

G5B

Property of
Flood Control District of MC Library
Please Return to
2801 W. Durango
Phoenix, AZ 85009

SUMMARY FACTBOOK

OCTOBER

1981



A902.907

SUMMARY FACTBOOK

OCTOBER 1981

CENTRAL ARIZONA WATER CONTROL STUDY

The Central Arizona Water Control Study (CAWCS) is nearing the end of the third and final stage. The CAWCS, as part of the planning effort for the Central Arizona Project (CAP), is being conducted by the U.S. Bureau of Reclamation (Bureau) with assistance from the U.S. Army Corps of Engineers (Corps). The main purpose of the study is to find a solution to the flood control and water supply problems of central Arizona, along with other planning objectives such as water conservation, fish and wildlife enhancement, enhancement of the social well-being of Indian communities and increased hydropower development opportunities. Throughout the CAWCS, as in all planning processes, new and better data have continually become available, and certain issues have gained or lost importance in light of new findings. At the beginning of the final stage of the CAWCS, considerations relative to the safety of existing dams began to significantly affect the development of alternatives. For this reason, safety of dams was included as a major objective of the CAWCS along with the original purposes of flood control and regulatory storage of CAP water.

In one month, the CAWCS proposed action will be identified. But before this decision is made, we need to know how the public feels about the alternatives being considered. This document contains the essential information which will be used in selecting the proposed action, and it provides the information you will need to participate in the decision. If you want or need more information on the plans and their development, a description of Stage III technical studies, detailed design and cost data, and environmental

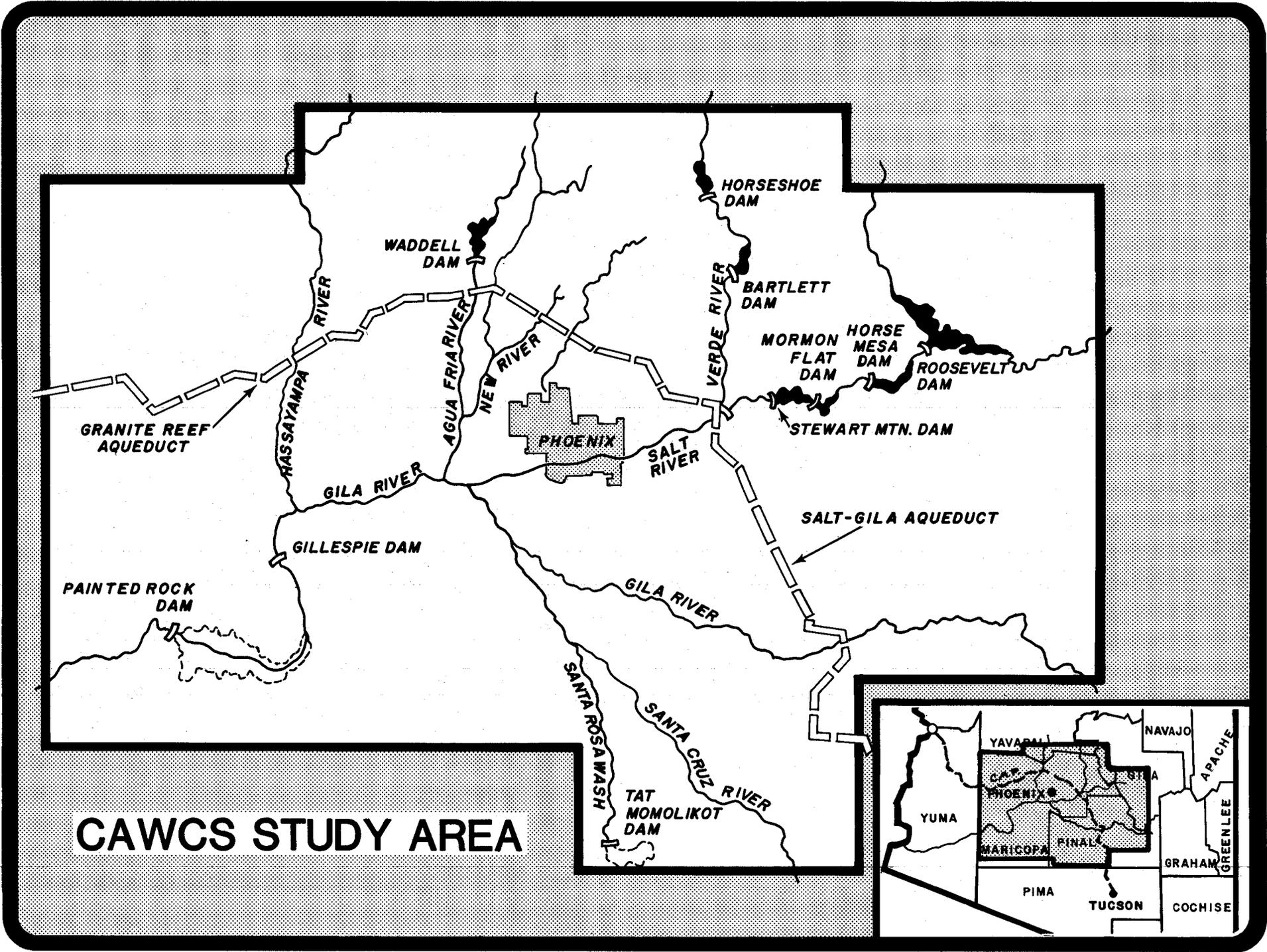


Figure 1

and social impact assessment results are provided in Factbook, October 1981. This document is available upon request from the CAWCS office. A response form is included at the end of the book by which you can let us know which plan you prefer. Additionally, you are encouraged to attend one of the public meetings scheduled for the end of September.

CENTRAL ARIZONA WATER CONTROL STUDY

PUBLIC MEETINGS

MONDAY, SEPTEMBER 28, 1:30 P.M.

City of Phoenix Council Chambers
251 West Washington
Phoenix

TUESDAY, SEPTEMBER 29, 7:30 P.M.

Carl Hayden High School
3333 West Roosevelt
Phoenix

WEDNESDAY, SEPTEMBER 30, 7:30 P.M.

Mesa Centennial Hall
201 North Center
Mesa

DESCRIPTION OF PLANS

Eight candidate plans, which solve flood control, regulatory storage, and Safety of Dams (SOD) problems, have been developed and evaluated in detail.

The candidate plans are:

CLIFF + NEW/ENLARGED ROOSEVELT + STEWART MOUNTAIN

- Plan 1: Cliff + New/Enlarged Roosevelt + Reconstructed Stewart Mountain
- Plan 2: Cliff + New/Enlarged Roosevelt + Reconstructed Stewart Mountain + Nonstructural

CONFLUENCE + CLIFF + NEW/ENLARGED ROOSEVELT + STEWART MOUNTAIN

- Plan 3: Confluence + Cliff + New/Enlarged Roosevelt + Reconstructed Stewart Mountain
- Plan 4: Confluence with a Large Spillway + Cliff + New/Enlarged Roosevelt + Reconstructed Stewart Mountain
- Plan 5: Confluence with Small Service Spillway and Auxiliary Spillway + Cliff + New/Enlarged Roosevelt + Reconstructed Stewart Mountain

NEW WADDELL + CLIFF + NEW/ENLARGED ROOSEVELT + STEWART MOUNTAIN

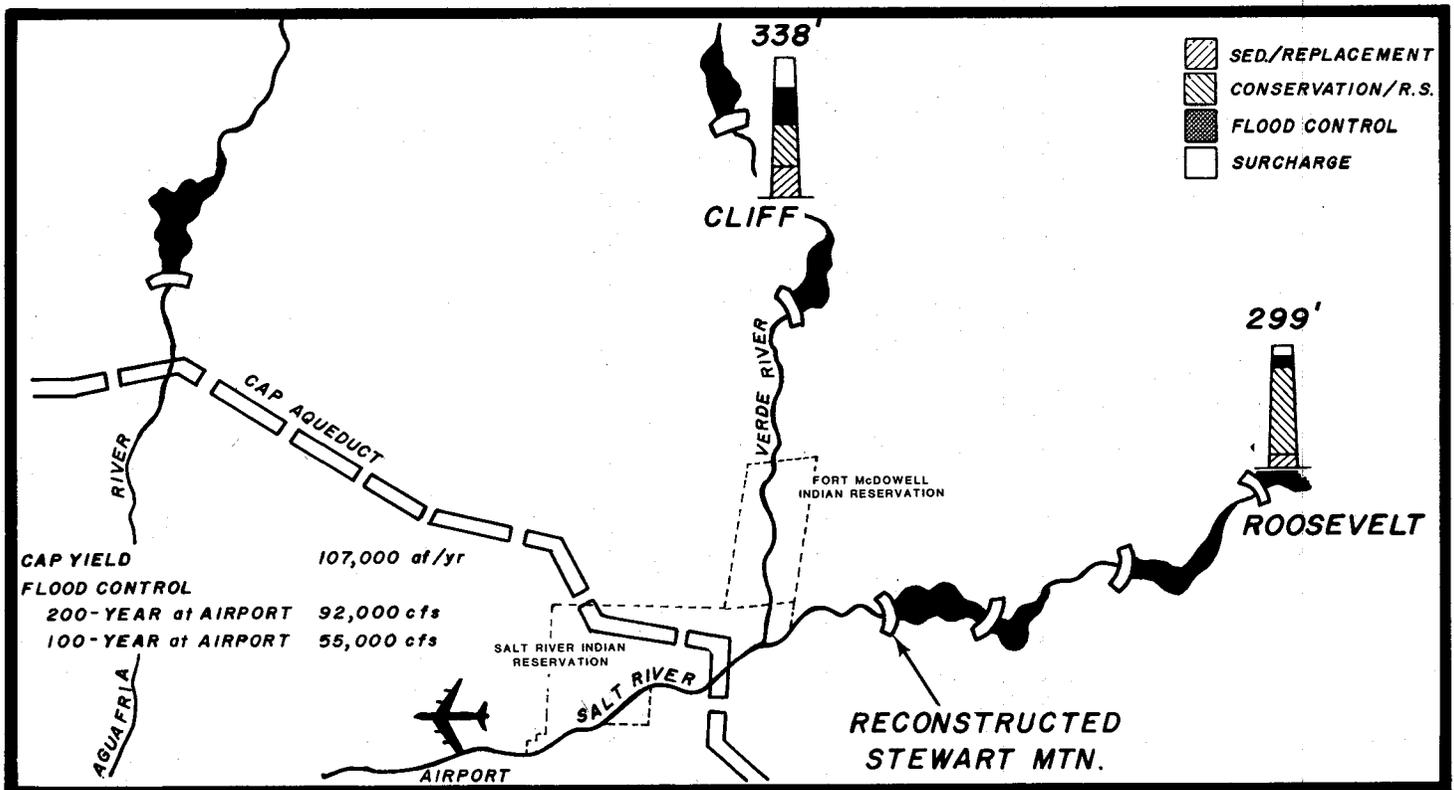
- Plan 6 New Waddell + Cliff + New/Enlarged Roosevelt + Reconstructed Stewart Mountain
- Plan 7: New Waddell + Cliff + New/Enlarged Roosevelt + Reconstructed Stewart Mountain (environmental emphasis)

CAWCS NO ACTION

- Plan 8: No CAWCS project; SOD studies continue to select a preferred dam safety solution

