

Table IV-46 continued

	OTHER TERRESTRIAL COMMUNITIES						Totals Habitat Value	Cost	
	Cliff		Roosevelt		Waddell				
	Acres	Habitat Value	Acres	Habitat Value	Acres	Habitat Value	Acres		
<u>FUTURE WITHOUT PROJECT AREA</u>	+9120	+53542	+7830	+34963	+8660	+30603	+25610	+119108	N/A
<u>PROJECT IMPACTS</u>									
Construction impact	-910	-5342	-880	-3929	-1670	-5901	-3460	-15172	N/A
Conservation pool clearing	-808	-4743	0	0	-1425	-5036	-2233	-9779	N/A
Conservation pool flooding	-862	-5061	-3440	-15361	-4945	-17475	-9247	-37897	N/A
Construction reclamation ⁴	+400	+2348	+400	+1768	+1580	+5583	+2380	+9699	N/A
Succession ⁴	+820	+4814	+2090	+9332	0	0	+2910	+14146	N/A
<u>FUTURE WITH PROJECT¹ REMAINING AREA</u>	+7760	+45558	+6000	+26773	+2200	+7774	+15960	+80105	N/A
<u>TOTAL IMPACT²</u>	-1360	-7984	-1830	-8190	-6460	-22829	-9650	-39003	N/A
<u>MITIGATION</u>									
Wildlife water facilities	(13)	+2789	(10)	+2094	(4)	+645	(27)	+5528	\$675,000
IDF Fencing	(50 mi)	+7608	(55 mi)	+13022	(35 mi)	+3491	(140)	+24121	\$1,190,000
<u>FUTURE WITH PROJECT³ AREA MANAGED</u>	+7760	+55955	+6000	+41889	+2200	+11910	+15960	+109754	
Change due to Project	-1360	+2413	-1830	+6926	-6460	-17693	-9650	-8354	N/A
<u>TOTAL COST</u>		\$770,000		\$740,000		\$405,000			\$1,865,000

1. The remaining area equals future without project after accounting for project impacts.

2. Total impacts = future without project + future with project remaining area.

3. Future with project area managed = future with project remaining area with mitigated habitat values.

4. Succession represents an ecological change from one vegetation cover type to another.

Table IV-46 continued

	Cliff		PERRENIAL STREAM COMMUNITIES				Miles	Totals Habitat Value	COSTS
	Miles	Habitat Value	Roosevelt Miles	Habitat Value	Waddell Miles	Habitat Value			
<u>FUTURE WITHOUT PROJECT AREA</u>	+20	+45558	+15	N/A	0	N/A	+35	+45558	N/A
<u>PROJECT IMPACTS</u>									
Construction impact	-4	-9113	0	N/A	0	N/A	-4	-9113	N/A
Conservation pool flooding	-6	-13668	0	N/A	0	N/A	-6	-13668	N/A
Construction reclamation	<u>+4</u>	<u>+6962</u>	<u>0</u>	N/A	0	N/A	<u>+4</u>	<u>+6926</u>	N/A
<u>FUTURE WITH PROJECT¹ REMAINING AREA</u>	<u>+14</u>	<u>+29739</u>	<u>+15</u>	N/A	0	N/A	<u>+29</u>	<u>+29739</u>	N/A
<u>TOTAL IMPACT²</u>	-6	-15819	0	N/A	0	N/A	-6	-15819	N/A
<u>MITIGATION</u>									
Reclamation of stream miles	+7	+22240	0	N/A	0	N/A	+7	+22240	\$610,000
Fish barriers	<u>(+1)</u>	<u>N/A</u>	<u>(0)</u>	N/A	<u>(+1)</u>	N/A	<u>(+2)</u>	<u>N/A</u>	<u>\$60,000</u>
<u>FUTURE WITH PROJECT³ AREA MANAGED</u>	+21	+51979	+15	0	0	0	+36	+51979	N/A
Change due to Project	+1	+6421	0	0	0	0	+2	+6421	N/A
<u>TOTAL COST</u>		\$619,000		-0-		\$51,000			\$670,000

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1. The remaining area equals future without project after accounting for project impacts.
 2. Total impacts = future without project + future with project remaining area.
 3. Future with project area managed = future with project remaining area with mitigated habitat values.

Table IV-46 continued

	RESERVOIR AQUATIC COMMUNITIES						Totals	Costs	
	Cliff Acres	Habitat Value	Roosevelt Acres	Habitat Value	Wadde11 Acres	Habitat Value			Habitat Value
<u>FUTURE WITHOUT PROJECT AREA</u>	+610	+1061	+11930	+29036	+830	+1950	+13370	+32047	N/A
<u>PROJECT IMPACTS</u>									
Construction impact	0	N/A	0	N/A	-80	-188	-80	-188	N/A
Conservation pool flooding	+130	+226	0	N/A	+1850	+3246	+1980	+3472	N/A
Construction reclamation	0	N/A	0	N/A	+40	+78	+40	+78	N/A
<u>FUTURE WITH PROJECT¹ REMAINING AREA</u>	<u>+740</u>	<u>+1287</u>	<u>+11930</u>	<u>+29036</u>	<u>+2600</u>	<u>+5086</u>	<u>+15270</u>	<u>+35409</u>	N/A
<u>TOTAL IMPACT²</u>	+130	+226	0	N/A	+1890	+3324	+2020	+3550	N/A
<u>MITIGATION</u>									
Drawn down rates (in/day)	(-.72)	+459	N/C	N/C	(-1.49)	+601	N/A	+1060	-0-
Minimum pool	(+1030)	N/A	N/C	N/A	(+1540)	N/A	(+2570)	N/A	N/A
Safety Clearing	-1161	+20	0	+459	-1425	+117	+2586	+479	-0-
<u>FUTURE WITH PROJECT³ AREA MANAGED</u>	<u>+740</u>	<u>+1766</u>	<u>+11930</u>	<u>+29495</u>	<u>+2600</u>	<u>+5804</u>	<u>+15270</u>	<u>+37065</u>	N/A
Change due to Project	+130	+705	0	+459	+1770	+3854	+1900	+5018	N/A
<u>TOTAL COST</u>	-0-		-0-		-0-				-0-

1. The remaining area equals future without project after accounting for project impacts.
2. Total impacts = future without project + future with project remaining area.
3. Future with project area managed = future with project remaining area with mitigated habitat values.

Table IV-46 continued

	SPECIAL USE AREAS						Totals Habitat Value	Costs
	Cliff Acres	Habitat Value	Roosevelt Acres	Habitat Value	Waddell Acres	Habitat Value		
<u>FUTURE WITHOUT PROJECT AREA</u>	0	N/A	+2000	N/A	0	N/A	+2000	N/A
<u>PROJECT IMPACTS</u>								
Recreation impacts	<u>0</u>	N/A	<u>-100</u>	N/A	<u>0</u>	N/A	<u>-100</u>	N/A
<u>FUTURE WITH PROJECT REMAINING AREA</u> ¹	<u>0</u>	N/A	<u>+1900</u>	N/A	<u>0</u>	N/A	<u>+1900</u>	N/A
<u>TOTAL IMPACT</u> ²	0	N/A	-100	N/A	0	N/A	-100	N/A
<u>MITIGATION</u>								
Provide winter waterfowl food areas	<u>+1720</u>	N/A	<u>+100</u>	N/A	<u>0</u>	N/A	<u>+1820</u>	<u>\$20,000</u>
<u>FUTURE WITH PROJECT AREA MANAGED</u> ³	+1720	N/A	+2000	N/A	0	N/A	+3720	N/A
Change due to Project	+1720	N/A	0	N/A	0	N/A	+1720	N/A
<u>TOTAL COST</u>		\$10,000		\$10,000		-0-		\$20,000

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1. The remaining area equals future without project after accounting for project impacts.
 2. Total impacts = future without project + future with project remaining area.
 3. Future with project area managed = future with project remaining area with mitigated habitat values.

(d) All riparian habitat in the construction areas not required for construction purposes will be protected from damage. All lands containing riparian habitat which is removed due to construction outside the impoundment area will be contoured and revegetated to preconstruction conditions.

(3) Additional Opportunities

(a) Support could be provided to land management programs that promote riparian/wetland habitat rehabilitation in suitable drainages at all project sites. An example of such a program is the Forest Service's riparian habitat rehabilitation program in the Tonto National Forest, with rehabilitation sites in the areas near the proposed Cliff Dam on the Verde River and the Salt River.

(b) Privately-owned parcels of land bordering the Salt and Verde Rivers could be acquired and managed to promote riparian growth and wildlife utilization. Several parcels on Tonto Creek at Roosevelt Lake offer potential sites for riparian habitat development. Size, quantity, cost and availability of the parcels for purchase have not yet been determined.

(c) Additional or substitute areas at Cliff Reservoir such as Mullen Mesa or Deadman Wash or other National Forest Service lands outside of project area could be converted to cottonwood/willow communities. These are currently desert areas that occur in the proposed surcharge pool and will be inundated during high frequency flood events, thereby greatly reducing their existing habitat value. These same flood events would serve to encourage the establishment of mixed scrub habitat due to the increased availability of water. However, these areas would require greater effort to vegetate and maintain than the proposed areas due to differences in soil type and depth to ground water.

(d) Additional benefits could be obtained by creating "pot holes" in the bed of Horseshoe Reservoir for cattails. This would in turn increase the value of the area for wetland wildlife species and waterfowl.

b. Other Terrestrial Communities

(1) Commitments

The upland desert habitat represents the major vegetation type within the Cliff, Roosevelt, and Waddell site areas and will be subjected to the greatest acreage loss within the reservoir inundation zone. Opportunities for recovering lost acreages are limited, but qualitative mitigation is possible. Reclamation is committed to mitigating the loss of habitat value to the greatest extent practical or to compensate for the losses by increasing values in other habitat communities.

(2) Means of Accomplishing Commitment

(a) Reclamation will restrict grazing and off-road vehicle access by fencing the IDF and/or by obtaining management agreements on

project withdrawn lands at each project site (i.e., with the Forest Service at Cliff and Roosevelt Damsites and the Maricopa County Parks Department and/or the State Land Department at New Waddell Damsite). In addition permanent water sources will be provided in areas where water is not now available to wildlife.

(b) All areas of construction disturbance in the project sites not needed for permanent facilities will be returned to natural contours and revegetated with native species of plants occurring in the habitat.

(c) These mitigation measures will reduce habitat value losses by 92 percent (72 percent annualized) over time, but there will be a 38 percent loss in acreage. These residual impacts will require negotiations with wildlife and land management agencies to determine how best to further reduce these losses.

(3) Additional Opportunities

(a) Additional land may be available at New Waddell if the size of the county park there is increased. If this occurs, Reclamation could negotiate a management agreement with the County that would increase wildlife values through the elimination of cattle grazing in the same manner as in the proposed measure.

(b) Additional land could be acquired to mitigate losses of habitat value. There appears to be an adequate supply of desert upland habitat that could be used. However, to regain the lost habitat value through management, the present habitat value of any acquired land would need to be taken into account, so that the required acreage would be 12,000 to 18,000 acres.

e. Perennial Streams

(1) Commitment

Reclamation is committed to replacing all of the habitat value lost due to the construction and operation of Plan 6. Reclamation is further committed to avoiding impacts to the native fisheries in perennial streams caused by the increased water storage elevations at Cliff and New Waddell Damsites which could introduce non-native reservoir fish into currently isolated native fish habitat.

(2) Means of Accomplishing the Commitment

(a) Up to 7 miles of river will be available after draining Horseshoe Reservoir. Reclamation will reclaim these 7 miles through stream management techniques which will replace the habitat value lost from the 6 miles of river inundated by Cliff Dam and Reservoir.

(b) Because of recent high flows on the Verde and resultant storage in Horseshoe Reservoir, the necessary physical parameters needed to choose the proper methods of reclamation of the river have not been

determined. Therefore, the first step is to collect and analyze this information. The second step will then be to select the proper methods for stabilizing the stream channel and creating habitat for riverine fishes and wildlife. Such habitat manipulation would be directed toward providing a heterogeneous mixture of pools, riffles, and backwaters. If these measures are successful the loss of 15,819 habitat units will be fully mitigated and possible enhancement of 6,421 habitat units could occur. These anticipated gains are predicted on rehabilitation during the first 10 years of project operation. If rehabilitation is delayed or takes longer than expected, the overall gains will be less. Given the accuracy of the forecasted flow regime, a quantitative increase of 1 stream mile could be gained.

(c) The avoidance of impacts to native stream fish will be accomplished by placing fish barriers above the IDF elevation on streams in the project area which contain native fish populations.

(d) Where possible, construction impacts to riverine resources will be avoided by locating haul roads away from water courses and minimizing river crossing areas.

(3) Additional Opportunities

(a) Instream flow releases could be made to downstream sections of the Salt and Verde Rivers to compensate or enhance riverine habitat. Instream flow studies are needed to determine the best flow regime as there may be conflicts between the requirements of the native and non-native fish populations in these systems.

(b) Minimum flows in the Salt and Verde Rivers could be maintained to prevent dry-up periods or to minimize the extent of the dry-up periods.

d. Reservoir Aquatic Communities

(1) Commitments

Beneficial effects will result from the implementation of Plan 6 for most aquatic dependent species. Reclamation's commitment with regard to adversely impacted game fish is to replace the lost habitat values to the greatest extent practical, compensate for these values by increasing habitat values elsewhere, or by increasing the density of game fish in project reservoirs as measured by the catch/unit effort.

A potential problem may exist with the introduction of Colorado River ichthyofauna and its effect on the fishery at New Waddell. Through a cooperative effort with the Arizona Game and Fish Department, the Fish and Wildlife Service and other interested parties, Reclamation will investigate the effect of the introductions or possible means of preventing its occurrence. The knowledge gained from this investigation will be used to confirm or modify the mitigation measures to gain the greatest value for the effort.

(2) Means of Accomplishing Commitments

(a) Reclamation is committed to reducing the rate of drawdown at New Waddell Reservoir to 5 feet or less during March and the first half of April as often as is practical to provide suitable spawning conditions for largemouth bass and other fish with similar spawning requirements. The time period for the reduced drawdown rate will be extended for as long as possible dependent on annual variations in power marketing and other considerations such as seasonal climatic conditions which may affect the needs of the water users. At a minimum, conditions suitable for largemouth bass spawning would be provided during normal and surplus water years.

