

**FINAL REPORT**

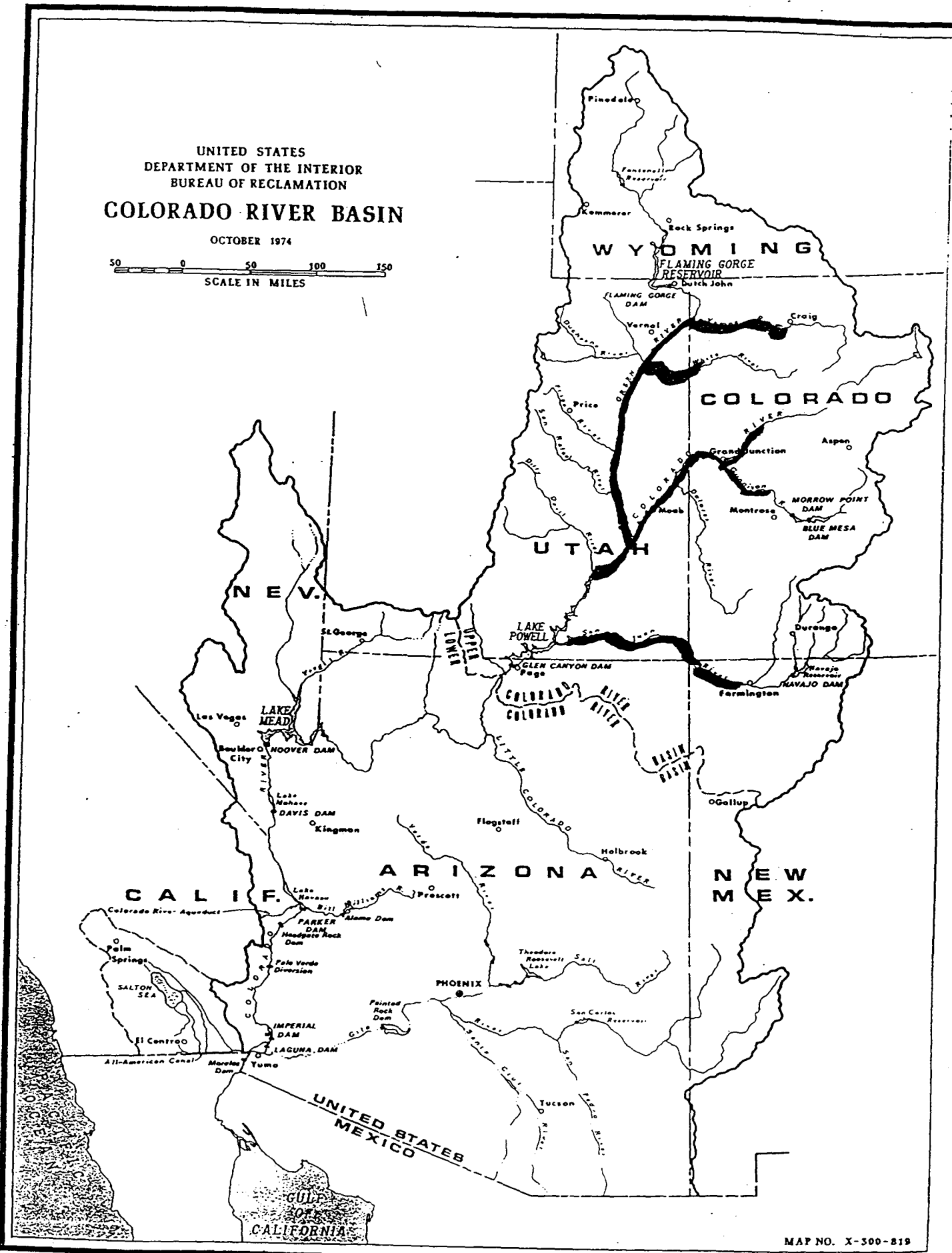
**COLORADO RIVER COMPACT  
WATER DEVELOPMENT PROJECTION**

November 2, 1995

Endangered Fish Flow and  
Colorado River Compact Water Development Workgroup

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF RECLAMATION  
**COLORADO RIVER BASIN**

OCTOBER 1974



MAP NO. X-500-819

— Critical Habitat for Colorado River Endangered Fish in the Upper Colorado River Basin.

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## EXECUTIVE SUMMARY

The CWCB informally convened the *ad hoc* Endangered Fish Flow and Colorado River Compact Water Development Workgroup ("Workgroup") to assist in estimating and protecting the future uses of Colorado's unused compact apportionment in the Colorado River Basin and to assure that the people of Colorado are not deprived of the beneficial use of those waters available by law and interstate compact. The Workgroup assisted and provided the CWCB input on how much water can be appropriated for endangered fish recovery instream flow purposes within the various sub-basins of the Colorado River basin in Colorado without impairing Colorado's ability to fully develop its compact apportioned waters. However, the observations and recommendations contained in this report are not intended to interpret the provisions of the Colorado River Compact, the Upper Colorado River Basin Compact and other provisions of the "Law of the Colorado River," the Colorado Constitution or other laws of the state of Colorado with respect to water rights or their administration in Colorado.

The workgroup first established ground rules and a process for undertaking this assignment. The workgroup then reviewed; 1) the key documents relating to the "Law of the Colorado River", 2) Colorado River basin hydrology within the state (10.8 MAF), 3) Colorado's compact apportionment under various interpretations of the "Law of the Colorado River" and the wide variation in hydrologic conditions (between 3.079 and 3.855 MAF); 4) Colorado's current consumptive uses of water (2.6 MAF maximum adjusted); and 5) the remaining compact apportionment again given the uncertainties of the law and variations in hydrology (between .45 MAF and 1.2 MAF at minimum). The workgroup then considered a variety of alternatives for distributing Colorado's remaining compact apportionment among the seven major subbasin's within Colorado.

These considerations are described and discussed in this report. This report has been reviewed by the workgroup on two occasions. In addition, it has also undergone a peer review for technical accuracy. These reviews resulted in only minor editorial changes, primarily for improved clarity. There were no substantive changes made to the report.

The Workgroup's recommended approach for distributing Colorado's remaining compact apportionment among the seven major tributaries is described in Table 4. In reviewing Table 4, the Workgroup wishes to emphasize the following observations:

A. We have not recommended any specific distribution to any particular subbasin; nor have we specifically recognized any particular water rights. Rather, we have established a recommended range of development allowance for each subbasin as described in Table 4. The upper limit of these ranges allows upto 3.855 MAF of total consumption from the Colorado River Basin by distributing up to one-half of the remaining compact apportioned waters needed to reach the 3.079 MAF level of development to each of the seven major subbasins but only to the extent that water is physically available for appropriation. The lower limit of our recommended ranges is based upon the lower estimate of Colorado's apportionment (i.e., 3.079 MAF), and distributes the state's approximately 450,000 acre feet of remaining apportionment among the seven major subbasins based on the proportionate

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share which each subbasin contributes to the natural flow of the Colorado River originating within Colorado but, again, only to the extent that water is physically available for appropriation. These ranges, which are shown in columns (G) and (H) of Table 4, should provide the flexibility for full compact development to occur as it normally would under state water law and assure that future development opportunities in Colorado are constrained by Colorado's compact apportionment rather than the instream flow water rights.

B. Colorado's compact apportionment is dependent on both the long term water supply and the assumptions made concerning the Law of the Colorado River. There are varying assumptions relating to water supply and the Upper Basin states' obligation to meet one-half of the Mexican Treaty commitment, which result in consumptive use apportionment values for Colorado ranging between 3.079 MAF and 3.855 MAF. As a result, a range of development allowance opportunities for each of the seven subbasins is recommended.

C. A conservative assumption should be made in which all future water development may occur under water rights which will be junior in priority to the endangered fish recovery instream flow water rights. There are numerous decreed conditional water rights with the combined capability to more than fully develop Colorado's remaining compact apportionment, and we recognize that future development of Colorado's remaining compact apportionment will most likely reflect a combination of both new water rights and the development of senior conditional water rights. In many cases, the water rights developed may be relying on the ability to reuse water which has previously been used. The recommended approach is intended to provide a safety factor sufficient to allow water rights junior to the anticipated instream flow water rights to fully utilize the remainder of Colorado's apportionment.

D. The development of senior conditional water rights should not be impaired by a junior CWCB instream flow right, although we assume that any changes of senior water rights (e.g., changes in use, point of diversion, etc.) will conform to the "no injury" standard with respect to the CWCB's instream flow rights and all other water rights. It is understood that in conforming to the "no injury" standard some additional limitations may be placed on the ability to change water rights.