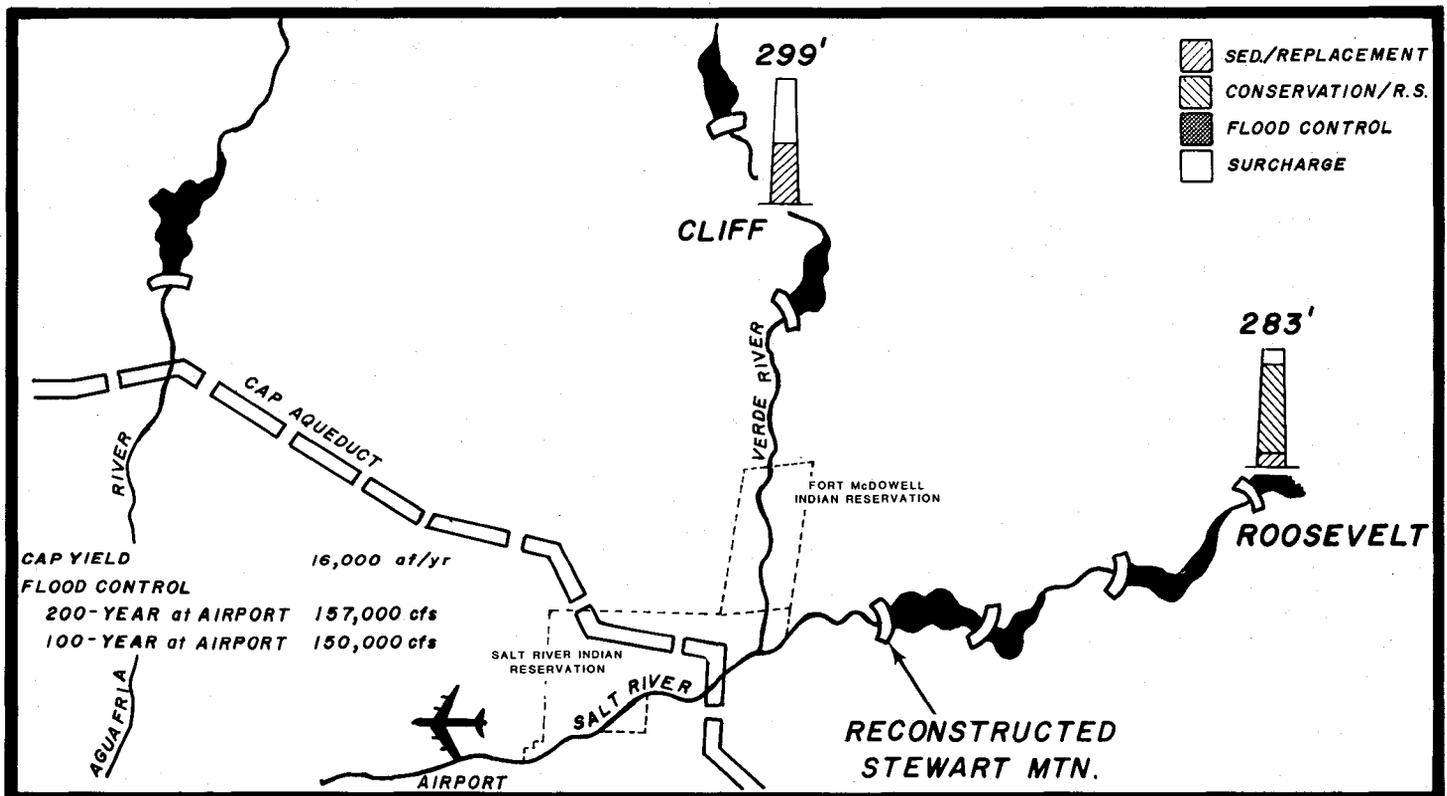
Following is a description of each plan (Charts 1 through 8), including a graphic illustration of the plan and a description of the purposes, physical features, and performance of the plan. To facilitate comparison of all plans against each evaluation factor considered critical to selection of a proposed action, a comparative evaluation table is presented (Table 1).

Chart 1
Plan 1: Cliff+ Roosevelt + Reconstructed Stewart Mtn. Dam



Under this plan, Roosevelt and Cliff would be constructed to provide flood control, regulatory storage and hydropower, in addition to SOD. Stewart Mountain Dam would be reconstructed (enlarging the size of the spillway) for SOD purposes. Because this plan would not connect directly with the CAP, there is no potential for energy management. At Roosevelt, dual use of the sediment pool (241,000 acre-feet) could provide increased water supply for an interim period. This space plus the new conservation space at Cliff Dam would be used for conservation to increase CAP yield through exchange by 107,000 acre-feet per year. A pumping plant would be required at or near the Granite Reef Diversion Dam to deliver water to the Salt-Gila Aqueduct. New hydropower generation plants would be constructed at Cliff and Roosevelt. Dedicated flood control space at Cliff and Roosevelt would reduce the 200-year flood (275,000 cfs) to 92,000 cfs at the airport and the 100-year event to 55,000 cfs at the airport. Conceptual recreation plans for Cliff and Roosevelt feature an increase (18 new sites) in camping and picnicking, with 16 additional reservoir-oriented sites at Cliff and Roosevelt, and two additional (one at each dam) stream-oriented recreation sites for picnicking.

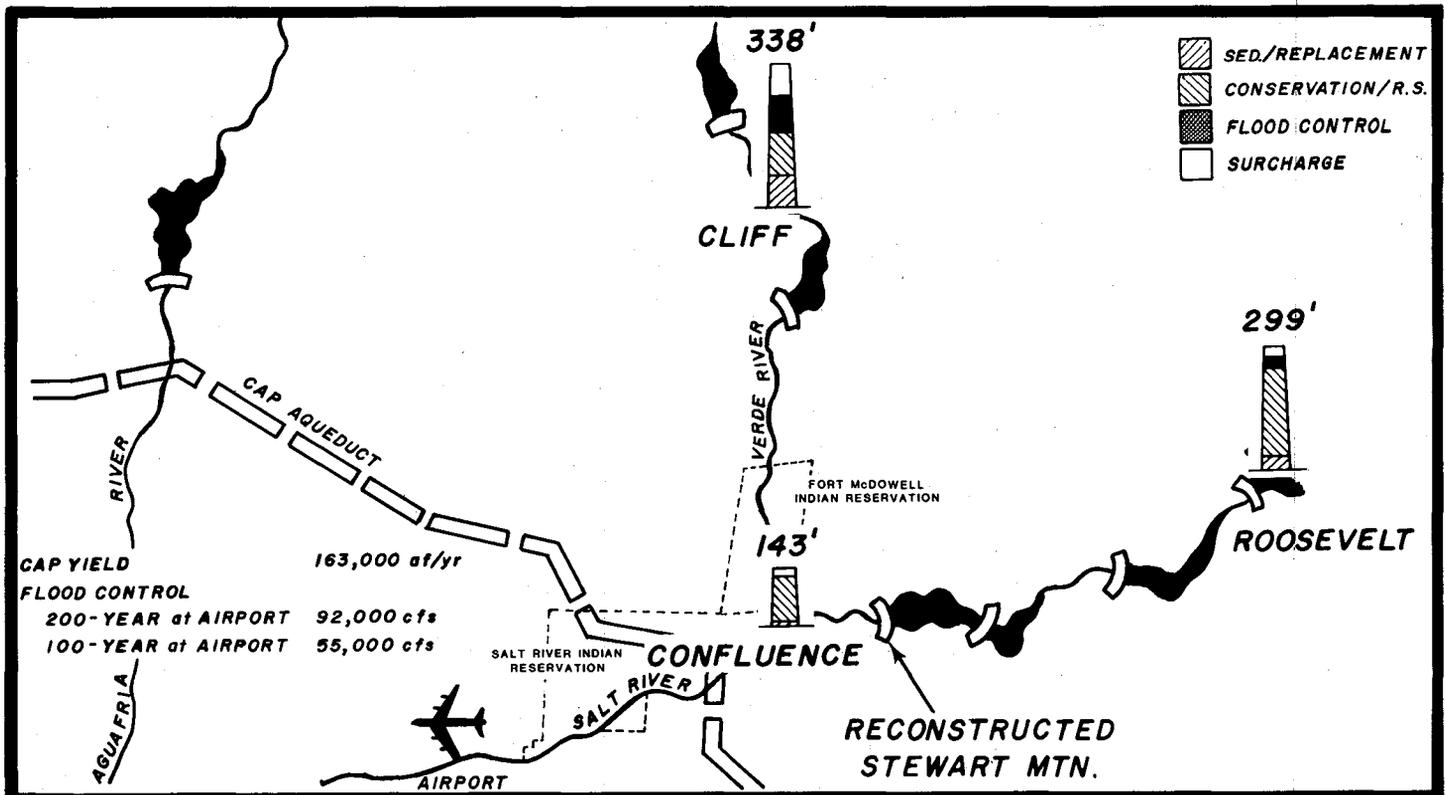
Chart 2
Plan 2: Cliff + Roosevelt + Reconstructed Stewart Mtn.+Nonstructural



This plan was developed with the objective of limited construction and minimizing impact on people. Through Stage II and initially in Stage III, re-regulation was considered for flood control. Further analysis of re-regulation, taking advantage of Cliff and Roosevelt as the CAWCS Safety of Dams solution, showed that by operating the dams for SOD only (no dedicated flood control space), incidental flood control at a level comparable to that of re-regulation could be obtained. Also the institutional problems and water losses associated with re-regulation were avoided. On this basis, SRP Re-regulation was no longer considered as a means of flood control and Plan 2 was modified.

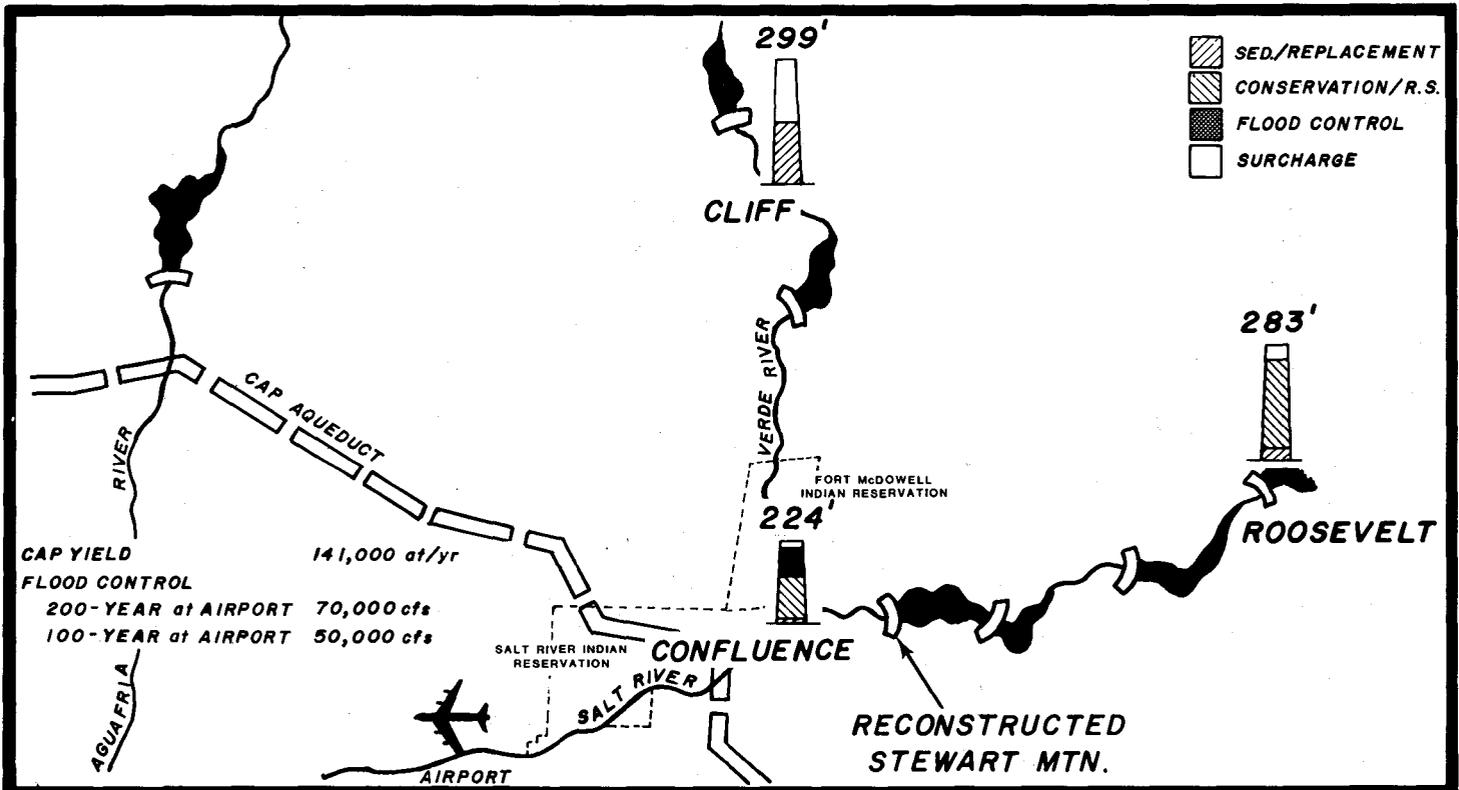
This plan limits construction at Cliff and Roosevelt to that necessary for SOD purposes. Flood control, provided by the use of the surcharge space at Cliff and Roosevelt in combination with nonstructural flood damage reduction measures downstream, would reduce the 200-year flood to 157,000 cfs and the 100-year flood to 150,000 cfs at the airport. Increased water supply for CAP (16,000 acre-feet per year) could be developed through an interim joint use of the sediment space at Roosevelt Dam. A pumping plant would be constructed at the Granite Reef Diversion Dam to deliver water to the Salt-Gila Aqueduct. Because this is a limited structural plan, hydropower and additional recreational facilities are not provided, except for replacement of existing facilities at Roosevelt.