(b) Reclamation is further committed to reducing conservation pool clearing to the minimum possible level. Currently, a total of 2,486 acres will be cleared at Cliff and Waddell Dam sites primarily for human safety and navigation considerations, predicated on expected boat usage. This will reduce initial impacts to terrestrial habitats and increase habitat values in the reservoirs over the unmitigated value by providing protective cover for fish.

(c) Minimum pools will be incorporated into the sediment and inactive storage pools at Cliff and New Waddell Reservoir sites. At Cliff Reservoir site this pool would be 1,030 acres in size with an average depth of 30 feet; at New Waddell Reservoir site the pool would be 1,540 acres in area and average 26 feet deep. These pools will provide carryover habitat in times when the reservoirs would normally be dry. This is considered an enhancement over present conditions.

(d) Because there will be a change in the water storage regime at Cliff Reservoir over the yearly evacuation of Horseshoe Reservoir, it is likely that the fisheries nursery effect of Horseshoe Reservoir on Bartlett Reservoir will be reduced. The construction of a harvest basin immediately downstream of Horseshoe Dam will facilitate the salvage of sport fish for stocking in Bartlett Reservoir, thereby reducing the impact. A management agreement will be required with the Arizona Game and Fish Department for such salvage and restocking operations.

(3) Additional Opportunities

(a) Largemouth bass could be stocked at New Waddell Reservoir. This would necessitate either buying fish or producing fish by building a warm water hatchery at New Waddell Reservoir.

(b) The fish habitat in reservoirs could be improved by creating artificial reefs for fish cover or by reducing the extent of clearing. This would be especially beneficial in the minimum pool areas.

(c) At Cliff Reservoir, sport fishery benefits could be gained if the Arizona Game and Fish Commission, in conjunction with the Forest Service, were to place horsepower limitations or no wake zone requirements on all or part of the reservoir. This would also reduce the amount of conservation pool clearing required for navigation and would increase protective cover for fish.

(d) Investigations could also be conducted into the feasibility of using Cliff Reservoir as compensation for a degradation in the centrarchid fishery at New Waddell damsite.

e. Special Use Areas

(1) Commitment

The Roosevelt waterfowl management area will incur direct and indirect impacts from the use of the proposed recreation facilities, within and adjacent to its boundaries, and the anticipated eight-fold increase in recreation use of the lake, reducing the value of this area to migrating waterfowl. Reclamation is committed to reducing the effect of this disturbance by increasing the value of the management area.

(2) Means of Accomplishing the Commitment

(a) The recreation sites that are developed by Reclamation within the waterfowl area would be closed during the winter use period. This measure will reduce the direct impacts of the recreation sites within the management area.

(b) Currently the Arizona Game and Fish Department plants winter food crops for waterfowl. By providing irrigation equipment (either portable or permanent) and sufficient water to irrigate 100 acres, the attractiveness of the area will be increased for waterfowl thereby reducing the indirect impacts of the disturbance caused by the increased use of the adjacent sites and the lake for recreation. This measure will increase the Arizona Game and Fish Department's ability to provide winter food crops by approximately 50 percent.

f. Endangered Species

(1) Commitment

(a) The Fish and Wildlife Service has issued a Biological Opinion under the Endangered Species Act. This opinion states that if Plan 6 is implemented as proposed, it will jeopardize the continued existence of the bald eagle in the Southwest. The Jeopardy Opinion was issued because of the impacts of the use of recreation developments and opportunities at Cliff and Roosevelt Reservoirs and because of construction impacts at Roosevelt and Stewart Mountain Dams. The Opinion also proposes reasonable and prudent modifications and conservation efforts which Reclamation is fully committed to successfully carrying out in order to both avoid jeopardizing the bald eagle and to conserve and protect the Gila topminnow.

(2) Means of Accomplishing the Commitments

(a) In accordance with established policy, Reclamation will work with the Fish and Wildlife Service, Arizona Game and Fish Department and the Forest Service to prepare an agreement to implement management strategies and actions to avoid adverse impacts on nesting bald eagles resulting from the increased recreation activities in the Plan 6 area.

(b) Reclamation is currently participating in and providing funding for the collection of information on the foraging and nesting ecology and prey base of the Stewart Mountain, Chalk Mountain, and Pinal Creek eagle pairs through an Interagency Agreement between the Fish and Wildlife Service and Reclamation. Additionally, Reclamation will continue to support the Forest Service's efforts to maintain nest wardens and provide liaisons between construction forces. The nest watch program will continue to receive funding from Reclamation for this effort.

(c) Reclamation supports breaching Horseshoe Dam in a manner to promote stream and riparian development in the exposed Horseshoe Reservoir and to avoid excessive erosion. Reclamation will coordinate with the Fish and Wildlife Service to develop the requirements for evacuation of Horseshoe Reservoir, to be included in the data submitted for final design and construction specifications.

(d) Borrow excavation will be avoided at Meddler Point, if possible. If not, construction specifications will require the removal of materials during the eagle nonbreeding season and the stockpiling of materials outside the eagle breeding and foraging territory. In accordance with standard Reclamation procedures, borrow areas will be restored to provide habitat suitable for eagle forage fish. Human use of this area will be addressed in the management strategies that are developed under the agreement discussed in Commitment (a).

(e) Award of the construction contracts associated with Stewart Mountain Dam will be scheduled to permit initiation of construction in April or May and then continue uninterrupted except for blasting. Construction specifications will exclude initiation of construction from October through March. Blasting activities will be prohibited from December through March.

(f) Reclamation will work with the Fish and Wildlife Service to design and evaluate a positive cutoff above the inflow design flood (IDF) elevation to provide a barrier to the movement of fishes upstream on Tule Creek into the Gila topminnow habitat. The positive cutoff will be constructed unless unforeseen design problems or extreme costs are encountered.

(g) Reclamation will participate in fishery investigations as part of the Interagency Agreement discussed in Commitment (b). The detailed scope of additional fishery investigations beyond those in the Interagency Agreement will be clarified prior to making a final commitment.

g. Additional Considerations

(1) Project Monitoring

(a) To ensure the adequacy of mitigation and compensation measures proposed in this plan and to facilitate monitoring the effects of the project, pre- and post-construction studies will be conducted. Investigations may be needed on such topics as spawning in pre- and post-project reservoirs,

effects of flood attenuation on downstream riparian areas, riparian reestablishment studies for Cliff Reservoir, alteration of temperature regimes and nutrient blockage on the Verde River, effects of upstream water exchanges on proposed riparian mitigation at Cliff Reservoir, investigations into the effects of the introduction of Colorado River ichthyofauna in conjunction with current studies, and river rehabilitation studies at Cliff Reservoir. Recommendations stemming from these studies suggesting additional mitigation would be evaluated and implemented if found to be justified.

2. Cultural Resources

a. Commitment

Cultural resources are objects, buildings, sites, districts and structures that reflect cultural values. Cultural resources are nonrenewable and it is Federal and Arizona State policy to conserve them. Therefore, the goal of the CAWCS cultural resource mitigation is to implement State and Federal policy and conserve those cultural values embodied in the hundreds of cultural resources present within the CAWCS impact areas.

b. Means for Accomplishing Objectives

Cultural values within all CAWCS impact areas have been identified or estimated, and recorded prehistoric and historic sites have been classified into types as described in Chapter III. Mitigation measures identified include:

(1) implementing data recovery and research studies to recover the information embodied in some of the archaeological and historical sites to be immediately and directly affected by the project.

(2) developing a program for monitoring, managing and studying those archaeological and historical sites situated in less directly affected areas such as flood pools within the proposed Cliff and Roosevelt Dam sites and surrounding areas that may be affected by increased recreational use.

(3) development of a program for public distribution and interpretation of the study results so that the scientific and historic values can be appreciated by interested professionals and the general public.

Plans to implement these measures are described in the following sections and have been summarized on Figure IV-4A.

A programmatic memorandum of agreement (PMOA) has been negotiated in compliance with Section 106 of the National Historic Preservation Act. The Section 110(f) requirement has been addressed through preparation of a document describing the full range of alternatives considered and presents support for the conclusion that substantial alteration of the Roosevelt Dam National Landmark is justified to achieve overriding project goals. Under the terms of the PMOA a general historic preservation plan is

being developed for the entire CAP and the proposed mitigation for Plan 6 will be refined and coordinated with this plan as construction specifications are developed.

It may be feasible to avoid and therefore preserve in place some sites in certain types of impact zones. For example, proposed haul road, transmission lines and borrow areas may be modified to avoid particular sites. The potential for this type of protection in place by means of project modification is relatively minor in terms of overall predicted impacts. However, there is potential for managing the 2,000 sites or more that are situated within secondary impact zones around the proposed reservoirs or within upper reservoir flood pools where inundation would be infrequent and the associated impacts relatively minor. This mitigation would be especially applicable at Cliff and Roosevelt where adjacent land are under Federal control.

Current impact analyses indicate that at least 300 prehistoric and historic sites will be destroyed or severely altered as a result of the proposed plan. A major part of the mitigation plan would consist of recovering information from this group of sites prior to their destruction. This would be accomplished through professional studies involving archaeological, architectural, and engineering investigations including surface mapping, mapping of buried features by remote sensing, surface artifact collection, test and full scale excavation, historical documentary research, and documentation through compilation of narrative histories, site descriptions, scaled drawings and photographs.

Study priorities would be based upon consideration of the relative significance of affected resources and the extent of impacts. The unrecovered data would represent a sacrifice of cultural resources. In addition, sites such as Roosevelt Dam embody values other than information potential. Even if the physical characteristics and significance are documented, the destruction or alteration of this site will represent a sacrifice of cultural values.

The details of a mitigation plan remain to be developed. An essential task to complete the plan is a refinement of the impact analysis on a site-by-site basis when specific construction and operation plans are developed. A second task includes development of a management/monitoring plan for sites in upper reservoir pools and adjacent areas. Successful implementation is dependent upon funding and development of a plan that is acceptable to all involved agencies.

To date, no sites affected by Plan 6 have been identified that have special cultural or religious value to Native Americans or other social groups, but Plan 6 would severely alter or destroy Roosevelt Dam, a National Historic Landmark. Although exact mitigation plans have yet to be developed, any mitigation of impacts to Roosevelt Dam would be incomplete. The general mitigation strategy would involve architectural and engineering documentation and development of a public information program regarding the historical significance of the dam and its role in water resource development in the West.

Figure IV-4A
 FRAMEWORK FOR CULTURAL RESOURCE MITIGATION,
 REGULATORY STORAGE DIVISION, CENTRAL ARIZONA PROJECT

MITIGATIVE ACTION	PLAN 6 ELEMENTS			
	<u>NEW WADDELL</u>	<u>STEWART MOUNTAIN</u>	<u>ROOSEVELT</u>	<u>CLIFF</u>
Data Recovery Studies	<div style="border: 1px solid black; padding: 5px;"> <p>combined historic archeology study focusing on water resource development sites</p> <p>historic analysis of social, economic and political aspects of water resource development in Central Arizona</p> <p>Historic American Building Survey/Historic American Engineering Record documentation</p> </div>			
historic				
prehistoric	<div style="border: 1px solid black; border-radius: 10px; padding: 5px; text-align: center;"> no further study anticipated </div>	<div style="border: 1px solid black; border-radius: 10px; padding: 5px; text-align: center;"> no further study anticipated </div>	<div style="border: 1px solid black; border-radius: 10px; padding: 5px; text-align: center;"> major study of one Salado platform mound complex </div>	<div style="border: 1px solid black; border-radius: 10px; padding: 5px; text-align: center;"> major study of Sinagua site complex and Hohokam villages </div>
Monitoring/Management	<div style="border: 1px solid black; border-radius: 10px; padding: 5px; text-align: center;"> interagency agreement with Tonto Forest for long-term (10 year) study of sites in less immediate and indirect impact zones </div>			
Public Interpretation	<div style="border: 1px solid black; border-radius: 10px; padding: 5px; text-align: center;"> develop visitor facilities with Forest Service, Salt River Project, or Tonto National Monument </div>			

d. Future Direction

A Programmatic Memorandum of Agreement (PMOA) for the Central Arizona Project, Arizona and New Mexico affecting historic properties was ratified on August 5, 1983, by the Advisory Council on Historic Preservation (ACHP). This completed the consultation required under Section 106 of the National Historic Preservation Act. The PMOA is between the Arizona and New Mexico State Historic Preservation Officers (SHPO) the ACHP and Reclamation. Stipulation of the PMOA require that Reclamation prepare an overall preservation plan for CAP. In addition, project feature specific plans will be prepared in consultation with the appropriate SHPO. In accordance with these stipulations, an overall plan is in preparation and is expected to be available in draft form early in 1984. A preliminary "Cultural Resource Mitigation Plan, Regulatory Storage Division, Central Arizona Project" has been prepared for submission to the Arizona SHPO. This plan outlines proposed mitigation activities for cultural properties affected by the proposed project and is in agreement with the above overall CAP preservation plan.

3. Social Resources

a. Commitment

Impacts to people because of relocation occur in the Cliff and Roosevelt site areas with Plan 6. Reclamation is committed to reducing the severity of the impacts or to avoid the impacts.

b. Means for Accomplishing Commitments

The means for achieving the commitments includes measures that reduce the number of people who are required to relocate (and hence eliminate the impacts to these people) and measures that ameliorate impacts to the people who are required to relocate.

(1) People living around Roosevelt Lake could be required to relocate if they live within the area defined by the top of flood surcharge space (top of IDF) for New/Modified Roosevelt Dam (2,200 foot elevation). Approximately 350 people live in the area below this elevation. A means to reduce the impact could be to relocate only the people who live in the area defined by the top of the 200-year flood pool (2,171 foot elevation). The rationale for this is the very low risk of reservoir inundation in the flood surcharge space. If only the people who live in the area below the 2,171 foot elevation were relocated only 90 families would have to be moved.

(2) For the full-time residents who would be required to relocate, Forest Service land bordering Roosevelt Lake Estates will be made available for resettlement. The provision of this land would require an exchange agreement between Reclamation and the Forest Service.

(3) An accurate, reliable system for disseminating information to relocatees could be established so that they are well informed about relocation proceedings.

