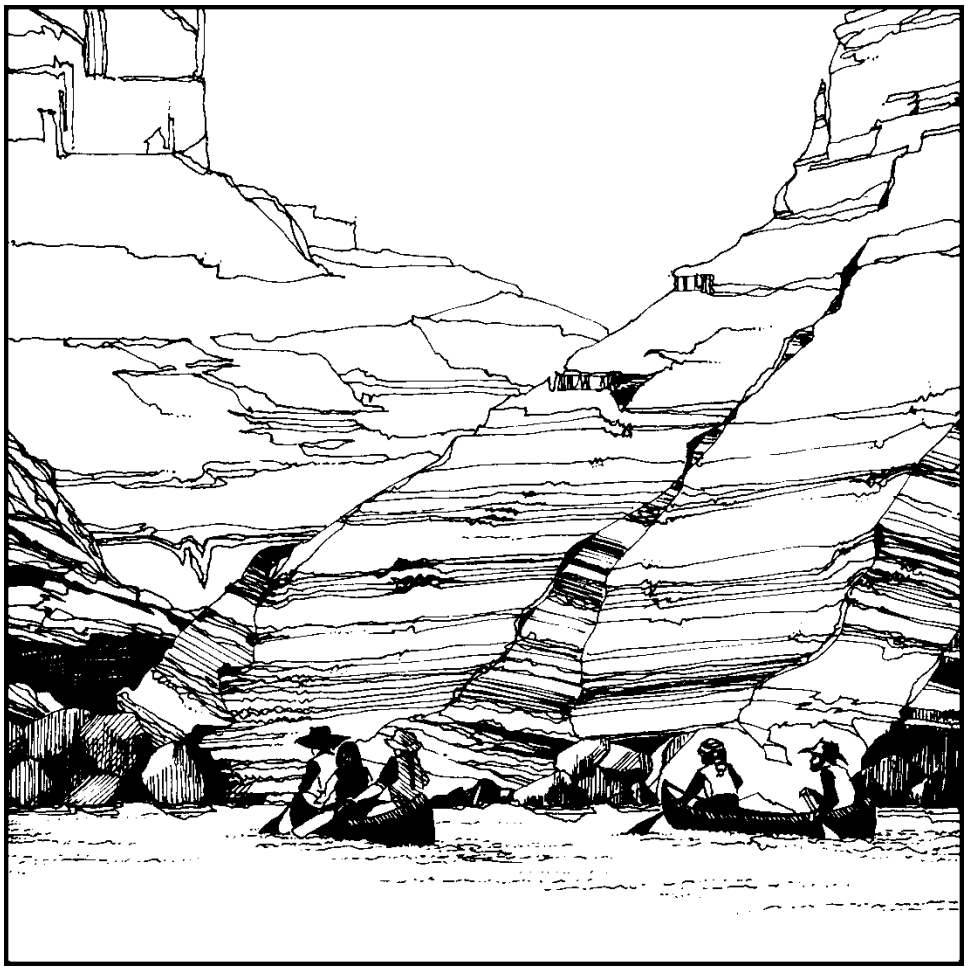
RECLAMATION

Managing Water in the West

Colorado River Basin Consumptive Uses and Losses Report 2006-2010



U.S. Department of the Interior
Bureau of Reclamation

Revised August 2017

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UPPER COLORADO RIVER SYSTEM
CONSUMPTIVE USES
AND
LOSSES REPORT
2006-2010

Revised August 2017

United States Department of the Interior
Bureau of Reclamation
Upper Colorado Region

UPPER COLORADO RIVER SYSTEM

CONSUMPTIVE USES AND LOSSES REPORT

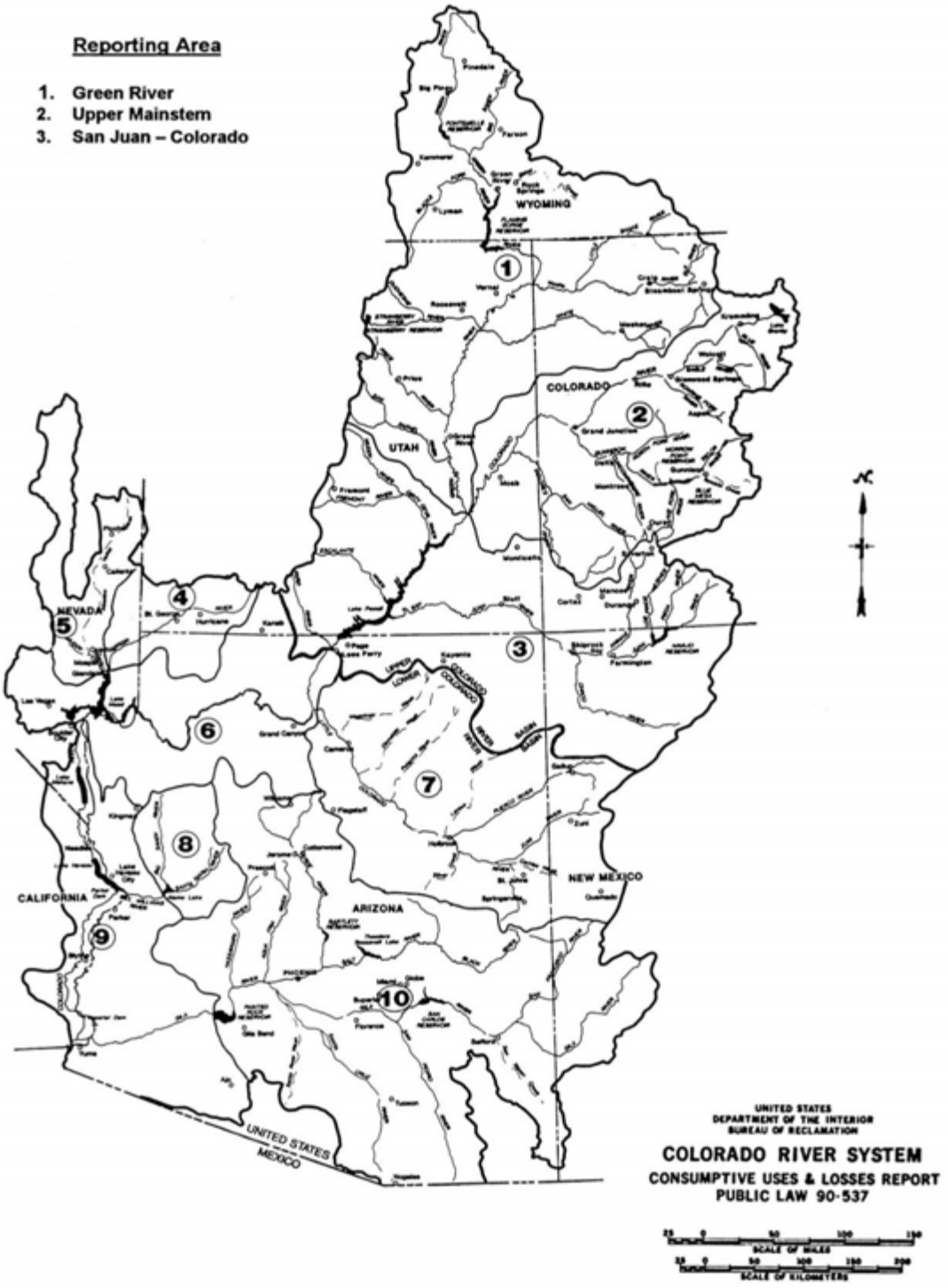
2006-2010

FOREWORD

This report was prepared pursuant to the Colorado River Basin Project Act of 1968, Public Law 90-537. The act directs the Secretary of the Interior to "make reports as to the annual consumptive uses and losses of water from the Colorado River System after each successive 5-year period, beginning with the 5-year period starting October 1, 1970. Such reports will be prepared in consultation with the States of the Lower Basin individually and with the Upper Colorado River Commission and will be transmitted to the President, the Congress, and to the Governors of each State signatory to the Colorado River Compact."