Chart 3
Plan 3: Confluence+Cliff+Roosevelt+Reconstructed Stewart Mtn. Dam



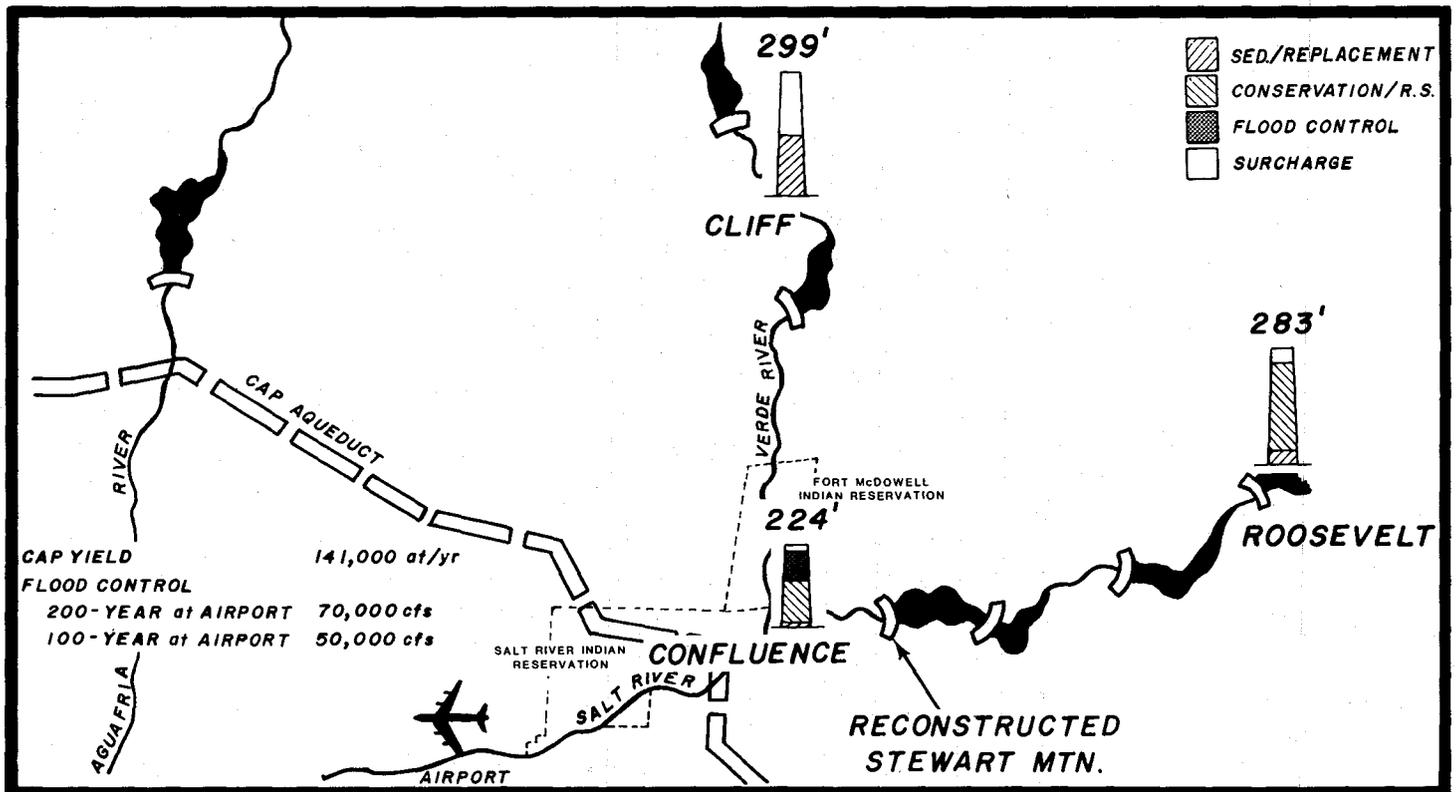
This plan was developed under the assumption that CAWCS and SOD were implemented at the same time. Under the plan, Cliff, Roosevelt, and a low Confluence Dam would be constructed concurrently. Because analysis indicated that it is less expensive to put flood control in upstream structures, Cliff and Roosevelt would provide flood control on the Salt and Verde, new conservation space, hydropower, and SOD. Hydropower facilities are the same as in Plan 1. The low Confluence Dam would be constructed for regulatory purposes. Routing floodwaters through this reservoir may provide some incidental flood damage reduction. Hydropower is developed at the Confluence; because the Confluence Dam would connect directly with the Salt-Gila Aqueduct via a pumping plant and canal, energy management potential could be realized. Under this plan, the 200-year flood would be reduced to 92,000 to 70,000 cfs and the 100-year flood to 55,000 to 50,000 at the airport. The CAP yield would be increased by 163,000 acre-feet per year. Conceptual recreation plans for Confluence, Cliff, and Roosevelt Dams include 26 new recreation sites (23 reservoir-oriented sites and 3 additional stream-oriented sites).

Chart 4
**Plan 4: Confluence (large spillway) + Cliff
 + Roosevelt + Reconstructed Stewart Mtn. Dam**



Plan 4 was developed on the premise that SOD is delayed (assumed to be 10 years delay for purposes of analysis), and therefore, the Confluence Dam, as it is downstream of all other dams, would have to withstand a large Inflow Design Flood until the SOD solution was implemented upstream. The Confluence Dam would be constructed first with a large service spillway (gated) to ensure the safety of the structure, and include flood control storage and regulatory storage capacity and a hydropower facility. The Confluence Dam would connect directly to the Salt-Gila Aqueduct through a pumping plant and canal, and energy management potential could be realized. Cliff and Roosevelt Dams would be constructed later for SOD purposes only. This plan reduced the 200-year flood to 70,000 cfs and the 100-year flood to 50,000 cfs at the airport. The CAP yield would be increased by 141,000 acre-feet per year. This plan includes additional recreation facilities at the Confluence only (7 reservoir-oriented sites; 1 stream-oriented site), as Cliff and Roosevelt are for SOD purposes only. Existing recreation and hydropower facilities are replaced at Roosevelt.

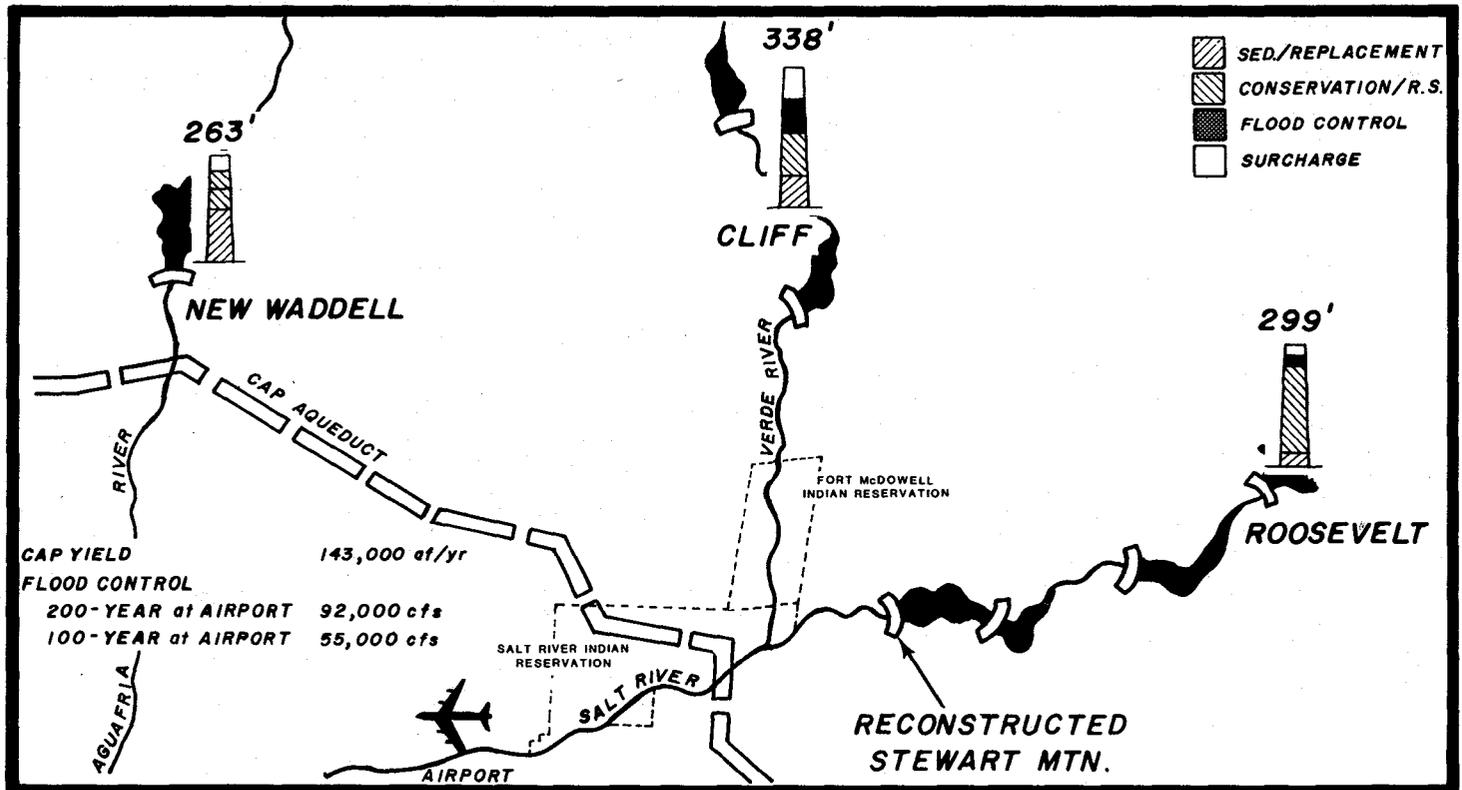
Chart 5
**Plan 5 Confluence (small spillway and emergency spillway)+Cliff
 +Roosevelt+Reconstructed Stewart Mtn. Dam**



Based on the same premise as Plan 4 (SOD delay), the Confluence Dam would be constructed first. However, instead of a large service spillway, the Confluence Dam would include a smaller service spillway (gated) and an auxiliary spillway (ungated) used only in large flooding events to ensure the safety of the structure. It would include regulatory storage, flood control storage, and a hydropower facility and would perform as in Plan 4. Cliff and Roosevelt Dams would be constructed later for SOD purposes only. Recreation plans are the same as Plan 4.