(4) Monetary compensation will be provided to relocatees to cover costs of relocation. The provision of the Uniform Relocation and Real Property Acquisition Act of 1970 include replacing the homes of relocatees with "safe, sanitary, and decent housing."

c. Future Direction

Negotiations over exchange land have occurred between Reclamation and the Forest Service, and these will continue. An agreement has been reached that exchange land will be made available to relocatees. A system for disseminating information to relocatees will be established. The relocations will be carried out in accordance with, and within the limitations of, the Uniform Relocation Act.

4. Mitigation of Construction-Related Impacts

The mitigation initiatives described above are aimed at reducing or eliminating long-term project impacts. Short-term environmental disruption would occur during the construction period of dams and related facilities. Impact mitigation initiatives for these short-term impacts are discussed in the following sections.

The environmental and safety concerns associated with construction activities would be stipulated in the specifications prepared for each construction contract. The specifications outline the proposed construction activity and methods to be used to insure safety and alleviate the environmental impacts associated with construction. The specifications prepared by Reclamation serve as the basis for the contractor's bid and are used by Reclamation to oversee the activities of the contractor.

Several major contracts would be awarded for construction of Plan 6. The contracts would be for various features of the plan. Each would have an individual specification outlining the measures to be used to insure public and worker safety and protect the environmental resources specific to that contract or construction activity.

Reclamation Instructions additionally outline methods and procedures to insure safety and preserve the environment during construction. The implementation of these instructions is expected to reduce construction-related impacts.

The start of construction for each of the features in Plan 6 cannot be determined at this time because of uncertainties about funding and priorities for construction. The lengths of construction have been estimated for each site and are as follows:

<u>Facility</u>	<u>Construction Time (years)</u>	
	<u>New Construction</u>	<u>Modification Only</u>
Cliff Dam	4	-
New/Modified Roosevelt Dam	5	3.5
New/Modified Stewart Mountain Dam	4	2
New Waddell Dam	4	-
CAP Pumping Facility	1.5	-

Construction of each of the new or modified dams will require about 250 workers on site during the construction period. About 100 workers will be required to construct the CAP pumping facilities near Granite Reef Diversion Dam.

a. Construction and Public Safety

Safety conditions would be monitored by Reclamation to avoid situations which could result in accidents involving construction workers, visitors, or travelers in the area. Signs, flagmen, barricades, and other safety devices would be used to warn of potential hazards. Safety regulations would be written in accordance with applicable State and Federal laws. The enforcement of safety regulations is primarily Reclamation's responsibility, but could also involve State and other Federal agencies.

b. Blasting Control

Whenever blasting is required, the contractor would submit a blasting plan which would be evaluated prior to authorization of the initiation of blasting. Blasting will probably be required at each of the four dam sites. Areas which may require blasting include excavation of dam foundations, cutoff trench, outlet works, and spillways. In addition, the reversible canal at the New Waddell site and the CAP pumping facilities near the Granite Reef Diversion Dam may also require blasting. Final design may require that riprap be obtained by blasting in some borrow areas.

c. Dust Control and Air Pollution

Dust from construction would be controlled by maintaining proper soil moisture conditions. The contractor would establish watering programs to maintain the proper moisture level but, during periods of high winds, dust could become a noticeable problem. Speed limits to reduce dust problems would be enforced based on the road conditions. Vehicles and equipment that show excessive emission of exhaust gases would not be operated until corrective repairs or adjustments are made. The burning of combustible materials not needed in construction would be initiated only with concurrence of local pollution-control and fire-prevention authorities. (See IV.B.7.a. for air quality impacts.)

d. Noise Abatement

Reclamation has initiated a construction noise monitoring program to maintain acceptable sound levels. Noise pollution levels would not exceed 75 decibels during nighttime operations nor 80 decibels during daytime operations as measured outdoors from areas considered to be noise-sensitive, such as residential areas. (See IV.B.7.c. for noise impacts.)

e. Water Pollution Abatement and Waste Material Disposal

Specifications would require the contractor to prevent construction-related pollution of ground water and surface water. The contractor would comply with applicable Federal and state laws and regulations concerning control and abatement of water pollution. Specific measures for abatement of construction-related pollution will be outlined in the construction specifications (See IV.B.2. for water quality impacts of construction).

Potential water pollution problems associated with construction activities result from disposal of construction wastewater. Specifically, liquid sanitary waste, wash water from cement batching, and water from dewatering of foundation excavation, will be disposed in accordance with construction specifications. The disposal process for construction-related wastewater is shown in Figure IV-4.

Figure IV-4 also displays the process required for disposal of solid wastes from construction sites. Solid waste disposal would be accomplished through burning, burial, or removal to specified sites. The contractor would be required to remove all unused construction materials and other rubbish from the work area after construction. Established landfills would be used where possible and burning would only be used when the responsible regulatory agencies approved. If additional landfill sites are needed, written approval would be obtained from the Arizona Department of Health Services.

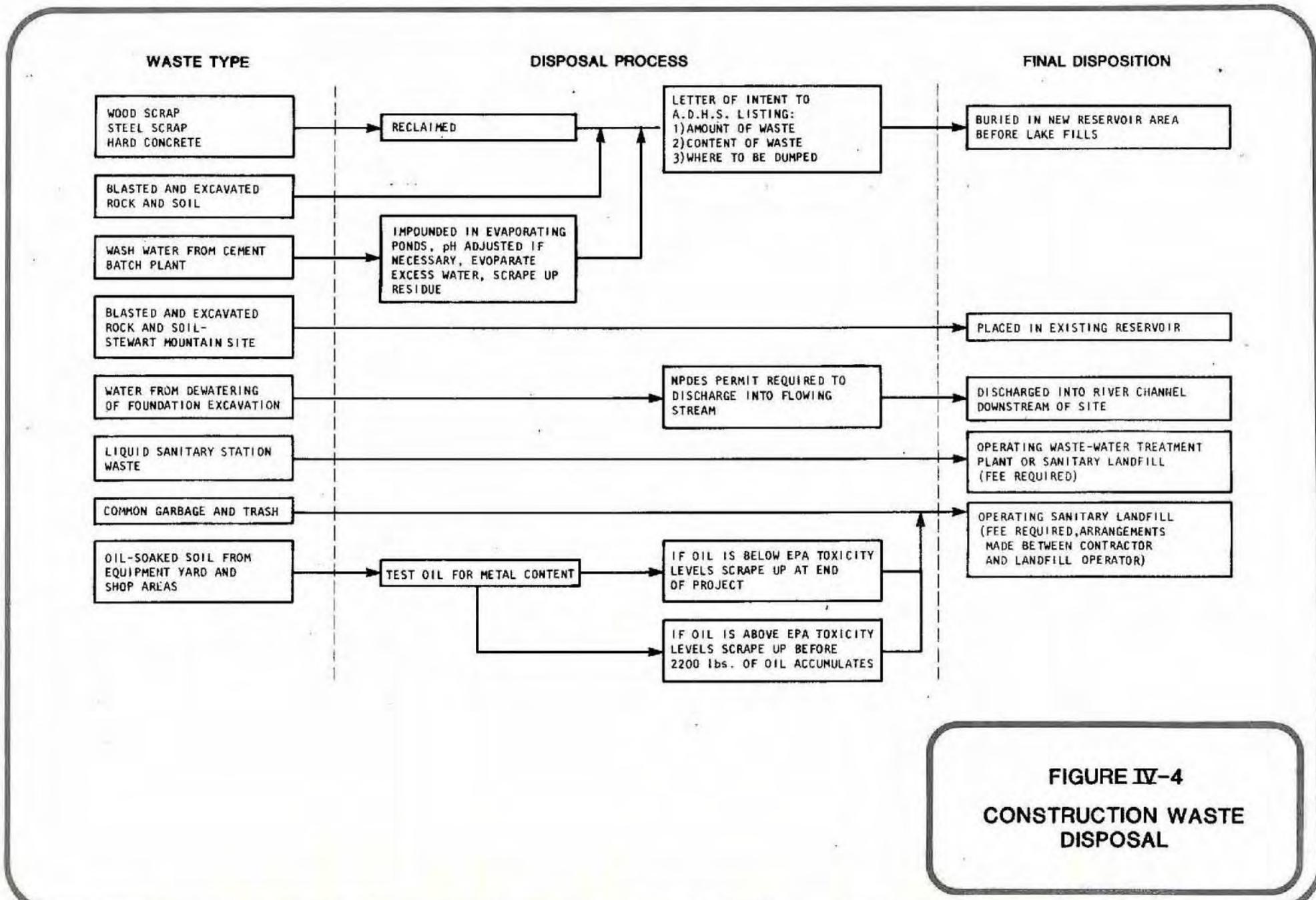
Existing sanitary landfills nearest to each dam construction site which accept various types of waste are shown in Table IV-47.

f. Erosion Control

All earthwork interrupted for an extended period would be left in such a manner as to discourage erosion caused by wind or rain. Excavated slopes would be bermed, terraced, or corrugated to prevent erosion and aid revegetation after construction. Whenever deep cut slopes are required, they would be benched or terraced and protected from cross-drainage by diking. The dikes would probably be constructed using the excavated material. Also, to prevent erosion of the cut slope, surface drains would be used at the tow of each beach or terrace. To prevent erosion on smaller slopes, the slope would be corrugated.

g. Prehistoric and Historic Cultural Resources

Any identified adverse impact will be avoided where practicable or mitigated through data recovery or management/monitoring. If evidence of previously unrecorded cultural resources is discovered during construction, operations in the vicinity of the discovery would cease. Mitigation studies would be conducted as appropriate prior to resuming construction.



**FIGURE IV-4
CONSTRUCTION WASTE
DISPOSAL**

Table IV-47

SANITARY LANDFILLS IN VICINITY
OF PLAN 6 CONSTRUCTION SITES

<u>Site</u>	<u>Sanitary Waste</u>	<u>Garbage and Trash</u>	<u>Oil-Soaked Soil</u>
Cliff	Cave Creek Landfill (Operated by Maricopa County)	Cave Creek Landfill	27th Ave. Landfill (Operated by City of Phoenix)
New Waddell	Cave Creek Landfill	New River Landfill (Operated by Maricopa County)	27th Ave. Landfill
Roosevelt	City of Globe Sewage Lagoons (Operated by City of Globe)	Roosevelt Lake Landfill (Operated by Gila County)	Roosevelt Lake Landfill
Stewart Mountain	27th Ave. Landfill	Tri-City Landfill (Operated by Salt River Pima- Maricopa Indian Community)	Tri-City Landfill

h. Vegetation

Removal or transplanting of protected native plants, when required, would be coordinated with the Arizona Commission of Agriculture and Horticulture in accordance with the Arizona Native Plant Law (ARS, Chapter 7, Article 1).

All construction sites located outside of the MSP pool where vegetation has been cleared or severely changed would be reclaimed. Disturbed areas susceptible to vegetative growth will be revegetated by seeding with native species or by other viable techniques. Haul roads will be scarified prior to seeding and barricaded to deter off-road vehicle use. Seeding and planting programs would be supervised by appointed Reclamation biologists.

The vegetation would be cleared from the MSP (conservation) pool. The cover would not be restored following construction within the zone. The conservation and land management agencies that manage the resources affected by construction would be advised of the construction schedule for plan implementation and of its effect on the committed resources. Reclamation is coordinating its planning with such agencies.

i. Wildlife

The construction contractor would be prohibited from collecting or unnecessarily disturbing threatened or endangered wildlife in the site area. Personnel would be advised of Arizona Game and Fish Department regulations pertaining to protected wildlife species. Construction activities would, as much as possible, accommodate the welfare of state-protected wildlife and wildlife habitat as determined by the Arizona Game and Fish Department.

D. Cumulative Impacts of the Proposed Action and Other Reclamation Projects

The Regulatory Storage Division of the CAP is one of nine major projects in the Lower Colorado River Basin (LCRB) under construction or in advance planning by the Bureau of Reclamation. These projects are:

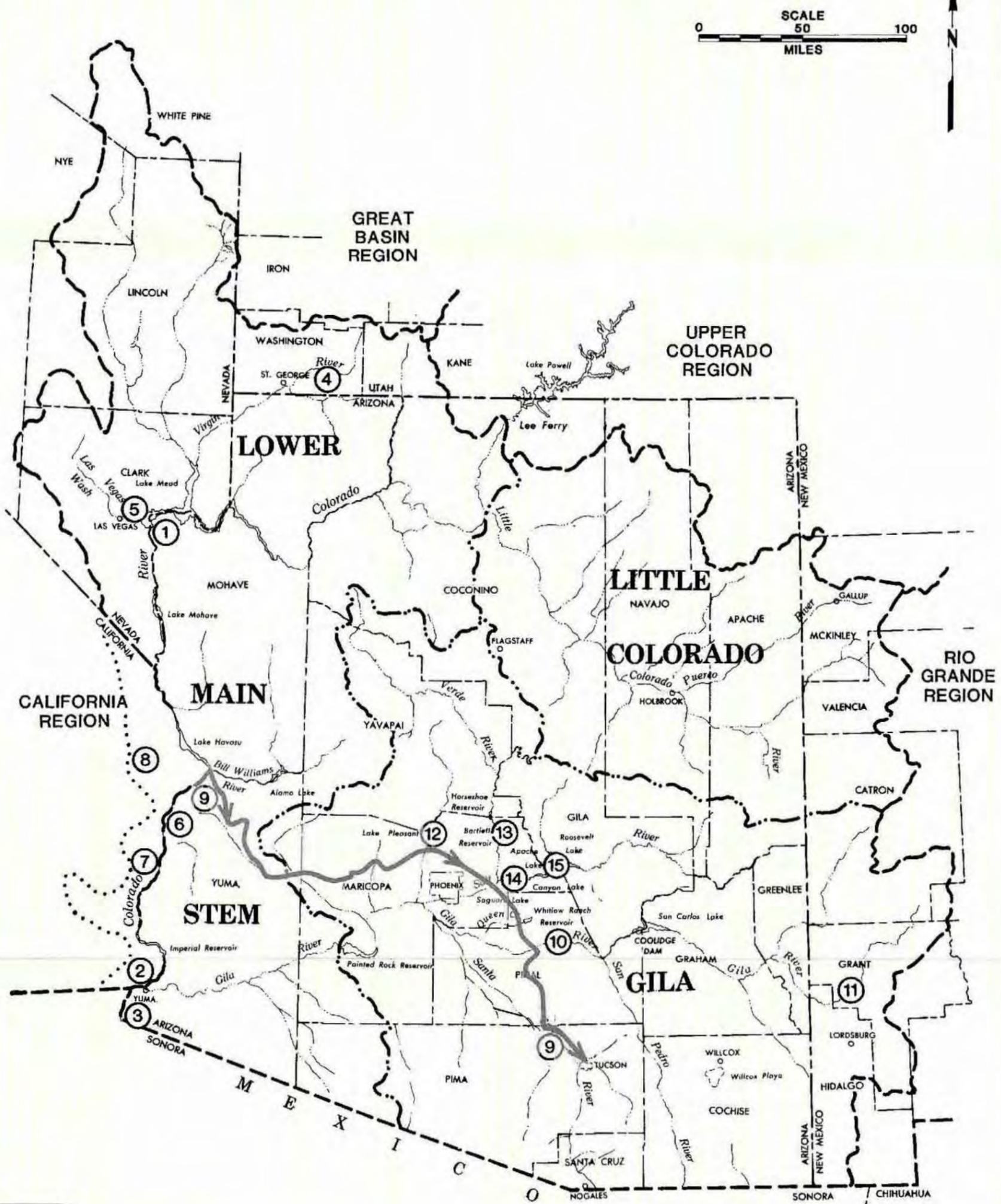
- CAP Aqueduct and Pumps
- CAP Transmission Lines
- CAP Regulatory Storage Division (Plan 6)
- Buttes Dam (or suitable alternative)
- Hooker Dam (or suitable alternative)
- Colorado River Front Work and Levee System
- Colorado River Basin Salinity Control Project (Title I)
- Colorado River Water Quality Improvement Program (Title II)
- Hoover Dam Modifications