E. The hydrologic information provided by the CWCB staff only includes waters which originate in Colorado and thus water from the Little Snake in Wyoming (200,000+ AF) and certain flows tributary to the San Juan in New Mexico (approximately 180,000 AF) are not included in the hydrology used to evaluate the various alternatives. There was not total agreement on this approach, but it was agreed that this was a conservative approach which avoided the need to make assumptions about what might or might not occur in our neighboring states.

F. We have not advocated the construction of any particular water project, nor should our recommendations prevent the development of any water project; we have been as neutral as possible in this regard.

G. Given the numerous uncertainties which exist, we do not recommend the appropriation of all the waters available for appropriation within any basin for instream flow protection without carving out or otherwise protecting a development allowance adequate to assure the flexibility to continue developing Colorado's water supplies in a responsible

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manner. Given the relative size of Colorado's compact apportionment (3.079 to 3.855 MAF) in comparison to the overall flows of the Colorado River originating in Colorado (10.797 MAF), it seems that there should still be adequate flows which the CWCB can protect under instream flow water rights to assist in the recovery of the endangered fish. The total instream flow appropriations suggested in Table 4 are no greater on average than will flow out of state under the compacts. The more significant challenge will be in arriving at monthly or daily distributions for these annual amounts which protect both water development opportunities and the needs of the endangered fish given the variable hydrology which occurs both annually and seasonally. Also, the structure and format of the water right application will be important, particularly in light of the recent decision in the *Aspen Wilderness Workshop, Inc. v. The Colorado Water Conservation Board* (Snowmass Creek Case).

H. Our recommended approach does not foreclose any reasonable development opportunities within Colorado's compact apportionment. As suggested in the CWCB's Statement of Policy and Procedure, it presumes that within the time it will take to fully develop the recommended range of new consumptive uses, new information about the endangered fish will become available such that the CWCB and others will find it necessary to reevaluate the situation and the state's needs. The open process employed in assembling these recommendations, facilitated through the support of the CWCB's staff and others, is helpful in promoting the use of the best information available and enabling a diverse group of interested parties to participate in policy formulation. However, there are limits to what can be expected from a group representing statewide interests, and the organization of similar groups within the principal subbasins should also be pursued in order to fine tune the information.

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## **DISCLAIMER**

The purpose of this report is to assist the Colorado Water Conservation Board (CWCB) in estimating the future use of Colorado's unused compact apportionment in the Colorado River basin so the CWCB can ensure that its appropriations will not "deprive the people of the state of Colorado of the beneficial use of those waters available by law and interstate compact." § 37-92-102(3), C.R.S. (1990).

Nothing in this report is intended to interpret or assert a position by Colorado, the CWCB or any member of the Workgroup on any provision of the Colorado River Compact, the Upper Colorado River Basin Compact, or any other component of the "Law of the River". Furthermore, nothing in this report is intended to interpret or take a position on any provision of Colorado law relating to the administration of water and water rights.

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## I. BACKGROUND

### A. Purpose and Need

The state of Colorado has been participating in the "Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin" ("Recovery Program") since 1988. The goal of the Recovery Program is to recover four endangered species of fish which live in the Colorado River, while allowing water development in the states of Colorado, Utah and Wyoming to continue. The Recovery Program includes a commitment to manage and protect instream flows needed to recover the endangered fishes in accordance with state laws and property rights and to date, has been successful as a cooperative means of meeting the regulatory requirements of the Endangered Species Act (ESA). Future success of the Recovery Program depends upon the state's continued commitment to appropriate and protect instream flows for the recovery of the endangered fish, as well as the implementation of all other aspects of the Recovery Program.

In March 1994, the Colorado Water Conservation Board ("CWCB") adopted an interim strategy<sup>1</sup> for the appropriation of water rights based on the recovery needs of the endangered fish, in an effort to integrate the instream flow needs of the fish into Colorado's existing system of water rights. This interim strategy is designed to overcome two major areas of uncertainty so that the Recovery Program can continue making sufficient progress toward recovery of the endangered fishes, and the U.S. Fish and Wildlife Service (Service) can continue to rely on the Recovery Program and its accomplishments to satisfy the ESA regulatory requirements related to water management and development activities. The two major areas of uncertainty center around the specific flow requirements for the endangered fishes and the location and magnitude of the development of Colorado's unused Colorado River Compact apportionment.

The CWCB's purpose for informally convening the *ad hoc* Endangered Fish Flow and Colorado River Compact Water Development Workgroup ("Workgroup") was to assist in estimating and protecting the future uses of Colorado's unused compact apportionment in the Colorado River Basin and to assure that the people of Colorado are not deprived of the beneficial use of those waters available by law and interstate compact. The Workgroup assisted and provided the CWCB input on how much water can be appropriated for endangered fish recovery instream flow purposes within the various sub-basins of the Colorado River basin in Colorado without impairing Colorado's ability to fully develop its compact apportioned waters. However, the observations and recommendations contained in this report are not intended to interpret the provisions of the Colorado River Compact, the Upper Colorado River Basin Compact and other provisions of the "Law of the Colorado River," the Colorado Constitution or other laws of the state of Colorado with respect to water

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<sup>1</sup> "Statement of Policy and Procedures Regarding the Appropriation of Instream Flows for the Recovery of Endangered Fishes of the Upper Colorado River Basin", Colorado Water Conservation Board March 9, 1994.



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rights or their administration in Colorado.

## **B. Workgroup History**

The Workgroup was convened informally by the CWCB in October 1994. The Workgroup includes 17 individuals invited to represent various geographical regions and water-related interests associated with Colorado River water supplies (e.g., irrigation, municipal and industrial, water conservancy districts, environmental). Technical support for the Workgroup was provided by staff from the CWCB and the Colorado River Water Conservation District ("CRWCD"). A list of the invited participants is attached as Appendix 1. A complete summary of all Workgroup meetings is available at the offices of the CWCB. The Workgroup held its first meeting on October 28, 1994 in Montrose, Colorado and has held seven meetings since that time, two of which were joint workshops with the CWCB. Handout materials and minutes are available for each meeting but are not included with this report because of their voluminous nature. However, selected materials have been included in a separate Technical Appendix accompanying this report.

## **C. Process**

Each participant contributed to the discussions and to this report as an individual and not as a representative of any specific organization. Statements made by participants have not been taken as positions of any organization unless specifically stated as such. Statements made by an individual during Workgroup meetings will not be attributed to that individual and used in other actions.

Our deliberations have been guided by state water law and the "Law of the Colorado River," Recovery Program documents, the September 1993, "Memorandum of Agreement between the United States Department of the Interior Fish and Wildlife Service and the CWCB concerning the Enforcement and Protection of Water and Water Rights," (Enforcement Agreement) and the CWCB's, "Statement of Policy and Procedure regarding the Appropriation of Instream Flows for the Recovery of Endangered Fishes of the Upper Colorado River Basin" (The Interim Strategy or Statement of Policy and Procedure) adopted in March 1994.

CWCB staff prepared information for our review related to the law of the Colorado River, identification of Colorado's compact apportionment and the potential restrictions thereon, estimates of Colorado's current consumptive use of water from the basin, and several alternatives predicting future development of Colorado's remaining apportionment and how it might be distributed among the seven major subbasins of the Colorado River. The CWCB staff also kept minutes of meetings and assisted in the drafting of this report.

## **II. LAW OF THE COLORADO RIVER**

The Colorado River and its tributaries drain portions of the states of Wyoming, Utah, Colorado, New Mexico, Arizona, Nevada and California. Colorado's use of the waters of the Colorado River and its tributaries is apportioned pursuant to the Colorado River Compact

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(1922), the Upper Colorado River Basin Compact (1948), the La Plata River Compact, and the Animas-La Plata Project Compact. In addition, certain treaties, federal statutes, and judicial decisions also control the allocation and use of the waters of the Colorado River. In combination, these various compacts, and related treaties, federal statutes and judicial decisions are referred to as the "Law of the Colorado River."

The following discussion briefly describes several of the major components of the Law of the Colorado River:

**Colorado River Compact (1922):** The Colorado River Compact divides the Colorado River Basin into Upper and Lower Basins with the division being at Lee Ferry, a point on the Colorado River one mile below the Paria River in Arizona. The Lower Basin states include Arizona, California, Nevada, and small portions of New Mexico and Utah that are tributary to the Colorado River below Lee Ferry. The Upper Basin states are Colorado, New Mexico, Utah, and Wyoming, with a small portion of Arizona being tributary to the Colorado River above Lee Ferry. Article III of the Compact apportions the use of the waters of the Colorado River system to the Upper and Lower Basins in the following manner:

1. Article III(a) apportions to both the Upper and the Lower Basin the right of each to the exclusive beneficial consumptive use of 7.5 million acre feet (MAF) annually from the "Colorado River System" in perpetuity.

