Ralph E. Clark III
519 East Georgia Ave.
Gunnison, Colorado
81230 USA
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August 8, 2005

President, Board of Directors, Manager, and Attorneys
Upper Gunnison River Water Conservation District
20 East Virginia Ave.
Gunnison, Colorado 81230

Re: Comments on recently submitted plans for developing the District's water rights

I may not be able to attend the special meeting of the District Board to be held on August 9, 2005, for receipt of public comments about the recent consultant's report on development of some of the District's water rights within its Upper Gunnison Project. The report is focused upon two projects now known as the Long Branch Reservoir and the Taylor River Canal.

The consulting team, lead by J and T Consulting Inc., produced very useful information and a feasibility analysis. I have already offered some comments following their presentation last month to the District Board. Below are some additional comments, some elaboration, and some benchmarks and options for further consideration. Page references are to the consultants' report unless noted.

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1. The primary goal expressed for the District's water management planning is protection of the already decreed water uses within the Upper Gunnison Basin from calls by senior water rights downstream of Blue Mesa Reservoir (Final Draft - Water Management Plan; February 2005; p. 6). Other expressed secondary goals include protecting future decreed water rights from such calls and improving the water supply available within sub-basins of the district.

Improvement of the water supply available within sub-basins is the principal objective for the two projects analyzed in the consultant's report - the Long Branch Reservoir and the Taylor River Canal. Together they would develop or provide about 5,235 acre-feet - or by comparison 835 acre-feet out of the 110,841 acre-feet of storage rights and 100 cfs of the 1,839 cfs direct flow rights now held by the District (Final Draft - Water Management Plan; February 2005; p. 4-20). These projects to not appear to offer much but large expenditures towards achieving goals expressed in the District's plan.

The estimated capital costs for the Long Branch Reservoir range from $14,300,000 to $17,500,000 (p.124). For the Taylor River Canal, the estimated capital costs range from $8,000,000 to 10,200,000 (p.128). The total cost for the two projects is estimated at

$22,300,000 to $27,750,000 or about $4,259 to $5,300 per acre foot of water developed . (pp. 106, 111, 125, 128).

After receipt of expected grants, the yearly repayments for the Long Branch Reservoir project would range from $742,600 to $929,900 for 835 acre-feet year (p.125) and $346,600 to $464,700 per year for the Taylor River Canal for delivery of 4,400 acre-feet a year (pp.111,128). In total this is $1,069,200 to $1,394,600 per year (pp.125, 128).

The estimated total annual direct benefits at $40.00 per acre-foot of 835 acre-feet delivered for the Long Branch Reservoir water would be about $33,400 (p. 107. Direct benefits estimated for the Taylor River Canal would be from 4,400 acre-feet and total $176,000 (p. 111). In sum the direct benefits would be $209,400 giving a direct return from capital invested ranging from only .93% to .75%

Also, these two projects represent only a small portion of the District's conditional water rights that it wishes to protect and for which it will soon again seek the Water Court's determination of diligence.

2. In 2000, the District obtained recognition of subordination by the Bureau of Reclamation's Aspinall Unit for development upstream of up to 40,000 acre-feet above Blue Mesa Reservoir (Final Draft - Water Management Plan; February 2005; p. 4-33). This provides benefits to both existing and future water development within the Upper Gunnison Basin that is junior in priority to the Aspinall Unit or the adjudication year of 1965. Indirectly, it can also provide benefits of protection to more senior water rights that may be called by even more senior water rights downstream of the Aspinall Unit.

As a benchmark, the District can store water under its rights in the Aspinall Unit (Blue Mesa Reservoir) to achieve a combination of its expressed goals. This was specifically contemplated in the decrees for these conditional water rights. To do this is also a part of current planning (Final Draft - Water Management Plan; February 2005; p. 9-5). At present the estimated cost for storage in the Aspinall Unit is about $75.00 per acre-foot. Storage of the 5,235 acre-feet that would be provided in an average year by the two projects (pp.106, 111) would cost be about $392,625 per year. For this amount, it would appear that more direct benefits could be achieved across the District.

However, an additional "cost" for storage in the Aspinall Unit could be the imposition of compliance with federal regulations related to the Reclamation Reform Act (Final Draft Water Management Plan; February 2005; p. 9-5). Given experience in recent years and interpretations of the federal regulations, this might not be an imposition upon many water users seeking protection for their use of 5,235 acre-feet from calls originating downstream of the Aspinall Unit. Storage of the District's water in the Aspinall Unit may also provide greater reliability than an "average yield" expected of only 80% of the time for the Long Branch Reservoir (p.125) and perhaps as well in the Taylor River Canal during drought conditions.

Management Plan; February 2005; p. 9-20) of which about 2 acre-feet are consumed to produce on average 1.5 tons of hay per acre (pp. 106, 111). The cost for sub-surface drip irrigation systems is about $1,500 per acre. The combined annual cost repayment for both projects would permit instillation of such systems upon 700 to 900 acres per year. Water thus made available for other uses would accumulate at 2,590 to 3,300 acre-feet per year and in two years would exceed the amount developed by the two proposed projects. See my letter to the District dated December 13, 2004, with 9 pages of printed web links available from the Micro Irrigation Forum attached.

The proposed sub-districts could be redefined so as to more closely associate direct beneficiaries with repayment obligations. For example, the Long Branch Reservoir could serve the Arch Ditch system in the Upper Tomichi Valley with its delivery amounting to 4. 6 cfs over three full months. The Arch Ditch has water rights totaling over 500 cfs (Hydrosphere Resource Consultants, Gunnison Basin Planning Model - Draft, 1993; p. 28.211.1). Similarly, the Gunnison River and Ohio Creek Canal and Irrigation Ditch system has water rights totaling over 270 cfs (Hydrosphere 1993; p. 59.183.1) and would be served by 24.3 cfs over three full months of diversion, or 4,400 acre-feet, expected to be delivered by the Taylor River Canal (pp. 111, 129. The areas actually served by each of these ditch systems should define the respective sub-districts for repayment assessment. The amounts delivered by the proposed projects are very small in comparison with the systems into which they can deliver.

Another option is to apply the capital costs for building the two projects towards full purchase of irrigated agricultural land in the area. If the agricultural property were fully acquired by a public entity, rather than placement of just a conservation easement, it could be leased for ranching use with the agreement to fallow in particularly dry years. This could provide water for others and also provide publically accessible open space, a land bank for affordable housing, and space for other infrastructure requirements in support of tourism, second-home development, and general growth. Much of the financing for this could come from the recapture, at the time that development approval is given for the change of use of agricultural land, of the amount of property taxes that would have been paid during the previous decade at a rate equivalent to property taxes paid currently upon vacant residential land. This approach has been applied in other states.

5. The small amounts of water delivered from the two projects do not justify expectations of measurably significant indirect benefits, particularly during periods of drought. The spreading of the delivered water over large areas and the timing for months of lag in any return of flows should also be considered. In addition, consideration is needed for potential dis-benefits created by higher ground water tables below the Taylor River Canal with respect to the operations of individual septic disposal systems (pp. 113, 115).

Respectfully:

Ralph E. Clark III

PROPOSED RESOLUTION TO COPE WITH DROUGHT IN GUNNISON COUNTY

During drought conditions, local irrigators must have additional water or use available water more effectively and efficiently. Most irrigators can not afford additional water. The Gunnison County Land Preservation Fund, the Gunnison County Conservation Trust, and the Upper Gunnison River Water Conservancy District should be used to financially assist with installation of water efficiency improvements on irrigated land if:

1) a conservation easement is placed upon all the associated agricultural land;
2) existing water rights are committed to remain with the land or to instream flows purposes;
3) existing water rights will be fully utilized when water is available to prevent abandonments, to recharge aquifers, to restore and maintain riparian natural values within the watershed, and to leach salts accumulated in the soil during drought conditions; and
4) one or more non-motorized trail routes will be continued or created to access public lands and a trail system throughout the county.

PROPOSED RESOLUTIONS ON AFFORDABLE HOUSING IN GUNNISON COUNTY

All county residents and workers should have timely access to safe, habitable, affordable housing near jobs, educational facilities, and transportation, and also be adequately served by necessary infrastructure. Provision of affordable housing and associated infrastructure should be available at the time need occurs and not provided or developed sometime later. The full financial burden for providing affordable housing and for associated infrastructure requirements should be born by the creator of the need - growth should pay its own way.

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The County Commissioners should work with the Colorado State Legislature to enable imposition of a real estate transfer tax to provide sufficient funding for adequate and timely provision of affordable housing and associated infrastructure requirements. Alternatively, Gunnison County could become a "home rule" county, establish a countywide improvement district for provision of affordable housing and associated infrastructure requirements, and adequately finance this by placement of an excise tax upon the privilege of developing property.

chairman of New York-based developer **Ninigret Group** LC, which built and co-

design. Mountains and waves "are my two passions," Mr. Abood says.

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1055 18/June 03/B6

Tribunary Ruling Hurts Builders

By Queena Sook Kim

Home builders were dealt a setback last week when a federal appeals court ruled that a man-made ditch can be considered a tributary under the Clean Water Act and is protected by the federal law.

The ruling is over a case that dates back to the 1990s, filed by the U.S. government against Maryland developers James and Rebecca Deaton, who had dug a ditch to drain water from isolated wetlands on a property they owned.

The decision essentially means "that whenever anybody digs a ditch to drain a wet spot on their land, it's going to require a federal permit," says Duane Desiderio, vice president for legal services at the National Association of Homebuilders, which helped the Deatons revive the suit. The group believes there are about eight million isolated wetlands nationwide that could be affected by the decision and is considering appealing. The Deatons declined to comment on the ruling.

The Deaton ruling by the Fourth Circuit Court of Appeals in the District of Maryland affects only the mid-Atlantic region. But the builders association worries that regulators nationwide will use the precedent to test the boundaries of their authority. Home builders have complained that strict environmental regulators have contributed to a scarcity of land that can be developed and to an increase in housing prices.

Environmentalists, by contrast, applauded the court decision, calling it both legally and scientifically sound.

In 1989, the Deatons bought a 12-acre parcel of land in a hilly, rural part of Maryland with plans of building five homes. But the local health department wouldn't permit underground septic tanks because after heavy rains, water pooled on parts of the land. The Deatons channeled the excess water off their property and into a roadside ditch, which is located eight miles from a series of waterways that eventually lead to the Wicomico River.

The issue became whether the Army Corps of Engineers had jurisdiction over the roadside ditch. The engineers corps said that the ditch was a waterway of the U.S. and fell under the Clean Water Act.

The Deatons argued that Congress didn't intend the act to regulate ditches or other water passages so far removed from an actual navigable waterway, said their attorney, Raymond Stevens Smethurst Jr. of Adkins, Potts and Smethurst in Salisbury, Md.

Dave K

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PHONE (303) 792-2161
FAX (303) 792-2165

November 2, 2001

TO: Kathleen Curry – Upper Gunnison River Water Conservancy District
Dave Kanzer – Colorado River Water Conservation District

FROM: Jim Slattery

SUBJECT: Undecreed Diversions in the Upper Gunnison Basin

During the process of preparing the "2001 Subordination Report" we identified certain ditches whose historical daily diversions exceeded the decreed water rights associated with the ditch. For the purposes of the subordination report it was decided, based on advice from counsel, that these "undecreed" diversions did not need to be included in the report. The interpretation of the subordination agreement was that the agreement only applied to decreed water rights. As a result of this process, the districts requested that we identify the structures whose historical diversions were in excess of the decreed water rights. The attached Table 1 is a listing of these irrigation structures. The information shown is table 1 is the average annual values for the 1990-2000 period. The following is a summary of the information contained in Table 1. — where is?