The location of these projects within the LCRB is shown on Figure IV-5

Cumulative impacts of these Reclamation projects are assessed in this section of the EIS. The impact assessment has been scoped to focus on four major issues: socioeconomic (including impacts to crop production, power development, recreation, and employment opportunities), biological resources (including aquatic and terrestrial biotic communities), water development and availability, and water quality (salinity). Existing data from environmental impact statements and planning reports for the projects were used to perform the assessment. A major source of baseline data was the Lower Colorado Region Comprehensive Framework Study prepared by the Lower Colorado Region State-Federal Interagency Group for the Pacific Southwest Interagency Committee (1972).

Impacts were assessed using the following major assumptions:

- 1) existing, accessible baseline data would be used
- 2) Reclamation projects in the LCRB under construction or in advance planning would constitute the action being assessed
- 3) projects would be operational by the year 2000
- 4) biological impacts would be assessed as the difference between future-without the future-with conditions in the year 2000



RECLAMATION PROJECTS UNDER CONSTRUCTION OR PROPOSED FOR THE LOWER COLORADO RIVER BASIN

FIGURE IV-5

- HOOVER DAM MODIFICATIONS ①
- COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I)
 - YUMA PROJECT ②
 - MOJAVE - COACHELLA PROJECT ③
- COLORADO RIVER WATER QUALITY IMPROVEMENT PROGRAM (TITLE II)
 - LAVERKIN SPRINGS UNIT ④
 - LAS VEGAS WASH UNIT ⑤
 - COLORADO RIVER INDIAN RESERVATION UNIT ⑥
 - PALO VERDE IRRIGATION DISTRICT UNIT ⑦

- COLORADO RIVER FRONT AND LEVEE SYSTEM (EXTENDS DOWNSTREAM FROM LAKE MOHAVE) ... ⑧
- CENTRAL ARIZONA PROJECT
 - AQUEDUCTS, PUMPS AND TRANSMISSION LINES ⑨
 - BUTTES DAM ⑩
 - HOOKER DAM ⑪
- PLAN 6
 - WADDELL DAM ⑫
 - CLIFF DAM ⑬
 - STEWART MOUNTAIN DAM ⑭
 - ROOSEVELT DAM ⑮

5) socioeconomic and water resources impacts would be assessed using a zero baseline

1. Socioeconomic Resources

Table IV-48 presents a summary of anticipated socioeconomic impacts of water resource development projects, either planned or under construction, in the LCRB. Two categories of projects are assessed: reservoir/aqueduct projects and water quality improvement projects. Because the character of these projects is not comparable, impacts associated with each category or type are discussed separately.

a. Reservoir/Aqueduct Projects

As shown in Table IV-48, as a result of the construction of components to the CAP and Hoover Dam Modifications, approximately 1,020 temporary construction jobs and 9 permanent jobs would be created. Additionally, recreation facility demand of the new water bodies has been estimated at approximately 44,600 annual recreation days for stream-oriented use and approximately 1.8 million annual recreation days for reservoir-oriented use.

b. Water Quality Improvement Projects

As a direct result of the water quality improvement projects in the LCRB, there will be an increase of approximately 57,000 acres of productive cropland. Approximately 100 construction jobs and 47 permanent jobs would be created by these projects. Due to the purpose and nature of the projects, there will be no impacts for power development or recreation.

c. Combined Impacts

An estimate of total reported socioeconomic impacts in the year 2000 for water development projects in the LCRB is as follows:

CROP PRODUCTION: 57,000 acres net gain

EMPLOYMENT

Construction: 1,120 construction jobs

Operation: 56 O&M jobs

POWER DEVELOPMENT: 370 to 1520 megawatt potential at Hoover Dam

RECREATION DEMAND

Stream-Oriented: 44,600 annual recreation days

Reservoir-Oriented: 1,807,600 annual recreation days

TABLE IV-48

SUMMARY OF ESTIMATED SOCIOECONOMIC IMPACTS OF
WATER RESOURCE DEVELOPMENT PROJECTS, PLANNED OR UNDER CONSTRUCTION,
LOWER COLORADO RIVER BASIN, YEAR 2000

PROJECT TYPE/TITLE	EMPLOYMENT ^b (Number of Jobs) (Construction or O&M)	CROP PRODUCTION (1,000 acres)	POWER DEVELOPMENT (Gwh/yr) ^e	RECREATION ^f (1,000 recreation days) (stream or reservoir)
o RESERVOIR/AQUEDUCT PROJECTS				
Central Arizona Project (FEIS 1972) ^a	IU ^c	NA ^d	-224.6	12.6 (str) 986.9 (res)
Regulatory Storage Division (DEIS 1983)	IU	NA	-2,073.0	NA
Pumps and Transmission Lines	3 (O&M)	NA	IU	NA
Buttes Dam	3 (O&M)	NA	IU	32.0 (str) 820.7 (res)
Hooker Dam	-	-	NA	-
Granite Reef Aqueduct	600 (const)	NA	NA	NA
Salt-Gila Aqueduct	IU	NA	NA	NA
Tucson Aqueduct	420 (const)	NA	NA	NA
Hoover Dam Modifications (DEIS 1980)	3 (O&M)	NA	+1,493.0	NA
RESERVOIR/AQUEDUCT SUBTOTAL	1,020 (const) 9 (O&M)	NA	-804.6	44.6 (str) 1,807.6 (res)
o WATER QUALITY IMPROVEMENT PROJECTS				
Colorado River Basin Salinity Project (Title I)	IU		-424.0	NA ^f
Mojave-Coachella (DEIS 1974)	3 (O&M)	37.3 (loss)		NA
Yuma Project (DEIS 1976)		0.4 (gain)		
Colorado River Water Quality Improvement Project (Title II)	IU			NA
Colorado River Indian Reservation Unit (FEIS 1976)	IU	93.0 (gain)	IU	NA
Las Vegas Wash (FEIS 1976)	IU	0.8 (loss)	-62.8	NA
La Verkin Springs Unit Utah (Feasibility Report 1973)	24 (O&M)	NA	-30.3	NA
Palo Verde Irrigation District Unit (FEIS 1976)	IU	IU	IU	NA
WATER QUALITY IMPROVEMENT SUBTOTAL	100 (const) 47 (O&M)	56.5 (net gain)	-522.5	NA
TOTAL	1,120 (const) 56 (O&M)	471.0-427.7 (net gain)	-1,327.1	44.6 (str) 1,807.6 (res)

^aDate in parentheses indicates year that environmental impact statement was published.

^bEstimate of number of new jobs created through construction or operations and maintenance as a direct result of proposed project.

^cInformation unavailable.

^dNA denotes not applicable.

^eEstimated annual power generated (+) or consumed (-) in gigawatt hours.

^fRecreation demand estimated for year 2000 in annual recreation days with separate projections for stream-oriented as opposed to reservoir-oriented.

2. Biological Resources

The biological resource baseline of the LCRB includes biotic communities ranging from desertscrub to alpine tundra. The natural biotic communities as described in data (Lower Colorado Region Framework Study) include not only the natural communities shown in Figure IV-6 but aquatic riparian communities and agricultural and developed urban lands. Table IV-49 gives the approximate range of these communities.

As can be seen in Figure IV-6 and the data presented in Table IV-49, desertscrub and woodlands, scrub, and grasslands formations constitute the major portion of the cover types occurring in the Lower Colorado Region. Riparian and aquatic communities, as shown in Figure IV-7, are identified with the drainage pattern, of which some 1,700 miles are represented on the main drainage as perennial stream. The drainage pattern with minor perennial streams includes some 2,500 miles of drainage. The major source of the Lower Colorado River drainage is the Mogollon Rim and White Mountain area, represented as the cross-hatched area in Figure IV-7. Lakes and reservoirs represent approximately 531 square miles of water surface.

The estimated change between the 1972 baseline and the future-without Reclamation projects is shown in Table IV-46. Clearly the major percentage change anticipated is in the agricultural and developed lands and riparian communities. Some 48 percent growth in urban and developed lands is anticipated over the 1972 baseline at year 2000. Agricultural lands will be converted to urban lands, and approximately 2.5 percent of the riparian communities will be lost by the year 2000.

The future-with Reclamation projects at year 2000 shows that, again, most of the important change will occur with urban land and riparian communities. In addition, perennial stream and lakes/reservoirs will undergo change between the future-without and future-with. A composite loss of about 7 percent of the riparian communities is expected by the year 2000, of which approximately 5 percent results from Reclamation projects. This represents a rather important change in this limited resource. Riparian communities are known to harbor a great deal of wildlife in the Southwestern deserts and the loss, therefore, is significant from the standpoint of resource quality, wildlife diversity, and unique resource.

The CAP will involve conveyance of water to central Arizona. This will serve as a new water source for interior Arizona. Some 14 square miles of additional water surface are expected to be developed by the year 2000 because of Reclamation projects, most of them associated with CAP. This gain in lake and reservoir surface area will not necessarily enhance the quality of fisheries, although several new bodies of water will be added to the watershed. These include the Cliff Reservoir on the Verde River and an enlarged Waddell Reservoir at Lake Pleasant, as well as reservoirs associated with Hooker and Buttes Dams on the Gila River. Some 21 miles of existing perennial streams will be lost by the enlargement of reservoirs and development of new impoundments. The loss of the perennial stream will affect riverine fisheries and riverine aquatic communities associated with these specific locales.

TABLE IV-49

BIOTIC COMMUNITIES OF THE LOWER COLORADO RIVER BASIN^a

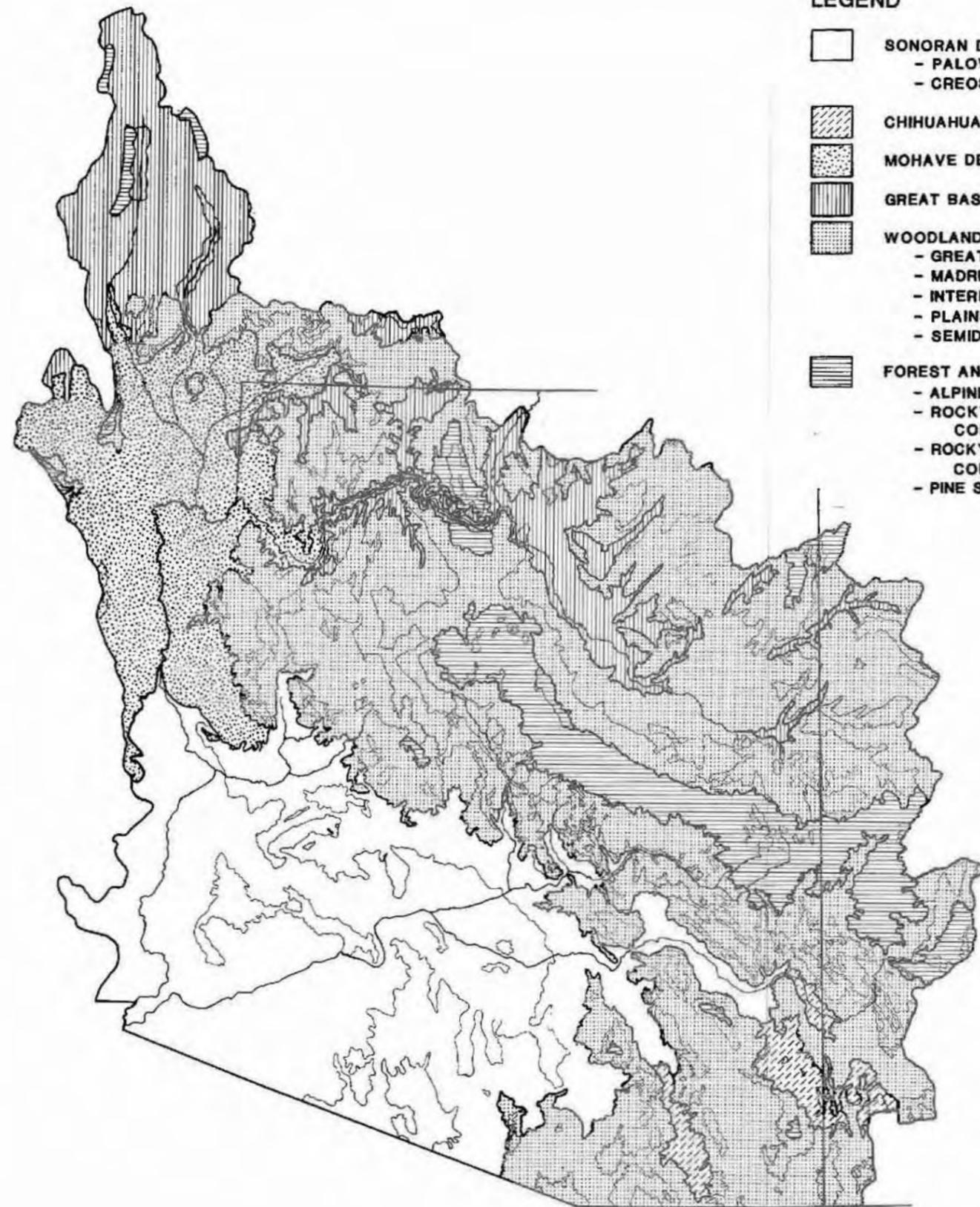
	Existing ^b Condition	Future Without	Future- without change (%)	Future- With	Impact	Impact Change (%)
Sonoran Desertscrub	35,671	35,540	-0.4	35,491	-49	-0.1
Chihuahuan Desertscrub	2,009	2,009	0	2,008	-1	T
Mohave Desertscrub	12,534	12,534	0	12,532	-2	T
Great Basin Desertscrub	13,355	13,355	0	13,255	0	0
Woodlands, Scrub, and Grassland Formations	62,923	62,923	0	62,922	-1	T
Forest and Tundra Formation	10,191	10,191	0	10,191	0	0
Agricultural Lands	2,838	2,581	-9.1	2,580	-1	T
Urban and Developed Lands	801	1,193	+48.9	1,241	+48	+4.0
Riparian Communities	166	162	-2.4	154	-8	-4.9
Perennial stream and Riverine Communities	(1,700 miles in major drainage)	(1,700)	0	(1,679)	(-21)	-1.2
Lakes and Reservoirs (Lacustrine Communities)	531	531	0	545	+14	+2.6
Miscellaneous (Non-vegetated Landscape)	119	119	0	119	0	0
TOTAL	141,138	141,138		141,138		

^aCommunities given in square miles, except perennial stream (miles).

