis should be given to more accurately measure use of irrigation water. Careful timing between irrigations is needed to further increase irrigation water use efficiencies.

Projections indicate there will be 2,100 acres in irrigated crops by the year 2000. These will be primarily citrus orchards in ranchette-type urban developments of ten acres or less. Drip or bubbler irrigation methods are becoming more popular and have the advantage of erosion control and make possible water use efficiency of up to 90 percent. It is projected that by the year 2000 rangeland will decrease to 25,000 acres. The ongoing land treatment program for rangeland will give emphasis to installation of those practices and measures that will control erosion and sediment and provide proper range use. Urban acreage is expected to increase. Landscaping around homes has minimized erosion. It is expected that this type of landscaping will continue in the future and have the same effect on minimizing erosion.

The following table shows the projected land use changes between the years 1974 and 2000.

LAND USE (Acres)		
	<u>1974</u>	<u>2000</u>
Cropland	10,905	-0-
Rangeland	40,172	25,010
Urban and Other	<u>18,095</u>	<u>44,162</u> 9/
Totals	69,172	69,172

Crop production in 1974 was as follows:

<u>Crop</u>	<u>Acreage</u>	<u>Yield/Ac.</u>	<u>Gross Annual Income</u>
Alfalfa	600	6 Tons	\$ 205,000
Citrus	7,750	400 Cartons	4,650,000
Cotton	580	2 Bales	354,000
Vegetables	80	220 CWT	215,000
Small Grains & Misc. Crops	<u>1,895</u>	1.5 Tons	<u>641,000</u>
Totals	10,905		\$6,065,000

The Natural Resource Conservation District (NRCD) was active recently in supporting the formulation of state laws to assist flood control programs. These laws provide state funds for up to 50 percent of land acquisition and relocation costs. Funds have also been made available to establish a state planning party to assist in planning P. L. 566 projects.

An active on-going program to assist land users to plan and apply conservation land treatment practices has been effective in reducing soil erosion and, to a degree, has been effective in increasing the efficiency of water use. Plans for an outdoor laboratory were completed by local school teachers with the assistance of the NRCD and the Soil Conservation Service.

The NRCD Board of Supervisors continues to provide strong leadership in the operations phase of the Hohokam Resource Conservation Development Project.

## Projects of Other Agencies

The Consolidated East Branch and Eastern Canals, operated and maintained by the Salt River Project, cross the watershed in a north-south direction. These canals are two of a three-canal system serving the area. The other canal is operated and maintained by the Roosevelt Water Conservation District and runs parallel to the east of the Consolidated East Branch and Eastern Canals. The planned project and this irrigation system are compatible and will complement one another since both are needed to sustain agricultural production.

The Central Arizona Project (CAP) is currently under construction. This is a multipurpose project that will provide facilities to convey annually up to 0.67 million acre-feet of Colorado River water to Central Arizona. The Buckhorn-Mesa Watershed Project has been closely coordinated with the CAP and the two projects are compatible.

The aqueduct for the CAP will cross the watershed below the flood-water retarding structures. The distance downstream will vary from immediately below to a distance of 3-1/2 miles. The degree of flood protection for the aqueduct provided by the system of structures will be dependent on the distance between the structures and the aqueduct. A substantial cost savings to the CAP will be realized from flood reduction provided by the structures.

The Spook Hill structure (Structure No. 4) is immediately above the CAP aqueduct. A portion of the borrow to build the Spook Hill structure will be taken from the aqueduct right-of-way.

# WATER AND RELATED LAND RESOURCES PROBLEMS

## Land and Water Management

Land and water management programs in the watershed are among the most up-to-date and efficient in the nation. Farmers, ranchers and other land users are knowledgeable about input-output relationships and interested in making efficient use of factors of production. Costs of production are high. High yields, which are necessary to offset the high costs of production, are dependent upon the timing of inputs. The landowners and operators are willing and able to install needed land treatment measures in order to insure efficient production.

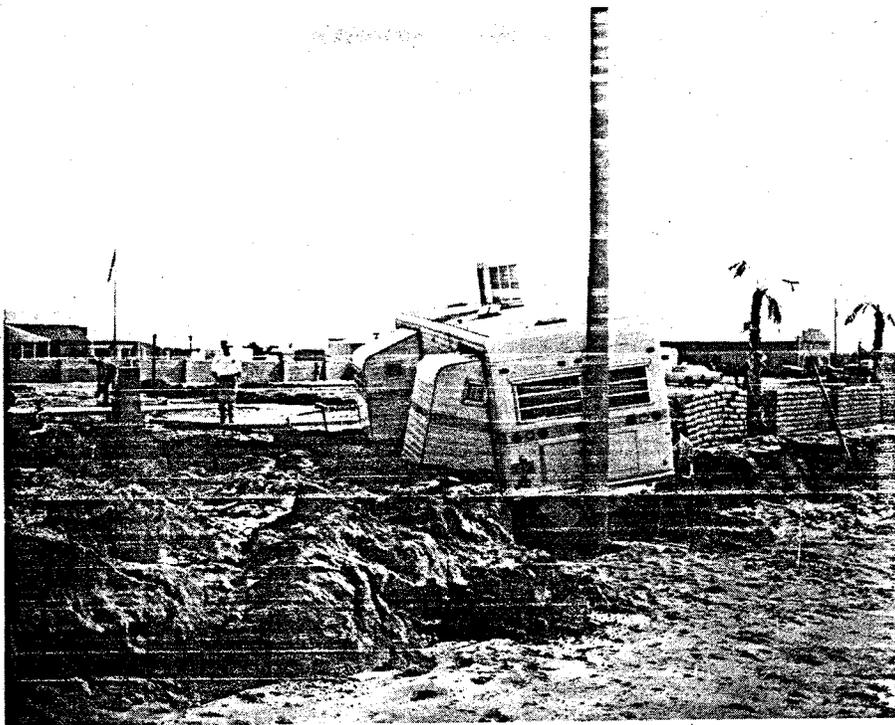
## Floodwater Damages

Floods are a part of the natural scene in the watershed. Since 1910, an estimated 40 floods have occurred. Twenty-seven floods occurred during the summer months and 13 floods occurred during the winter months. Runoff in 1926, 1930, 1941, 1943, 1954, 1959, 1966 and 1971 caused particularly serious damage. The floods, varying in magnitude, occur on the average of about once every one and one-half years. Floods originating in the watershed result from high intensity cloudburst summer storms or from the tropical storms from the Pacific Southwest.

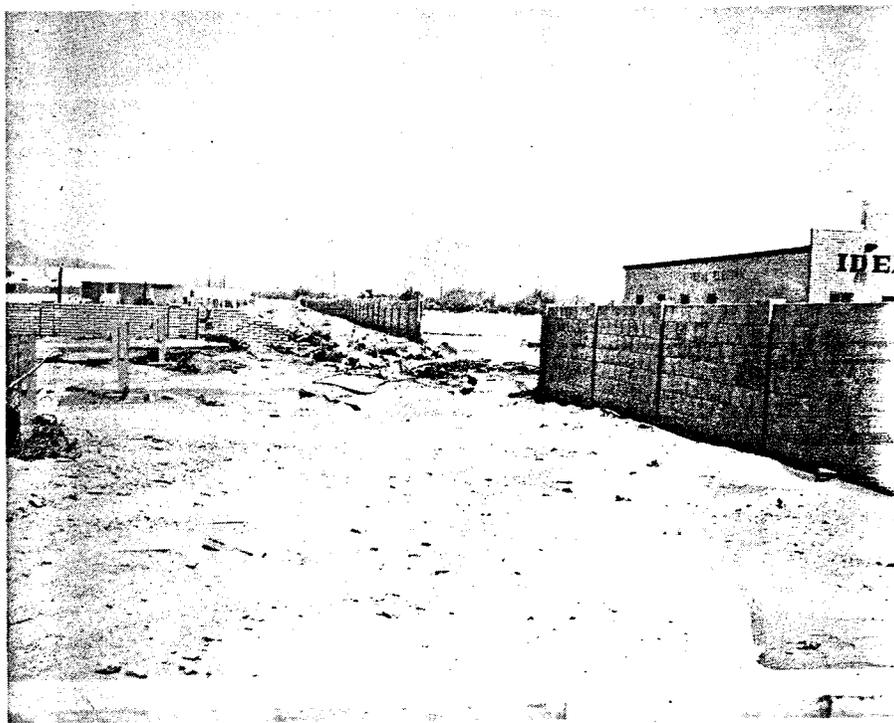
The floodwaters originating in the upstream drainages flow in a south-southwest direction and inundate not only properties within the Buckhorn-Mesa Watershed but lands to the south in the Apache Junction-Gilbert Watershed.

Flood damages experienced during 1954 are typical of those associated with larger storms. Runoff during this storm was of a magnitude as to occur on the average of once every 17 years. Approximately 5,750 acres of highly productive cropland were inundated. This included 640 acres of alfalfa, 2,130 acres of citrus, 1,840 acres of cotton, 450 acres of small grains, and 690 acres of vegetables. Damage to cotton and vegetables accounted for the majority of the crop losses. At current prices, the crop loss in 1954 would amount to \$637,000. The 1974 value of the land and improvements affected is \$22,000,000.

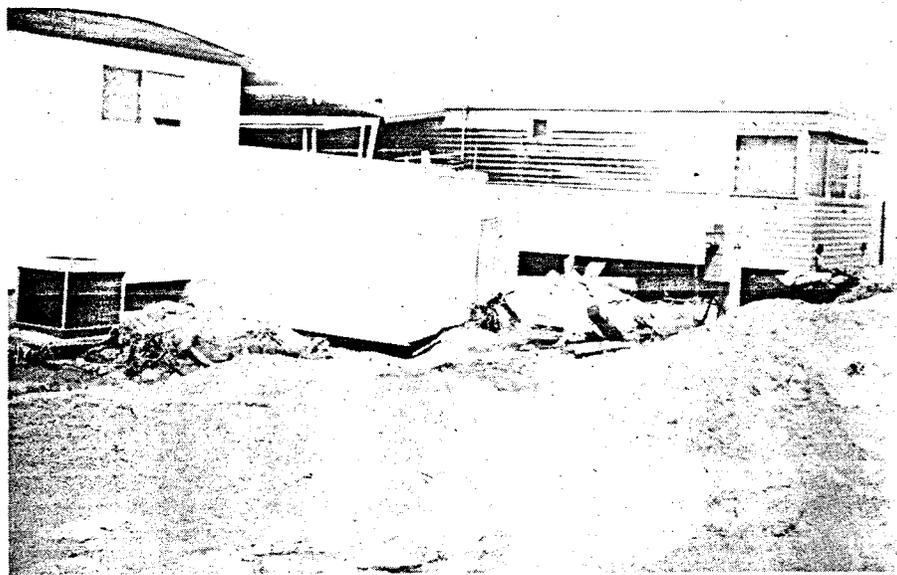
Flood flows during this 1954 storm varied from four inches to three feet in depth throughout the residential and commercial areas east of the RWCD Canal. This residential and retail-commercial area has in the past five to ten years undergone a tremendous growth. Present value of properties subject to damage from a flood of this magnitude is \$57,000,000.



House trailer in Apache Junction which was washed through a wall and stopped by a telephone pole during the August 15, 1971 flood.



Typical damage to trailer courts in which sections of retaining walls and foundations were washed away.



Foundations settled because of wetting  
by floodwater causing extensive damage.



Cleanup after a flood is back-breaking work.

The magnitude of damage expected from a storm to occur on the average of only once in 100 years (one percent frequency of event) would seriously affect the local economy for several years. The flood resulting from a storm of this magnitude on the watershed would inundate approximately 28,330 acres. The flood plain includes 17,310 acres in this watershed and 11,020 acres in the Apache Junction-Gilbert Watershed immediately downstream. Using the 1974 land use, this would amount to 9,010 acres of highly productive irrigated lands; 8,250 acres of urban; and 11,070 acres of undeveloped desert. Projections indicate that by the year 2000, even without the flood protection afforded by this project, the land use will change. <sup>10/</sup> The 100-year flood plain by the year 2000 will consist of 23,200 acres of urban and 5,130 acres of undeveloped desert. The crops grown at this time would be restricted to small acreages on ranchettes.

In addition to these direct damages there are considerable indirect losses as a result of flood inundations. Flood flows over U. S. Highway 60-80-89 disrupt traffic for three to four hours. Traffic flow on this interstate highway is estimated at 17,000 vehicles per day at the present time. Loss of income to businessmen and other enterprises within the watershed is substantial. A flood during the height of the tourist season can seriously affect income of individual owners of motels, trailer courts and others depending on this trade. The cotton gins in and around the area report delays in processing and loss of income due to reduced yields because of flood flows. Delays in harvesting the citrus crops affect transportation schedules as well as profits to citrus growers.

### Erosion Damages

Scouring on 400 acres of cropland required filling and releveling after the 1954 storm. Immediate remedial action is necessary by farmers to maintain proper irrigation grades.

Erosion rates in the watershed are generally low. The estimated range in average annual erosion for all but a few small isolated areas is from approximately 0.10 ton per acre on nearly level rangeland to almost 0.70 ton per acre in the Usery and Goldfield Mountains. Erosion in the Superstition Mountains is very low, mainly because of the large outcrops of resistant rocks. Cropland erosion rates are quite low because the cropland is nearly level. Cover provided by most crops grown is at its peak in the season of erosion-producing summer thunderstorms. Estimates of cropland erosion range from about 0.05 ton per acre for alfalfa to 0.50 ton per acre for continuous row crops. The average is about 0.25 ton per acre. The most significant reasons for the low erosion on the major portion of the watershed are:

1. Low frequency of occurrence of high intensity storms.
2. Armoring of the steeper soil surfaces with gravel, cobbles,

and coarse sand protecting the soil particles from detachment by falling rain and runoff.

3. The occurrence of flatter slopes where soils are without armored surfaces.

It is estimated that average annual erosion rates have been accelerated temporarily to as much as 2.0 tons per acre where protective soil armoring and vegetation have been disturbed during construction of homes on steeper slopes. Generally, on such sites, vegetation is reestablished or the gravel content in the soil is sufficient for the formation of a new armored surface. Observation of the older homesites indicates that, in most cases, the erosion rate reverts to as low or lower than the rate before construction.

### Sediment Damages

Damages from deposition of sediment on cultivated acreages during the 1954 storm then amounted to \$33,000. Deposition of sediment on alfalfa fields has a smothering effect on the plant. This smothering effect can cause losses up to two cuttings, depending upon the severity of the flood. On-farm irrigation ditches and laterals are filled with sediment when breached by flood flows. This causes additional loss of crop yields due to the inability of providing proper amounts of irrigation water through reduced ditch capacity. Sediment deposition on fields prevents proper distribution of irrigation water and causes additional crop damage. Farmers are also faced with the problem of releveling fields after heavy sediment deposition.

Fine silts and other material carried by the flood flows entering homes ruin carpeting. Sediment deposition in wells necessitates cleaning by removal of deposits and presents an unsatisfactory health condition for the community by contaminating drinking water. This condition is further aggravated by overflow of septic tanks.

Deposition of sediment on county roads and U. S. Highway 60-80-89 during the 1954 flood presented a formidable cleanup problem to county and state highway crews. Deposition occurred on 35 miles of county and state roads during this storm. As the area develops, this type of damage will increase in magnitude.

### Irrigation Problems

All cropland (10,905 acres in 1974) is irrigated. Very little of the crop consumptive use of water is supplied by rainfall. Urban development is encroaching on the irrigated land.

Surface waters from the Salt River system allocated to cropland within the watershed (42,000 acre-feet) are not adequate to supply the full needs of the crops. Both the Roosevelt Water Conservation District and the Salt River Project augment their surface water supplies with wells (28,000 acre-feet) situated along their main irrigation canals. The need for continual use of these wells to supply the present demand for water is in effect reducing ground water levels, increasing costs of pumping and generally creating an increasingly higher cost of water for the areas served. Both the surface and ground water sources of supply have a moderate salinity hazard, but no serious salt problems exist.

Land subsidence as the result of ground water withdrawal from alluvial aquifers within the watershed is known to have occurred. 11/ With continued ground water withdrawal, additional subsidence is anticipated. Land subsidence is believed to have affected all of the watershed area except for the mountainous portions. Areas which have experienced the greatest amounts of subsidence are in the western one-third of the watershed. In this area subsidence of as much as three feet has occurred.

There is one known earth fissure in the watershed. This is located in section 19, R. 7 E., T. 1 N. This is about 1.5 miles downslope from the Spook Hill damsite. With the present available information regarding the development of earth fissures, it is not possible to accurately predict where earth fissures may develop in the future.

Land management systems for approximately 8,705 acres of the irrigated land are considered adequate; management systems are considered inadequate on approximately 2,200 acres. The graded border irrigation method is primarily used. About 6,500 acres need to be converted to level basin or drip methods of irrigation to increase overall water use efficiency.

There are a wide variety of crops adapted to the area; crops are produced 12 months a year. Frost control is necessary for the citrus groves. The soils being farmed are highly suited to crop production. The cropland is located on the lower portions of an alluvial fan; these areas are relatively flat with gentle slopes.

Phreatophyte and vector control is not a problem.

#### Municipal and Industrial Water Problems

The principal source of municipal and industrial water is ground water. Wells are from 250 to 500 feet in depth. Ground water levels are declining; 200 to 500 feet in 17 years. In the near future, surface water may be acquired for municipal purposes, either from the Salt River system and/or the Central Arizona Project.

Population in the watershed is projected to increase from 54,000 in 1974 to 130,000 in 2000. 10/ The demand for municipal and industrial water, if it increases on a proportionate basis, would increase approximately 250 percent or more. Consumptive use per capita is about 140 gallons per day at present and is projected to be over 175 gallons per day by the year 2020. The supply from both ground water and surface water will be adequate to satisfy demand in the year 2000.

### Recreation Problems

The only water available for recreation in the watershed is a portion of the Salt River that forms the northwest boundary. Water is of good quality with sediment controlled by the upstream system of structures on the Salt and Verde Rivers.

Recreation resources in the watershed and immediate vicinity are available to the general public, a majority of the developments being on publicly owned land. Because of a favorable climate, recreational facilities are used on a year-long basis. This increases the demand on existing facilities.

Recreation demand within the watershed and surrounding areas is greater than normally would be expected. Residential development, most of which is oriented towards retirement community accommodations, is expanding at a rapid rate. The watershed is also within day use distance of the greater Phoenix area. Maricopa County, which includes the greater Phoenix area, is projected to increase to about 1,374,000 in 1975 and about 3,100,000 by the year 2000. 12/ These factors combine to generate rapid population increase with a high per capita recreational need.

Water-related recreational facilities are immediately available outside the watershed at the system of lakes on the Salt and Verde Rivers. These facilities receive heavy use because of their proximity to the Phoenix metropolitan area and due to the lack of additional facilities elsewhere.

### Plant and Animal Problems

The current trend in land use in the watershed is the conversion of agricultural and desert lands to residential use, primarily winter homes, retirement homes, and ranchettes. Due to the climate and the proximity to metropolitan Phoenix, this land use conversion is more rapid than would normally be expected, occurring at the rate of approximately 1,200 acres per year of urban development; of which, 300 acres is diverted from agricultural and over 900 acres from desert rangeland.

This annual land use change results in a loss of approximately 160 acres of desert riparian nesting habitat; 740 acres of desert upland palo verde, bursage, creosote bush habitat; and 300 acres of agricultural land available for use by wildlife. This loss of habitat, primarily for non-game species, is probably more important in this area than other areas of the state. Many of the winter and retirement homes and ranchettes have been developed because of the rural character of the area.

There is little loss of wildlife or habitat due to flooding in the watershed; in fact, natural vegetative growth is stimulated by periodic flooding.

The problem associated with this watershed area is not one of providing additional wildlife habitat, but of retaining some remnant of existing habitat in the face of urbanization.

For the most part, threatened species of wildlife inhabit the stream riparian vegetation--some along the Salt River-- and to a lesser degree, the desert riparian vegetation area. The threatened species depend on the stream riparian and desert riparian vegetation. Activities of man are encroaching on both types of riparian vegetation.

#### Water Quality Problems

The extent of chemical or organic pollution in flood flows has not been determined. Neither the Arizona Health Department nor the Environmental Protection Agency has a water quality monitoring program for runoff from the watershed area. Turbidity and temperature of floodwaters are not known at this time.

The existing washes in the watershed are ephemeral in nature and have a very limited capacity. During the runoff periods, channel capacities are exceeded and water flows overland as sheet flow. Presently, the majority of the land in the upper part of the watershed is upland desert; and the primary pollutant in the runoff water is sediment. Suspended sediment concentration is about 18,000 parts per million.

Rapid urbanization is occurring in the watershed with the normal sewage treatment consisting of individual septic tanks. These tanks are subject to damage by the sheet flows, and the resultant floodwater could be very polluted.

When floodwaters go across existing irrigated land, some agricultural chemicals may be picked up by the floodwaters. No data is available to estimate the extent of pollution from this source.

Total dissolved salts are the primary pollutant and sometimes exceed a maximum allowable concentration of 500 parts per million. Because of

the lack of availability of water from other sources, water with undesirable qualities is utilized for public water supplies, domestic water, and irrigation. There are no known adverse health effects from using this water.

### Air Quality Problems

The rapid growth of population in the Phoenix metropolitan area contributed to a deterioration in the air quality. The increase in the number of residences, offices, industries, and vehicles has resulted in several air pollution problems. These include the increased burning of fuel for the additional power required to heat, cool, and light new homes and offices. Associated with new construction is large-scale land modification and the stripping of desert vegetative cover for the development of housing tracts and shopping centers resulting in the release of particulates or dust. 13/

### Economic and Social Problems

In 1970 there was a total of 15 family farms in the watershed. Of these, only one had income of \$3,000 or less. Most of these were dependent on off-farm employment.

The area is experiencing rapid urbanization. The population and the economy of the area are growing rapidly. Both irrigated cropland and desert land are being developed. The cropland being developed for residential and commercial use is among the most productive in the United States. As the desert land is developed, the scenery and desert ecology is affected. The open space enjoyed by present residents is being replaced by housing.

As more people locate farther from the principal city center, where many of the jobs are, there will be increased use of energy requirements for transportation.

The unemployment rate was estimated to be eight percent in Arizona during December 1974. With the Phoenix metropolitan area in such proximity, there are ample job opportunities. Most of the farms have one or two permanent employees other than the family members. During certain seasons, more people may be hired for specific jobs such as picking citrus and planting vegetables.

A good portion of the watershed is rural in character, but by the year 2000, it is projected that the area will be urbanized. The ranchettes will be producing crops, but with small acreages of 3 to 10 acres, the owners will be dependent on off-farm employment for their primary source of income.

# RELATIONSHIP TO LAND USE PLANS, POLICIES, AND CONTROLS

Planning departments of cities and the county in cooperation with the Maricopa Association of Governments, Transportation, and Planning Office have made estimates of the magnitude and distribution of future (through year 2000) populations and concomitant housing for Maricopa County. The Pinal County Planning and Zoning Department supplied the projections for the portion of the watershed in Pinal County. The project, as formulated, conforms with these projections. The project is in agreement with the Office of Business Economics, Economic Research Service (OBERS) projections. Before the year 2020, decreased flooding damages will be an important part in the more efficient use of a critical water and economic demand in the Lower Colorado Region.

The level of flood protection provided by the planned measures will be adequate for agricultural uses of the land. With an adequate internal drainage system installed, 100-year level flood protection will be provided to existing residences and commercial establishments. Damages from a flood of this size would be limited to streets, yards, and parking lots.

The Maricopa County Board of Supervisors recently approved changes to the subdivision regulations that require detention facilities be included in all new subdivision plats to detain a 100-year, two-hour storm. The Board of Supervisors will enforce these regulations in such a manner that the volume of storm water to be stored for the area between the system of floodwater retarding structures and the Roosevelt Water Conservation District Floodway will equal or exceed one (1) inch over the newly developed area. With this on-site storage of increased runoff coming from all future urban development areas and an adequate internal drainage system installed, projected residential, commercial, and industrial properties will not be subject to flood damage.

In March of 1973 the Arizona Water Commission prepared a State Flood Control Program. The structural works of improvement in the Buckhorn-Mesa Watershed Project are a part of the "...physical works required to protect the people already living in Arizona from loss of life, extensive property damage, and inordinate inconvenience." 14/

The Flood Control District of Maricopa County was established in March 1959 and encompasses the entire county. In August 1973 the District prepared a Comprehensive Flood Control Plan for the county. The measures included in the Buckhorn-Mesa Watershed Project are an integral part of the coordinated flood control program for the county.

The unincorporated areas of Maricopa County became eligible for flood insurance under the National Flood Insurance Program on December

31, 1970. The Federal Insurance Administrator is responsible for identifying the special flood hazard areas and supplying the communities with the technical data necessary for the development of a sound management program for flood prone areas. The plan is to provide flood insurance on existing structures and their contents and to discourage the building of additional structures subject to flood damages within the flood plain. Rate studies are being conducted to establish actuarial rates. The flood prevention measures will be instrumental in reducing the rates for affected areas.

The 1973 State Legislature enacted into law House Bill 2010 relating to flood plain management in Arizona. The law specifically requires that local jurisdictions delineate flood plains where development is ongoing or imminent. Further development within delineated areas is to be restricted unless accomplished in accordance with regulations adopted by the local jurisdiction or under a special use permit. Maricopa County has submitted flood plain regulations as required.

Because of climatic factors, the Phoenix metropolitan area, which includes the project area, has unique air pollution problems. The area has difficulty meeting federal standards for particulate concentrations because it is a desert environment, and the wind constantly transports the desert particulates. Another federal standard that the area has difficulty meeting is the carbon monoxide standard. The gaseous pollutant problem is aggravated by the inversion factor--pollutants build up during the day, and the sharp drop between day and evening temperatures trap the pollutants in the atmosphere, preventing their dissipation. The threat of inversion is especially critical during December, January, February, and March. The annual average concentration of sulfur dioxide and nitrogen dioxide has not exceeded federal standards since continuous monitoring was initiated.

Efforts are being made to control air pollution in the area before it reaches a critical stage. This responsibility is shared by the State of Arizona and Maricopa County. The Arizona State Air Pollution Control Division of the Department of Health has jurisdiction over everything that emits 75 tons of particulates a day as well as over mobile units of pollution, such as cars and hot-mix asphalt units. Any other source of air pollution is under the jurisdiction of the Maricopa County Bureau of Air Pollution Control. The county air implementation program consists of requiring permits for equipment that discharges pollutants into the atmosphere and also of monitoring air quality. The major contributor to air pollution in the overflow area is automobile exhaust, the control of which is under State jurisdiction. Presently, the State is implementing an emission-standards program.

Determination of the suitability of water for domestic use is generally based on the dissolved solids content. The U. S. Public Health Service Drinking Water Standards (1963) indicate that domestic water

supplies should not exceed a total dissolved solids limit of 500 milligrams per liter (mg/l), but domestic water supplies of up to 1,000 mg/l are not uncommon. In central Arizona, the quality of ground water varies by area and with depth, depending primarily upon the mineralogical composition of the aquifer from which water is pumped. Most of the wells in the project area produce water containing 500 to 1,000 mg/l dissolved solids, but some range as high as 1,500 mg/l dissolved solids.

# ENVIRONMENTAL IMPACT

## STRUCTURAL MEASURES

The runoff originating above the floodwater retarding structures and floodways from a 100-year frequency flood will be completely controlled. For specific areas downstream of the structures, the degree of flood protection will vary with the distance from the structure. Within the watershed an estimated 9,530 acres will remain subject to flooding from the 100-year frequency flood. Of these, 1,600 acres are presently in urban development. The following tables and map show the reduction in flooding resulting from installation of the structural measures by area for 1974 conditions. The first table shows the effects of the structural measures in reducing flooding inside the watershed; the second table shows the same for areas outside the watershed. Average annual floodwater damages will be reduced 64 percent.

Flood control will aid in stabilizing the agricultural industry in the immediate area. This stabilizing influence will not materially affect the conversion of agricultural lands for housing and other related uses as population expands in the benefited area.

Stabilization of irrigated agriculture will have some wildlife benefit in that a number of bird species are benefited by the proximity of grain crops to their nesting and roosting areas.

Erosion and flood plain scour will be reduced on the areas protected from flooding. On the cropland areas protected it will not be necessary for farmers to fill and relevel fields after storms. Topsoil will be protected, and the fields will be more productive. In subdivisions scour areas require filling and reshaping after floods; this problem will be materially reduced.

The five floodwater retarding structures will trap 823 acre-feet of sediment over the life of the project. This will reduce downstream sediment damage to roads, bridges, irrigation facilities, urban developments, crops, and other properties.

The areas directly disturbed by construction activities include an estimated 963 acres committed to dams, emergency spillways, borrow areas, and floodways. This area to be cleared consists of 799 acres of upland desert vegetation, primarily palo verde, bursage, and creosote bush; and 164 acres of desert riparian vegetation, mostly mesquite, ironwood, and palo verde. The borrow area is 595 acres; 361 acres of this will also be used for sediment accumulation. /All dams and disturbed areas, except that which is used for emergency spillways, will be revegetated and landscaped, and will have an irrigation system to help establish native grasses, shrubs, and trees. This area amounts to 985 acres./

REDUCTION IN FLOODING - 1974  
Buckhorn-Mesa Watershed  
(Acres)

<u>Location</u>	<u>Land Use</u>	<u>Total</u>	<u>100 Year Frequency Storm</u>	
			<u>Without Project</u>	<u>With Project</u> <sup>1/</sup>
Upstream (A) of RWCD Floodway	Cropland	2,405	2,000	600
	Rangeland			
	Upland Desert	32,941	2,300	1,800
	Riparian	7,101	5,280	4,700
	Urban			
	Residential & Commercial Ranchettes	10,725	3,260	400 <sup>2/</sup>
		--	--	--
	Subtotal	53,172	12,840	7,500
Downstream (B) of RWCD Floodway	Cropland	8,500	1,820	700
	Rangeland			
	Upland Desert	--	--	--
	Riparian	130	130	130
	Urban			
	Residential & Commercial Ranchettes	4,450	1,500	900 <sup>2/</sup>
		2,920	1,020	300 <sup>2/</sup>
	Subtotal	16,000	4,470	2,030
TOTAL		69,172	17,310	9,530

<sup>1/</sup> Based on construction of Spook Hill, Pass Mountain, Signal Butte, Apache Junction, and Weekes Wash FRS, along with the associated floodways and the RWCD Floodway from Brown Road to the Apache Trail.

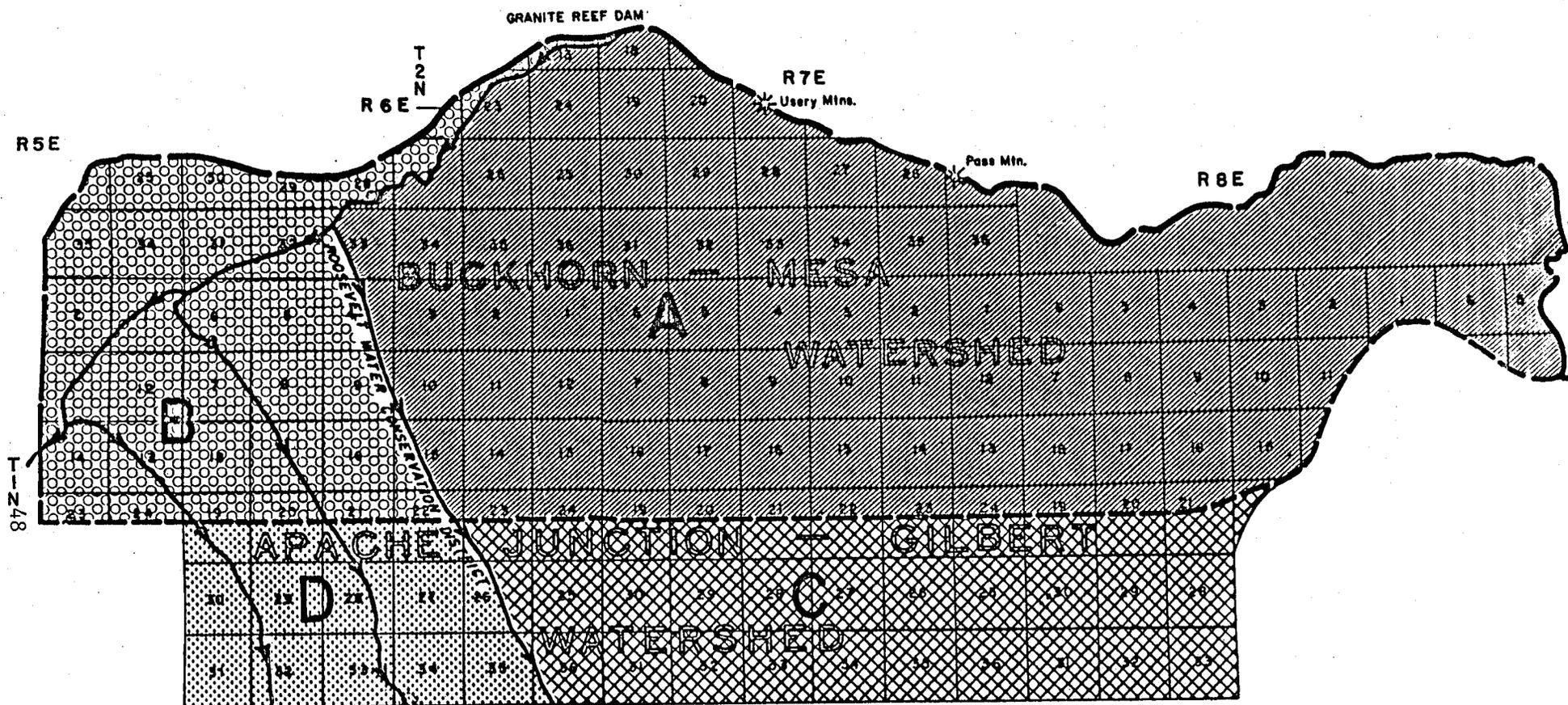
<sup>2/</sup> These acres are based on no internal storm drainage network. With an adequate internal drainage system, these acres would be approximately two-thirds of shown values and no homes would have interior water damage.

REDUCTION IN FLOODING - 1974  
 Outside Buckhorn-Mesa Watershed 1/  
 (Acres)

<u>Location</u>	<u>Land Use</u>	<u>Total</u>	<u>100 Year Frequency Storm</u>	
			<u>Without Project</u>	<u>With Project</u> <sup>2/</sup>
Upstream (C) of RWCD Floodway	Cropland	2,000	2,000	1,200
	Rangeland			
	Upland Desert	7,200	2,360	1,600
	Riparian	1,400	1,000	800
	Urban			
	Residential & Commercial Ranchettes	4,600 --	1,600 --	480 --
	Subtotal	15,200	6,960	4,080
Downstream (D) of RWCD Floodway	Cropland	6,540	3,540	1,820
	Rangeland			
	Upland Desert	--	--	--
	Riparian	--	--	--
	Urban			
	Residential & Commercial Ranchettes	1,000 --	520 --	120 --
	Subtotal	7,540	4,060	1,940
TOTAL		22,740	11,020	6,020

1/ The area estimated to be affected by the structures is bounded on the west by Gilbert Road, on the north by Apache Trail, on the east by Tomohawk Drive, and on the south by Baseline Road.