Reach	Number of Structures with Undecreed Diversions	Average Annual Diversions by Undecreed Rights (ac-ft/yr)	Average Annual Consumptive Use Associated with the Undecreed Diversions (ac-ft/yr)
Above Blue Mesa	427	71,997	3,089
Blue Mesa to Morrow	3	444	173
Morrow to Crystal	15	169	20
Total	445	72,590	3,282

The information contained in this analysis is only for the active ditches upstream of Crystal Dam that had irrigated acreage assigned to the ditches. There might be additional structures with undecreed diversions but no associated irrigated acreage that are not listed in Table 1. Please give me a call if you have any questions.

Upper Gunnison River Water Conservancy District

MARCH 14, 2002

BOARD WORKSESSION
4:30-9:00 p.m.
GUNNISON COUNTY MULTIPURPOSE BUILDING
275 SOUTH SPRUCE STREET
GUNNISON, CO

FIRST DRAFT OF THE DISTRICT'S WATER MANAGEMENT PLAN

DISCUSSION TOPICS:

1. Goals for the Meeting
2. Summary of Comments Received
3. Focus of the Plan
4. Plan Goal No.1 (Basin Augmentation for Existing Uses)

   a. Undecreed Diversions
   b. Financing
   c. Use of Upper Gunnison Project Water Rights
   d. RRA Compliance

5. Response to the Comments
6. Consultant's Role
7. Plan Schedule
8. Next Meeting

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Ralph E. Clark III
519 East Georgia Ave.
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tel. 970-641-2907

March 9, 2002

Editor
Gunnison Country Times
sent by fax to 641-6515

The greatest current threat of transmountain diversion is for water to be taken directly from storage in Blue Mesa Reservoir. The Supreme Court's decision on Union Park promoted this by suggesting 240,000 acre-feet of water might be available each year. Articles and editorials in major Front Range newspapers then promoted this idea. Despite having expressed policy against doing anything to support transmountain diversion, the Boards of the Upper Gunnison River Water Conservancy District - with the exception of Steve Glazer, and of the Gunnison County Commissioners - with the exception of Jim Starr, just sent a very positive signal to the Front Range about taking water from Blue Mesa.

These two Boards agreed on a stipulation or statement to offer to the Water Court. It provides that the National Park Service must not use its water right for the Black Canyon in any way which would decrease storage yields in Blue Mesa. It also says that this water right must become the most junior water right now within the basin. These provisions set up 240,000 acre-feet or more of water as a very attractive target for transmountain diversion. These provisions can also mean having a downstream flow of just a minimum 300 cubic feet per second year around through the Black Canyon in order to optimize storage yield within the reservoir.

Water stored in Blue Mesa is "supposed" to only be used in the Gunnison Basin. However, this supposition already has received very different and threatening interpretations. By approving the stipulation the Boards raise prospects of many more years of litigation to oppose Front Range plans to take the offered target. Alternatives could commit truly appropriate flows through the Black Canyon to restore and sustain its extraordinary natural values while continuing historic irrigation practices upstream. Alternatives could make the National Park Service an ally rather asking it to accept something injurious to the Black Canyon of the Gunnison National Park.

This stipulation was crafted behind closed doors in executive sessions. While concerned with litigation, it reflects a major change in public policy. It implies a large increase in future expenses for defending our basin's water. Given the significance of the action by these Boards, a referendum vote on approval of the stipulation appears in order. Given the significance of implications, a full environmental analysis should be conducted before federal acceptance of the stipulation's provisions.

Respectfully:

Ralph E. Clark III

Instream

Summary Of East River Diversions/Records

Average Monthly Diversions (1975–1991)

(Acre-Feet)

Total cfs decreed to ditch

Possible Monthly diversion at cfs for 1 month using 1 cfs/month = 60.4 acre feet

Flow rec'd see East River Water Supply Quality 10/12/95

		November	December	January	February	March	April	May	June	July	August	September	October
?	ANDERS BOTTOM DITCH 1.6 cfs	*	*	*	*	96.6 *	0	63	171 ?	108 ?	41	21	6
?	ANNA ROZMAN DITCH 6.5 cfs	*	*	*	*	392.6 *	0	72	356	424 ?	181	55	36
OK	BOCKER DITCH 39.75	*	*	*	*	2400.9 *	5	263	1224	1169	153	71	17
?	CRESTED BUTTE LTD PL 1.7, with enl'd 4.125	*	*	*	102.6 on *	252.1 *	63	65	135 ?	84	103 ?	74	95
OK	DILLSWORTH DITCH 43.034	*	*	*	*	2599.0 *	1	544	1914	2056	1110	568	375
OK	EAST RIVER NO 1 DITCH 145.95	*	*	*	*	8815.3 *	111	1964	4969	4525	1138	638	1416
?	EAST RIVER NO 2 DITCH 49.37	*	*	*	*	2981.9 *	0	940	3084 ?	3211 ?	1130	585	506
OK	FISHER DITCH ENLARGEMENT 42.2	*	*	*	*	2548.8 *	0	398	1359	1258	321	94	21
?	HAPPY HOLLOW HIGHLINE DITCH 5.5	*	*	*	*	332.2 *	7	139	530 ?	428 ?	67	23	18
OK	HOWE & SHERWOOD IRR DITCH 20.05	*	*	*	*	1211.0 *	24	317	952	751	175	56	136
OK	IMOBERSTEG DITCH 22.5	*	*	*	*	1359 *	0	326	1077	1071	175	45	53
?	JAMES WATT DITCH 28.5	*	*	*	*	1721.4 *	5	549	1773 ?	1780 ?	777	263	158
?	JOHN LORR DITCH 3.0	*	*	*	*	181.2 *	0	60	213 ?	130	35	11	0
?	KUBIACK DITCH 13.5	*	*	*	*	815.4 *	11	401	1061 ?	934 ?	148	71	93
OK	L R SPANN DITCH 8.0	*	*	*	*	483.2 *	5	95	275	256	130	69	54
OK	LAFAYETTE DITCH 40.6	*	*	*	*	2452.2 *	23	779	2065	1880	822	334	335
OK	MARSTON DITCH 12.5	*	*	*	*	755.0 *	21	224	303	201	107	47	29
?	MCCLENATHAN DITCH 8 cfs	*	*	*	*	483.2 *	4	191	720 ?	596 ?	97	26	13
?	MCDONALD DITCH 2.	*	*	*	*	120.8 *	8	372 ?	898 ?	837 ?	527 ?	217 ?	143 ?
OK	RICHARD BALL DITCH 25.325	*	*	*	*	1529.3 *	23	445	1353	1200	486	146	287
OK	SCHUPP DITCH 15.0	*	*	*	*	906.0 *	2	152	292	209	127	68	39
?	SLIDE DITCH 20.2	*	*	*	*	1220.0 *	29	479	1805 ?	1487 ?	372	53	45
OK	VERZUH DITCH 36.0	*	*	*	*	2174.4 *	48	757	1905	1769	814	232	150
OK	VERZUH YOUNG BIFANO DITCH 34.75	*	*	*	*	2098.9 *	0	682	1938	1948	785	223	190
?	WATT NO 2 DITCH 4.	*	*	*	*	241.6 *	*	0	279 ?	112	0	0	0
?	DANNI DITCH 1	*	*	*	*	60.4 *	0	28	190 ?	169 ?	26	4	0
OK	ANNA ROZMAN ALTERNATE DITCH 3.5	*	*	*	*	211.4 *	*	0	23	39	42	29	19
OK	EAST RIVER PUMPING STATION 4.5	14	29	36	36	271.846	20	0	26	28	19	17	9
	Total Average Diversion	14	29	36	36	46	409	10306	30891	28661	9910	4041	4243

Total Average Annual Diversion = 88622

* = No data given for this month

TABLE 7.2

Priority Class Intervals Used for Aggregation of Smaller Water Rights

Priority Class	Holt Number	Comment
Priority Class I	all < 20394.92081	all senior to Gunnison Tunnel irrigation decree
Priority Class II	all > 20394.92081 but < 30668.65040	junior to Tunnel but senior to Taylor Park
Priority Class III	all > 30668.6504 but < 40267.97842	junior to Taylor Park but senior to Blue Mesa
Priority Class IV	all > 40267.97842	junior to Blue Mesa(1)

(1) but possibly benefiting from Curecanti subordination

Note also that ranges of Holt Numbers included in some priority classes overlap the Holt Numbers of some select water rights. This means that the aggregated decrees which fall in the overlap range are not strictly administered. For example, the Willow Creek Ditch (5.21 cfs) has a Holt Number of 20394.80142 making it senior to the Gunnison Tunnel but junior to the first Cimarron Canal decree. In the model, the ditch falls into Priority Class I and will be represented as senior to <u>both</u> the Tunnel and the first Cimarron decree. The depletion attributable to the ditch is still incorporated into the model but it is assigned a priority not strictly in keeping with its decree.

8.4.7 Baseline, Moderate, and High Growth Conditions

The baseline condition for irrigated agricultural diversions and consumptive use assumes continued operation of currently irrigated lands with associated historical cropping patterns and water shortages. The moderate growth scenario assumes providing a full irrigation water supply to all currently irrigated lands. The high growth scenario assumes providing a full water supply to all currently irrigated lands as well as to all identified Class 1 through 3 arable lands that are presently not irrigated. This scenario reflects the potential maximum growth in agricultural production and its associated water demand.

8.4.8 Irrigated Agricultural Demand Forecasts

Table 8.13 summarizes forecasted agricultural water demands within the study area. Agricultural consumptive use varies from 229,000 af under the baseline scenario to 283,000 af under the high growth scenario, a difference of 24 percent.

8.4.9 Livestock Water Demands

The majority of livestock production in the study area is in the form of cattle and sheep grazing operations with minor hog production. Additionally, a few small-scale dairy and feedlot operations are present in Delta and Montrose Counties but are insignificant in terms of basinwide consumptive use of water.

Daily water requirements and consumptive use rates for beef cattle, sheep and hogs are presented in Table 8.14 The rates were then applied to livestock population projections to determine basinwide water demand due to livestock production.

Upper Gunnison River Water Conservancy District

MEMORANDUM

TO: Board Members,
Upper Gunnison River Water Conservancy District

FROM: Tyler Martineau TM

DATE: November 4, 1992

SUBJECT: Upper Gunnison Project Water Rights

During the Board of Directors' October 26 worksession on how to plan the future of water development in the Upper Gunnison Basin several board members asked for information which would assist the board in determining the best procedures for developing the water rights belonging to the District. Basic information concerning the water rights associated with the Upper Gunnison Project was requested to be provided to the board.

Enclosed is a list which names the structure, source, and decreed amount for each of the Upper Gunnison Project water rights. Attached is a map showing the location of each of the structures included in the project. Additional information on these water rights is available in the litigation section of the dark blue boardmember notebook.

Also attached is a summary sheet for the Taylor Park Reservoir refill right which was upheld by the Colorado Supreme Court last month.