^bLower Colorado Region Framework Study, State-Federal Interagency Group, 1972. Lower Colorado Region Framework Study: Fish and Wildlife, Appendix XIII.



VICINITY MAP



LEGEND

- 
SONORAN DESERTSCRUB
 - PALOVERDE - MIXED CACTI SERIES
 - CREOSOTEBUSH - BURSAGE SERIES
- 
CHIHUAHUAN DESERTSCRUB
- 
MOHAVE DESERTSCRUB
- 
GREAT BASIN DESERTSCRUB
- 
WOODLAND, SCRUB, AND GRASSLAND FORMATIONS
 - GREAT BASIN CONIFER WOODLAND
 - MADREAN EVERGREEN WOODLAND
 - INTERIOR CHAPARRAL
 - PLAINS AND GREAT BASIN GRASSLAND
 - SEMIDESERT GRASSLAND
- 
FOREST AND TUNDRA FORMATION
 - ALPINE TUNDRA
 - ROCKY MOUNTAIN SUBALPINE CONIFER FOREST
 - ROCKY MOUNTAIN MONTANE CONIFER FOREST
 - PINE SERIES

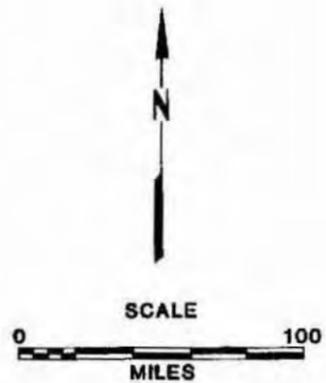
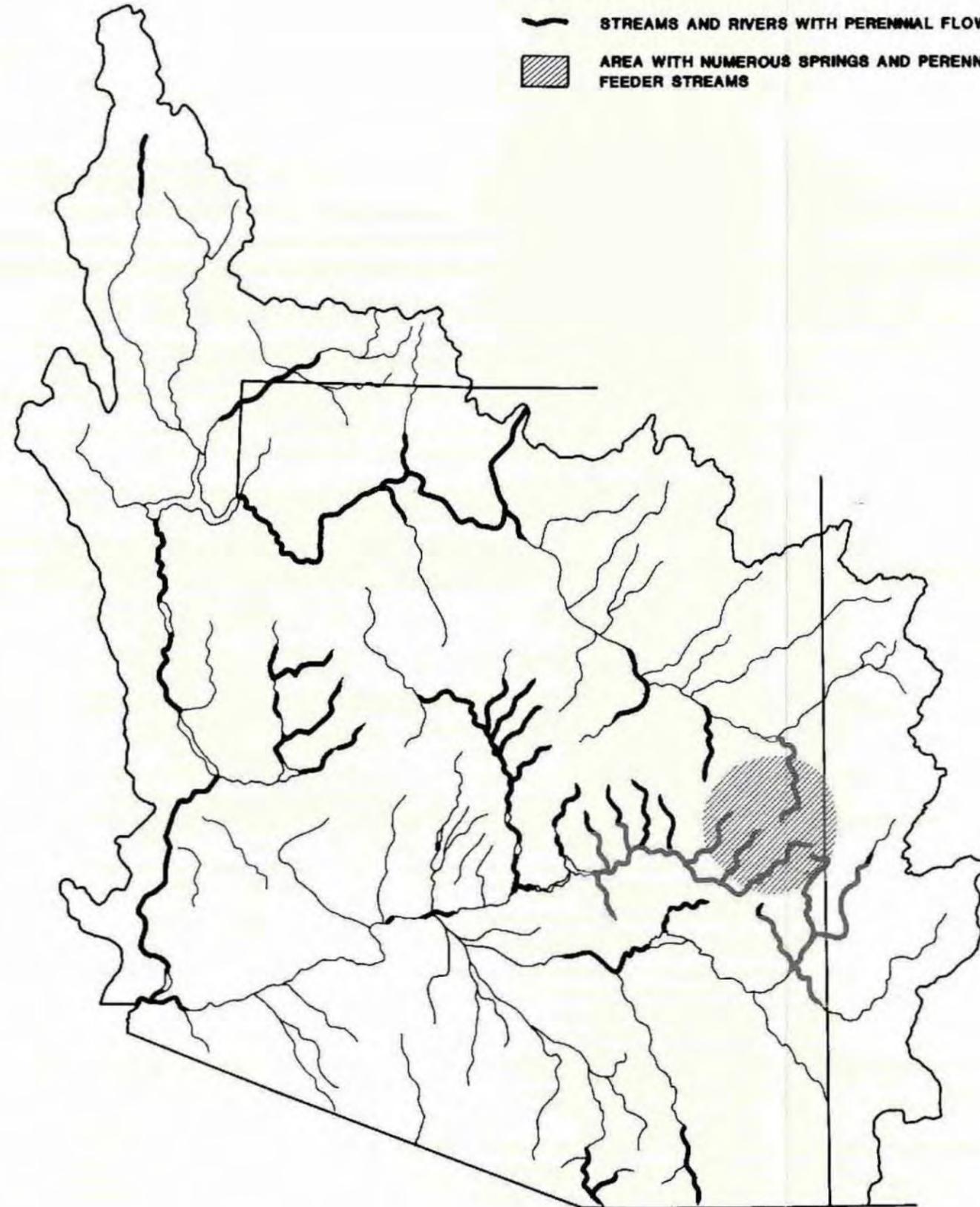


FIGURE IV-6
BIOTIC COMMUNITIES OF THE
LOWER COLORADO RIVER BASIN

ADOPTED FROM BROWN AND LOWE, 1977.

LEGEND

-  **STREAMS AND RIVERS WITH PERENNIAL FLOWS**
-  **AREA WITH NUMEROUS SPRINGS AND PERENNIAL FEEDER STREAMS**



VICINITY MAP

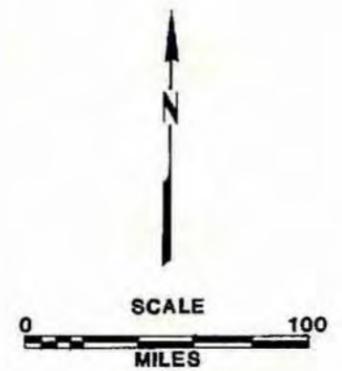


FIGURE IV-7
RIPARIAN BIOTIC COMMUNITIES
ASSOCIATED WITH
PERENNIAL STREAMS OF THE
LOWER COLORADO RIVER BASIN

PARTIALLY ADOPTED FROM BROWN et al, 1978

Several Federal endangered species occur within the Lower Colorado region and will be affected by the various projects mentioned above. The bald eagle, peregrine falcon, Yuma clapper rail, Gila topminnow, Colorado River squawfish, woundfin, humpback chub, and bonytailed chub utilize riparian and aquatic habitats in the drainage. These species will not, for the most part, be affected by these projects except in localized areas. The effects of the Regulatory Storage Division of CAP (Plan 6) have already been discussed in this EIS (Chapter IV. B.1.). The other projects will have little effect on these endangered species except for the loss of some Yuma clapper rail habitat in the extreme southern reach of the Colorado River at the International Boundary.

3. Water Development and Availability

a. Water Sources and Allocations

Water in the LCRB comes mainly from three sources: direct precipitation, the Colorado River, and the ground water system. Some of this water is used more than once through irrigation tailwater collection systems and wastewater treatment plants.

Precipitation over the LCRB varies with time of year, elevation, and location. Much of the precipitation falls on areas away from potential users. The portion of this water which does not evaporate either infiltrates into the soil or becomes overland flow towards the Colorado River. Significant efforts have been made in parts of the LCRB to control these flows and store the water for beneficial use at the locations and times when users need the water, through construction of reservoir impoundments and other measures.

The Colorado River enters the LCRB from the Upper Colorado River Basin at Lees Ferry in north central Arizona. This dividing point was established as part of the Colorado River Compact of 1921. The Compact further apportions to both the upper and lower basins 7,500,000 af of water per year from the Colorado River system. Article III(b) apportions an additional 1,000,000 af annually for beneficial use to the Lower Basin. In the summer of 1952, the State of Arizona initiated an interstate suit in the Supreme Court of the United States against California and others to confirm its title to Colorado River water. On June 3, 1963 the Supreme Court rendered an opinion on Arizona's entitlement to Colorado River water. Subsequently, on March 9, 1964, the Supreme Court decree in Arizona vs. California confirmed Arizona's entitlement to 2,800,000 af annually of the first 7,500,000 acre-feet of Colorado River main stem flow available to the Lower Basin states, plus 46 percent of flows in excess of 7,500,000 af (Central Arizona Project Final EIS, USBR, 1972).

Allocations of Colorado River water are shown below:

<u>Allottee</u>	<u>Allocation (af/yr)</u>
California	4,400,000
Arizona	2,800,000
Nevada	300,000
New Mexico	<u>18,000</u>
Total Individual Allocations	7,518,000
LCRB Entitlement	7,500,000

In addition there is 1,500,000 af of Colorado River supply required for Mexico. As can be seen from this information, more water is allocated than is normally available. An order of precedence has been established to guarantee minimum deliveries to senior water users. Users with lower precedence may not receive their total allocations in years when the runoff is less than the total shown above and main stem storage reservoirs are low.

Ground water is used extensively in the LCRB. This is especially true in arid regions where ground water levels have been falling significantly in recent years as pumping exceeds recharge.

b. Water Control Facilities

Existing facilities for water control in the LCRB consist of water conservation and distribution facilities. Along the main stem of the Lower Colorado River, there are three water reclamation dams and three diversion dams. The Gila River basin includes numerous facilities to store and divert water as well as several flood control features. Major water control features in the LCRB are listed below:

<u>Location</u>	<u>Name</u>	<u>Purpose</u>
Colorado River Main Stem		
	Hoover Dam	Water Development
	Davis Dam	Water Development
	Parker Dam	Water Development
	Imperial Dam	Diversion
	Laguna Dam	Diversion
	Morelos Dam	Diversion
Gila River Basin		
Gila River	Coolidge Dam	Water Development
	Ashurst-Hayden Dam	Diversion
	Gillespie Dam	Diversion
	Painted Rock Dam	Flood Control

Salt River	Theodore Roosevelt Dam	Water Development
	Horse Mesa Dam	Water Development
	Mormon Flat Dam	Water Development
	Stewart Mountain Dam	Water Development
	Granite Reef Dam	Diversion
Verde River	Horseshoe Dam	Water Development
	Bartlett Dam	Water Development
Aqua Fria River	Waddell Dam	Water Development

These water development features serve to capture surface water for use in the service areas of the respective water user groups. Much of the potential runoff is controlled and used beneficially for agricultural, municipal, and industrial purposes in the LCRB. Infrequent runoff events exceed the storage capacity of the existing reservoirs and flooding occurs with a loss of potentially useful water.

The facilities now exist to completely divert or store all of the surface water in the LCRB. Consequently, only on rare occasions does the Colorado River flow into the Gulf of California.

c. Cumulative Impacts to Water Availability

Reclamation has various water-related projects proposed or under construction in the LCRB. Table IV-50 shows the changes in water supply which will result from operation of the projects.

The table shows a loss of 206,000 af/yr from the Colorado River main stem as a result of reservoir/aqueduct projects. All of this water would not necessarily reach the main stem under existing conditions, as much of the water would enter the ground water system before reaching the Colorado River.

The cumulative impact of the the Reclamation projects is that water will be taken from the Colorado River main stem. This water will come from allocations already made to the new users (those who will divert the water). It is not anticipated that normal flows in the Colorado River would be affected by the projects. Most of the water developed by the proposed projects is flood water which will be prevented from entering the main stem of the Colorado River. Floodwaters are known to recharge ground water systems along the rivers, and the full extent of reduced flood flows has not yet been determined. The impacts caused by the projects listed above of reduced flood flows along the main stem are considered insignificant.