2. Article III(b) allows an additional 1.0 MAF per year of increased beneficial consumptive use to the Lower Basin.

3. Article III(c) provides water for Mexico pursuant to treaty first from any surplus over the waters allocated to the states in Article III(a) and (b) of the compact as described above. If such surplus proves insufficient, then the burden of any deficiency shall be shared equally by the Upper and Lower Basins.

4. Article III(d) provides that the Upper Basin states will not cause the flow of the river at Lee Ferry to be depleted below an aggregate of 75 MAF for any period of ten consecutive years beginning with the ratification of the Compact.

5. Article III(e) provides that the Upper Basin states will not withhold water and the states of the Lower Basin will not require delivery of water which cannot reasonably be applied to domestic and agricultural uses.

**Mexican Treaty (1944):** In 1944, the United States and Mexico signed a treaty concerning the waters of certain international rivers, including the Colorado River. The treaty guaranteed a scheduled annual delivery of 1.5 MAF to Mexico (except in the event of an extraordinary drought or serious accident) and up to 1.7 MAF per year in years of surplus on the Colorado River.

**Upper Colorado River Basin Compact (1948):** In 1948, the Upper Basin states entered into a compact which apportioned among themselves the waters of the Colorado River available to the Upper Basin under the 1922 Compact. The 1948 Compact apportions to Arizona 50,000 acre-feet per year, while the other Upper Basin states received a percentage of the remaining apportionment, as follows:

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Colorado	51.75%
Utah	23.00%
Wyoming	14.00%
New Mexico	11.25%

Under this formula, if 7.5 MAF were available to the Upper Basin annually, Colorado's apportionment would provide for the consumptive use of 3,855,375 acre feet of water annually.

The 1948 Compact also: **a)** provides that consumptive uses under the 1922 La Plata River Compact shall be charged to the apportionments made to the states under the 1948 Compact; **b)** apportions water between Colorado and Wyoming on the Little Snake River in a manner that gives preference to pre-Compact water rights; **c)** requires that Colorado will not cause the flow of the Yampa River at the Maybell gaging station to be depleted below an aggregate of 5 MAF for any period of ten consecutive years reckoned in continuing progressive series beginning in 1949; and **d)** provides that any of the Upper Basin states may exceed the basic apportionment provided that it does not deprive another state of its apportionment.

**Coordinated Long Range Operating Criteria (1970):** The Coordinated Long-Range Operating Criteria for Colorado River Reservoirs were promulgated pursuant to Section 602(a) of the Colorado River Basin Project Act (1968) by the Secretary of the Interior and noticed in the Federal Register on June 10, 1970. These criteria control the coordinated long-range operation of storage reservoirs and projects in the Colorado River Basin constructed under the authority of the Colorado River Storage Project Act (i.e., Powell, Flaming Gorge, Aspinall, Navajo and participating projects), the Boulder Canyon Project Act (i.e., Lake Mead), and the Colorado River Basin Project Act (i.e., Central Arizona Project).

The operating criteria also require a determination by the Secretary of the Interior of the amount of water required to be in storage in order to assure that the beneficial consumptive use of water in the Upper Basin is not impaired ("602(a) storage requirements"). If active storage is less than the 602(a) storage requirements or if active storage in Lake Powell is less than active storage in Lake Mead, then the release from Lake Powell for the coming year will be 8.23 MAF. However, if Lake Powell storage exceeds 602(a) storage requirements and is higher than Lake Mead's, then releases greater than 8.23 MAF will be made to maintain the active storage in Mead and Powell at approximately equal amounts (equalization).

### III. BASIN CHARACTERISTICS & CURRENT HYDROLOGY

The "natural flow" (sometimes also referred to as "virgin flow") of a river or stream, as defined by the U.S. Bureau of Reclamation, is the undepleted and unregulated flow which would have occurred absent the activities of man. Table 1 shows the natural flow from each major tributary of the Colorado River within Colorado as developed by the U.S. Bureau of Reclamation for use in their CRSS planning model. The average annual natural flow of the

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Colorado River and its tributaries originating within the State of Colorado is approximately 10.8 MAF.

**Table 1**

Natural Flow <sup>2</sup> Colorado River Basin/ Tributaries	Average Annual Natural Flow (af)	Percent of Total Natural Flow (%)
Green River Basin		
Little Snake River	220,400	2.04
Yampa River	1,241,100	11.49
White River	<u>573,400</u>	<u>5.31</u>
Total	2,034,900	18.85
Colorado River Basin		
Colorado River Mainstem	3,602,400	33.36
Gunnison River	2,378,700	22.03
Dolores River	<u>843,500</u>	<u>7.81</u>
Total	6,824,600	63.20
San Juan River Basin		
San Juan River	1,938,200	17.95
STATE TOTAL	10,797,700	100.00

Physical water availability refers to the actual flow of a river or stream which is available for appropriation. In theory, when the flow measured at a gage is subtracted from the natural flow for a given year the result indicates the depletion, resulting from either consumptive uses or reservoir regulation, from the stream above that gage under present conditions. The Technical Appendix contains a summary of the physical water availability at various points throughout the Colorado River Basin.

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<sup>2</sup> Bureau of Reclamation, 1906 - 1985 Natural Flow Data Base - CRSS.

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### IV. COLORADO'S COMPACT APPORTIONMENT

During the 1922 Compact negotiations, it was believed that the long-term average water supply at Lee Ferry, Arizona was greater than 15.0 MAF per year and that there would be at least 7.5 MAF annually available for use in the Upper Basin. Furthermore, it was believed that there was at least enough water originating in the Lower Basin to satisfy the Mexican Treaty obligation of 1.5 MAF annually and satisfy an additional 1.0 MAF of annual consumptive use in the Lower Basin. Under the above assumptions, Colorado would have at least 3,855,375 acre feet of annual consumptive use available to it. However, it has become apparent that long term water supply conditions were overestimated and that the average annual water supply at Lee Ferry is only approximately 15 MAF, which is insufficient to meet the Mexican Treaty obligation and provide 7.5 MAF of consumptive use to both the Lower and Upper Basins.

In addition, the 1922 compact made the 7.5 MAF apportionments to each of the Upper and Lower Basins from the waters of the "Colorado River System." The "Colorado River System" is defined in the 1922 compact as "that portion of the Colorado River and its tributaries within the United States of America." However, the 1964 decree in *Arizona v. California* only allocated 7.5 MAF among the Lower Basin states from the Colorado River mainstem, and refused to apportion the use of Lower Basin tributaries.

Consequently, the Long Range Operating Criteria provide that at minimum 8.23 MAF be released annually from Lake Powell (7.5 MAF to the Lower Basin plus .75 MAF for one-half the Mexican Treaty obligation less .02 MAF of tributary inflow between Glen Canyon and Lee Ferry). Although the Secretary of the Interior has disclaimed any intent to interpret the "Law of the Colorado River" in promulgating the criteria, the criteria effectively require the Upper Basin to deliver annually one-half of the Mexican Treaty obligation at Lee Ferry. It should be emphasized that the Upper Basin States have never agreed to or concurred with the concept of supplying one-half of the Mexican Treaty obligation each and every year. These varying assumptions of water supply and interpretation of the Mexican Treaty obligation result in different interpretations of the water supply available to the Upper Basin and Colorado as shown in Table 2 below.

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**Table 2**

## Consumptive Use Entitlement

Upper Basin Water Supply	Mexican Treaty Obligation	Upper Basin Apportionment	Colorado's Apportionment
7,500,000	0	7,500,000	3,855,375
7,500,000	750,000	6,750,000	3,467,250
6,750,000	750,000	6,000,000	3,079,125

A hydrologic determination conducted by the U.S. Bureau of Reclamation in 1988 found that under the "Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs" and considering the critical drought period (i.e., a drought period between 1954 and 1966) that there were only 6.0 MAF available to the Upper Colorado River Basin. Using this 1988 estimate, Colorado's annual consumptive use entitlement on average maybe only 3,079,125 acre feet. **Therefore, on a long-term average annual basis, Colorado may only be entitled to use between 3.079 MAF and 3.855 MAF of the approximately 10,797,700 acre feet originating in Colorado, and the remainder must flow out of the State to meet downstream compact requirements.** However, until full compact development occurs in other states, Colorado could use in excess of this amount on a temporary basis. But, Colorado also needs to be aware it could be taking significant risks if it makes extended use of more than 3.079 MAF annually. **As a result, we have considered a range of development opportunities based upon these different estimates (i.e., 3.855 MAF, 3.467 MAF, and 3.079 MAF).**

## V. COLORADO'S CURRENT CONSUMPTIVE USES AND REMAINING COLORADO RIVER APPORTIONMENT

The Colorado River Basin Project Act directs the Secretary of the Interior to make reports on the annual consumptive use and loss of water from the Colorado River system. The most recent such report was prepared by Reclamation for the 1981-1985 period.