2/ Based on construction of proposed FRS and floodways in Buckhorn-Mesa Watershed, along with the RWCD Floodway from Brown Road to Apache Trail.



AREAS DESCRIBED  
in Tables Showing  
Effects of Buckhorn-Mesa Structural Program

AREA DESIGNATION	DESCRIPTION	TOTAL ACRES IN AREA
A (Buckhorn-Mesa Watershed)	Upstream (East) of RWCD Canal	53,172
B (Buckhorn-Mesa Watershed)	Downstream (West) of RWCD Canal	16,000
C (Apache-Junction Watershed)	Upstream (East) of RWCD Canal	15,200
D (Apache-Junction Watershed)	Downstream (West) of RWCD Canal	7,540

BUCKHORN-MESA WATERSHED

Changed Land Use Resulting From  
Project Installation

Structure No. or Name	Present Land Use	Area of Changed Land Use				Total Area <sup>1/</sup> Acres
		Dam & Emergency Spillway Acres	Borrow Acres	Sediment Pool Acres	Design Storm Pool Acres	
1	Upland Desert	48	83	47	116	164
	Desert Riparian	10	17	10	24	34
2	Upland Desert	37	83	51	127	164
	Desert Riparian	8	17	10	26	34
3	Upland Desert	23	71	30	87	110
	Desert Riparian	5	14	6	18	23
4	Upland Desert	93	191	139	340	433
	Desert Riparian	19	39	28	70	89
7	Upland Desert	26	66	33	116	142
	Desert Riparian	5	14	7	24	29
Apache-Junc- tion Flood- way	Upland Desert				1.2	1.2
	Desert Riparian				0.3	0.3
Apache-Junc- tion Dam Outlet	Upland Desert				0.5	0.5
	Desert Riparian				0.1	0.1
Bulldog Floodway	Upland Desert				4.7	4.7
	Desert Riparian				1.0	1.0
Pass Moun- tain Dam Outlet	Upland Desert				0.9	0.9
	Desert Riparian				0.2	0.2
Signal Butte Floodway	Upland Desert				8.2	8.2
	Desert Riparian				1.7	1.7
Spook Hill Dam Outlet	Upland Desert				62.5	62.5
	Desert Riparian				12.8	12.8
Totals		274	595	361	1,042.1	1,316.1
<u>SUMMARY</u>						
Upland Desert		227	494	300	864.0	1,091.0
Desert Riparian		47	101	61	178.1	225.1

<sup>1/</sup> Borrow and sediment pool areas are included in the design storm pool area.

Wildlife populations that at present depend on habitat in the previously mentioned areas will be lost. These populations are expected to be reestablished when planted vegetation becomes sufficiently mature in 10 to 20 years to satisfy food, cover and nesting requirements. Until the area cleared is revegetated, there will be increased wind and water erosion and negative esthetic effects.

The design storm pools will total 1,042 acres. The borrow and sediment pool areas (595 acres) are included in this total. Excluding that acreage needed for channel work, the remaining reservoir areas (353 acres) will not be cleared but will sustain periodic inundation.

Effects on vegetation in the flood pool areas vary depending upon frequency and duration of inundation. Vegetation within flood pools at the lower elevations will be reduced in value to wildlife due to frequent inundation. Flood pools for the less frequent storms, up to about the 10 year level, will have an increase in vegetation density. The conditions produced by periodic storage at this level, however, result in conditions more conducive to the growth of salt cedar than native species such as mesquite. While salt cedar does provide wildlife cover, it is not as desirable as native plant species. Vegetation in the flood pools with very infrequent storage will not be greatly affected.

The structures will have a visual impact on the rapidly developing area--an area to which people are moving because of its scenic and natural beauty. The areas most affected will be where the structures parallel major roads, at road crossings, and where developments are in proximity to the structures. The structures will be imposed onto a broad open landscape with mountains in the background. The uniformity of line and color will contrast with the natural horizon and colors. As the observer moves closer to the dam, the natural horizon will be more obscured by the dam; and the dam will dominate the horizon. About 595 acres will be stripped of vegetation for borrow material with which to build the dams. This will have a visual impact on the area.

The landscape design goal will be to minimize the visual impact of the structure by maximizing the coordination between the landscape of the dams and borrow areas and existing natural desert. A visual resource analysis will be performed not only to identify the landscape quality but also to give guidelines for landscape designs. Specifically, zones of particular treatments will be determined such that the areas with the greatest visual impact will receive the maximum design treatment. The landscape techniques will include, for example, the revegetation with native materials and the establishment of a desert earth texture onto the surface of the dams. Thus, as the plants grow and surface weathers, the adverse visual impacts will decrease.

Floodwater Retarding Structure No. 3 is located on the southern boundary of the Usery Mountain Semi-Regional Park. The landscaping

plan for the structure and uses of the structure will be determined by a landscaping committee during the final design stage. One proposal received is that the structure be included in the Phoenix Area network of trails. The elevation of the structure would provide a different view of the surrounding area and a focal point for that part of the park. Another proposal is that the dam and reservoir be constructed to serve as an amphitheater.

Runoff from the watershed does not normally reach any perennial streams. Under present conditions, runoff from the watershed is discharged through a series of small washes and overland flow into the Roosevelt Water Conservation District Floodway. Installation of the proposed floodwater retarding structures will cause a portion of the runoff from the area controlled to be diverted into the perennial Salt River. On an average annual basis, the amount of water diverted from the watershed to the Salt River is estimated to be 320 acre-feet. Another 130 acre-feet, on an average annual basis, will be trapped by the structures but released down designated washes at non-damaging rates. Runoff originating from the watershed area above the proposed Weekes Wash structure will be returned to its present course at a controlled release rate. The releases resulting from small storms in the designated washes and Weekes Wash will percolate into the soil. Prolonged releases, resulting from large storms, will reach the RWCD Floodway. This floodway outlets into the Gila River. ★

It is estimated that under present conditions, a maximum of 50 percent of the average annual runoff (225 acre-feet) from the watershed reaches the water table as ground water recharge. Geologic conditions along the proposed alignment of the four interconnected damsites are not conducive to significant ground water recharge rates. A reduction of 160 acre-feet in the amount of ground water recharge is anticipated as a result of the diversion of water into the Salt River. This will have no significant effect on the total amount of ground water in storage, the water table elevation, or on subsidence in the area.

Ground water recharge will be increased in the area downstream from the Weekes Wash damsite and the designated washes that have gated pipes through the dam. The controlled release rate of floodwaters will increase the time of availability of runoff water, thereby increasing the amount of water which can infiltrate through the channel bed and recharge the ground water table.

The riparian vegetation along the desert washes is there because of the increased amounts of water available to the plants from flows in the washes. The gated pipes through the dams will be sufficient to maintain the downstream riparian vegetation in a healthy condition in the selected washes. Riparian vegetation above the structures will increase in cover and vigor.

In the natural wash that will be used as a temporary outlet for Spook Hill Dam there is one and one-half acre-feet of sand bedload. This bedload extends from Bush Highway upstream to the point where the constructed outlet enters the natural wash. The bedload depth ranges from 0 to 2 feet. A 10-year frequency flow (or greater), without the project, will transport this bedload through the culverts under Bush Highway. Most of this bedload would then be deposited on the Salt River flood plain and in a three-acre marsh approximately 1,200 feet below the highway. With the project the entire one and one-half acre-feet will be trapped in the sediment basin.

The three-acre marsh will be checked periodically after installation of the project to insure that there is no acceleration in the rate of loss. If it is determined that the project is accelerating the loss, then an alternative means of keeping sediment out of the marsh will be determined and implemented. This will insure protection of the Type 5 wetland and associated wildlife species, including the Yuma clapper rail.

The average annual suspended sediment yield introduced into the Salt River from the project amounts to 0.5 acre-feet per year. It is estimated that the average annual suspended sediment concentration in the release flows from the Spook Hill structure is 400 parts per million. Suspended sediment of this concentration does not present a water quality problem to fish in this one-half mile reach of the river. However, to measure the short and long term effects of the project release flows being introduced into the Salt River, action will be initiated with appropriate agencies and sponsors to establish a monitoring program.

The U. S. Forest Service recreation area is subject to inundation from large flows in the Salt River and from large flows in the natural wash that will serve as a temporary outlet for the Spook Hill structure. A low dike will be installed on the west side of the recreation area to direct flows in the natural wash away from the area. Complete protection from inundation cannot be accomplished because of the low elevation in relation to the Salt River.

The Bureau of Reclamation in designing and locating the least costly route for the Central Arizona Project aqueduct took advantage of the flood protection offered by the structural measures in this watershed project. Without the flood protection afforded the CAP aqueduct by this project, the Bureau of Reclamation would need to construct flood protective works for this section of the aqueduct. The design would be cross-drainage structures that would give very little flood protection downstream or floodwater retarding structures similar to those in this watershed project.

Air pollution in the form of dust will occur during the construction period. Noise levels and traffic disruption around construction sites will increase.

The 1,316 acres used for project purposes will not necessarily preclude hunting of upland game on this acreage. However, the quality of hunting will be reduced on 963 acres because of the less dense vegetation. This acreage will be fenced to exclude livestock grazing. There are no cultivated lands required for installation of the structural measures.

Endangered and threatened species of wildlife of the watershed more normally inhabit the stream riparian habitat occurring along the Salt River. This habitat is not expected to change significantly in either quality or quantity.

Fishery resources of the watershed are restricted to the Salt River and Granite Reef Dam area. Available fishing will be significantly affected by project construction. The suspended sediment being contributed to the Salt River from planned structural measures is about 0.04 percent of the total in the Salt River. The effect on fish population will be slight.

★ There will be no closures of dedicated or accepted roads or bridges resulting from the project. There will be minor relocation work on nine bridges and seven roads within the watershed. However, this will not significantly influence travel time to any point in the watershed since detours will be necessary for only short periods of time.

The flood prevention structural measures will pass through less than five acres of developed urbanized area with minimum disturbance of private dwellings. Four families will need to be relocated. No farm or non-farm related businesses are in the structural locations. The relocation will be according to P.L. 91-646 and includes adequate advisory assistance.

The Superstition Freeway is to be built in the area where flood peaks would be reduced by structural measures in the Buckhorn-Mesa Watershed. The peak flows through the Freeway for a distance of about ten miles would be reduced by about 65 percent.

A survey of the areas where the floodwater retarding structures, pool areas, and floodways are to be located identified only one archeological site with any significance that would be affected. This site has been salvaged. If additional sites are unearthed during construction, work will be suspended; and the National Park Service and the State Historic Preservation Office will be notified.

Land rights for the project will require that 1,412 acres of private land be removed from the tax rolls. This will reduce the taxable property in the county. A small mine exists in the reservoir area of the Weekes Wash Dam and mineral claims have been filed on a portion of the area needed for the Spook Hill Dam outlet channel. These will need to be either acquired or cleared.

The water supply needed for projected urban development is inadequate. Possible sources of additional water for future urban development are conversion of water presently used for irrigation, the Central Arizona Project, and the Salt River system.

## ECONOMIC AND SOCIAL

Floods disrupt the local economy contributing to a general loss of business. Property is damaged and property owners are inconvenienced. Labor employed in productive endeavors must be diverted to repairs of residential and commercial damages. These conditions will no longer exist, and residents and property owners will realize a better sense of security and safety without the threat of flooding.

The effects on the economy from the project relate to increased production of goods and services and reduced costs. Flood protection for cropland will increase production. The additional production will require harvesting, marketing, and processing, thus more jobs will be created.

The installation of the proposed structural measures will create 214 man-years of skilled employment valued at \$5,300,000 and 58 man-years of semi-skilled jobs valued at \$1,300,000 during the construction period.

The skilled jobs will be for equipment operators, carpenters, etc., while semi-skilled opportunities will be filled by laborers involved in project construction work.

The operation and maintenance of the structural measures will create employment for the equivalent of at least two permanent jobs.

There will be a separation of urban developments with the installation of the structural measures. This will result in minor social impacts such as lower visual quality of the surrounding area and limited access to neighbors on the opposite side of the structure. However, roads will cross the structures at regular intervals. ✕

Traffic will no longer be disrupted and transportation problems and costs to businesses and residents will be eliminated.

Harvesting of agricultural crops will be possible without delays due to flooding of fields and roads.

Health hazards caused by flooded cesspools and ponded water which quickly stagnates and becomes a thriving habitat for mosquitos will be reduced.

The actual construction along the proposed alignment will not result in any unusual land value changes. Flood prevention structures have been anticipated in this general location for several years.

The per capita income, including that of minority and low income persons, will not be appreciably affected by the project.

All relocations will be accomplished under the provisions of Public Law 91-646. Relocation assistance advisory services will be provided to relocatees in securing adequate replacement housing in an ample amount of time. Multiple real estate listings indicate sufficient availability of suitable housing. The change in friends and normal activities will require adjustment on the part of individuals being moved.

## FAVORABLE ENVIRONMENTAL IMPACTS

1. Provide protection for 4,180 acres of the 5,780 acres of urban land presently subject to damage from the 100-year frequency flood. An estimated 2,520 acres of the 3,820 acres of irrigated cropland will receive protection from the 100-year frequency flood.
2. Help stabilize the agricultural industry in the immediate area.
3. Reduce sediment moving downstream onto developed land by 823 acre-feet over the life of the project.
4. Reduce average annual floodwater damage by 64 percent.
5. Limit flooding from a 100-year frequency flood to yards, streets, and parking lots in present and future urban developments with a combination of nonstructural and structural measures.
6. Provide increased opportunity for ground water recharge below Weekes Wash Dam and on washes with gated pipes through the dam.
7. Reduce flooding on 11,020 acres outside the watershed.
8. Provide protection to 10 miles of the planned Superstition Freeway and a portion of the CAP aqueduct.
9. Reduce flood plain scour and erosion on the area protected.
10. Increase land productivity by providing flood protection to 5,780 acres of cropland.
11. Increase job opportunities through construction and operation and maintenance of the project.
12. Improve the health, welfare, and quality of living of the watershed residents by controlling floodwaters.
13. Protect the U. S. Forest Service recreation area from flows in the natural wash that will be used as a temporary outlet for Spook Hill Dam.

## ADVERSE ENVIRONMENTAL EFFECTS

1. Temporary loss of 164 acres of desert riparian vegetation and 799 acres of desert upland vegetation through construction activities. Wildlife populations now using these areas will be lost but will reestablish as planted vegetation matures.
2. Less ground water recharge for the area downstream of the floodwater retarding structures by 160 acre-feet on an average annual basis.
3. Infringement on the desert slope views by the floodwater retarding structures. Uniformity of line and color of the structures will contrast with the natural landscape.
4. Increased air pollution and noise during construction.
5. Disruption of traffic during construction.
6. Relocation of four families.
7. Disturbance of one significant archeological site. Salvage was done by a qualified archeologist.
8. Removal of 1,412 acres of private land from the tax rolls.
9. Accelerated movement of the bedload that exists in the natural wash that will serve as a temporary outlet for Spook Hill Dam.

# ALTERNATIVES

## ALTERNATIVE NO. 1

### NO PROJECT

This alternative includes the ongoing land treatment program. Because technology, land use, and land ownership change, the land treatment program is in a continuous updating process. The Soil Conservation Service, through the Natural Resource Conservation Districts, will continue to provide technical assistance for installation of this program.

Land use projections for the "No Project" alternative are the same as for the other alternatives. As desert land and cropland are taken for urban development, the following are among the impacts that are expected: loss of productive cropland; loss in scenic quality; reduced air and water quality; more energy use; loss in wildlife habitat; and more traffic congestion.

Officials of the community recognize that a flood problem exists. With or without this project, a flood plain management program will be developed. The flood plain management program will encompass proper land-use planning, protective measures for existing developments, and land-use regulation.

Specific flood hazard areas will be identified through detailed flood plain information studies. Common recognition of these hazards will be the key to the action program for flood plain management that will follow.

The first item in the action program is adjustments in existing structures and occupancy in the identified flood hazard areas. Because of characteristics of the flood plain, the studies may show that most present development is in a flood hazard area. From studies of aerial photographs, it is estimated that there are 19,940 existing homes or commercial establishments that would need to be floodproofed. A preliminary cost estimate to floodproof these establishments is \$64,000,000.

Flood plain land use will be controlled through the following: zoning ordinances; subdivision regulations, including utility extensions; building codes; acquisition and evacuation; building financing and related tax assessment adjustments; flood hazard warning signs and notices; and flood insurance. The regulations will have two purposes. One is to maintain adequate floodways that have sufficient cross-section area for passing a specified flood flow through the developed areas without damage. The second is to regulate development of the flood plain to prevent damages to future development.

Cost of the structural measures would be considerably more than the planned project measures. They would consist, to a great extent, of floodproofing by diking existing development; maintaining floodways for internal drainage of present and projected developments; and floodproofing of future development through either dikes or landfills, with subsequent increases of the flood problem in unfilled areas. With the planned project measures, only the floodways will be required; and these would be substantially reduced in size.

Under the "No Project" alternative, a total of 823 acre-feet of sediment would move downstream causing damage to roads, bridges, irrigation facilities, urban developments, crops, and other properties over the next 100 years. Periodic floodwater and erosion damage, consisting of scour damage to cropland and other unprotected land, would occur.

On an average annual basis, the project will provide benefits of \$2,808,790 while costs will be \$1,122,800. The net monetary benefits to be foregone by not implementing the project is estimated to be \$1,685,990 annually.

## ALTERNATIVE NO. 2

### STRUCTURAL PROTECTION FOR EXISTING URBAN DEVELOPMENTS ONLY, WITH FURTHER URBAN BUILDUP PREVENTED

This alternative would protect existing urban developments by means of structural works. Future flood damages would be reduced by prohibiting further intensive land use in the flood plain. Strict land-use zoning, purchase of development rights, and other nonstructural means would be used to prevent flood plain buildup. Implementation would be dependent upon changes in state and local laws to reduce taxes on agricultural and open space lands and to provide for public acquisition of land development rights. To prevent increases in runoff from upland areas which affect the flood plain, restrictions to further urbanization would be required.

The structural measures as included in the planned project would be installed. Environmental effects resulting from these measures also would be the same as with the planned project. The on-going land treatment program would be included.

Flooding of urban land would be reduced from 5,780 acres to 1,600 acres from the 100-year frequency flood. Homes on the remaining 1,600 acres subject to damage would need floodproofing.

Restrictions to urbanization would tend to maintain the present status of urban development and would result in about 26,000 more acres of agriculture open space lands in the watershed than with the project plan. Productive cropland would be preserved; scenic quality would not

be affected; air and water quality would be improved; energy use would be reduced; wildlife habitat would be preserved; and there would be less traffic congestion.

The total cost for this alternative would be an estimated \$72,000,000. The economic, social, and environmental effects of requiring home builders and businessmen to seek other sites would be an important consideration for this alternative. Urban benefits would increase.

### ALTERNATIVE NO. 3

#### STRUCTURAL PROTECTION FOR ALL FLOOD PRONE AREAS, BUT WITH FURTHER URBAN BUILDUP PREVENTED ON PRIME IRRIGATED CROPLAND

This alternative contains structural and nonstructural measures that would protect existing urban development in the flood plain. Purchase of development rights and other nonstructural means would be used to prevent further urban encroachment on prime irrigated land. It would allow additional urban development on other land if floodproofing and other non-structural means are used to control flood damage.

Projected urban development is the same as the planned project. The acreages would be cropland, 10,905; rangeland, 14,105; and urban and other, 44,162. The effects of this alternative would be essentially the same as the planned project except that prime irrigated cropland would stay in production. The acreage of cropland would serve as open space to enhance the quality of life for residents of the area. The flood protection for the cropland will increase production and reduce costs. A more diversified economy will be realized.

The total estimated cost of this alternative would be \$124,000,000.

### ALTERNATIVE NO. 4

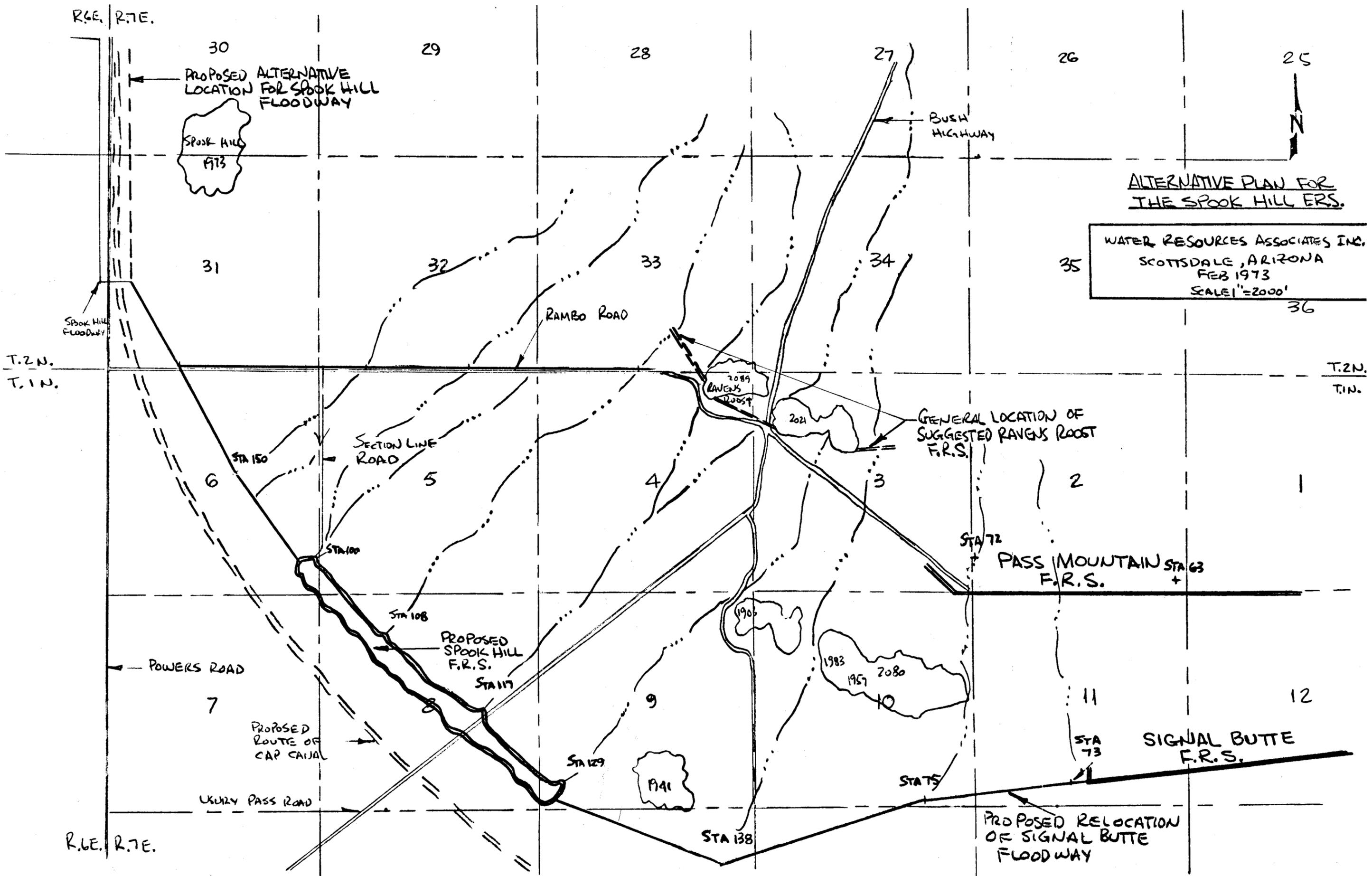
#### ALTERNATIVE TO THE SPOOK HILL FLOODWATER RETARDING STRUCTURE

The East Mesa Area Development Association (EMADA) hired an engineering consultant to develop an alternative to the Spook Hill Floodwater Retarding Structure. Information submitted on cost was:

Preliminary estimates of cost indicated that the proposed alternative plan might cost an additional \$500,000 for construction and that there could be as much as \$1.5 million savings to rights-of-way costs.

ALTERNATIVE PLAN FOR THE SPOOK HILL F.R.S.

WATER RESOURCES ASSOCIATES INC.  
SCOTTSDALE, ARIZONA  
FEB 1973  
SCALE 1"=2000'



PROPOSED ALTERNATIVE LOCATION FOR SPOOK HILL FLOODWAY

SPOOK HILL 1973

BUSH HIGHWAY

RAMBO ROAD

SECTION LINE ROAD

GENERAL LOCATION OF SUGGESTED RAVENS ROOST F.R.S.

PASS MOUNTAIN F.R.S.

POWERS ROAD

PROPOSED SPOOK HILL F.R.S.

SIGNAL BUTTE F.R.S.

PROPOSED ROUTE OF CAP CANAL

PROPOSED RELOCATION OF SIGNAL BUTTE FLOODWAY

LUXURY PASS ROAD

STA 138

STA 129

STA 73

STA 100

STA 108

STA 150

STA 117

STA 72

STA 63

1941

1906

1983

1957

2080

2089

2021

6

5

4

3

2

1

7

9

10

11

12

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32

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The Association expressed several concerns for developing the alternative. Among these were:

1. Structure could be a hazard.
2. Structure is a threat to property values.
3. Substantial savings in rights-of-way cost.
4. Alternative is better suited for inclusion of park and recreation facilities.
5. Imminent possibility of major suburban development of the Spook Hill structure.
6. Protection of property and facilities on south slopes of the Usery Mountains.

The alternative plan proposes the elimination of the Spook Hill Dam in its planned location and substitutes a reservoir as shown on the attached plan with a surface area of 125 to 130 acres, 10 to 12 feet deep with a capacity of approximately 1200 to 1400 acre-feet. The construction of the reservoir in the location shown is to be partially cut and partially filled so that the southwest side of the reservoir is elevated approximately five to six feet above existing ground, with the bulk of the area needed for the reservoir placed on public lands.

In order for this alternative plan to be workable and feasible in the form presented, it is assumed that other flood protection plans are to be implemented in the form as shown in existing reports or perhaps by other methods accomplishing the same end results.

This proposal was discussed with EMADA and the consultant on March 22, 1973. It was pointed out at this meeting that the data furnished was not adequate to review the technical or environmental adequacy. A general meeting regarding this proposal was held April 13, 1974. Represented at this meeting were: EMADA; cities of Mesa, Gilbert, and Apache Junction; East Maricopa Natural Resource Conservation District; Arizona Water Commission; State Legislature; Arizona Bank; U. S. Bureau of Reclamation; Flood Control District of Maricopa County; Roosevelt Water Conservation District; and the Bureau of Indian Affairs. Concensus of this group, other than EMADA, was to proceed with the project as formulated.

By letter, on April 17, 1973, the Maricopa County Flood Control District reaffirmed their position regarding the project as now formulated.

## ALTERNATIVE NO. 5

### ACCELERATED LAND TREATMENT AND FLOODWAYS

This would entail land treatment measures supplemented by 43 miles of concrete-lined floodways. Six different floodways would be built in the upper watershed to collect the runoff. Each floodway would empty into

the RWCD at different locations. The floodways could be aligned to miss most homes, but bridges and relocation of utilities would be a major cost. Total cost of this alternative is estimated to be \$75,000,000.

Environmental impacts include the following:

1. Sediment would be dumped into the RWCD Floodway and not stored. Downstream development would be protected from sediment damage.
2. Approximately the same level of flood prevention would be realized as in the recommended plan.
3. Less native desert vegetation would be disturbed. More cropland would be required.
4. There would be less visual impact on the rapidly developing area.

#### ALTERNATIVE NO. 6

#### ACCELERATED LAND TREATMENT AND FLOODWATER RETARDING STRUCTURES

This would entail land treatment measures supplemented by five floodwater retarding structures. The floodwater retarding structures in the recommended plan would be extended to replace the floodways. Total cost of this alternative is \$26.4 million.

Environmental impacts include the following:

1. The same level flood prevention as the recommended plan would be realized.
2. Greater visual impact on the local area.
3. Storage pool areas would increase by 270 acres, affecting that much more native vegetation.
4. An additional four homes would need to be relocated.

## SHORT-TERM VS. LONG-TERM USE OF RESOURCES

Use of land for structural measures will not significantly restrict future options or limit productivity. Floodwater retarding structures, pool areas, borrow areas, and floodways will preclude full optional use of 4.3 percent of the watershed area. Opportunities for productive use will be maintained or enhanced on the remaining 95.7 percent.

The Type I River Basin Report for the Lower Colorado Region indicates that installation of the Buckhorn-Mesa Watershed Project will be compatible with future long-term uses of land, water, and other natural resources of the watershed. Development of these resources according to the planned project will not only help alleviate immediate problems such as flooding, sediment, and erosion, but will also enhance options available for long-term uses such as economic and urban growth.

Land use projections show that the flood prone area of the watershed will be developed for residential and industrial purposes, without or with a project. If a project of flood plain management and flood protection is not undertaken in the near future, land and water resource problems will increase.

The plan provides a level of protection consistent with the needs and anticipated use of the flood prone area. With a properly planned and implemented flood plain management program, present development plus all new development can be provided with 100-year frequency protection. It will aid in orderly development of natural resources of the area using conservation and environmental measures to maintain the usefulness of the lands for use by future generations.

All structural measures have been evaluated for a 100-year period. During this period, the dams and floodways will provide their designated level of flood protection. After the project has served its useful 100-year life, sediment accumulation in the reservoirs will gradually decrease flood protection. Several alternatives will be available to local sponsors at this time such as:

1. Perform any necessary maintenance, clean out accumulated sediment, and continue use of the structures as in the past.
2. Modify the dam to the extent that original storage capacity will be restored.
3. Demolish the structure and use the land for other purposes.
4. Any other alternative that provides a useful purpose.

Land treatment measures will continue to be effective as long as they are properly maintained.

The Buckhorn-Mesa Watershed comprises about 0.2 percent of the total area of the Gila Subregion within the Lower Colorado Region in Arizona. Five P. L. 566 watershed projects have been completely installed, and seven other P. L. 566 watershed projects are being installed in the Subregion. Three other projects have been approved for planning. Thirty-six additional watersheds in the Subregion have been identified as having development potential. <sup>15/</sup> The following table lists pertinent information for watersheds in the Subregion:

#### STATUS OF THE PL-566 PROJECTS IN THE GILA SUBREGION

Watersheds Installation Completed	Dams No.	Drainage Area Controlled Sq. Mi.	Sediment Storage Ac. Ft.	Floodwater Storage Ac. Ft.	Channel Improvement Mi.
FLORENCE	1	63.4	755	4,060	1
FRYE CREEK-STOCKTON	5	203	2,800	7,500	14
MAGMA	1	62	160	4,850	11
WHITE TANKS	2	34	170	3,520	11
VANAR	0	0	0	0	6
ARROYOS NO. 1	12	29	420	1,400	1
Subtotals	21	391.4	4,305	21,330	37

#### Watersheds Authorized for Installation

WICKENBURG	2	1.9	26	274	0
APACHE JUNCTION	1	49.9	175	3,960	15
WILLIAMS-CHANDLER	2	109.1	380	7,700	9
GUADALUPE	1	1.9	25	265	0
BUCKEYE	3	88.9	2,310	8,000	3.5
PERILLA MOUNTAIN	2	32.8	330	3,018	6.5
HARQUAHALA	3	136.7	925	8,707	15.0
Subtotals	14	421.2	4,171	31,924	49
BUCKHORN-MESA	5	42.5	825	3,551	7
TOTAL	38	853.2	9,275	56,531	93

#### Watersheds Authorized for Planning

DOS CABEZAS	- Cochise County
EAGLE TAIL	- Maricopa County
GILA FLOODWAY-LOWER QUEEN CREEK	- Maricopa and Pinal Counties

The project is not designed to correct land and water resource use problems on a short-term or immediate basis, but for a 100-year period.

The project is expected to be effective in conserving land and water resources long after its designed life. The degree of flood prevention will remain high if land use changes have been projected correctly so assumed future hydrologic conditions are correct. Sediment control will continue long after the designed life of the structure, especially if hydrologic conditions are improved beyond those proposed in this project or if sediment is removed from the storage areas provided at each site.

Individually, the effects of the PL-566 watershed projects on the main stem of the Gila River will be very difficult to assess. Taken collectively, the 38 floodwater retarding structures proposed or installed in the 13 PL-566 watershed projects and Buckhorn-Mesa project will control a drainage area of 850 square miles. This is about 1.5 percent of the total Gila River drainage area. About 625 square miles of the controlled drainage area are located above the junction of the Santa Cruz River and Gila River. In other words, the PL-566 projects will control 2.2 percent of the drainage area above this junction. Structures in these projects call for 9,275-acre feet of sediment storage and 56,500 acre-feet of floodwater detention storage. Over 45 miles of floodways have been installed, 3 miles are under construction, and 45 miles are planned for construction.

Storage provided in these dams for floodwater detention amounts to about 1.25 inches of run-off per acre controlled. Hydrologic studies of large drainage areas indicate that this type of structure will influence peak flow in the main channel generally in direct proportion to the percent of the total drainage area controlled. This will indicate a total reduction of about two percent in peak flows in the Gila River immediately below its confluence with the Santa Cruz River and a one and one-half percent decrease in peak flows for the total drainage area of the Gila River.

Works of improvement in this project are complementary to those in other water resource projects in the Gila Subregion. The Corps of Engineers have a system of floodwater retarding structures and channels either planned or installed to give flood protection to portions of the Phoenix metropolitan area. The Bureau of Reclamation, as part of the Central Arizona Project, plans to build the Orme Dam or a suitable alternative. A system of floodwater retarding structures to protect the CAP aqueduct across the Paradise Valley area is also planned. At the same time, these structures will be protecting developments downstream. Works of improvement in the Buckhorn-Mesa Watershed Project plus those in the two watershed projects to the south will supplement protection provided by the Corps of Engineers and the Bureau of Reclamation projects by giving additional protection to those developments in the eastern part of the Phoenix metropolitan area.

## IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Committed to the dams, storage pool areas, and floodways will be 1,316 acres of rangeland. This will be an essentially irreversible commitment as long as the structures are used. The composition of the rangeland is: Upland Desert, 1,091 acres and Desert Riparian, 225 acres.

There are four families that will be displaced by land rights acquisition for the floodwater retarding structures and floodways.

The commitment of the land and water resources described above does not preclude the physical use of the resources for other purposes.

Labor required for construction and maintenance of structural measures will be irretrievably committed.

# CONSULTATION AND REVIEW WITH APPROPRIATE AGENCIES AND OTHERS

## General

Consultation with individuals, groups, and governmental bodies has been a continuing part of developing this plan since interest began in 1960. The original application for planning assistance was filed; and in 1960, the State Land Department gave the watershed top priority for planning in the State. The application for planning assistance was sent to Washington, D. C., July 29, 1960. The Preliminary Investigation was completed in February 1961. Planning authority was issued on March 13, 1961.

Field surveys were made throughout the watershed. Permission to trespass for the field survey was obtained from each landowner; at that time the reason for the survey was explained. In addition to the landowners, the following people, firms, and agencies were among those consulted during the planning process.