This report reflects the Department of the Interior's best estimate of actual consumptive uses and losses within the Upper Colorado River Basin. The reliability of the estimate is affected by the availability of data and the current capabilities of data evaluation. While typically reflecting estimates from the entire river basin, this report only includes Upper Basin numbers. Reclamation’s Lower Basin Regional Office is in the process of recalculating estimates of consumptive uses and losses from 1971 through the present. These activities are ongoing and the resulting data will be included in this, and subsequent, reports as they become available.

REPORTING AREA MAP



SUMMARY

This report presents estimates of the consumptive uses and losses from the Upper Colorado River System for each calendar year from 2006 through 2010. It includes a breakdown of the beneficial consumptive use by major types of use, by major tributary streams, and, where possible, by individual States.

The Colorado River rises in the Rocky Mountains of Colorado, flows southwesterly about 1,400 miles and terminates in the Gulf of California. Its drainage area of 242,000 square miles in this country represents one-fifteenth of the area of the United States. Its water is used for irrigation, municipal and industrial purposes, electric power generation, mineral activities, livestock, fish and wildlife, and recreation. Large amounts are exported from the system to adjoining areas. The following table summarizes annual water use from the system by basins and States, including water use supplied by groundwater. Distribution of water use by types of use from the various reporting areas is contained within the body of the report.

Table Summary

Upper Colorado River System: Water Use by States, Basins, and Tributaries [1]

(1,000 acre-feet)

STATE AND BASIN OF USE	2006	2007	2008	2009	2010	Average 2006-2010
ARIZONA						
Upper Basin	37	37	36	36	35	36
COLORADO						
Upper Basin	2,049	2,025	2,292	2,192	2,068	2,125
NEW MEXICO						
Upper Basin	393	429	458	416	389	417
UTAH						
Upper Basin	996	963	843	824	889	903
WYOMING						
Upper Basin	341	430	400	399	390	392
OTHER [2]						
Upper Basin Colorado River Storage Project Reservoir Evaporation	444	453	495	533	531	491
UPPER COLORADO RIVER SYSTEM						
Upper Basin	3,815	3,884	4,029	3,867	3,770	3,873
Other: Reservoir Evaporation and Channel Losses	444	453	495	533	531	491
Grand Total	4,259	4,337	4,524	4,400	4,301	4,364
UPPER COLORADO RIVER SYSTEM GRAND TOTAL	4,259	4,337	4,524	4,400	4,301	4,364

[1] Onsite consumptive uses and losses includes water uses satisfied by groundwater overdraft.
[2] Mainstem reservoir evaporation in the Upper Basin.

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Colorado River Basin

Upper Colorado River

UPPER COLORADO RIVER SYSTEM CONSUMPTIVE USES AND LOSSES REPORT 2006-2010

INTRODUCTION

The Upper Colorado River System is composed of portions of five States: Arizona, Colorado, New Mexico, Utah, and Wyoming. The Upper and Lower Colorado River Basins combined have a drainage area of about 242,000 square miles and represents about one-fifteenth of the area of the United States.

This report incorporates annual estimates of consumptive uses and losses of water from the Upper Colorado River System (system) from 2006 through 2010. Wherever available, water use reports prepared in accordance with legal requirements concerning the operation of the Colorado River were utilized. Base data needed to estimate onsite consumptive uses were taken largely from existing reports, studies, and from ongoing programs. Where current data were not available, estimated values were developed by various techniques and reasoned judgment. In general, methodology followed the techniques normally used within the system for estimating water use.

Nothing in this report is intended to interpret the provisions of the Colorado River Compact (45 Stat. 1057), the Upper Colorado River Basin Compact (63 Stat. 31), the Utilization of Waters of the Colorado and Tijuana Rivers and the Rio Grande, Treaty between the United States of America and Mexico (Treaty Series 994; 59 Stat. 1219), the Consolidated Decree entered by the Supreme Court of the United States in Arizona vs. California (574 U.S. 150 (2006), the Boulder Canyon Project Act (45 Stat. 1057), the Boulder Canyon Project Adjustment Act (54 Stat. 774; 43 U.S.C. 618a), the Colorado River Storage Project Act, (70 Stat. 105; 43 U.S.C. 620), the Colorado River Basin Project Act (82 Stat. 885; 43 U.S.C. 1501), the Colorado River Basin Salinity Control Act (88 Stat. 266; 43 U.S.C. 1951), the Hoover Power Plant Act of 1984 (98 Stat. 1333), the Colorado River Floodway Protection Act (100 Stat. 1129; 43 U.S.C. 1600), or the Grand Canyon Protection Act of 1992 (Title XVIII of Public Law 102-575, 106 Stat. 4669).

AUTHORITY

The authority for this report is contained in Public Law 90-537. Also known as the Colorado River Basin Project Act of 1968. Title VI, Section 601(b)(1) of the Act reads as follows:

(b) The Secretary is directed to:

(1) Make reports as to the annual consumptive uses and losses of water from the Colorado River System after each successive 5-year period, beginning with the 5-year period starting October 1, 1970. Such reports will include a detailed breakdown of the beneficial consumptive use of water on a State-by-State basis. Specific figures on quantities consumptively used from the major tributary streams flowing into the Colorado River shall also be included on a State-by-State basis. Such reports will be prepared in consultation with the States of the Lower Basin individually and with the Upper Colorado River Commission, and shall be transmitted to the President, the Congress, and to the Governors of each State signatory to the Colorado River Compact.

PLAN OF STUDY

The Plan of Study and Methods Manual for the Colorado River System Consumptive Uses and Losses Report 1985-1990 was prepared and submitted in July 1992. These procedures were generally followed in the preparation of this report. Any changes in methodology are presented in the Methodology and Data Adequacy section of this report.

STUDY REPORTING AREAS

The drainage area of the Colorado River System, in the United States, encompasses approximately 242,000 square miles. The river originates in the Rocky Mountains of Colorado and Wyoming, flows southwest for nearly 1,400 miles, terminating in the Gulf of California. The system consists of portions of seven states: Arizona, California, Colorado, New Mexico, Nevada, Utah, and Wyoming. The upper basin drainage area was divided into three sub-basins for the purposes of this report.

The Colorado River Compact, signed November 24, 1922, was established because the Upper Basin States were concerned that any storage of water on the river would be put to use more rapidly by the Lower Basin States, thus allowing them to claim prior appropriative rights. The Upper Basin States wanted provisions for their future development.

Traditionally, this five year report includes consumptive uses and losses data for the entire Colorado River system. Because of an ongoing effort in the lower basin to refine and recalculate these data in that reach of the river (and its tributaries), this report only covers upper basin data. When the lower basin data is available for this five year reporting period, it will be included in a total basin report.

For the purposes of this report, the term "Upper Basin States" refers to the States of Colorado, New Mexico, Utah, and Wyoming. However, the Upper Colorado River Basin is defined by its hydrologic boundaries, therefore, the hydrologic boundaries include portions of Arizona in the Upper Colorado River Basin and portions of Utah and New Mexico in the Lower Colorado River Basin. Lee Ferry is the division point between the Upper Colorado River Basin and the Lower Colorado River Basin. Hydrologic boundaries are shown on the map on page ii.