4. Water Quality

a. Existing Conditions

Water quality, primarily salinity varies greatly over the LCRB. Most surface water is of good quality and with standard water treatment

TABLE IV-50

LCRB WATER AVAILABILITY IMPACTS

<u>PROJECT TYPE/TITLE</u>	<u>Annual Volume of Main Stem Colorado River Water Affected (af)</u>	<u>Comments</u>
o RESERVOIR/AQUEDUCT PROJECT		
Central Arizona Project (FEIS 1972) ^a	(1,034,000)	Arizona allocation of Colorado River water now delivered to California (no gain or loss)
Regulatory Storage Division (DEIS 1983)	-138,000	Increased yield through operation includes
Pumps and Transmission Lines	NA	local flood water and excess flow on Colorado main stem
Buttes Dam	-50,000	Flood water captured for irrigation use
Hooker Dam	-18,000	New Mexico LCRB allocation of Colorado River water through exchange
Granite Reef Aqueduct	NA	
Salt-Gila Aqueduct	NA	
Tucson Aqueduct	NA	
Hoover Dam Modifications (DEIS 1980)	NA	
RESERVOIR/AQUEDUCT SUBTOTAL	-206,000	
o WATER QUALITY IMPROVEMENT PROJECTS		
Colorado River Basin Salinity Project (Title I)		
Mojave - Coachella (DEIS 1974)	+132,000	Canal lining and other improvements reduce irrigation losses
Yuma Project (DEIS 1976)	+16,200	Canal lining and other improvements reduce irrigation losses
Colorado River Water Quality Improvement Project (Title II)	IU ^b	
Colorado River Indian Reservation Unit (FEIS 1976)		
Las Vega Wash (FEIS 1976)	-3,600	Water lost from Las Vegas Wash during salt reduction operation
La Verkin Springs Unit Utah (Concluding Report 1981)	-2,470	Water lost from La Verkin Springs Unit during salt reduction operation
Palo Verde Irrigation District Unit (FEIS 1976)	IU	
WATER QUALITY IMPROVEMENT SUBTOTAL	+143,130	
TOTAL	- 63,870	

^a Date in parentheses indicates publication date of environmental impact statement.

^b Information unavailable.

methods meets drinking water requirements. In general, ground water is of poorer quality than the surface water but can also be treated to meet drinking water standards. There are, however, locations where the surface water and/or ground water qualities are significantly lower than the rest of the basin.

The Colorado River Basin is a large basin with substantial agricultural and increasing urban development. The quality of return flows to the Colorado River has been declining and the diversions from the main stem have depleted the flow substantially. As a result, the quality of the water in the Colorado River as well as some other tributaries has been declining. Salts from natural sources such as saline springs, as well as manmade sources, i.e., return flows of irrigated farmlands are the primary contributors to this decline.

Although a number of water quality-related legislative actions have been taken on the State and Federal levels, four Federal acts are of special significance to the Colorado River Basin: (1) The Water Quality Act of 1965 and related amendments, (2) the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500), (3) the Colorado River Basin Salinity Control Act of 1974, and (4) the Clean Water Act of 1977. Also central to water quality issues are agreements with Mexico on Colorado River system waters entering that country.

The first of these, the Water Quality Act of 1965 (Public Law 89-234), amended the Federal Water Pollution Control Act and established a Federal Water Pollution Control Administration (now EPA). Among other provisions, it required states to adopt water quality criteria for interstate waters inside their boundaries. The seven basin states initially developed water quality standards which did not include numeric salinity criteria for the Colorado River primarily because of technical constraints. In 1972, the states agreed to a policy which called for the maintenance of salinity concentrations in the Lower Colorado River system at or below existing levels while the Upper Basin states continued to develop their compact apportioned waters. The states suggested that the Bureau of Reclamation should have primary responsibility for investigating, planning, and implementing the proposed Colorado River Basin Salinity Control Program with the assistance of the Federal Office of Saline Water and EPA.

Enactment of the Federal Water Pollution Control Act Amendments of 1972 affected salinity control in that the legislation was interpreted by EPA to require numerical standards for salinity in the Colorado River. In response, the basin states founded the Colorado River Basin Salinity Control Forum to develop numeric salinity criteria and a basinwide plan of implementation for salinity control. The Basin States held public meetings on the proposed standards as required by the enacting legislation. The forum recommended that the individual Basin States adopt the Proposed Water Quality Standards for Salinity Including Numeric Criteria and Plan of Implementation for Salinity Control, Colorado River System. The proposed water quality standard called for maintenance of flow-weighted average TDS concentrations of 723 mg/L below Hoover Dam, 747 mg/L below Parker Dam, and 879 mg/L below Imperial. Included in the plan of implementation were four salinity control units and possibly additional units, the application of

effluent limitations, and use of saline water whenever practicable and for future studies. The standards are to be reviewed at 3-year intervals. All of the Basin States adopted the 1975 Forum-recommended standards.

The Colorado River Basin Salinity Control Act of 1974 (Public Law 93-320) provided the means to comply with United States obligations to Mexico which included as a major feature a desalting plant and brine discharge canal. These facilities will enable the United States to deliver to Mexico water having an average salinity no greater than 115 ppm±30 ppm (Mexican count) over the annual average salinity of Colorado River waters at Imperial Dam. Units authorized for construction under Title II of that Act, are Paradox Valley Unit and Grand Valley Unit, Colorado; Crystal Geysers Unit, Utah; and Las Vegas Wash Unit, Nevada.

Planning Units are:

Irrigation sources -

- Colorado River Indian Reservation Unit, Arizona
- Lower Gunnison Basin Unit, Colorado
- Unita Basin Unit, Utah
- McElmo Creek Unit, Colorado
- Palo Verde Irrigation District Unit, California

Point sources -

- LaVerkin Springs Unit, Utah
- Lower Virgin River Unit, Nevada-Arizona
- Glenwood-Dotsero Springs Unit, Colorado
- Meeker Dome Unit, Colorado

Diffuse sources -

- Big Sandy River Unit, Wyoming
- Price-San Rafael Rivers Unit, Utah
- Dirty Devil River Unit, Utah

Of the 12 units listed above, 10 (excluding Colorado River Indian Reservation Unit and Palo Verde Irrigation District) were approved for feasibility study by Public Law 96-375 in October 1980. Other studies include Blue Springs Unit, Saline Water Use and Disposal Opportunities Unit, and the Aquatrain Project.

In 1978, the Forum reviewed the salinity standards which were adopted by all of the seven basin states, and recommended the construction of 3 of the 4 salinity control units and 10 of the 12 projects identified in the 1974 Act, the placing of effluent limitations on industrial and municipal discharges, and the reduction of the salt loading effects of irrigation return flows. The plan also called for the inclusion of Water Quality Management Plans to comply with Section 208 provisions after the plans' adoption by the states and approval of EPA. It also contemplated the use of saline water for industrial purposes and future salinity use/control methods.

b. Cumulative Impacts to Water Quality

Because of the manner in which the impacts of individual projects are analyzed, it is not practical to sum up the total impact of all LCRB projects. Table IV-51 and Table IV-51A show the effect of selected Water Quality Improvement Projects being constructed or proposed in the basin. Generally, however, the proposed water quality improvement projects will reduce the Colorado River main stem TDS. This will help to meet the requirements of Minute No. 242 as well as to help stabilize the salinity of the lower Colorado River below the project locations. This water quality improvement is considered to be significantly beneficial in that the many users along the lower Colorado River will have water of better and more dependable quality.

E. Energy Requirements and Conservation for the Proposed Action (Plan 6)

Energy required for the operation of Plan 6 will come from the Navajo Generating Station, a feature of the Central Arizona Project. Energy will be required to pump water through the CAP aqueduct from the Colorado River and from the aqueduct into the regulatory storage reservoir at New Waddell. Hydroelectric energy will also be produced by the operation of Plan 6, by generating facilities which will use water as it is released from the reservoirs. The average additional net energy consumption of Plan 6 is 145 gigawatt hours (GWH = one billion watts) per year over the life of the project.

There is no net energy conservation associated with Plan 6; however, the energy management capability provided by regulatory storage for the CAP would allow coal-fired electricity to be substituted for electricity produced by higher priced oil and natural gas. This would be achieved by using Navajo Generating Station power (coal-fired) to pump water into storage during off-peak periods, such as winter months or at night. The peak period power which is not used by the CAP would be sold to other users, who would replace oil and gas-fired electricity with Navajo power. The energy which could be shifted from peak periods to off-peak periods in Plan 6 is 1084 GWH per year; this includes power produced by the hydroelectric powerplant included in the plan.

This shift of pumping energy from peak periods to off peak periods requires more energy than is available from Navajo Generating Station during the winter months if Arizona's full allotment of Colorado River water is pumped when it is available. Currently a task force of local interest groups is investigating ways to provide adequate energy for the pumping of Arizona's entitlement of Colorado River water. For the purpose of the analysis, because winter energy is normally available from several sources, it was assumed that adequate energy would be available to economically pump Arizona's Colorado River entitlement.

TABLE IV-51

ANNUAL IMPACTS TO WATER QUALITY

<u>PROJECT TYPE/Title</u>	<u>Annual Impacts to Water Quality</u>
o RESERVOIR/AQUEDUCT PROJECTS	
Central Arizona Project (FEIS 1972) ^a	Same Main Stem withdrawal from different location but reduction in basin depletion.
Regulatory Storage Division (DEIS 1983)	Additional withdrawal of 138,000 af main stem and local surface water
Pumps and Transmission Lines	NA
Buttes Dam	-50,000 af withdrawn from Gila River at dam site
Hooker Dam	-18,000 af withdrawn from Gila River at dam site
Granite Reef Aqueduct	NA
Salt-Gila Aqueduct	NA
Tucson Aqueduct	NA
Hoover Dam Modifications (DEIS 1980)	NA
o WATER QUALITY IMPROVEMENT PROJECTS	
Colorado River Basin Salinity Project (Title I)	lowers TDS at Morelos Dam from 1,355 to 910 mg/l
Mojave - Coachella (DEIS 1974)	
Yuma Project (DEIS 1976)	
Colorado River Water Quality Improvement Project (Title II)	
Colorado River Indian Reservation Unit (FEIS 1976)	IU ^b
Las Vega Wash (FEIS 1976)	Reduce TDS at Imperial Dam by 8 mg/l
La Verkin Springs Unit Utah (Feasibility Report 1973)	Removal of 103,000 tons of salts from Virgin River salt load
Palo Verde Irrigation District Unit (FEIS 1976)	IU

^aDate in parentheses indicates publication date of environmental impact statement.

^bInformation unavailable

Table IV-51A

WATER QUALITY IMPROVEMENT PROJECTS

COLORADO RIVER BASIN

Unit	Primary Feature	Salinity Reduction at Imperial Dam (mg/L) <u>1/</u>	Tons of Salt Removed
* Paradox Valley	Deep well injection	18	180,000
* Grand Valley (Stage I) (overall)	Canal/lateral lining	2.5 27	24,000 280,000
* Las Vegas Wash	Bypass channels	6.2	71,000
LaVerkin Springs	Desalting/ponds	<u>2/</u> 8.4	103,000
Lower Gunnison Basin	Canal/lateral lining Recommended plan	14	141,000
Uinta Basin	Selective canal/lateral lining	2.4	24,000
McElmo Creek Basin	Combining canals/selective lining	2.4	24,000
Palo Verde Irrigation District (10 percent of area)	Lateral lining + onfarm + IMS (joint project with SCS)	8	<u>4/</u> 67,400
Glenwood-Dotsero Springs	Collection/evaporation ponds (preferred plan)	31	314,000
Big Sandy River	Industrial use	8	75,000
Saline water use and disposal opportunities <u>3/</u>	Local use for energy development Long distance export disposal Coal slurry pipeline	84 77-194 15-50	878,000 768,000-1,975,000 351,000-531,000

1/ All concentration reductions were calculated using CRSS projected 2010 flow and salt load conditions. The concentrating effect of water depletion was not considered in this calculation.

2/ Annual equivalent value of salinity reduction. The ultimate value after a 22-year buildup period would be 11 mg/L.

3/ Early appraisal or inventory estimates.

4/ Tons of salt removed would decrease to 50,200 by 2010 and an associated mg/L of 6.

* Under construction

F. Relationship Between Short-Term Uses of the Environment and Long-Term Enhancement for the Proposed Action (Plan 6)

The long-term effects of Plan 6 would be more efficient management of the CAP system, an increase in the amount of Colorado River water imported to central Arizona and concomitant reduction in ground water use, and a level of flood control for metropolitan Phoenix which would substantially reduce or eliminate major property damage and transportation disruptions.

Short-term disturbances to the environment would occur during construction of the dams in Plan 6 (Chapter IV.C). Long-term impacts would also result from implementation of the plan (see Chapter IV.A.) Land required for the structures, reservoirs, and rights-of-way would not be available for other uses during the life of the project. Other long-term impacts would include the loss or alteration of environmental resources required for construction or operation of the project, and impacts to people relocated as a result of the project.

Table IV-52 summarizes the short- and long-term impacts associated with Plan 6. Short-term impacts are assumed to occur immediately or during construction of the project, and long-term impacts would result over the life of the project (100 years) or permanently. Impacts described in Table IV-52 represent unmitigated impacts. A description of proposed mitigation initiatives for Plan 6 is given in Chapter IV.C.

G. Irreversible and Irretrievable Commitment of Resources

The construction and operation of Plan 6 would irreversibly and irretrievably commit physical and environmental resources to the project. An irreversible commitment of these resources is considered the permanent loss of the resource. Loss of resources is described for the typical-year and represents unmitigated impacts unless otherwise noted.

1. Biological Resources

Biological resources lost as a result of Plan 6 include 110 acres of riparian/wetland habitat, 11,060 acres of terrestrial habitat, and 1,039 animal unit months (AUMs) for special use and management areas. These resources would be inundated by reservoirs included in the plan.

2. Cultural Resources

In Plan 6, at least 158 prehistoric sites would be destroyed by construction activities, including artifact scatters, domestic and agricultural sites, petroglyphs, trash mounds, and water-soil control features.

Construction and operation of Plan 6 would destroy at least 39 historic sites. The most significant site to be affected is Theodore Roosevelt Dam, which is a National Historic Landmark. The dam would be destroyed by construction of New Roosevelt Dam or altered by modification.

Table IV-52

RELATIONSHIPS AND TRADEOFFS BETWEEN SHORT-TERM USES OF THE ENVIRONMENT
AND LONG-TERM ENHANCEMENT FOR THE PROPOSED ACTION

Resource	Short-Term	Long-Term	Tradeoffs
Riparian & Wetland Communities	Loss of high-quality cottonwood-willow, mesquite, and cattail habitat, loss of habitat for important Arizona wildlife.	Loss of high-quality cottonwood-willow, mesquite, and cattail habitat, loss of habitat for important Arizona wildlife.	Loss of habitat traded for increased water storage and flood control capacity. No enhancement.
Other Terrestrial Communities	Loss of desert upland vegetation such as paloverde-mixed cacti habitat.	Same.	Loss of vegetation traded for increased water storage capacity. No enhancement.
Perennial Stream/Riverine Communities	Disruption of perennial stream and riverine habitat due to erosion and high turbidity.	Gain of 1 mile of perennial stream. Instream flow below Bartlett Dam would remain 50 cfs.	None identified. Enhancement would occur if guaranteed 200 cfs instream flows are provided; remaining riverine communities would be improved.
Reservoir Aquatic Communities	Disturbance of reservoir communities during construction.	Gain in acres of reservoir habitat, and 1 guaranteed minimum pool for fisheries at New Waddell.	Short-term disruption traded for gain in habitat quantity. No enhancement of habitat quality.