275 S. Spruce Street • Gunnison, Colorado, 81230 • (303) 641-6065

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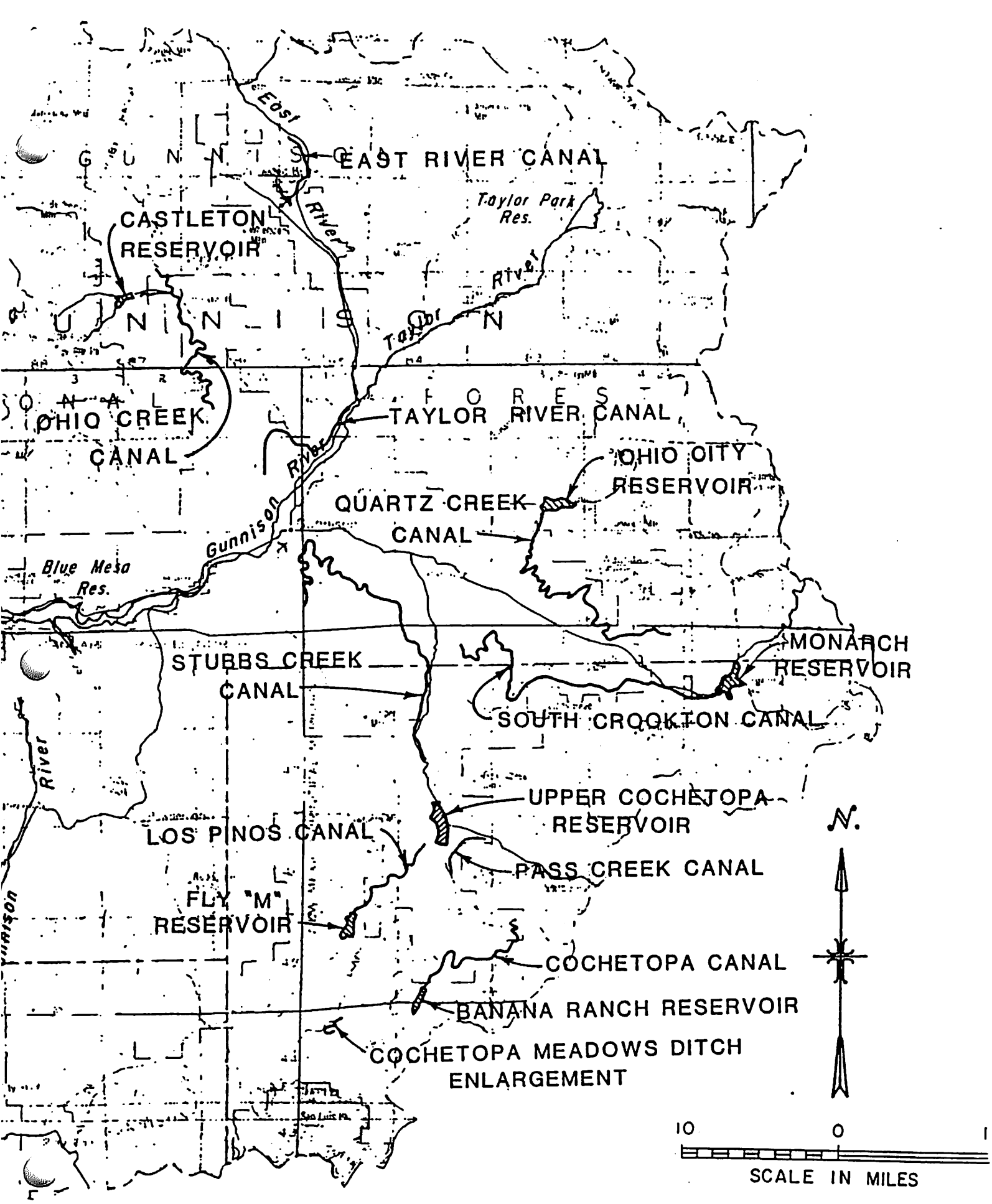

MAP OF

UPPER GUNNISON PROJECT

WATER SUPPLY HANDBOOK

A Handbook on
Water Supply Planning
and
Resource Management

Institute for Water Resources
Water Resources Support Center
U.S. Army Corps of Engineers
7701 Telegraph Road
Alexandria, Virginia 22315-3868

Prepared by
Theodore M. Hillyer
with
Germaine A. Hofbauer
Policy and Special Studies Division

404 pages
on 3½ disk

December 1998

Revised IWR Report 96-PS-4

for Black Fork file Corp

FLOW RECOMMENDATIONS FOR THE GUNNISON RIVER AND COLORADO RIVER

Hydrologic Category	Gunnison River (cfs)	Colorado River (cfs)
Spring Peak, Mean Daily Flow		
Dry; 90-100% exceedance	≥4,000 (≥3,600)	≥12,000 (≥10,800)
Moderately Dry; 70-90% exceedance	≥7,000 (≥6,300)	≥20,000 (≥18,000)
Average-Dry; 50-70% exceedance	≥9,500 (≥8,500)	≥27,000 (≥24,300)
Average-Wet; 30-50% exceedance	≥12,500 (≥11,300)	≥35,000 (≥31,500)
Moderately Wet; 10-30% exceedance	≥16,000 (≥14,400)	≥43,000 (≥38,700)
Wet; 0-10% exceedance	≥20,000 (≥18,000)	≥55,000 (≥49,500)
Base Flow		
Dry; 90-100% exceedance	≥1,050, Jun-Jul; ≥750, Aug-Feb	≥1,800, Jul – Feb
Moderately Dry; 70-90% exceedance	≥1,050, Jun - Aug; ≥750, Sep-Feb	2,500 – 4,000; Aug – Feb
Average-Dry; 50-70% exceedance	>1,050 - 2,000, Aug- Feb	2,500 – 4,000; Aug – Feb
Average-Wet; 30-50% exceedance	>1,050 - 2,000, Aug- Feb	3,000 – 4,800; Aug – Feb
Moderately Wet; 10-30% exceedance	1,500 – 2,500, Sep - Feb	3,000 – 4,800; Aug – Feb
Wet; 0-10% exceedance	1,500 – 2,500, Sep - Feb	≤ 6,000; Sep – Feb

For peak flows, larger number is the target that should be equaled or exceeded for at least 2 days. Number in parentheses should be reached or exceeded for at least 1 day on either side of the target flow.

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Source: PITST. (Aug 2001) Flow Recommendations for the Gunnison River and Status Report on the Upper ~~Gunnison~~ Basin Endangered Fish Recovery Program, printed by Water Consults, Loveland CO, 21 pages
Distributed by author at Black Canyon of the Gunnison Congressional Tour; August 16 and 17, 2001

FLOW RECOMMENDATIONS FOR THE GUNNISON RIVER RE: ASPINALL UNIT

Instream

Summary Of East River Diversions/Records

Average Monthly Diversions (1975–1991)

(Acre-Feet)

Total cfs decreed to ditch

Possible Monthly diversion at cfs for 1 month using 1 cfs/month = 60.4 acre feet.

Flows and see East River Water Supply Quality 10/12/93

		November	December	January	February	March	April	May	June	July	August	September	October
?	ANDERS BOTTOM DITCH 1.6 cfs	*	*	*	*	96.6 *	0	63	171?	108?	41	21	6
?	ANNA ROZMAN DITCH 6.5 cfs	*	*	*	*	392.6 *	0	72	356	424 ?	181	55	36
ok	BOCKER DITCH 39.75	*	*	*	*	2400.9 *	5	263	1224	1169	153	71	17
?	CRESTED BUTTE LTD PL 1.7, with cfs 2.8 & 4.125	*	*	*	102.6 on	252.1 *	63	65	135 ?	84	103 ?	74	95
ok	DILLSWORTH DITCH 43.034	*	*	*	*	2599.0 *	1	544	1914	2056	1110	568	375
ok	EAST RIVER NO 1 DITCH 145.95	*	*	*	*	8815.3 *	111	1964	4969	4525	1138	638	1416
?	EAST RIVER NO 2 DITCH 49.37	*	*	*	*	2981.9 *	0	940	3084 ?	3211?	1130	585	506
ok	FISHER DITCH ENLARGEMENT 42.2	*	*	*	*	2548.8*	0	398	1359	1258	321	94	21
?	HAPPY HOLLOW HIGHLINE DITCH 5.5	*	*	*	*	332.2*	7	139	530 ?	428 ?	67	23	18
ok	HOWE & SHERWOOD IRR DITCH 20.05	*	*	*	*	1211.0*	24	317	952	751	175	56	136
ok	IMOBERSTEG DITCH 22.5	*	*	*	*	1359 *	0	326	1077	1071	175	45	53
?	JAMES WATT DITCH 28.5	*	*	*	*	1721.4 *	5	549	1773 ?	1780 ?	777	263	158
?	JOHN LORR DITCH 3.0	*	*	*	*	181.2 *	0	60	213 ?	130	35	11	0
?	KUBIACK DITCH 13.5	*	*	*	*	815.4 *	11	401	1061 ?	934 ?	148	71	93
ok	L R SPANN DITCH 8.0	*	*	*	*	483.2*	5	95	275	256	130	69	54
ok	LAFAYETTE DITCH 40.6	*	*	*	*	2452.2*	23	779	2065	1880	822	334	335
ok	MARSTON DITCH 12.5	*	*	*	*	755.0*	21	224	303	201	107	47	29
?	MCCLENATHAN DITCH 8 cfs	*	*	*	*	483.2*	4	191	720 ?	596 ?	97	26	13
?	MCDONALD DITCH 2.	*	*	*	*	120.8*	8	372 ?	898 ?	837 ?	527 ?	217?	143 ?
ok	RICHARD BALL DITCH 25.325	*	*	*	*	1529.3*	23	445	1353	1200	486	146	287
ok	SCHUPP DITCH 15.0	*	*	*	*	906.0*	2	152	292	209	127	68	39
?	SLIDE DITCH 20.2	*	*	*	*	1220.0*	29	479	1805 ?	1487 ?	372	53	45
ok	VERZUH DITCH 36.0	*	*	*	*	2174.4 *	48	757	1905	1769	814	232	150
ok	VERZUH YOUNG BIFANO DITCH 34.75	*	*	*	*	2098.9 *	0	682	1938	1948	785	223	190
?	WATT NO 2 DITCH 4.	*	*	*	*	241.6 *	*	0	279 ?	112	0	0	0
?	DANNI DITCH 1	*	*	*	*	60.4 *	0	28	190 ?	169 ?	26	4	0
ok	ANNA ROZMAN ALTERNATE DITCH 3.5	*	*	*	*	211.4 *	*	0	23	39	42	29	19
ok	EAST RIVER PUMPING STATION 4.5	14	29	36	36	271.846	20	0	26	28	19	17	9
	Total Average Diversion	14	29	36	36	46	409	10306	30891	28661	9910	4041	4243

Total Average Annual Diversion = 88622

* = No data given for this month

DUTY OF WATER STUDY FOR UPPER GUNNISON BASIN — R.E.Clark III - Sep. 2001

Data Source: Hydrosphere Resource Consultants (1993) Gunnison Basin Planning Model - Draft - Beta 0.9 and User Documentation, published by consultant, Boulder, Colorado, multiple sections with approx. 250 pages.

Assumptions:
1 cfs for 1 month equals 60.3 acre-feet
Diversion is over 4.0 full months in irrigation season

Key Administration Numbers (p. 4-8):
Gunnison Tunnel is 20,393.18779
Black Canyon Nat. Park reserved right is 30,450.00000
Blue Mesa Reservoir (Aspinall Unit) is 40,266.39398

Results: The irrigation season is May through October with an annual water demand of 5.32 acre-feet per acre irrigated (Helton and Williamsen P. C. (2000) pp. 9 - 11). If water is physically available, then diversion with rights senior to the Gunnison Tunnel would be sufficient in most reaches and with rights senior to the Black Canyon would provide a generous supply. Note that actual irrigated acreage may be less than amounts in model and some water rights have been abandoned since 1993. This would generally increase figures for acre-feet per acre from those shown.