U. S. Army Corps of Engineers, Los Angeles District; U. S. Fish and Wildlife Service; U. S. Forest Service; U. S. Bureau of Reclamation; U. S. Bureau of Land Management; U. S. Bureau of Indian Affairs; U. S. Department of Health, Education and Welfare; U. S. Bureau of Mines; U. S. Geological Survey; National Park Service; Arizona Land Department; Arizona Water Commission; Arizona Game and Fish Department; Arizona Highway Department; Maricopa County Parks and Recreation Department; Maricopa County Planning and Zoning Department; Maricopa Association of Governments; Office of Planning and Development; City of Mesa; City of Gilbert; Unincorporated town of Apache Junction; East Mesa Area Development Association; Maricopa County Board of Supervisors; and Maricopa County Highway Department.

Between 1960 and the present, numerous news articles and pictures have appeared in local papers relating to activities and information concerning the Buckhorn-Mesa Watershed Project. Letters have been written to federal, state, county, and city officials, as well as local organizations and individuals, in an effort to provide ample opportunities for the general public to participate in the planning process. Television interviews have been conducted explaining to the general public of Arizona the watershed project.

There has been a resurgence of consultation with individuals, groups, and governmental bodies since the National Environmental Policy Act of 1969 became effective.

Numerous meetings have been held with the Sponsors; State Game and Fish Department, U. S. Fish and Wildlife Service, city mayors, city, county, and regional planning groups, environmental and sportsmen groups and individuals, as well as industrial people, in regard to land use policy and environmental considerations.

Discussion and Disposition of Each Comment on Draft  
Environmental Impact Statement

Letters of comment concerning the draft environmental impact statement were requested from each of the following departments, agencies, organizations, groups, and individuals:

<u>Federal Government</u>	<u>Responded</u>
Department of Agriculture	
Office of the Secretary	Yes
Agricultural Research Service, Phoenix, Arizona	No
Agricultural Stabilization and Conservation Service, Phoenix, Arizona	No
Economic Research Service, Berkeley, California	No
Farmers Home Administration, Phoenix, Arizona	No
Forest Service	
Regional Forester, Albuquerque, New Mexico	No
Forest Supervisor, Phoenix, Arizona	Yes
Department of the Army	
Assistant Secretary of the Army (Civil Works)	Yes
Asst. Chief, Planning Division, Corps of Engineers, San Francisco, California	Yes
District Engineer, Corps of Engineers, Los Angeles, California	No
Study Manager, Phoenix Urban Study Corps of Engineers, Phoenix, Arizona	Yes
Department of Commerce	
Deputy Assistant Secretary for Environmental Affairs	Yes
Department of Health, Education, and Welfare	
Director, Office of Environmental Affairs	Yes
Assistant Secretary for Health and Scientific Affairs	No
Regional Environmental Officer, San Francisco, California	No

Federal Government (Cont'd)Responded

Department of Housing and Urban Development	
Director, Federal Housing Administration	Yes
Director, Area Office, Los Angeles, CA	No
Director, Federal Housing Administration, Phoenix, Arizona	No
Department of the Interior	
Office of the Secretary	Yes
Regional Director, Fish and Wildlife Service, Albuquerque, New Mexico	No
Field Supervisor, Fish and Wildlife Service, Phoenix, Arizona	No
District Chief, Water Resource Division, U. S. Geological Survey, Tucson, Arizona	No
Area Director, Bureau of Indian Affairs, Phoenix, Arizona	No
State Director, Bureau of Land Management, Phoenix, Arizona	Yes
Chief, Bureau of Mines, Denver, Colorado	No
Regional Director, Pacific Southwest Region, Bureau of Outdoor Recreation, San Francisco, California	No
Regional Director, National Park Service, Santa Fe, New Mexico	No
Regional Director, Bureau of Reclamation, Boulder City, Nevada	No
Project Manager, Bureau of Reclamation, Phoenix, Arizona	No
Department of Transportation	
Deputy Chief, Office of Marine Environment and Systems	Yes
Environmental Protection Agency	
Regional Administrator, Region IX San Francisco, California	Yes
Chairman, Federal Power Commission	No
Advisory Council on Historic Preservation	
Assistant Director, Office of Review and Compliance	Yes

State and Local Government (Cont'd)

Responded

Governor of Arizona	Yes
Arizona Commission of Agriculture and Horticulture	Yes
Arizona Office of Economic Planning and Development	Yes
Arizona Department of Transportation	Yes
Arizona Game and Fish Department	Yes
Arizona State Parks Board	Yes
Arizona State Land Department	Yes
Arizona Outdoor Recreation Coordinating Commission	Yes
Arizona Department of Health Services	Yes
Arizona State University	Yes
University of Arizona	Yes
Arizona Water Commission	Yes
Arizona Department of Economic Security	Yes
Arizona Historical Society	No
Flood Control District of Maricopa County	Yes
Maricopa County Parks and Recreation Department	No
Maricopa County Highway Department	No
Maricopa County Manager	No
Maricopa Association of Governments	No
Maricopa County Board of Supervisors	Yes
Phoenix Historical Society	No
Pinal County Highway Department	No
City of Mesa	No
Pinal County Board of Supervisors	Yes
Indian Affairs Commission	Yes
Prescott Historical Society	Yes
Arizona Power Authority	Yes
Museum of Northern Arizona	Yes
Central Arizona Association of Governments	Yes
Southwestern Minerals Exploration Association	Yes
Civil Rights Division	Yes

Other Groups

East Maricopa Natural Resource Conservation District	No
Advisory Commission on Arizona Environment	No
Maricopa Audubon Society	No
Archeological Society	No
Arizona Conservation Council	No
Arizona Reclamation Association	No
Arizona Water Resources Committee	No
Arizona Wildlife Federation	No
Friends of the Earth	
Washington, D. C.	No
Scottsdale, Arizona	No

Other Groups (Cont'd)Responded

League of Women Voters	No
Sierra Club	No
Desert Sage Water Company	No
Arizona Public Service Company	No
Salt River Porject	Yes
Mountain Bell Telephone Company	No
Arizona Water Company	No
Roosevelt Water Conservation District	No
Gila Indian Reservation	No
Natural Resource Defense Council	No
Environmental Defense Fund	No
Environmental Impact Assessment Project	No
National Wildlife Federation	No
National Audubon Society	No
Student Environmental Workshop	No
El Paso Natural Gas Company	No
Stone and Webster Engineering Corporation	No
Archaeological Research Services	Yes
Planning Team, Sandpoint Zone, Forest Service, USDA	No
Extension Specialist in Natural Resources, Michigan State University	No
Center for Urban Affairs, Northwestern University	No
District Ranger, Mesa Ranger District, Tonto National Forest	No
Head Librarian, Missouri Botanical Garden	No
Ecology and Environment, Incorporated	No
Ecologist, Black and Veatch, Kansas City, Missouri	No
President, BRI Systems, Inc. Phoenix, Arizona	No
Team Leader, Yuma Clapper Rail Recovery Team	No

Individuals

Mr. Paul Abele	No
Mr. George Adams	No
Mr. J. H. Adams	No
Ms. Louise Adams	No
Mr. Norm Aubuchon	No
Mr. Dale I. Bailey	No
Ms. Glenda Bailey	No
Mr. Hanford Bates	No
Mr. George Beater	No
Mrs. Nonna L. Beaugureau	Yes
Mrs. Ginger Bidle	No
J. E. Blough	No
Mr. Dale Boggs	No

Individuals (Cont'd)Responded

Ms. Annie Bohunicky	No
T. S. Bollack	Yes
Mr. Kermit Bressner	No
Mr. Herb Browe	No
Mr. Bernie E. Brown	No
Mr. Theodore T. Budrow	No
Mr. and Mrs. Kenneth Button	No
Mr. Joseph Calderone	No
Mr. John Carpenter	No
Mr. S. Cavender	No
Ms. Elleene Chernka	No
Mr. Nick Cochrane	No
Mr. Arnold F. Cramer	No
Ms. Mahala Cramer	No
Mr. and Mrs. E. Crawford	No
Mr. O. Virgil Crismon	No
Mr. Carl Davis	No
Mr. and Mrs. John Davis	No
Dr. Truman Davis	Yes
Mr. Jim Decker	No
Mr. George Denehy	No
Ms. Grace deVos	No
Mr. Stan Dickerson	No
Mr. David Dong	No
Mr. and Mrs. R. C. Dumalao	No
Mr. Howard Easter	No
Ms. Gerry Eliot	No
Mr. and Mrs. Bernard Erickson	Yes
Mr. and Mrs. E. Evanson	No
Mr. Robert C. Fassett	No
Ms. Hildegard E. Feye	No
Mr. Kenneth E. Fix	No
Mr. James P. Forrest	No
Ms. Patricia Forrest	No
Fremont Junior High School, Attn: C. L. Pace	No
Mr. Ed Fujinaka	No
Mr. Edwin F. Gaines	No
Mrs. Ross L. Gardner	No
Dr. L. C. Gilland	No
Mr. and Mrs. Olin Goldman	Yes
Mr. Lloyd E. Gurtler	No
A. H. Hall	No
Mr. Randall Hamilton	No
M. Hardesty	No
Mr. Gerald Hart	No
Mr. Robert C. Hartnoll	No
Mr. A. G. Hatin	No
Mr. Cliff Heffron	No

Individuals (Cont'd)Responded

Mr. Leonard Heinzmann	No
Mr. A. C. Hinton	No
Mr. Charles Hobart	No
Mr. Harlan Hobbs	No
P. G. Holaren	No
Mr. R. M. Holliday	No
Mr. James A. Holmes	No
Mr. Howard Hough	No
Mr. Ron Houston	No
Mr. Ivan Hunt	No
V. B. Irvine	No
Mr. and Mrs. Douglas W. Johnson	No
Mr. and Mrs. Duane Johnson	No
Mr. Edward Johnson	No
Mr. Fred Johnson	No
Mr. Walter C. Jonas	No
Mr. Ray H. Jones	No
Mr. Robert W. Jones, III	No
Mr. John Kaufman	No
Mr. James F. Kellem	No
Mr. and Mrs. John Kodatt	Yes
Mr. Albert Korman	No
Ms. Ann Langdon	No
Mr. D. W. Laurie	No
R. D. Lewis	No
Mr. H. R. Lippincott	No
D. C. Litch	No
Mr. and Mrs. Don Lovitt	No
Mr. R. E. Lyons	No
J. A. McFall	No
C. E. McGatha	No
Mr. Jim McMillen	No
Mr. John R. Marasco	No
Mr. Bob Markley	No
Mr. Barry Master	No
Ms. J. W. Mertz	No
Mr. Bruce Meyerson	No
Mr. Harry J. Miller	No
Mr. Arthur W. Mohr	No
Mr. Jon M. Mills	No
Mr. C. W. Morris	No
Mr. Charles Murran	No
Mr. Ruben H. Nelson	No
Mr. T. Delbert Nelson	No
Ms. Arlene Newland	No
Mr. Edwin Nurmi	No
Mr. R. A. Nygard	No
Mr. John F. Octigan, Jr.	Yes
Mr. James O'Leary	No

Individuals (Cont'd)Responded

Mr. H. R. Orth	No
Mr. Dean Osterberg	No
Mr. Herbert Otto	No
Mr. Lannis Owens	No
Mr. Raymond R. Parent	No
Mr. Peter H. Paster	No
Mr. Lester J. Pease	No
Mr. Roy Powell	No
Mr. B. R. Pravel	No
Mr. Frank P. Price	No
Mr. and Mrs. L. Randall	No
Red Mountain Realty, Attn: Gene McDowell	No
M. R. Reed	No
Mr. Paul Rees	No
Mr. Jeff Relth	No
Ms. Adelaide Reynolds	No
Mr. Ben Richardson	No
Mr. and Mrs. Robert Riordan	No
Mrs. W. R. Robertson	No
Mr. A. P. Roclevitch	No
Mr. O. C. Rosenblatt	No
Ms. V. P. Ryan	No
Mr. Jack Sale	No
Mrs. W. Satchwell	No
Mr. R. Schillerstrom	No
Mr. Steve Schweitzer	No
Mr. Alden W. Sears	No
Mr. Russ Segel	No
Mr. Mike Shannon	No
Mr. Dan Shell	No
Mr. Levi A. Sleighter	No
Mr. Dean Sloan	No
Mr. Earl E. Smelt	No
Mr. Arvard R. Smith	No
Mr. John M. Smith	No
Mr. John M. Smith, Jr.	No
Jerry Snook	No
Mrs. George Souders	No
Mr. R. S. Spavin	No
Mr. Hunter Spear	No
Mrs. Michael C. Spotten	No
C. C. Stedman	No
Mr. Warren Steffey	No
Mr. and Mrs. Shelly Stevens	No
T. H. Stewart	No
Roz Stout	No
Mr. Ron Swisher	No
Mr. Edward Taylor	No
Mr. Richard Tucker	No
Mr. Stan Turley	No
Mr. Donald Watters	No
Ms. Alma Webb	No

Individuals (Cont'd)

Responded

Mr. Bruce Weisenberger	No
Mr. Fred E. Wells	No
Mr. Frank Welsh	No
Mr. Bill Whetten	No
Mr. Lloyd Whetten	No
Mr. Walter D. White	No
Ms. T. L. Williams	No
Mrs. Wayne Williams	No
Mr. Alfred Williamson	No
Mr. Robert Withers	No
Mr. Clay Withrow	No
Ms. Jill Woods	No
Melvin Worsley	No
Mrs. Francis Wrang	No
Ms. Cecile Wright	No
I. Wright	No
Mr. John Wyllie	No
Mr. Walt Ranks	No

The following are replies to comments concerning the draft Environmental Impact Statement.

Departments and Agencies of the  
Federal Government

United States Department of Agriculture - Office of the Secretary  
(Letter of September 25, 1975)

1. Comment: In the section entitled Present and Projected Population, you estimated the number of non-white residents within the Buckhorn-Mesa Watershed to be less than two percent of the present population or 1,080 people, about half of which are Negroes. Then in the Economic and Social section on page 54, you indicated that the per capita income of minority and low income persons will not be appreciably affected by the project. The use of terms non-white residents and minority persons gives rise to some confusion. According to Departmental usage, non-white includes (1) Negro, (2) Spanish-surname, (3) American Indian, (4) Orientals, and (5) All Other, and the term minority persons includes all non-whites.

Response: The term "non-white" has been changed to "minority."

2. Comment: Using the 1970 Census of Population for minorities or non-whites in both Maricopa and Pinal Counties as a guide, it appears that you did not include Spanish-surname (Spanish Americans) in the non-white population estimate for the Buckhorn-Mesa Watershed. The Census data show 140,607 Spanish-surnames in Maricopa County and 24,813 in Pinal County.

It's conceivable that the inclusion of Spanish-surname in the non-white grouping would make a difference, in your socio-economic impact assessment of the Buckhorn-Mesa Watershed, on the minority persons. If there is a change, this fact and its magnitude should be included in the final draft.

Response: Persons of Spanish-surname represent about 13 percent of the watershed population. We do not feel that inclusion of Spanish-surname people in the non-white grouping would make a significant difference in the socio-economic impact assessment on the minority persons.

3. Comment: Also, in the final draft, we recommend the use of either non-white or minority persons, not both in the same document unless each is defined.

Response: Appropriate changes have been made in final statement.

United States Department of Agriculture - Forest Service (Memorandum of July 24, 1975)

1. Comment: On forest lands the soil material along the floodway right-of-way, ranges from deep cobbly and clayey old valley fill to outcropping of granite bedrock. In some places the old alluvial fill is indurated with calcium carbonate and silica flows.

How stable will the dike and floodway bottom be where the floodway is built across so highly variable soil material? Will there be differential settling, cracking of the dike, high seepage losses, and possible washing out of the dike?

Response: In the design of a dike, consideration is given to differential settling, cracking, and high seepage losses along with many other factors that could cause failure. During construction, surface soils are removed, and a core trench is excavated deep enough to extend into relatively impervious material. The core trench is backfilled with suitable material placed and compacted as required for the earth embankment. Investigations have disclosed that differential settling, cracking, and high seepage losses will not be a problem in construction of this floodway.

2. Comment: Indications are that the constructed floodway will not be concrete lined so the stability of the surface soils is of concern to us. Will the constructed floodway resist lateral and vertical scouring?

Response: The constructed floodway is being designed to resist vertical and lateral scour as required by SCS criteria. Concrete lining of this floodway is not required to insure stability.

3. Comment: How will the floodway cut banks be stabilized? It is anticipated that the cut side slopes of the constructed floodway will range from 10 to 30 feet in height and will be visible from different areas. Much screening and stabilization will be necessary.

Response: Reaches in deep cut will be in hard granite and stabilization is not a problem. In final design, landscaping features will be determined in consultation with design engineers, landscape architects, local sponsors, and other interested local parties.

4. Comment: Prior to final field examination a complete set of cross-section plans should be furnished us so we will know just how much cut and fill there is at any given point.

Response: A set of drawings and quantity calculations related to this outlet will be made available to the Forest Supervisor of the Tonto National Forest for review and comment prior to final approval.

5. Comment: At the point where the constructed floodway empties into the natural drainage, is there sufficient natural capacity existing to transport flood-flows without excessive erosion? How will head cutting be avoided at this point?

Response: The constructed channel outlets onto a granite-lined natural wash. There is sufficient channel capacity to allow floodwaters to go unimpeded downstream to the box culverts under Bush Highway. Based on engineering and geologic investigations, no appreciable amounts of head-cutting or erosion will occur in the granite-lined wash.

6. Comment: Is the natural channel stable enough to transport the added floodwater, or will scouring and/or deposition be experienced? If so, where and to what extent?

Response: It has been determined that the granite lying beneath a thin bedload in the natural wash is stable and that there is sufficient capacity to carry the discharge from a 100-year frequency storm. The natural wash passes under Bush Highway through two 7-foot by 10-foot concrete box culverts.

It is proposed that stabilization measures will be designed to protect the concrete box culverts from head-cutting. These measures could include a short section of rock riprap channel or grade stabilization structures of reinforced concrete, gabion, or timber. Downstream of the stabilization structure a sediment basin will be constructed to trap bedload material. From this point to the Salt River water's edge, floodwater carrying suspended sediment will spread over the river flood plain and flow through a three-acre marsh. Flows will enter the river about one-half mile upstream of the Granite Reef Dam at non-erosive velocities.

Without the Buckhorn-Mesa project, a 10-year frequency flow in the natural wash would move all the bedload (one and one-half acre-feet) through the culverts under Bush Highway. If a 10-year or larger flow occurred in the natural wash under present conditions, a scour channel would be formed on the Salt River flood plain below the Bush Highway culverts.

7. Comment: The following unstable soil conditions exist in the natural channel and that coupled with increased water flows and velocities, how much of the material will be scoured out? The sediment from the channel bottom will be dumped into the Salt River. The Salt River Project should be notified of this increased sediment yield.
- A. Old alluvial valley fill makes up part of the drainage channel side slopes. In some places the old alluvium is capped with indurated materials. These materials are highly erodible.
  - B. The remains of old river terraces occur in the natural channel. They occur just a little higher than the present flood plain. Much of these will be scoured out.
  - C. The sandy flood plain in the natural channel has built up for many years. This sandy flood plain will be scoured out. How many tons of sediment will be picked up along the channel and dumped into the Salt River? Is a sand trap needed above the exit into the Salt River?

Response: The first question has been answered as part of comment 6. The Salt River Project has been notified of the impacts of this project.

- A. No answer necessary.
- B. Answered as part of comment 6.
- C. Answered as part of comment 6.

8. Comment: How will the unstable conditions along the natural channel be stabilized?

Response: The natural channel above Bush Highway will be stable according to our investigations. Conditions below Bush Highway are explained as part of comment 6.

9. Comment: Will the native vegetation in the natural channel be removed prior to water flows? If not, what measures will be taken to keep the debris out of Granite Reef Dam?

Response: Only in the areas of actual construction will the vegetation be removed. The county highway department was contacted and accumulation of debris has not been a problem in the past. Removal of any debris that does collect and create problems will be the responsibility of the sponsors.

10. Comment: How will the cross drainages that empty into the constructed floodway be handled? What measures will be taken at each entrance to prevent the opposite bank from being eroded away?

Response: Cross drainages that intersect the floodway will be handled either through channel junctions or weirs. In most cases these will be cut into granite. Where not cut into granite, protection will be provided by rock riprap. The opposite banks will be protected by rock riprap where needed.

11. Comment: The capacity of the twin box culverts under the Bush Highway has been discussed to some extent. Everyone is of the opinion that it is large enough to carry the anticipated flows. If the existing vegetation and debris in the natural channel are not completely cleaned up they stand a chance of plugging up the culvert and causing the water to go over the road thus it could wash the road out.

Response: The collection of trash and debris at any bridge or culvert is always a possibility. In the case with the two box culverts under Bush Highway, over the past seven to eight years, there have been no major maintenance problems that the county road department can recall. With the small amount of native vegetation in the channel, plugging of the culverts is not anticipated as a major problem.

12. Comment: The protective wing walls on the up-stream side of the bridge are not of sufficient size and design to protect the bridge and highway. These will have to be redesigned.

Response: An engineering survey and inspection will be made to insure the adequacy of the wing walls on the upstream side of the two box culverts under Bush Highway.

13. Comment: How will the Granite Reef recreation area be protected from the flood waters? Structure designs should be submitted to us prior to final field examination.

Response: The design of structural measures to protect the Granite Reef recreation area will be submitted to the Forest Service for concurrence. A low dike on the east side of the channel is proposed to direct floodwater flows away from the area. Complete protection of this area from inundation cannot be accomplished because of the low elevation in relation to the Salt River.

14. Comment: The Spook Hill flood control dam and outlet are being designed for the 100-year, two-hour storm. The capacity of the natural drainage has been computed using the ten-year storm as a design basis. It was determined that flows of 1000 cfs are possible in the natural drainage. The natural drainage has a relatively steep slope, 3 to 5 percent, and therefore has the potential of generating very high velocities. (As a comparison of how much 1000 cfs is, the two canals leaving Granite Reef Dam carry approximately 900 cfs.)

If just after completion of the project we happened to get a 25, 50, 75, or 100-year storm, what would this do to the natural drainage?

Response: As explained in answer to comment 6, the bedload in the natural channel above Bush Highway would be caught by the sediment basin. The natural channel above Bush Highway would be stable because of the underlying granite. Our investigations have shown that this channel would be stable for the 25, 50, 75, and 100-year flows.

15. Comment: It is understood that the natural drainage is only going to be used as a temporary outlet to the Salt River and that eventually the Central Arizona Project will extend the constructed floodway parallel to their aqueduct and discharge it into Orme Reservoir. What assurance do we have that the CAP will extend the floodway? If not, what measures would be necessary to up-grade the drainage to the same design standard as the main structures?

Response: The CAP aqueduct will be protected from floodwater damage. The most economical way to provide this protection is by either a flood detention dam or floodway. Based on these facts, we can be assured that when the aqueduct is constructed, the Spook Hill Dam outlet floodway will be extended to a point where it will discharge floodwaters

into Orme Reservoir or a suitable alternative. If it is determined that the CAP aqueduct will not be constructed, alternative outlets will be studied.

16. Comment: Prior to any work being done on National Forest Land an archeological clearance report should be submitted to the Forest Service.

Response: A copy of "An Archaeological Reconnaissance Survey of the Buckhorn-Mesa Flood Control Project," by Thomas R. Cartledge and Donald E. Weaver, Jr., Department of Anthropology, Arizona State University, has been forwarded, and a copy of "A Cultural Inventory of the Proposed Granite Reef and Salt-Gila Aqueducts, Agua Fria River to Gila River, Arizona," Arizona State University, Department of Anthropology, together with parts of "Central Arizona Project Salt-Gila Aqueduct," Arizona State University, and "Appendix III, Archaeological Resources, Orme Reservoir, Phase 1-A, Salt Arm Extension," by John Beesley and Gordon L. Fritz, have been forwarded to the Forest Service supervisor on July 17, 1975. The area of the outlet has been surveyed without identifying significant archeological resources.

17. Comment: The constructed floodway will be built on the Goldfield grazing allotment. What measures will be taken to keep cattle out of the outlet structures? Some structures are needed to get cattle across the floodway.

Response: It is proposed that a floodgate be installed in the fence where it crosses the floodway. Cattle could then graze on both sides of the floodway by walking around the end. If road crossings are necessary within the forest boundary, cattle could use these for crossing.

18. Comment: Access to and across the constructed structures are necessary for fire prevention and suppression.

Response: Where necessary, roads will be cut down into the floodway with ramps on either or both sides. The location of the roads will be coordinated with the Forest Service.

19. Comment: Has the alternative of using one of the larger drainages south of the forest boundary as the temporary outlet for the floodwaters been considered? This proposal needs to be evaluated in detail as an alternative.

Response: Three alternate outlets for Spook Hill Dam were analyzed. Installation costs were determined as follows:

- A. Alternate No. 1: Spook Hill Floodway outletting into a natural wash upstream of Granite Reef Dam and downstream of U.S. Forest Service campgrounds. Downstream of Bush Highway, a sediment basin to trap bedload material is to be constructed. Installation cost - \$39,400.
- B. Alternate No. 2: Spook Hill Floodway extended to the northeast outletting into a natural wash upstream of the U.S. Forest Service campgrounds. Installation cost - \$1,188,500.
- C. Alternate No. 3: Spook Hill Floodway discharging floodwaters downstream of Granite Reef Dam. Installation cost - \$2,959,200.

Alternate No. 1 was selected for two reasons. (a) It is by far the least costly and (b) working with the agencies and organizations concerned we were able to add features to mitigate the adverse environmental effects foreseen.

United States Department of Agriculture - Forest Service (Memorandum of July 29, 1975)

No reply necessary.

Department of the Army - Assistant Secretary of the Army (Civil Works)  
(Letter of November 3, 1975)

- 1. Comment: We suggest that the Service consider allowing a minimum of the three feet for wave action and wind runup above the retarding structure's maximum pool elevation.

Response: For all dams in this watershed the top of each dam is in excess of three feet above the emergency spillway design storm pool elevation.

- 2. Comment: It is suggested that the Service consider including a more detailed evaluation of the effects of the project on wildlife populations and hunting quality.

Response: Additional information relating to this subject has been included in the section entitled Environmental Setting - Physical Resources and in the section entitled Environmental Impact - Structural Measures.

3. Comment: The project would appear to destroy a five-acre marsh which is inhabited by the endangered Yuma clapper rail.

Response: Upstream of the three-acre marsh area a sediment basin will be constructed to trap bedload material. From this point to the Salt River water's edge floodwater will spread over the river flood plain.

It is proposed that the marsh area downslope of the sediment basin be monitored after construction of the outlet channel to insure that excessive acceleration of the rate of loss of the marsh does not occur. If it is determined that the construction of project measures is causing an acceleration of the loss of the marsh, then alternative ways of keeping floodwaters and sediment out of the marsh will be studied and implemented. This will insure protection of the Type 5 wetland and associated wildlife species including the Yuma clapper rail.

Department of the Army - South Pacific Division, Corps of Engineers  
(Letter of October 22, 1975)

No reply necessary.

Department of the Army - Los Angeles District, Corps of Engineers  
(Letter of September 24, 1975)

No reply necessary.

United States Department of Commerce - The Assistant Secretary for  
Science and Technology (Letter of October 20, 1975)

Comment: Bench marks, triangulation stations, and traverse stations have been established by the National Geodetic Survey in the vicinity of the proposed project. Construction required for the project could result in destruction or damage to some of these monuments.

The National Geodetic Survey requires sufficient advance notification of impending disturbance or destruction of monuments so that plans can be made for their relocation. It is recommended that provision be made in the project funding to cover costs of monument relocation.

Response: At time of final design of each structural measure the Soil Conservation Service will notify the National Geodetic Survey of all monuments that are involved. The monuments will be relocated at no cost to the National Geodetic Survey.

Department of Health, Education, and Welfare (Letter of October 23, 1975)

1. Comment: What measures will be taken to control the air pollution generated by on-site construction?

Response: During construction appropriate measures will be taken to minimize soil erosion and water and air pollution. On a site-by-site basis, plans and specifications will be developed for each structural measure. These plans will include watering haul roads and earth fills to suppress dust, reducing erosion by temporary vegetation or mulching of exposed areas, and burying unsalvageable material. State and federal laws and regulations will be observed in minimizing air and noise pollution.

2. Comment: Will fertilizers, herbicides, or insecticides be used during the land treatment program?

If so, what precautions will be taken to minimize the entry of these agents into the aquatic environment and the ingestion of these chemicals by grazing animals in the immediate area?

Response: During construction, measures will be taken to minimize soil erosion and water and air pollution. If temporary vegetation is established on exposed areas then there is a good possibility that fertilizers, herbicides, or insecticides would be used. These chemicals will be used as directed and proper precautions will be taken to minimize any possible adverse effects.

Department of Housing and Urban Development - Federal Housing Administration  
(Letter of September 16, 1975)

No reply necessary.

United States Department of the Interior - Office of the Secretary  
(Letter of January 13, 1976)

1. Comment: The first comment suggested consideration of directing Spook Hill Dam flood flows into a natural wash below Granite Reef Dam as proposed in the 1963 Work Plan. We found no direct reference in the draft EIS or supplemental work plan to the feasibility or non-feasibility of using this natural wash rather than the one presently proposed above Granite Reef Dam. Our reasons for initially suggesting use of the wash downstream of Granite Reef Dam are still valid. Furthermore, your Service is now aware that the endangered Yuma clapper rail exists in the 5-acre marsh at the confluence of the presently proposed natural wash flood channel and the Salt River. We discussed with your representatives and the Arizona Game and Fish Department on August 21, 1975, the additional sediment carrying capacity of the flood flows that will be entering this marsh. This is contrary to SCS's Policy Memorandum on Wetlands Preservation dated May 5, 1975. This policy is particularly important when endangered species are involved. Section 7 of the Endangered Species Act, administered by the Fish and Wildlife Service states:

"All Federal Agencies are to utilize their authorities in furtherance of the Act by carrying out programs for conservation of endangered species and threatened species. These agencies are also to insure that action authorized, funded, or carried out by them do not jeopardize the continued existence of these species."

Implications in the preceding two documents, combined with the potential adverse effects on the Salt River fishery discussed in the April 25, 1975, comments, seem to favor a serious consideration for releasing flood flows below Granite Reef Dam. Besides avoiding adverse environmental impacts, releasing project flows below Granite Reef Dam would have favorable impacts on riparian vegetation along a portion of the Salt River that man has depleted of water.

- Response: Information on three alternate locations for the Spook Hill Outlet was developed and presented at the meeting referred to in your comment. These were:

- A. Spook Hill Floodway releasing into a natural wash upstream of Granite Reef Dam and downstream of a U.S. Forest Service campground. Included in this alternate is a sediment basin between Bush Highway and the Salt River. Installation cost - \$39,400.
- B. Spook Hill Floodway extended to the northeast releasing into a natural wash upstream of the U.S. Forest Service campground. Installation cost - \$1,188,500
- C. Spook Hill Floodway extended to the Salt River downstream of the Granite Reef Dam. Installation cost - \$2,959,200.

We have worked with U.S. Fish and Wildlife Service, the Arizona Game and Fish Department, and representatives of the Yuma Clapper Rail Recovery Team in determining how to best alleviate the adverse impacts on the marsh and Salt River fishery. We have the opinion of these agencies that the project as described in the Planned Project section of this Environmental Impact Statement will not significantly impact the marsh, the Yuma clapper rail, or the Salt River fishery.

2. Comment: Our second major comment on the preliminary draft documents suggested using the approximate 1,000,000 cubic yards of borrow material that will be available from excavation of Bureau of Reclamation's Salt-Gila Aqueduct, between Spook Hill Dam and the existing Powerline Dam, to help build Apache Junction, Signal Butte, and Pass Mountain Dams. This would greatly reduce the amount of habitat clearing and revegetation costs associated with the project. We suggested costs presently assigned to revegetation could be used to offset borrow transportation costs. We found no mention of this alternative in the draft EIS or the supplemental work plan and again suggest it be discussed in the EIS.

Response: To make use of the 1 million cubic yards of borrow material would entail stage construction of both the dams in the Buckhorn-Mesa Watershed and the Salt-Gila Aqueduct of the CAP. The estimated cost of moving this borrow material would amount to 1.5 million dollars plus the cost of traffic control. The estimated cost of revegetation of borrow areas would amount to 1 million dollars. At the time of final design coordination of these two projects will be effected to determine if it is advantageous to all concerned to use material from the aqueduct.

3. Comment: The current work plan does not mention mineral resources; moreover, the project map in both documents shows neither the outline of the proposed reservoirs nor the corridors through which canals will pass. Without such a map, we cannot adequately comment on possible conflicts between mineral resources and planned project works. The supplemental work plan might well include a statement similar to that in the Environmental Setting - Physical Resources section of the EIS, noting that all known mineral deposits are outside the construction areas.

Response: The EIS and the supplemental work plan have been changed to indicate that a small mine exists in the reservoir area of the Weekes Wash Dam and mineral claims have been filed on a portion of the area needed for the Spook Hill Dam outlet channel. These will need to be either acquired or cleared.

4. Comment: We are concerned about the references in these documents that the selection of the Orme Dam site, which is currently under study by the Bureau of Reclamation, is in a firm and final state. Until the final environmental statement on Orme Dam, or a suitable alternative has been filed and decisions made upon the alternative selected, it is inappropriate for other agency's plans to take the stance that Orme Dam and appurtenant facilities have been predetermined as the final plan. Until a final plan is adopted, the agency statements should be couched in tentative language with respect to Orme Dam and appurtenant facilities. Other comments to this concern have been made as appropriate.

Paragraph 2 on page 8 should be rephrased to take a tentative position until the Orme Dam or a suitable alternative decision is reached.

In the section entitled Short-Term Vs. Long-Term Use of Resources; the paragraph relating to the Bureau of Reclamation's program for the Central Arizona Project should be recast as a tentative decision until such time as a decision has been reached regarding Orme Dam or a suitable alternative.

Response: Appropriate changes have been made in the Environmental Impact Statement.

5. Comment: In the Planned Project section it indicates that a drip irrigation system will be installed in the dam and borrow areas to irrigate native plants through a two-year establishment period. While a two year period is sufficient to establish native plants, an additional year of irrigation will do far more to increase their size and hasten their maturity than the first two years combined. Therefore, consideration should be given to providing a third year of drip irrigation to provide for the viable establishment of the plants.

Response: The irrigation systems will be left in place after the establishment period for any needed supplemental irrigation by the sponsors. This information has been added in the Planned Project section.

6. Comment: On page 7 it states "The areas directly disturbed by construction activities include an estimated 888 acres committed to dams, emergency spillways, borrow areas, and floodways." Page 45, paragraph 6 of the EIS states, "The areas directly disturbed by construction activities include an estimated 963 acres committed to dams, emergency spillways, borrow areas, and floodways." The acreage discrepancy should be resolved.

Response: The figures have been corrected.

7. Comment: The statement that national resource lands are limited to grazing is in error. Lands are not presently leased for grazing but are used by outdoor recreationists and hunters.

Response: Appropriate changes have been made in the narrative.

8. Comment: There is no longer a U.S. Highway 70 designated in the project area.

Response: Reference to U.S. Highway 70 has been deleted.

9. Comment: Mineral deposits in Maricopa County are currently yielding sand, gravel, lime, stone, and clay valued at about \$20 million per year and deposits in Pinal County are yielding copper, molybdenum, gold, silver, sand, gravel, lime, gypsum, stone, perlite, pyrite, diatomite, and clays valued at about \$255 million per year. An examination of library and file data without benefit of a field investigation shows that mineral resources of the watershed and environs include gold, silver, clays, sand, gravel, stone, mercury, tungsten, copper, and molybdenum.