Table IV- 52 (continued)

Resource	Short-Term	Long-Term	Tradeoffs
Threatened & Endangered Species	Possible loss of breeding productivity in bald eagle breeding areas during construction.	Loss of bald eagle preferred habitat.	Habitat management programs would improve quality and restrict accessibility of remaining bald eagle habitat, and may improve productivity.
Special Use & Management Areas	Loss of riparian habitat rehabilitation sites in Cliff area, loss of rangeland (AUMs).	Loss of riparian habitat rehabilitation sites at Cliff, implementation of riparian and rangeland rehabilitation programs in Confluence & Roosevelt areas.	Rehabilitation sites at Cliff traded for additional management sites at Confluence and Roosevelt. Enhancement expected in site-specific areas.
Water Quality	Increases in turbidity and suspended sediment load from construction-related activities.	Changes in the average level of water quality constituents in CAP and MCMWCD#1 water supplies, (increased potential for reservoir eutrophication,) increased potential for THM production.	Change in quality of local water supplies is traded for increased supply, reliability of supply during peak use periods, and reduction of ground-water pumping. No enhancement.
Stream-Oriented Recreation	Existing recreation resources and facilities would be disrupted as a result of construction.	Increase in maximum annual recreation days and development of additional facilities for camping & picnicking; gain of 1 stream mile.	Short-term disturbance of recreational facilities and activities traded for gain of stream and increased stream-oriented facilities. Enhancement would occur.

Table IV-52 (continued)

Resource	Short-Term	Long-Term	Tradeoffs
Reservoir-Oriented Recreation	Existing recreation resources and facilities would be disrupted during construction.	Increase of surface acres of water during the recreation season and gain in recreation days for boating, camping, picnicking, and swimming.	Short-term disturbance of recreational facilities traded for increased resources and facilities at Roosevelt and New Waddell. Enhancement would occur.
Prehistoric Resources	Sites destroyed or altered by construction activities; documentation and data recovery of selected sites prior to construction.	Sites destroyed or altered as a result of construction, operation and increased site visitation; collected information and artifacts preserved but sites lost for further study.	Future research potential and existence of sites traded for immediate site documentation and data collection. No enhancement.
Historic Resources	Roosevelt Dam and other sites destroyed or altered by construction activities; documentation and data recovery of sites prior to construction.	Sites on or eligible for inclusion on the National Register of Historic Places destroyed, altered, or impaired; loss of public educational/recreational value of sites.	Future research potential and existence of sites traded for immediate site documentation and data collection. No enhancement.

Table IV-52 (continued)

Resource	Short-Term	Long-Term	Tradeoffs
Social	People relocated from around Roosevelt Lake and from KA Ranch.	Decrease in personal autonomy, satisfaction with lifestyle, self-sufficiency, and community cohesion. Increase in mortality and illness rates for relocatees; elimination or reduction of flood-related problems for residents of downstream floodplain.	Relocation of upstream residents traded for flood control and elimination of dam safety hazard for downstream residents. Enhancement expected for downstream residents.
Economic Resources	Expenditure for construction and interest payments.	Repayment of local costs over life of the project; benefits realized yearly from regulatory storage and flood control exceed cost.	Construction and repayment costs are traded for national economic development benefits of project. Enhancement expected.
Air Quality	Temporary increase in dust emissions (TSP) and vehicular emissions during construction of dams and recreation sites.	No state or federal ambient air quality standards would be violated in any site area.	None identified. No enhancement.
Aesthetics	Temporary disruption of visual quality during construction.	Gain of acres of Visual Quality Zone 1, representing a shift from low to high quality visual resources.	Disruption of existing visual resources traded for long-term gain of higher quality resources. Enhancement expected.

Table IV-52 (continued)

Resource	Short-Term	Long-Term	Tradeoffs
Noise	Temporary increase in noise in excess of EPA's short-term goal for residents in the Roosevelt area during construction.	Day-night sound levels in all site areas would remain in compliance with EPA's long-term goals.	None identified. No enhancement.
Sand & Gravel Resources	None identified.	Some sand and gravel deposits enhanced by reduced flooding.	None identified. Enhancement expected.
Prime Farmland	Acquisition of prime farmland at Cliff site for construction.	Protection of downstream prime farmland from flooding; possible conversion of some downstream prime farmland to urban uses.	Loss of prime farmland upstream traded for protection of downstream prime farmland. No enhancement.
Land	Changes in land use within affected site areas due to construction of dams and facilities; changes in land ownership due to federal acquisition of lands required for construction at New Waddell.	Land use conversions and increased development in downstream areas due to flood control, including Rio Salado and Sky Harbor Airport expansion.	None identified - no major incompatible land uses are anticipated. Enhancement of downstream lands expected.

3. Economics

Economic resources committed to the construction and operation of Plan 6 would not be available for other uses.

4. Aesthetics

There would be irreversible changes in the aesthetic quality of the affected site areas in Plan 6. These changes would result from the construction of the dams and appurtenant facilities and from the operation of the reservoirs.

5. Geology/Soils

Approximately 130 acres of prime farmland would be acquired for Plan 6 and subsequently inundated. Additionally, sand, gravel, and other soil fill materials will be committed for the construction of the dams and facilities. These resources would come from borrow areas near the dam sites or from commercial sources.

6. Land Resources

Land required for the construction of Plan 6, including dam sites, reservoir areas, and rights-of-way would be irreversibly committed to the project and would be unavailable for other uses.

H. Conflicts with Other Agency Programs, Plans, and Policies

Letters were sent on January 19, 1982 to members of the CAWCS Governor's Advisory Committee and Technical Agency Group, representing over 80 agencies. The letters requested notification if whether the "planning or implementation of any CAWCS alternative action (Plans 1, 2, 3, 6, or 7) presents conflicts with your agency's programs, policies, or plans".

Letters were received from 12 agencies in response. The following agencies presented possible conflict with their policies, programs, or plans which must be considered in implementing an alternative.

1. Arizona Department of Transportation

The Department and the Federal Highway Administration are jointly participating in a plan to upgrade and realign a 14-mile segment of State Route 188, including the portion which crosses Roosevelt Dam. This road would require relocation under CAWCS alternatives. Reclamation is working with the Department of Transportation to coordinate planning of Route 188 modifications. The Department also has plans to extend State Route 74 for possible connection with New River in the vicinity of Lake Pleasant, and has several material pits in the area. Reclamation planning of New Waddell Dam construction and operation will consider these sites and avoid impacting them if possible. Compensation will be made for land and facilities required to construct New Waddell Dam and Reservoir.

2. Maricopa County Department of Planning and Development

The Advance Planning Division may have potential zoning conflicts if construction of New Waddell Dam and Reservoir creates significant growth impacts in the area. Planning for impacts caused by an influx of workers during dam construction is also a concern of the Planning Department. These factors have been considered in CAWCS planning, and Reclamation does not expect significant development impacts either during the construction period or as a long-term result of dam construction, mainly because of the public ownership and management of land around the proposed dams.

3. Maricopa County Parks and Recreation Department

The Parks Department operates Lake Pleasant Regional Park. The enlargement of New Waddell Dam and Reservoir presents several conflicts with the Department's policies, plans, and programs. Reclamation is working closely with the Parks Department to coordinate plans for development of the area.

4. City of Mesa

Implementation of Plan 6 may present conflicts with the proposed operation of the City of Mesa water treatment plant by either reducing the amount of water available to the city or increasing the turbidity of water delivered to the treatment plant. These conflicts are being investigated by the Reclamation.

5. Rio Salado Development District

Plans 2, 8, and 9 conflict with Rio Salado development plans because Plan 8 provides no flood control and the level of flood control provided by Plan 2 is not considered by the District to be sufficient to allow implementation of the Rio Salado concept.

6. Fish and Wildlife Service

The Fish and Wildlife Service stated that Plan 3 is in conflict with its policies for preserving and managing habitat identified as Resource Category 1. Such habitat would be destroyed by construction of Confluence Dam and Reservoir.

7. Arizona Game and Fish Department

Delivery of Colorado River water into New Waddell Reservoir as proposed in Plans 6 and 7 could potentially introduce Colorado River ichthyofauna into that reservoir. Such introduction would be in conflict with the Arizona Game and Fish Department's policies on importation and introduction of non-native fish species, and management criteria for the Lake Pleasant sport fishery. The Arizona Game and Fish Department has expressed a strong concern about the potential adverse impacts on the Lake Pleasant fishery, specifically due to the importation of, and competition and predatory impacts from, the blue tilapia and striped bass.

CAP water deliveries to the Salt River Project at Granite Reef Dam also present the same potential problems with regard to introducing these Colorado River species into the lower Salt and Verde Rivers. This potential problem is present even without any action under CAWCS. However, CAWCS Plans 6 and 7 would compound this potential problem by providing a means for white bass to move from New Waddell Reservoir into the lower Salt and Verde Rivers via the reversible canal and the Granite Reef Aqueduct.

I. Plan 6 Compliance With Other Environmental Statutes

Federal environmental statutes which have application to Plan 6 are listed in Table IV-53. Requirements of these statutes, as well as the status of Plan 6 compliance, are also described.

J. Environmental Commitments

Although the actual quantity and quality of the mitigation measures are not identified, Reclamation is committed to use the initiatives to provide mitigation at a sufficient level to either minimize or eliminate the impacts caused by the proposed action. The environmental commitments are displayed for only the proposed action because that is the action Reclamation expects to implement.

Other environmental commitments are listed, even though they do not take the form of mitigation. For example, Reclamation has committed itself to accomplish several studies as part of the Regulatory Storage Project. Although these studies are not mitigation, they are environmental commitments.

1. Construction Consideration

a. Construction and Public Safety

Safety conditions would be monitored by Reclamation to avoid accidents. Signs, flagmen, barricades, and other safety devices would be used to warn of potential hazards.

b. Blasting Control

Whenever blasting is required, the contractor would submit a blasting plan which would be evaluated prior to authorization of the initiation of blasting.

c. Dust Control and Air Pollution

Dust from construction would be controlled by establishing watering programs. Speed limits to reduce dust problems would be enforced based on the road conditions. Vehicles and equipment that show excessive emission of exhaust gases would not be operated until corrective repairs or adjustments are made. The burning of combustible materials not needed in construction would be initiated only with concurrence of local pollution-control and fire-prevention authorities.

Table VI-53

STATUS OF PLAN 6 COMPLIANCE WITH OTHER ENVIRONMENTAL STATUTES

Affected Resource	Statute	Requirements	Plan 6 Compliance Status
Water Quality	Federal Water Pollution Control Act of 1972 (PL 92-500)/Section 404, Clean Water Act of 1977.	Requires a Corps of Engineers permit for the discharge of dredged or fill material into navigable waterways. An individual permit is not required if conditions of a Nationwide Permit apply. Plan 6 complies with the conditions for Nationwide Permits (see Appendix E).	Full Compliance. A Section 404 evaluation is included as Appendix E of this report. This evaluation satisfies the requirement for Reclamation compliance with Section 404.
Wild & Scenic Rivers	Wild and Scenic Rivers Act of 1968 (PL 90-542)	Section 7 prohibits federal agencies from assisting or licensing water resource projects on or affecting any river designated for study as a potential component of the national wild and scenic river system. Section 5 requires consideration of wild and scenic rivers in planning water resource projects.	Full Compliance. Tonto Creek from its source to Roosevelt Lake is listed on the Nationwide Rivers Inventory and is eligible for inclusion in the Wild & Scenic Rivers System. The U.S. Forest Service has recommended that a 39.5 miles segment of the Verde River from Clarkdale approximately to Table Mountain be included in the National Wild and Scenic River System. (see <u>Verde River Wild and Scenic River Study Report, Final EIS, U.S. Forest Service, September 1982</u>). A small segment of Tonto Creek would be affected only under

Table IV-53 (continued)

Affected Resource	Statute	Requirements	Plan 6 Compliance Status
Wild & Scenic Rivers (continued)			200-year flood conditions. The Verde River segment would only be affected under IDF conditions. Due to the infrequency of these events, Plan 6 is not likely to diminish the wild and scenic value of these rivers.
Floodplains & Wetlands	Executive Order 11988, Avoid Impacts Associated with Occupancy Modification of Floodplains, May 24, 1977 / Executive Order 11990, Avoid Adverse Impacts to Wetlands, May 24, 1977.	Agencies must determine whether their actions will affect floodplains and wetlands, consider alternatives, and include all practical measures to minimize impacts.	Full Compliance. Impacts to floodplains and wetlands are addressed in Appendix D of this report, and have been included in the impacts and effects analyses for biological and social resources (Chapter IVB).
Biological Resources	Endangered Species Act of 1973, as amended (PL 93-205).	Section 7 required consultation with the U.S. Fish & Wildlife Service to determine if federal project actions will affect threatened or endangered wildlife species, and to insure that any action authorized, funded, or carried out does not jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat which is determined to be critical.	Full Compliance. A Biological Opinion rendered by the Fish & Wildlife Service in compliance with Section 7 of the Endangered Species Act is included as Appendix F of this report.

Table IV-53 (continued)

Affected Resource	Statute	Requirements	Plan 6 Compliance Status
Biological Resources (continued)	Fish & Wildlife Coordination Act (PL 85-624).	Requires coordination with federal and state wildlife agencies (Fish & Wildlife Service and Arizona Game & Fish Department) for the purpose of mitigating and compensating for project-caused losses to wildlife resources.	Full Compliance. A Fish & Wildlife Coordination Report is included as Appendix G of this report.
Prime Farmland	Council on Environmental Quality Memorandum, Analysis of Impacts on Prime and Unique Farmlands, August 30, 1976.	Requires that federal agencies analyze the effects of their actions on prime and unique farmland, document these effects in an EIS where appropriate, and develop alternatives and/or mitigation measures.	Full Compliance. Plan 6 impacts and effects to prime farmland, and mitigation measures, are described in Chapter IVB of the EIS.