(A) Stream Reach (name for reaches as used by model)	(B) Number of Decrees	(C) Total Amount in cfs	(D) Total Potential Diversion for Season in acre-feet	(E) From the water model's documentation, the amounts decreed in cfs with administration numbers: before Gunnison Tunnel: less than 20,393.18779	between the Gun. Tun. and Black Canyon: 20,393.18179 - 30,450.00000	between the Black Canyon and Aspinall: 30,450.00000 - 40,266.39398	after the Aspinall Unit: greater than 40.266.39398	(F) sum check between model and user doc.	(G) Irrigated Acres (When preparing model, records on acreage not searched for all reaches.) Found acres	Modeled acres	(H) Amount that could be diverted over months to each acre of modeled irrigated land using: total of all absolute decrees	(I) decrees senior to: Gunnison Tunnel	Black Canyon
	number	in cfs	in ac-ft	in cfs	in cfs	in cfs	in cfs	in cfs			ac-ft /ac	ac-ft /ac	ac-ft /ac
District 28													
BananaRResSiteVcty	16	200.64	48,394	7.62	114.82	19.20	59.00	200.64	1,460	1,744	27.75	1.05	16.93
CochAbWPassBelPauline	35	201.85	48,686	65.50	12.00	124.35	0.00	201.85	1,378	1,759	27.68	8.98	10.63
FlyingMResSiteVcnty	12	53.30	12,856	12.46	40.84	0.00	0.00	53.30	589	707	18.18	4.25	18.18
LowerCochetopaCr	41	116.60	28,124	19.70	71.80	22.80	2.30	116.60	693	1,082	25.99	4.39	20.40
LowerQuartzCreek	24	226.93	54,736	14.70	199.23	3.00	10.00	226.93	228	459	119.25	7.72	112.42
PaulineResSiteVcnity	2	48.00	11,578	0.00	48.00	0.00	0.00	48.00	0	295	39.25	0.00	39.25
RazorCreek	24	158.69	38,276	19.85	117.34	21.40	0.10	158.69	680	753	50.83	6.36	43.94
TomichiCrBelCoch	98	538.89	129,980	92.48	384.75	60.40	1.25	538.88	1,465	3,950	32.91	5.65	29.14
TmchCrBtwElko&RzrCr	61	322.09	77,688	65.52	169.22	87.35	0.00	322.09	2,043	2,916	26.64	5.42	19.42
TmchCBtwQtz&Coch	4	8.50	2,050	0.80	3.20	3.50	1.00	8.50	16	37	55.41	5.22	26.08
TomchiCrAboveElko	101	971.31	234,280	121.41	705.98	138.92	5.00	971.31	3,700	6,642	35.27	4.41	30.05
UpperCochetopaCr	11	16.70	4,028	2.20	12.00	2.50	0.00	16.70	0	133	30.29	3.99	25.75
UpperQuartzCreek	40	240.89	58,103	17.70	182.32	38.87	2.00	240.89	1,560	1,833	31.70	2.33	26.32
Sub-total		3,104.39	748,779	439.94	2,061.50	522.29	80.65	3,104.38		22,310	33.56	4.76	27.04

(A) Stream Reach (name for reaches as used by model)	(B) Number of Decrees	(C) Total Amount in cfs	(D) Total Potential Diversion for Season in acre-feet	(E) From the water model's documentation, the amounts decreed in cfs with administration numbers: before Gunnison Tunnel: less than 20,393.18779	between the Gun. Tun. and Black Canyon: 20,393.18179 - 30,450.00000	between the Black Canyon and Aspinall: 30,450.00000 - 40,266.39398	after the Aspinall Unit: greater than 40.266.39398	(F) sum check between model and user doc.	(G) Irrigated Acres (When preparing model, records on acreage not searched for all reaches.) Found acres	Modeled acres	(H) total of all absolute decrees	(I) Amount that could be diverted over months to each acre of modeled irrigated land using: decrees senior to: Gunnison Tunnel	Black Canyon
	number	in cfs	in ac-ft	in cfs	in cfs	in cfs	in cfs	in cfs			ac-ft /ac	ac-ft /ac	ac-ft /ac
District 59													
BMTTribsDemands	16	168.13	40,553	42.19	48.39	158.92	0.02	249.52	0	400	101.38	25.44	54.62
BTMTribsDemands	22	81.39	19,631	BTM and BMT combined in model				0.00	0	400	49.08		
BrushCreek	10	52.25	12,603	12.18	0.00	40.08	0.00	52.26	0	583	21.62	5.04	5.04
CastleCreek	15	167.84	40,483	28.50	3.54	135.80	0.00	167.84	0	1,289	31.41	5.33	6.00
CementCreek	9	54.24	13,083	9.83	0.00	44.41	0.00	54.24	0	296	44.20	8.01	8.01
EastRAbCrstButte-1	12	135.61	32,709	0.00	16.00	119.61	0.00	135.61	0	989	33.07	0.00	3.90
EastRiverBelCementCr	70	421.72	101,719	68.20	10.84	341.78	1.00	421.82	0	3,742	27.19	4.40	5.09
ERBtwCrButte&CmntCr	4	67.45	16,269	30.08	10.27	27.10	0.00	67.45	0	296	54.96	24.51	32.88
GunnisonAboveOhioCr	67	701.22	169,134	193.45	29.77	472.07	6.00	701.29	0	4,125	41.01	11.31	13.05
GunnisonBtwOhio&Tomichi	57	373.85	90,173	83.69	9.44	279.73	1.00	373.86	0	2,405	37.49	8.39	9.34
MillCreek	27	218.88	52,794	20.51	32.71	165.69	0.00	218.91	0	942	56.05	5.25	13.63
OhioCrBelCastleCr	12	55.00	13,266	18.63	0.00	36.38	0.00	55.01	0	222	59.77	20.24	20.24
OhioCrBelowMillCr	80	674.26	162,632	183.68	1.63	483.00	6.00	674.31	0	7,357	22.11	6.02	6.08
OhioCrBtwCPRes&MillCr	32	171.45	41,354	42.21	7.50	116.51	5.25	171.47	0	901	45.90	11.30	13.31
SlateRiver	33	210.38	50,744	24.43	19.34	164.66	2.00	210.43	0	1,415	35.87	4.16	7.46
TaylorRAboveSpringCr	5	19.58	4,723	0.00	5.33	12.75	1.50	19.58	0	187	25.26	0.00	6.87
TaylorRBelowSpringCr	10	88.84	21,428	0.00	20.84	68.02	0.00	88.86	0	273	78.51	0.00	18.41
Sub-total		3,662.09	883,296	757.58	215.60	2,666.51	22.77	3,662.46		25,822	34.21	7.08	9.09
District 59													
BlueRiver&Tributaries	23	116.86	28,187	0.00	72.61	43.41	0.84	116.86	0	1,000	28.19	0.00	17.51
CebollaCreek	134	457.26	110,291	78.83	270.48	54.95	53.00	457.26	0	4,600	23.98	4.13	18.32
GunRTribsBtwTmchi&BM	28	117.66	28,380	24.54	88.12	5.00	0.00	117.66	0	4,000	7.09	1.48	6.79
LowerCimarronR	20	95.98	23,150	19.73	44.08	29.18	3.00	95.99	0	2,534	9.14	1.88	6.07
LowerLakeFork	23	135.41	32,661	15.40	79.00	19.50	20.73	134.63	0	479	67.79	7.75	47.54
UpperCimarronR	25	67.18	16,204	22.63	16.35	28.10	0.10	67.18	0	1,966	8.24	2.78	4.78
UpperLakeFork	96	491.25	118,490	27.15	142.20	286.88	35.02	491.25	0	1,121	105.70	5.84	36.44
Sub-total		1,481.60	357,362	188.28	712.84	467.02	112.69	1,480.83		15,700	22.75	2.89	13.84
Total		8,248.08	1,989,437	1,385.80	2,989.94	3,655.82	216.11	8,247.67		63,832	31.17	5.24	16.53

RATIO COMPARISONS OF WATER RUNOFF AND WATER DEMANDS IN PORTIONS OF UPPER GUNNISON BASIN
R. E. Clark III - February, 1999

Flow of 1 cubic foot per second (cfs) for one month equals: 60.2 acre-feet (acft)

	Basic Data				Ratio Comparisons				
Assumptions: using larger of irrigated acreage given by USGS or GunMod Source:	Area of basin in sq. miles (USGS)	Average Annual Runoff in acft (USGS)	Irrigated Land in acres (USGS/GunM)	Absolute Rights Senior to Up. Gunnison Project in cfs (GunMod)	Runoff acft per sq. mile	Runoff acft per irr. acre	Runoff acft per decreed cfs	Potential for Diversion in 3 months as acft per acre irrigated	Runoff in acft per decreed cfs as a percentage of Potential Diversion in acft
Major Basins									
Tomichi Creek at Gunnison GunMod gives 22,310 acres	1,061	127,600	24,000	3,023.73	120.26	5.32	42.20	22.75	185%
East River at Almont GunMod gives 7,320 acres	289	247,770	7,400	939.00	857.34	33.48	263.87	22.92	1151%
Lake Fork at Gateview (6 miles abv. Blue Mesa) USGS is same as GunMod	334	172,200	1,600	570.13	515.57	107.63	302.04	64.35	469%
Cebolla Creek near Powderhorn GunMod; USGS gives no figure	248	45,400	4,600	404.26	183.06	9.87	112.30	15.87	708%
Gunnison River at Gunnison USGS gives 22,000	1,012	558,500	25,022	3,390.17	551.88	22.32	164.74	24.47	673%
Taylor River at Almont USGS gives 360 acres	477	245,800	460	106.94	515.30	534.35	2,298.49	41.99	5474%
Portions of Tomichi Creek Basin									
Quartz Creek (below Gold C. near Ohio City) USGS gives 900 acres.	106	39,170	1,833	238.89	369.53	21.37	163.97	23.54	697%
Tomichi Creek at Parlin (above Quartz C.) GunMod gives 10,348 acres	427	47,060	11,000	1,451.77	110.21	4.28	32.42	23.84	136%
Tomichi Creek at Sargents (below Marshall C.) USGS; GunMod gives no figure	149	46,420	1,900	154.41	311.54	24.43	300.63	14.68	2048%
Cochetopa Creek near Parlin GunMod; USGS gives no figure	334	34,210	5,720	598.09	102.43	5.98	57.20	18.88	303%
Portions of Ohio Creek Basin									
Ohio Creek at Baldwin (below Castle C.) GunMod gives 222 acres	48	32,870	1,580	222.85	684.79	20.80	147.50	25.47	579%
Ohio Creek near Baldwin (below Mill C.) GunMod gives 3,354 acres	184	64,940	3,850	613.23	352.93	16.87	105.90	28.77	368%

irrigated acreage between this gauge and Gunnison River receives diversions from Gunnison River

Data Sources:

U.S. Geological Survey (1970) Surface Water Supply of the United States 1961-65; Part 9 Colorado River Basin, vol. 1; Water Supply Paper 1924.
U.S. Geological Survey (1998) Water Resources Data, Colorado; Water Year 1997 - Colorado River Basin; vol. 2
Hydrosphere Resource Consultants (1993) Gunnison Basin Planning Model – Draft, Beta 0.9, Boulder, Colorado

Ralph E. Clark III
519 East Georgia Ave.
Gunnison, Colorado 81230
tel. 970-641-2907

December 6, 1997

Mark Schumacher, President
Board Members, Manager and Attorneys
Upper Gunnison river Water Conservancy district
275 South Spruce Street
Gunnison, Colorado 81230

Dear President, Board Members, Manager, and Attorneys:

Recent discussions about demonstrating diligence toward development of the District's conditional water rights for its Upper Gunnison Project have frequently mentioned the need to cope with anticipated calls by senior downstream water rights (for example see Memorandum to the Board of 19 Nov 97 for Agenda Item 4). The Gunnison Tunnel and the Redlands Diversion are the two identified sources of downstream calls previously experienced by water users in the Upper Gunnison River Basin. Early in a planning process such as the one the District has undertaken to demonstrate diligence, it is necessary to assess the extent and nature of perceived problems - in this instance calls from the downstream senior water users. I am not aware of this having yet been done and it is needed.

I hope the attached assessment provides a clearer understanding of the problem, demonstrates a useful process for applying already available information, and represents a contribution of effort toward demonstration of diligence.