Response: Information in the Environmental Impact Statement relates only to the mineral deposits in the watershed.

10. Comment: The construction of this paragraph creates the impression that the reservoir behind the Granite Reef Diversion Dam of the Reclamation Salt River Project is "one small stockwater pond." The pond should be more accurately described and located.

Response: The reservoir behind the Granite Reef Dam has been more accurately described and located in the narrative.

11. Comment: Because Camp Creek and Sycamore Creek are uncontrolled Verde River tributaries of relatively large magnitude downstream from Bartlett Dam, and Salt River below Stewart Mountain Dam is controlled, the assumption presented about similar sediment concentrations warrants reconsideration.

Response: After reconsideration the assumption was deleted.

12. Comment: Acreage for national resource land does not agree with Appendix E.

Response: References to national resource land have been corrected to 6,240 acres.

13. Comment: The list of endangered and threatened fish and wildlife species should include the Yuma clapper rail (Rallus longirostis yumanensis).

Response: The Yuma clapper rail has been included in the Endangered and Threatened Fish and Wildlife table.

14. Comment: In the subsection entitled Recreation Resources delete the phrase "is scheduled for completion during fiscal year 1980."

Response: This sentence now reads "The Bureau of Land Management's Lost Dutchman Recreational Site, at this time, is only partially completed."

15. Comment: While it is stated in the section entitled "Archeological, Historical, and Unique Scenic Resources" the "structural locations" have been surveyed for archeological resources, it is not clear whether these "structural locations" include the borrow areas, access routes and areas to be

cleared of vegetation. We note also that in the Planned Project section it is stated that "a detailed archeological survey of all locations where surface disruption is likely to occur was conducted by qualified archeologists." Perhaps the full extent of the survey could be clarified in the final statement. Copies of letters of correspondence from the State Historic Preservation Officer concerning the project's effect upon archeological resources should also be included in the final statement.

Response: An archeological survey has been made for the total area of concern. Reference can be made to the letter from the State Historic Preservation Officer of January 28, 1976, on this subject. This letter is in Appendix C.

16. Comment: On page 35, second paragraph, second sentence, it states that an estimated 40 floods have occurred since 1910. It further states the floods occur on the average of about once every two and one-half years. One statement is incorrect.

Response: The fifth sentence in this paragraph has been changed to read, "The floods, varying in magnitude, occur on the average of about once every one and one-half years."

17. Comment: The statement does not adequately address the impact of Structure No. 3 which is located on the southern boundary of Maricopa County's Utery Mountain Semi-Regional Park. We feel that the EIS should address the impacts of the structure which are immediately adjacent to a public recreation facility.

Response: Additional information has been added to the impacts section of the Environmental Impact Statement addressing these concerns.

18. Comment: The EIS shows figures for acreage protected and acreage still subject to flooding from the 100-year frequency storm, but the accompanying map does not distinguish between these two classifications. This should be clarified in the final statement. The remaining flood risks should be carefully defined because of the indicated pressure for further development of this flood prone area.

Response: The characteristics of the floodplain make it practically impossible to delineate the area flooded by flood size for present and with project conditions.

The desert is characterized by long alluvial fans. These fans have relatively level cross-slopes and are dissected by a series of shallow-braided channels. Limited channel capacity is one feature common to most washes and is affected by deposition of silt and debris and by vegetative growth in and along the washes. This limited channel capacity causes frequent out-of-bank flooding.

Man-made obstructions such as roads, ditch embankments, and homes affect the location, direction, and depth of flooding. Fences, walls, buildings, equipment, and parking areas cause floodwaters to be diverted, ponded, or detained, thus, making it difficult to delineate the area flooded for any frequency of flood.

Floodwater retarding structures and related floodways will effectively reduce the risk of flood damage by decreasing the rate and volume of runoff below the structures. This effect will be most apparent in the reduction of the size of area flooded with lesser affect upon the depth and duration of flooding.

The complexities in defining the affect of flooding has resulted in using historical flood data. Floodwater runoff volumes are related to the area flooded. However, the location of flooding can be only described in general terms as a percentage of the area subject to flooding.

19. Comment: We suggest that temporary or long-term, beneficial or adverse impacts of seepage from unlined channels and from impoundments, even though perhaps only periodic, should be evaluated, as should the possibility of growth of phreatophytes in areas of temporary impoundment, flow and seepage and in areas of periodic flooding.

Response: Because of geologic conditions along the proposed alignment of the unlined floodways and the relatively short duration and infrequent flows, the impacts of seepage from the floodways will be insignificant. The impacts of seepage from the impoundments have been evaluated and included in the Environmental Impact section of the Environmental Impact Statement. Evaluated were the affects on groundwater, downstream vegetation, and vegetation in the flood pool areas.

20. Comment: Reference is made to a vegetative study made by Applied Remote Sensing Program (ARSP) of the University of Arizona on 19 water impounding and diversion structures in southwest and central Arizona. The paragraph states that the study results show the net overall impact of the 19 structures to be increased vegetative vigor and cover. On July 15, 1975, personnel from your Service held a meeting to discuss the results of this study with biologists from the Corps of Engineers, and our Bureau of Reclamation and Fish and Wildlife Service. All the biologists in attendance were of the opinion that the study was hastily and poorly planned and that the results are meaningless. The researchers arbitrarily studied vegetation along washes one mile upstream and one mile downstream of the structures. All the results actually showed was that at the time of the study, there was more vegetation in the mile upstream than in the mile downstream of the structures. This was to be expected since the vegetation or reduced quality below the structures was compared to the combined altered vegetation in the flood pools and the unaffected vegetation along the washes upstream of the flood pools. A meaningful study would be to compare the areas of affected vegetation upstream and downstream of the structures and to compare vegetation, both quantitatively and qualitatively before and after construction. No results were given or conclusions drawn that would indicate whether the type of vegetation established after construction is as high of quality to wildlife as that existing before construction.

Furthermore, we know that several of the structures, extensive modification has been done in the watershed above the flood pool, such as the construction of dikes, to ensure greater flows into the pools. These activities were assessed in the study.

Response: Phase II of this study by the University of Arizona has been initiated. It is hoped that in this Phase the net impact on vegetation can be confirmed.

21. Comment: The increased sediment load and its impact on fish populations should be expanded. Sediments from winter storms which do not now enter the Salt River, would be directed into the river by the project. Without supporting data, it would appear the total sediment increase on an annual basis would be considerably higher than the 0.1 percent stated.

Response: The suspended sediment contributed to the Salt River from the project is about 0.04 percent of the total. Refer to the reply for comment 1 for other related information.

22. Comment: Final EIS should be altered, along with text, to reflect current listings.

Response: Appropriate changes made.

United States Department of the Interior - Bureau of Land Management  
(Letter of November 10, 1975)

Reply is made to only comments included in the United States Department of the Interior letter dated January 13, 1976, from the Deputy Assistant Secretary of the Interior.

Department of Transportation - United States Coast Guard (Letter of November 11, 1975)

No reply necessary.

United States Environmental Protection Agency (Letter of November 21, 1975)

1. Comment: The technique devised to evaluate turbidity impact, based upon the total flow rate, is misleading and ineffective in assessing short-term water quality problems. Given that flood flows occur infrequently and thus will enter the Salt River in sizable quantities at one point, the technique would not facilitate the measurement of the frequency of short-term loading nor indicate the associated water quality implications. Related to these concerns is the issue of floodwater storage. Assuming that Orme Dam is constructed and future floodwaters diverted to the dam, an important question is, will the continual mixing occurring in fore bay and long period storage, create substantial long-term water quality problems? If water quality standards are exceeded what mitigating measures will be enforced?

If Orme Dam is not constructed what will be the long-term effects of possible infrequent but regular violations of promulgated standards at the Granite Reef Dam site and to those served by the dam? If violations do indeed occur, what measures will be utilized to mitigate the problems?

In view of these concerns, EPA suggests that the Soil Conservation Service (SCS) include in the EIS a discussion

including the comingling of watershed runoff and Salt River waters, mitigating measures and short- and long-term effects. EPA recognizes the difficulty in obtaining such data but encourages the SCS to establish a water quality monitoring program as an integral component of the proposed project.

Response: If Orme Dam is constructed, the floodway outlet will be extended and constructed by the Bureau of Reclamation. The extension of this outlet to Orme Dam will cut across drainages that will contribute sediment to the reservoir. The affect of this sediment yield has not been evaluated in this environmental impact statement as it will be addressed by the Bureau of Reclamation in its statement on Orme Dam.

Salt River water is primarily used for agricultural, municipal and industrial purposes. If Salt River water is used for agricultural purposes, Salt River Project personnel have indicated that there are no problems with the introduction of Buckhorn-Mesa floodwaters into the river upstream of the Granite Reef Dam.

Under present conditions water treatment plants use ground water rather than river water for municipal and industrial purposes when the quality of river water exceeds acceptable limits.

The SCS does agree that a monitoring system to evaluate the effects of the completed Buckhorn-Mesa Watershed Project will be beneficial. Consequently the SCS will initiate action with appropriate agencies and sponsors to establish a monitoring program.

2. Comment: The document concludes on page 51 that the reduction of 160 acre-feet in the amount of ground water recharge will have no significant effect on the total amount of ground water in storage, the water table elevation, or in subsidence in the area. However, an insufficient quantity of applicable data such as location of water tables, depths to tables, and the specific areas of subsidence makes any attempt to validate this conclusion all but impossible. It is not clear whether there will be a net increase or decrease in ground water recharge since water is to be transported to other areas of the watershed.

Response: On page 19, paragraph 6, the first sentence has been written to read, "The watershed is located near the outer fringes of a vast ground water reservoir, the Salt River Valley, which is about 1.6 million acres in size."

On page 19, paragraph 7, a last sentence has been added and reads, "The depth to the water table increased as much as 60 feet in some portions of the Salt River Valley between 1964 and 1972. 3/"

On page 38, paragraph 2 is written to read, "Land subsidence as the result of ground water withdrawal from alluvial aquifers within the watershed is known to have occurred. 11/ With continued ground water withdrawal, additional subsidence is anticipated. Land subsidence is believed to have affected all of the watershed area except for the mountainous portions. Areas which have experienced the greatest amounts of subsidence are in the western one-third of the watershed. In this area subsidence of as much as three feet has occurred."

EPA agreed verbally that there is an insignificant affect on ground water recharge from floodwaters being transported to other areas of the watershed.

3. Comment: It is noted that on page 52 that 2 acre-feet of sediment will be discharged into the Salt River due to temporary use of the natural wash juxtaposed to the Spook Hill structure. This appears to constitute a significant temporary degradation of water quality and as such necessitates discussion.

The comment on page 53 that the effect on fish population as a result of sediment introduction will be slight may not be so conclusive in light of the aforementioned. Moreover, in view of the debate concerning the construction of Orme Dam, it appears relevant that the long-term implications of channel usage should be addressed and mitigative measures be incorporated into the discussion.

Response: On page 7, paragraph 4, the third sentence is substituted with, "Downstream of the stabilization structure a sediment basin will be constructed to trap bedload material. From this point to the Salt River water's edge, floodwater carrying suspended sediment will spread over the river flood plain and flow through a three-acre marsh."

Flows will enter the river about one-half mile upstream of the Granite Reef Dam." The one and one-half acre-feet of sand bedload mentioned on page 52 is coarse material.

On page 52, a second paragraph has been inserted and written to read, "The average annual suspended sediment introduced into the Salt River from the project amounts to 0.5 acre-feet per year. It is estimated that the average annual suspended sediment concentration of the release flows from the Spook Hill structure is 400 parts per million. Suspended sediment of this concentration does not present a water quality problem to fish in this one-half mile reach of the river." This concentration of suspended sediment does not significantly affect the fishery in this reach of river.

The average annual suspended sediment concentration of the diverted floodwaters has been reduced from 1,200 parts per million to 400 ppm. A change in the design of the principal spillway riser has been made, thus increasing the sediment trap efficiency.

4. Comment: It is considered necessary for proper functioning of the floodways to include periodic removal and disposal of sediment and debris. EPA agrees, but urges the SCS to clearly indicate and assess the environmental hazards associated with each specifically defined disposal area. Moreover, it seems quite logical and economically efficient that the disposal impacts associated with sediment materials (trapped by the dam structures) be assessed at this time.

Response: Sediment will be removed from floodways and be spread within the right-of-way of the channel. Where practical it will be seeded to native grasses.

Sediment deposited behind dams will not be removed during the 100-year effective economic life of the dam.

A further discussion of these subjects is on page 14 and 15.

United States Environmental Protection Agency (Letter of January 12, 1976)

No reply necessary.

Advisory Council on Historic Preservation (Letter of September 17, 1975)

1. Comment: Please furnish additional data indicating:

Compliance with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470 {f}). The Council must have evidence that the most recent listing of the National Register of Historic Places has been consulted (see Federal Register, February 4, 1975 and monthly supplements each first Tuesday thereafter) and that either of the following conditions is satisfied:

- A. If no National Register property is affected by the project, a section detailing this determination must appear in the environmental statement.
- B. If a National Register property is affected by the project, the environmental statement must contain an account of steps taken in compliance with Section 106 and a comprehensive discussion of the contemplated effects on the National Register property.

Response: The following statement has been included in the Archeological, Historical, and a Unique Scenic Resources section. "The above mentioned sites are not listed in the Federal Register of Historic Places."

2. Comment: The Council suggests that the final environmental statement contain evidence of the Arizona State Historic Preservation Officer's concurrence that none of the cultural resources located and identified in the reconnaissance surveys, including the one significant archeological site which was subsequently "salvaged" by a qualified archeologist, appear to meet the criteria for inclusion in the National Register.

Response: The following statement has been included on page 30 in the EIS. "The Arizona State Historic Preservation Officer concurs that none of the cultural resources located and identified in the above mentioned reconnaissance surveys appears to meet the criteria for inclusion in the National Register."

State and Local Government

Office of the Governor (Letter of September 11, 1975)

No reply necessary.

Office of the Board of Supervisors, Maricopa County (Letter of October 20, 1975)

No reply necessary.

Office of the Board of Supervisors, Pinal County (Letter of September 8, 1975)

No reply necessary.

Arizona Water Commission (Letter of October 21, 1975)

1. Comment: CAP protection should be a goal.

Response: The Bureau of Reclamation in designing and locating the Central Arizona Project aqueduct took advantage of the flood protection afforded by the structural measures in this watershed project. Protection of the aqueduct is not a specific objective of the sponsors of this project.

2. Comment: This implies that D. A. > 10 sq. mi. requires a concrete crest control structure. Class "C" structures with doubtful materials indicate a need for an emergency spillway crest control.

Response: To provide protection for Dam No. 4 against breaching, special consideration in planning the emergency spillway is required. For only this site it is suggested that a reinforced concrete crest control structure be included.

3. Comment: Reword, "A substantial cost savings to the CAP will be realized from the reduction in flood protective works needed," to read, "A substantial cost savings to the CAP will be realized from the flood protective works of Spook Hill Dam."

Response: Spook Hill Dam and outlet will provide a higher degree of protection for the CAP aqueduct because of the aqueducts' close proximity to the Dam. The remaining structures will provide a lesser degree of protection depending on the distance between the structures and

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the aqueduct. This is assuming that timing for construction of the CAP aqueduct and the flood control structures in this project can be coordinated.

4. Comment: Clarify. Will the supply from both ground water and surface water be adequate to satisfy demand in the year 2000?

Response: Information has been added to the narrative to clarify.

5. Comment: Which pollutants are present and how do they compare with the maximum allowable concentrations? Is this now affecting the health of the residents?

Response: Information has been added to the narrative to answer the questions.

6. Comment: In the section entitled Relationship to Land Use Plans, Policies, and Controls it mentions that the project is in agreement with the OBERS projection that before the year 2020 decreased flooding damages will be an important part in the more efficient use of a critical water and economic demand in the Lower Colorado Region.

Response: Information has been added.

Arizona State Clearinghouse (Letter of October 10, 1975 and enclosures.)

The Arizona State Clearinghouse conducted a review of the Draft Environmental Impact Statement in compliance with OMB Circular A-95.

The reviews by the Office of Economic Planning and Development; Indian Affairs Commission; Arizona Bureau of Mines; College of Mines, University of Arizona; Center for Environmental Studies, Arizona State University; Prescott Historical Society; Agriculture and Horticulture Department; Arizona Power Authority; Department of Health Services; Arizona Outdoor Recreation Coordinating Commission; Museum of Northern Arizona; and Central Arizona Association of Governments indicate no comment on this project.

The reviews by the Civil Rights Division, Department of Law and the Southwestern Materials Exploration Association indicate that the proposal is supported as written.

Arizona State Land Department (Letter of September 22, 1975)

1. Comment: There is little or no discussion on the statement of land ownership patterns and the ramifications involved in obtaining rights for the project or funds to be made available for land and rights-of-way acquisition.

Response: Land ownership patterns are discussed in the Environmental Setting section and are shown on a map entitled Land Status, Land Use, and Resource Unit Map, which is in Appendix E.

The Weekes Wash Dam and the Roosevelt Water Conservation District Floodway are designed to act independently. All other structural measures are designed to act as a single unit. The location of each structure was selected, based on such factors as topography, land rights required, elevation, and environmental considerations. In each case the most economical site was selected. Minor adjustments in location of structures can be made in final design if a need exists. The local sponsors recognize their responsibilities in obtaining the necessary land rights.

2. Comment: Favorable location of portions of the project, according to ownership pattern, may tend to reduce the cost of the overall project.

Response: It is recognized that the overall cost of structural measures are influenced by the cost of the land; however, this is not the only consideration. The most economical sites have been selected based on total cost.

3. Comment: The alternatives discussed in the Alternatives section could be expanded as we were unable to relate any real consideration for alternatives. We suggest the alternatives provided are not clearly outlined from an economic analysis view. In further regard to alternatives:

The State Trust Lands and private land in sections 4, 7, and 9, T1N, R7E, would receive protection from dikes located at Stone Mountain and Ravens Roost as suggested by Water Resource Associates, Inc. No cost figures are indicated in the report for this particular addition. Support of this alternative should not alter the Spook Hill Dam as proposed, scheduled for construction in 1975-76.

Response: Analysis of alternative site locations were carried to the point that the most economical site could be selected. This type of detailed information has not been included in this Environmental Impact Statement.

Alternative No. 4 in the Alternatives section discusses the proposal developed by the Water Resource Associates, Inc. for the East Mesa Area Development Association.

4. Comment: We suggested, in our May 13, 1975, correspondence, several alternatives to site locations for your consideration. The development capabilities of State Trust Lands in sections 7 and 16, T1N, R8E, will be improved by relocating the Apache Junction Dam, Apache Junction, and Bulldog Floodways.

Response: The most economical sites have been selected based on total cost.

5. Comment: In T1N, R7E, portions of the State Lands (sections 4, 8, and 9) have been applied for by the Mesa School District for proposed school sites.

Response: State Lands in these sections do not appear to be involved in the structural areas.

6. Comment: In T1N, R8E, portions of the State Lands (sections 3, 7, 10, and 16) may be in conflict for the project and other uses.

Response: If those areas needed for the structural measures can be kept clear of developments, it will facilitate installation of the structures.

7. Comment: Access should be assured for utilities and roads from the north to south portions of section 7.

Response: There will be no closures of dedicated or accepted roads or bridges resulting from the project. There will be adequate access. Provisions can be made for utilities from the north to the south portions of section 7. You will be consulted during the final design stage.

Department of Economic Security (Letter of September 12, 1975)

Comment: The project is supported provided that no action is taken which would affect lands held in trust for any federally recognized Indian tribes or the undetermined or unresolved land claims and water rights vested in these tribes without the express official approval of the respective Indian tribal government.

Response: No action will be taken that will affect lands held in trust for any federally recognized Indian tribes or the undetermined or unresolved land claims and water rights vested in these tribes.

Flood Control District of Maricopa County (Letter of October 20, 1975)

1. Comment: Effective October 1, 1975, the Board of Supervisors of Maricopa County approved changes to the subdivision regulations that require detention facilities be included in all subdivision plats to detain a 100-year, two-hour storm.

Response: Appropriate changes have been made in the Supplemental Work Plan and Environmental Impact Statement to reflect this compliance.

2. Comment: The proposed alignment of the floodways may be modified to reduce the impact on certain existing developments.

Response: Minor modifications in alignment of the floodways can be made in final design. These changes should be made during planning where possible.

3. Comment: That the sponsors will obtain the assistance of a qualified mining engineer in determining the extent and value of known mineral deposits.

Response: The land rights agreement will provide for the unencumbered installation of works of improvement. There is a possibility that mineral claims can be filed on other land needed for installation of the project between the present time and when the land rights are obtained.

4. Comment: Close coordination should be effected with the Flood Control District in selecting spoil disposal areas in order that a minimum impact may be caused on proposed developments.

Response: It is agreed that close coordination in the selection of spoil disposal areas is necessary.

Arizona Game and Fish Department (Letter of October 15, 1975)

1. Comment: We feel that erosional rates on rangeland largely depend upon proper range management.

Response: We agree that proper range management is a significant practice in reducing erosion on rangeland.

2. Comment: Reduction of flood plain scour and erosion, will not be lessened or eliminated, especially above the proposed structures.

Response: Flood plain scour and erosion will be significantly reduced below the structures. Above structures the land treatment program will be beneficial; the reduction in flood plain scour and erosion will not be as significant as below the structures.

3. Comment: Revegetation of dam structures and other sites with perennial plants (especially woody species) may be a waste of funds; planting to grasses may be of more value.

Response: This comment was withdrawn by letter dated October 30, 1975, from the Arizona Game and Fish Department.

4. Comment: Floodwaters reaching the Salt River from this project will be of non-erosive velocity which assures deposition of silt on the five acre marsh.

Response: Use of the term "non-erosive velocity" means that the in-place soils will not be eroded. It does not mean that the flows will not transport suspended sediment. The effects on the marsh are explained in the Environmental Impact Statement.

5. Comment: It should be noted that the primary factor regulating wildlife populations and diversity is habitat. The marsh is a very important part of the diversity of habitat along the Salt River that makes it so valuable to wildlife enthusiasts and wildlife alike.

Response: This is recognized in the Environmental Impact Statement.

6. Comment: "Endangered and threatened fish and wildlife," based upon the U.S. Department of Interior, Fish and Wildlife Service, Threatened Wildlife of the United States, the list should be expanded to include clapper rail (endangered), prairie falcon (threatened), peregrine falcon (endangered), black hawk (peripheral), and osprey (undetermined).

Response: The birds have been added to the list.

7. Comment: We believe the Salt River is one of the most, if not the most, important areas in the state for nearly all "threatened" species.
- Response: No reply necessary.
8. Comment: We do not agree that habitat along the Salt River will not change significantly in quality or quantity. We feel that the marsh and other parts of the riparian habitat along the Salt River will be greatly altered. Water quality will also be reduced.
- Response: These adverse effects have been recognized through reviews of the preliminary draft of the Environmental Impact Statement. As a result two features have been added to the project: (1) A sediment basin to trap the bedload and (2) A change in the design of the outlet works for the Spook Hill floodwater retarding structure to increase the sediment trap efficiency. With these two added features the agencies concerned have agreed that the adverse effects on the marsh and water quality in the Salt River will be insignificant.
9. Comment: The accelerated loss of marsh and ten or more marsh-associated birds, including one endangered species should be added to the list of Adverse Environmental Effects.
- Response: It is not felt that there will be an accelerated loss of the marsh and associated bird life. The marsh will be checked periodically after installation of the project, to make certain that loss is not accelerating.
10. Comment: Yuma clapper rail should be added to the list in Appendix D. Bald eagles may be seen year-round, not as an uncommon winter resident. Virginia rail, marsh wren, and killdeer may nest; Bell's vireo probably nests; roadrunners do nest on site.
- Response: The Yuma clapper rail has been added to Appendix D. However, in reference to the other avifauna reference is made to footnote 1 at bottom of page D-1.
11. Comment: We feel that some water could be allowed to remain in pools behind the structures encouraging vegetative growth; thereby, mitigating in part for loss of vegetation downstream from the project facilities.

Response: Gated pipes through the dams will be sufficient to maintain downstream riparian vegetation. Vegetation above the structures will increase in density and vigor.

12. Comment: The cost of routing water into the Salt River above Granite Reef Dam was not mentioned. However, at a recent meeting it was mentioned that the cost of routing runoff into natural drainages below Granite Reef was too costly. We would appreciate knowing the comparative costs of the alternatives.

Response: Three alternate outlets for Spook Hill Dam were analyzed. Installation and average annual costs were determined as follows:

1. Alternate No. 1: Spook Hill Floodway outletting into a natural wash upstream of Granite Reef Dam and downstream of U.S. Forest Service campgrounds. Downstream of Bush Highway, a sediment basin to trap bedload material is to be constructed. Installation cost - \$39,400. Average annual cost - \$1,500.
2. Alternate No. 2: Spook Hill Floodway extended to the northeast outletting into a natural wash upstream of the U.S. Forest Service campgrounds. Installation cost - \$1,188,500. Average annual cost - \$36,700.
3. Alternate No. 3: Spook Hill Floodway discharging floodwaters downstream of Granite Reef Dam. Installation cost - \$2,959,200. Average annual cost - \$104,300.

13. Comment: It is also felt that increased silting of the Salt River will be detrimental to fisheries.

Response: Reference is made to the reply made to comment 8.

Arizona Game and Fish Department (Letter of October 30, 1975)

Comment: In the October 15, 1975, letter we stated that the planting (revegetation) of woody plants may be a waste of funds and that grasses may be of more value. Revegetation with woody plants will be more expensive; however, it may not be a waste of funds. This type of vegetation has high wildlife values and coupled with revegetation of ground cover plants (grasses

and annuals) could provide excellent wildlife habitat for small game and non-game species. In addition, the experience gained in planting woody species would be valuable for future projects. We recognize the value of such plants as mesquite, paloverde, catclaw, hackberry, ironwood, and brittle-bush and would recommend attempts be made to re-establish these plants in disturbed areas.

Response: No reply necessary.

Arizona Department of Transportation (Letter of October 2, 1975)

No reply necessary.

Arizona State Parks (Letter of January 28, 1976)

No reply necessary.

#### Other Groups

Archaeological Research Services (Letter of September 8, 1975)

Comment: No mention was made in the Archaeological, Historical, and Unique Scenic Resources section to the effect that the National Register of Historic Places and the State Register had been consulted to determine if sites in these inventories existed within the project area.

Response: Refer to the reply to the letter authored by the State Historic Preservation Officer.

Salt River Project (Letter of November 5, 1975)

1. Comment: Surface water is brought to irrigated lands from resources located on both the Salt River and Verde River.

Response: Appropriate changes in the narrative were made.

2. Comment: Existing records of tests on both the Salt and Verde Rivers show that under present conditions these rivers periodically exceed Arizona State Department of Health water quality standards. Is this due to suspended matter during periods of heavy runoff?

Response: Yes.

3. Comment: Why include the bald eagle in the list of "Endangered and Threatened Fish and Wildlife," when there is no evidence to indicate that the eagles are even there?

Response: The reference to eagles was changed to: "While the species are not known specifically to nest in or regularly inhabit the watershed, observations of this species within the watershed would be possible."

4. Comment: Unemployment rate of four percent sounds low.

Response: Correct. Unemployment rate for this area was estimated to be eight percent in December 1974.

5. Comment: The outlet channel for Spook Hill Dam will intercept several washes which now discharge below Granite Reef Dam. Preliminary discussions with SCS officials indicated that approximately 50,000 to 80,000 cubic yards of additional material will be transported to the Salt River above Granite Reef.

Response: The amount of bedload sediment associated with a 10-year storm, that would be delivered downstream of the two box culverts under Bush Highway, is one and one-half acre-feet. This is equivalent to about 2,400 cubic yards of material. A sediment basin to trap bedload material is to be constructed downstream from Bush Highway; therefore, bedload material is not expected to reach the Salt River. Floodwaters flowing through the sediment basin will be discharged at a non-erosive velocity.

On an average annual basis, diversion of additional washes plus suspended sediment from Spook Hill structure will cause an additional 0.5 acre-feet per year to be discharged into the Salt River above Granite Reef Dam. This is equivalent to 810 cubic yards.

6. Comment: The Salt River Project has an ongoing dredging program in the Salt River immediately upstream from Granite Reef Dam in an attempt to keep sediment out of its main

canals. If the Buckhorn-Mesa Watershed project results in measureable increases in sediment to be removed, the Salt River Project should be reimbursed for this increased expenditure.

Response: As the project is now proposed an agreement has been reached with the Salt River Project that the increase in sediment to be removed would be insignificant.

7. Comment: Adverse Environmental Effects 9 and 10 are related to sediment transportation and would have direct impact on the Salt River Project.

Response: Refer to the reply to comment 5. Adverse Environmental Effect number 10 has been deleted.

General Public

6029 Federal Building, Phoenix, Arizona 85025

November 7, 1975

Ms. Nonna Beaugureau  
2301 N. Sunset Drive  
Mesa, Arizona 85205

Dear Ms. Beaugureau:

Thank you very much for your recent letter providing comments on the draft Environmental Impact Statement (EIS) for the Buckhorn-Mesa watershed project. Your comments along with all others received will be considered in preparation of the final EIS. I will mail you a copy of the final EIS when it is published.

Your opposition to the Spook Hill structure is duly noted. While you and the people you represent may not live in a flood plain, the project is designed to provide flood damage reduction benefits on 7,780 acres. Highly qualified hydraulic engineers and hydrologists have studied this watershed and determined there is a serious flood problem. All the economic and hydraulic supporting data for this project is available in our files. You are welcome to review it.

Your concern for wildlife and desert flora is also noted. Impacts on these resources will be discussed further in the final EIS.

Orme Dam is mentioned twice in your letter. The Buckhorn-Mesa watershed project was planned and proposed improvements located without consideration of the Central Arizona Project (CAP) Canal. The Bureau of Reclamation located the canal below the Buckhorn-Mesa structures to take advantage of the flood protection. Our evaluation shows this project is economically justified without considering any benefits that might accrue to the CAP Canal.

We appreciate your concern and comments on this project.

Sincerely,

*R. L. Swenson* For:

Thomas G. Rockenbaugh  
State Conservationist

bcc:

Flood Control District of Maricopa County  
East Maricopa NRC  
Pinal County Board of Supervisors  
R. L. Clark, RBWP Staff /

File  
*[Signature]*

6029 Federal Building, Phoenix, Arizona 85025

October 21, 1975

Mr. T. S. Bollack  
6659 E. Rustic Drive  
Mesa, Arizona 85205

Dear Mr. Bollack:

Thank you for your comments on the Draft Environmental Impact Statement prepared for the Buckhorn-Mesa Watershed Project. Your comments, along with all others received on the Draft EIS, will be considered in the final EIS. You will also receive a copy of the final EIS when it is available.

Sincerely,

*John W. Peterson*

For:

George C. Marks  
State Conservationist

bcc: R. L. Clark, RBWP Staff (original letter att'd)

10/22

6029 Federal Building, Phoenix, Arizona 85025

November 11, 1975

C. Truman Davis, M. D.  
1150 North Country Club Drive  
Mesa, Arizona 85201

Dear Dr. Davis:

Thank you very much for your letter providing comments on the Buckhorn-Mesa Watershed Project. Area residents made application for planning assistance in this watershed in July 1960. The Soil Conservation Service and the project's sponsors have been working at formulating a feasible watershed plan since that time. The Spook Hill Reservoir is but one of the structural measures proposed in this watershed project.

We are currently assisting the sponsors prepare the final environmental impact statement (EIS) for this project. Your comments will be considered in that final EIS. I will see that you receive a copy of that document when it is published.

It's unfortunate that you were not aware this project plan was proposed. In the past 15 years, there have been 35 to 40 public meetings along with extensive newspaper and even TV coverage given. The last public meetings held were in April and May of this year. About 150 to 200 persons attended the May meeting at the Fremont Junior High School Auditorium. It seems that no matter how hard we try, there will always be some who do not receive the information.

The construction of the Spook Hill Reservoir most certainly will have an impact on the surrounding area. The purpose of the environmental impact statement is to assess those impacts. Provisions will be made in the design of all dams for water releases that will assist in sustaining downstream vegetation.

All dedicated and accepted roads will remain open. No area that now has access across the proposed Spook Hill Dam or any other structure will be cut off as a result of construction. ★

Highly qualified hydraulic engineers, hydrologists, and economists have studied this watershed and determined that there is a serious flood problem. While you may not live in the flood plain, this project is designed to provide flood damage reduction benefits on about 7780 acres.

C. Truman Davis, M. D.

2

All the economic and hydraulic supporting data are available in our files. You are welcome to review it.

I appreciate your concern and comments on this project.

Sincerely,

*JGB*  
Thomas G. Rockenbaugh  
State Conservationist

6029 Federal Building, Phoenix, Arizona 85025

November 7, 1975

Mrs. B. Erickson  
5826 Montara Place  
Mesa, Arizona 85205

Dear Mrs. Erickson:

Thank you very much for your recent letter providing comments on the draft Environmental Impact Statement (EIS) for the Buckhorn-Mesa watershed project. Your comments, along with all others received, will be considered in preparation of the final EIS. I will mail you a copy of the final EIS when it is published.

The Buckhorn-Mesa watershed project was not proposed primarily to protect the Central Arizona Project (CAP) Canal. Our evaluation shows this project is economically justified without considering any benefits that might accrue to the CAP Canal. The Bureau of Reclamation located the canal below the Buckhorn-Mesa structures to take advantage of the flood protection.

We appreciate your concern and comments on this project.

Sincerely,

*R. S. Swenson*

For:

Thomas G. Rockenbaugh  
State Conservationist

bcc:

Flood Control District of Maricopa County  
East Maricopa NRC  
Pinal County Board of Supervisors  
R. L. Clark, RBWP Staff

6029 Federal Building, Phoenix, Arizona 85025

November 7, 1975

Mr. Olin E. Goldman  
2436 Usery Pass Road  
Mesa, Arizona 85207

Dear Mr. Goldman:

Thank you very much for your letter providing comments on the draft Environmental Impact Statement (EIS) for the Buckhorn-Mesa watershed project. Your comments, along with all others received, will be considered in preparation of the final EIS. I will mail you a copy of the final EIS when it is published.

In your letter, you mention that construction of the Spook Hill structure would "completely block Usery Pass Road, as well as other access roads to your school and home." All dedicated and accepted roads will remain open. If I have accurately located your property from the address given, you will have east and west access by way of McDowell and McKellips roads, and north and south access by way of Ellsworth road. It is possible Brown Road will also be extended eastward through the area of the Spook Hill structure.

We appreciate your concern and comments on this project.

Sincerely,

*R. L. Swenson*

For:

Thomas G. Rockenbaugh  
State Conservationist

bcc:

Flood Control District of Maricopa County  
East Maricopa NRCD  
Pinal County Board of Supervisors  
R. L. Clark, RBWP Staff |

6029 Federal Building, Phoenix, Arizona 85025

November 7, 1975

Mrs. Rachel D. Goldman  
2436 Usery Pass Road  
Mesa, Arizona 85207

Dear Mrs. Goldman:

Thank you very much for your letter providing comments on the draft Environmental Impact Statement (EIS) for the Buckhorn-Mesa watershed project. Your comments, along with all others received, will be considered in preparation of the final EIS. I will mail you a copy of the final EIS when it is published.