The major tributary streams selected as reporting areas in the Upper Colorado River Basin are: Green River (Wyoming, Colorado, Utah), Upper Main Stem (Colorado, Utah), and San Juan-Colorado (Colorado, New Mexico, Utah, Arizona). The outflow point and drainage area for each is shown in table C-1. The boundaries of the reporting areas are shown on the map on page ii. A brief description of each reporting area follows.

Upper Colorado River Basin

Green River (Wyoming, Colorado, Utah)

The Green River reporting area comprises approximately 44,800 square miles in southwestern Wyoming, northwestern Colorado, and northeastern and east-central Utah.

Principal tributaries of the Green River are Blacks Fork, New Fork, and Big Sandy Creek in southwestern Wyoming, Yampa and White Rivers on the western slope of the Continental Divide in northwestern Colorado, and the Price, Duchesne, and San Rafael Rivers in eastern Utah. These streams are fed by numerous headwater lakes.

The principal towns in the reporting area are Rock Springs and Green River in Wyoming, Vernal and Price in Utah, and Craig, Steamboat Springs, and Meeker in Colorado.

Mineral production is the major industry. Oil and natural gas are of primary importance, as are coal, Gilsonite, asphalt, and trona (soda ash). Thermal electric power production is becoming an increasingly important industry.

Agriculture ranks near mineral production in importance to the local economy. Agricultural development is centered on livestock production, primarily beef cattle and sheep. Due to a short growing season, crop production is limited largely to small grain, hay, and pasture. These crops are used as winter livestock feed and complement the vast areas of public grazing lands.

Irrigation consumptive use accounts for nearly 72 percent of the total water use in the Green River reporting area exclusive of any share of main stem evaporation. Nearly 529,000 acres of land are irrigated in an average year. Large exports of water are made to the Great Basin in Utah.

Upper Main Stem (Colorado, Utah)

The Upper Main Stem reporting area is drained by the Colorado River and its tributaries above the mouth of the Green River. Principal tributaries are the Roaring Fork, Gunnison, and the Dolores Rivers. The Upper Main Stem reporting area consists of 26,200 square miles, with about 85 percent of the area in Colorado and the remainder in Utah.

Grand Junction, Montrose, and Glenwood Springs are the principal towns in the Colorado portion of the upper main stem of the Colorado River. Moab is the only major community in the Utah portion of the upper main stem of the Colorado River.

Mineral production is the predominant industry. This area is the Nation's chief source of molybdenum and is a major source of vanadium, uranium, lead, zinc, coal, and Gilsonite. On the Upper Main Stem reporting area, as in that of the Green River, agriculture centers around production of livestock which feeds on irrigated lands to complement the large areas of rangeland. Somewhat increased diversification of crops occurs in the Upper Main Stem, however, with some major land areas devoted to corn, beans, potatoes, table vegetables, and fruit. This diversification is made possible by climatic and topographic conditions that create favorable air drainage and minimize frost damage.

Irrigation consumptive use accounts for about 56 percent of the water use in the Upper Main Stem reporting area exclusive of any share of main stem evaporation. In an average year approximately 579,000 acres of land are irrigated. Approximately, 36 percent of the water consumptively used is exported to serve agricultural and municipal needs on the Eastern slope of the Continental Divide in Colorado.

San Juan-Colorado (Colorado, New Mexico, Utah, Arizona)

The San Juan reporting area is drained by the Colorado River and its tributaries below the mouth of the Green River and above Lee Ferry, Arizona. The largest of the tributary streams is the San Juan River which heads on the western slope of the Continental Divide in southwestern Colorado. Principal tributaries of the San Juan River are the Navajo, Piedra, Los Pinos, Animas, and La Plata Rivers. The other main tributaries in the basin are the Dirty Devil, Escalante, and Paria Rivers, which drain a portion of the Eastern slope of the Wasatch Plateau in Utah. The reporting area includes about 38,600 square miles in portions of Utah, New Mexico, Arizona, and Colorado.

The largest towns in this portion of the basin are Durango and Cortez in Colorado, Monticello and Blanding in Utah, Farmington in New Mexico, and Page in Arizona.

Mining and agriculture form the economic base for the San Juan-Colorado reporting area. The agricultural development is similar to that of the Upper Main Stem where most of the cropland is devoted to livestock feeds except for the production of diversified market crops on lands with favorable drainage. The main market crops are fruit, vegetables, and dry beans. Oil, natural gas, and coal are the most important minerals produced. Thermal electric power production is increasingly important to the economy of the area.

Irrigation accounts for the largest use of water, about 71 percent of the San Juan reporting area use, exclusive of any share of main stem evaporation. About 426,000 acres of land are irrigated in an average year.

TERMINOLOGY

The Colorado River is not only one of the most highly controlled rivers in the world, but is also one of the most institutionally encompassed. A multitude of legal documents, known collectively as the "Law of the River," effect and dictate its management and operation. Major documents include:

Colorado River Compact—1922
Boulder Canyon Project Act—1928
California Limitation Act—1929
California Seven Party Agreement—1931
Mexican Water Treaty—1944
Upper Colorado River Basin Compact—1948
Colorado River Storage Project Act—1956
United States Supreme Court Decree in *Arizona vs. California*—1964
Colorado River Basin Project Act—1968
Minute 242 of the International Boundary and Water Commission,
United States and Mexico—1973
Colorado River Basin Salinity Control Act—1974, amended 1980, 1984, 1995, 1996, 2000 and 2008
Colorado River Water Delivery Agreement—2003
United States Supreme Court Consolidated Decree in *Arizona vs. California*—2006

The Colorado River System is defined in the Colorado River Compact of 1922 as "...that portion of the Colorado River and its tributaries within the United States,", whereas the Colorado River Basin is defined as "...all of the drainage area of the Colorado River System and all other territory within the United States of America to which waters of the Colorado River System shall be beneficially applied.". The compact divided the Colorado River Basin into two sub-basins—the "Upper Basin" and the "Lower Basin," with Lee Ferry as the division point on the river. Lee Ferry, located in Arizona, is a point in the main stem one mile below the mouth of the Paria River. For the purpose of this report, the Great Divide Basin, a closed basin in Wyoming has not been considered as part of the Upper Colorado River System since flows from this basin never reach the Colorado River. Diversions from the system to areas outside its drainage area are considered herein as exports and have not been classified by types of use.

Beneficial consumptive use is normally construed to mean the consumption of water brought about by human endeavors and in this report includes use of water for municipal, industrial, agricultural, power generation, export, recreation, fish and wildlife, and other purposes, along with the associated losses incidental to these uses.

The storage of water and water in transit may also act as losses on the system although normally such water is recoverable in time. Qualitatively, what constitutes beneficial consumptive use is fairly well understood; however, an inability to exactly quantify these uses has led to various differences of opinion. The practical necessity of administering the various water rights, apportionments, etc., of the Colorado River has led to definitions of consumptive use or depletions generally in terms of "how it shall be measured." The Upper Colorado River Basin Compact provides that the Upper Colorado River Commission is to determine the apportionment made to each State by "...the inflow- outflow method in terms of manmade depletions of the virgin flow at Lee Ferry...".
There is further provision that the measurement method can be changed by unanimous action of the Commission. In contrast, article I(A) of the decree of the Supreme Court of the United States in Arizona vs. California defines, for the purpose of the decree, "Consumptive use means diversions from the stream less such return flows thereto as are available for consumptive use in the United States or in satisfaction of the Mexican Treaty obligation.". Nearly all the water exported from the Upper Colorado River System

is measured; however, the remaining beneficial consumptive use, for the most part, must be estimated using theoretical methods and techniques. In the Lower Colorado River System tributaries to the main stem, similar methods must be employed to determine the amount of water consumptively used.