Chart 6

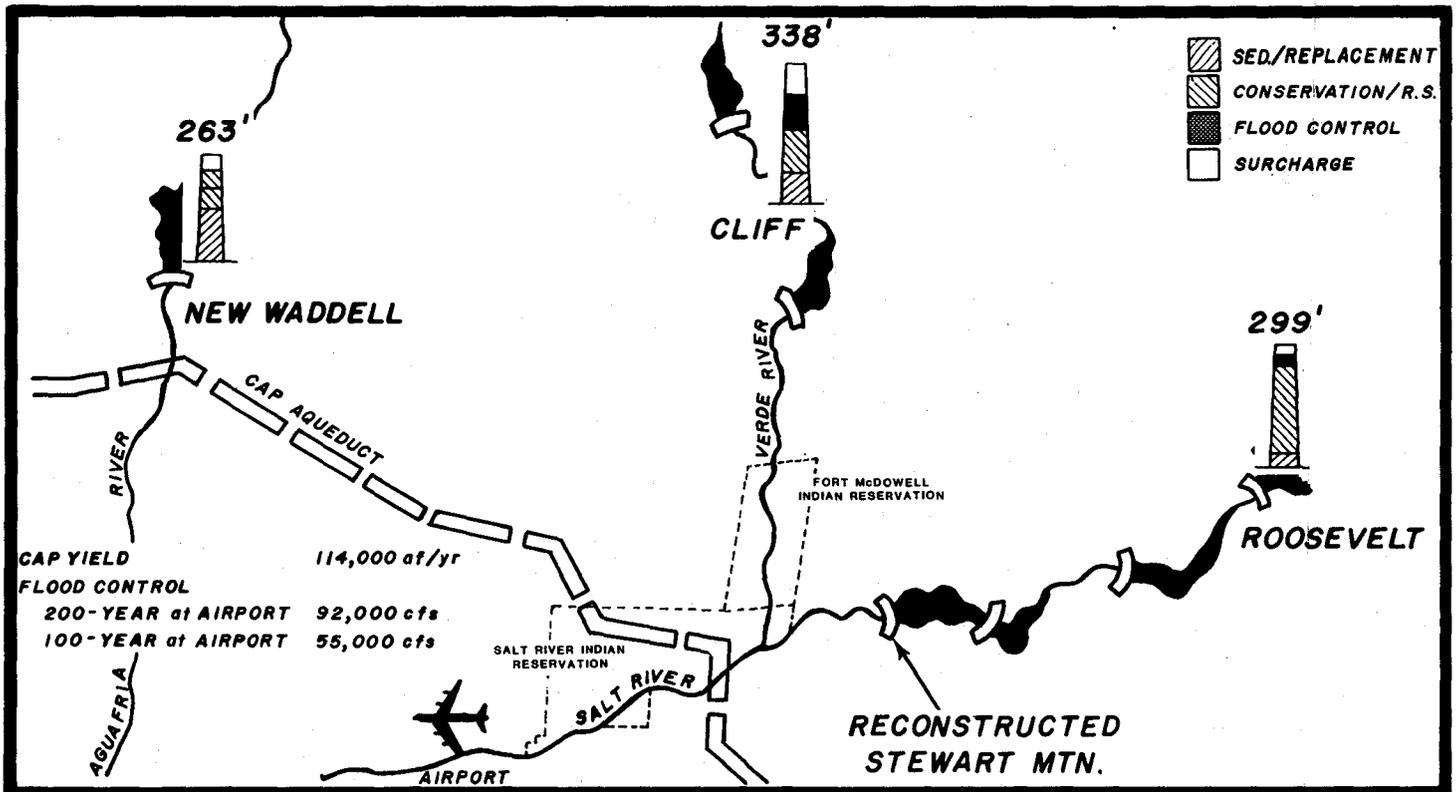
Plan 6: New Waddell + Cliff + Roosevelt + Reconstructed Stewart Mtn. Dam



New Waddell would be constructed for regulatory storage and would include a hydropower generation plant. The dam would be connected to the Granite Reef Aqueduct by a canal with a pumping plant. The CAP water supply would be increased by 143,000 acre-feet per year. Flood control, additional water conservation, hydropower, and SOD would be provided at Cliff and Roosevelt. Facilities would be the same as in Plan 1. This plan would reduce the 200-year flood at the airport to 92,000 cfs and the 100-year flood to 55,000 cfs. Conceptual recreation plans include 19 additional reservoir-oriented sites and 2 stream-oriented sites, one at Cliff and one at Roosevelt. No stream-oriented recreation was proposed at New Waddell because there are no streams of recreation value in the site area.

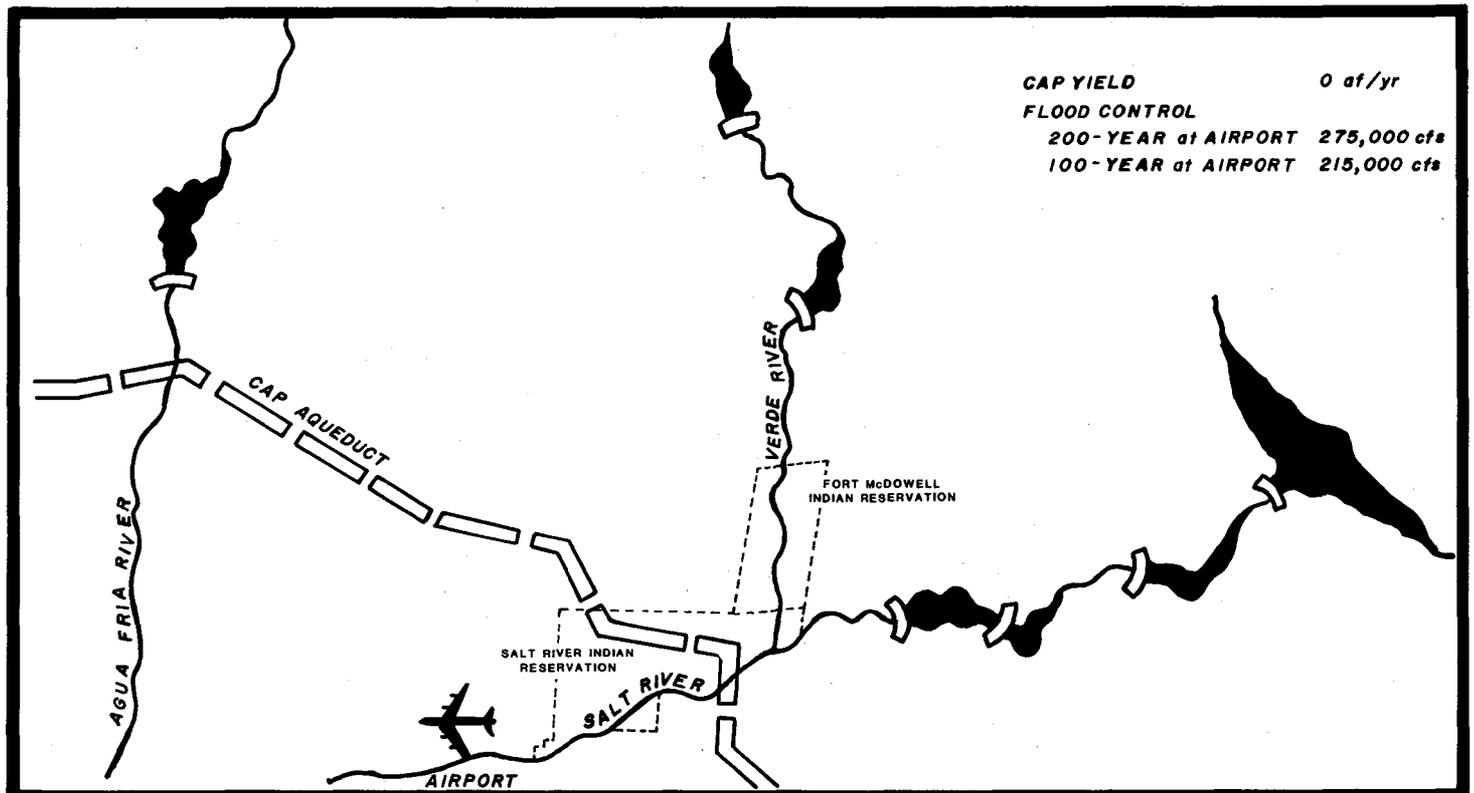
Chart 7

**Plan 7: New Waddell + Cliff + Roosevelt + Reconstructed Stewart Mtn. Dam
(environmental enhancement)**



This plan is the same as Plan 6, but would be operated to emphasize opportunities for environmental enhancement. A portion of the water supply generated by the new conservation space at Cliff and Roosevelt and the regulatory storage at New Waddell would be used for recreation and fish and wildlife conservation. Due to system losses for these purposes, the increase in CAP water supply is 114,000 acre-feet per year, which is less than in Plan 6. Recreation plans are the same as for Plan 6, but enough water is made available to provide minimum flows (enough water to sustain fish populations) on the Salt and Verde Rivers and to provide the potential for recreation and fish and wildlife enhancement on the Salt River through Phoenix. As a means for achieving this, 30,000 acre-feet of water could be made available to Rio Salado. To ensure minimum flows, exchanges with SRP are sometimes required.

Chart 8
Plan 8 CAWCS NO ACTION



The No Action alternative provides the baseline against which all other plans are compared. With this option, CAP would be constructed, but no CAWCS regulatory storage or flood control would be provided. SOD studies would however continue toward selection of a preferred SOD solution. This solution may differ from the Cliff/Roosevelt combination in CAWCS/SOD plans.

With no CAWCS action the following is assumed:

- The Central Arizona Project will deliver Colorado River water to the study area, but there will be no regulatory storage in the system.
- No flood control measures or structures under study by the CAWCS will be implemented by the federal government.
- Under the Dam Safety Act, Salt River Project Dams will be modified, e.g., large spillways to pass flows or, similar to Plan 2, construction of Cliff and Roosevelt to suppress flows on the Salt and Verde Rivers.
- Thirteen bridges will be constructed or modified by state and local governments to withstand flows of 200,000 cfs.
- Buttes Dam, an authorized feature of CAP on the Gila River, will be constructed for development of additional CAP waters, flood control, and sediment control. But, there will be no regulatory storage as proposed by CAWCS. Other CAP features which will be constructed include the Granite Reef Aqueduct, Salt-Gila Aqueduct, the Tucson Aqueduct, and Hooker Dam or a suitable alternative.

- Floodplain management, including enforcement of existing laws and regulations is assumed. No existing structure would be abandoned, but new structures in 100-year flood plain fringes would be floodproofed to protect against a 100-year flood.
- Channelization around existing facilities at the airport will be conducted.
- Limited channel clearing from 91st Avenue to Gillespie Dam will be conducted by the Flood Control District of Maricopa County. Gillespie Dam will not be modified in conjunction with channel clearing.
- There will be an improved flood warning system, under an appropriation of \$400,000.
- Several flood control facilities (New River, Cave Buttes, and Adobe Dams, Soil Conservation Service dams, Indian Bend Wash) will be constructed.
- The U.S. Forest Service Cottonwood Recovery Program on the Verde River, designed to improve wildlife habitat, will be implemented.
- A Tempe Salado Project will be implemented. The overall Rio Salado concept was assumed not to be developed.