In your letter, you mention that construction of the Spook Hill structure would "completely block Usery Pass Road as well as other access roads to your school and home." All dedicated and accepted roads will remain open. If I have accurately located your property from the address given, you will have east and west access by way of McDowell and McKellips roads, and north and south access by way of Ellsworth Road. It is possible Brown Road will also be extended eastward through the area of the Spook Hill structure.

We appreciate your concern and comments on this project.

Sincerely,

*R. S. Livenman*

For:

Thomas G. Rockenbaugh  
State Conservationist

bcc:  
Maricopa County Flood Control District  
East Maricopa NRC  
Pinal County Board of Supervisors  
R. L. Clark, RBWP Staff

6029 Federal Building, Phoenix, Arizona 85025

November 7, 1975

Hannah and John Kodatt  
2418 Usery Pass Road  
Mesa, Arizona 85207

Dear Hannah and John Kodatt:

Thank you very much for your recent letter providing comments on the draft Environmental Impact Statement (EIS) for the Buckhorn-Mesa watershed project. Your comments, along with all others received, will be considered in preparation of the final EIS. I will mail you a copy of the final EIS when it is published.

The Buckhorn-Mesa watershed project was not proposed primarily to protect the Central Arizona Project (CAP) Canal. Our evaluation shows this project is economically justified without considering any benefits that might accrue to the CAP Canal. The Bureau of Reclamation located the canal below the Buckhorn-Mesa structures to take advantage of the flood protection.

Your concern for wildlife and desert flora is also noted. Impacts on these resources will be discussed further in the final EIS.

We appreciate your concern and comments on this project.

Sincerely,

*R. L. Swenson* For:

Thomas G. Rockenbaugh  
State Conservationist

bcc:

Flood Control District of Maricopa County  
East Maricopa NRCB  
Pinal County Board of Supervisors  
R. L. Clark, RBWP Staff /

6029 Federal Building, Phoenix, Arizona 85025

November 7, 1975

John F. Octigan, Jr.  
Cynthia C. Octigan  
2448 Usery Pass Road  
Mesa, Arizona 85207

Dear John F. and Cynthia Octigan:

Thank you for your letter providing comments on the draft Environmental Impact Statement (EIS) for the Buckhorn-Mesa watershed project. Your comments, along with all others received, will be considered in preparation of the final EIS. I will mail you a copy of the final EIS when it is published.

The total estimated cost of this project is \$35,428,860 and not \$2 billion as you state in your letter. You might have this proposal confused with the Central Arizona Project.

Your concerns for the desert vegetation, natural beauty, dust created by construction and individual relocations as a project alternative are duly noted. Impacts on resources and alternatives to the proposed project will be further discussed in the final EIS.

As this project is not part of the Central Arizona Project, nor is it justified based upon benefits to the CAP Canal, it is not necessary litigation over Orme Dam be resolved before this project is begun. The two projects are close together physically, but were evaluated as distinctly separate proposals.

We appreciate your concern and comments on this project.

Sincerely,

*R. L. Swenson* For:

Thomas G. Rockenbaugh  
State Conservationist

bcc:  
Flood Control District of Maricopa County  
East Maricopa NRCD  
Pinal County Board of Supervisors  
R. L. Clark, RBWP Staff

## REFERENCES

1. All information and data, except as otherwise noted, were collected by the SCS, USDA.
2. U. S. Department of Commerce, Bureau of the Census, *County and City Data Book (1972)*.
3. T. W. Anderson, *Electrical-Analog Analysis of Ground-Water Depletion in Central Arizona*, U. S. Department of Interior, Geological Survey Water Supply Paper 1860 (1968); Arizona Water Commission, *Phase I Arizona State Water Plan Inventory of Resources and Uses (July 1975)*.
4. U. S. Department of Interior, Geological Survey, *Water Quality Records in Arizona (1964)*.
5. Lyman Benson and Robert A. Darrow, *A Manual of Southwestern Desert Trees and Shrubs*, University of Arizona Bulletin (April 1944).
6. Arizona Highway Department, *Draft Environmental Impact Statement, Superstition Freeway (July 24, 1973)*.
7. W. L. Minckley, *Fishes of Arizona*, Arizona Game and Fish Department, (1973).
8. U. S. Department of Interior, Fish and Wildlife Service, *Threatened Wildlife of the United States*, Federal Register, September 26, 1975, (Vol. 40, No. 188).
9. About 2,100 acres will be producing crops in ranchettes.
10. Maricopa Association of Governments and Pinal County Planning and Zoning Department (September 1974).
11. H. H. Schumann, *Land Subsidence and Earth Fissures in Alluvial Deposits In The Phoenix Area, Arizona (Map)*, U. S. Department of Interior, Geological Survey (1974).
12. Maricopa Association of Governments, Transportation & Planning Office, *Preliminary Resident Population and Housing Unit Projections (1975-2000)* (September 1974).
13. U. S. Army Engineer District, Los Angeles, California, *Final Environmental Statement, Indian Bend Wash, Arizona (October 1973)*.
14. Arizona Water Commission, *State Flood Control Program, Report No. 3*, (March 1973).
15. Type I Lower Colorado Region River Basin Study (June 1971).

APPROVAL

APPROVED BY:

---

Thomas G. Rockenbaugh  
State Conservationist

## APPENDICES

Appendix A - Comparison of Benefits and Costs for Structural Measures

Appendix B - Project Map

Appendix C - Letters of Comment Received on Draft Environmental Impact Statement.

Appendix D - Avifauna, Mammals, Fishes, and Herpetofauna

Appendix E - Land Status, Land Use, and Resource Unit Map

APPENDIX A

COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

COMPARISON OF BENEFIT AND COST FOR STRUCTURAL MEASURES (Revised)

Buckhorn-Mesa Watershed, Arizona

(Dollars)

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Evaluation Unit	Average Annual Benefits <sup>1/</sup>		Average Annual Cost	Benefit Cost Ratio
	Damage Reduction	Total		
Floodwater Retarding Structures and Channel Work	2,808,790	2,808,790	1,004,300	2.8:1.0
Project Administration	xxx	xxx	118,500	xxx
GRAND TOTAL	2,808,790 <sup>2/</sup>	2,808,790	1,122,800	2.5:1.0

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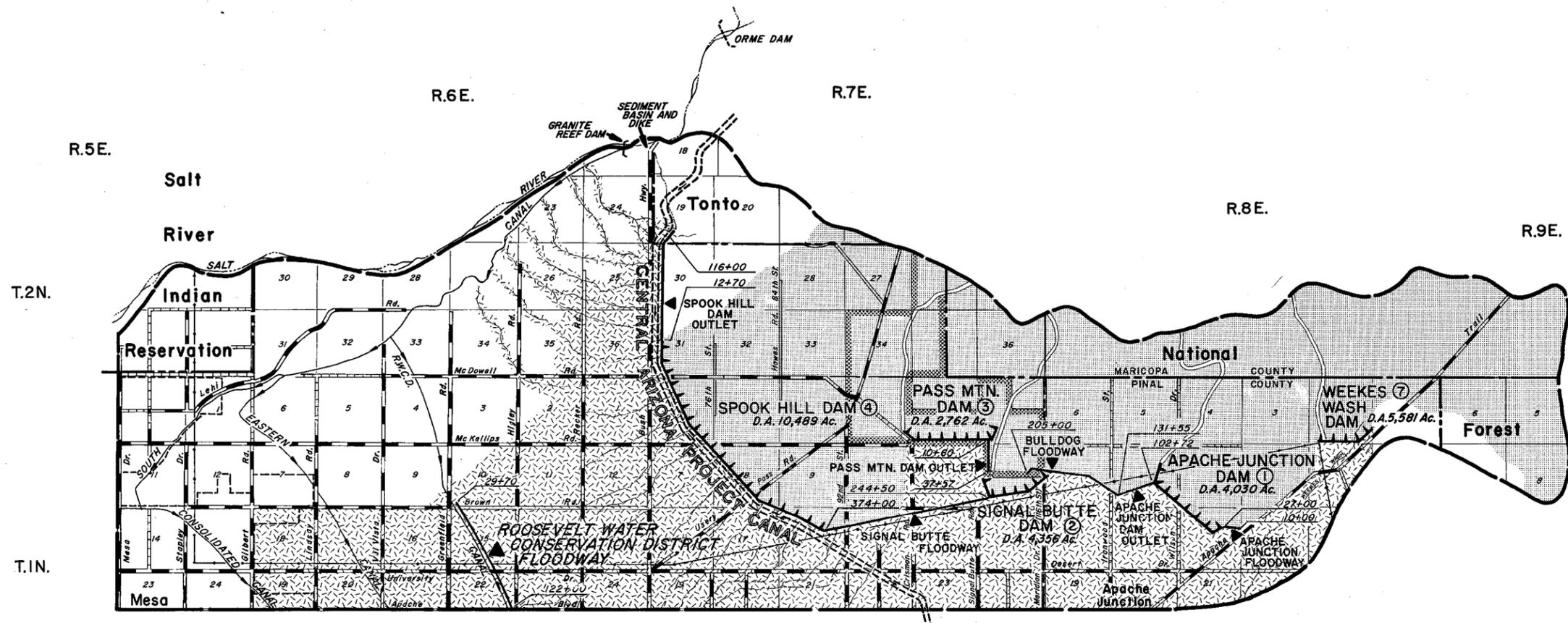
1/ Price base: current normalized prices for agricultural products  
current prices for agricultural and nonagricultural  
properties.

2/ In addition, it is estimated that land treatment measures will  
provide flood damage reduction benefits of \$1,970 annually.

February 1975

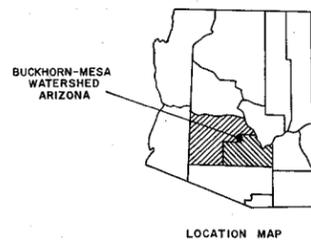
APPENDIX B

PROJECT MAP



**LEGEND**

RANGE & TOWNSHIP LINE	---
SECTION LINE	---
SECTION NUMBER	36
PAVED ROAD	=====
GRADED ROAD	-----
UNIMPROVED ROAD	-----
POWER LINE	-----
CANAL	-----
INTERMITTENT STREAM	-----
COUNTY LINE	-----
INDIAN RESERVATION BOUNDARY	-----
NATIONAL FOREST BOUNDARY	-----
WATERSHED BOUNDARY	-----
CENTRAL ARIZONA PROJECT CANAL	-----
MESA CITY LIMITS	-----
DRAINAGE AREA CONTROLLED BY STRUCTURE	-----
AREA BENEFITED	-----
FLOODWATER RETARDING STRUCTURE	-----
STRUCTURE NUMBER	③
DRAINAGE AREA ACREAGE	D.A. 1,230 Ac.
CHANNEL WORKS FOR FLOOD PREVENTION	-----
USURY MOUNTAIN SEMI-REGIONAL PARK	-----



**PROJECT MAP**  
**BUCKHORN - MESA WATERSHED**  
**MARICOPA AND PINAL COUNTIES, ARIZONA**

MARCH 1975



APPENDIX C

LETTERS OF COMMENT RECEIVED

ON

DRAFT ENVIRONMENTAL IMPACT STATEMENT

UNITED STATES DEPARTMENT OF AGRICULTURE  
OFFICE OF THE SECRETARY  
WASHINGTON, D.C. 20250

OFFICE OF EQUAL OPPORTUNITY

SEP 25 1975

IN REPLY

REFER TO: 8140 - Supplement 7

SUBJECT: Draft Environmental Impact Statement for  
the Buckhorn-Mesa Watershed, Arizona

TO: George C. Marks  
State Conservationist

THROUGH: Verne M. Bathurst  
Deputy Administrator  
for Management, SCS

The Draft Environmental Impact Statement (EIS) for the Buckhorn-Mesa Watershed was reviewed by this office to assess the civil rights impact of the socio-economic effects on minority groups.

Under the heading, "Present and Projected Population," on page 22, you estimated the number of non-white residents within the Buckhorn-Mesa Watershed to be less than two percent of the present population or 1,080 people, about half of which are Negroes. Then on page 52, you indicated that the per capita income of minority and low income persons will not be appreciably affected by the project. The use of terms non-white residents and minority persons gives rise to some confusion. According to Departmental usage, non-white includes (1) Negro, (2) Spanish-surname, (3) American Indian, (4) Orientals, and (5) All Other, and the term minority persons includes all non-whites.

Using the 1970 Census of Population for minorities or non-whites in both Maricopa and Pinal Counties as a guide, it appears that you did not include Spanish surname (Spanish Americans) in the non-white population estimate for the Buckhorn-Mesa Watershed. The Census data show 140,607 Spanish surname in Maricopa County and 24,813 in Pinal County.

It's conceivable that the inclusion of Spanish surname in the non-white grouping would make a difference in your socio-economic impact assessment of the Buckhorn-Mesa Watershed on the minority persons. If there is a change, this fact and its magnitude should be included in the final draft.

Also, in the final draft, we recommend the use of either non-white or minority persons, not both in the same document unless each is defined.

*Miles S. Washington, Jr.*

MILES S. WASHINGTON, JR.  
Acting Director

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

The United States Department of Agriculture, Forest Service has recommended that the following two memoranda be included in the final Environmental Impact Statement. They are dated June 24, 1975, and July 29, 1975.

Mesa 03

3510 Watershed Prot. and Flood Control  
2540 Watershed Protection and Management

June 24, 1975

Backhorn Mesa Watershed Project  
Spook Hill Floodway

Forest Supervisor, Tonto NF

The following report is the results of field examinations by the following Tonto National Forest employees.

1. Frank B. Leonard - District Ranger Mesa
2. Clay Withrow - District Range & Wildlife Staff
3. Dick O'Connell - District R & L Staff
4. John Rector - Forest Hydrologist
5. Howard Broderick - Soil Scientist
6. Charles Kershaw - Landscape Architect

The field examination was an effort to determine what affects the proposed Spook Hill Flood Control Project would have on National Forest System Lands.

On April 22, 1975 a public meeting was held to get the public's comments to the proposed watershed project. The meeting was held after a Preliminary Draft Environmental Impact Statement had been distributed by the S.C.S.

To our thinking that statement did not fully evaluate the effects of the project on National Forest Lands nor did it discuss possible ways of reducing these affects or alternatives if mitigation of the affects were not possible. Following are effects that have not been completely evaluated to our satisfaction. I feel these concerns should be fully resolved before a right-of-way is issued for this project. If the adverse effects on National Forest Lands cannot be resolved to our satisfaction the right-of-way in question should not be issued.

Our evaluation and concerns are as follows:

1. On forest lands the soil material along the canal right-of-way, ranges from deep cobbly and clayey old valley fill to out-crops of granite bedrock. In some places the old alluvial fill is indurated with calcium carbonate and silica flows.

How stable will the dike and canal bottom be where the canal is built across so highly variable soil material? Will there be differential settling, cracking of the dike, high seepage losses and possible washing out of the dike?

2. Indications are that the constructed floodway will not be concrete lined so the stability of the surface soils is of concern to us. Will the constructed floodway resist lateral and vertical scouring?

3. How will the floodway cut banks be stabilized? It is anticipated that the cut side slopes of the constructed canal will range from 10 to 30 feet in height and will be visible from different areas. Much screening and stabilization will be necessary.

4. Prior to final field examination a complete set of cross-section plans should be furnished us so we will know just how much cut and fill there is at any given point.

\* 5. At the point where the constructed floodway empties into the natural drainage, is there sufficient natural capacity existing to transport flood-flows without excessive erosion? How will head cutting be avoided at this point?

6. Is the natural channel stable enough to transport the added floodwater, or will scouring and/or deposition be experienced? If so where and to what extent?

\* 7. The following unstable soil conditions exist in the natural channel and that coupled with increased water flow and velocities how much of the material will be scoured out? The sediment from the channel bottom will be dumped into the Salt River. The Salt River Project should be notified of this increased sediment yield.

(a) Old alluvial valley fill makes up part of the drainage channel side slopes. In some places the old alluvium is capped with indurated materials. These materials are highly erodible.

(b) The remains of old river terraces occur in the natural channel. They occur just a little higher than the present flood plain. Much of these will be scoured out.

(c) The sandy flood plain in the natural channel has built up for many years. This sandy flood plain will be scoured out. I think we should know about how many tons of sediment will be picked up along the channel and dumped into

the Salt River? Do we need a sand trap above the exit into the Salt River?

8. How will the unstable conditions along the natural channel be stabilized?
9. Will the native vegetation in the natural channel be removed prior to water flows? If not what measures will be taken to keep the debris out of Granite Reef Dam?
10. How will the cross drainages that empty into the constructed canal be handled? What measures will be taken at each entrance to prevent the opposite bank from being eroded away?
11. The capacity of the twin box culverts under the Bush Highway has been discussed to some extent. Everyone is of the opinion that it is possibly large enough to carry the anticipated flows. If the existing vegetation and debris in the natural channel are not completely cleaned up they stand a chance of plugging up the culvert and causing the water to go over the road thus it could wash the road out.
12. The protective wing walls on the up-stream side of the bridge are not of sufficient size and design to protect the bridge and highway. These will have to be re-designed.
13. How will the Granite Reef recreation area be protected from the flood waters? Structure designs should be submitted to us prior to final field examination.
14. The Spook Hill control dam and outlet are being designed for the 100 year-two hour storm. The capacity of the natural drainage has been computed using a ten (10) year storm as a design basis. It was determined that flows of 1000+ cfs are possible in the natural drainage. The natural drainage has a relatively steep slope, 3 to 5 percent, and therefore has the potential of generating very high velocities. (As a comparison of how much 1000 cfs is the two canals leaving Granite Reef Dam carry approximately 900 cfs.)

If just after completion of the project we happened to get a 25, 50, 75 or 100 year storm what would this do to the natural drainage?

15. It is understood that the natural drainage is only going to be used as a temporary outlet to the Salt River and that eventually the Central Arizona Project will extend the constructed canal parallel to their aqueduct and discharge it into Orme Reservoir. What assurance do we have that the CAP will extend the canal? If not what measures would be necessary to up-grade the drainage to the same design standard as the main structures?

16. Prior to any work being done on National Forest Land an archeological clearance report should be submitted to the Forest Service.

17. The constructed canal will be built on the Goldfield grazing allotment. What measures will be taken to keep cattle out of the outlet structures and also some structures are needed to get cattle from one side to another.

18. Access to and across the constructed structures are necessary for fire prevention and suppression.

19. Has the alternative been considered and discussed in full detail of using one of the larger drainages south of the Forest boundary as the temporary outlet for the floodwaters? I would like to see this proposal evaluated in detail as an alternative.

I realize that the above is quite a list of concerns and affects connected with the proposed project but if we are to maintain the integrity of our surface resource in the area these should be resolved to our satisfaction before a right-of-way is issued.

I will be available most of the time in case another field examination and review is necessary.



FRANK B. LEONARD  
Mesa District Ranger

Mesa RD

3510 Watershed Project and Flood Control  
2540 Watershed Protection and Management

July 29, 1975

Buckhorn Mesa Watershed Project  
Spook Hill Floodway

Forest Supervisor, Tonto NF

On July 22 a meeting was held in the conference room of the Forest Supervisor's office for the purpose of going over the memo from the Soil Conservation Service answering questions in my memo of June 24, 1975 to you. Those in attendance were as follows:

REC'D  
TONTON NF

JUL 30 1975

Frank B. Leonard	USFS
Ron Clarke	SCS
Paul Monville	SCS
John Peterson	SCS
Chuck Kershaw	USFS
Rex Stone	SCS
John Rector	USFS

FS	<input checked="" type="checkbox"/>
DFS	<input checked="" type="checkbox"/>
RRW	<input type="checkbox"/>
R&L	<input type="checkbox"/>
TFW	<input type="checkbox"/>
Eng	<input type="checkbox"/>
PIO	<input type="checkbox"/>
AO	<input type="checkbox"/>
B&F	<input type="checkbox"/>
AS	<input type="checkbox"/>
PM	<input type="checkbox"/>
RES	<input type="checkbox"/>
Copy to Rers	<input type="checkbox"/>
Copy Rcd	<input type="checkbox"/>
Encl Rcd	<input type="checkbox"/>

During the meeting most of the questions in my memo were answered satisfactorily. I still had some concerns on question no. 3, 5, 10 and a meeting was set up on July 25, 1975 to go over the area on the ground and resolve anything still of concern to me.

At the meeting on July 25 were Don Riddle, Engineer, Don Clarke Geologists, Paul Monville Design Engineer, Joe Arnold State and Private Forestry Area Planning and Development, John Rector Tonto Forest Hydrologist and Bill Leonard District Ranger. At the meeting on the ground all concerns were discussed to a point where proper recommendations can be made.

After receiving the plan and profile it was much easier to tell what the impacts were going to be on National Forest lands at any given point. Question No. 3 concerned bank stabilization. This does not seem to be much of a problem in that the floodway will be approximately 12 feet deep and 80 feet wide where it enters the forest boundary. At this point there is approximately 1.5 ft. of cobbly valley fill over a withered granite. The deeper cuts of the channel go through the fractured granite into harder less erosive material. At the forest boundary the side slopes will be 2-1 due to the shallower cuts and withered granite towards the surface. As the floodway enters the natural channel the side slopes in the harder granite are going to be 1-1. We feel erosion

will not be much of a problem due to the shallow material overlying harder granite. The depth of the floodway from where it enters the forest varies from approximately 12 to 41 feet just before it enters the natural channel. Due to the complete channel being below ground level screening will not be necessary.

Question number 5 was concerned with where the constructed floodway emptied into the natural channel. The constructed floodway was continued into the natural drainage until it day-lighted itself. This point was approximately 150' before all of the water could collect into one central channel. The area at the mouth of the floodway is relatively level and the water will cover an area of approximately 100 x 150 feet seeking its own channels before collecting in the main channel.

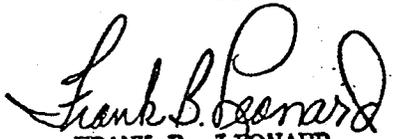
The alternative of letting the water go at this point would be to construct a dyke on both sides for another 150 feet to the main channel. If dykes are constructed the vegetation in the area would be completely removed or destroyed by construction equipment. If the water is turned loose and allowed to seek its own channel for the last 150' some of the smaller shrubs would be lost but most would remain. The least impact on the land would be to allow the water to seek its own channel with no further disturbance by heavy machinery. Little erosion will take place due to the very shallow material overlying the granite.

Question No. 10 was concerned with the cross drainages that intersect the floodway. It was determined that very little wall protection was necessary due to the depth of the channel into granite. Most cross drainages were so small that no protection would be necessary. The two larger drainages will be handled by drainage junction and therefore will not enter the floodway at a right angle. (See attached drawings for drainage junction.)

Considerable discussion was had on how much of the loose cobbly material would be transported down stream and deposited either before or after it went under the bridge on the Beeline Hwy. It was agreed that most of the loose material would be moved and deposited down stream leaving only the harder granite exposed. It was also realized that if the floodway is picked up in the future by C.A.P. that it would be a long time in healing. It would start to heal only after smaller floods deposited materials along and then vegetation (grasses and shrubs) began to establish themselves.

After considerable discussions and meetings with the S.C.S. and Forest Service Specialists make the following recommendations concerning the Spook Hill Floodway of the Buckhorn-Mesa Watershed Project.

1. Recommend a protection dyke be installed below the bridge on the ~~Beeline~~ Hwy. for protection of our Granite Reef Campground.  
Bush
2. Recommend a water gap be installed in floodway between the National Forest Boundary and outside lands.
3. Recommend a road crossing be made adjacent to and inside the Forest Boundary for access across the floodway for vehicles and cattle.
4. Recommend no further construction be done at end of floodway and the discharged water be allowed to seek its own channels.
5. Recommend both my memo of June 24, 1975 and memo from S.C.S. of July 17, 1975 be included in the draft Environmental Impact Statement for the project.
6. Recommend a right-of-way be issued for that portion of National Forest Land necessary for construction of the floodway. The issuance of this right-of-way should be coordinated with the flood control district and the Soil Conservation Service at the appropriate time as not to hold up construction etc.

  
FRANK B. LEONARD  
Mesa District Ranger

Attachments:

1. Memo June 24, 1975 from Mesa District to Forest Supervisor.
2. Memo July 17, 1975 from S.C.S. to Forest Supervisor.
3. General Location Map.
4. Cross drainage junction plats (2)
5. One copy each of Plan and Profile  
Sta. 145+00 to Sta. 190+00 and  
Sta. 190+00 to Sta. 210+00

3 NOV 1975

Honorable Robert W. Long  
Assistant Secretary of Agriculture  
Washington, D. C. 20250

Dear Mr. Long:

In compliance with Section 5 of Public Law 566, 83d Congress, the views of the Secretary of the Army were requested for the Supplemental Watershed Work Plan and Draft Environmental Impact Statement for the Buckhorn-Mesa Watershed, Arizona.

We have reviewed the work plan and foresee no conflict with any projects or current proposals of this Department. In fact, planning studies for the Gila Floodway are based upon the assumption that the Buckhorn-Mesa project will be constructed in the immediate future. Since the project will protect urban and potentially urban areas, we do suggest that the Service consider allowing a minimum of three feet for wave action and wind runup above the retarding structure's maximum pool elevation.

As requested by the Service, we have also reviewed the environmental statement. We suggest that the Service consider including a more detailed evaluation of the effects of the project on wildlife populations and hunting quality. In addition, the project would appear to destroy a five-acre marsh which is inhabited by the endangered Yuma Clapper Rail. We suggest that the statement include a discussion of the possible effects of the project on the Yuma Clapper Rail.

Sincerely,

(Signed) Charles R. Ford

*for* Victor V. Veysey  
Assistant Secretary of the Army  
(Civil Works)



REPLY TO  
ATTENTION OF:

DEPARTMENT OF THE ARMY  
SOUTH PACIFIC DIVISION, CORPS OF ENGINEERS  
630 Sansome Street, Room 1216  
San Francisco, California 94111

SPDPD-F

22 October 1975

Mr. George C. Marks  
State Conservationist  
Soil Conservation Service  
U.S. Department of Agriculture  
6029 Federal Building  
Phoenix, Arizona 85025

Dear Mr. Marks:

Reference is made to your letter of 3 September 1975, and its inclosures, requesting our review and comments on the supplemental watershed plan and draft environmental impact statement for the Buckhorn-Mesa Watershed, Arizona.

We are providing coordinated review comments through our Chief of Engineers office in response to a similar request from your Administrator in Washington, D.C.

Sincerely yours,

A handwritten signature in cursive script that reads "Phillip F. Dunn, Jr.".

PHILLIP F. DUNN, JR.  
Assistant Chief, Planning Division



DEPARTMENT OF THE ARMY  
LOS ANGELES DISTRICT, CORPS OF ENGINEERS  
OFFICE OF SPECIAL ASSISTANT TO THE DISTRICT ENGINEER  
2721 NORTH CENTRAL AVENUE, SUITE 800  
PHOENIX, ARIZONA 85004  
Phoenix Urban Study

SPLED-WU

24 September 1975

Mr. George C. Marks  
State Conservationist  
Soil Conservation Service USDA  
6029 Federal Building  
Phoenix, Arizona 85025

Dear Mr. Marks:

This responds to your letter of September 3, 1975 requesting comments on the supplemental watershed plan and draft environmental impact statement for the Buckhorn-Mesa Watershed, Arizona.

The watershed work plan does not adversely affect any existing or planned projects of the Corps of Engineers.

We wish to express our appreciation for the opportunity to offer comments on this phase of the project.

Sincerely,

  
HW WORTHINGTON, PE  
Study Manager  
Phoenix Urban Study





UNITED STATES DEPARTMENT OF COMMERCE  
The Assistant Secretary for Science and Technology  
Washington, D.C. 20230

October 20, 1975

Mr. George C. Marks  
State Conservationist  
Soil Conservation Service  
United States Department of Agriculture  
6029 Federal Building  
Phoenix, Arizona 85025

Dear Mr. Marks:

The draft environmental impact statement, "Buckhorn-Mesa Watershed, Arizona," which accompanied your letter of September 3, 1975, has been received by the Department of Commerce for review and comment.

The statement has been reviewed and the following comments are offered for your consideration.

Bench marks, triangulation stations, and traverse stations have been established by the National Geodetic Survey in the vicinity of the proposed project. Construction required for the project could result in destruction or damage to some of these monuments.

The National Geodetic Survey requires sufficient advance notification of impending disturbance or destruction of monuments so that plans can be made for their relocation. It is recommended that provision be made in the project funding to cover costs of monument relocation.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving four copies of the final statement.

Sincerely,

Sidney R. Galler  
Deputy Assistant Secretary  
for Environmental Affairs





DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE  
OFFICE OF THE SECRETARY  
WASHINGTON, D.C. 20201

OCT 23 1975

Mr. George C. Marks  
State Conservationist  
Soil Conservation Service  
Department of Agriculture  
6029 Federal Building  
Phoenix, Arizona 85025

Dear Mr. Marks:

We have reviewed the supplemental draft Environmental Impact Statement concerning the Buckhorn-Mesa Watershed, Arizona. On the basis of our review, we have the following questions:

- 1 - What measures will be taken to control the air pollution generated by on-site construction?
- 2 - Will fertilizers, herbicides, or insecticides be used during the land treatment program? If so, what precautions will be taken to minimize the entry of these agents into the aquatic environment and the ingestion of these chemicals by grazing animals in the immediate area?

Thank you for the opportunity to review the document.

Sincerely,

Charles Custard  
Director  
Office of Environmental Affairs



DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT  
FEDERAL HOUSING ADMINISTRATION  
PHOENIX INSURING OFFICE  
244 WEST OSBORN ROAD  
PHOENIX, ARIZONA 85013

REGION IX  
450 Golden Gate Avenue  
P.O. Box 36003  
San Francisco, California 94102

September 16, 1975

IN REPLY REFER TO:  
9.3U - Freshman

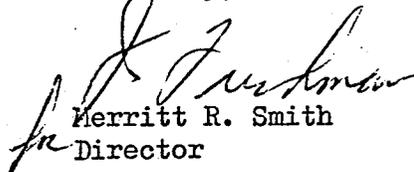
Mr. George C. Marks,  
State Conservationist  
United States Department of Agriculture  
Soil Conservation Service  
6029 Federal Building  
Phoenix, Arizona 85025

Dear Mr. Marks:

We have reviewed the draft environmental impact  
statement for the Buckhorn-Mesa Watershed, Arizona.

We do not have any comment on this document.

Sincerely,

  
Merritt R. Smith  
Director



# United States Department of the Interior

OFFICE OF THE SECRETARY  
WASHINGTON, D.C. 20240

PEP ER-75/885

JAN 13 1976

Dear Mr. Marks:

Thank you for the letter of September 3, 1975, requesting our views and comments on the supplemental watershed work plan and draft environmental statement for the Buckhorn-Mesa Watershed, Maricopa and Pinal Counties, Arizona. Our review has revealed some omissions and deficiencies which should be corrected before the documents are finalized. Specific comments arranged by section designation and page number are presented below.

## General Comments

The Department's Fish and Wildlife Service provided comments on the preliminary draft EIS and supplemental watershed work plan by letter, on April 25, 1975. We have noted that two major comments made in that letter have been overlooked in the preparation of the subject documents.

The first comment suggested consideration of directing Spook Hill Dam flood flows into a natural wash below Granite Reef Dam as proposed in the 1963 Project Work Plan. We found no direct reference in the draft EIS or supplemental work plan to the feasibility or non-feasibility of using this natural wash rather than the one presently proposed above Granite Reef Dam. Our reasons for initially suggesting use of the wash downstream of Granite Reef Dam are still valid. Furthermore, your Service is now aware that the endangered Yuma clapper rail exists in the 5-acre marsh at the confluence of the presently proposed natural wash flood channel and the Salt River. We discussed with your representatives and the Arizona Game and Fish Department on August 21, 1975, the additional sediment carrying capacity of the flood flows that will be entering this marsh due to the project will hasten the loss of the marsh. This is contrary to SCS's Policy Memorandum on Wetlands Preservation dated May 5, 1975. This policy is particularly important when endangered species are involved. Section 7 of the Endangered Species Act, administered by the Fish and Wildlife Service states:



"All Federal agencies are to utilize their authorities in furtherance of the Act by carrying out programs for conservation of endangered species and threatened species. These agencies are also to insure that action authorized, funded, or carried out by them do not jeopardize the continued existence of these species."

Implications in the preceding two documents, combined with the potential adverse effects on the Salt River fishery discussed in the April 25 comments, seem to favor a serious consideration for releasing flood flows below Granite Reef Dam. Besides avoiding adverse environmental impacts, releasing project flows below Granite Reef Dam would have favorable impacts on riparian vegetation along a portion of the Salt River that man has depleted of water.

Our second major comment on the preliminary draft documents suggested using the approximate 1,000,000 cubic yards of borrowed material that will be available from excavation of Bureau of Reclamation's Salt-Gila Aqueduct, between Spook Hill Dam and the existing Powerline Dam, to help build Apache Junction, Signal Butte, and Pass Mountain Dams. This would greatly reduce the amount of habitat clearing and revegetation costs associated with the project. We suggested costs presently assigned to revegetation could be used to offset borrow transportation costs. We found no mention of this alternative in the draft EIS or Work Plan and again suggest it be discussed in the EIS.

The current work plan does not mention mineral resources. Moreover, the project map in both documents shows neither the outline of the proposed reservoirs nor the corridors through which canals will pass. Without such a map, we cannot adequately comment on possible conflicts between mineral resources and planned project works. We suggest that the final drafts include a project map accurately outlining the flood control pools of the five proposed reservoirs and the canal routes. The work plan might well include a statement similar to that on page 19 of the environmental statement noting that all known mineral deposits are outside the construction areas.

We are concerned about the references in these documents that the selection of the Orme Dam site, which is currently under study by the Bureau of Reclamation, is in a firm and final stage. Until the final environmental statement on Orme Dam or suitable

alternatives has been filed and decisions made upon the alternative selected, it is inappropriate for other agency plans to take the stance that Orme Dam and appurtenant facilities have been predetermined as the final plan. Until a final plan is adopted, the agency statements should be couched in tentative language with respect to Orme Dam and appurtenant facilities. Other comments to this concern have been made as appropriate.

#### Work Plan

Page 4, paragraph 4. This paragraph indicates that a drip irrigation system will be installed at dam and borrow construction areas to irrigate native plants through a two-year establishment period. While a two year period is sufficient to establish native plants, an additional year of irrigation will do far more to increase their size and hasten their maturity than the first two years combined. Therefore, your Service should consider providing a third year of drip irrigation to provide for the viable establishment of the plants. This comment also applies to page 9, paragraph 2 of the environmental statement.

Page 7, paragraph 6. This paragraph states "The areas directly disturbed by construction activities include an estimated 888 acres committed to dams, emergency spillways, borrow areas and floodways." Page 43, paragraph 6 of the EIS states, "The areas directly disturbed by construction activities include an estimated 963 acres committed to dams, emergency spillways, borrow areas and floodways." The acreage discrepancy should be resolved, and cross-checked with the draft statement summary.