Reservoir evaporation loss is a consumptive use associated with the beneficial use of water for other purposes. For the purpose of this report, main stem reservoir evaporation is carried as a separate item for the Upper Basin.

Channel losses within the system are normally construed to be the consumptive use by riparian vegetation along the stream channel (or conveyance route) and the evaporation from the stream's water surface and wetted materials. Seepage from the stream normally appears again downstream or reaches a groundwater aquifer where it may be usable again. A decided lack of data and acceptable methodology, along with the intermittent flow characteristics of many southwestern streams, combine to make a reasonable determination of channel loss difficult. Channel losses have not been estimated for this report within the Upper Basin.

METHODOLOGY AND DATA ADEQUACY

This report is based almost entirely on data obtained from ongoing programs and current reports. Quantitative measurements of water use were used wherever available, but the majority of the basin water use was theoretically calculated. The following sections describe these calculations for the Upper Colorado River Basin.

Colorado River Basin Tributaries

In the tributary areas of the basin, records of diversions and return flows are not complete enough to allow direct calculation of consumptive water use. Theoretical and indirect methods of estimating consumptive use must then be relied upon. In the New Mexico portion of the Upper Colorado River Basin, the annual consumptive use of water is reported by the New Mexico Interstate Stream Commission. For the Arizona, Colorado, Utah and Wyoming portions of the Upper Colorado River Basin, the annual consumptive use of water was estimated using the following methodologies.

Agriculture

The percent of irrigation consumptive use ranged between 63 and 68 percent for the Upper Basin tributaries. This percent range excludes main stem evaporation. The annual irrigated acreage of most crops grown within each reporting area was estimated from information published in the yearly State Agriculture Statistics, 2002 & 2007 National Census of Agriculture (since the State statistics do not include pasture land), and from Geographic Information System (GIS) irrigated acreage data available for Colorado (2005, 2011), Utah (2005,2011), and Wyoming (2005, 2011). The total irrigated acreage values for the Upper Basin are shown in table UC-7.

Since most of these data were reported on a county basis, it was necessary to separate them into smaller reporting areas to represent the area denoted by the 8-digit Hydrologic Unit Code (HUC), county, and State boundary intersections. This was accomplished using the irrigated acreage delineation available from GIS and intersecting the coverage with the HUC, county and state boundaries.

These reporting areas generally follow tributary stream basin and State boundaries. One or more representative weather stations were selected to represent mean weather conditions for agricultural lands within each reporting area. Using records of temperature, precipitation, and frost dates, a consumptive use rate is computed for each major crop in each of the reporting years using the modified Blaney Criddle evapotranspiration formula in the version described in the Soil Conservation Service Technical Release No. 21, "Irrigation Water Requirements," revised September 1970. Irrigation consumptive use rates are determined by subtracting the effective precipitation from the consumptive use rates. Effective precipitation for the Upper Basin was computed using the Soil Conservation Service method. This method is referenced in "SCS Technical Release No. 21." The monthly values of irrigation consumptive use rates multiplied by the estimates of irrigated acreage yield the final values of irrigation consumptive use volumes.

These theoretical consumptive use calculations are based on the assumption of full water supply during the crop growing season. However, it is estimated that in an average year, about 37 percent of the irrigated lands in the Upper Basin receive less than a full supply of water, either due to junior water rights or a lack of distribution facilities. The degree to which these lands suffer shortages varies widely from year to year, depending in large part on the magnitude of runoff. An estimate of the short supply service lands was made for irrigation reporting areas covering the Upper Colorado Basin, primarily on the basis of reports and investigations collected for the 1971 comprehensive framework study. A streamflow gauging station was selected within each reporting area and the magnitude of the recessional portion of the annual hydrograph was used as an index to select the date at which consumptive use calculations are terminated for the short supply lands. Estimates of total shortage water volumes (the volume of water that would have been consumed by crops if the shortage criteria were not in place) are displayed in table UC-9.

Comprehensive framework studies of the incidental use of water associated with irrigation indicated that this use varied between 5 and 29 percent of the irrigation consumptive use, depending upon the location of the study area within the Upper Colorado Basin.

The agricultural data is generally adequate for use in this report. Each state annually prepared State Agricultural Statistics, which include county total acreage estimates (irrigated and unirrigated are not distinguished) of the harvested crops during the reporting period. These statistics are assumed to be reliable. State Agricultural Statistics do not include pasture land in the Basin and do not distinguish between irrigated and unirrigated agricultural lands. Therefore, in the Upper Basin states GIS irrigated acreage data (available approximately every 5 years) in conjunction with the National Census of Agriculture data were used to estimate irrigated pasture lands and to develop a ratio for irrigated versus unirrigated agriculture to determine the portion of State Agricultural Statistics that is irrigated agriculture. Other areas of agricultural data collection that need to be updated and verified are: (1) the consumptive water use of lands that receive less

than a full seasonal supply of irrigation water and the aerial extent of these lands, and (2) the amount of incidental seepage and phreatophytic losses associated with irrigation.

Reservoir Evaporation

A comprehensive listing was developed of all reservoirs in the Upper Colorado River Basin primarily based on the National Inventory of Dams database, which included the latitude, longitude, elevation, and surface area at total capacity for each reservoir.

Monthly water-surface area was obtained for those reservoirs for which records are available. For those reservoirs lacking records (unmeasured), a "fullness factor" was estimated on the basis of reservoir use and historical hydrologic conditions. These "fullness factors" were then used to obtain estimates of average annual water surface area for the unreported reservoirs. For all reservoirs without monthly evaporation estiamtes, annual free water surface (FWS) evaporation rates were used to determine reservoir evaporation.

The FWS evaporation value was taken from NOAA Technical Report NWS 33, “Evaporation Atlas for the Contiguous 48 United States”, June 1982, Map 3 of 4 : Annual FWS Evaporation based on the reservoir location information. An account was taken of precipitation and runoff salvage to determine net evaporation rates. The annual FWS evaporation rates were distributed monthly based on an average basin monthly distribution. For unmeasured reservoirs, the annual net evaporation rates were applied to the estimates of average annual water-surface area to yield the values of annual reservoir evaporation.

An exception to this procedure was the determination of evaporation from what are called the main stem reservoirs shown in table UC-1 and a few additional reservoirs operated by Reclamation. For these reservoirs monthly reservoir evaporation was taken from Reclamation’s hydrologic data base. Records of monthly evaporation rates applied at these sites are based on past pan evaporation studies adjusted based on limited mass transfer method based measurements and maintained by Reclamation’s Upper Colorado Region water operations group.

Groundwater

Currently, all groundwater pumping is counted as consumptive use charged against the Colorado River Basin. Obviously, this is not necessarily true. Depending on the location and depth of the well and what types of soils are present in the area, it is possible that little or none of the water pumped would have contributed to the Colorado River System for hundreds or even thousands of years. If changes to this groundwater accounting structure are desired, a team consisting of personnel from various State Engineers Offices, Bureau of Reclamation, and any other pertinent agencies should be established. This team would establish guidelines for computing what amounts of groundwater pumped should be charged against the Colorado River Basin on an area-by-area basis. The recommendations of this team could then be incorporated in future Consumptive Uses and Losses calculations. Until these guidelines are established, the Consumptive Uses and Losses Reports will continue to report all groundwater pumping as depletion from the system.