COMPARATIVE EVALUATION OF PLANS

Following is a comparative evaluation (Table 1) of all candidate plans plus the No Action alternative. The evaluation factors have been identified by the Bureau as those considered to be critical in selecting a proposed action based on results of technical analyses and public involvement efforts to date. Other factors were assessed in the evaluation of plans, such as visual quality, noise, effects on future and existing land use, and geological resources. However, these factors were determined not to be critical to the selection of a proposed action and, therefore, are not included in the comparative table. Detailed definition of all evaluation factors, as well as more detailed design and cost data and environmental and social assessment results for each plan, are provided in the Factbook, October 1981. Brief definitions of some of the critical evaluation factors immediately follow the table. We encourage you to read them as they will prove helpful in making your evaluation of the plans.

Factors are grouped under major categories. The items listed under each factor are those used to measure the impact. Impacts are the measured difference between the interpretation of the significance of the impacts. Effects are the interpretation of the significance of the impacts. Mitigation (action to reduce or eliminate environmental and social impacts) recommendations are shown. Mitigated/unmitigated effects are displayed as:

- Insignificant (I): a small change, or one involving a low-quality resource
- Significant Beneficial (SB): major improvement in a condition, usually long-term and affecting high-quality resources

- Significant Adverse (SA): major degradation of a condition, usually long-term and affecting high-quality resources
- Beneficial Flag (BF): extraordinary beneficial change in a unique, protected, or very high-quality resource
- Adverse Flag (AF): extraordinary adverse change in a unique, protected, or very high-quality resource

TABLE 1
COMPARATIVE EVALUATION OF PLANS

Factors/Measures	Plan 8 CAWCS No Action (Future-Without Project)	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7
PERFORMANCE								
<u>CAP Water yield (af/yr)</u>								
-Total increased over the baseline	0 (1,006,000 af/yr CAP water)	107,000	16,000	163,000	141,000	141,000	143,000	114,000
<u>Energy Management</u>								
-Opportunity available	No	No	No	Yes	Yes	Yes	Yes	Yes
-Additional megawatts available for sale	0 (50) ^a	0	0	86 ^b				
<u>Hydropower</u>								
-Kilowatts produced (KW)	0 (0)	4,130	0	16,350	12,220	12,220	5,530	5,530
<u>Safety of Dams</u>								
-Dam safety requirements for existing dams accomplished	Cont'd SOD studies	Yes	Yes	Yes	Delayed	Delayed	Yes	Yes
<u>Flood Control (cfs)</u>								
-100-yr flood @ airport	215,000 (215,000)	55,000	150,000	50-55,000	50,000	50,000	55,000	55,000
-200-yr flood @ airport	275,000 (275,000)	92,000	157,000	70-92,000	70,000	70,000	92,000	92,000

^aWinter only.
^bYear-round.

TABLE 1. (Continued)

Factors/Measures	Plan 8 CAWCS No Action (Future-Without Project)	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7
BIOLOGICAL RESOURCES								
<u>Threatened/Endangered Plants and Wildlife</u>								
-Loss of acres of preferred habitat/total acres potentially inundated by IDF (bald eagle and Yuma clapper rail)	0 (2,260 acres in site areas)	-280/730	-280/670	-870/1,320		-870/1,600		-280/740
-Number of breeding areas (bald eagle) with disrupted productivity	0 (5 breeding areas in site areas of which 3 most productive are at Confluence; 6 breeding areas in CAWCS area; 13 breeding areas in southwestern U.S.)	1	1	3		3		1
-Mitigation		+280 acres preferred bald eagle habitat	+280 acres preferred bald eagle habitat	+200 acres preferred bald eagle habitat		+200 preferred acres bald eagle habitat		+280 preferred acres bald eagle habitat
-Unmitigated/ Mitigated Effect		SA/I	SA/I	AF/SA		AF/AF		SA/I
<u>Riparian/Wetland Biotic Communities</u>								
-Loss/gain of acres of habitat/total acres potentially inundated by IDF	0 (11,890 acres in site areas)	+1,570/3,490	+2,110/3,390	-220/7,430		-160/9,020		+1,780/3,890 +1,200/3,890
-Mitigation		Enhancement of 2,200 acres	Enhancement of 2,740 acres	Enhancement of 2,680 acres		Enhancement of 2,680 acres		Enhancement of 2,680 acres Enhancement of 2,200 acres
-Unmitigated/ Mitigated Effect		I/SB	I/SB	SA/I		SA/I		I/SB I/SB

TABLE 1 (Continued)

Factors/Measures	Plan 8 CAWCS No Action (Future-Without Project)	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7
BIOLOGICAL RESOURCES								
<u>Perennial Stream/ Riverine Community</u>								
-Loss of miles of perennial stream/total stream miles potentially inundated by IDF	0 (68 miles in site areas; 137 miles in CAWCS area)	-2/23	-2/22	-18/44		-19/53	-1/23	-2/23
-Change in flow characteristics of Salt and Verde Rivers	No change (on average, 106 days/year \leq 50 cfs in Salt, 61 days/year \leq 50 cfs in Verde)	No change	No change	No change		No change	No change	Guaranteed minimum flows of 200 cfs in Salt and Verde
-Mitigation		----- Stream losses not mitigatable -----						
-Unmitigated/ Mitigated Effect		I/I	I/I	AF/AF		AF/AF	I/I	SB/SB
<u>Reservoir Aquatic Community</u>								
-Gain of surface acres of habitat	0 (13,640 acres in site areas; 30,000 acres in CAWCS area)	+90	0			+2,950	+730	+1,420
-Gain of guaranteed minimum pool(s)	0 (no guaranteed minimum pools at SRP lakes or Lake Pleasant)	0	0		+1 minimum pool at Confluence		+1 minimum pool at New Waddell	+2 minimum pools at New Waddell and Cliff
-Drawdown rates greater than 2 inches/day during spawning season	No change (drawdown rates 3.0 in/day at Roosevelt, 9.2 in/day at Horseshoe, 1.6 in/day at Lake Pleasant)	> 2 in/day at Cliff	> 2 in/day at Cliff		> 2 in/day at Cliff and Confluence		> 2 in/day at Cliff and New Waddell	> 2 in/day at Cliff and New Waddell; <2 in/day at Roosevelt
-Mitigation		----- Reduction in drawdown rates to < 2 in/day during spawning season -----						
-Unmitigated/ Mitigated Effect		I/SB	I/SB	I/SB		I/SB	I/SB	SB/BF

TABLE 1 (Continued)

Factors/Measures	Plan 8 CAWCS No Action (Future-Without Project)	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7																																																																																	
WATER QUALITY																																																																																									
<u>Constituents</u>																																																																																									
	CAP water in local systems at locations and times chosen by users. Local surface water sources maintain quality independent of CAP influence	Average of 70,000 af of SRP (Verde River) water exchanged w/CAP each year <u>Comparison of Water Sources</u> (mg/l) <table border="1"> <tr> <td></td> <td>Verde</td> <td>CAP</td> </tr> <tr> <td>Ca</td> <td>42.5</td> <td>85.0</td> </tr> <tr> <td>Cl</td> <td>18.8</td> <td>94.5</td> </tr> <tr> <td>Fe</td> <td>0.021</td> <td>0.158</td> </tr> <tr> <td>Hard</td> <td>212.1</td> <td>339.3</td> </tr> <tr> <td>Mg</td> <td>25.7</td> <td>30.8</td> </tr> <tr> <td>Na</td> <td>30.4</td> <td>107.4</td> </tr> <tr> <td>Pb</td> <td>0.003</td> <td>0.041</td> </tr> <tr> <td>SO₄</td> <td>52.9</td> <td>309.3</td> </tr> <tr> <td>TDS</td> <td>264.0</td> <td>722.3</td> </tr> </table>		Verde	CAP	Ca	42.5	85.0	Cl	18.8	94.5	Fe	0.021	0.158	Hard	212.1	339.3	Mg	25.7	30.8	Na	30.4	107.4	Pb	0.003	0.041	SO ₄	52.9	309.3	TDS	264.0	722.3	No change from future-without condition	Annual average of 845,000 af of SRP surface water mixed with 250,000 af of CAP water at Confluence site. 30-35% of SRP water treated for M&I use <u>Changes in Average Verde River Concentrations</u> (mg/l) <table border="1"> <tr> <td>Ca</td> <td>42.5</td> <td>to 61.1 (+44%)</td> </tr> <tr> <td>Cl</td> <td>18.8</td> <td>to 51.9 (+176%)</td> </tr> <tr> <td>Fe</td> <td>0.021</td> <td>to 0.081 (+289%)</td> </tr> <tr> <td>Hard</td> <td>212.1</td> <td>to 267.8 (+26%)</td> </tr> <tr> <td>Mg</td> <td>25.7</td> <td>to 27.9 (+9%)</td> </tr> <tr> <td>Na</td> <td>30.4</td> <td>to 64.1 (+110%)</td> </tr> <tr> <td>Pb</td> <td>0.003</td> <td>to 0.020 (+553%)</td> </tr> <tr> <td>SO₄</td> <td>52.9</td> <td>to 165.2 (+212%)</td> </tr> <tr> <td>TDS</td> <td>264.0</td> <td>to 464.7 (+76%)</td> </tr> </table>	Ca	42.5	to 61.1 (+44%)	Cl	18.8	to 51.9 (+176%)	Fe	0.021	to 0.081 (+289%)	Hard	212.1	to 267.8 (+26%)	Mg	25.7	to 27.9 (+9%)	Na	30.4	to 64.1 (+110%)	Pb	0.003	to 0.020 (+553%)	SO ₄	52.9	to 165.2 (+212%)	TDS	264.0	to 464.7 (+76%)	Annual average of 25,000 af of MCMWCD#1 surface water mixed with 200,000 af of CAP water at Waddell site. None of the MCMWCD#1 water treated for M&I uses <u>Changes in Average MCMWCD#1 Concentrations</u> (mg/l) <table border="1"> <tr> <td>Ca</td> <td>75.0</td> <td>to 83.9 (+12%)</td> </tr> <tr> <td>Cl</td> <td>30.5</td> <td>to 84.1 (+176%)</td> </tr> <tr> <td>Fe</td> <td>0.01</td> <td>to 0.142 (+1316%)</td> </tr> <tr> <td>Hard</td> <td>170.5</td> <td>to 311.9 (+83%)</td> </tr> <tr> <td>Mg</td> <td>30.9</td> <td>to 30.8 (-1%)</td> </tr> <tr> <td>Na</td> <td>32.7</td> <td>to 95.7 (+193%)</td> </tr> <tr> <td>Pb</td> <td>0.01</td> <td>to 0.038 (+276%)</td> </tr> <tr> <td>SO₄</td> <td>70.4</td> <td>to 269.4 (+283%)</td> </tr> <tr> <td>TDS</td> <td>265.9</td> <td>to 650.0 (+142%)</td> </tr> </table>	Ca	75.0	to 83.9 (+12%)	Cl	30.5	to 84.1 (+176%)	Fe	0.01	to 0.142 (+1316%)	Hard	170.5	to 311.9 (+83%)	Mg	30.9	to 30.8 (-1%)	Na	32.7	to 95.7 (+193%)	Pb	0.01	to 0.038 (+276%)	SO ₄	70.4	to 269.4 (+283%)	TDS	265.9	to 650.0 (+142%)
	Verde	CAP																																																																																							
Ca	42.5	85.0																																																																																							
Cl	18.8	94.5																																																																																							
Fe	0.021	0.158																																																																																							
Hard	212.1	339.3																																																																																							
Mg	25.7	30.8																																																																																							
Na	30.4	107.4																																																																																							
Pb	0.003	0.041																																																																																							
SO ₄	52.9	309.3																																																																																							
TDS	264.0	722.3																																																																																							
Ca	42.5	to 61.1 (+44%)																																																																																							
Cl	18.8	to 51.9 (+176%)																																																																																							
Fe	0.021	to 0.081 (+289%)																																																																																							
Hard	212.1	to 267.8 (+26%)																																																																																							
Mg	25.7	to 27.9 (+9%)																																																																																							
Na	30.4	to 64.1 (+110%)																																																																																							
Pb	0.003	to 0.020 (+553%)																																																																																							
SO ₄	52.9	to 165.2 (+212%)																																																																																							
TDS	264.0	to 464.7 (+76%)																																																																																							
Ca	75.0	to 83.9 (+12%)																																																																																							
Cl	30.5	to 84.1 (+176%)																																																																																							
Fe	0.01	to 0.142 (+1316%)																																																																																							
Hard	170.5	to 311.9 (+83%)																																																																																							
Mg	30.9	to 30.8 (-1%)																																																																																							
Na	32.7	to 95.7 (+193%)																																																																																							
Pb	0.01	to 0.038 (+276%)																																																																																							
SO ₄	70.4	to 269.4 (+283%)																																																																																							
TDS	265.9	to 650.0 (+142%)																																																																																							
	After-exchange maximum concentrations reach new highs for numerous constituents. Degradation of some SRP water during period when only Verde River water is normally delivered. Possible short-term impacts to M&I and agricultural users. Short exchange period affects only 8% of SRP surface water			After-mix maximum SRP concentrations reach new highs for numerous constituents. All of SRP surface water degraded and possible increased M&I treatment costs with short-term maximum CAP concentrations. Possible changes in agricultural operation only during period when Verde River water is normally delivered			After-mix maximum MCMWCD#1 concentrations reach new high for numerous constituents with no significant effect on agricultural users																																																																																		
-Mitigation		Notify users of exchange period	Not applicable		Aeration of water between reservoir and treatment plants			No mitigation recommended																																																																																	
-Unmitigated/ Mitigated Effect		I/I	No Effect	SA/SA	SA/SA	SA/SA	I/I	I/I																																																																																	