1. A call by the Gunnison Tunnel can be expected when the divertable flow past the East Portal is less than the flow desired by the Uncompahgre Valley Water Users Association. Information on flows and diversion requirements is drawn from planning documents prepared by the Bureau of Reclamation (BoR), Western Area Power Administration (WAPA), and the Colorado Water Conservation Board (CWCB).

When a downstream call occurs from the Gunnison Tunnel, it is assumed that the Aspinall Unit is unable to store water or in effect must pass through all inflow. It is also assumed that the Tunnel has priority over flow requirements of the Black Canyon National Monument. Therefore, there are two considerations in determining when a call might occur: (1) when releases from the Aspinall Unit are insufficient to meet Gunnison Tunnel requirements and (2) when Inflows to the Aspinall Unit are insufficient to meet Gunnison Tunnel requirements.

The attached "Assessment of Possible Calls By The Gunnison Tunnel" addresses both considerations by comparing reported inflows to the Aspinall Unit and releases from Crystal

Reservoir with reported Gunnison Tunnel diversions in representative years. The Gunnison Tunnel requirements are those given as the average by month over its recent years of operation (Average Demand Situation with a yearly total of about 337,000 acre-feet) and the average of the highest and lowest maximum diversion recorded by month in the years from 1952 through 1989 (High Demand Situation with a yearly total of about 513,000 acre-feet).

Examined are the inflow patterns and flows below Crystal Reservoir in an average or "moderate" water year, a "typical" dry year, and the very dry year of 1977. Source references for data are given on the chart.

Interpretation

The assessment suggests that a call upon the Upper Basin occurs only with particular combinations of events. In the notably dry year of 1977 there were adequate releases from the Aspinall Unit to meet average demand requirements of the Gunnison Tunnel and to provide in excess of 300 cfs for the Black Canyon. There would have been a need to call for only a relatively small additional amount (3,446 acre-feet over the year) assuming a maximum demand requirement by the Tunnel. Note that calls would have in occurred October, November and March - not as might be expected when water is needed to finish off the hay crop before cutting.

Comparison of Gunnison Tunnel demand requirements with typical dry year inflows to the Aspinall Unit shows that inflows exceed most average Tunnel demands except for the 12,394 acre-feet occurring in September. Under the assumption of maximum Tunnel demand requirements, these are relatively small amounts needed during the hay crop finishing period of July and August in the Upper Gunnison Basin.

This assessment can be repeated with different assumptions of flow patterns and demand requirements. It can also be done to compare requirements of the Redlands Diversion and endangered fish ladder operations with flows at the Whitewater gauge upstream of Grand Junction.

From this assessment it appears that provision of some 15,000 acre-feet could address a call by the Gunnison Tunnel in a typical dry year. The Board needs to determine how much call coverage will be provided, to whom, at what level of risk or exposure to extreme events, and at what cost to those benefitting. Unusual flow patterns combined with maximum demands from the Gunnison Tunnel may occur so infrequently and the quantities of water needed be so large and expensive that providing full coverage in all extreme situations might not be possible - and those benefitting might not wish to bear the costs.

Respectfully:

Ralph E. Clark III

enc.

ASSESSMENT OF POSSIBLE CALLS BY GUNNISON TUNNEL f:acall1 -- R. Clark (4FEB95)

Assuming
(1) No use by UVWUA of Taylor Reservoir storage
(2) Call passes through Aspinall Unit to produce desired flow at Gunnison Tunnel diversion.
(3) Call is to provide inflow to Aspinall Unit sufficient to satisfy demand of Gunnison Tunnel
(4) Demand of Gunnison Tunnel is reported monthly average.

Notations and Constants

Notations -- acre-feet or ac-ft expressed as whole number - 8,679
-- cubic feet per second or cfs expressed with tenths - 567.8

Constants: 1 cfs for a month equals 60.4597 acre-feet

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	acre-feet
MODERATE INFLOW SITUATION WITH AVERAGE DEMAND													
Moderate year inflow to Aspinall Unit - USDOE SLCA Electric Power Marketing DEIS, pp. C-34 - C-35.													
as average cfs for month	1,321.0	1,058.0	718.0	648.0	722.0	1,148.0	2,762.0	5,629.0	5,117.0	1,819.0	1,239.0	886.0	1,394,624
Demand by Gunnison Tunnel is reported average diversion for irrigation - USBR (1990) AB Lateral FEIS, p. 99.													
as average cfs for month	464.0	56.0	8.0	11.0	8.0	66.0	624.0	875.0	795.0	914.0	944.0	803.0	336,640
Difference between inflow and Tunnel demand -- negative figure in ( ) is amount needed to fulfill call.													
in average cfs months	857.0	1,002.0	710.0	637.0	714.0	1,082.0	2,138.0	4,754.0	4,322.0	905.0	295.0	83.0	
in acre-feet	0	0	0	0	0	0	0	0	0	0	0	0	0
DRY YEAR INFLOW SITUATION WITH AVERAGE DEMAND													
Dry year inflow to Aspinall Unit - USDOE SLCA Electric Power Marketing DEIS, pp. C-36 - C-37.													
as average cfs for month	716.0	583.0	514.0	497.0	501.0	894.0	2,053.0	2,469.0	2,362.0	1,069.0	1,046.0	598.0	804,235
Demand by Gunnison Tunnel is reported average diversion for irrigation - USBR (1990) AB Lateral FEIS, p. 99.													
as average cfs for month	464.0	56.0	8.0	11.0	8.0	66.0	624.0	875.0	795.0	914.0	944.0	803.0	336,640
Difference between inflow and Tunnel demand -- negative figure in ( ) is amount needed to fulfill call.													
in average cfs months	252.0	527.0	508.0	486.0	493.0	828.0	1,429.0	1,594.0	1,567.0	155.0	102.0	(205.0)	
in acre-feet	0	0	0	0	0	0	0	0	0	0	0	(12,394)	(12,394)
DRY YEAR INFLOW WITH HIGH DEMAND SITUATION													
Dry year inflow to Aspinall Unit - USDOE SLCA Electric Power Marketing DEIS, pp. C-36 - C-37.													
as average cfs for month	716.0	583.0	514.0	497.0	501.0	894.0	2,053.0	2,469.0	2,362.0	1,069.0	1,046.0	598.0	804,235
Average of highest and lowest of the maximum daily diversions through Gunnison Tunnel, by month 1952 - 1989 - CWCB 1990 Exhibit A - Application for change of water right - Rabbit Gulch													
as average cfs for month	812.0	334.0	150.0	250.0	177.5	365.0	902.0	1,070.0	1,079.5	1,125.0	1,167.5	1,049.5	512,819
Difference between inflow and Tunnel demand -- negative figure in ( ) is amount needed to fulfill call.													
in average cfs months	(96.0)	249.0	364.0	247.0	323.5	529.0	1,151.0	1,399.0	1,282.5	(56.0)	(121.5)	(451.5)	
in acre-feet	(5,804)	0	0	0	0	0	0	0	0	(3,386)	(7,346)	(27,298)	(43,833)
1977 AS DRY YEAR WITH AVERAGE DEMAND SITUATION													
1977 Flow below Crystal Reservoir - USBR (1990) AB Lateral FEIS p. 86.													
as average cfs for month	782.0	333.0	300.0	606.0	306.0	339.0	1,023.0	1,300.0	1,300.0	1,300.0	1,300.0	1,157.0	607,378
Demand by Gunnison Tunnel is reported average diversion for irrigation - USBR (1990) AB Lateral FEIS, p. 99.													
as average cfs for month	464.0	56.0	8.0	11.0	8.0	66.0	624.0	875.0	795.0	914.0	944.0	803.0	336,640
Difference between inflow and Tunnel demand -- negative figure in ( ) is amount needed to fulfill call.													
in average cfs months	318.0	277.0	292.0	595.0	298.0	273.0	399.0	425.0	505.0	386.0	356.0	354.0	
in acre-feet	0	0	0	0	0	0	0	0	0	0	0	0	0
1977 AS DRY YEAR WITH HIGH DEMAND SITUATION													
1977 Flow below Crystal Reservoir - USBR (1990) AB Lateral FEIS p. 86.													
as average cfs for month	782.0	333.0	300.0	606.0	306.0	339.0	1,023.0	1,300.0	1,300.0	1,300.0	1,300.0	1,157.0	607,378
Average of highest and lowest of the maximum daily diversions through Gunnison Tunnel, by month 1952 - 1989 - CWCB 1990 Exhibit A - Application for change of water right - Rabbit Gulch													
as average cfs for month	812.0	334.0	150.0	250.0	177.5	365.0	902.0	1,070.0	1,079.5	1,125.0	1,167.5	1,049.5	512,819
Difference between inflow and Tunnel demand -- negative figure in ( ) is amount needed to fulfill call.													
in average cfs months	(30.0)	(1.0)	150.0	358.0	128.5	(26.0)	121.0	230.0	220.5	175.0	132.5	107.5	
in acre-feet	(1,814)	(60)	0	0	0	(1,572)	0	0	0	0	0	0	(3,446)

Average-Dry; 50-70% exceedance	≥9,500 (≥8,500)	≥27,000 (≥24,300)
Average-Wet; 30-50% exceedance	≥12,500 (≥11,300)	≥35,000 (≥31,500)
Moderately Wet; 10-30% exceedance	≥16,000 (≥14,400)	≥43,000 (≥38,700)
Wet; 0-10% exceedance	≥20,000 (≥18,000)	≥55,000 (≥49,500)
Base Flow		
Dry; 90-100% exceedance	≥1,050, Jun-Jul; ≥750, Aug -Feb	≥1,800, Jul – Feb
Moderately Dry; 70-90% exceedance	≥1,050, Jun - Aug; ≥750, Sep-Feb	2,500 – 4,000; Aug – Feb
Average-Dry; 50-70% exceedance	≥1,050 - 2,000, Aug- Feb	2,500 – 4,000; Aug – Feb
Average-Wet; 30-50% exceedance	≥1,050 - 2,000, Aug- Feb	3,000 – 4,800; Aug – Feb
Moderately Wet; 10-30% exceedance	1,500 – 2,500, Sep - Feb	3,000 – 4,800; Aug – Feb
Wet; 0-10% exceedance	1,500 – 2,500, Sep - Feb	≤ 6,000; Sep – Feb

For peak flows, larger number is the target that should be equaled or exceeded for at least 2 days. Number in parentheses should be reached or exceeded for at least 1 day on either side of the target flow.