Currently, the Arizona portion of the Upper Basin is the only part of the basin that reports (see the Arizona portion of the Upper Colorado River basin Consumptive Uses and Losses Reports) the portion of consumptive use served via groundwater pumpage.

Stockpond Evaporation and Livestock

Stockpond surface areas were estimated from the May 1975 Soil Conservation Service (SCS) publication, "Livestock Water Use." The subbasin stockpond areas were subdivided by county using the livestock population distribution. The livestock population distribution was further subdivided to State and basin by the irrigated lands average distribution. The same procedure used to calculate the unmeasured reservoir evaporation was used to estimate the stockpond evaporation.

Livestock population data was taken from annual state agriculture statistics and the 2002 and 2007 Census of Agriculture. Livestock population data included cattle, sheep, horses, and hogs. Consumption rates for the various livestock were derived from various reports, including the SCS publication, "Livestock Water Use," May 1975.

Stockpond and livestock data are adequate to prepare an estimate of this consumptive use. Considering the small amount of water use, any refuting effort would be best spent on the irrigation or evaporation categories.

Mineral Resources

The Upper Basin uses water in the production of numerous minerals in addition to energy-related materials such as oil and natural gas.

Estimates of the water consumptively used were based largely on phone surveys conducted by the U.S. Geological Survey and summarized in “Estimated Use of Water in the United States”. These data were reported at an 8-digit HUC level in 1995 and unofficially in 2000. Estimates for 2006-2010 relied on the unofficially reported 2000 water use estimates.

Thermal Electric Power

The net use of water for the production of thermal electric energy from the tributaries of the Colorado River Basin was collected from records obtained from the various power companies in the Basin or estimates from historically reported records. These records have been becoming more difficult to collect and are primarily estimated based on historically reported records.

Municipal and Industrial

The basis for estimating municipal and industrial uses was the urban and rural population within the reporting areas. Preparation of annual population estimates was guided by the 2000 and 2010 census, various state and county statistical reviews, and reports that included population estimates for local areas. The yearly population estimates for the Upper Basin are shown in table UC-8.

Historically, municipal and industrial consumptive uses were collected by the USGS and summarized in the “Estimated Use of Water in the United States” reporting series (published every 5 years) at an 8-digit HUC watershed scale. These reports have not included consumptive use estimates at this scale since 1995. To estimate 2006-2010 municipal and industrial consumptive use a per capita use rate was derived from data summarized in “Estimated Use of Water in the United States in 1995", USGS Circular 1200, where estimates were last published at the 8-digit HUC watershed scale. The data used included a combination of water supply withdrawal and consumptive use estimates from the domestic, commercial, industrial, and public use categories along with population data. The estimates for 2006-2010 were computed based on the 1995 per capita use estimates coupled with the 2006-2010 urban and rural population.

The population of the Upper Colorado River System, estimated at nearly 877 thousand in 2006, has increased to approximately 929 thousand in 2010. Approximately twenty percent of the Upper Basin population was classified as rural with a significantly smaller per-capita use of water. Both the urban and rural areas have the mutual problem of providing an adequate current and future water supply for a growing population in water-short areas. As a result of almost continuous studies concerning these problems, adequate production and effluent records are usually available to adequately assess water use.

Transbasin Diversions

Nearly all the transbasin diversions both out of and into the Upper Colorado River System were measured and reported by the Geological Survey, state agencies or local water commissioners and users. The remainder was estimated on the basis of past records and capacity of facilities. Due to the high degree of measurement, this area of basin consumptive use is considered to be quite accurately determined.

BENEFICIAL CONSUMPTIVE USES AND LOSSES

A summary table of the Upper Colorado River System total annual water uses, 2006 through 2010, shown on page iv. Tables C-2 through C-6 show on a yearly basis the same information broken down by State, basin, and type of use. Water use within the selected reporting areas is discussed below.

Upper Colorado River Tributaries

Summaries of estimated annual consumptive uses and losses in the Upper Colorado River Basin for each of the reporting years, broken down by State, reporting area, and type of use are shown in tables UC-2 through UC-6. The subtotals and totals may not add appropriately because totals were computed before rounding all values to 100 acre-feet. Totals were computed before rounding to ensure values reported, including subtotals and totals, are representative of the values utilized for computation of natural flow in the Upper Colorado Basin.

Estimated main stem reservoir evaporation is shown in table UC-1. Technically, these are not all main stem reservoirs but are reservoirs that participate in the Colorado River Storage Project (CRSP). The Upper Colorado River Commission designates which reservoirs in the CRSP have evaporation losses charged to the State and which have losses charged to the basin as a whole. Reservoirs listed in table UC-1 are those to be charged to the basin as a whole. These reservoir evaporation losses average 491,300 acre-feet per year or approximately 11 percent of all Upper Basin uses.

Upper Basin consumptive use varied between 4.26 million and 4.52 million acre-feet and averaged 4.36 million acre-feet per year for the reporting period, 2006 through 2010. Agricultural uses accounted for about 59 percent of the total Upper Basin consumptive uses and losses. Irrigated acreage fluctuated very little during this period, ranging between 1.34 million acres and 1.69 million acres, and averaged 1.53 million acres per year. Variation in consumptive use during the reporting period was largely due to year-to-year changes in climatic conditions.

Transbasin exports, the second largest Upper Basin use, on the average accounted for 19 percent of Upper Basin total use, showed year by year variation during the reporting period ranging from a high of 955,000 acre-feet in 2008 to a low of 672,100 acre-feet in 2010. Water uses for thermal electric power generation remained fairly constant, averaging about 165,000 acre-feet per year, which represents about four percent of consumptive use in the Upper Basin.

Table C-1
Drainage Area of the Upper Colorado River System by State and Major Tributary Streams.

(1,000 Square Miles)

Major Tributary Streams and their Selected Outflow Points	Wyoming	Colorado	Utah	New Mexico	Arizona	TOTAL
Green River at Colorado River confluence, Utah (subbasin 1)	17.1	10.6	17.1	-	-	44.8
Upper Main Stem at Green River confluence, Utah (subbasin 2)	-	22.2	4.0	-	-	26.2
San Juan - Colorado at Lee's Ferry, Arizona (subbasin 3)	-	5.8	16.2	9.7	6.9	38.6
Colorado River System above Lee's Ferry	17.1	38.6	37.3	9.7	6.9	109.6

Table C-2
Summary of Estimated Water Use by Upper Basin States and the Types of Use
2006

(1,000 acre-feet)

State	Estimated Beneficial Consumptive Uses and Losses [1]					
	Reservoir Evaporation	Irrigated Agriculture [2]	Municipal and Industrial [3]	Export Outside System	Export Within System	TOTAL
Arizona	3.7	1.6	31.6	0.0	0.0	36.8
Colorado	92.5	1,232.0	64.9	659.4	0.0	2,048.9
New Mexico	30.9	215.5	67.3	78.8	0.0	392.5
Utah	78.9	748.0	56.3	112.7	0.0	995.9
Wyoming	36.6	239.0	45.7	19.8	0.0	341.1
Other[4]	444.0	0.0	0.0	0.0	0.0	444.0
Upper Colorado River System Total	686.5	2,436.2	265.8	870.7	0.0	4,259.1

[1] From Tables UC-1 and UC-2.

[2] Includes livestock water use and stockpond evaporation.

[3] Includes water uses for thermal electric power generation and mineral resources.

[4] Reservoir evaporation represents main stem reservoir evaporation in the Upper Basin.