TABLE 1 (Continued)

Factors/Measures	Plan 8 CAWCS No Action (Future-Without Project)	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7
WATER QUALITY								
<u>Eutrophication</u>								
-Potential for eutrophic conditions to occur	Low potential for SRP and MCMWCD#1 water. High organics in CAP water may produce trihalomethane in water treatment plants which receive CAP water	No eutrophication problems caused by project implementation. Increased potential for trihalomethane production at water treatment plants served by SRP during exchange period	No eutrophication problems caused by project implementation		Confluence Reservoir has high potential for eutrophication with high probability for blue-green algal dominance. Probable aesthetic impacts on Verde arm in most years. Increased potential for trihalomethane production at water treatment plants served by SRP			New Waddell Reservoir has low to moderate potential for eutrophication with no projected problems
-Mitigation		Different disinfection process for SRP M&I water	Not applicable		Downstream impacts mitigatable with aeration and different disinfection process for SRP M&I water			No mitigation recommended
-Unmitigated/ Mitigated Effect		I/I	No Effect	SA/I	SA/I	SA/I	I/I	I/I

TABLE 1 (Continued)

Factors/Measures	Plan 8 CAWCS No Action (Future-Without Project)	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7
CULTURAL RESOURCES								
<u>Prehistoric Cultural Resources</u>								
-Number of sites destroyed/total number of sites potentially affected	0 (3,296 sites in site areas)	134/2,906	57/2,906	158/3,151		77/3,169		160/3,033
-Acres of archaeological deposits affected	0 (15,668 acres of deposits in site areas)	7,808	7,808	13,754		15,551		7,925
-Effects Factor		-8,984	-8,210	-15,650		-19,600		-9,194
-Mitigation		Avoiding resource; partial data recovery (e.g., mapping sites, collection of surface artifacts, use of remote sensing techniques, test excavations, partial site excavations); site protection (e.g., fencing around site, policing, site monitoring, enforcement of laws against vandalism). Complete mitigation of impacts not possible.						
-Unmitigated/ Mitigated Effect		AF/AF	AF/AF	AF/AF		AF/AF	AF/AF	AF/AF
<u>Historic Cultural Resources</u>								
-Number of sites destroyed/total number of sites potentially affected	0 (175 sites in site areas)	21/44	21/38	66/116		64/127		33/44
-Effects Factor		-260	-213	-698		-753		-260
-Mitigation		Avoiding resource; partial data recovery (e.g., mapping sites, collection of surface artifacts, use of remote sensing techniques, test excavations, partial site excavations); site protection (e.g., fencing around site, policing, site monitoring, enforcement of laws against vandalism); site documentation (e.g., recording surface architecture or structural features); additional historical research.						
		Roosevelt Dam impacts not mitigatable		Fort McDowell and Roosevelt Dam impacts not mitigatable				Roosevelt Dam impacts not mitigatable
-Unmitigated/ Mitigated Effect		AF/AF	AF/AF	AF/AF		AF/AF	AF/AF	AF/AF

TABLE 1 (Continued)

Factors/Measures	Plan 8 CAWCS No Action (Future-Without Project)	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7
RECREATION								
<u>Stream-Oriented Recreation</u>								
-Net loss of miles of perennial stream/loss of tubing miles	0 (68 stream miles in site areas; 986 miles in 5-county region)	-2/0	-2/0	-18/16.8	-19/16.8	-19/16.8	-1/0	-2/0
-Net loss/gain in maximum recreation days per year for stream-oriented activities	0 (2,210,000 stream-oriented recreation days in site areas; 8,236,000 5-county region)	+43,000	-1,000	-1,469,000	-1,514,000	-1,514,000	+43,000	+43,000
-Mitigation		----- Loss of stream miles not mitigatable -----						
-Unmitigated/Mitigated Effect		I/I	I/I	AF/AF	AF/AF	AF/AF	I/I	I/I
-Regional stream-oriented recreation needs met/intensified	Most needs not met except tubing	Negligible change	Negligible change	Tubing needs intensified by 94%			Negligible change	Negligible change
<u>Reservoir-Oriented Recreation</u>								
-Net gain in usable surface acres	0 (15,755 acres in site areas; 34,774 in 5-county region)	+845	0	+5,320	+5,320	+5,320	+1,781	+1,991
-Net loss/gain in maximum recreation days per year for reservoir-oriented recreation	0 (752,000 reservoir-oriented recreation days for site areas; 6,479,000 for 5-county region)	1,152,000	-9,000	+4,359,000	+2,875,000	+2,875,000	+1,564,000	+1,587,000

TABLE 1 (Continued)

Factors/Measures	Plan 8 CAWCS No Action (Future-Without Project)	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7
RECREATION								
<u>Reservoir-Oriented Recreation</u>								
-Regional reservoir-oriented recreation needs met/intensified	Most needs not met	Meets needs for swimming by 46%, developed camping by 190%	Insignificant intensification of lake boating needs	Meets needs for swimming by 343%, developed camping by 192%, picnicking by 37%	Meets needs for swimming by 256%, powerboating by 17%, picnicking by 32%	Meets needs for swimming by 61%, developed camping by 200%, picnicking by 28%	Meets needs for swimming by 61%, developed camping by 200%, picnicking by 28%. Potential for development of Rio Salado increased by provision of water supply for the project	Meets needs for swimming by 61%, developed camping by 200%, picnicking by 28%. Potential for development of Rio Salado increased by provision of water supply for the project
-Mitigation		Not required for this factor						
-Unmitigated/ Mitigated Effect		SB	I	SB	SB	SB	SB	BF

TABLE 1 (Continued)

Factors/Measures	Plan 8 CAWCS No Action (Future-Without Project)	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7
SOCIAL IMPACTS								
<u>Indian Relocations</u> (Fort McDowell Indian Community)								
-Changes affecting individuals	<ol style="list-style-type: none"> 1. Normal mortality and illness rates given the age distribution of the population 2. High levels of personal autonomy 3. High satisfaction with way of life 4. High potential for increased financial self-sufficiency 	No change from without project condition			<ol style="list-style-type: none"> 1. Substantial increase in illness and mortality rates 2. Extreme decline in levels of personal autonomy 3. Extreme decrease in satisfaction with way of life 4. Substantial decrease in potential for sustained financial self-sufficiency 		No change from without project condition	
-Changes affecting families and small groups (INTERPERSONAL)	<ol style="list-style-type: none"> 1. High levels of extended family ties; highly integrated support systems within the family 2. Normal incidence of family problems such as divorce, child abuse and neglect, and drug abuse; moderate incidence of alcohol abuse 	No change from without project condition			<ol style="list-style-type: none"> 1. Substantial decrease in extended family ties and family support systems 2. Substantial increase in incidence of family problems such as alcohol and drug abuse, divorce, child abuse and neglect 		No change from without project condition	
-Changes affecting the community	<ol style="list-style-type: none"> 1. High community cohesion; high levels of informal support networks 2. High community viability (significant increase from present condition); strong community leadership; high potential for tribal autonomy 3. High potential for increased tribal economic self-sufficiency; moderate levels of unemployment 4. High potential for sustaining Yavapai culture 	No change from without project condition			<ol style="list-style-type: none"> 1. Extreme decrease in community cohesion; substantial decline in number and efficacy of informal support networks 2. Extreme decrease in community viability; substantial decline in autonomy (ability to control the direction of the community) and in efficacy of tribal leadership; elimination of trend toward self-determination 3. Substantial decrease in potential for tribal economic self-sufficiency (increased dependency on government services); substantial increase in unemployment 4. Extreme decrease in potential to sustain Yavapai culture 		No change from without project condition	

TABLE 1 (Continued)

Factors/Measures	Plan 8 CAWCS No Action (Future-Without Project)	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7
SOCIAL IMPACTS								
<u>Indian Relocations</u> (Cont'd)								
-Number of people relocated	0 (350 people in community)	0	0	290	350	350	0	0
-Mitigation		Not Applicable	Not Applicable	<ol style="list-style-type: none"> 1. Relocate the entire community together; do not relocate on individual basis 2. Provide the tribe with additional land equal to or greater in size than that purchased and of the highest quality available which is contiguous to the reservation boundaries 3. Monetary compensation should cover all expenditures and new expenses incurred by the residents as a result of relocation and should be distributed according to the tribe's wishes 4. Provide special services to meet needs that are unique to this area 5. Initiate a plan that ensures the participation of the entire community in all decisions and plans relevant to the relocation 6. Provide an accurate, reliable system for disseminating information to residents so that they are constantly informed about the relocation proceedings 7. Guarantee that the land and water rights provided the tribe will never be revoked 			Not Applicable	Not Applicable
-Unmitigated/ Mitigated Effect		No Effect	No Effect	AF/AF	AF/AF	AF/AF	No Effect	No Effect

TABLE 1 (Continued)

Factors/Measures	Plan 8 CAWCS No Action (Future-Without Project)	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7
SOCIAL IMPACTS								
<u>Non-Indian Relocations</u> (Roosevelt Lake)								
-Changes affecting individuals	<ul style="list-style-type: none"> 1. Normal mortality and illness rates given age distribution of population 2. High levels of personal autonomy 3. High satisfaction with way of life 4. High potential for financial self-sufficiency 							<ul style="list-style-type: none"> 1. Slight increase in mortality rates and increased illness rates 2. Substantial decrease in personal autonomy 3. Substantial decrease in satisfaction with way of life 4. Moderately reduced financial capacity
-Changes affecting families and small groups (INTERPERSONAL)	<ul style="list-style-type: none"> 1. Low levels of informal support networks in all communities except Roosevelt Gardens; at Roosevelt Gardens, moderately developed informal support networks. Family interactions primarily within nuclear family at all locations 2. Incidence of family problems such as divorce, child abuse and neglect, alcohol and drug abuse 							<ul style="list-style-type: none"> 1. Slight decrease in informal support networks 2. No change

TABLE 1 (Continued)