Rad Ca

Do exceedance

FLOW RECOMMENDATIONS FOR THE GUNNISON RIVER RE: ASPINALL UNIT

✓ **Basis for objections to flow recommendations included:**

1. USFWS reinterpreted published data and recommendations for peak flows, and inappropriately expanded those recommendations.
2. Flows were recommended for life stages of razorback sucker and Colorado pikeminnow, even though it has not been demonstrated that these life stages will persist in the Gunnison, or that the Gunnison is necessary for recovery of the

2001 ABSTRACT OF ASSESSMENT
GUNNISON COUNTY

PROPERTY CLASSIFICATION	*VALUATION*
VACANT LAND	
Residential (vacant lots)	$58,639,900
Commercial (vacant lots)	$4,445,990
Industrial (vacant lots)	$859,790
PUD (vacant lots)	$0
All other vacant land	$0
less than 1 acre	$58,540
1 to 5 acres	$2,491,500
5 to 10 acres	$807,200
10 to 35 acres	$2,450,240
35 to 100 acres	$3,466,890
100 acres and up	$2,561,910
Minor Structures	$84,690
TOTAL VACANT LAND	**$75,866,650**

RESIDENTIAL	**LAND**	**IMPROVEMENTS**	**VALUATION**
Single family residences	$30,619,550	$89,120,750	$119,740,300
Farm/ranch residences	$0	$6,560,070	$6,560,070
Duplex/triplex	$785,510	$2,116,880	$2,902,390
Multi-units (4-8)	$203,650	$621,520	$825,170
Multi-units (9 & up)	$228,950	$1,369,060	$1,598,010
Condominiums	$0	$23,389,180	$23,389,180
Manufactured housing	$278,640	$1,058,860	$1,337,500
Farm/ranch manufactured	$0	$101,700	$101,700
Manufactured housing	$474,970	$65,790	$540,760
Partially exempt (taxable part)	$9,460	$27,120	$36,580
TOTAL RESIDENTIAL REAL PROPERTY	**$32,600,730**	**$124,430,930**	**$157,031,660**

COMMERCIAL	**LAND**	**IMPROVEMENTS**	**VALUATION**
Merchandising	$5,568,560	$8,287,150	$13,855,710
Lodging	$7,474,060	$14,643,390	$22,117,450
Offices	$1,033,090	$3,157,070	$4,190,160
Recreation	$652,830	$1,286,590	$1,939,420
Special purpose	$4,777,750	$8,962,590	$13,740,340
Warehouse/storage	$1,966,850	$2,875,830	$4,842,680
Multi-use (3+ uses)	$1,074,540	$1,857,710	$2,932,250
Recreation lands	$525,110	$0	$525,110
Partially exempt property	$88,680	$93,300	$181,980
Residential furniture and equipment	$0	$365,590	$365,590
Commercial furniture and equipment	$0	$8,602,100	$8,602,100
TOTAL COMMERCIAL PROPERTY	**$23,161,470**	**$50,131,320**	**$73,292,790**

INDUSTRIAL	**LAND**	**IMPROVEMENTS**	**VALUATION**
Contract/service	$247,420	$390,450	$637,870
Manufacturing/ processing	$341,670	$452,320	$793,990
Equipment, furniture & machinery	0	$315,210	$315,210
TOTAL INDUSTRIAL PROPERTY	**$589,090**	**$1,157,980**	**$1,747,070**

AGRICULTURAL	**ACRES**	**VALUATION**
Meadow hay land	43,675	$2,695,540
Grazing land	281,995	$1,831,960
Farm/ranch waste land	4,321	$7,120
Forest land	84	$770
Farm/ranch support buildings		$1,308,010
All other agricultural property		$31,430
TOTAL AGRICULTURAL PROPERTY	**330,075**	**$5,874,830**

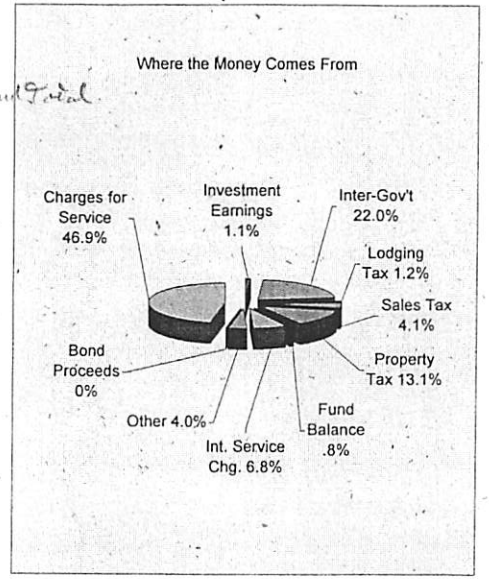
NATURAL RESOURCES (excludes producing mines, oil & gas)	**ACRES**	**VALUATION**
COAL:		
Land		$8,305,060
Improvements		$9,025,810
Equipment, furniture & machinery		$15,945,470
EARTH OR STONE PRODUCTS:		
Land		$218,710
Improvements		$35,980
Equipment, furniture & machinery		$56,440
NON-PRODUCING (Patented):		
Land	10,341	$2,385,890
Improvements		$625,880
SEVERED MINERAL INTERESTS:		
Land	58,411	$146,610
TOTAL NATURAL RESOURCE PROPERTY		**$36,745,850**

PRODUCING MINES	**VALUATION**
EQUIPMENT, FURNITURE & MACHINERY FOR:	
Molybdenum	$228,710
Precious metals	$2,880
TOTAL PRODUCING MINES PROPERTY	**$231,590**

OIL AND GAS	
Producing oil (primary) land	$0
Producing gas (primary) land	$234,500
EQUIPMENT FURNITURE & MACHINERY:	
Producing oil (primary)	$0
Producing gas (primary)	$12,740
TOTAL OIL AND GAS PROPERTY	**$247,240**

GRAND TOTAL ASSESSED VALUATION OF GUNNISON COUNTY FOR 2001

BY ASSESSOR	$351,037,690
STATE ASSESSED UTILITIES	$9,307,900
TOTAL	$360,345,590
CHANGES BY COUNTY BOARD OF EQUALIZATION	($1,799,280)
CHANGES BY STATE BOARD OF EQUALIZATION	$0
GRAND TOTAL 2001 ASSESSED VALUATION	**$358,546,310**

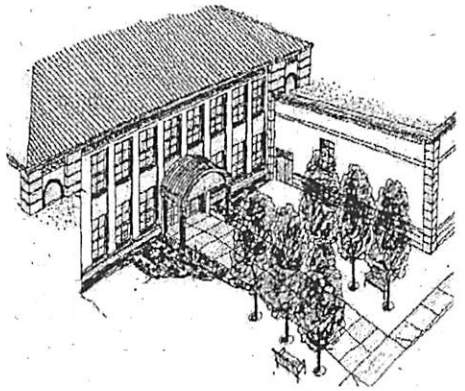


GUNNISON COUNTY OFFICERS - 2001

Perry Anderson . . . . . Commissioner District 1
Fred Field . . . . . Commissioner District 2
Jim Starr . . . . . Commissioner District 3
J. Steven Patrick . . . . . County Judge
Joanne Reitinger . . . . . Clerk-Recorder
Alva May Dunbar . . . . . Treasurer
Judith M. Smith . . . . . Assessor
Richard Murdie . . . . . Sheriff
Joyce Gray . . . . . Clerk of District Court
David Baumgarten . . . . . County Attorney
Anne Steinbeck . . . . . Director of Social Services
C. J. Miller . . . . . County Coroner
John DeVore . . . . . County Manager

ABSTRACT OF ASSESSMENTS AND LEVIES 2001

GUNNISON COUNTY, COLORADO



BLACKSTOCK GOVERNMENT CENTER

Formerly Blackstock Elementary School

Judith M. Smith
Assessor

221 N. Wisconsin Street, Suite A
Gunnison, Colorado 81230
(970) 641-1085
assessor@co.gunnison.co.us

2001	LEVYING BODIES	100	200	300	400	500	501	502	503	601	602	603	606	607	608	609	610	611	612	613	614	615	616	617	619	620	701	702	801	VALUATION*
COUNTY	GENERAL - 14.778 WELFARE - 0.250 TEMP TAX CR. - (4.605) ROAD & BRIDGE - 0 LIBRARY - 1.125 ABATE - 0.012 HEALTH CARE - .907 TOTAL LEVY 12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	12.482	$358,546,310
RE1J	GENERAL - 21.980 ABATEMENTS - 0.035 BOND REDEMPTION - 5.426 TOTAL LEVY - 27.442	27.442	27.442	27.442	27.442	27.442	27.442	27.442	27.442	27.442	27.442	27.442	27.442	27.442	27.442	27.442	27.442	27.442	27.442	27.442	27.442	27.442	27.442	27.442	27.442	27.442				$316,139,580
50J	GENERAL - 29.135 ABATEMENTS - 0.010 BOND REDEMPTION - 0 TOTAL LEVY - 29.145																										28.145	28.145		$38,898,070
RE1J-M	GENERAL - 27.319 BOND REDEMPTION - 0 ABATEMENTS - 0.077 TOTAL LEVY - 27.396																												27.396	$3,508,660
CRESTED BUTTE	GENERAL - 7.300 STREETS & ALLEYS - 5.750 TEMPORARY TAX CREDIT - (4.048) TOTAL LEVY 9.002		9.002																											$47,132,070
GUNNISON	GENERAL - 3.868 TOTAL LEVY - 3.868	3.868																												$47,181,950
MARBLE	GENERAL - 6.505 TOTAL LEVY - 6.505				6.505																									$2,373,980
MT CRESTED BUTTE	GENERAL 5.000 CAPITAL EXPENDITURES - 5.378 TEMPORARY TAX CREDIT (0.828) TOTAL LEVY = 9.550					9.550	9.550	9.550	9.550																					$64,368,050
MT CRESTED BUTTE DDA	DDA REVENUE BASED ON INCREMENT X MILL LEVY / 1000						0.000																							$30,761,960
PITKIN	GENERAL - 3.510 TOTAL LEVY - 3.510			3.510																										$2,244,090
BOSTWICK PARK WATER DISTRICT	GENERAL - 0.981 TEMPORARY TAX CREDIT - (0.113) ABATEMENTS - .002 TOTAL LEVY = .870															0.870														$1,787,170
CARBONDALE & RURAL FIRE PROTECTION DISTRICT	GENERAL - 4.403 DEBT RETIREMENT - .809 ABATEMENTS - 0.025 TOTAL LEVY - 5.237				5.237																			5.237						$8,652,910
COLORADO RIVER WATER DISTRICT	GENERAL - 0.252 ABATEMENTS - .001 TOTAL LEVY - 0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	$358,546,310
CRAWFORD WATER DISTRICT	GENERAL = .560 (WATER ASSESSMENT $4.80 PER ACRE FOOT) TOTAL LEVY = .560																0.560													$22,430
CRESTED BUTTE FIRE PROTECTION DISTRICT	GENERAL - 6.079 DEBT RETIREMENT - 0 ABATE .004 TEMPORARY TAX CREDIT - (2.490) TOTAL LEVY - 3.593		3.593			3.593	3.593	3.593	3.593				3.593	3.593								3.593	3.593		3.593					$173,158,310
CRESTED BUTTE SOUTH METRO DISTRICT	GENERAL - 14.363 ABATEMENTS - 0 TEMPORARY TAX CREDIT - (1.718) DEBT RETIREMENT - 2.358 TOTAL LEVY - 15.003																					15.003								$11,800,300
EAST RIVER REGIONAL SANITATION DISTRICT	GENERAL - 6.000 TOTAL LEVY - 6.000																						6.000		6.000					$13,525,390
FRUITLAND MESA WATER DISTRICT	GENERAL - 0 TOTAL LEVY - 0																	0.000												$56,180
GUNNISON CEMETERY DISTRICT	GENERAL - 0.764 ABATEMENTS - 0 TEMPORARY TAX CREDIT - (0.006) TOTAL LEVY - 0.758	0.758		0.758						0.758								0.758		0.758	0.758									$115,596,860
GUNNISON COUNTY FIRE PROTECTION DISTRICT	GENERAL - 4.500 ABATEMENTS - 0 TOTAL LEVY 4.500			4.500						4.500	4.500					4.500			4.500							4.500			4.500	$88,935,220
GUNN. COUNTY METROPOLITAN RECREATION DIST.	ABATEMENTS - 0 TEMPORARY TAX CREDIT - (0.283) TOTAL LEVY 0.597	0.597	0.597	0.597		0.597	0.597	0.597	0.597	0.597	0.597		0.597	0.597		0.597			0.597				0.597	0.597		0.597				0.597	$308,745,510
MT CRESTED BUTTE WATER & SANITATION DISTRICT	GENERAL - 8.082 ABATEMENTS - 0 TEMPORARY TAX CREDIT - (1.810) DEBT RETIREMENT - 1.694 TOTAL LEVY - 8.966					8.966	8.966	8.966	8.966					8.966																$70,357,540
NORTH FORK WATER DISTRICT	GENERAL - 0.101 B & I - 0.500 TOTAL LEVY - 0.601														0.601												0.601			$37,257,100
RESERVE METRO DIST. 1																														
RESERVE METRO DIST. 2	TOTAL LEVY - 50.000								50.000																					$1,615,980
SKYLAND METROPOLITAN DISTRICT	GENERAL - 0.000 B & I - 22.080 TOTAL LEVY 22.080																						22.080							$11,537,010
UPPER GUNNISON WATER DISTRICT	GENERAL - 2.000 ABATEMENTS - 0 TEMPORARY TAX CREDIT - (0.144) TOTAL LEVY - 1.856	1.856	1.856	1.856		1.856	1.856	1.856	1.856	1.856	1.856		1.856	1.856				1.856		1.856		1.856	1.856		1.856					$300,762,270
	TOTAL LEVY FOR 2001	47.256	55.225	51.398	51.919	64.739	64.739	64.739	114.739	47.888	47.130	40.177	46.223	55.189	40.778	46.144	40.737	42.791	45.274	42.791	40.935	61.226	74.303	45.414	52.223	44.677	41.481	40.880	45.228	*GROSS ASSESSED VALUE
	2000 LEVY	52.537	61.983	53.954	56.636	73.161	73.161			50.444	49.679	45.228	52.007	62.783	45.828	48.629	45.869	47.993	47.679	47.993	45.993	68.742	87.207	50.131	65.127	47.003	42.351	41.751	44.104	

Total General Property Tax Revenues for Up Gun
Up Gun RBCD budget for 2002
609,455
from Gunnison County $558,214
91.6% of money for Up Gun
Carlson Journal - Gun Co.