#### Draft Environmental Statement

##### Project Description

Page 3, paragraph 2. The statement that national resource lands are limited to grazing is in error. Lands are not presently leased for grazing but are used by outdoor recreationists and hunters.

Page 8, paragraph 2. -This paragraph should be rephrased to a tentative position until the Orme Dam or suitable alternative decision is reached. An alternative treatment of the permanent discharge could then be required.

## Environmental Setting

Page 17, paragraph 2. There is no longer a U.S. Highway 70 designated in the project area.

Page 19, paragraph 3. Mineral deposits in Maricopa County are currently yielding sand and gravel, lime, stone, and clay valued at about \$20 million per year and deposits in Pinal County are yielding copper, molybdenum, gold, silver, sand and gravel, lime, gypsum, stone, perlite, pyrite, distomite, and clays valued at about \$255 million per year. An examination of library and file data without benefit of a field investigation shows that mineral resources of the watershed and environs include gold, silver, clays, sand, and gravel, stone, mercury, tungsten, copper, and molybdenum.

Page 20, paragraph 4. The construction of this paragraph creates the impression that the reservoir behind the Granite Reef Diversion Dam of the Reclamation Salt River Project is "one small stockwater pond." The pond should be more accurately described and located.

Page 20, paragraph 7. Because Camp Creek and Sycamore Creek are uncontrolled Verde River tributaries of relatively large magnitude downstream from Bartlett Dam, and Salt River below Stewart Mountain Dam is controlled, the assumption presented about similar sediment concentrations warrants reconsideration.

Page 22, paragraph 4. Acreage for national resource land does not agree with Appendix C. Much of the land shown as NRL in Appendix C is withdrawn by Bureau of Reclamation.

Page 27. The list of endangered and threatened fish and wildlife species should include the Yuma clapper rail (Rallus longirostis yumanensis).

Page 27, paragraph 5. Delete statement ". . . . is scheduled for completion during fiscal year 1980."

While it is stated in the statement (page 28) that "structural locations" have been surveyed for archeological resources, it is not clear whether these "structural locations" include the borrow areas, access routes and areas to be cleared of vegetation. We note also that on page 13 it is stated that "a detailed archeological survey of all locations where surface disruption is likely to occur was conducted by qualified archeologists." Perhaps the full extent of the survey could be clarified in the final statement. Copies of letters of correspondence from the State Historic Preservation Officer concerning the project's effect upon archeological resources should also be included in the final statement.

Page 34, paragraph 2. States that 40 floods have occurred since 1910. It goes on to say the floods occurred about once every 2 1/2 years. One of the statements is incorrect.

### Impacts

The statement does not adequately address the impact of Structure #3 which is to be located on or near the south section line of section 5, Township 1 North, Range 7 East, Gila and Salt River Base and Meridian. This section line forms the south boundary of Maricopa County's Usery Mountain Semi-Regional Park which was patented to the County by the Federal Government on November 22, 1966, under the Recreation and Public Purposes Act of 1926 (pat. #AR-035784). The Park was partially developed with a grant from the Land and Water Conservation Fund (project #04-00230). The construction of the water control feature would not compromise the Land and Water Conservation Fund grant due to the specific language in the grant agreement between the Bureau of Outdoor Recreation and the State of Arizona, and the fact that the recreation improvements are some distance removed from the water control feature. We feel that the statement should address the impacts of the structure which is on or immediately adjacent to a public recreation facility.

As indicated in the environmental statement, the proposed structures could only partly control flooding resulting from a 100-year flood downstream from the control structures, and "the degree of flood protection will vary with the distance from the structure" (page 43). The statement shows figures for acreage protected and acreage still subject to flooding from the 100-year-frequency storm, but the accompanying map (page 46) does not distinguish between these two classifications. This should be clarified in the final statement. The remaining flood risks should be carefully defined because of the indicated pressure for further development of this flood prone area.

We suggest that temporary or long-term, beneficial or adverse impacts of seepage from unlined channels and from impoundments, even though perhaps only periodic, should be evaluated, as should the possibility of growth of phreatophytes in areas of temporary impoundment, flow and seepage and in areas of periodic flooding.

Page 49, paragraph 5. This paragraph refers to a vegetative study made by Applied Remote Sensing Program (ARSP) of the University of Arizona on 19 water impounding and diversion

structures in southwest and central Arizona. The paragraph states that the study results show the net overall impact of the 19 structures to be increased vegetative vigor and cover. On July 15, 1975, personnel from your Service held a meeting to discuss the results of this study with biologists from the Corps of Engineers, and our Bureau of Reclamation and Fish and Wildlife Service. All the biologists in attendance were of the opinion that the study was hastily and poorly planned and that the results are meaningless. The researchers arbitrarily studied vegetation along washes one mile upstream and one mile downstream of the structures. All the results actually showed was that at the time of the study, there was more vegetation in the mile upstream than in the mile downstream of the structures. This was to be expected since the vegetation or reduced quality below the structures was compared to the combined altered vegetation in the flood pools and the unaffected vegetation along the washes upstream of the flood pools. A meaningful study would be to compare the areas of affected vegetation upstream and downstream of the structures and to compare vegetation, both quantitatively and qualitatively, before and after construction. No results were given or conclusions drawn that would indicate whether the type of vegetation established after construction is as high of quality to wildlife as that existing before construction.

Furthermore, we know that at several of the structures, extensive modification has been done in the watershed above the flood pool, such as the construction of dikes, to ensure greater flows into the pools. These activities were not assessed in the study.

Page 51, paragraph 2. This paragraph on the increased sediment load and its impact on fish populations should be expanded. Sediments from winter storms which do not now enter the Salt River, would be directed into the river by the project. Without supporting data, it would appear the total sediment increase on an annual basis would be considerably higher than the 0.1 percent stated.

Page 63, paragraph 5. The last part of the paragraph relating to the Bureau of Reclamation program for the Central Arizona Project should be recast as a tentative decision until such time as a decision has been reached regarding Orme Dam or suitable alternatives. The Paradise Valley Flood Detention Dikes are essentially complete now and will be completed in the near future.

Page 66, reference 7. The final EIS should be altered, along with text, to reflect current listings. (Most recent: Federal Register September 26, 1975 - Vol. 40, No. 188).

We hope these comments will be of assistance to you in preparing your final documents.

Sincerely yours,



Deputy Assistant Secretary of the Interior

Mr. George C. Marks  
State Conservationist  
Soil Conservation Service  
Department of Agriculture  
6029 Federal Building  
Phoenix, Arizona 85025



## United States Department of the Interior

BUREAU OF LAND MANAGEMENT

ARIZONA STATE OFFICE  
2400 VALLEY BANK CENTER  
PHOENIX, ARIZONA 85073

1792 (911)

November 10, 1975

Mr. George C. Marks  
State Conservationist  
Soil Conservation Service, USDA  
6029 Federal Building  
Phoenix, Arizona 85025

Dear Mr. Marks:

We reviewed the Draft Environmental Impact Statement and Supplemental Watershed Plan for the Buckhorn-Mesa Watershed, Arizona, and forwarded our comments to the Office of the Secretary of the Interior on October 23. A copy of our comments is attached per your request.

Thank you for your courtesy in furnishing a copy direct to us.

Sincerely,



State Director

Enclosure  
Cy ltr 10/23/75

October 23, 1975

## Memorandum

To : Director, Office of Environmental Project Review, Office of the Secretary

From : <sup>ASSOCIATE</sup> State Director, Arizona BLM

Subject: Review of draft environmental statement and supplemental watershed work plan for the Buckhorn-Mesa Watershed, Maricopa and Pinal Counties, Arizona (ER 75/885)

Our staff has reviewed the subject documents and offers the following comments.

The statement covers the proposal very well. As there is no treatment proposed on lands administered by the BLM within the project area, the initial impact on national resource lands will be minimum. One general concern on projects of this type is that they tend to foster growth and urbanization which in time will adversely influence many of the environmental impacts which appear to be mitigated in the DLS.

The following minor items are presented by page number in the statement:

- p. 3            Para. 2. Statement on national resource lands limited to grazing is in error. Lands are not presently leased for grazing but are used by outdoor recreationists and hunters.
- p. 22            Acreage for national resource land does not agree with Appendix C. Much of the land shown as NRL in Appendix C is withdrawn by Bureau of Reclamation.
- p. 25            Para. 1. Fishing data, if any, should be included.
- Para. 6. We do not believe that beaver and muskrat are present within basin.
- p. 27            Under Endangered Wildlife, add: Peregrine Falcon.  
                   Under Status Undetermined, add: Desert Tortoise and Prairie Falcon.
- Para. 5. Delete statement ". . . . is scheduled for completion during fiscal year 1980."

- p. 34 Para. 2. States that 40 floods have occurred since 1910. It goes on to say the floods occurred about once every 2½ years. One of the statements is incorrect.
- pp. 38,39 Our general concern of the conflict resulting from flood control, increased urbanization and associated loss of wildlife habitat is expressed in this section of Plant and Animal Problems.
- p. 40 Para. 5. The unemployment rate is not up to date. The rate of 4% is too low. If this is based upon the 1970 census data, it should be stated.
- p. 43 Para. 3. Bird species are not listed, but benefits would be limited to non-game birds.
- p. 48 Para. 3. The ecological change could reasonably be called adverse; however it is not considered under Adverse Environmental Impacts on page 55.
- pp. 50,51 Last & 1st para. resp. These are also not listed as adverse effects on page 55.
- p. 64 Loss of archeological resources should be listed.
- p. 66 Reference 7. Final EIS should be altered, along with text, to reflect current listings. (Most recent: Federal Register September 26, 1975 - Vol. 40, No. 188).

cc:  
WO BLM (260)





DEPARTMENT OF TRANSPORTATION  
UNITED STATES COAST GUARD

MAILING ADDRESS:  
U.S. COAST GUARD (G-WS/73)  
WASHINGTON, D.C. 20590  
PHONE: (202) 426-2262

• 11 NOV 1975

Mr. George C. Marks  
State Conservationist  
Soil Conservation Service  
6029 Federal Building  
Phoenix, Arizona 85025

Dear Mr. Marks:

This is in response to your letter of 3 September 1975 addressed to the Commandant, U. S. Coast Guard concerning a draft environmental impact statement for the Buckhorn-Mesa Watershed, Maricopa and Pinal Counties, Arizona.

The concerned operating administrations and staff of the Department of Transportation have reviewed the material submitted. We have no comments to offer nor do we have any objection to this project.

The opportunity to review this draft statement is appreciated.

Sincerely,

**D. J. RILEY**  
Captain, U. S. Coast Guard  
Deputy Chief, Office of the Commandant  
Environment and Systems  
By direction of the Commandant



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION IX  
100 CALIFORNIA STREET  
SAN FRANCISCO, CALIFORNIA 94111

Mr. George C. Marks  
State Conservationist  
Soil Conservation Service  
Federal Building, Room 6029  
Phoenix, AZ 85025

NOV 21 1975

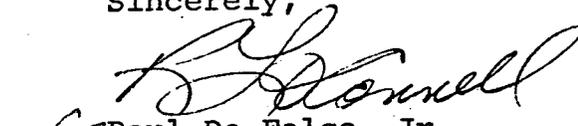
Dear Mr. Marks:

The Environmental Protection Agency has received and reviewed the draft environmental statement for the Buckhorn-Mesa Watershed in Maricopa and Pinal Counties, Arizona.

EPA's comments on the draft environmental statement have been classified as Category ER-2. Definitions of the categories are provided on the enclosure. The classification and the date of EPA's comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act. Our procedure is to categorize our comments on both the environmental consequences of the proposed action and the adequacy of the environmental statement.

EPA appreciates the opportunity to comment on this draft environmental statement and requests one copy of the final environmental statement when available.

Sincerely,

  
Paul De Falco, Jr.  
Regional Administrator

Enclosure

cc: Council on Environmental Quality

COMMENTS ON THE DEIS FOR  
BUCKHORN-MESA WATERSHED IN MARICOPA  
AND PINAL COUNTIES, ARIZONA

EPA recognizes that such naturally occurring disasters as flooding and the concomitant social and economic implications constitute real and potential problems in the Buckhorn-Mesa Watershed. Further, EPA recognizes that such problems exact heavy costs upon the human environment and associated structures, and it is a natural recourse to seek to minimize these imposed costs by reducing the immediate threat. However, EPA recognizes that the reduction of such hazards can lead to other adverse impacts. Such action therefore requires close and careful environmental planning.

In the review of the draft EIS, EPA has discovered important environmental objections. Briefly these are related to:

- 1) Various water quality problems; and
- 2) Channel dredge disposal.

1. While the draft document admits on page 49 that no chemical, organic pollutant, temperature nor turbidity data exist, the document specifically states that the addition of the watershed runoff (.05% of the annual Salt River flow of 1,086,700 AC-FT) will not appreciably change the turbidity of the Salt River. The implication may be drawn that the additional water quality parameters will also have a neutral effect upon river water quality. While superficially the implications appear valid, such conclusions cannot be emphatically iterated without further information and clarification.

The technique devised to evaluate turbidity impact, based upon the total flow rate, is misleading and ineffective in assessing short-term water quality problems. Given that flood flows occur infrequently and thus will enter the Salt River in sizable quantities at one point, the technique would not facilitate the measurement of the frequency of short term loading nor indicate the associated water quality implications. Related to these concerns is the issue of floodwater storage. Assuming that Orme Dam is constructed and future floodwaters diverted to the Dam, an important question is will the continual mixing occurring in after bay and long period storage, create substantial long-term water quality problems? If water quality standards are exceeded what mitigating measures will be enforced?

If Orme Dam is not constructed what will be the long-term effects of possible infrequent but regular violations of promulgated standards at the Granite Reef Dam site and to those served by the Dam? If violations do indeed occur, what measures will be utilized to mitigate the problems?

Further, since it is stated on page 51 that these storage facilities are among various sources that are being considered or are currently in urban usage, water quality degradation from these facilities represents a legitimate concern.

In view of these concerns, EPA suggests that the Soil Conservation Service (SCS) include in the EIS a discussion including the comingling of watershed runoff and Salt River waters, mitigating measures and short- and long-term effects. EPA recognizes the difficulty in obtaining such data but encourages the SCS to establish a water quality monitoring program as an integral component of the proposed project.

2. The document concludes on page 49 that the reduction of 160 AC-FT in the amount of ground water recharge will have no significant effect on the total amount of ground water in storage, the water table elevation, or in subsidence in the area. However, an insufficient quantity of applicable data such as location of water tables, depths to tables, and the specific areas of subsidence makes any attempt to validate this conclusion all but impossible. It is not clear whether there will be a net increase or decrease in ground water recharge since water is to be transported to other areas of the watersheds for various uses.
3. EPA notes on page 50 that 2 AC-FT of sediment will be discharged into the Salt River due to temporary use of the natural wash juxtaposed to the Spook Hill structure. This appears to constitute a significant temporary degradation of water quality and as such necessitates discussion.

The comment on page 51 that the effect on fish population as a result of sediment introduction will be slight may not be so conclusive in light of the aforementioned. Moreover, in view of the debate concerning the construction of Orme Dam, it appears relevant that the long-term implications of channel usage should be addressed and mitigative measures be incorporated into the discussion.

4. It is considered necessary for proper functioning of the floodways to include periodic removal and disposal of sediment and debris. EPA agrees, but urges the SCS to clearly indicate and assess the environmental hazards associated with each specifically defined disposal area. Moreover, it seems quite logical and economically efficient that the disposal impacts associated with sediment materials (trapped by the dam structures) be assessed at this time.

EPA suggests a reassessment of these concerns and appreciates the opportunity to review and express comments on the draft EIS for the Buckhorn-Mesa Watershed.

## EIS CATEGORY CODES

### Environmental Impact of the Action

#### LO--Lack of Objections

EPA has no objection to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

#### ER--Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to reassess these aspects.

#### EU--Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

### Adequacy of the Impact Statement

#### Category 1--Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

#### Category 2--Insufficient Information

EPA believes that the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

#### Category 3--Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement.

If a draft impact statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make such a determination.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION IX  
100 CALIFORNIA STREET  
SAN FRANCISCO, CALIFORNIA 94111

Mr. Thomas G. Rockenbaugh  
State Conservationist  
Soil Conservation Service  
U.S. Department of Agriculture  
6029 Federal Building  
Phoenix AZ 85025

JAN 12 1976

Dear Mr. Rockenbaugh:

Thank you for your letter of December 22, 1975 requesting EPA to review your responses addressing EPA's comments on the Draft Environmental Impact Statement for the Buckhorn-Mesa Watershed Project, Arizona.

EPA rated the Draft E.I.S. ER-2 (environmental reservations, inadequate information), with the major concerns being related to water quality issues. In addition, because of the environmentally sensitive nature of the Buckhorn-Mesa area, EPA believes that special consideration should be given to proposed projects to insure the minimization of adverse effects occurring as a result of the project.

Upon review of the responses submitted by the Soil Conservation Service (SCS) and the revised responses dated December 22, 1975, it appears that EPA's concerns have been addressed. However, EPA believes that because of the environmental sensitivity of Buckhorn-Mesa, the responses need to be examined in the context of the Final E.I.S. Therefore, EPA reserves the opportunity for final comment in the review process of the Final E.I.S.

If we can be of further assistance, please do not hesitate to contact our EIS Coordinator, Patricia Sanderson Port, at 415/556-3232. Please submit three copies of the Final E.I.S. to this office when it is available.

Sincerely,

A handwritten signature in black ink, appearing to read "Paul De Falco, Jr.", written over a printed name.

Paul De Falco, Jr.  
Regional Administrator

*Acting*

Advisory Council  
On Historic Preservation

1522 K Street N.W.  
Washington, D.C. 20005

September 17, 1975

Mr. George C. Marks  
State Conservationist  
Soil Conservation Service  
U.S. Department of Agriculture  
6029 Federal Building  
Phoenix, Arizona 85025

Dear Mr. Marks:

This is in response to your request of September 3, 1975 for comments on the draft environmental statement (DES) and supplemental watershed plan for the Buckhorn-Mesa Watershed, Arizona. Pursuant to its responsibilities under Section 102(2)(C) of the National Environmental Policy Act of 1969, the Advisory Council has determined that the DES is inadequate concerning evidence of compliance with Section 106 of the National Historic Preservation Act of 1966. Please furnish additional data indicating:

Compliance with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470[f]). The Council must have evidence that the most recent listing of the National Register of Historic Places has been consulted (see Federal Register, February 4, 1975 and monthly supplements each first Tuesday thereafter) and that either of the following conditions is satisfied:

- A. If no National Register property is affected by the project, a section detailing this determination must appear in the environmental statement.
- B. If a National Register property is affected by the project, the environmental statement must contain an account of steps taken in compliance with Section 106 and a comprehensive discussion of the contemplated effects on the National Register property. (The "Procedures for the Protection of Historic and Cultural Properties" [36 C.F.R. Part 800] details the steps for compliance with Section 106.)

C-33

With respect to evidence of compliance with Executive Order 11593, "Protection and Enhancement of the Cultural Environment" of May 13, 1971, it would appear from statements in the DES that the undertaking as proposed will not affect cultural resources determined to be eligible for inclusion in the National Register. However, the procedures for compliance with Section 106 and the Executive Order 11593 require the Federal agency to consult with the appropriate State Historic Preservation Officer. Therefore, the Council suggests that the final environmental statement contain evidence of the Arizona State Historic Preservation Officer's concurrence that none of the cultural resources located and identified in the reconnaissance surveys, including the one significant archeological site which was subsequently "salvaged" by a qualified archeologist, appeared to meet the criteria for inclusion in the National Register.

Sincerely yours,

*Michael H. Burns*

Louis S. Wall

*for* Assistant Director, Office  
of Review and Compliance



OFFICE OF THE GOVERNOR  
STATE HOUSE  
PHOENIX, ARIZONA 85007

IN REPLY  
REFER TO:

RAUL H. CASTRO  
GOVERNOR

September 11, 1975

Mr. George C. Marks  
State Conservationist  
Soil Conservation Service  
U. S. Dept. of Agriculture  
6029 Federal Building  
Phoenix, Arizona 85025

Dear Mr. Marks:

Acknowledgment is hereby made of your letter, dated September 3, 1975, enclosing the supplemental plan for the Buckhorn-Mesa Watershed.

Your letter and the supplements are being sent to the Arizona Water Commission for their consideration.

I am appreciative of your thoughtfulness.

Very truly yours,

A handwritten signature in cursive script that reads "Raúl H. Castro".

Raúl H. Castro

RHC:lcs

# OFFICE OF THE BOARD OF SUPERVISORS



## MARICOPA COUNTY

602 County Administration Bldg. 111 S. 3rd Avenue, Phoenix, Arizona 85003

HENRY H. HAWS  
District 1

ELDON RUDD  
District 2

BOB CORBIN  
District 3

BOB STARK  
District 4

JOE EDDIE LOPEZ  
District 5

October 20, 1975

Mr. George C. Marks, State Conservationist  
U. S. Soil Conservation Service  
6029 Federal Building  
Phoenix, Arizona 85025

Dear Mr. Marks:

We appreciate the opportunity to review and comment on the Draft Environmental Impact Statement for the Buckhorn-Mesa Watershed. The Draft Environmental Statement has been reviewed by the appropriate departments of Maricopa County, and comments are consolidated in this letter.

We are aware of the adverse impacts the construction of this Flood Control project will have on the local area. The actions proposed in the Draft Environmental Statement does, in our opinion, reduce adverse impacts to a minimum. The reduction in damages due to floods greatly outweighs the adverse impact.

We are presently preparing "A Report Upon a Future Land Use Plan for Eastern Maricopa County." The features of the Buckhorn-Mesa Flood Control Project as indicated in the draft have been incorporated into this report.

In the Draft statement brief comments are made concerning the existing recreational developments within the general area of the watershed project. As planning continues for the development of this project, it is envisioned that additional recreational facilities may be incorporated in various features of the project. County Parks and Recreation Department will work closely with you in this regard.

We recognize that certain County roads may be inundated for a short period during major storms. This, no doubt, will be an inconvenience to local residents. However, alternate routes of access will be available. This is not considered a serious inconvenience since periods of road closures will occur very infrequently.

The Draft Environmental Impact Statement presents a thorough and complete analysis of the impacts this project will have upon the local area. The Board of Supervisors concur in the Draft statement and offer their full support for this project.

Sincerely,

  
Bob Stark, Chairman



**BOARD OF SUPERVISORS**  
PINAL COUNTY - FLORENCE, ARIZONA 85232  
TELEPHONE (602) 868-5801

JAMES KORTSEN, JR., CHAIRMAN  
STANFIELD

VIRGINIA NEWSOME, MEMBER  
SAN MANUEL

A. D. HERRON, MEMBER  
FLORENCE

September 8, 1975

JAY BATEMAN, ADMINISTRATOR  
FLORENCE

MERCY W. TUCKER, CLERK  
FLORENCE

Mr. George C. Marks  
State Conservationist  
United States Department of Agriculture  
Soil Conservation Service  
5029 Federal Building  
Phoenix, Arizona 85025

RE: Buckhorn-Mesa Watershed

Dear Mr. Marks:

Our Board thanks you for your letter of September 3, 1975 and the enclosing of supplemental plans and environmental statements.

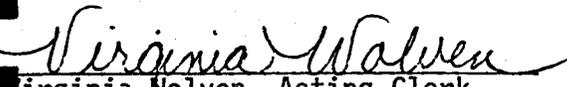
This letter advises that our Board has reviewed the aforesaid plans and statements, and, in Regular Continued Session this date further advises as follows:

- A - Our Board has no official comments nor statements for additions, deletions nor modifications in the plans nor of the Environmental Impact Statement.
- B - We do hereby compliment and commend you and each other person involved in doing a beautiful job of field work as well as of planning, and, in putting together these two very fine documents.

Thanking you again and with best personal regards, I am,

Very truly yours,

ATTEST:

  
Virginia Wolven, Acting Clerk  
Pinal County Board of Supervisors

  
A. D. Herron, Chairman  
Pinal County Board of Supervisors

cc: Colonel William S. Henderson, Jr.

WILLIAM H. WHEELER  
CHAIRMAN  
PETER F. BIANCO  
VICE CHAIRMAN  
SLEY E. STEINER  
EXECUTIVE DIRECTOR  
AND  
STATE WATER ENGINEER  
VIRGINIA FRONABARGER  
SECRETARY



## Arizona Water Commission

222 NORTH CENTRAL AVENUE, SUITE 800

Phoenix, Arizona 85004

TELEPHONE (602) 258-7561

MEMBERS  
LINTON CLARIDGE  
GLEN G. CURTIS  
W. N. JACK SHAWVER  
DOUGLAS J. WALL  
J. C. WETZLER  
EXOFFICIO MEMBERS  
ANDREW L. BETTWY  
MARSHALL HUMPHREY

October 21, 1975

Mr. George Marks  
State Conservationist  
Soil Conservation Service  
6029 Federal Building  
Phoenix, Arizona 85025

Dear George:

I appreciate having the opportunity of reviewing the Buckhorn-Mesa Watershed Supplemental Work Plan and Environmental Impact Statement. The planned project is well presented showing considerable expertise in formulation and time in planning.

Our review has resulted in the following comments:

E.I.S.

- (1) Pg. 1, par. 2. Add. CAP protection should be a goal.
- (2) Pg. 8, par. 3. This implies that D.A. > 10 sq. mi. requires a concrete crest control structure. Class "C" structures with doubtful materials indicate a crest control.
- (3) Pg. 33, par. 3. Reword. Last sentence to - "A substantial cost savings to the CAP will be realized from the flood protective works of Spook Hill Dam."
- (4) Pg. 38, par. 1. Clarify. Will the supply from both groundwater and surface water be adequate to satisfy demand in the year 2000?
- (5) Pg. 39, last paragraph. Which pollutants are present and how do they compare with the maximum allowable concentrations? Is this now affecting the health of the residents?
- (6) Pg. 41. Mention in this section that the project is in agreement with the OBE-ERS projection that before the year 2020 decreased flooding damages will be an important part in the more efficient use of a critical water and economic demand in the Lower Colorado Region.

George Marks

-2-

October 21, 1975

Supplement - No comment.

If there are any questions, please feel free to call this office.

Sincerely,

*Thomas C Clark Jr*

Wesley E. Steiner  
Executive Director

cc: Constance LaMonica,  
Arizona State Clearinghouse

COVER SHEET for FEDERAL GRANT APPLICATION/AWARD NOTIFICATION

ARIZONA

1 APPLICATION DATE  
yr mo day  
19 \_\_\_\_\_

3. APPLICANT - Organizational Unit Dept. of Agriculture,  
Soil Conservation Service

4. ADDRESS - Street or P. O. Box  
Federal Bldg., Room 6029

2 FEDERAL EMPLOYER I

5. CITY  
Phoenix

6. COUNTY  
Maricopa

7. STATE  
AZ

8. ZIP CODE  
85025

9. PROG NO./FEDERAL AGENCY  
10999 Dept. of Agriculture,  
Soil Conservation Servi

10. TYPE OF ACTION  
a  New c  Modification  
b  Continuation

TYPE OF CHANGE (Complete if 10b or 10c was checked)  
11. a  Increased Dollars b  Decreased Dollars  
12. a  Increased Duration b  Decreased Duration

13. a  Other Scope Change  
b  Cancellation

14a. EXISTING FED GRANT  
14b. EXISTING CLEARINGH

15. REQUESTED FUND START 19\_\_\_\_\_  
16. FUNDS DURATION \_\_\_\_\_(Months)  
17. EST. PROJECT START 19\_\_\_\_\_  
18. EST. PROJECT DURATION \_\_\_\_\_(Months)

19. APPLICANT TYPE Enter Letter  
A. State F. School District   
B. Interstate G. Community Action Agency  
C. COG H. Sponsored Organization  
D. County I. Indian  
E. City J. Other

FUNDS REQUESTED (For Changes Show Only Amt. of Inc.(+) or D  
20a. FEDERAL GRANT ( ) \$  
20b. FEDERAL LOAN ( ) \$  
21. STATE ( ) \$  
22. LOCAL ( ) \$  
23. OTHER ( ) \$ 1  
24. TOTAL (20,21,22,23) ( ) \$ 1

25. BRIEF TITLE OF APPLICANT'S PROJECT  
Buckhorn-Mesa Watershed Project (Draft EIS) and  
Supplemental Watershed Work Plan Agreement No. 1

26. PROJECT ABSTRACT (60 Characters Per Line - 5 Lines). Attach 1-2 Page Project Summary For Review.  
Purposes of project are to reduce flooding & associated flood damages occurring within the floodprone area, to reduce erosion & sediment throughout the watershed, to increase efficiency of irrigation water use, and to afford flood protection to lands now undergoing rapid urbanization

27. AREA OF PROJECT IMPACT (Indicate City, County, State, etc.)  
Maricopa and Pinal Counties, Arizona

28. CONGRESSIONAL DISTRICT  
Of Applicant Districts Impacted By Project  
[ ] [ ]

29. Environmental Assessment Required  
By State/Federal Agency?  Yes  
If Yes, Attach.  No

30. CLEARINGHOUSE(S) TO WHICH SUBMITTED  
a  State b  Area Wide

31. NAME OF CONTACT PERSON  
George C. Marks, State Conserva.

b ADDRESS - Street or P. O. Box  
Federal Bldg., Room 6029

c TELEPHONE NO  
261-3271

31. STATE AGENCIES ONLY

WILL PROJECT, REQUIRE NEW POSITION  YES  NO

WILL PROJECT, SUPPORT EXISTING POSITIONS  YES  NO

31. MATCHING RATIO FEDERAL STATE LOCAL  
MULTIPLE CLEARINGHOUSE 201 205

33. a ACTION BASED ON REVIEW OF  
a  Notification  
b  Application

33. b ACTION TAKEN  
a  With Comment c  Waived  
b  Without Comment d  Unfavorable

75800008

35. CLEARINGHOUSE IMPACT CODE

STATE WIDE  Yes  No

County/ Ping Area  
013

County/ City  
021

County/ City  
Ping Area

36. STATE PLAN REQUIRED  
 Yes  No

75 09 10

38. FINAL CLEARINGHOUSE ACTION DATE  
yr mo day  
19 75 10 10 By *Ralph King*

39. CERTIFICATION - The applicant certifies that to the best of his knowledge and belief the above data are true and correct and filing of this form has been duly authorized by the governing body of the applicant.

40. NAME (Print or Type)

b TITLE

c SIGNATURE of Authorized Representative

d TELEPHONE NUMB

41. DATE MAILED TO FEDERAL/STATE AGENCY yr mo day  
19\_\_\_\_

42. NAME OF FEDERAL / STATE AGENCY TO WHICH THIS APPLICATION SUBMITTED

43. GRANT APPLICATION ID (Assigned by Federal Agency)

52. Application Rec'd.  
yr mo day

44. GRANTOR AGENCY

19\_\_\_\_ C-40

45. ORGANIZATIONAL UNIT

R E V I S  
Amende lic.  
Received  
yr mo day

R E V I S

54. Exp. Action Revised As Of  
yr mo day

R E V I S

Office of Economic Planning  
and Development, 3rd Floor  
1624 West Adams Street  
Phoenix, Arizona 85007

State Application Identifier (SAI)  
September 10, 1975

State AZ Number 75-80-000

From: Constance LaMonica

This project is referred to you for review and comment. Please evaluate as to:

- (1) the program's effect upon the plans and programs of your agency
- (2) the importance of its contribution to State and/or areawide goals and objectives
- (3) its accord with any applicable law, order or regulation with which you are familiar
- (4) additional considerations

Economic Sec.	Highway
Civil Rights	Aq. & Hort.
Indian Affairs	Power
Game & Fish	Health
Mineral Res.	Land
Bureau of Mines	Parks
AZ Mining Ass'n	AORCC
Arid Lands Studies	Water
Environmental Studies	CFPAD
S.W. Minerals Expl.	Museum of N
Archaeological Research	Arizona
Prescott Hist. Society	Regions I &

Please return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need further information or additional time for review.

- No comment on this project
- Proposal is supported as written
- Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature..... Harry Higgins

Date..... 10-10-75

Title..... Plng. Dir.

Telephone..... 271-5005

TO: Mr. Clinton M. Patten  
Executive Secretary  
Indian Affairs Commission  
1645 West Jefferson St.  
Phoenix, AZ 85007

State Application Identifier (SAI)

September 10, 1975

State AZ

Number 75-80-0

From: Constance LaMonica

Economic Sec.	Highway
Civil Rights	Ag. & Hort.
Indian Affairs	Power
Game & Fish	Health
Mineral Res.	Land
Bureau of Mines	Parks
AZ Mining Ass'n	AOROC
Arid Lands Studies	Water
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S.W. Minerals Expl.	Museum of
Archaeological Research	Arizona
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- No comment on this project  
 Proposal is supported as written  
 Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature Clinton M Patten

Date 9-16-75

T

Telephone

Dean, College of Mines  
Bldg., AZ Bureau of Mines  
The University of Arizona  
Tucson, Arizona 85721

State Application Identifier (SAI)

September 10, 1975

State AZ

Number 75-80-000

Economic Sec.	Highway
Civil Rights	Aq. & Hort.
Indian Affairs	Power
Game & Fish	Health
Mineral Res.	Land
Bureau of Mines	Parks
AZ Mining Ass'n	AORCC
Arid Lands Studies	Water
Environmental Studies	CEPAD
S.W. Minerals Expl.	Museum of N
Archaeological Research	Arizona
Prescott Hist. Society	Regions I &

From: Constance LaMonica

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- No comment on this project  
 Proposal is supported as written  
 Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature

*William H. Drescher*

Date

*9/24/75*

Title

*Director/Dean*

Telephone

*854-1401*

TO: Mrs. Barbara Smith  
Center for Environmental Studies  
125 Wilson Hall, ASU  
Tempe, AZ 85281

State Application Identifier (SAI)  
September 10, 1975

State AZ Number 75-80-0

Economic Sec.	Highway
Civil Rights	Aq. & Hor
Indian Affairs	Power
Game & Fish	Health
Mineral Res.	Land
Bureau of Mines	Parks
AZ Mining Ass'n	AOROC
Arid Lands Studies	Water
Environmental Studies	ORPAD
S.W. Minerals Expt.	Museum of
Archaeological Research	Arizona
Prescott Hist. Society	Regions I

From: Constance LaMonica

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- No comment on this project  
 Proposal is supported as written  
 Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature: *James Schoenewelt*

Date: *25 Sep 75*

Title: *Center for Env. Studies*

Telephone: .....