Factors/Measures	Plan 8 CAWCS No Action (Future-Without Project)	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7
SOCIAL IMPACTS								
<u>Non-Indian Relocations</u> (Cont'd)								
-Changes affecting the community	<ol style="list-style-type: none"> 1. Low to moderate community cohesion in all communities except Roosevelt Gardens; high community cohesion at Roosevelt Gardens 2. Community development likely to remain at present low level, which is adequate to sustain viability. (Formal social organization emerges on temporary basis to meet needs and respond to immediate problems.) Low level community organization on day-to-day basis. (Emphasis on individuality more than community) 	<ol style="list-style-type: none"> 1. Slight decrease in community cohesion and social organization 2. Slight decrease in community viability 						
-Number of people relocated	0 (650 people in affected communities)	325	275	325	275	275	325	325
-Mitigation	<p>Mitigation for Plans 2, 4, and 5: 1. Relocate only those people who live within the area likely to be inundated more than once in 200 years, but not within the larger IDF area; provision of low-cost flood insurance to people residing in the IDF area.</p> <p>Mitigation for Plans 1, 3, 6, and 7: 1. Relocate only those people who live within the confines of the SPF take-line, with no relocation of people in the IDF area 2. Provision of low-cost flood insurance to people in the IDF area 3. Provision of Forest Service land in the Roosevelt Lake area for relocations, allowing enough space so neighbors may relocate near each other if they wish 4. Monetary compensation for all relocation expenses incurred by residents 5. Provide special services to meet needs that are unique to this area</p>							
-Unmitigated/ Mitigated Effect		SA/I	SA/I	SA/I	SA/I	SA/I	SA/I	SA/I

TABLE 1 (Continued)

Factors/Measures	Plan 8 CAWCS No Action (Future-Without Project)	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7
SOCIAL IMPACTS (Cont'd)								
<u>Flooding</u>	Future-without project: 200-year flood (275,000 cfs at airport)	Impact of reduction of 200-year flood (275,000 cfs at airport) to 70-92,000 cfs at airport	Impact of reduction of 200-year flood (275,000 cfs at airport) to 157,000 cfs at airport	Impact of reduction of 200-year flood (275,000 cfs at airport) to 70-92,000 cfs at airport				

(The conditions described have a probability of occurring approximately once every 200 years or one chance in 200 of occurring in any given year. In a flood of lesser magnitude, the conditions described in all plans would be less severe)

-Individual Impacts

Quality of life

Slight increase in mortality rates. Extensive health problems resulting from sewage and debris in inundated areas. High levels of stress and anxiety resulting from disruptions due to flooding. Substantial financial losses which could not be recovered, i.e., loss of businesses and employment opportunities, lost wages during extended clean-up period, property damages. Inconveniences and major disruptions in home and work routines

Normal mortality rates. Elimination of health problems resulting from sewage and debris in inundated areas. Elimination of high stress and anxiety levels and financial losses associated with flooding. Substantial reduction in inconveniences and disruptions to home and work routines

Holly Acres: No impact, i.e. continued widespread health problems resulting from flooding debris. High levels of stress and anxiety resulting from disruptions due to flooding and evacuation. Substantial financial losses which could not be recovered. Continued inconveniences and major disruptions in home and work routines.

Normal mortality rates. Elimination of health problems resulting from sewage and debris in inundated areas. Elimination of high stress and anxiety levels and financial losses associated with flooding. Substantial reduction in inconveniences and disruptions to home and work routines

Other areas:
Normal mortality rates. Substantial reduction in problems resulting from sewage and debris in inundated areas. Elimination of high stress and anxiety levels and financial losses associated with flooding. Substantial reduction in inconveniences and disruptions to home and work routines

TABLE 1 (Continued)

Factors/Measures	Plan 8 CAWCS No Action (Future-Without Project)	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7
<u>Flooding (Cont'd)</u>								
- Regional Impacts								
Change in number of communities with residential properties likely to sustain floodwater damage and requiring evacuation	Inundation and massive evacuations in communities of Mesa, Tempe, Phoenix, Salt River Indian Community, Gila River Indian Community, Holly Acres and Buckeye areas during 200-year flood (200-year floodplain population in year 2000 projected to be 44,800)	Elimination of inundation and evacuations in downstream communities of Mesa, Tempe, Phoenix, Salt River Indian Community, Holly Acres and Buckeye areas during 200-year flood (projected population of 200-year floodplain in year 2000 is 44,800)	Inundation of Holly Acres area and evacuation of 525 residents (year 2000 projected population.) Elimination of inundation and evacuations in downstream communities of Mesa, Tempe, Phoenix, Salt River Indian Community, and Buckeye area during 200-year flood (projected population of 200-year floodplain in year 2000 is 44,800)	Elimination of inundation and evacuations in downstream communities of Mesa, Tempe, Phoenix, Salt River Indian Community, Holly Acres and Buckeye areas during 200-year flood (projected population of 200-year floodplain in year 2000 is 44,800)				
Number of automobile river crossings closed	Closing of all but one (Mill Avenue) of 29 crossings in total future crossing stock (Southern Pacific Railroad bridge would be open for rail transport)	Closing of 15 crossings: 14 of 29 in total future crossing stock remain open up to 200-year flood condition; 15 of 29 remain open in 100-year flood condition	Closing of 16 crossings: 13 of 29 in total future crossing stock remain open in 200-year and 100-year condition	Closing of 15 crossings: 14 of 29 in total future crossings stock remain open up to 200-year flood condition; 15 of 29 remain open in 100-year flood condition				

TABLE 1 (Continued)

Factors/Measures	Plan 8 CAWCS No Action (Future-Without Project)	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7
<u>Flooding (Cont'd)</u>								
- Regional Impacts (Cont'd)								
Incidence of transportation disruptions	Severe disruptions to transportation and affected services--probable limitation of the one remaining crossing to emergency use only. Separation of communities north and south of river for extended period. (If Mill Avenue and Southern Pacific Railroad Bridges were available for work-related crossings, of 125,000 commuters normally crossing per day, only 72,000 would be able to do so)	Elimination of major disruptions to transportation. (Bridges remaining open during 200-year flood are expected to carry 75 to 80 percent of all traffic crossing on a <u>normal</u> day.) Some slowing of traffic due to adjustments to new routes and added driving distance to open crossings						
Incidence of health and safety problems related to flooding	Severe health hazards due to potential for raw sewage in river. Extensive inundation potential in large sector of the community. Hazards from down power lines. Greatly overburdened emergency and medical care facilities with some areas cut off from direct access to any emergency and medical services	Elimination of health and safety hazards due to damages to power lines and sewer lines. Substantial reduction in delays in delivery of emergency services	Substantial reduction in health and safety hazards due to damages to major power lines and breaks in sewer lines. Substantial reduction in delays in delivery of emergency services	Elimination of health and safety hazards due to damages to power lines and sewer lines. Substantial reduction in delays in delivery of emergency services				
Effect		BF	SB	BF	BF	BF	BF	BF

TABLE 1 (Continued)

Factors/Measures	Plan 8 CAWCS No Action (Future-Without Project)	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7
ECONOMIC @ 7 3/8%								
<u>Cost (\$)</u>								
-Total Construction Cost (including IDC)	0 (2,500,000,000)	476,140,000	408,550,000	764,640,000	1,173,810,000	1,083,810,000	746,150,000	746,150,000
-Total Annual Cost	0 (185,000,000)	41,110,000	31,840,000	66,650,000	95,930,000	89,280,000	64,320,000	62,890,000
<u>Benefits (\$)</u>								
-Regulatory Storage								
Energy management	0	0	0	17,170,000	16,160,000	16,160,000	16,160,000	16,160,000
Hydropower	0	700,000	0	3,600,000	2,900,000	2,900,000	940,000	940,000
Water Supply Benefits		8,660,000	1,200,000	13,920,000	11,700,000	11,700,000	11,880,000	6,200,000
Total Regulatory Storage Benefits		9,360,000	1,200,000	34,690,000	30,760,000	30,760,000	28,980,000	23,300,000
-Flood Control								
Inundation Reduction		10,580,000	5,373,000	10,580,000	9,560,000	9,560,000	10,580,000	10,580,000
Location and Intensification		16,460,000	4,873,000	16,460,000	17,400,000	17,400,000	16,460,000	16,460,000
Total Flood Control Benefits		27,040,000	10,246,000	27,040,000	26,960,000	26,960,000	27,040,000	27,040,000
-Safety of Dams		29,530,000	29,530,000	29,530,000	14,500,000	14,500,000	29,530,000	29,530,000
-Recreation		Not Available						
-Fish and Wildlife		Not Available						
<u>Total Annual Benefit^a</u>		65,930,000	40,970,000	91,260,000	72,220,000	72,220,000	85,550,000	79,870,000
-Net Economic Benefit		24,830,000	9,136,000	24,610,000	-23,710,000	-17,060,000	21,230,000	16,980,000
-Benefit/Cost Ratio		1.60	1.29	1.37	0.75	0.81	1.33	1.27

^aSee following page for a descriptive note on the computational procedure used for benefits.

TABLE 1 (Continued)

Factors/Measures	Plan 8 CAWCS No Action (Future-Without Project)	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7
ECONOMIC @ 7 3/8%								
Note:								
<p>During initial plan formulation, it was assumed that the plans would be operated so as to deliver as much water from the Colorado River as possible subject to such constraints as aqueduct capacity, demand, and ability to exchange water. Analyzing the regulatory storage benefits obtained using this operation indicated that by operating the plans differently the potential to significantly increase the regulatory storage benefits existed. To verify this, the benefits for the plans were quickly reevaluated using different operating criteria. With these criteria the plans would be operated to develop additional water only from within Arizona and energy management potential would be maximized. If this second assumption is used, the net benefits for all plans with direct-connected regulatory storage will increase. The following table shows the benefits and yield for the plans under this assumption. Discussions will continue in an effort to define what the operating goals of regulatory storage will be. Based on the results of these discussions, some plan or plans will be re-fined and perhaps re-sized.</p>								
<u>Cost (\$)</u>								
-Total Construction Cost	476,140,000	408,550,000	764,640,000	1,173,810,000	1,083,810,000	746,150,000	746,150,000	
-Total Annual Cost	41,060,000	31,840,000	64,990,000	95,298,000	88,646,000	61,940,000	60,440,000	
<u>Benefits (\$)</u>								
-Total Annual Benefits	65,815,000	40,976,000	102,183,000	84,976,000	84,967,000	94,652,000	86,645,000	
Net Benefits	24,755,000	9,136,000	37,193,000	-10,322,000	-3,670,000	32,712,000	26,205,000	
Benefit/Cost Ratio	1.60	1.29	1.57	.89	.96	1.53	1.43	
-Yield (acre-feet)	100,000	16,000	130,000	130,000	130,000	95,000	65,000	

TABLE 1 (Continued)

Factors/Measures	Plan 8 CAWCS No Action (Future-Without Project)	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7
FINANCIAL*(\$) @ 3½%								
<u>Non-Reimbursable</u>								
SOD	0 (0)	201,360,000		225,600,000	370,770,000	370,770,000	210,950,000	
CAWCS	0 (67,948,000)	189,328,000		270,696,000	328,502,000	282,051,000	205,100,000	
<u>CAWCD Net Repayment Obligation</u>	0 (833,829,000)	37,021,000		-427,002,000	-260,319,000	-322,908,000	-365,522,000	

* The financial analysis is based on preliminary data. It is applicable only for planning purposes, and is subject to policy and legal review.

EVALUATION FACTORS

PERFORMANCE

YIELD: The annual increase in the amount of available CAP water associated with a plan as a result of the addition of regulatory storage.

ENERGY MANAGEMENT: With regulatory storage at the Confluence or New Waddell (direct connection), the CAP can use its allocation of Navajo Generating Station power to pump water in off-peak periods such as in the winter or at night and store it for later delivery (measured in megawatts available for sale). The high-value electricity which would otherwise have to be used to pump water can be sold by CAP to other users, producing increased revenue to CAP.