Table 3a shows the state's 1981-85 average, maximum and adjusted maximum consumptive use of water by major tributary basin and type of use in Colorado. While this information is currently in the process of being updated, the updated information is not sufficiently completed to be useful at this time. Suffice to say at this point that new projects have been built since 1985 and that existing projects are being more fully utilized.

During the 1981-85 period, Colorado's consumptive use of Colorado River water averaged 2.3 MAF annually. The maximum consumptive use which occurred during the period was approximately 2.5 MAF. An "Adjusted Maximum Consumptive Use" value,

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which includes the maximum amount ever diverted in a single year by transmountain diversion projects, and updated values of municipal and industrial consumption prepared by the U.S. Geological Survey for 1985 was also computed; this value is approximately 2.6 MAF.

In this context, Table 3b shows that Colorado has approximately 450,000 acre feet of its apportionment left to develop through full use of existing (but under-utilized) projects and the construction of new projects to reach the 3.079 MAF level of compact development. **If Colorado chooses to develop more than 3.079 MAF of consumptive use, the risk of curtailment and associated socioeconomic disruption in the event of a future "compact call" increases. However, because of the uncertainty associated with Colorado's ultimate compact apportionment, the Workgroup felt the target for the upper limit of Colorado's consumptive use should still be 3.855 MAF. Endangered fish recovery instream flow protection by the CWCB should be done in a fashion which allows for the potential development of a full 3.855 MAF.**

### VI. ALTERNATIVES CONSIDERED FOR DISTRIBUTING COLORADO'S REMAINING COMPACT APPORTIONMENT AMONG THE MAJOR SUBBASINS IN COLORADO

In the course of our deliberations, a variety of alternative scenarios for "allocating" Colorado's unused apportionment among the subbasins were considered. We have not been asked, or authorized, to make a legal or policy determination of who would be entitled to the water or how a potential compact call might be administered. Rather, we have attempted to estimate the overall pattern of future water development by basin which might occur.

The following is a summary of our overall thought process. The alternatives reviewed are adequately reflected in the summaries of our meetings, and will not be explained in detail here in order to keep this document to a readable length. Many alternatives were considered, and approximately ten were evaluated in some detail.

The development of alternatives began with a brief review of the CWCB staff work in November 1991, in which the suggested approach was to distribute the remaining compact apportionment based on the potential development of conditional water rights in priority. It was noted that there was approximately 3.9 MAF of decreed absolute storage on the western slope of Colorado and about 4 times that amount in conditional storage decrees, which is easily enough to exhaust the natural water supply. It was also noted that conditional water rights do not necessarily represent actual demands. These factors created a large amount of uncertainty about the development of conditional water rights and which ones would or would not be developed, thus, the approach was abandoned.

The next set of alternatives considered different ways of distributing the remaining compact apportionment in a logical fashion, such as based on the fraction of natural flow originating in a given basin, or allowing all remaining apportionment to be developed in any basin. Although these approaches might be more equitable, they might not be realistic and they were not pursued after initial evaluations.

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The next step in the process was to look at various types of growth and development projections. First, population projections for the western slope of Colorado and Colorado as a whole were reviewed. These projections show a 50 % increase in population for the west slope and about a 140 % increase for the state as a whole by the year 2020. Next, Colorado's section of the "Upper Colorado River Division States Depletion Schedule for the Colorado River Basin," was reviewed. The CWCB provides this depletion schedule to the Upper Colorado River Commission, which in turn provides it to the U.S. Bureau of Reclamation for use in CRSS planning studies and determining Salinity Control Program needs. This depletion schedule is also provided to the Western Area Power Administration for use in power marketing studies that help establish power rates for Westerns marketing area. The current depletion schedule projects full compact development by the year 2060. Because of the purposes for which the depletion schedule is used and the fact that it considers only major projects, some felt the projections might be conservative. While these projections were quite useful in developing an understanding of how future development might occur, they did not go far enough to provide the guidance sought for this effort.

The next step was to combine in some fashion the growth projections with actual water use, and then compare those results to the development projections. This was done by developing a set of alternatives in which the proposed development projections were adjusted to reflect the depletion schedule and potential future growth. Once this was accomplished, we had as good a feel as possible for how future growth might occur. The major concern was that any recommendation based on these values might be perceived as a state water plan or land use plan which supports certain types of development, and would be considered unacceptable. Thus, the challenge became how to set forth this information in a fashion that would allow the CWCB to move forward with the appropriation of recovery instream flows and yet assure that adequate water supplies were left in each basin to meet future development needs within the limitations imposed by water supply and overall compact apportionment.

At this point the focus returned to looking at apportionment alternatives among individual basins with the knowledge of compact limitations and what we believed to be adequate estimates of potential future growth and uses. Given the uncertainties in determining Colorado's actual compact apportionment, providing a range for the development allowances in each basin was essential. The ranges (shown on Table 4) should allow for both the compact uncertainty, and for the uncertainty in where future water development might actually occur. This approach would also allow any water remaining in a river in excess of these compact development allowances, and there is a considerable amount on average, to be used for recovery instream flows.

Recovery instream flows will be divided into two parts in accordance with paragraphs 3 and 4 of the Enforcement Agreement between the CWCB and the Service. The Paragraph 4 portion of the recovery instream flow would be "modifiable" by the CWCB. The Paragraph 3 portion would only be modifiable with the consent of the Service. Because of compact and water supply limitations, it will probably not be possible to develop all the water within the ranges identified for each basin since the total of the upper limits combined more than likely exceeds Colorado's ultimate compact apportionment. Therefore, the CWCB should coordinate



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with interested parties in each basin to refine the development allowance and identify the portions of the recovery instream water right which will be classified as paragraph 3 and 4.

### **VII. WORKGROUP OBSERVATIONS AND RECOMMENDATIONS TO THE CWCB**

The Workgroup's recommended approach for distributing Colorado's remaining compact apportionment among the major tributaries is described in Table 4. In reviewing Table 4, the Workgroup wishes to emphasize the following observations:

A. We have not recommended any specific distribution to any particular subbasin; nor have we specifically recognized any particular water rights. Rather, we have established a recommended range of development allowance for each subbasin as described in Table 4. The upper limit of these ranges allows upto 3.855 MAF of total consumption from the Colorado River Basin by distributing up to one-half of the remaining compact apportioned waters needed to reach the 3.079 MAF level of development to each of the seven major subbasins but only to the extent that water is physically available for appropriation. The lower limit of our recommended ranges is based upon the lower estimate of Colorado's apportionment (i.e., 3.079 MAF), and distributes the state's approximately 450,000 acre feet of remaining apportionment among the seven major subbasins based on the proportionate share which each subbasin contributes to the natural flow of the Colorado River originating within Colorado but, again, only to the extent that water is physically available for appropriation. These ranges, which are shown in columns (G) and (H) of Table 4, should provide the flexibility for full compact development to occur as it normally would under state water law and assure that future development opportunities in Colorado are constrained by Colorado's compact apportionment rather than the instream flow water rights.

B. Colorado's compact apportionment is dependent on both the long term water supply and the assumptions made concerning the Law of the Colorado River. There are varying assumptions relating to water supply and the Upper Basin states' obligation to meet one-half of the Mexican Treaty commitment, which result in consumptive use apportionment values for Colorado ranging between 3.079 MAF and 3.855 MAF. As a result, a range of development allowance opportunities for each of the seven subbasins is recommended.

C. A conservative assumption should be made in which all future water development may occur under water rights which will be junior in priority to the endangered fish recovery instream flow water rights. There are numerous decreed conditional water rights with the combined capability to more than fully develop Colorado's remaining compact apportionment, and we recognize that future development of Colorado's remaining compact apportionment will most likely reflect a combination of both new water rights and the development of senior conditional water rights. In many cases, the water rights developed may be relying on the ability to reuse water which has previously been used. The recommended approach is intended to provide a safety factor sufficient to allow water rights junior to the anticipated instream flow water rights to fully utilize the remainder of Colorado's apportionment.