Table C-3
Summary of Estimated Water Use by Upper Basin States and the Types of Use
2007

(1,000 acre-feet)

State	Estimated Beneficial Consumptive Uses and Losses [1]					
	Reservoir Evaporation	Irrigated Agriculture [2]	Municipal and Industrial [3]	Export Outside System	Export Within System	TOTAL
Arizona	3.5	2.1	31.1	0.0	0.0	36.7
Colorado	93.4	1,346.8	64.9	520.0	0.0	2,025.0
New Mexico	32.4	228.4	63.0	105.1	0.0	428.9
Utah	78.4	694.1	56.4	134.2	0.0	963.1
Wyoming	34.1	338.0	42.9	15.3	0.0	430.3
Other [4]	453.0	0.0	0.0	0.0	0.0	453.0
Colorado River System Total	694.9	2,609.4	258.3	774.6	0.0	4,337.1

[1] From Tables UC-1 and UC-2.

[2] Includes livestock water use and stockpond evaporation.

[3] Includes water uses for thermal electric power generation and mineral resources.

[4] Reservoir evaporation represents main stem reservoir evaporation in the Upper Basin.

Table C-4
Summary of Estimated Water Use by Upper Basin States and the Types of Use
2008

(1,000 acre-feet)

State	Estimated Beneficial Consumptive Uses and Losses [1]					
	Reservoir Evaporation	Irrigated Agriculture [2]	Municipal and Industrial [3]	Export Outside System	Export Within System	TOTAL
Arizona	3.5	2.3	30.0	0.0	0.0	35.7
Colorado	92.7	1,458.1	65.6	675.2	0.0	2,291.6
New Mexico	28.7	226.0	63.8	140.0	0.0	458.4
Utah	77.4	591.2	56.4	117.8	0.0	842.9
Wyoming	35.8	298.6	43.7	22.0	0.0	400.1
Other [4]	495.1	0.0	0.0	0.0	0.0	495.1
Colorado River System Total	733.2	2,576.1	259.5	955.0	0.0	4,523.8

[1] From Tables UC-1 and UC-2.

[2] Includes livestock water use and stockpond evaporation.

[3] Includes water uses for thermal electric power generation and mineral resources.

[4] Reservoir evaporation represents main stem reservoir evaporation in the Upper Basin.

Table C-5
Summary of Estimated Water Use by Upper Basin States and the Types of Use
2009

(1,000 acre-feet)

State	Estimated Beneficial Consumptive Uses and Losses [1]					
	Reservoir Evaporation	Irrigated Agriculture [2]	Municipal and Industrial [3]	Export Outside System	Export Within System	TOTAL
Arizona	3.8	1.9	30.3	0.0	0.0	35.9
Colorado	93.6	1,476.8	66.3	555.4	0.0	2,192.1
New Mexico	28.9	217.9	64.2	105.4	0.0	416.4
Utah	80.2	570.1	56.5	116.8	0.0	823.6
Wyoming	36.4	306.0	43.6	13.0	0.0	399.1
Other [4]	533.1	0.0	0.0	0.0	0.0	533.1
Colorado River System Total	776.0	2,572.8	260.9	790.5	0.0	4,400.2

[1] From Tables UC-1 and UC-2.

[2] Includes livestock water use and stockpond evaporation.

[3] Includes water uses for thermal electric power generation and mineral resources.

[4] Reservoir evaporation represents main stem reservoir evaporation in the Upper Basin.

Table C-6
Summary of Estimated Water Use by Upper Basin States and the Types of Use
2010

(1,000 acre-feet)

State	Estimated Beneficial Consumptive Uses and Losses [1]					
	Reservoir Evaporation	Irrigated Agriculture [2]	Municipal and Industrial [3]	Export Outside System	Export Within System	TOTAL
Arizona	3.3	2.7	29.2	0.0	0.0	35.1
Colorado	90.3	1,476.8	67.0	433.6	0.0	2,067.7
New Mexico	29.8	212.7	56.8	89.4	0.0	388.8
Utah	77.4	619.5	56.8	135.0	0.0	888.7
Wyoming	32.4	297.8	45.2	14.1	0.0	389.6
Other [4]	531.1	0.0	0.0	0.0	0.0	531.1
Colorado River System Total	764.3	2,609.6	255.1	672.1	0.0	4,301.0

[1] From Tables UC-1 and UC-2.

[2] Includes livestock water use and stockpond evaporation.

[3] Includes water uses for thermal electric power generation and mineral resources.

[4] Reservoir evaporation represents main stem reservoir evaporation in the Upper Basin.

Table UC-1
Upper Colorado River Basin
Estimated Main Stem Reservoir Evaporation [1]
2006-2010

(1,000 acre-feet)

	Evaporation					
Reservoir	2006	2007	2008	2009	2010	Average
Flaming Gorge	76.5	76.6	75.3	79.7	78.4	77.3
Blue Mesa	8.8	8.7	8.2	8.8	8.4	8.6
Morrow Point	0.8	0.8	0.8	0.8	0.8	0.8
Lake Powell	357.9	367.0	410.8	443.8	443.4	404.6
TOTAL	444.0	453.0	495.1	533.1	531.1	491.3

[1] Undistributed by States. Evaporation determined using average historical evaporation rates.

Table UC-2
Upper Colorado River Basin
Estimated Water Use within States, by Major Tributaries and Types of Use
2006

(1,000 acre-feet)

State	Tributary	Reservoir Evaporation[1]	Agriculture			Municipal and Industrial				Export		
			Irrigation	Stockpond Evaporation & Livestock	Subtotal	Mineral Resources	Thermal Electric Power	Other[2]	Subtotal	Outside System	Within System	TOTAL
Arizona	San Juan - Colorado Rivers	3.7	0.6	1.0	1.6	0.0	26.7	4.9	31.6	0.0	0.0	36.8
Colorado	Green River	8.4	148.4	3.2	151.6	0.3	18.5	3.4	22.2	0.0	2.8	185.0
	Upper Main Stem	73.2	795.0	6.5	801.5	3.1	1.7	31.5	36.4	658.3	213.9	1,783.2
	San Juan - Colorado Rivers	10.9	274.3	4.7	279.0	0.2	0.0	6.2	6.4	1.1	(216.7)	80.7
	TOTAL	92.5	1,217.8	14.3	1,232.0	3.6	20.2	41.1	64.9	659.4	0.0	2,048.9
New Mexico	San Juan - Colorado Rivers	30.9	211.3	4.2	215.5	1.0	50.4	16.0	67.3	78.8	0.0	392.5
Utah	Green River	70.8	591.4	4.5	595.9	1.2	34.5	12.3	48.0	117.7	0.0	832.1
	Upper Main Stem	1.4	20.5	0.2	20.6	0.6	0.0	1.7	2.2	0.0	0.0	24.3
	San Juan - Colorado Rivers	6.6	127.8	3.7	131.5	2.2	0.0	3.8	6.1	(5.0)	0.0	139.1
	TOTAL	78.9	739.7	8.4	748.0	3.9	34.5	17.8	56.3	112.7	0.0	995.5
Wyoming	Green River	36.6	234.1	4.9	239.0	0.8	39.7	5.2	45.7	19.8	0.0	341.1
Upper Basin	Green River	115.8	974.0	12.5	986.5	2.2	92.7	21.0	115.9	137.5	2.8	1,358.5
	Upper Main Stem	74.6	815.5	6.6	822.1	3.7	1.7	33.2	38.6	658.3	213.9	1,807.6
	San Juan - Colorado Rivers	52.1	614.0	13.6	627.6	3.3	77.1	30.9	111.4	74.9	(216.7)	649.1
	TOTAL	242.5	2,403.4	32.8	2,436.2	9.3	171.5	85.1	265.8	870.7	0.0	3,815.2

[1] Excludes reservoir evaporation from Colorado River main stem reservoirs listed in Table UC-1.
[2] Includes rural, urban, and other industrial uses.