Dr. Kenneth Kimsey, Director  
Prescott Historical Society  
415 West Gurley Street  
Prescott, AZ 86301

State Application Identifier (SAI)  
September 10, 1975

State AZ Number 75-80-000

Economic Sec.	Highway
Civil Rights	Ag. & Hort.
Indian Affairs	Power
Game & Fish	Health
Mineral Res.	Land
Bureau of Mines	Parks
AZ Mining Ass'n	AORCC
Arid Lands Studies	Water
Environmental Studies	CFPAD
S.W. Minerals Expt.	Museum of N
Archaeological Research	Arizona
Prescott Hist. Society	Regions I &

From: Constance LaMonica

This project is referred to you for review and comment. Please evaluate as to:

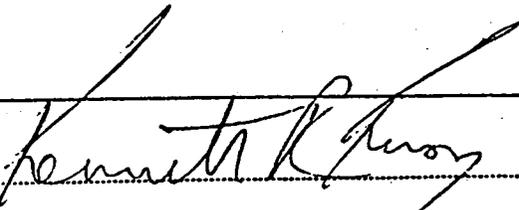
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- No comment on this project  
 Proposal is supported as written  
 Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature



Date

9/15/75

Title

Director

Telephone

445-3122

Mr. L. D. McCorkindale  
Agriculture & Horticulture Dept.  
414-Capitol Annex-West  
Phoenix, Arizona 85007

State Application Identifier (SAI)

September 10, 1975

State AZ

Number 75-80-00

From: Constance LaMonica

This project is referred to you for review and comment. Please evaluate as to:

- (1) the program's effect upon the plans and programs of your agency
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Economic Sec.	Highway
Civil Rights	Aq. & Hort
Indian Affairs	Power
Game & Fish	Health
Mineral Res.	Land
Bureau of Mines	Parks
AZ Mining Ass'n	AORCC
Arid Lands Studies	Water
Environmental Studies	NEPAD
S.W. Minerals Expl.	Museum of
Archaeological Research	Arizona
Prescott Hist. Society	Regions I

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- No comment on this project  
 Proposal is supported as written  
 Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature

*L. D. McCorkindale*

Date

9-24-75

Telephone

271-4373

To: Mr. Les Ormsby, Admin.  
Arizona Power Authority  
1810 West Adams Street  
Phoenix, Arizona 85005

State Application Identifier (SAI)  
September 11, 1975

State AZ Number 75-80-0

From: Constance LaMonica

This project is referred to you for review and comment. Please evaluate as to:

- (1) the program's effect upon the plans and programs of your agency
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Economic Sec.	Highway
Civil Rights	Aq. & Hort
Indian Affairs	Power
Game & Fish	Health
Mineral Res.	Land
Bureau of Mines	Parks
AZ Mining Ass'n	AORCC
Arid Lands Studies	Water
Environmental Studies	CFPAD
S.W. Minerals Expl.	Museum of
Archaeological Research	Arizona
Prescott Hist. Society	Regions I

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- No comment on this project  
 Proposal is supported as written  
 Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature.....

*L. Ormsby*

Date.....

9/12/75

Telephone.....

Dr. Suzanne Dandoy, Acting Dir.  
Department of Health Services  
1740 West Adams Street  
Phoenix, Arizona 85007

State Application Identifier (SAI)

September 10, 1975

State AZ

Number 75-80-000

Economic Sec.	Highway
Civil Rights	Ag. & Hort.
Indian Affairs	Power
Game & Fish	Health
Mineral Res.	Land
Bureau of Mines	Parks
- AZ Mining Ass'n	AORCC
Arid Lands Studies	Water
Environmental Studies	OPPAD
S.W. Minerals Expl.	Museum of No
Archaeological Research	Arizona
Prescott Hist. Society	Regions I &

From Constance LaMonica

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- I comment on this project
- Proposal is supported as written
- Comments as indicated below

Comments: (Use additional sheets if necessary)

Signature James D. Goff  
 JAMES D. GOFF, P.E., ASSISTANT DIRECTOR

Date 9-22-75

Telephone \_\_\_\_\_

Mr. Roland H. Sharer  
State Liaison Officer, AORCC  
4433 N. 19th Ave., Suite 203  
Phoenix, Arizona 85015

State Application Identifier (SAI)  
September 10, 1975

State AZ Number 75-80-00

From: Constance LaMonica

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- (2) the importance of its contribution to State and/or areawide goals and objectives
- its accord with any applicable law, order or regulation with which you are familiar
- additional considerations

Economic Sec.	Highway
Civil Rights	Aq. & Hort
Indian Affairs	Power
Game & Fish	Health
Mineral Res.	Land
Bureau of Mines	Parks
AZ Mining Ass'n	AORCC
Arid Lands Studies	Water
Environmental Studies	(FPAD)
S.W. Minerals Expl.	Museum of N
Archaeological Research	Arizona
Prescott Hist. Society	Regions I &

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- No comment on this project
- Proposal is supported as written
- Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature: *Robert H. Sharer*

Date: *Sept. 15, 1975*

Title: *State Liaison Officer*

Telephone: *271-5013*

Mr. Edward B. Danson, Director  
Museum of Northern Arizona  
P. O. Box 1389  
Fort Valley Road  
Flagstaff, AZ 86001

State Application Identifier (SAI)

September 10, 1975

State AZ

Number 75-80-00

Economic Sec.	Highway
Civil Rights	Aq. & Hort
Indian Affairs	Power
Game & Fish	Health
Mineral Res.	Land
Bureau of Mines	Parks
AZ Mining Ass'n	AORCC
Arid Lands Studies	Water
Environmental Studies	CFPAD
S.W. Minerals Expl.	Museum of
Archaeological Research	Arizona
Prescott Hist. Society	Regions I

From: Constance LaMonica

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- No comment on this project  
 Proposal is supported as written  
 Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature.....

Dr. Hermann K. Bleibtreu

Date..... 9/15/75

Title..... Director

Telephone..... (602) 774-5211

Mr. Thomas Gleason, Exec. Dir.  
Central AZ Ass'n of Gov'ts  
P. O. Box JJ  
Florence, AZ 85232

State Application Identifier (SAI)

State AZ

Number 175-90

From Constance LaManica

This project is referred to you for review and comment. Please evaluate as to:

- (1) the program's effect upon the plans and programs of your agency
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- No comment on this project
- Proposal supported as written
- Comments as indicated below

Respond to Applicant

Respond to Clearinghouse

Comments: (Use additional sheets if necessary)

Reviewer's Signature

*Richard R. ...*

Date 10-1-75

Title

Exec. Dir.

Telephone 868-5878

To: Mr. Ford Smith, Exec. Dir.  
Civil Rights Div, Dept of Law  
1645 W. Jefferson, Room 140  
Phoenix, Arizona 85007

N

State Application Identifier (SAI)	
September 10, 1975	
State AZ	Number 75-80-00

From: Constance LaMonica

This project is referred to you for review and comment. Please evaluate as to:

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Economic Sec.	Highway
Civil Rights	Ag. & Hort
Indian Affairs	Power
Game & Fish	Health
Mineral Res.	Land
Bureau of Mines	Parks
AZ Mining Ass'n	AORCC
Arid Lands Studies	Water
Environmental Studies	CFPAD
S.W. Minerals Expl.	Museum of I
Archaeological Research	Arizona
Prescott Hist. Society	Regions I

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- No comment on this project
- Proposal is supported as written
- Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature J. Ford Smith  
Executive Director

Date Sept. 12, 1975  
Telephone 271-5263

Mr. Ted H. Eyde, Secretary  
Southwestern Minerals  
Exploration Association  
P.O. Box 49026  
Tucson, AZ 85717

State Application Identifier (SAI)

September 10, 1975

State AZ

Number 75-80-000

Economic Sec.	Highway
Civil Rights	Aq. & Hort.
Indian Affairs	Power
Game & Fish	Health
Mineral Res.	Land
Bureau of Mines	Parks
AZ Mining Ass'n	AORCC
Arid Lands Studies	Water
Environmental Studies	ORPAD
S.W. Minerals Expl.	Museum of No
Archaeological Research	Arizona
Prescott Hist. Society	Regions I &

From: Constance LaMonica

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- Proposal is supported as written
- Comments as indicated below

Comments: (Use additional sheets if necessary)

PROJECT APPEARS TO BE NECESSARY  
TO PROTECT AREA FROM FLOODING.

Reviewer's Signature.....

*Ted H. Eyde*

Date 9-24-75

Title.....

*Proprietor*

Telephone 747-0770

Mr. Andrew L. Bettwy  
Comam., Department of Land  
1624 W. Adams St., 4th Floor  
Phoenix, Arizona 85007

State Application Identifier (SAI)  
September 10, 1975

State AZ

Number 75-80-000

Economic Sec.	Highway
Civil Rights	Ag. & Hort.
Indian Affairs	Power
Game & Fish	Health
Mineral Res.	Land
Bureau of Mines	Parks
AZ Mining Ass'n	AORCC
Arid Lands Studies	Water
Environmental Studies	OFFPAD
S.W. Minerals Expl.	Museum of N
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Prescott Hist. Society	Regions I &

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 Comments as indicated below

Comments: (Use additional sheets if necessary)

*Attached*

Reviewer's Signature.....

*Carl P. M. Cull*

Date.....

*9-22-75*

Title.....

Telephone.....



RAUL H CASTRO  
GOVERNOR

Arizona  
State Land Department

1624 WEST ADAMS  
PHOENIX, ARIZONA 85007  
602 - 271-4634



OFFICE OF  
STATE LAND COMMISSIONER

September 22, 1975

Mr. George Marks  
State Conservationist  
U. S. Department of Agriculture  
Soil Conservation Service  
6059 Federal Building  
Phoenix, Arizona 85025

Dear Mr. Marks:

This replies to your September 3, 1975 letter enclosing a draft environmental impact statement and a supplemental watershed work plan for the Buckhorn-Mesa Watershed, Arizona. Our comments on the preliminary draft statement were forwarded by a letter of May 3, 1975. However, as these do not appear as a part of Appendix E of the draft statement they are reiterated as follows in that they may be of interest to you in further consideration of the project and statement.

There is little or no discussion in the statement of land ownership patterns and the ramifications involved in obtaining rights for the project or funds to be made available for land and rights of way acquisition. Perhaps a statement pertaining to this subject would be helpful. Favorable location of portions of the project, according to ownership pattern, may tend to reduce the cost of the overall project

The alternatives discussion on pages 56-60 could be expanded as we were unable to relate any real consideration for alternatives, and suggest the alternatives provided are not clearly outlined from an economic analysis view. In further regard to alternatives:

The State Trust Lands and Private Land in Sections 4, 7 and 9, T1N, R7E, would receive protection dikes located at Stone Mountain and Ravens Roost, as suggested by Water Resource Associates, Inc. No cost figures are indicated in the report for this particular addition. Support of this alternative should not alter the Spook Hill Dam as proposed, scheduled for construction in 1975-76.

The level to which Project location planning has been carried out at this time is not known. We suggested, however, in our May 13 correspondence, with an enclosed plat, several alternatives to site locations for your consideration.

Mr. George Marks  
September 22, 1975  
Page Two

The development capabilities of State Trust Lands in Sections 7 and 16, T1N, R8E, will be improved by the relocating of the Apache Junction Dam, Apache Junction Floodway and Bulldog Floodway shown as suggested alternatives.

The suggested alternative location of the Apache Junction Floodway would provide protection for existing private development south of the State Trust Lands. In addition, the alternative would prevent drainage water from Section 10, which is State Trust Lands, from being a hazard when and after Section 10 has come under development.

Correlation is needed on proposed land uses; our statistical information indicates the following:

In T1N, R7E, portions of the State Lands (Sections 4, 8 and 9) have been applied for by the Mesa School District for proposed school sites.

In T1N, R8E, portions of the State Lands (Sections 3, 7, 10 and 16) may be in conflict for the Project and other uses. (Sections 7 and 16 are the pertinent ones) There are commercial leases on Section 7 for undetermined use, expiring December 6, 1974, Section 10 for a trailer park, expiring January 20, 1976, and Section 16 for a planned community, expiring July 20, 1975.

Access should be assured for utilities and roads from the north to the south portions of Section 7. The lower south portion of this section is leased for mobile home development and wherein a packed sewer plant is contemplated that can be expanded to accommodate a development north of the power lines and proposed Bulldog Floodway.

We offer these comments for whatever benefit they may be concerning the report and if we can be of further assistance, please advise.

Sincerely,

Andrew L. Bettwy  
State Land Commissioner

by   
Kelly R. Johnson  
Administrator  
Office of Natural Resource Conservation

KRJ/jb

C-56

cc: Arizona State Clearinghouse (75-80-0008)

Mr. John P. Dickinson  
Dept. of Economic Security  
1717 West Jefferson Street  
Phoenix, Arizona 85007

State Application Identifier (SAI)

September 10, 1975

State AZ

Number 75-80-000

Economic Sec.	Highway
Civil Rights	Aq. & Hort.
Indian Affairs	Power
Game & Fish	Health
Mineral Res.	Land
Bureau of Mines	Parks
AZ Mining Ass'n	AORCC
Arid Lands Studies	Water
Environmental Studies	CFPAD
S.W. Minerals Expl.	Museum of N
Archaeological Research	Arizona
Prescott Hist. Society	Regions I &

from Constance LaMonica

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- No comment on this project  
 Proposal is supported as written  
 Comments as indicated below

Comments: (Use additional sheets if necessary)

The project is supported provided that no action is taken which would affect lands held in trust for any federally recognized Indian tribes or the undetermined or unresolved land claims and water rights vested in these tribes without the express official approval of the respective Indian tribal government.

Reviewer's Signature

Title

Date

Telephone

*Nancy R. Hahn*

*Planner*

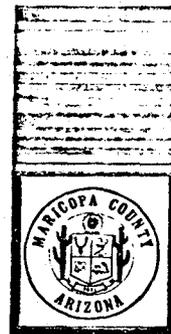
*12 Sept. 1975*

*271-5984*

# FLOOD CONTROL DISTRICT of Maricopa County

3325 West Durango Street • Phoenix, Arizona 85009 • Telephone (602) 262-3630/262-3639

October 20, 1975



Mr. George C. Marks, State Conservationist  
U. S. Soil Conservation Service  
6029 Federal Building  
Phoenix, Arizona 85025

Dear Mr. Marks:

In response to your letter of September 3, 1975, we are submitting comments on the Draft Supplemental Work Plan and the Draft Environmental Impact Statement for the Buckhorn-Mesa Watershed Project.

## SUPPLEMENTAL WATERSHED WORK PLAN

Paragraph 9 of the Draft Supplemental Watershed Work Plan Agreement No. 1, page IV has now been complied with by Maricopa County. Effective October 1, 1975, the Board of Supervisors of Maricopa County approved changes to the subdivision regulations that require detention facilities be included in all subdivision plats to detain a 100-year two-hour storm. The exact wording of this change to the subdivision regulations has been reviewed by members of your staff and they have concurred that it meets the requirements stated in paragraph 9 (Page IV).

## DRAFT ENVIRONMENTAL IMPACT STATEMENT

1. The first paragraph on page 4 and the third paragraph on page 41 should be modified as indicated in the comments above on the Supplemental Watershed Work Plan Agreement.
2. The proposed alignment of the floodways may be modified to reduce the impact on certain existing developments. We will discuss these matters with your staff in the near future.
3. The penultimate paragraph on page 11 states that sponsors will obtain the assistance of a qualified Mining Engineer in determining the extent and value of known mineral deposits. It is our understanding that known mineral deposits exist only in the Weekes Wash Dam site which is a responsibility of Pinal County.
4. In selecting a borrow for spoil-disposal areas close coordination should be effected with the Flood Control District in order that a minimum impact may be caused on proposed recreational facilities and developments.

Sincerely,

A handwritten signature in cursive script, which appears to read "Herbert P. Donald", is written over the typed name.

Herbert P. Donald

Governor  
RAUL H. CASTRO

Commissioners:

ROBERT J. SPILLMAN, Chairman, Phoenix  
WILLIAM H. BEERS, Prescott  
CHARLES F. ROBERTS, O.D., Bisbee  
FRANK FERGUSON, JR., Yuma  
MILTON G. EVANS, Flagstaff

Director

ROBERT A. JANTZEN

Asst. Director, Operations

HIL M. COSPER

Asst. Director, Services

ROGER J. GRUENEWALD



## ARIZONA GAME & FISH DEPARTMENT

2222 West Greenway Road Phoenix, Arizona 85023 942-3000

October 15, 1975

Mr. George C. Marks  
State Conservationist  
Soil Conservation Service  
6029 Federal Building  
Phoenix, Arizona 85025

Dear Mr. Marks:

Arizona Game and Fish biologists have reviewed the draft environmental impact statement of the Buckhorn-Mesa Watershed Project and have the following comments.

Page 1. Watershed protection goals: We feel that erosional rates on rangeland (goal a) largely depend upon proper range management.

Goal d, reduction of flood plain scour and erosion, will not be lessened or eliminated, especially above the proposed structures.

Page 9. Revegetation of dam structure and other sites with perennial plants (especially woody species) may be a waste of funds; planting to grasses may be of more value.

Mention that the floodwaters reaching the Salt River from this project will be of "nonerosive velocity" assures deposition of silt on the 5 acre marsh.

Page 26, second paragraph. It should be noted that the primary factor regulating wildlife populations and diversity is habitat. The marsh is a very important part of the diversity of habitat along the Salt River that makes it so valuable to wildlife enthusiasts and wildlife alike.

Page 27. "Endangered and threatened fish and wildlife", based upon the U.S. Department of Interior, Fish and Wildlife Service, Threatened Wildlife of the United States, the list should be expanded to include

clapper rail (endangered), prairie falcon (threatened), peregrine falcon (endangered), black hawk (peripheral), osprey (undetermined).

Page 39. First paragraph: "This loss of habitat, primarily for nongame species, is probably more important in this area than other areas of the state..." We believe the Salt River is one of the most, if not the most, important areas in the state for nearly all the "threatened" species.

Page 51. Second sentence of first paragraph: We do not agree that habitat along the Salt River will not change significantly in quality or quantity. We feel that the marsh and other parts of the riparian habitat along the Salt River will be greatly altered. Water quality will also be reduced.

Page 55. "Adverse environmental impacts": The accelerated loss of marsh and ten or more marsh-associated birds, including one endangered species should be added to the list.

Appendix D. Yuma clapper rail should be added to the list. Bald eagles may be seen year-round, not as an uncommon winter resident. Virginia rail, marsh wren and killdeer may nest; Bell's vireo probably nests; roadrunners do nest on site.

In addition to the above comments, we feel that some water could be allowed to remain in pools behind the structures encouraging vegetative growth, thereby mitigating in part for loss of vegetation downstream from the project facilities.

The cost of routing water into the Salt River above Granite Reef Dam was not mentioned. However, at a recent meeting it was mentioned that the cost of routing runoff into natural drainages below Granite Reef was too costly. We would appreciate knowing the comparative costs of the drainages.

It is also felt that increased silting of the Salt River will be detrimental to fisheries.

We appreciate the generous time allotment for review of this document. If you have further questions, please feel free to contact us.

Sincerely,

Robert A. Jantzen, Director

*Bernard Weynand*

C-60

By:

Bernard Weynand, Specialist  
Planning & Evaluation Branch

BW:ab

Governor  
RAUL H. CASTRO

Commissioners:  
BERT J. SPILLMAN, Chairman, Phoenix  
AM H. BEERS, Prescott  
CHARLES F. ROBERTS, O.D., Bisbee  
FRANK FERGUSON, JR., Yuma  
MILTON G. EVANS, Flagstaff

Director  
ROBERT A. JANTZEN

Asst. Director, Operations  
PHIL M. COSPER

Asst. Director, Services  
ROGER J. GRUENEWALD



## ARIZONA GAME & FISH DEPARTMENT

2222 West Greenway Road Phoenix, Arizona 85023 942-3000

October 30, 1975

Mr. George C. Marks  
State Conservationist  
Soil Conservation Service  
6029 Federal Building  
Phoenix, Arizona 85025

Dear Mr. Marks:

I would like to add to the comments of our letter of October 15, 1975, regarding the Buckhorn-Mesa Watershed Project. I wish to make particular reference to the fourth paragraph on page one.

In the October 15 letter we stated that the planting (revegetation) of woody plants may be a waste of funds and that grasses may be of more value. Revegetation with woody plants will be more expensive, however, it may not be a waste of funds. This type of vegetation has high wildlife values and coupled with revegetation of ground cover plants (grasses and annuals) could provide excellent wildlife habitat for small game and non-game species. In addition, the experience gained in planting woody species would be valuable for future projects. We recognize the value of such plants as mesquite, paloverde, catclaw, hackberry, ironwood and brittle-bush and would recommend attempts be made to reestablish these plants in disturbed areas.

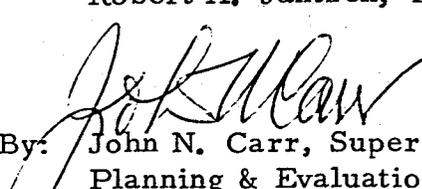
We certainly hope that our statement in the October 15 letter does not eliminate the possibility of revegetation attempts with woody plant species. We were only recognizing the fact that this is more expensive than revegetation with grasses and annuals.

If you have further questions, please feel free to contact us.

Sincerely,

Robert A. Jantzen, Director

C-61

By:   
John N. Carr, Supervisor  
Planning & Evaluation Branch

cc: Dick Morgan,



# ARIZONA DEPARTMENT OF TRANSPORTATION

## HIGHWAYS DIVISION

206 South Seventeenth Avenue Phoenix, Arizona 85007

R. L. H. CASTRO  
Governor

October 2, 1975

WILLIAM N. PRICE  
State Engineer

WILLIAM A. ORDWAY  
Director

Mrs. Constance LaMonica  
Arizona State Clearinghouse  
Office of Economic Planning  
and Development  
1624 West Adams, Suite 317  
Phoenix, Arizona 85007

Re: Buckhorn-Mesa Watershed Project  
(Draft EIS) & Supplemental Watershed  
Work Plan Agreement No. 1  
Maricopa and Pinal Counties, Arizona  
Soil Conservation Service  
State Identifier 75-80-0008

Dear Mrs. LaMonica:

The Environmental Planning Services in coordination with the Structures Section of the Highways Division, Arizona Department of Transportation, has reviewed the Buckhorn-Mesa Watershed Project (Draft Environmental Impact Statement) and the Supplemental Watershed Work Plan Agreement No. 1 submitted by the U.S.D.A. Soil Conservation Service.

We note no significant change from the project construction detail as originally presented in the preliminary draft environmental impact statement and believe the proposed project, as described in the study, presents no adverse impact upon the Arizona State and Federal Highway System. A copy of our reply on the preliminary environmental impact statement was forwarded on April 25, 1975 and reached the same conclusion. A copy is attached for your information.

We support the plan to aid in the control of flash flood waters in the Buckhorn-Mesa Watershed and agree with the comment in the study which points out this project should decrease flood damage potential along the new Superstition Freeway (State Route 360).

We appreciate the opportunity to review and comment on this proposal.

Yours very truly,

WM. N. PRICE  
State Engineer

*Mason J. Toles*  
MASON J. TOLES, Manager  
Environmental Planning Services

MJT:ADG:jh

Attachment

cc: George C. Marks, State Conservationist ✓  
U.S. Department of Agriculture

ADOT Structures Section

C-62



DENNIS McCARTHY, STATE HISTORIC PRESERVATION OFFICER  
STATE AND NATIONAL REGISTER OF HISTORIC PLACES

January 28, 1976

Mr. George C. Marks  
State Conservationist  
Att: John Peterson  
U.S. Dept. of Agriculture  
Soil Conservation Service  
111 West Monroe  
Phoenix, Arizona

Re: Buckhorn Mesa Watershed Project

Dear Mr. Marks:

I have reviewed Archaeological Investigation at AZ U:10:51 (ASU), Maricopa Co. Arizona by James B. Rodgers. In view of the archaeological background consisting of four surveys, collection of prehistoric artifacts and excavation of the historic component Az U:10:3 (ASM) or "Area B" of Az U:10:51 (ASU) I concur with the recommendations made by Donald E. Weaver, Contract Archaeologist, Arizona State University. The site is not eligible for nomination to the National Register of Historic Places. In actual fact, the cultural resources have been displaced in the process of compliance with 36 C.R.R. Part 800, the "Procedures for the Protection of Historical and Cultural Properties."

There are no National Register sites within the area of the proposed project.

Sincerely,

*Dorothy H. Hall*  
Dorothy H. Hall  
Alternate State Historic  
Preservation Officer

DHH:ag

C-63

ARIZONA  
STATE  
MARKS

1688 WEST ADAMS STREET  
PHOENIX, ARIZONA 85007  
TELEPHONE 602-271-4174

RAUL H. CASTRO  
GOVERNOR

DOROTHY H. HALL  
HISTORIC SITES  
PRESERVATION OFFICER

MARJORIE H. WILSON  
HISTORIAN

JAMES W. GARRISON  
ARCHITECTURAL HISTORIAN

DENNIS McCARTHY  
DIRECTOR

WALLACE VEGORS  
DEPUTY DIRECTOR



Archaeological  
Research  
Services

2124 South Mill Avenue  
Tempe, Arizona 85282  
Phone (602) 966-3508

9-8-75

Mr. George C. Marks  
State Conversationist  
U.S. Department of Agriculture  
Soil Conservation Service  
6029 Federal Bldg.  
Phoenix, Arizona 85025

Dear Mr. Marks:

I have reviewed the section of the Buckhorn Mesa Watershed Project report that falls within my area of competence (Archaeological and Historical resources) and find the content to be satisfactory.

I would point out, however, that no mention was made in this section to the effect that the National Register of Historic Places and the State Register had been consulted to determine if sites in these inventories existed within the project area. It is my understanding that such consideration is mandatory according to Federal guidelines.

I am pleased to comment on such reports as they become available.

Sincerely,

Lyle M. Stone, Ph.D.  
ARCHAEOLOGICAL RESEARCH SERVICES

C-64

SALT RIVER PROJECT

P.O. BOX 1980  
PHOENIX, ARIZONA 85001

November 5, 1975



TELEPHONE 273-5900

Thomas Rockenbaugh  
State Conservationist  
U. S. Department of Agriculture  
Soil Conservation Service  
Room 6029, Federal Building  
Phoenix, Arizona  
85025

re Buckhorn-Mesa Watershed Project Environmental  
Impact Statement

Dear Mr. Rockenbaugh:

Attached are comments from the Salt River Project's  
Water Group on the Buckhorn Mesa Watershed Project  
Draft Environmental Impact Statement. The Salt River  
Project's Power Group reviewed the statement also, but  
had no comments since no major power facilities appear  
to be affected.

I wish to thank the Soil Conservation Service for this  
opportunity to comment.

Sincerely,

A handwritten signature in cursive script that reads 'Jack A. Rassi'.

Jack A. Rassi  
Environmental Division

ccn  
attachment

C-65

## AVOID VEREAL ORDERS

Date October 30, 1975

FROM DON WOMACK, EXECUTIVE ENGINEER, WATER  
TO JACK A. RASSI, ENVIRONMENTAL DIVISION  
SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT - BUCKHORN-MESA WATERSHED, ARIZONA

I have reviewed the draft of the EIS for the Water Group, offer the following comments:

On page 20, fifth paragraph, the first sentence states that surface water is brought to the irrigated lands from reservoirs located on the Salt River. Surface water is also brought to these lands from reservoirs on the Verde River.

On page 21, the first sentence states "Existing records of tests on both the Salt and Verde Rivers show that under present conditions these rivers periodically exceed Arizona State Department of Health water quality standards." Is this due to suspended matter during period of heavy runoff?

On page 27, states that species such as the bald eagle are highly mobile, that they are not known specifically to nest in or inhabit the watershed, but that observation would be possible. Why include the bald eagle in the list of "Endangered and Threatened Fish and Wildlife" when there apparently is no evidence to indicate that the eagles are even there?

Page 40, under "Economic and Social Problems" lists an unemployment rate for the area affected of 4%. Perhaps this is accurate, but it sounds quite low for current conditions.

Pages 48 to 50 discuss the anticipated runoff and the sediment to be transported by it. Granted that the amount of water diverted to the Salt River from Spook Hill is very small in comparison to the annual total flow in the Salt River. However, the channel will intercept several washes which now discharge below Granite Reef Dam. Preliminary discussions with SCS officials indicated that approximately 50,000 to 80,000 cubic yards of additional material will be transported to the Salt River above Granite Reef.

The Salt River Project has an ongoing dredging program in the Salt River immediately upstream from Granite Reef Dam in an attempt to keep sediment out of its main canals. If the Buckhorn-Mesa Watershed projects result in measurable increases in sediment to be removed, the Salt River Project should be reimbursed for this increased expenditure.

Page 55, Adverse Environmental Impacts 9 and 10 are related to sediment transportation and would have direct impact on the Salt River Project, as outlined in the previous paragraph.

- DON WOMACK

at

C-66

xc: R. Teeple  
D. Weesner  
C. Whalin

Oct. 29, 1975

George Marks  
U.S. Dept. of Agriculture  
Soil Conservation Service  
111 W. Monroe St.  
Phoenix, AZ 85003

Dear Mr. Marks:

I am writing for a large group of people from the Sahuaro Hills Dreamland Villa, Velda Rose, Apache Wells, Skyway Village and adjacent areas to give our comments re: July issue of Buckhorn-Mesa Watershed, before deadline November 2, 1975.

We strongly oppose Spook Hill Dam etc., we don't need it, we don't want it, it is most unnecessary. We are not a flood plain as someone erroneously claimed.

We have the last stand of beautiful Desert flora, wildlife, Recreational sites, and Residential Zoned R 1 in all of Maricopa County. We want to preserve this for all future generations to enjoy.

We respectfully request you do no further work of any kind re: some eg. Impact Statement, Inquisition of Right of Ways, Construction of any kind, Landscaping Planning etc., as this is a waste of taxpayers money, until the Final Impact Statement on Orme Dam is released.

We recognize there is a law suit pending re: Orme Dam and trust the courts will listen to the people instead of the Bureaucrats.

Lets get together and clear up our air, the Pollution will kill all of us if we don't.

Having lived here for thirty years I remember the beautiful clear fresh air we used to breathe.

God help us all

Most Sincerely

/s/ Nonna L. Beaugureau  
Concerned Citizens Committee

Will be awaiting your reply.

6659 E. Rustic Drive  
Mesa, Arizona 85205  
18 October 1975

Mr. George C. Marks  
State Conservationist  
U. S. Dept. of Agriculture  
Soil Conservation Service  
6029 Federal Building  
Phoenix, Arizona 85025

Dear Mr. Marks:

I have reviewed the most recent (July 1975) Buckhorn-Mesa Watershed Project Environmental Impact Statement (draft) and find little or no essential differences between it and the previous draft.

I find it beyond belief that it is intended to spend \$35,008,000 plus (page 15) dollars to reduce water damage to crop and range land in the area as seems to be a "big" part of the whole effort, when by the year 2000 by your own estimate (page 32) there will be no crop land left and range land will be reduced by about 38 per cent. This is ludicrous! There can't be a case made for saving the new residential/industrial areas because simple building codes can require that drainage requirements be met as the areas develop. This would, among other things, put costs where they should be on the shoulders of those who locate there.

While the whole thing stretches one's imagination to the limit, I find the alternatives recommended at the end of the so called 100 year period (page 61) an insult to any intelligent individual's thinking. No matter how you have said it, it comes out "well you can forget it now. You don't need the dams, waterways, etc". Are we to believe the problem (?) if there ever was one just got up and went away?

In summary, it is obvious that I am against the whole project particularly Spook Hill. I feel it is unwise and impractical to push ahead with the project when so much litigation is pending on a related project (CAP) that may affect the Buckhorn-Mesa Watershed Project one way or another. I therefore request that (1) the whole damn thing be scrapped or; (2) that the start of construction be delayed pending the outcome of the CAP legal snarl.

Sincerely yours,

  
T. S. BOLLACK

THE OPHTHALMOLOGY CLINIC OF MESA, LTD.

1150 NORTH COUNTRY CLUB DRIVE  
MESA, ARIZONA 85201

C. TRUMAN DAVIS, M. D., M. S., (OPH)  
OPHTHALMOLOGY AND OPHTHALMIC SURGERY

TELEPHONE 964-8695  
AREA CODE 602

November 3, 1975

George Marks  
U. S. Dept. of Agriculture  
Soil Conservation Service  
111 W. Monroe St.  
Phoenix, AZ 85003

Dear Sir:

The plans to build a "flood control project" in our area has just recently come to our attention. We were certainly never properly informed of the plans, and in discussing the matter with others who live in the neighborhood, we find that almost no one knows that the project is planned. We have been told that "adequate" public meetings were held, but none of us were ever informed of these meetings.

We are appalled at the impact which the Spook Hill Dam project will have on our entire area. In spite of the flimsy assurances we have been given to the contrary, it is obvious that profound changes will be made in our terrain.

In order to be effective for flood control, the dam will impound water for a temporary period. This will destroy the vegetation on both the up-hill and down-hill side of the dam and will create a bare, cracked dusty area on the up-hill side when the water has evaporated.

We have been fortunate to have hard-surfaced roads built in our area by the County in the last two or three years. Now we are told that it will be necessary to close most of these thoroughfares when the Spook Hill Dam is built. This will create a definite hardship for many of us with waste of precious fuel.

The only flood problems which we know about in our area are one or two mobile homes which were overturned because they were foolishly placed in a desert wash. I hardly think that a massive, expensive, destructive Federal project is warranted to remedy this condition.

It is our hope that reason will prevail, and this illogical and expensive project will be abandoned.

Sincerely yours,

A handwritten signature in black ink, appearing to read "C. Truman Davis". The signature is written in a cursive style with a long, sweeping underline.

C. Truman Davis, M. D.

bd

Oct. 30, 1975

Dear Mr. Marks,

I am writing for a group of people in Apache Wells in Mesa about the Spook Hill Project for several reasons--

1. We don't need this project
2. We don't want this project
3. Too much dust will be created
4. Then it is a health hazard
5. It will also destroy the wild life, also residential sites
6. It is a waste of the tax payers money. This is obviously being built to protect CAP Canal.

We know there is a law suit pending regarding the Orme Dam. We request nothing be done with this work on Buckhorn Mesa Shed of any kind until the final impact statement on Orme Dam is released.

We are awaiting your reply.

/s/ Mrs. B. Erickson

5826 Montara Place  
Mesa, Arizona 85205

P.S. We came from Chicago ten years ago and notice now that the air & dust is considerably worse.

/s/ Mrs. B.

October 29, 1975  
2436 Usery Pass Rd.  
Mesa, Arizona 85207

Mr. John Peterson  
Assistant State Conservationist  
6029 Federal Bldg.  
203 N. 1st Ave  
Phoenix, Arizona 85025

Dear Mr. Peterson:

I strongly object to the Buckhorn-Mesa Watershed Project as a whole and specifically the Spook Hill Dam, the Pass Mountain Dam and their inter-connecting floodways.

My family together with two other families have close to a half million dollars invested in our homes and Trinity Christian School; all of which would be seriously affected by the above project. We have already been adversely affected by the illegal closing of a portion of Usery Pass Road. The building of this project would completely block Usery Pass Road as well as other access roads to our school and homes. The beautiful desert vegetation would be totally destroyed in a number of areas and seriously damaged in others due to the change in water run-off. There would also be a serious dust problem during construction and long afterward; for no amount of landscaping can replace what will be destroyed. All of the above is in addition to the awful waste of the taxpayers money on a project that the people of the area do not want.

Sincerely yours  
A voter and taxpayer

/s/ Olin E. Goldman

2436 Usery Pass Rd.  
Mesa, AZ 85207  
October 27, 1975

Mr. George C. Marks  
State Conservationist  
U.S. Dept. of Agriculture  
111 W. Monroe St.  
Phoenix, AZ 85003

Dear Sir:

I wish to express my very strong objection the Buckhorn-Mesa Watershed project as a whole, and with specific objections to the Spook Hill Dam, the Pass Mountain Dam and their inter-connecting flood ways.