D. The development of senior conditional water rights should not be impaired by a

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junior CWCB instream flow right, although we assume that any changes of senior water rights (e.g., changes in use, point of diversion, etc.) will conform to the "no injury" standard with respect to the CWCB's instream flow rights and all other water rights. It is understood that in conforming to the "no injury" standard some additional limitations may be placed on the ability to change water rights.

E. The hydrologic information provided by the CWCB staff only includes waters which originate in Colorado and thus water from the Little Snake in Wyoming (200,000+ AF) and certain flows tributary to the San Juan in New Mexico (approximately 180,000 AF) are not included in the hydrology used to evaluate the various alternatives. There was not total agreement on this approach, but it was agreed that this was a conservative approach which avoided the need to make assumptions about what might or might not occur in our neighboring states.

F. We have not advocated the construction of any particular water project, nor should our recommendations prevent the development of any water project; we have been as neutral as possible in this regard.

G. Given the numerous uncertainties which exist, we do not recommend the appropriation of all the waters available for appropriation within any basin for instream flow protection without carving out or otherwise protecting a development allowance adequate to assure the flexibility to continue developing Colorado's water supplies in a responsible manner. Given the relative size of Colorado's compact apportionment (3.079 to 3.855 MAF) in comparison to the overall flows of the Colorado River originating in Colorado (10.797 MAF), it seems that there should still be adequate flows which the CWCB can protect under instream flow water rights to assist in the recovery of the endangered fish. The total instream flow appropriations suggested in Table 4 are no greater on average than will flow out of state under the compacts. The more significant challenge will be in arriving at monthly or daily distributions for these annual amounts which protect both water development opportunities and the needs of the endangered fish given the variable hydrology which occurs both annually and seasonally. Also, the structure and format of the water right application will be important, particularly in light of the recent decision in the *Aspen Wilderness Workshop, Inc. v. The Colorado Water Conservation Board* (Snowmass Creek Case).

H. Our recommended approach does not foreclose any reasonable development opportunities within Colorado's compact apportionment. As suggested in the CWCB's Statement of Policy and Procedure, it presumes that within the time it will take to fully develop the recommended range of new consumptive uses, new information about the endangered fish will become available such that the CWCB and others will find it necessary to reevaluate the situation and the state's needs. The open process employed in assembling these recommendations, facilitated through the support of the CWCB's staff and others, is helpful in promoting the use of the best information available and enabling a diverse group of interested parties to participate in policy formulation. However, there are limits to what can be expected from a group representing statewide interests, and the organization of similar groups within the principal subbasins should also be pursued in order to fine tune the information.

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**TABLE 4**

Recommended Alternative (VI): Range of flows with full compact development between 3.079 maf and 3.855 maf. 50 % of remaining compact entitlement to reach 3.079 maf is allocated to each basin in order to reach 3.855 maf. The "Colorado River Future Depletion Schedule" is used as a check for how full compact development might be reached.

(A) Basin \ Subbasin	(B) Average Annual Natural Flow (af)	(C) Percent Total Natural Flow (%)	(D) Present Day Max. Annual Consumption Adjusted (af) (Note 2)	(E) Lower Limit for Future Development (af) (450,425*col. C)	(F) Upper Limit for Future Development (af) (B - D) (Note 1)	(G) Lower Limit for Total Consumption (af) (D + E) (Note 3)	(H) Upper Limit for Total Consumption (af) (D+F) (Note 6)	(I) Upper Limit Instream Flow Appropriation (af) (B-G)	(J) Lower Limit Instream Flow Appropriation (af) (B-H)	(K) Instream Flow Appropriation (af) (I)	(L) Paragraph 3 (af) (J)	(M) Paragraph 4 (af) (I-L)
<b>GREEN RIVER BASIN</b>												
LITTLE SNAKE RIVER (Note 4)	220,400	2.04%	15,400	9,194	205,000	24,594	220,400	195,806	0	195,806	0	195,806
YAMPA RIVER	1,241,100	11.49%	112,800	51,772	225,213	164,572	338,013	1,076,528	903,088	1,076,528	903,088	173,441
WHITE RIVER	573,400	5.31%	62,800	23,919	225,213	86,719	288,013	486,681	285,388	486,681	285,388	201,294
<b>GREEN RIVER SUBTOTAL</b>	<b>2,034,900</b>	<b>18.85%</b>	<b>191,000</b>	<b>84,886</b>	<b>655,425</b>	<b>275,885</b>	<b>846,425</b>	<b>1,759,015</b>	<b>1,188,475</b>	<b>1,759,015</b>	<b>1,188,475</b>	<b>570,540</b>
<b>COLORADO RIVER BASIN</b>												
MAIN STEM	3,602,400	33.36%	1,261,500	150,274	225,213	1,503,500	1,503,500	2,098,900	2,098,900	2,098,900	2,098,900	0
GUNNISON RIVER	2,378,700	22.03%	497,600	99,227	225,213	596,827	722,813	1,781,873	1,655,888	1,781,873	1,655,888	125,986
DOLORES RIVER	843,500	7.81%	78,000	35,187	225,213	124,000	303,213	719,500	540,288	719,500	540,288	179,213
<b>COLORADO RIVER SUBTOTAL</b>	<b>6,824,600</b>	<b>63.20%</b>	<b>1,837,100</b>	<b>284,688</b>	<b>675,638</b>	<b>2,224,327</b>	<b>2,529,525</b>	<b>4,600,273</b>	<b>4,295,075</b>	<b>4,600,273</b>	<b>4,295,075</b>	<b>305,198</b>
SAN JUAN RIVER BASIN (Note 5)	1,938,200	17.95%	259,600	80,852	225,213	350,600	484,813	1,587,600	1,453,388	1,587,600	1,453,388	134,213
State Subtotal	10,797,700	100%	2,287,700	450,425	1,556,275	2,850,812	3,860,763	7,946,888	6,936,938	7,946,888	6,936,938	1,009,951
CRSP EVAPORATION			341,000			341,000	341,000					
<b>STATE TOTAL</b>	<b>10,797,700</b>	<b>100.00%</b>	<b>2,628,700</b>	<b>450,425</b>	<b>1,556,275</b>	<b>3,191,812</b>	<b>4,201,763</b>	<b>7,946,888</b>	<b>6,936,938</b>	<b>7,946,888</b>	<b>6,936,938</b>	<b>1,009,951</b>

Note 1 - Value is lesser of 50% of 450,425 (225,213) or Annual Natural Flow (B) minus Annual Consumption (D). See detailed explanation of column (F) on following page.

Note 2 - Maximum Annual Consumption Adjusted is the maximum consumption reported by USBR in their Consumptive Uses and Losses Report 1981-85 and then adjusted to account for maximum transmountain diversions (1978) and more detailed information concerning M&I uses as reported by the USGS for 1985.

Note 3 - Value in column G reflects the maximum adjusted depletions in each basin to date, plus the full utilization of projects already in-place as defined in "Colorado's Future Depletion Projections ." Values for the Mainstem, Dolores and San Juan are greater than (D) plus (E) as a result, however, the values were never allowed to be less than the sum of (D) and (E). State Total of (D) plus (E) equals 3.079 maf. See detailed explanation of column (G) on following page.

Note 4 - The Little Snake natural flow of 220,400 acre-feet is only 47% of the total flow or only that portion of the flow originating in Colorado.

Note 5 - The San Juan natural flow of 1,938,200 acre-feet is 88.18 % of the total flow or only that portion of the flow originating in Colorado.

Note 6 - Value in Column (H) must always be greater than value in Column (G), however, it may not exceed value in Column (B). If not greater than Column (G), value in Column (H) was set equal to value in Column (G).