Table UC-3
Upper Colorado River Basin
Estimated Water Use within States, by Major Tributaries and Types of Use
2007

(1,000 acre-feet)

State	Tributary	Reservoir Evaporation[1]	Agriculture			Municipal and Industrial				Export		TOTAL
			Irrigation	Stockpond Evaporation & Livestock	Subtotal	Mineral Resources	Thermal Electric Power	Other[2]	Subtotal	Outside System	Within System	
Arizona	San Juan - Colorado Rivers	3.5	1.0	1.1	2.1	0.0	27.6	3.5	31.1	0.0	0.0	36.7
Colorado	Green River	7.5	155.9	2.7	158.6	0.3	17.8	3.4	21.6	0.0	1.8	189.5
	Upper Main Stem	74.3	836.9	6.1	843.0	3.1	1.6	32.1	36.9	517.5	220.6	1,692.3
	San Juan - Colorado Rivers	11.5	340.3	4.9	345.2	0.2	0.0	6.3	6.5	2.5	(222.4)	143.3
	TOTAL	93.4	1,333.1	13.7	1,346.8	3.6	19.5	41.9	64.9	520.0	0.0	2,025.0
New Mexico	San Juan - Colorado Rivers	32.4	224.1	4.3	228.4	1.0	45.7	16.3	63.0	105.1	0.0	428.9
Utah	Green River	70.4	537.8	4.5	542.3	1.0	34.5	12.5	48.1	138.7	0.0	799.5
	Upper Main Stem	1.5	14.3	0.2	14.5	0.5	0.0	1.7	2.2	0.0	0.0	18.2
	San Juan - Colorado Rivers	6.6	133.4	3.8	137.2	2.3	0.0	3.9	6.1	(4.5)	0.0	145.5
	TOTAL	78.4	685.5	8.6	694.1	3.8	34.5	18.1	56.4	134.2	0.0	963.1
Wyoming	Green River	34.1	333.3	4.8	338.0	0.8	36.9	5.3	42.9	15.3	0.0	430.3
Upper Basin	Green River	112.0	1,027.0	12.0	1,039.0	2.1	89.2	21.2	112.5	154.0	1.8	1,419.3
	Upper Main Stem	75.8	851.2	6.3	857.5	3.7	1.6	33.8	39.1	517.5	220.6	1,710.4
	San Juan - Colorado Rivers	54.0	698.8	14.1	712.9	3.4	73.3	30.0	106.7	103.1	(222.4)	754.4
	TOTAL	241.9	2,577.0	32.4	2,609.4	9.2	164.1	85.0	258.3	774.6	0.0	3,884.1

[1] Excludes reservoir evaporation from Colorado River main stem reservoirs listed in Table UC-1.
[2] Includes rural, urban, and other industrial uses.

Table UC-4
Upper Colorado River Basin
Estimated Water Use within States, by Major Tributaries and Types of Use
2008

(1,000 acre-feet)

State	Tributary	Reservoir Evaporation[1]	Agriculture			Municipal and Industrial				Export		TOTAL
			Irrigation	Stockpond Evaporation & Livestock	Subtotal	Mineral Resources	Thermal Electric Power	Other[2]	Subtotal	Outside System	Within System	
Arizona	San Juan - Colorado Rivers	3.5	1.1	1.2	2.3	0.0	26.3	3.7	30.0	0.0	0.0	35.7
Colorado	Green River	8.4	151.8	2.9	154.7	0.2	17.8	3.5	21.6	0.0	2.7	187.4
	Upper Main Stem	73.7	907.0	6.3	913.2	3.1	1.6	32.7	37.5	673.4	235.8	1,933.6
	San Juan - Colorado Rivers	10.7	385.1	5.0	390.1	0.2	0.0	6.4	6.5	1.7	(238.5)	170.6
	TOTAL	92.7	1,443.9	14.2	1,458.1	3.5	19.5	42.6	65.6	675.2	0.0	2,291.6
New Mexico	San Juan - Colorado Rivers	28.7	221.7	4.3	226.0	0.9	46.0	16.9	63.8	140.0	0.0	458.4
Utah	Green River	69.3	454.6	4.5	459.1	0.9	34.5	12.7	48.1	123.1	0.0	699.7
	Upper Main Stem	1.5	17.6	0.2	17.8	0.5	0.0	1.7	2.2	0.0	0.0	21.4
	San Juan - Colorado Rivers	6.6	110.5	3.8	114.3	2.3	0.0	3.9	6.2	(5.3)	0.0	121.8
	TOTAL	77.4	582.8	8.5	591.2	3.7	34.5	18.3	56.4	117.8	0.0	842.9
Wyoming	Green River	35.8	293.8	4.8	298.6	0.8	37.6	5.3	43.7	22.0	0.0	400.1
Upper Basin	Green River	113.5	900.2	12.2	912.4	1.9	90.0	21.5	113.3	145.2	2.7	1,287.2
	Upper Main Stem	75.2	924.5	6.4	931.0	3.6	1.6	34.4	39.7	673.4	235.8	1,955.0
	San Juan - Colorado Rivers	49.4	718.4	14.3	732.7	3.4	72.3	30.8	106.5	136.4	(238.5)	786.5
	TOTAL	238.1	2,543.2	33.0	2,576.1	8.9	163.9	86.7	259.5	955.0	0.0	4,028.7

[1] Excludes reservoir evaporation from Colorado River main stem reservoirs listed in Table UC-1.

[2] Includes rural, urban, and other industrial uses.

Table UC-5
Upper Colorado River Basin
Estimated Water Use within States, by Major Tributaries and Types of Use
2009

(1,000 acre-feet)

State	Tributary	Reservoir Evaporation[1]	Agriculture			Municipal and Industrial				Export		TOTAL
			Irrigation	Stockpond Evaporation & Livestock	Subtotal	Mineral Resources	Thermal Electric Power	Other[2]	Subtotal	Outside System	Within System	
Arizona	San Juan - Colorado Rivers	3.8	0.7	1.2	1.9	0.0	26.1	4.2	30.3	0.0	0.0	35.9
Colorado	Green River	8.1	204.7	2.8	207.5	0.2	17.8	3.5	21.5	0.0	3.0	240.1
	Upper Main Stem	73.8	885.5	6.2	891.7	3.1	1.6	33.4	38.1	553.6	207.3	1,764.6
	San Juan - Colorado Rivers	11.7	372.0	5.7	377.6	0.2	0.0	6.5	6.6	1.8	(210.3)	187.5
	TOTAL	93.6	1,462.2	14.6	1,476.8	3.5	19.4	43.4	66.3	555.4	0.0	2,192.1
New Mexico	San Juan - Colorado Rivers	28.9	213.6	4.3	217.9	0.9	48.0	15.2	64.2	105.4	0.0	416.4
Utah	Green River	72.1	443.9	4.5	448.4	0.8	34.5	12.9	48.2	121.0	0.0	689.7
	Upper Main Stem	1.5	15.1	0.2	15.2	0.4	0.0	1.7	2.1	0.0	0.0	18.8
	San Juan - Colorado Rivers	6.6	102.6	3.8	106.5	2.3	0.0	3.9	6.2	(4.3)	0.0	115.0
	TOTAL	80.2	561.6	8.5	570.1	3.5	34.5	18.5	56.5	116.8	0.0	823.6
Wyoming	Green River	36.4	301.1	4.9	306.0	0.7	37.6	5.3	43.6	13.0	0.0	399.1
Upper Basin	Green River	116.6	949.7	12.2	961.9	1.7	89.9	21.7	113.3	134.0	3.0	1,328.8
	Upper Main Stem	75.3	900.6	6.4	907.0	3.6	1.6	35.1	40.3	553.6	207.3	1,783.4
	San Juan - Colorado Rivers	51.0	688.9	15.0	703.9	3.4	74.1	29.8	107.3	102.9	(210.3)	754.8
	TOTAL	242.8	2,539.3	33.5	2,572.8	8.7	165.6	86.6	260.9	790.5	0.0	3,867.1

[1] Excludes reservoir evaporation from Colorado River main stem reservoirs listed in Table UC-1.
[2] Includes rural, urban, and other industrial uses.