Up Gun District is
83% of Gun. County
That includes mines
railroad

001 ABSTRACT OF ASSESSMENT
GUNNISON COUNTY

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Contract/service	$247,420	$390,450	$637,870
Manufacturing/ processing	$341,670	$452,320	$793,990
Equipment, furniture & machinery	0	$315,210	$315,210
TOTAL INDUSTRIAL PROPERTY	**$589,090**	**$1,157,980**	**$1,747,070**

% value
61.71 @
6.49 @

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Grazing land	281,995	$1,831,960
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1.6% of Grand Total

NATURAL RESOURCES (excludes producing mines, oil & gas)	ACRES	VALUATION
COAL:		
Land		$8,305,060
Improvements		$9,025,810
Equipment, furniture & machinery		$15,945,470
EARTH OR STONE PRODUCTS:		
Land		$218,710
Improvements		$35,980
Equipment, furniture & machinery		$56,440
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Precious metals	$2,880
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OIL AND GAS	
Producing oil (primary) land	$0
Producing gas (primary) land	$234,500
EQUIPMENT FURNITURE & MACHINERY:	
Producing oil (primary)	$0
Producing gas (primary)	$12,740
TOTAL OIL AND GAS PROPERTY	**$247,240**

GRAND TOTAL ASSESSED VALUATION OF GUNNISON COUNTY FOR 2001

BY ASSESSOR	$351,037,690
STATE ASSESSED UTILITIES	$9,307,900
TOTAL	$360,345,590
CHANGES BY COUNTY BOARD OF EQUALIZATION	($1,799,280)
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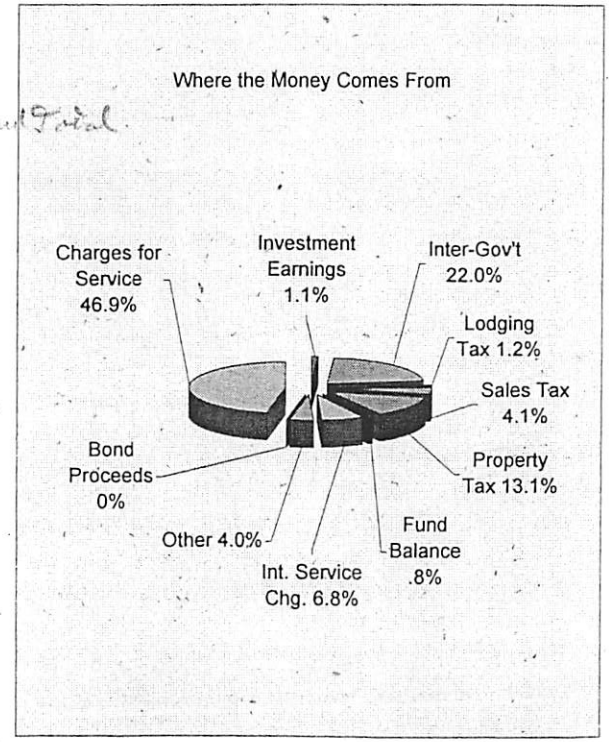

GUNNISON COUNTY OFFICERS - 2001

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Jim Starr	Commissioner District 3
J. Steven Patrick	County Judge
Joanne Reitinger	Clerk-Recorder
Alva May Dunbar	Treasurer
Judith M. Smith	Assessor
Richard Murdie	Sheriff
Joyce Gray	Clerk of District Court
David Baumgarten	County Attorney
Anne Steinbeck	Director of Social Services
C. J. Miller	County Coroner
John DeVore	County Manager

Table II - 5A. County Agricultural Profiles

	Gunnison		Colorado	
	1997	1992	1997	1992
1 NO. OF FARMS & RANCHES	187	173	28,268	27,152
2 AGRICULTURAL LAND USE				
Land in Farms (1000 acres)	195	177	32,634	33,983
Cropland (1000 acres)	38	48	10,509	10,933
Irrigated Land (1000 acres)	51	49	3,430	3,170
3 PUBLIC LAND OWNERSHIP 1995				
Land in County (1000 acres)	2,085		66,602	
State Land (percent)	1%		5%	
Federal Land (percent)	80%		36%	
4 FARMS BY VALUE OF SALES 1997				
less than 10,000	82		13,397	
More than 10,000	105		14,871	
5 FARMS BY TYPE OF ORGANIZATION 1997				
Individual or Family	134		23,281	
Partnership or Corporation	46		4,675	
Other	7		312	
6 OPERATOR BY PRINCIPAL OCCUPATION 1997				
Farming	104		15,399	
Other	83		12,869	
7 TOP FIVE COMMODITIES BY VALUE 1997				
	Cattle and Calves		Cattle and Calves	
	Sheep and lambs		Corn for grain	
	Horses and ponies		Wheat	
	Hogs and pigs		Nursery and greenhouse crops	
	Goats		Hay crops	
8 TOP FIVE COMMODITIES BY CROP AREA 1997				
	Hay		Wheat	
	Sorghum		Hay crops	
			Corn for grain	
			Sorghum	
			Proso millet	
9 AG PRODUCTION VALUE in 1999 Dollars				
	1999	1997	1999	1997
Crop Market Value ($000)	813	1,029	1,355,665	1,394,770
Livestock Market Value ($000)	7,473	7,436	3,226,519	3,247,342
Total Market Value ($000)	8,286	8,465	4,582,184	4,642,112
10 AGRIBUSINESS IMPACT 1997				
Agricultural Production Jobs	261		38,508	
Agricultural Inputs Jobs	71		36,364	
Agricultural Processing and Marking Jobs	1		30,267	
Total Agribusiness Jobs	333		105,140	
% of Total State/County Employment	3.20%		4.40%	
Agricultural Production Income (000)	-238		733,144	
Agricultural Inputs Income (000)	1144		685,075	
Agricultural Processing and Marking Inc. (000)	10		1,045,770	
Total Agribusiness Income (000)	916		2,463,988	
% of Total State/County Income	0.34%		2.19%	

D = withheld to avoid disclosing data for individual farms and ranches. Consequently, county data may not sum to state total.
Rows 1,2,4-8 from "1997 Census of Agriculture," U.S. Dept. of Agriculture, National Agricultural Statistics Service.
Row 3 from "Colorado Land Ownership", Colorado Department of Agriculture 1995
Row 9 from US Bureau of Economic Analysis
Rows 10 from "Colorado's Agribusiness System," CSU Cooperative Extension.

of this irrigated pasture and meadows is code 4137

GUNNISON COUNTY ASSESSOR'S OFFICE

IRRIGATED PARCELS >= 960 ACRES

These are Total acres for parcels

R011232	602	398300000086	N2SW4. SW4SW4. SEC 2, LOTS 7,9,13,14,15,16. S2. SEC 3 & LOTS 15,16,SE4. SEC 4 & N2NE4. SEC 9 & NW4.SW4NE4. SEC 10 ALL 48N4W 1065.723 ACRES #472611 #503507 #503509 #505869	LAND:	$23,990
LEXANDER WILLIAM M ETAL				IMP	$111,430
1957 UNCOMPAHGRE RD			27.2	TOTAL:	$135,420
IONTROSE	CO 81401			acres	1065.723
R015880	701	292100000020	984.07 ACRES IN SEC 22,23,25,26,27 11S90W #499757	LAND:	$107,740
SPEN LEAF RANCH INC			155.49	IMP	$325,390
98 1550 RD				TOTAL:	$433,130
ELTA	CO 81416			acres	984.07
R025302	801	398500000020	994.93A IN SEC 8,17,20,21,29 48N5W B686 P540 B726 P423	LAND:	$84,100
LUE CREEK PARTNERS			201	IMP	$0
/O DALBY WENDLAND & CO				TOTAL:	$84,100
O BOX 1605					
IONTROSE	CO 814021605			acres	994.93
R026847	801	398500000046	3313.5A IN SEC 20,21,28,29,32,33 48N5W B665 P330 B686 P568 B726 P417 #485520	LAND:	$130,720
LUE CREEK PARTNERS				IMP	$644,400
/O DALBY WENDLAND & CO			176.1	TOTAL:	$775,120
O BOX 1605					
ONTROSE	CO 814021605			acres	3313.5
R017963	601	343500000051	1015.83 ACRES IN SEC 3,4,10 15S85W #505234	LAND:	$23,480
OCKRELL INVESTMENT PARTNERS LP				IMP	$0
) SMITH ST SUITE 3900			53.59	TOTAL:	$23,480
OUSTON	TX 77002			acres	1015.83
R008402 ?	601	343500000040	2209.63 ACRES IN SEC 21,22,23 25,26,27,28,34,35 15S85W B718 P394 B751 P795,797 #439791	LAND:	$121,360
STESS FAMILY LIMITED PARTNERSHIP				IMP	$20,760
315 SO DENTWOOD			check ? 95.3 + 82.9 + 5.69 + 95.3 + 76.9 + 11.0 + 43.93	TOTAL:	$142,120
ALLAS	TX 75220			acres	2209.63
R015867	701	291900000003	1849.69A IN SEC 7,8,17,18,19 11S89W #473835	LAND:	$82,470
LCON SEABOARD DIVERSIFIED INC A				IMP	$139,610
POST OAK STE 1400			110.7	TOTAL:	$222,080
OUSTON	TX 77027			acres	1849.69
R016364	801	398500000050	1675.339 ACRES IN SEC 22,23,25,26,27,34,35,36 48N5W #498479 #510610	LAND:	$73,820
ERDIN FAMILY INVESTMENTS LP				IMP	$230,840
10 LAKERIDGE PLACE			40.5 + 74.36	TOTAL:	$304,660
ORTH LIBERTY	IA 52317			acres	1675.339
R015838	701	298700000004	S2. SEC 1, SW4SE4. E2SE4. SEC 2 (LESS 240' WIDE STRIP), E2. E2NW4. NW4NW4. SEC 11, SEC 12. (LESS SE4SW4) 12S90W B378 P260	LAND:	$48,210
TCHKISS RANCHES INC				IMP	$73,970
) BOX 479			35.26	TOTAL:	$122,180
TCHKISS	CO 81419			acres	1501.84
R015843	701	291900000007	1150.048A IN SEC 17,18,19,20,29 LYING EAST OF HWY 50 11S89W B385 P184 B561 P108-143 B684 P221	LAND:	$87,740
COBS FAMILY PARTNERSHIP				IMP	$51,580
) BOX 693			183.2	TOTAL:	$139,320
TCHKISS	CO 81419			acres	1150.048