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**TABLE 3b**

**COLORADO RIVER CONSUMPTIVE USE ENTITLEMENT AND REMAINING AMOUNTS  
AVAILABLE FOR DEVELOPMENT UNDER VARYING HYDROLOGIC DETERMINATIONS**

		(ACRE FEET)										
1)	UPPER COLORADO BASIN HYDROLOGIC DETERMINATION	5,400,000	5,600,000	5,800,000	6,000,000	6,200,000	6,400,000	6,500,000	6,600,000	6,750,000	7,000,000	7,500,000
2)	COLORADO'S SHARE	2,768,625	2,872,125	2,975,625	3,079,125	3,182,625	3,286,125	3,337,875	3,389,625	3,467,250	3,596,625	3,855,375
3)	COLORADO'S 1981-1985 AVERAGE CU	2,300,400	2,300,400	2,300,400	2,300,400	2,300,400	2,300,400	2,300,400	2,300,400	2,300,400	2,300,400	2,300,400
4)	COLORADO'S ADJUSTED MAXIMUM CU	2,628,700	2,628,700	2,628,700	2,628,700	2,628,700	2,628,700	2,628,700	2,628,700	2,628,700	2,628,700	2,628,700
5)	AVAILABLE TO COLORADO ON AVERAGE	468,225	571,725	675,225	778,725	882,225	985,725	1,037,475	1,089,225	1,166,850	1,296,225	1,554,975
6)	AVAILABLE TO COLORADO AT MINIMUM	139,925	243,425	346,925	450,425	553,925	657,425	709,175	760,925	838,550	967,925	1,226,675

Column Descriptions:

- 1) Amount of water assumed to be available to the Upper Colorado River Basin.  
Most recent Hydrologic Determination performed by U.S. Bureau of Reclamation was in 1988 and found 6.0 MAF available
- 2) [Column 1 - 50,000 AF for Arizona] x .5175, which is Colorado's share under Upper Colorado River Compact.
- 3) From 1981-1985 U.S. Bureau of Reclamation Consumptive Uses and Losses Report. See Table 3(a) herein.
- 4) See Table 3(a) herein.
- 5) Value in row 2 minus value in row 3.
- 6) Value in row 2 minus value in row 4.

## TABLE 4 Footnotes "Explanation of Columns"

- A. River basin name, row description.
- B. The average annual natural flow (undepleted, unregulated flow) between 1906 and 1985 from the tributary basins as computed by the U.S. Bureau of Reclamation.
- C. The percent of natural flow which originates in each tributary basin. It is computed by dividing the tributary value in Column B by the state total at the bottom or end of column B.
- D. The maximum annual consumptive use reported by the U.S. Bureau of Reclamation in their consumptive uses and losses report between 1981 and 1985 and then adjusted up to account for maximum transmountain diversion which occurred in 1978 and more detailed information concerning M&I uses as reported by the U.S. Geological Survey in 1985. The maximum adjusted consumptive use values were used to reflect the full extent of existing development which has occurred to date.
- E. The lower limit of future compact development was computed by taking the percent of natural flow (column C) times the remaining undeveloped compact apportionment to reach the 3.079 million acre-foot level of compact development (3,079,125 - 2,628,700 = 450,425 acre feet). This distributes the remaining compact apportionment on the basis of the percentage of natural flow originating in each of the seven subbasins. This seemed equitable to the Workgroup and in cases like the Yampa seemed to be adequate to allow for most foreseeable development over the next 40-years or so. This also provided results which were fairly consistent with the results of the Yampa Feasibility Study currently being performed by Hydrosphere for the Colorado River Water Conservation District and the CWCBC. The state total of column (D) plus column (E) is 3,079,125 acre feet or Colorado's lower limit of compact development.
- F. The upper limit of future development was computed to allow for flexibility and the most optimistic projection of future compact development (3.855 maf). The upper limit was computed by allowing for one-half of the remaining compact apportionment to reach the 3.079 maf level of compact development (225,213 acre feet) to occur in each basin except wherein so doing would exceed the available water supply of the basin (note: this only occurred on the Little Snake and would not have occurred here either had we considered all the flow passing the Lily gauge approximately half of which originates in Wyoming). Doing this also allowed for the uncertainty in assumptions made concerning the "Law of the River" by providing for the total consumptive use of water to reach 3.855 million acre feet. The "State Subtotals" of columns (D) plus (F) in this case total 3,843,975 acre feet or approximately 3.855 maf without including CRSP evaporation. The values in this case could be adjusted to total exactly 3.855 maf if desired, but the Workgroup elected not to do so.
- G. The lower limit of total consumption reflects the maximum adjusted depletions in each basin to date plus the full utilization of projects already in-place as reflected on Colorado's current "depletion schedule." The current depletion schedule was used as a check on the potential validity of the values used. However, in no case was the value in column G permitted to be less than the total of columns D plus E. For the Colorado Mainstem, Dolores and San Juan Basins, the values used actually exceed the sum of column (D) plus (E) by 91,726; 10,813; and 10,148 acre feet respectively or 112,687 af overall in order to reflect the full utilization of projects already in-place. By doing this we assure that we did not compromise any existing major projects and yet still provide for Colorado's full use of its compact entitlement in an equitable manner.
- H. The upper limit of total consumption was computed by adding the present day consumption (column D) to the upper limit of future development (column F). The only restriction was that column H had to be greater than or equal to the lower limit (column G). For the Colorado Mainstem, it was necessary to raise the upper limit 16,787 af in order to make it equal to the lower limit. Thus, column H subtotals slightly exceed 3.855 MAF even before CRSP evaporation is added in.
- I&K. Given these values you can now compute the upper and lower limits of an instream flow appropriation. The upper limit is computed by subtracting column G from column B. This also becomes column K in the table and represents the total recovery instream appropriation. Please note this level of recovery instream flow does not contain any water that would be used to reach full compact development at approximately at 3.079 MAF level of development. However, it does include the utilization of 341,000 acre feet which would be lost to evaporation off the primary CRSPA storage units (Lake Powell, Flaming Gorge and Aspinall) and charged to Colorado's apportionment.
- J&L. The lower limit instream flow appropriation is computed by subtracting column H from column B. This becomes column L in the table and represents one possible level of appropriation of paragraph 3 water. In this case it represents the volume of water which must leave Colorado on average at full compact development in the basin. The value also includes the 341,000 acre feet which would go to meet Colorado's portion of CRSP evaporation, which because it is not used in Colorado can be added to the instream flow appropriation.
- M. Column M is the difference between columns I and J or alternatively, the difference between column K and column L. This represents one possible level of paragraph 4 water and can be described as the water that takes you from 3.079 MAF of development to at least 3.855 MAF with a little cushion (346,388 AF).

APPENDIX I

COLORADO RIVER COMPACT WATER  
DEVELOPMENT WORKGROUP

7/18/95

	Phone #	FAX #
1. Shirley Baty La Plata County Board of Commissioners 1060 East Second Avenue Durango, Co. 81301	970 382-6219 249-3254 (H)	970 382-6299
2. Jim Evans Associated Governments of Northwest Colorado P.O. Box 351 Rifle, Co. 81650	970 625-1723	
3. Rebecca Frank 2004 Wood Court Grand Junction, Co. 81503	970 243-1603	970 241-6860
4. Steve Harris Harris Water Engineering 954 2nd Avenue Durango, Co. 81301	970 259-5322	970 247-0587
5. Jim Hokit Uncompahgre Valley Water Users Association P.O. Box 69 Montrose, Co 81402-0069	970 249-3813	970 249-6830
6. Rick Hum Summit County Board of Commissioners P.O. Box 68 Breckenridge, Co. 80424	970 453-2561 X350	970 453-5461
7. Doug Kemper City of Aurora 1470 So. Havana St. Aurora, Co. 80012	303 695-7386	303 695-7123

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|-----|--|--|-----------------|
| 8.  | Norman Klements<br>Rio Blanco Water<br>Conservancy District<br>2252 East Main Street<br>Rangeley, Co. 81648                  | 970<br>675-5055  | 970             |
| 9.  | Susan Lohr<br>Rocky Mountain Biological<br>Laboratory<br>Box 1757<br>Crested Butte, Co. 81224                                | 970<br>349-7231<br><br>E-Mail<br><u><a href="mailto:RMBLDIR@WSC.COLORADO.EDU">RMBLDIR@WSC.COLORADO.EDU</a></u> | 970<br>349-7231 |
| 10. | Tyler Martineau<br>Upper Gunnison River Water<br>Conservancy District<br>275 South Spruce Street<br>Gunnison, Colorado 81230 | 970<br>641-6065  | 970<br>641-6727 |
| 11. | Forest Nelson<br>2496 County Road 8<br>Meeker, Colorado 81641  | 970<br>878-4721  |                 |
| 12. | Dan Noble<br>San Miguel Water<br>Conservancy District<br>P.O. Box 130<br>Norwood, Co. 81423                                  | 970<br>327-4393<br>327-4384 (H)  | 970<br>327-4090 |
| 13. | John Porter<br>Dolores Water Conservancy<br>District<br>P.O. Box 1117<br>Cortez, Co. 81321                                   | 970<br>565-7562  | 970<br>565-0501 |
| 14. | Thomas R. Sharp<br>Sharp & Barney<br>P.O. Box 774608<br>Steamboat Springs, Co. 80477   | 970<br>879-1572(W)<br>879-1482(H)  | 970<br>879-8162 |
| 15. | Dean Visintainer<br>Moffat County Board of<br>Commissioners<br>221 West Victory Way<br>Craig, Co. 81625                      | 970<br>824-5517  | 970<br>824-3995 |