Table UC-6
Upper Colorado River Basin
Estimated Water Use within States, by Major Tributaries and Types of Use
2010

(1,000 acre-feet)

State	Tributary	Reservoir Evaporation[1]	Agriculture			Municipal and Industrial				Export		TOTAL
			Irrigation	Stockpond Evaporation & Livestock	Subtotal	Mineral Resources	Thermal Electric Power	Other[2]	Subtotal	Outside System	Within System	
Arizona	San Juan - Colorado Rivers	3.3	1.2	1.5	2.7	0.0	23.9	5.2	29.2	0.0	0.0	35.1
Colorado	Green River	7.6	216.4	2.7	219.1	0.2	17.8	3.6	21.5	0.0	2.9	251.0
	Upper Main Stem	72.4	883.4	5.7	889.1	3.1	1.6	34.0	38.8	432.2	217.3	1,649.6
	San Juan - Colorado Rivers	10.4	363.7	5.0	368.7	0.2	0.0	6.6	6.7	1.4	(220.2)	167.1
	TOTAL	90.3	1,463.4	13.4	1,476.8	3.5	19.4	44.1	67.0	433.6	0.0	2,067.7
New Mexico	San Juan - Colorado Rivers	29.8	208.4	4.3	212.7	0.9	42.5	13.4	56.8	89.4	0.0	388.8
Utah	Green River	69.6	492.8	4.5	497.3	0.6	34.7	13.1	48.4	140.3	0.0	755.5
	Upper Main Stem	1.4	25.7	0.2	25.9	0.4	0.0	1.7	2.1	0.0	0.0	29.4
	San Juan - Colorado Rivers	6.4	92.6	3.8	96.4	2.4	0.0	3.9	6.3	(5.3)	0.0	103.8
	TOTAL	77.4	611.0	8.5	619.5	3.4	34.7	18.7	56.8	135.0	0.0	888.7
Wyoming	Green River	32.4	293.0	4.8	297.8	0.7	38.2	6.3	45.2	14.1	0.0	389.6
Upper Basin	Green River	109.5	1,002.1	12.1	1,014.2	1.6	90.7	23.0	115.2	154.4	2.9	1,396.2
	Upper Main Stem	73.8	909.1	5.9	915.0	3.5	1.6	35.7	40.9	432.2	217.3	1,679.1
	San Juan - Colorado Rivers	50.0	665.8	14.6	680.4	3.5	66.5	29.0	99.0	85.5	(220.2)	694.8
	TOTAL	233.3	2,577.0	32.6	2,609.6	8.6	158.8	87.7	255.1	672.1	0.0	3,770.0

[1] Excludes reservoir evaporation from Colorado River main stem reservoirs listed in Table UC-1.
[2] Includes rural, urban, and other industrial uses.

Table UC-7
Upper Colorado River Basin
Irrigated Acreage
2006 - 2010

(1,000 acres)

State	Tributary	Irrigated Acreage 2006	2007	2008	2009	2010
Arizona	San Juan - Colorado Rivers	0.5	0.6	0.6	0.6	0.7
Colorado	Green River	100.8	110.0	131.8	177.6	178.8
	Upper Main Stem	469.1	486.3	520.3	516.0	548.7
	San Juan - Colorado Rivers	163.5	187.7	217.7	218.2	234.9
	TOTAL	733.4	784.0	869.8	911.8	962.4
New Mexico	San Juan - Colorado Rivers	81.9	84.8	85.7	83.0	86.8
Utah	Green River	275.4	248.8	238.2	240.9	270.7
	Upper Main Stem	9.0	7.8	7.6	8.3	6.8
	San Juan - Colorado Rivers	58.7	60.3	53.1	50.4	49.1
	TOTAL	343.0	316.9	299.0	299.7	326.5
Wyoming	Green River	183.4	304.3	293.7	304.7	309.6
Upper Basin	Green River	559.5	663.1	663.7	723.1	759.1
	Upper Main Stem	478.1	494.0	527.9	524.3	555.4
	San Juan - Colorado Rivers	304.6	333.4	357.1	352.3	371.5
	TOTAL	1,342.2	1,490.6	1,548.8	1,599.8	1,686.0

Table UC-8
Upper Colorado River Basin
Population Estimates
2006 - 2010

(1,000's)

State	Tributary	Population				
		2006	2007	2008	2009	2010
Arizona	San Juan - Colorado Rivers	48.2	47.9	47.7	47.5	47.3
Colorado	Green River	41.4	41.9	42.4	42.9	43.4
	Upper Main Stem	387.7	395.4	403.1	410.8	418.4
	San Juan - Colorado Rivers	84.7	85.9	87.0	88.2	89.3
	TOTAL	513.8	523.2	532.5	541.9	551.1
New Mexico	San Juan - Colorado Rivers	147.1	147.3	147.5	147.8	148.0
Utah	Green River	79.5	80.8	82.1	83.3	84.6
	Upper Main Stem	9.2	9.3	9.4	9.4	9.5
	San Juan - Colorado Rivers	20.5	20.6	20.7	20.8	20.8
	TOTAL	109.2	110.7	112.2	113.6	114.9
Wyoming	Green River	58.8	61.1	63.3	65.6	67.9
Upper Basin	Green River	179.7	183.8	187.8	191.8	195.9
	Upper Main Stem	396.9	404.7	412.5	420.3	427.9
	San Juan - Colorado Rivers	300.5	301.7	302.9	304.3	305.4
	TOTAL	877.1	890.2	903.2	916.4	929.2

Table UC-9
Upper Colorado River Basin
Agricultural Water Shortage Estimates
2006 - 2010

(1,000's)

State	Tributary	Shortage 2006	2007	2008	2009	2010
Arizona[1]	San Juan - Colorado Rivers					
Colorado	Green River	3.6	7.4	6.2	7.3	5.5
	Upper Main Stem	4.6	7.5	7.3	7.9	7.6
	San Juan - Colorado Rivers	2.4	4.7	3.2	4.6	4.1
	TOTAL	10.6	19.6	16.7	19.7	17.2
New Mexico[1]	San Juan - Colorado Rivers					
Utah	Green River	58.2	124.5	91.4	101.5	116.4
	Upper Main Stem	5.2	7.3	4.5	9.7	3.1
	San Juan - Colorado Rivers	15.1	19.6	23.4	24.4	20.4
	TOTAL	78.5	151.4	119.2	135.6	140.0
Wyoming	Green River	18.7	62.2	38.8	37.2	51.9
Upper Basin	Green River	80.5	194.1	136.4	145.9	173.8
	Upper Main Stem	9.8	14.7	11.8	17.7	10.8
	San Juan - Colorado Rivers	17.5	24.3	26.6	29.0	24.5
	TOTAL	107.8	233.2	174.7	192.6	209.1

[1] Shortages not reported