HYDROPOWER: The amount of power produced through the construction and operation of new hydropower generating facilities in the structural facilities within the various plans (measured in kilowatts produced).

SAFETY OF DAMS: With the inclusion of SOD in all candidate plans, dam safety requirements for existing dams are accomplished by all plans; however, they would be delayed in Plans 4 and 5. SOD requirements would be met with the CAWCS No Action alternative, as SOD studies would continue toward a solution.

FLOOD CONTROL: The reduction of the 200-year flood event (275,000 cfs at the airport) and the 100-year flood event (215,000 cfs at the airport) to a lower flow at the airport.

BIOLOGICAL RESOURCES

THREATENED/ENDANGERED PLANTS AND WILDLIFE: Species of plants and animals designated as endangered by authority of the Endangered Species Act.

RIPARIAN/WETLAND BIOTIC COMMUNITY: The riparian/wetland community consists of vegetation and associated wildlife that depend on streams and lakes for a source of water.

PERENNIAL STREAM/RIVERINE COMMUNITY: The perennial stream community includes plants and animals that live and grow in the flowing water and pools of the streams.

RESERVOIR AQUATIC COMMUNITY: The reservoir aquatic community primarily includes sport fish and other types of fish that live in well-managed reservoirs in Central Arizona.

WATER QUALITY

CONSTITUENTS: The increase or decrease in concentrations of total dissolved solids (TDS), nitrates, flourides, and other constituents due to mixing CAP water from the Colorado River with water from the Salt, Verde, or Agua Fria Rivers.

EUTROPHICATION: Eutrophication is a process of nutrient enrichment (nitrogen and phosphorous) in a lake or reservoir. This condition is

usually beneficial for fisheries, but algal growth can affect water quality adversely in terms of aesthetics (color, odor, taste) and can increase concentrations of dissolved organic material in the water.

CULTURAL RESOURCES

PREHISTORIC CULTURAL RESOURCES: Prehistoric resources are sites and associated artifacts that date from before the time of written records in the area, generally before the time of initial Spanish contact. One measurement unique to cultural resources is the effects factor which takes into consideration the number of sites affected, the significance of the sites, and the severity of the impact. Larger effects-factor numbers indicate greater impacts and smaller numbers indicate lesser impacts.

HISTORIC CULTURAL RESOURCES: Historic resources are sites or properties which were occupied after the time when written records became available for an area.

RECREATION

STREAM-ORIENTED RECREATION: Stream-oriented recreation includes recreational resources and activities associated with flowing water, including tubing, stream fishing, and picnicking.

RESERVOIR-ORIENTED RECREATION: Reservoir-oriented recreation is recreation associated with lakes behind dams and includes activities such as boating, lake fishing, swimming, and picnicking.

SOCIAL IMPACTS

INDIAN RELOCATIONS: Some of the alternative plans would require relocation of residents of the Fort McDowell Indian Community. The impact of relocation is assessed on three levels: individual, interpersonal, and community. These three categories overlap; however, impacts are attributed to that category which is most directly affected.

NON-INDIAN RELOCATIONS: The impacts of relocation at Roosevelt Lake and at the Cliff site are assessed using the same variables for analysis as with Indian relocations, with the exception of the transmission of Yavapai culture. With Plans 4 and 5, the potential exists for relocation of some businesses and residences at Fountain Hills, an assessment of which will be completed before the end of the study.

FLOODING: The impacts of flooding on people's lives.

ECONOMICS

COSTS: The cost of a project includes the Total Construction Cost (land acquisition, relocation, and structure) interest payments, and operation, maintenance, and replacement costs. Cost is also expressed as the Total Annual Cost which is the total construction cost, annualized over the life of the project, and the operation, maintenance, and replacement costs.

BENEFITS

REGULATORY STORAGE BENEFITS: Water supply benefits equal the value, measured in dollars, of the increase in available CAP water as a result of regulatory storage. Energy management benefits equal the value, measured in dollars, of energy and capacity that is made available for other use (sale) as a result of the flexible pumping patterns provided by regulatory storage. Hydropower benefits are equal to the value of hydropower generated under each plan.

FLOOD CONTROL BENEFITS: Inundation reduction benefits equal the net difference, in dollars, between flood damages that would occur with a project and damages that would occur without a project. Location benefits are measured by the increase in land values with the plan.

SAFETY OF DAMS BENEFITS: SOD benefits are equal to the cost of the least cost single-purpose SOD alternative.

All Summary Fact

RECREATION BENEFITS: Recreation benefits equal the value of the recreational experience based on what people would be willing to pay to use the particular site. (Not available at this time)

FISH AND WILDLIFE BENEFITS: The value of the enhancement of the fish and wildlife resource. (Not available at this time)

NET ECONOMIC BENEFITS: Net economic benefits are the difference between the total annual benefits derived from a project and its total annual cost.

BENEFIT/COST RATIO: Dollar amount of benefits divided by the cost. It is a measure of the economic efficiency of a plan and must be greater than one for a project to be economically justified.

FINANCIAL

CAWCD NET REPAYMENT OBLIGATION: The change in the amount of dollars the District must raise above power revenues to repay their portion of the project.

NON-REIMBURSIBLE COST: The amount paid by the federal government with federal taxes.

SELECTING THE PROPOSED ACTION

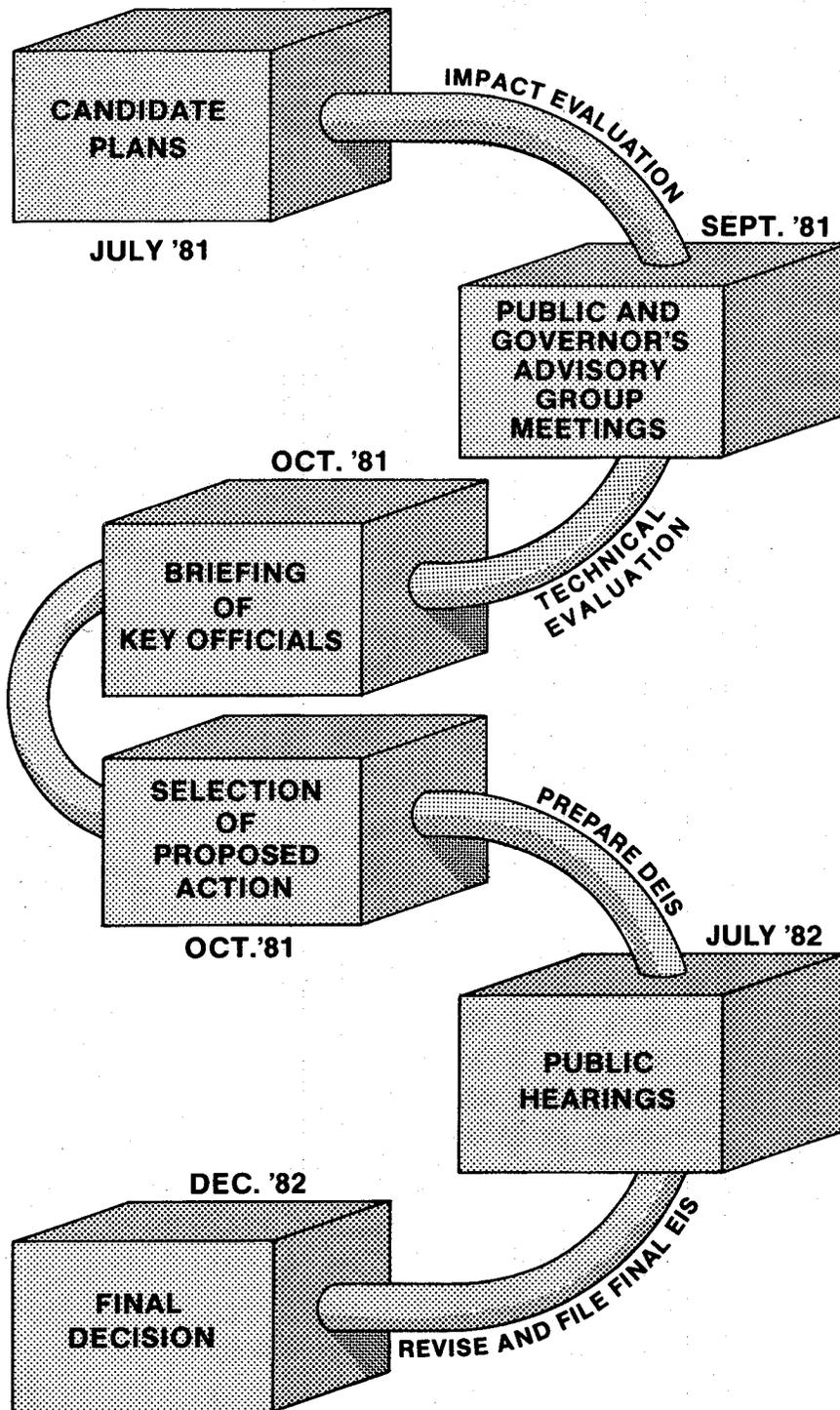
For an overview of the CAWCS schedule see the following page. A meeting of the Governor's Advisory Committee will be held on October 2 and 3, and the members will make their recommendation to the Governor. Information from these meetings will be considered in the plan selection.

Then in mid-October, representatives from the Bureau will evaluate each plan and its impacts, and assign relative importance to evaluation factors based on technical studies and public values, attitudes, and preferences. Based on this technical evaluation, plans will be ranked.

Throughout October, key officials in the Bureau and the Department of Interior, will be briefed on the results of the technical evaluation. Then at the end of October, the CAWCS proposed action will be selected. The selection will take into consideration the technical evaluation and public preferences, and will be based further on consultation with the Bureau, Corps, and Department of Interior officials, the Congressional Delegation, and the Governor.

Once the proposed action is selected, a year-long Environmental Impact Statement (EIS) process begins. A draft EIS will be prepared describing significant impacts of the proposed plan and the other candidate plans. A public hearing on the draft EIS will then be held. The draft EIS will be revised accordingly and a final EIS will be filed. The final decision will be made by the Secretary of Interior in December 1982.

CAWCS SCHEDULE



RESPONSE FORM

We would appreciate your comments on the plans described in this Factbook. For mailing: Please fold with address showing; tape or staple edge. No postage is required.

Which plan do you prefer, and why?

Other comments on the plans:

(FOLD)

(FOLD)



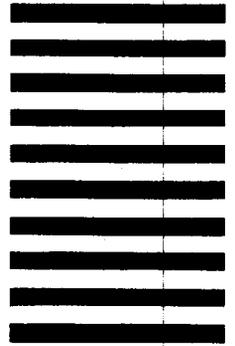
NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. G-110 PHOENIX, ARIZONA

POSTAGE WILL BE PAID BY ADDRESSEE

Bureau of Reclamation
Arizona Projects Office
Suite 2200, Valley Center
201 North Central Avenue
Phoenix, Arizona 85073



NOTES

NOTES

Bureau of Reclamation
Arizona Projects Office
Suite 2200, Valley Center
201 North Central Avenue
Phoenix, Arizona 85073

First Class Mail
Postage & Fees
PAID
U.S. Dept. of Int.
PHOENIX, ARIZONA
Permit No. G-110

**FLOOD CONTROL DISTRICT
RECEIVED**

SEP 22 '91

CH ENG	/	HYDRO
ASST		LMgt
ADMIN		SUSP
C & O		FILE
ENGR		DESTROY
FINANCE	2	CSB
REMARKS		

AZ 85009 CO NA C BUCHS 4795
SCOTT BUCHANAN
FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
3335 W DURANGO
PHOENIX AZ 85009

OFFICIAL PRINTING
PENALTY FOR PRIVATE USE, \$300.00

SR-21