- |     |  |                                   |                 |
|-----|--|-----------------------------------|-----------------|
| 16. | Greg Walcher<br>Club 20<br>P.O. Box 550<br>Grand Junction, Co.81502-0550   | 970<br>242-3264                   | 970<br>245-8300 |
| 17. | Eric Wilkinson<br>Northern Colorado Water<br>Conservancy District<br>1250 No. Wilson Avenue<br>P.O. Box 679<br>Loveland, Co. 80539 | 970<br>667-2437<br>877-4188 (Car) | 970<br>663-6907 |

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## TECHNICAL APPENDIX

Data on the pages which follow are taken from the, "Colorado River Basin Physical Water Availability Study" prepared for the Colorado Water Conservation Board in January, 1995 by Leonard Rice Consulting Water Engineers, Inc. It shows mean daily flows at selected stream gages for average and dry years. The reader is referred to the report for additional information if such is desired.

**Table 1**  
**Summary of Average Adjusted Daily Flows (cfs) for Current Levels of Depletions**

Yampa R. Location, (1)		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual (1,000 af)
blw Craig	1	282	271	211	203	255	563	2,137	4,996	4,890	1,301	291	188	942.3
nr Maybell	2	337	350	278	272	344	721	2,507	6,188	5,625	1,570	369	207	1,134.9
at Deerlodge Park	3	466	497	387	365	524	1,133	3,531	8,501	7,856	2,175	506	282	1,585.4

(1) Figure 1 map reference number.

**Table 2**  
**Summary of Average Adjusted Daily Flows (cfs) for Current Levels of Depletions**

Little Snake R. Location (1)		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual (1,000 af)
near Lily	4	120	133	109	101	139	359	989	2,536	2,000	370	68	47	422.7

(1) Figure 1 map reference number.

**Table 3**  
**Percentages of Little Snake River near Lily, CO Flows that Originate in Wyoming**

Records	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Tot
Gaged	50.1%	50.2%	50.1%	50.1%	50.5%	50.8%	50.3%	50.3%	49.7%	48.2%	48.0%	48.5%	50.1%
Adjusted Gage	49.1%	49.4%	49.2%	49.2%	50.0%	50.6%	50.6%	49.7%	48.2%	45.7%	45.7%	46.9%	49.1%

**Table 4**  
**Summary of Average Adjusted Daily Flows (cfs) for Current Levels of Depletions**

White R. Location (1)		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual (1,000 af)
blw Meeker	5	462	421	377	344	336	397	598	1,576	1,970	789	433	396	489.5
blw Boise Cr	6	499	475	426	386	402	506	691	1,645	2,000	831	478	432	530.0
nr Stateline	7	503	460	395	364	429	567	733	1,784	2,093	854	470	432	550.1

(1) Figure 1 map reference number.

Table 5  
Summary of Average Adjusted Daily Flows (cfs) for Current Levels of Depletions

Colorado R. Location (1)		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual (1,000 af)	
R e a c h 1	btw Glenwood Springs	8	2,122	1,947	1,638	1,529	1,522	1,729	2,716	6,539	9,622	5,607	2,827	2,247	2,421.3
	nr DeBeque	9	2,217	2,050	1,766	1,656	1,654	1,887	3,005	7,769	11,060	5,933	2,853	2,272	2,676.6
	nr Cameo	10	2,344	2,176	1,896	1,770	1,772	2,007	3,120	8,014	11,181	5,984	2,970	2,392	2,758.6
2	btw GVP Div	11	1,193	1,888	1,394	1,214	1,216	1,478	2,159	7,111	10,226	4,574	1,541	1,046	2,117.7
3	btw GVC Div nr Palisade	12	1,269	2,266	1,957	1,852	1,858	2,092	2,384	7,149	10,236	4,577	1,557	1,092	2,312.7
	at 27.5 Road near Palisade	13	1,487	2,484	2,175	2,070	2,076	2,310	2,602	7,367	10,454	4,795	1,775	1,310	2,470.5
4	btw Gunnison River	14	2,784	3,840	3,574	3,534	3,456	3,828	4,971	11,900	14,321	6,473	2,593	2,393	3,845.4
	at Stateline	15	4,441	4,472	4,102	3,904	4,028	4,434	6,101	13,491	16,077	8,105	4,089	4,071	4,671.1

(1) Figure 1 map reference number.

Table 6  
Summary of Average Adjusted Daily Flows (cfs) for Current Levels of Depletions

Gunnison R. Location (1)		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual (1,000 af)
at Delta combined with Uncompaggre at Delta	16	1,860	1,888	2,016	2,099	2,109	2,166	2,644	4,432	4,227	2,199	1,403	1,664	1,732.9
nr Grand Junction	17	1,978	1,983	2,085	2,125	2,086	2,176	3,043	5,279	4,617	2,380	1,553	1,873	1,882.9
btw Redlands Canal	18	1,313	1,310	1,397	1,460	1,378	1,516	2,369	4,533	3,868	1,677	837	1,125	1,380.4

(1) Figure 1 map reference number.

Table 7  
Summary of Average Adjusted Daily Flows (cfs) for Current Levels of Depletions

Dolores R. Location (1)		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual (1,000 af)
Est. Dolores R. blw San Miguel R.	19	227	197	172	170	194	399	1,762	2,714	2,026	721	317	216	551.1
near Cisco	20	251	233	206	188	234	435	1,956	3,305	2,174	793	328	254	626.5

(1) Figure 1 map reference number.

Table 8  
Summary of Average Adjusted Daily Flows (cfs) for Current Levels of Depletions

San Juan R. Station (1)		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual (1,000 af)	
near Carracus	21	321	245	170	152	186	534	1023	1589	1686	612	299	314	431.10	
at Farmington	22	1421	1397	1562	1617	1650	1692	1993	3405	4013	2407	1386	1394	1445.45	
at Four Corners	23	1475	1505	1642	1716	1852	1963	2360	3711	4082	2405	1473	1452	1547.60	
near Bluff	24	1781	1662	1707	1737	1991	2133	2618	3658	3987	2574	1658	1673	1606.23	
S a n J u a n T r i b u t a r i e s	Spring Cr at La Boca	25	35	9	6	5	10	23	16	44	63	71	74	65	25.53
	Animas R. nr Cedar Hill	26	522	383	299	270	280	458	1068	2457	3083	1344	635	611	689.90
	La Plata R. at State Line	27	16	15	14	13	18	40	119	129	83	24	10	11	29.71
	Mancos R. near Towaoc	28	28	26	18	15	26	62	131	191	103	30	25	30	41.43
	Piedra R. near Arboles	29	209	145	100	82	101	315	957	1366	1130	361	198	224	313.60
	Los Pinos R. at La Boca	30	247	186	127	92	105	215	399	496	587	339	225	246	197.24
	Mc Elmo Cr nr State Line	31	69	55	42	33	49	70	44	44	60	96	92	78	44.37
Combined San Juan Tributaries		1447	1064	776	662	776	1718	3757	6318	6795	2877	1557	1579	1772.88	

(1) Figure 1 map reference number.