The above project will seriously affect Trinity Christian School, as did the closing of Usery Pass Rd. I am a member of a three family group with close to a half-million dollars invested in Trinity Christian School and our homes, who will suffer adverse affects from the above project. The building of this Buckhorn-Mesa Watershed project will completely block Usery Pass Road and all other access roads to our school and homes. The change of the water run-off will completely destroy the beautiful desert vegetation in a number of areas and seriously damage others. The construction of this above project will cause a very serious dust problem not to mention, how it will destroy the senic beauty of this area.

Please do not use (or waste) our tax money on this project because we do not need or want it.

Thank you for reading and giving consideration to what I have written.

Sincerely,

/s/ Rachel D. Goldman

(Mrs. Olin Goldman)

Nov. 1, 1975

George Marks  
U.S. Dept. of Agriculture  
Soil Conservation Service  
111 W. Monroe St  
Phoenix, Arizona 85003

Dear Sir:

Please reconsider the building of Spook Hill Dam Project.

We are concerned over the entire C.A.P. Project and obviously Spook Hill Project is being built to protect the C.A.P. Canal.

Spook Hill Dam Project will destroy one of the last areas of beautiful desert vegetation in the entire valley. The mutilation of this area will be nothing but an eye sore, destruction of abundant wildlife, a health hazard and the terrible waste of taxpayers money. Many residential sites will be effected by this project.

The report speaks of flood control, there will be no flood control or is any needed for the residents in this area. There will always be those who build in natural drainage channels.

Orme Dam is also mentioned - we understand there is no impact statement on the Orme Dam. We believe the Soil Conservation Service should do no further work on Buckhorn until the report is released on Orme Dam.

Thank you

/s/ Hannah & John Kodatt

2418 Usery Pass Rd.  
Mesa, Arizona 85207

JOHN F. OCTIGAN, JR.

2448 USERY PASS ROAD • MESA, ARIZONA 85207

October 29, 1975

Mr. George Marks  
U. S. Dept. of Agriculture  
Soil Conservation Service  
Phoenix, Arizona 85003

Dear Mr. Marks:

This letter is written because of our concern for the Spook Hill Dam Project and our opposition to it.

Two years ago we built a new home which is located Southwest of the intersection of East McDowell and Usery Pass Roads. In addition to our home we are involved with the operation of a Christian School which is on the adjoining property. During the construction of these buildings and also three other homes in the adjacent area, there was deep concern to keep construction equipment restricted to the main building area in order that the surrounding desert would be kept in its natural untouched, untrampled state. A fence was put around the basic 50 acre site in order to keep out trail bike riders and others who were roping and pulling over cactus and generally destroying the natural beauty of this attractive high desert area.

In addition to the above concern the following is also called to your attention:

1. High cost of the project, about 2 billion dollars. The Government is now running at a huge deficit and this adds to it and helps increase inflationary pressure.
2. Aggravation of dust conditions. This project will protect the C.A.P. Canal which is an undertaking of the Bureau of Reclamation who should, I believe, control the entire development.
3. Should not the pending lawsuit involving Orne Dam be resolved before adjacent work is begun?
4. Relocation of the few individuals who are in a flood plane area is less expensive than the proposed project.

Thank you for your attention to this matter.

Yours truly,

*John F. Octigan*  
C-75 *Arthel C. Octigan*

APPENDIX D

AVIFAUNA, MAMMALS, FISHES, AND HERPETOFAUNA

## BUCKHORN-MESA WATERSHED

Avifauna 1/

<u>Common Name</u>	<u>Species</u>	<u>Relative Abundance</u>
Eared Grebe	<u>Podiceps caspicus</u>	uncommon winter
*Pied-billed Grebe	<u>Podilymbus podiceps</u>	uncommon resident
Double-crested Cormorant	<u>Phalacrocorax auritus</u>	uncommon transient
*Great Blue Heron	<u>Ardea herodias</u>	uncommon resident
*Green Heron	<u>Butorides virescens</u>	uncommon summer
Little Blue Heron	<u>Florida caerulea</u>	accidental
Common Egret	<u>Casmerodius albus</u>	rare transient
Snowy Egret	<u>Leucophoyx thula</u>	common transient
Black-crowned Night Heron	<u>Nycticorax nycticorax</u>	uncommon transient
*Least Bittern	<u>Ixobrychus exilis</u>	uncommon summer resident
White-faced Ibis	<u>Plegadis chihi</u>	rare transient
Canada Goose	<u>Branta canadensis</u>	uncommon winter
Mallard	<u>Anas platyrhynchos</u>	common winter
Gadwall	<u>Anas strepera</u>	rare transient
Pintail	<u>Anas acuta</u>	common winter
Green-winged Teal	<u>Anas carolinensis</u>	common winter
Blue-winged Teal	<u>Anas discors</u>	uncommon transient
Cinnamon Teal	<u>Anas cyanoptera</u>	common transient
American Widgeon	<u>Mareca americana</u>	common winter
Shoveler	<u>Spatula clypeata</u>	common winter
Wood Duck	<u>Aix sponsa</u>	accidental
Redhead	<u>Aythya americana</u>	uncommon winter

1/ From General Discussion of the Impact of the Central Arizona Project on the Birds and Mammals in the Area by Robert D. Ohmart

\* Indicates nesting

Ring-necked Duck	<u>Aythya collaris</u>	uncommon winter
Bufflehead	<u>Bucephala albeola</u>	uncommon winter
*Ruddy Duck	<u>Oxyura jamaicensis</u>	uncommon resident
Common Merganser	<u>Mergus merganser</u>	uncommon winter
Red-breasted Merganser	<u>Mergus serrator</u>	rare transient
Turkey Vulture	<u>Cathartes aura</u>	common summer
Sharp-shinned Hawk	<u>Accipiter striatus</u>	common winter
Goshawk	<u>Accipiter gentilis</u>	accidental
*Cooper's Hawk	<u>Accipiter cooperii</u>	common resident
*Red-tailed Hawk	<u>Buteo jamaicensis</u>	common resident
Zone-tailed Hawk	<u>Buteo albonotatus</u>	rare visitant
*Harris' Hawk	<u>Parabuteo unicinctus</u>	fairly common resident
*Black Hawk	<u>Buteogallus anthracinus</u>	rare summer resident
Golden Eagle	<u>Aquila chrysaetos</u>	rare visitant
*Bald Eagle	<u>Haliaeetus leucocephalus</u>	uncommon winter resident
Marsh Hawk	<u>Circus cyaneus</u>	uncommon winter
Osprey	<u>Pandion haliaetus</u>	uncommon transient
Prarie Falcon	<u>Falco mexicanus</u>	uncommon resident
Peregrine Falcon	<u>Falco peregrinus anatum</u>	rare resident
*Sparrow Hawk	<u>Falco sparverius</u>	common resident
*Gambel's Quail	<u>Lophortyx gambelii</u>	common to abundant resident
Yuma Clapper Rail	<u>Rallus longirostris yumanensis</u>	rare summer
Virginia Rail	<u>Rallus limicola</u>	uncommon winter
Sora	<u>Porzana carolina</u>	uncommon winter
*Common Gallinule	<u>Gallinula chloropus</u>	uncommon resident
*American Coot	<u>Fulica americana</u>	common resident
Killdeer	<u>Charadrius vociferus</u>	common resident

\*Indicates nesting

Common Snipe	<u>Capella gallinago</u>	uncommon resident
Spotted Sandpiper	<u>Actitis macularis</u>	common winter
Least Sandpiper	<u>Erolia minutilla</u>	common winter
Stilt Sandpiper	<u>Micropalama himantopus</u>	accidental
American Avocet	<u>Recurvirostra americana</u>	uncommon transient
Ring-billed Gull	<u>Larus delawarensis</u>	uncommon winter
Band-tailed Pigeon	<u>Columba fasciata</u>	accidental
*White-Winged Dove	<u>Zenaida asiatica</u>	abundant summer resident
*Mourning Dove	<u>Zenaidura macroura</u>	abundant summer, uncom. winter
*Ground Dove	<u>Columbigallina passerina</u>	uncommon resident
*Inca Dove	<u>Scardafella inca</u>	uncommon resident
*Yellow-billed Cuckoo	<u>Coccyzus americanus</u>	uncommon summer resident
Roadrunner	<u>Geococcyx californianus</u>	common resident
Groove-billed Ani	<u>Crotophaga sulcirostris</u>	accidental
*Screech Owl	<u>Otus asio</u>	common resident
*Great Horned Owl	<u>Bubo virginianus</u>	common resident
*Ferruginous Owl	<u>Glaucidium brasilianum</u>	rare resident
*Elf Owl	<u>Micrathene whitneyi</u>	common summer resident
*Poor-will	<u>Phalaenoptilus nuttallii</u>	common summer resident
*Lesser Nighthawk	<u>Chordeiles acutipennis</u>	abundant summer resident
Vaux's Swift	<u>Chaetura vauxi</u>	irregular transient
White-throated Swift	<u>Aeronautes saxatalis</u>	common visitant
*Black-chinned Hummingbird	<u>Archilochus alexandri</u>	common summer resident
*Costa's Hummingbird	<u>Calypte costae</u>	common summer resident
*Indicates nesting		

Anna's Hummingbird	<u>Calypte anna</u>	uncommon winter
Rufous Hummingbird	<u>Selasphorus rufus</u>	rare transient
Belted Kingfisher	<u>Megaceryle alcyon</u>	common winter
Red-shafted Flicker	<u>Colaptes cafer</u>	common winter
*Gilded Flicker	<u>Colaptes chrysoides</u>	common resident
*Gila Woodpecker	<u>Centurus uropygialis</u>	common resident
Acorn Woodpecker	<u>Melanerpes formicivorus</u>	accidental
Lewis' Woodpecker	<u>Asyndesmus lewis</u>	irregular winter
Yellow-bellied Sapsucker	<u>Sphyrapicus varius</u>	common winter
*Ladder-backed Woodpecker	<u>Dendrocopos scalaris</u>	common resident
Tropical Kingbird	<u>Tyrannus melancholicus</u>	accidental
*Western Kingbird	<u>Tyrannus verticalis</u>	common summer resident
Cassin's Kingbird	<u>Tyrannus vociferans</u>	rare transient
Scissor-tailed Flycatcher	<u>Muscivora forficata</u>	accidental
*Wied's Crested Flycatcher	<u>Myiarchus tyrannulus</u>	common summer resident
*Ash-throated Flycatcher	<u>Myiarchus cinerascens</u>	common summer, uncom. winter
Eastern Phoebe	<u>Sayornis phoebe</u>	accidental
*Black Phoebe	<u>Sayornis nigricans</u>	common resident
Say's Phoebe	<u>Sayornis saya</u>	common winter
Traill's Flycatcher	<u>Empidonax traillii</u>	uncommon transient
Hammond's Flycatcher	<u>Empidonax hammondi</u>	common trans., uncom. winter
Dusky Flycatcher	<u>Empidonax oberholseri</u>	uncommon transient & winter
Gray Flycatcher	<u>Empidonax wrightii</u>	uncommon transient & winter
Western Flycatcher	<u>Empidonax difficilis</u>	common transient
Coue's Flycatcher	<u>Contopus pertinax</u>	accidental

\*Indicates nesting

Western Wood Pewee	<u>Contopus sordidulus</u>	common transient
Olive-sided Flycatcher	<u>Nuttallornis borealis</u>	uncommon transient
*Vermilion Flycatcher	<u>Pyrocephalus rubinus</u>	common summer resident
Horned Lark	<u>Eremophila alpestris</u>	rare transient
Violet-green Swallow	<u>Tachycineta thalassina</u>	abundant transient
Tree Swallow	<u>Iridoprocne bicolor</u>	common transient
*Rough-winged Swallow	<u>Stelgidopteryx ruficollis</u>	uncommon summer, com. trans.
*Cliff Swallow	<u>Petrochelidon pyrrhonota</u>	uncommon summer, com. trans.
Barn Swallow	<u>Hirundo rustica</u>	uncommon transient
Purple Martin	<u>Progne subis</u>	rare transient
Steller's Jay	<u>Cyanocitta stelleri</u>	accidental
Scrub Jay	<u>Apelocoma coerulescens</u>	irregular winter
Common Raven	<u>Corvus corax</u>	rare resident, com. winter
Common Crow	<u>Corvus brachyrhynchos</u>	common winter
Mountain Chickadee	<u>Parus gambeli</u>	irregular winter
Bridled Titmouse	<u>Parus wollweberi</u>	uncommon winter
*Verdin	<u>Auriparus flaviceps</u>	abundant resident
Common Bushtit	<u>Psaltriparus minimus</u>	irregular winter
White-breasted Nuthatch	<u>Sitta carolinensis</u>	irregular winter
Red-breasted Nuthatch	<u>Sitta canadensis</u>	irregular winter
Brown Creeper	<u>Certhia familiaris</u>	uncommon winter
House Wren	<u>Troglodytes aedon</u>	common winter
Bewick's Wren	<u>Thryomanes bewickii</u>	common winter
*Cactus Wren	<u>Campylorhynchus brunnei-</u> <u>capillum</u>	common resident

\*Indicates nesting

Long-billed Marsh Wren	<u>Telmatodytes palustris</u>	common winter
*Canyon Wren	<u>Catherpes mexicanus</u>	uncommon resident
*Rock Wren	<u>Salpinctes obsoletus</u>	common resident
*Mockingbird	<u>Mimus polyglottos</u>	uncommon resident
*Bendire's Thrasher	<u>Toxostoma bendirei</u>	uncommon resident
*Curve-billed Thrasher	<u>Toxostoma curvirostre</u>	common resident
*Crissal Thrasher	<u>Toxostoma dorsale</u>	common resident
Sage Thrasher	<u>Oreoscoptes montanus</u>	uncommon winter
Robin	<u>Turdus migratorius</u>	uncom. to abundant winter
Rufous-backed Robin	<u>Turdus rufo-palliatus</u>	accidental
Hermit Thrush	<u>Hylocichla guttata</u>	irregular winter
Swainson's Thrush	<u>Hylocichla ustulata</u>	accidental
Western Bluebird	<u>Sialia mexicana</u>	common winter
Mountain Bluebird	<u>Sialia currucoides</u>	common winter
Townsend's Solitaire	<u>Myadestes townsendi</u>	irregular winter
Blue-gray Gnatcatcher	<u>Polioptila caerulea</u>	common winter
*Black-tailed Gnatcatcher	<u>Polioptila melanura</u>	common resident
Golden-crowned Kinglet	<u>Regulus satrapa</u>	accidental
Ruby-crowned Kinglet	<u>Regulus calendula</u>	abundant winter
Water Pipit	<u>Anthus spinoletta</u>	uncommon winter
Cedar Waxwing	<u>Bombycilla cedrorum</u>	irregular winter
*Phainopepla	<u>Phainopepla nitens</u>	common resident
*Logger Shrike	<u>Lanius ludovicianus</u>	uncommon resident
*Starling	<u>Sturnus vulgaris</u>	common resident
*Indicates nesting		

Hutton's Vireo	<u>Vireo huttoni</u>	common winter
Bell's Vireo	<u>Vireo bellii</u>	uncommon summer resident
Gray Vireo	<u>Vireo vicinior</u>	accidental
Solitary Vireo	<u>Vireo solitarius</u>	com. transient, rare winter
Warbling Vireo	<u>Vireo gilvus</u>	common transient
Black & White Warbler	<u>Mniotilta varia</u>	accidental
Orange-crowned Warbler	<u>Vermivora celata</u>	common trans., uncom. winter
Nashville Warbler	<u>Vermivora ruficapilla</u>	rare transient
Virginia's Warbler	<u>Vermivora virginiae</u>	rare transient
*Lucy's Warbler	<u>Vermivora luciae</u>	abundant resident
*Yellow Warbler	<u>Dendroica petechia</u>	uncom. summer; com. trans.
Audubon's Warbler	<u>Dendroica auduboni</u>	abundant winter
Black-throated Gray Warbler	<u>Dendroica nigrescens</u>	com. transient, uncom. winter
Townsend's Warbler	<u>Dendroica townsendi</u>	common transient
Hermit Warbler	<u>Dendroica occidentalis</u>	accidental
Northern Waterthrush	<u>Seiurus noveboracensis</u>	accidental
MacCillivray's Warbler	<u>Oporornis tolmiei</u>	common transient
*Yellowthroat	<u>Geothlypis trichas</u>	uncommon summer resident
*Yellow-breasted Chat	<u>Icteria virens</u>	common summer resident
Wilson's Warbler	<u>Wilsonia pusilla</u>	common transient
American Redstart	<u>Setophaga ruticilla</u>	accidental
Painted Redstart	<u>Setophaga picta</u>	accidental
*House Sparrow	<u>Passer domesticus</u>	uncommon resident
Western Meadowlark	<u>Sturnella neglecta</u>	common winter

\*Indicates nesting

Yellow-headed Blackbird	<u>Xanthocephalus xanthocephalus</u>	uncommon winter
*Red-winged Blackbird	<u>Agelaius phoeniceus</u>	common resident
Hooded Oriole	<u>Icterus cucullatus</u>	uncommon summer resident
*Bullock's Oriole	<u>Icterus bullockii</u>	common summer resident
Rusty Blackbird	<u>Euphagus carolinus</u>	accidental
Brewer's Blackbird	<u>Euphagus cyanocephalus</u>	uncommon winter resident
Boat-tailed Grackle	<u>Cassidix mexicanus</u>	uncommon visitant
*Brown-headed Cowbird	<u>Molothrus ater</u>	common summer resident
*Bronzed Cowbird	<u>Tangavivus aeneus</u>	uncommon summer resident
Western Tanager	<u>Piranga ludoviciana</u>	common transient
*Summer Tanager	<u>Piranga rubra</u>	common summer resident
*Cardinal	<u>Richmondia cardinalis</u>	common resident
Black-headed Grosbeak	<u>Pheucticus melanocephalus</u>	common transient
*Blue Grosbeak	<u>Guiraca caerulea</u>	uncommon summer resident
Lazuli Bunting	<u>Passerina amoena</u>	uncommon transient
Evening Grosbeak	<u>Hesperiphona vespertina</u>	accidental
*House Finch	<u>Carpodacus mexicanus</u>	common resident
Pine Siskin	<u>Spinus pinus</u>	irregular winter
American Goldfinch	<u>Spinus tristis</u>	uncommon winter
*Lesser Goldfinch	<u>Spinus psaltria</u>	common resident
Lawrence's Goldfinch	<u>Spinus lawrencei</u>	rare winter
Green-tailed Towhee	<u>Chlorura chlorura</u>	common transient
Rufous-sided Towhee	<u>Pipilo erythrophthalmus</u>	uncommon winter

\*Indicates nesting

*Brown Towhee	<u>Pipilo fuscus</u>	common resident
*Abert's Towhee	<u>Pipilo aberti</u>	common resident
Vesper Sparrow	<u>Poocetes gramineus</u>	uncommon winter
Lark Sparrow	<u>Chondestes grammacus</u>	uncommon winter
*Black-throated Sparrow	<u>Amphispiza bilineata</u>	common resident
Sage Sparrow	<u>Amphispiza belli</u>	uncommon winter
Oregon Junco	<u>Junco oreganus</u>	irregular winter
Chipping Sparrow	<u>Spizella passerina</u>	uncommon transient
Brewer's Sparrow	<u>Spizella breweri</u>	common winter
White-crowned Sparrow	<u>Zonotrichia leucophrys</u>	common winter
Golden-crowned Sparrow	<u>Zonotrichia atricapilla</u>	accidental
White-throated Sparrow	<u>Zonotrichia albicollis</u>	accidental
Lincoln's Sparrow	<u>Melospiza lincolni</u>	uncommon winter
Swamp Sparrow	<u>Melospiza georgiana</u>	accidental
*Song Sparrow	<u>Melospiza melodia</u>	common resident

\*Indicates nesting

BUCKHORN-MESA WATERSHED

Mammals 1/

<u>Common Name</u>	<u>Species</u>
Desert Shrew	<u>Notiosorex crawfordi</u>
California Leaf-Nose Bat	<u>Macrotus californicus</u>
Cave Myotis	<u>Myotis velifer</u>
California Myotis	<u>Myotis californicus</u>
Long-eared Myotis	<u>Myotis evotis</u>
Small-footed Myotis	<u>Myotis subulatus</u>
Fringed Myotis	<u>Myotis thysanodes</u>
Long-legged Myotis	<u>Myotis volans</u>
Western pipistrelle	<u>Pipistrellus hesperus</u>
Silver-haired Bat	<u>Lasionycteris noctivagans</u>
Western Big-eared Bat	<u>Corynorhinus rafinesquii</u>
Mexican Freetail Bat	<u>Tadarida mexicana</u>
Western Mastiff Bat	<u>Eumops perotis</u>
Big Freetail Bat	<u>Tadarida macrotis</u>
Big Brown Bat	<u>Eptesicus fuscus</u>
Red Bat	<u>Lasiurus borealis</u>
Hoary Bat	<u>Lasiurus cinereus</u>
Spotted Bat	<u>Euderma maculata</u>
Townsend's Big-eared Bat	<u>Corynorhinus townsendii</u>

1/ From General Discussion of the Impact of the Central Arizona Project on the Birds and Mammals of the Area by Robert D. Ohmart; A Field Guide to the Mammals by W. H. Burt and R. P. Grossenheider.

Common NameSpecies

Pallid Bat	<u>Antrozous pallidus</u>
Brazilian Free-tailed Bat	<u>Tadarida braziliensis</u>
Greater Mastiff Bat	<u>Eumops perotis</u>
Yuma Bat	<u>Myotis yumanensis</u>
Black-tailed Jackrabbit	<u>Lepus californicus</u>
Desert Cottontail	<u>Sylvilagus auduboni</u>
Rock Squirrel	<u>Citellus variegatus</u>
Harris' Antelope Ground Squirrel	<u>Citellus harrisi</u>
Round-tailed Ground Squirrel	<u>Citellus tereticaudus</u>
Cliff Chipmunk	<u>Eutamias merriami</u>
Valley Pocket Gopher	<u>Thomomys bottae</u>
Arizona Pocket Mouse	<u>Perognathus amplus</u>
Long-tailed Pocket Mouse	<u>Perognathus formosus</u>
Desert Pocket Mouse	<u>Perognathus penicillatus</u>
Rock Pocket Mouse	<u>Perognathus intermedius</u>
Silky Pocket Mouse	<u>Perognathus flavus</u>
Bailey Pocket Mouse	<u>Perognathus baileyi</u>
Hespid Pocket Mouse	<u>Perognathus hispidus</u>
Merriam's Kangaroo Rat	<u>Dipodomys merriami</u>
Ord's Kangaroo Rat	<u>Dipodomys ordii</u>
Desert Kangaroo Rat	<u>Dipodomys deserti</u>
Southern Grasshopper Mouse	<u>Onychomys torridus</u>
Western Harvest Mouse	<u>Reithrodontomys megalotis</u>

<u>Common Name</u>	<u>Species</u>
Cactus Mouse	<u>Peromyscus eremicus</u>
Deer Mouse	<u>Peromyscus maniculatus</u>
White-footed Mouse	<u>Peromyscus leucopus</u>
White-throated Wood Rat	<u>Neotoma albigula</u>
Desert Wood Rat	<u>Neotoma lepida</u>
Hesperid Cotton Rat	<u>Sigmodon hispidus</u>
Norway Rat	<u>Rattus norvegicus</u>
House Mouse	<u>Mus musculus</u>
Beaver	<u>Castor canadensis</u>
Muskrat	<u>Ondatra zibethica</u>
Porcupine	<u>Erethizon dorsatum</u>
Coyote	<u>Canis latrans</u>
Gray Fox	<u>Urocyon cinereoargenteus</u>
Ringtail	<u>Bassariscus astutus</u>
Raccoon	<u>Procyon lotor</u>
Coati	<u>Nasua narica</u>
Badger	<u>Taxidea taxus</u>
Spotted Skunk	<u>Spilogale putorius</u>
Stripped Skunk	<u>Mephitis mephitis</u>
Hooded Skunk	<u>Mephitis macroura</u>
Hognose Skunk	<u>Conepatus mesoleucus</u>
Mountain Lion	<u>Felis concolor</u>

Common Name

Species

Bobcat

Lynx rufus

Javelina

Tayassu tajacu

Mule Deer

Odocoileus hemionus

Kit Fox

Vulpes macrotis

BUCKHORN-MESA WATERSHED

Fishes of the Granite Reef Dam Area 1/

Salt River, Arizona

<u>Common Name</u>	<u>Species</u>
Threadfin Shad	<u>Dorosoma petenense</u>
Carp	<u>Cyprinus carpio</u>
Golden Shiner	<u>Notemigonus chrysoleucas</u>
Woundfin	<u>Plagopterus argentissimus</u>
Longfin Dace	<u>Agosia chrysogaster</u>
Fathead Minnow	<u>Pimephales promelas</u>
Red Shiner	<u>Notropis lutrensis</u>
Gila Sucker	<u>Catostomus insignis</u>
Gila Mountain Sucker	<u>Pantosteus clarki</u>
Channel Catfish	<u>Ictalurus punctatus</u>
Black Bullhead	<u>Ictalurus melas</u>
Yellow Bullhead	<u>Ictalurus natalis</u>
Mosquitofish	<u>Gambusia affinis</u>
Sailfin Molly	<u>Poecilia latipinna</u>
Largemouth Bass	<u>Micropterus salmoides</u>
Green Sunfish	<u>Chaenobryttus cyanelus</u>
Bluegill	<u>Lepomis macrochirus</u>
Black Crappie	<u>Pomoxis nigromaculatus</u>
Yellow Perch	<u>Perca flavescens</u>
Mozambique Mouthbrooder (Tilapia)	<u>Tilapia mossambica</u>

1/ From Fishes of Arizona by W. L. Minckley

BUCKHORN-MESA WATERSHED

Herpetofauna 1/

<u>Common Name</u>	<u>Species</u>
Arizona Tiger Salamander	<u>Ambystoma tigrinum nebulosum</u>
Couch's Spadefoot Toad	<u>Scaphiopus couchi</u>
Western Spadefoot Toad	<u>Scaphiopus hammondi</u>
Southwestern Woodhouse's Toad	<u>Bufo woodhousei australis</u>
Great Plains Toad	<u>Bufo cognatus</u>
Red-spotted Toad	<u>Bufo punctatus</u>
Colorado River Toad	<u>Bufo alvarius</u>
Canyon Treefrog	<u>Hyla arenicolor</u>
Leopard Frog	<u>Rana pipiens</u>
Bull Frog	<u>Rana catesbeiana</u>
Common Snapping Turtle	<u>Chelydra serpentina</u>
Sonora Mud Turtle	<u>Kinosternon sonoriense</u>
Yellow Box Turtle	<u>Terrapene ornata luteola</u>
Desert Tortoise	<u>Gopherus agassizi</u>
Texas Softshell Turtle	<u>Trionyx spiniferus emoryi</u>
Desert Banded Gecko	<u>Coleonyx variegatus variegatus</u>
Western Chuckwalla	<u>Sauromalus obesus obesus</u>
Arizona Chuckwalla	<u>Sauromalus obesus tumidus</u>
Desert Iguana	<u>Dipsosaurus dorsalis dorsalis</u>
Lesser Earless Lizard	<u>Holbrookia maculata</u>
Southwestern Earless Lizard	<u>Holbrookia texana scitula</u>
Zebra-tailed Lizard	<u>Callisaurus draconoides</u>
Collared Lizard	<u>Crotaphytus collaris</u>

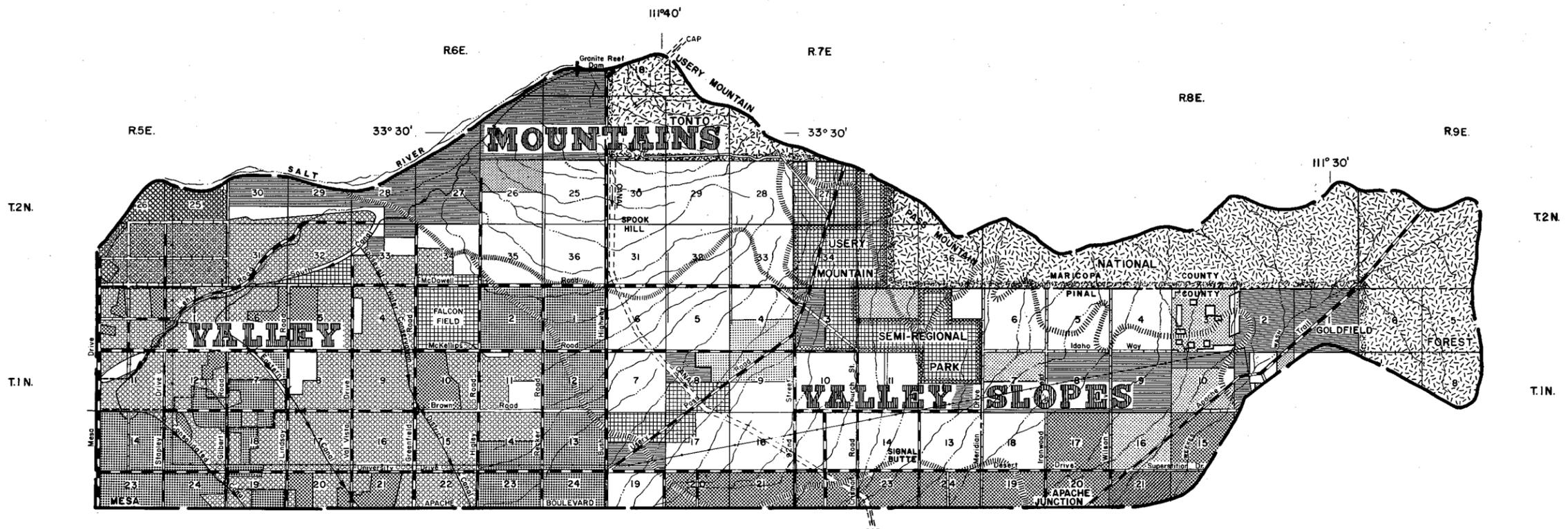
1/ Herpetofauna of the Orme, Buttes, Charleston, and Hooker Reservoir Sites, Arizona and New Mexico by W. L. Minckley, ASU, January 1972.

<u>Common Name</u>	<u>Species</u>
Leopard Lizard	<u>Crotaphytus wislizenii wislizenii</u>
Desert Spiny Lizard	<u>Sceloporus magister magister</u>
Sonora Spiny Lizard	<u>Sceloporus clarki clarki</u>
Southern Plateau Lizard	<u>Sceloporus undulatus tristichus</u>
Tree Lizard	<u>Urosaurus ornatus</u>
Desert Side-blotched Lizard	<u>Uta stansburiana</u>
Regal Horned Lizard	<u>Phrynosoma solare</u>
Texas Horned Lizard	<u>Phrynosoma coronatum</u>
Great Plains Skink	<u>Eumeces obsoletus</u>
Southern Whiptail Lizard	<u>Cnemidophorus tigris gracilis</u>
Little Striped Whip-tail Lizard	<u>Cnemidophorus inornatus</u>
Chiracahua Whip-tail Lizard	<u>Cnemidophorus exsanguis</u>
Arizona Alligator Lizard	<u>Gerrhonotus kingi nobilis</u>
Reticulate Gila Monster	<u>Heloderma suspectum suspectum</u>
Western Blindsnake	<u>Leptotyphlops humilis</u>
Regal Ringneck Snake	<u>Diadophis punctatus regalis</u>
Spotted Leaf-nosed Snake	<u>Phyllorhynchus decurtatus:</u> <u>nubiluu X perkinsi</u>
Red Racer	<u>Masticophis flagellum piceus</u>
Sonora Whipsnake	<u>Masticophis bilineatus bilineatus</u>
Desert Patch-nosed Snake	<u>Salvadora hexalepis hexalepis</u>
Arizona Glossy Snake	<u>Arizona elegans noctivaga</u>
Sonora Gopher Snake	<u>Pituophis melanoleucus affinis</u>
Yuma King Snake	<u>Lampropeltis getulus yumensis</u>
Western Black-neck Garter Snake	<u>Thamnophis cyrtopsis cyrtopsis</u>
Mexican Garter Snake	<u>Thamnophis eques megalops</u>
Checkered Garter Snake	<u>Thamnophis marcianus</u>

<u>Common Name</u>	<u>Species</u>
Tucson Shovel-nosed Snake	<u>Chionactis occipitalis klauberi</u>
Banded Sand Snake	<u>Chilomeniscus cinctus</u>
Desert Black-headed Snake	<u>Tantilla planiceps transmontana</u>
Sonoran Lyre Snake	<u>Trimorphodon lambda lambda</u>
Desert Night Snake	<u>Hypsiglena torquata derserticola</u>
Arizona Coral Snake	<u>Micruroides euryxanthus euryxanthus</u>
Western Diamondback Rattlesnake	<u>Crotalus atrox</u>
Southwestern Speckled Rattlesnake	<u>Crotalus mitchelli pyrrhus</u>
Sonoran Sidewinder	<u>Crotalus cerastes cercobombus</u>
Northern Black-tailed Rattlesnake	<u>Crotalus molossus molossus</u>
Tiger Rattlesnake	<u>Crotalus tigris</u>
Arizona Black Rattlesnake	<u>Crotalus viridis cerberus</u>
Mohave Rattlesnake	<u>Crotalus scutulatus scutulatus</u>

APPENDIX E

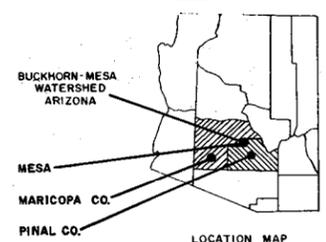
LAND STATUS, LAND USE, AND RESOURCE UNIT MAP



**LEGEND**

LAND STATUS	LAND USE
U.S.A.-INDIAN TRUST	IRRIGATED CROPLAND
U.S.A.-INDIAN TRUST	RANGELAND
U.S.A.-NATIONAL FOREST-MULTIPLE USE	
NATIONAL RESOURCE LAND-MULTIPLE USE	
RESOURCE UNIT BOUNDARY	
ARIZONA STATE	RANGELAND
COUNTY AND MUNICIPAL	RECREATION-RANGELAND
PRIVATE	URBAN-INDUSTRIAL
PRIVATE	RANGELAND
PRIVATE	IRRIGATED CROPLAND
RANGE & TOWNSHIP LINE	
SECTION LINE	
SECTION NUMBER	36
PAVED ROAD	
GRADED ROAD	
UNIMPROVED ROAD	
POWER LINE	
CANAL	
INTERMITTENT STREAM	
COUNTY LINE	
PARK BOUNDARY	
NATIONAL FOREST BOUNDARY	
WATERSHED BOUNDARY	
PROPOSED CENTRAL ARIZONA PROJECT CANAL	CANAL
MESA CITY LIMITS	

**ARIZONA**



**LAND STATUS, LAND USE, AND RESOURCE UNIT MAP  
BUCKHORN-MESA WATERSHED  
MARICOPA AND PINAL COUNTIES, ARIZONA**

**SOURCES:**

BUREAU OF LAND MANAGEMENT — ARIZONA STATE LAND DEPARTMENT-11-74  
STATE SURFACE TRUST LAND  
IRRIGATED FARM LAND — "CROP LAND OF ARIZONA" 10-74