Table IV-53 (continued)

Affected Resource	Statute	Requirements	Plan 6 Compliance Status
Cultural Resources	National Historic Preservation Act of 1966; Executive Order 11593, Protection and Enhancement of the Cultural Environment, May 13, 1971 and implementing regulations under the Archaeological and Historic Preservation Act of 1974 (PL 92-291).	Federal agencies are responsible for the identification, protection, management, and nomination to the National Register of Historic Places of significant cultural resources which are located on federal lands and/or which would be affected by federal actions. Consultation with the Advisory Council on Historic Preservations and the State Historic Preservation Officer (SHPO) is required when a federal action may affect cultural resources on or eligible for inclusion on the National Register (Section 106 of the National Historic Preservation Act). In addition, there is a specific requirement to minimize alteration or destruction of National Historic Landmarks, such as Roosevelt Dam (Section 110(f) of the National Historic Preservation Act).	Compliance Ongoing. A programmatic memorandum of agreement (PMOA) has been negotiated in compliance with Section 106 of the National Historic Preservation Act. The Section 110(f) requirement has been addressed through preparation of a document describing the full range of alternatives considered and presents support for the conclusion that substantial alternatives of the Roosevelt Dam National Landmark is justified to achieve overriding project goals. Under the terms of the PMOA a general historic preservation plan is being developed for the entire CAP and the proposed mitigation for Plan 6 will be refined and coordinated with this plan as construction specifications are developed.

Table IV-53 (continued)

Affected Resource	Statute	Requirements	Plan 6 Compliance Status
Recreational Resources	Federal Water Project Recreation Act, 16 USC 4601.	Provides for outdoor recreational and fish and wildlife enhancement for federal water projects, in coordination with existing and planned recreational developments.	No compliance required. Conceptual Recreation Plans have been developed for the Plan 6 affect site areas. Descriptions of recreational sites proposed in conjunction with the plan and analyses of the effects of use of such sites on existing and planned recreational development are outlined in Chapter IV. (also see <u>Recreation Supporting Document USBR</u> , September 1982 for details of the recreation plans.)
Air Quality	Clean Air Act of 1963, as amended 1970, Public Law 88-206.	Provides for the improvement, strengthening, and acceleration of program for the prevention and abatement of air pollution.	Watering program and speed limits established during construction to keep down dust. Construction vehicles will be kept in repair to prevent undue emissions. Burning of materials will be done only with concurrence of local pollution-control authorities.

d. Noise Abatement

Reclamation will monitor noise levels to insure that noise levels would not exceed 75 decibels during nighttime operations nor 80 decibels during daytime operations.

e. Water Pollution Abatement and Waste Material Disposal

The contractor would comply with applicable Federal and state laws and regulations concerning control and abatement of water pollution.

Solid waste disposal would be accomplished through burning, burial, or removal to specified sites.

f. Erosion Control

Excavated slopes would be bermed, terraced, or corrugated to prevent erosion and aid revegetation after construction. Deep cut slopes would be benched or terraced and protected from cross-drainage by diking. The dikes would probably be constructed using the excavated material. Surface drains would be used at the toe of each beach or terrace.

g. Prehistoric and Historic Cultural Resources

If evidence of previously unrecorded cultural resources is discovered during construction, operations in the vicinity of the discovery would cease. Mitigation studies would be conducted as appropriate prior to resuming construction.

h. Vegetation

Removal or transplanting of protected native plants, when required, would be coordinated with the Arizona Commission of Agriculture and Horticulture in accordance with the Arizona Native Plant Law (ARS, Chapter 7, Article 1).

All construction sites where vegetation has been cleared or severely changed would be reclaimed. Disturbed areas susceptible to vegetative growth will be revegetated by seeding with native species or by other viable techniques. Haul roads will be scarified prior to seeding and barricaded to deter off-road vehicle use. Seeding and planting programs would be supervised by appointed Reclamation biologists.

i. Wildlife

The contractor would be prohibited from collecting or unnecessarily disturbing threatened or endangered wildlife in the site area. Personnel would be advised of Arizona Game and Fish Department regulations pertaining to protected wildlife species.

j. Riverine Resources

Construction impacts to riverine resources will be avoided where possible by locating haul roads away from water courses and minimizing river crossing areas.

2. Biological Resources

In developing, operating, and maintaining Plan 6 facilities, the goal of Reclamation is to incur no net loss of environmental values, and where possible, to enhance these values.

a. Riparian/Wetland Communities

The objective of Reclamation is to replace 100 percent of the habitat values of the Riparian/Wetland Communities upstream of Bartlett and Stewart Mountain Dams and at Lake Pleasant. The methods for meeting this commitment will include revegetating cottonwood/willow and mesquite habitat types in suitable areas within the exposed bed of Horseshoe Reservoir above elevation 1940. Based on current information, sufficient area will be exposed to recover all of the habitat value lost to construction and operation of Plan 6, including losses at Roosevelt and New Waddell Dams.

The revegetation of 250 acres of cottonwood-willow and 690 acres of mesquite will be done at the Cliff site.

The mixed scrub at all sites and cattail habitat at Cliff Dam will recover without revegetation through natural succession. To ensure full development of the habitat values, livestock grazing and ORV use would need to be eliminated in this riparian area and fencing may be required.

The draining of Horseshoe Reservoir and the breaching of Horseshoe Dam will be scheduled to coincide with the seeding and germination period of cottonwood and willow species in March and April.

All riparian habitat in the construction areas not required for construction purposes will be protected from damage. All lands containing riparian habitat which is removed due to construction outside the impoundment area will be contoured and revegetated to preconstruction conditions.

b. Other Terrestrial Communities

The upland desert habitat represents the major vegetation type within the Cliff, Roosevelt, and Waddell site areas and will be subjected to the greatest acreage loss within the reservoir inundation zone. Reclamation is committed to mitigating the loss of habitat value to the greatest extent practical or to compensate for the losses by increasing values in other habitats.

Vegetation clearing plans, which call for only partial conservation pool clearance in order to provide fish cover, will be put into effect at New Waddell and Cliff Reservoir sites. No clearing will occur in the conservation pool at Roosevelt Reservoir site.

The most practical means of decreasing losses is to manage the IDF areas at Waddell, Cliff and Roosevelt Damsites for wildlife by restricting grazing and off road vehicles. This management would increase habitat values by 87 percent over the unmitigated project action. An additional 5 percent of the lost value can be regained by providing permanent water sources in areas where water is not now available to wildlife.

Reclamation will restrict grazing and off-road vehicle access by fencing the IDF and/or by obtaining management agreements on project withdrawn lands at each project site, i.e. with the Forest Service at Cliff and Roosevelt Damsites, and the Maricopa County Parks Department and/or the State Land Department at New Waddell Damsite.

All areas of construction disturbance in the project sites not needed for permanent facilities will be returned to natural contours and revegetated with native species of plants.

c. Perennial Streams

Reclamation is committed to replacing all of the habitat value lost due to the construction and operation of Plan 6. Reclamation is further committed to avoiding impacts to the native fisheries in perennial streams caused by the increased water storage elevations at Cliff and New Waddell Damsites which could introduce non-native reservoir fish into currently isolated native fish habitat.

Up to 7 miles of river will be available in Horseshoe Reservoir. Reclamation's objective is to reclaim these 7 miles through stream management techniques which will replace the habitat value lost from the 6 miles of river inundated by Cliff Dam and Reservoir.

Reclamation will work with the Fish and Wildlife Service to design and evaluate a positive cutoff above the inflow design flood (IDF) elevation to provide a barrier to the movement of fishes upstream on Tule Creek into the Gila topminnow habitat. Fish barriers will be placed above the IDF elevation in the project area which contain native fish populations to avoid impacts to native stream fish.

d. Reservoir Aquatic Communities

Reclamation is committed to replace the lost habitat values to the greatest extent practical, compensate for these values by increasing habitat values elsewhere, or by increasing the density of game fish in project reservoirs as measured by catch/unit effort.

Reclamation will investigate the possible impacts of the introduction of Colorado River ichthyofauna into the New Waddell Reservoir through a cooperative effort with the Arizona Game and Fish Department, the Fish and Wildlife Service, and other interested parties.

Reclamation is committed to reducing the rate of drawdown at New Waddell Reservoir to 5 feet or less during March and the first half of April as often as is practical.

Reclamation is further committed to reducing conservation pool clearing to the minimum possible level. Currently, a total of 2,486 acres will be cleared at Cliff and Waddell Damsites primarily for human safety and navigation considerations as predicated on expected boat usage.

Minimum pools would be incorporated into the sediment and inactive storage pools at Cliff and New Waddell Reservoir sites. At Cliff Reservoir site this pool would be 1,030 acres in size with an average depth of 30 feet; at New Waddell Reservoir site the pool would be 1,540 acres in area and average 26 feet deep.

The construction of a harvest basin immediately downstream of Horseshoe Dam will facilitate the salvage of sport fish for stocking in Bartlett Reservoir. A management agreement will be required with the Arizona Game and Fish Department for such salvage and restocking operations.

e. Special Use Areas

The Roosevelt waterfowl management area will incur direct and indirect impacts from the anticipated eight-fold increase in recreation use of the lake which will reduce its value to migrating waterfowl. Reclamation is committed to reducing the effect of this disturbance by increasing the value of the management area.

The recreation plan for Roosevelt Reservoir calls for closing the recreation sites that are within the waterfowl area during the winter use period. Reclamation will provide irrigation equipment (either portable or permanent) and sufficient water to irrigate 100 acres of winter food crops for waterfowl. This measure will increase the Arizona Game and Fish Department's ability to provide winter food crops by approximately 50 percent.

f. Endangered Species

The Fish and Wildlife Service has issued a Biological Opinion under the Endangered Species Act that Plan 6 as proposed will jeopardize the continued existence of the bald eagle in the Southwest. The Jeopardy Opinion was issued because of the impacts of the use of recreation developments and opportunities at Cliff and Roosevelt Reservoirs and because of construction impacts at Roosevelt and Stewart Mountain Dams.

In accordance with established policy, Reclamation will work with the Fish and Wildlife Service, Arizona Game and Fish Department, and the National Forest Service to prepare an agreement to implement management strategies and actions to avoid adverse impacts on nesting bald eagles resulting from the increased recreation activities in the Plan 6 area.

Reclamation will continue to support the Forest Service's efforts to maintain nest wardens and provide liaisons between construction forces. The nest watch program will continue to receive funding from Reclamation for this effort.

Reclamation supports breaching Horseshoe Dam in a manner to promote stream and riparian development in the exposed Horseshoe Reservoir and to avoid excessive erosion. Reclamation will coordinate with the Fish and Wildlife Service to develop the requirements for evacuation of Horseshoe Reservoir to be included in the data submitted for final design and construction specifications.

Borrow excavation will be avoided at Meddler Point, if possible. If not, construction specifications will require the removal of materials during the eagle nonbreeding season and the stockpiling of materials outside the eagle breeding and foraging territory. Borrow areas will be restored to provide habitat suitable for eagle forage fish.

Award of the construction contracts associated with Stewart Mountain Dam will be scheduled to permit initiation of construction in April or May and then continue uninterrupted except for blasting. Construction specifications will exclude initiation of construction from October through March. Blasting activities will be prohibited from December through March.

Reclamation will work with the Fish and Wildlife Service to design and evaluate a positive cutoff above the inflow design flood (IDF) elevation to provide a barrier to the movement of fishes upstream on Tule Creek into the Gila topminnow habitat. The positive cutoff will be constructed unless unforeseen design problems or extreme costs are encountered.

Reclamation will participate in fishery investigations as part of an Interagency Agreement.

g. Project Monitoring

Reclamation will monitor the effects of the project and the success of all mitigation measures.

To ensure the adequacy of mitigation and compensation measures proposed in this plan and to facilitate monitoring the effects of the project, pre- and post-construction studies will be conducted. Studies may be required to investigate such topics as spawning in pre- and post-project reservoirs, effects of flood attenuation on downstream riparian areas, riparian reestablishment studies for Cliff Reservoir, alteration of temperature regimes and nutrient blockage on the Verde River, effects of upstream water exchanges on proposed riparian mitigation at Cliff Reservoir, investigations into the effects of the introduction of Colorado River ichthyofauna in conjunction with current studies, and river rehabilitation studies at Cliff Reservoir. Recommendations stemming from these studies suggesting additional mitigation would be evaluated and implemented if found to be justified.

3. Cultural Resources

Cultural values within all CAWCS impact areas have been identified or estimated, and recorded prehistoric and historic sites have been classified into type.

Data recovery and research studies to recover the information embodied in some of the archaeological and historical sites to be immediately and directly affected by the project will be implemented.

A program will be developed for monitoring, managing, and studying those archaeological and historical sites situated in less directly affected areas such as flood pools within the proposed Cliff and Roosevelt Damsites and surrounding areas that may be affected by increased recreational use.

A program will be developed for public distribution and interpretation of the study results so that the scientific and historic values can be appreciated by interested professionals and the general public.

A Programmatic Memorandum of Agreement (PMOA) has been negotiated in compliance with Section 106 of the National Historic Preservation Act. Under the terms of the PMOA, a general historic preservation plan is being developed for the entire CAP and the proposed mitigation for Plan 6 will be refined and coordinated with this plan as construction specifications are developed.

4. Social Resources

Impacts to people because of relocation occur in the Cliff and Roosevelt site areas with Plan 6.

For the full-time residents who would be required to relocate, Forest Service land bordering Roosevelt Lake Estates will be made available for resettlement. The provision of this land would require an exchange agreement between Reclamation and the Forest Service.

An accurate, reliable system for disseminating information to relocatees could be established so that they are well informed about relocation proceedings.

Monetary compensation will be provided to relocatees to cover costs of relocation. One of the provisions of the Uniform Relocation Act of 1970 includes replacing the homes of relocatees with "safe, sanitary, and decent housing."

Negotiations over exchange land have occurred between Reclamation and the Forest Service, and these will continue. An agreement has been reached that exchange land will be made available to relocatees. A system for disseminating information to relocatees will be established. The relocations will be carried out in accordance with, and within the limitations of, the Uniform Relocation Act.