Dry Year Adjusted Daily Flows (CFS) for Current Levels of Depletions

Yampa R.	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual (1,000 af)
blw Craig	179	147	121	97	138	232	806	1585	1278	176	89	103	299
% of Total	3.6%	3.0%	2.4%	2.0%	2.8%	4.7%	16.3%	32.0%	25.8%	3.6%	1.8%	2.1%	100%
nr Maybell	190	157	124	116	188	312	805	1799	1486	87	61	62	325
% of Total	3.5%	2.9%	2.3%	2.2%	3.5%	5.8%	14.9%	33.4%	27.6%	1.6%	1.1%	1.2%	100%
at Deerlodge Park	261	186	134	110	238	328	1018	2150	1756	100	65	99	389
% of Total	4.0%	2.9%	2.1%	1.7%	3.7%	5.1%	15.8%	33.4%	27.2%	1.6%	1.0%	1.5%	100%

Dry Year Adjusted Daily Flows (CFS) for Current Levels of Depletions

Little Snake R.	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual (1,000 af)
near Lily	72	61	37	35	57	114	393	481	222	34	5	0	374
% of Total	4.8%	4.0%	2.4%	2.3%	3.8%	7.5%	26.0%	31.8%	14.7%	2.3%	0.3%	0.0%	100%

Dry Year Adjusted Daily Flows (CFS) for Current Levels of Depletions

White R.	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual (1,000 af)
blw Meeker	377	314	298	284	251	309	393	374	283	147	215	235	210
% of Total	10.8%	9.0%	8.6%	8.2%	7.2%	8.9%	11.3%	10.7%	8.1%	4.2%	6.2%	6.8%	100%
blw Boise Cr	401	359	314	263	328	399	422	406	293	123	190	252	226
% of Total	10.7%	9.6%	8.4%	7.0%	8.7%	10.6%	11.3%	10.8%	7.8%	3.3%	5.1%	6.7%	100%
nr Statefline	396	352	299	326	354	411	434	401	273	146	223	232	232
% of Total	10.3%	9.1%	7.8%	8.5%	9.2%	10.7%	11.3%	10.4%	7.1%	3.8%	5.8%	6.0%	100%

Dry Year Adjusted Daily Flows (CFS) for Current Levels of Depletions

Colorado R.	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual (1,000 af)
blw Glenwood Springs	1823	1531	1322	1209	1099	1013	1545	1865	2078	2184	2169	1618	1176
% of Total	9.4%	7.9%	6.8%	6.2%	5.6%	5.2%	7.9%	9.6%	10.7%	11.2%	11.1%	8.3%	100%
nr DeBeque	1999	1720	1577	1490	1285	1173	1617	1992	2187	2290	2227	1657	1283
% of Total	9.4%	8.1%	7.4%	7.0%	6.1%	5.5%	7.6%	9.4%	10.3%	10.8%	10.5%	7.8%	100%
nr Cameo	2225	1933	1802	1709	1540	1295	1815	2256	2256	2256	2256	1706	1393
% of Total	9.7%	8.4%	7.8%	7.4%	6.7%	5.6%	7.9%	9.8%	9.8%	9.8%	9.8%	7.4%	100%
blw GVP Div	1165	1647	1053	961	800	472	692	787	719	641	927	298	613
% of Total	11.5%	16.2%	10.4%	9.5%	7.9%	4.6%	6.8%	7.7%	7.1%	6.3%	9.1%	2.9%	100%
blw GVC Div nr Palisade	1232	2027	1853	1761	1600	1215	772	810	718	688	992	379	846
% of Total	8.8%	14.4%	13.2%	12.5%	11.4%	8.6%	5.5%	5.8%	5.1%	4.9%	7.1%	2.7%	100%
blw Gunnison River	2376	3439	3321	3228	2357	1592	1151	908	711	981	1279	604	1324
% of Total	10.8%	15.7%	15.1%	14.7%	10.7%	7.3%	5.2%	4.1%	3.2%	4.5%	5.8%	2.8%	100%
at Statefline	3551	3665	3609	3368	2724	2014	1733	1839	1734	2104	1894	2153	1834
% of Total	11.7%	12.1%	11.9%	11.1%	9.0%	6.6%	5.7%	6.1%	5.7%	6.9%	6.2%	7.1%	100%

Dry Year Adjusted Daily Flows (CFS) for Current Levels of Depletions

Gunnison R.	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual (1,000 af)
at Delta combined with Umcompahgre													
% of Total	1192	1483	1683	1597	1031	638	609	387	224	427	505	533	622
	11.6%	14.4%	16.3%	15.5%	10.0%	6.2%	5.9%	3.8%	2.2%	4.1%	4.9%	5.2%	100%
nr Grand Junction	1498	1763	1943	1890	1240	771	709	535	364	627	642	671	764
% of Total	11.8%	13.9%	15.4%	14.9%	9.8%	6.1%	5.6%	4.2%	2.9%	5.0%	5.1%	5.3%	100%

Dry Year Adjusted Daily Flows (CFS) for Current Levels of Depletions

Dolores R.	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual (1,000 af)
Est. Dolores R. btw San Miguel R.	128	81	65	72	90	86	122	94	179	433	330	92	108
% of Total	7.2%	4.6%	3.7%	4.1%	5.1%	4.9%	6.9%	5.3%	10.1%	24.4%	18.6%	5.2%	100%
near Cisco	137	99	69	85	136	100	137	94	164	350	278	89	105
% of Total	7.9%	5.7%	4.0%	4.9%	7.8%	5.8%	7.9%	5.4%	9.4%	20.1%	16.0%	5.1%	100%

Dry Year Adjusted Daily Flows (CFS) for Current Levels of Depletions

San Juan R.	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual (1,000 af)
near Carracus	123	112	76	74	88	129	173	259	166	129	239	149	104
% of Total	7.2%	6.5%	4.4%	4.3%	5.1%	7.5%	10.1%	15.1%	9.7%	7.5%	13.9%	8.7%	100%
at Farmington	661	594	1488	1536	954	572	273	576	721	727	965	517	580
% of Total	6.9%	6.2%	15.5%	16.0%	10.0%	6.0%	2.8%	6.0%	7.5%	7.6%	10.1%	5.4%	100%
at Four Corners	654	714	1570	1636	1159	843	404	531	756	711	1030	515	635
% of Total	6.2%	6.8%	14.9%	15.5%	11.0%	8.0%	3.8%	5.0%	7.2%	6.8%	9.8%	4.9%	100%
near Bluff	783	793	1329	1355	983	683	274	373	347	1024	1326	546	594
% of Total	8.0%	8.1%	13.5%	13.8%	10.0%	7.0%	2.8%	3.8%	3.5%	10.4%	13.5%	5.6%	100%

**COLORADO RIVER COMPACT WATER DEVELOPMENT PROJECTION**  
**November 2, 1995 FINAL REPORT**

**TABLE 3a**

**COLORADO'S CONSUMPTIVE USE OF WATER**

	1981-85 Average Consumption					1981-85 Maximum Consumption					Adjusted Maximum Consumption				
	Agriculture	Exports	M&I	Evap.	Total	Agriculture	Exports	M&I	Evap.	Total	Agriculture	Exports	M&I	Evap.	Total
Green River Basin															
Little Snake R.						14.9	0.0	0.0	0.5	15.4	14.9	0.0	0.0	0.5	15.4
Yampa R.						89.4	0.0	13.1	4.5	107.0	89.4	0.0	18.9	4.5	112.8
White R.						54.3	0.0	5.5	1.5	61.3	54.3	0.0	7.0	1.5	62.8
TOTAL	143.3	0.0	17.4	6.5	167.1	158.6	0.0	18.6	6.5	183.7	158.6	0.0	25.9	6.5	191.0
Colorado River Basin															
Main Stem						548.5	598.7	14.6	47.1	1,208.9	548.5	627.5	38.4	47.1	1,261.5
Gunnison R						462.0	3.0	7.5	17.9	490.4	462.0	3.0	14.7	17.9	497.6
Dolores R.						67.2	0.0	1.0	7.3	75.5	67.2	0.0	3.5	7.3	78.0
TOTAL	1,011.1	500.4	20.1	67.6	1,599.2	1,077.7	601.7	23.1	72.3	1,774.8	1,077.7	630.5	56.6	72.3	1,837.1
San Juan River Basin															
San Juan R.	211.3	3.4	4.3	8.7	227.7	230.0	4.3	5.0	8.8	248.1	230.0	4.3	11.4	13.9	259.6
CRSP Evaporation				306.4	306.4				341.1	341.1				341.1	341.1
STATE TOTAL	1,365.7	503.9	41.7	389.2	2,300.4	1,466.3	606.0	46.7	428.7	2,547.7	1,466.3	634.8	93.9	433.8	2,628.8

- A) Ag and Evaporation have not exceeded the maximum values recorded during the 1981-85 period based on best available to date. Exports all time high was in 1978. Maximum Adjusted M&I values from U.S. Geological Survey WRIR 88-4101, all other values from U.S. Bureau of Reclamation Consumptive Uses and Losses Report.
- B) San Juan Adjustments could include full depletions for Animas-La Plata Project, Dolores Project and 10,193 irrigated acres for the Indian Settlement Agreements which are not included in the 20,900 acres identified in ALP or Dolores Projects (259,600 + 120,700 + 44,000 + 19,500 = 443,800).
- C) Adjustments similar to those for the San Juan could also be made in other basins based on the USBR depletion schedule.