GUNNISON COUNTY ASSESSOR'S OFFICE

IRRIGATED PARCELS >= 960 ACRES

R040199	601	379300000055	TRACT IN N2NE4. NE4NW4 SEC 17 AND IN W2SE4 SEC 8. 49N3E #490846	LAND:	$1,850
KATHEISER JAMES GREGORY ETAL				IMP	$138,320
3500 COUNTY ROAD 44			7	TOTAL:	$140,170
PARLIN	CO 81239			acres	1827.04
R016138	702	318300000002	2211.41 IN SEC 1,2,3,10,11 & TR 37,38,47,48 13S89W B672 P548	LAND:	$131,310
L RANCH A GENERAL PARTNERSHIP				IMP	$796,100
P O BOX 500			117.54	TOTAL:	$927,410
SOMERSET	CO 81434			acres	2211.41
R015812	701	298900000035	8.35A IN SE4SE4. SEC 21 (-.43A & -31.65A SE4SE4 SEC 21), S2SW4. SEC 22, W2. SEC 26, E2. N2NW4. N2SW4. SEC 27, NE4NE4. N2SE4. SEC 28 B291 P404 B706 P564 B712 P832	LAND:	$67,410
LEE RICHARD N ETAL				IMP	$257,160
P O BOX 509			125.48	TOTAL:	$324,570
HELPER	UT 84526			acres	5005.31
R015965	701	292100000016	2477.74 ACRES IN SEC 2,10,11,13,14,15,22,23,24,25,26 11S90W (INC HES 80 & 160 A IN UTE PLACER) B258 P461,462 B354 P278 B498 P13	LAND:	$88,340
MCINTYRE LIVESTOCK CORPORATION				IMP	$86,010
1690 M ROAD			32.45	TOTAL:	$174,350
FRUITA	CO 81521			acres	2477.74
R008369	601	351500000004	1282.42 ACRES IN SEC 17,18,19,20, 29,30 51N1W GOVT PATENT B264 P145 B338 P411 B579 P945-950	LAND:	$72,270
MILLER HARRY E				IMP	$286,340
COUNTY ROAD 7			83.93 + 119.96	TOTAL:	$358,610
GUNNISON	CO 81230			acres	1282.42
R010330	601	378700000024	SE4.S2NE4.LOT 4(SW4SW4. 36.849A) SE4SW4. SEC 18 150A IN NW4.SW4. SEC 17, NE4NW4.N2NE4. 34.29A SE4NE4. 20.71A IN E2SE4. SEC 19, N2NW4.SW4NW4.NW4SW4. SEC 20 49N1W TOTAL 961.849 ACRES B682 P83	LAND:	$118,920
MONCRIEF W A JR				IMP	$181,520
950 COMMERCE STREET				TOTAL:	$300,440
FORT WORTH	TX 761025418		111.45 + 44.12 + 377.19	acres	961.85
R015907	701	318500000005	1666.72 ACRES IN SEC 8,9,16,17,18 ALL 13S90W #483286	LAND:	$21,120
MOUNTAIN COAL COMPANY				IMP	$12,590
C/O ARK LAND COMPANY			8.82	TOTAL:	$33,710
CITYPLACE ONE SUITE 300				acres	1663.72
ST LOUIS	MO 63141				
R007234	601	343700000009	1451.97 ACRES IN SEC 5,6,7,8,9 15S86W, B422 P194	LAND:	$52,670
MUNIS ROSALIE C				IMP	$0
BOX 246			44.12	TOTAL:	$52,670
PHILIPSBURG	MT 59858			acres	1451.97
R012371	602	424500000022	3079.91 ACRES IN SEC 17,20,21,22,27 28,29,32,33,34 46N3W B626 P158	LAND:	$51,860
NORSWORTHY LAMAR				IMP	$6,990
C/O HOLLY CORP			20	TOTAL:	$58,850
100 CRESCENT CT SUITE 1600				acres	3079.91
DALLAS	TX 75201				
R007213	601	379900000022	TRACTS 41-43, 45-48, 50-57, PART OF TRACT 44 SEC 8,9,16,17,20,21,28,33 49N5E RESURVEY #507191 #507193	LAND:	$210,790
OCONNOR TRUST				IMP	$690,210
MICHAEL A AND KAREN L OCONNOR TR			788.0	TOTAL:	$901,000
PO BOX 2466				acres	2032
CORPUS CHRISTI	TX 78403				

GUNNISON COUNTY ASSESSOR'S OFFICE

IRRIGATED PARCELS >= 960 ACRES

R007291	601	378500000004	W2. W2E2. E2NE4. SEC 3, SE4. S2NE4. LOTS 1 & 2 (N2NE4, 81.10A). E2NW4. NW4NW4. SEC 4, NE4NE4. SEC 9, NW4. E2SW4. SEC 10, 49N2W B505 P598-602 B425 P1-6 B550 P322 B425 P89 B760 P555 B692 P845	LAND:	$43,970
ROBBINS HAROLD R (AKA ROBERT H R				IMP	$0
ETAL				TOTAL:	$43,970
615 N SPRUCE				acres	1201.1
GUNNISON	CO 81230				
R011269	602	405500000008	2282.62A IN SEC 12,13,14,23,24,25, 26,36, 47N1 1/2W B357 P34	LAND:	$58,190
SODERQUIST RANCHES INC				IMP	$0
61986 OAK GROVE RD				TOTAL:	$58,190
MONTROSE	CO 81401			acres	2282.62
R013251	606	325700000121	PT OF S2NE4. SE4. SEC 19 N2. N2SE4. NE4SW4. SEC 29 E2. E2SW4. SEC 30 E2NW4. N2SW4. SEC 31 14S85W (CAMP 1160.62 ACRES) B380 P21 B788 P845	LAND:	$43,720
SPANN VIRGIL & LEE RANCHES INC				IMP	$0
36781 W HWY 50				TOTAL:	$43,720
GUNNISON	CO 81230			acres	1160.62
R007345	601	343700000040	1492.77 ACRES IN SECTIONS 21,22,27,28,34 15S86W B382 P189 B384 P337	LAND:	$78,900
STRATMAN CATTLE CO				IMP	$141,750
TN MAC STRATMAN				TOTAL:	$220,650
10458 COUNTY ROAD 730				acres	1492.77
GUNNISON	CO 81230				
R007374	601	369900000078	NE4. SE4. S2SW4. SEC 6, NW4. SW4. SW4NE4. SE4 NORTH OF HWY 135 SEC 5, NW4NW4. SW4NW4 LYING NORTH OF HWY 135 SEC 8, PT OF LOTS 1,2. S2NE4. SE4NW4. NE4SW4. TR IN LOT 3. SE4 NORTH OF HWY 135 SEC 7, NW4NW4NE4 LYING NORTH OF HWY 135, SEC 18 50N1E B404 P239-254 #495144 #500944	LAND:	$166,900
TRAMPE DORA MAE				IMP	$277,040
COUNTY ROAD 8				TOTAL:	$443,940
GUNNISON	CO 81230			acres	1102.415
R013231	606	325700000008	S2 SEC 4,SE4SE4 SEC 5, E2E2. W2SE4.SW4NE4. PART OF E2SW4. LYING E OF THE EAST RIVER SEC 8 ALL SEC 9 N2NE4 SEC 17 14S85W 1392.661A #508713	LAND:	$60,640
TRAMPE RANCHES PARTNERSHIP LLLP				IMP	$0
244 TOMICHI TR				TOTAL:	$60,640
GUNNISON	CO 81230			acres	1392.66
R007110	601	343700000050	1601.32 ACRES IN SEC 18,19,20,29,30 15S86W #500872 #500873	LAND:	$178,440
TROPHY RANCHES LLC				IMP	$340,190
777 EAST WISCONSIN AVE STE 3020				TOTAL:	$518,630
MILWAUKEE	WI 53202			acres	1601.32
R007972	601	343700000047	1227.26A IN: SEC 9,16,17,20,21 15S86W B674 P374 #499497	LAND:	$63,540
WALSH JOHN L ETAL				IMP	$330,480
11900 COUNTY RD 730				TOTAL:	$394,020
GUNNISON	CO 81230			acres	1227.26
R009687	601	370100000128	1265.3 ACRES IN SEC 1,2,3,5,6,8,10, 11,12 50N1W #509007 #509098	LAND:	$217,780
WESTSIDE LAND & TIMBER COMPANY I				IMP	$626,880
A SOUTH CAROLINA CORP				TOTAL:	$844,660
210 BIRCHTREE DR				acres	1265.3
GREENWOOD	SC 29649				
025330	602	424700000025	978.03 ACRES IN SEC 25,26,35,36 46N4W B416 P113, B700 P371, B700 P375, B709 P149	LAND:	$12,850
WHINNERY HELEN E				IMP	$0
2557 HWY 149				TOTAL:	$12,850
POWDERHORN	CO 81243			acres	978.03

WATER FLOWS IN THE UPPER GUNNISON BASIN

prepared by Butch Clark (970-641-2907) for the
Watershed Planning meeting on November 17, 1999

How much water flows through our Upper Gunnison Basin - where and when? Attached is information to answer this question.

Average water flows by month for various places in the Upper Gunnison Basin are reported by the U.S. Geological Survey. Beginning as early as 1910, the USGS gaged, recorded, and reported stream flows in our basin. During the past ten years the Upper Gunnison River Water Conservancy District, Gunnison County and its municipalities, Colorado and various federal agencies, and others have contributed towards expanding the system of gaging stations placed around the basin. Both water quantity and quality conditions are now monitored at many sites. The data are used for water development, flood control, coping with drought, managing fisheries and recreation, water quality planning, and many other purposes.

Attached charts and graphs show reported average flow by month for selected locations and the percentage of annual flow by month during a water year - October through the next September. How water flows through streams over time is largely determined by river size, climate, geology, topography, and vegetative cover (see Poff and others; 1997). Streamflow quantity and timing are the most critical components of water supply, water quality, and ecosystem integrity of stream systems. Streamflow can be described in terms of magnitude, frequency, duration, predictability, and rate of change or flashiness (Poff and others 1997; pp. 770 - 771). This pattern of flow over the water year, or longer periods, is called a hydrograph. How much water flows, and when, gives both form and process to rivers (Rosgen 1996; chapters 2 and 3). Presentation of this information by percentage allows comparisons of streams having different sizes.

Typically, hydrographs for streams in the upper Gunnison River Basin show a high peak for the months of spring runoff. This peak is sharpest for the smaller upper elevation streams and during "wet" years as shown in the chart for Blue Mesa Reservoir. At other locations the pattern is more spread-out and reflects operation of an upstream reservoir (for example Taylor River at Almont and hydrographs for averages from different time periods for flows of the Gunnison River below the Aspinall Unit). An notable exception is the hydrograph for Cochetopa Creek. It shows a rise in August and into September which largely reflects return of water back into the stream that had rapidly entered upstream aquifers during the spring runoff. In effect, this an example of naturally provided water management which increases late season flow.

Useful References:

Bentrup G. and Hoag J. B. (1998) The Practical Streambank Bioengineering Guide, USDA - Natural Resources Conservation Service, Plant Materials Center, Aberdine, Idaho, multiple sections with approx. 350 pages.

Poff N. L., Allan D., Bain M. B., and others (1997) The Natural Flow Regime in BioScience vol. 47 n. 11, December, pages 769 - 784.

Rosgen D. (1996) Applied River Morphology, Wildland Hydrology, Pagosa Springs, Colorado, multiple sections, approx. 300 pages.

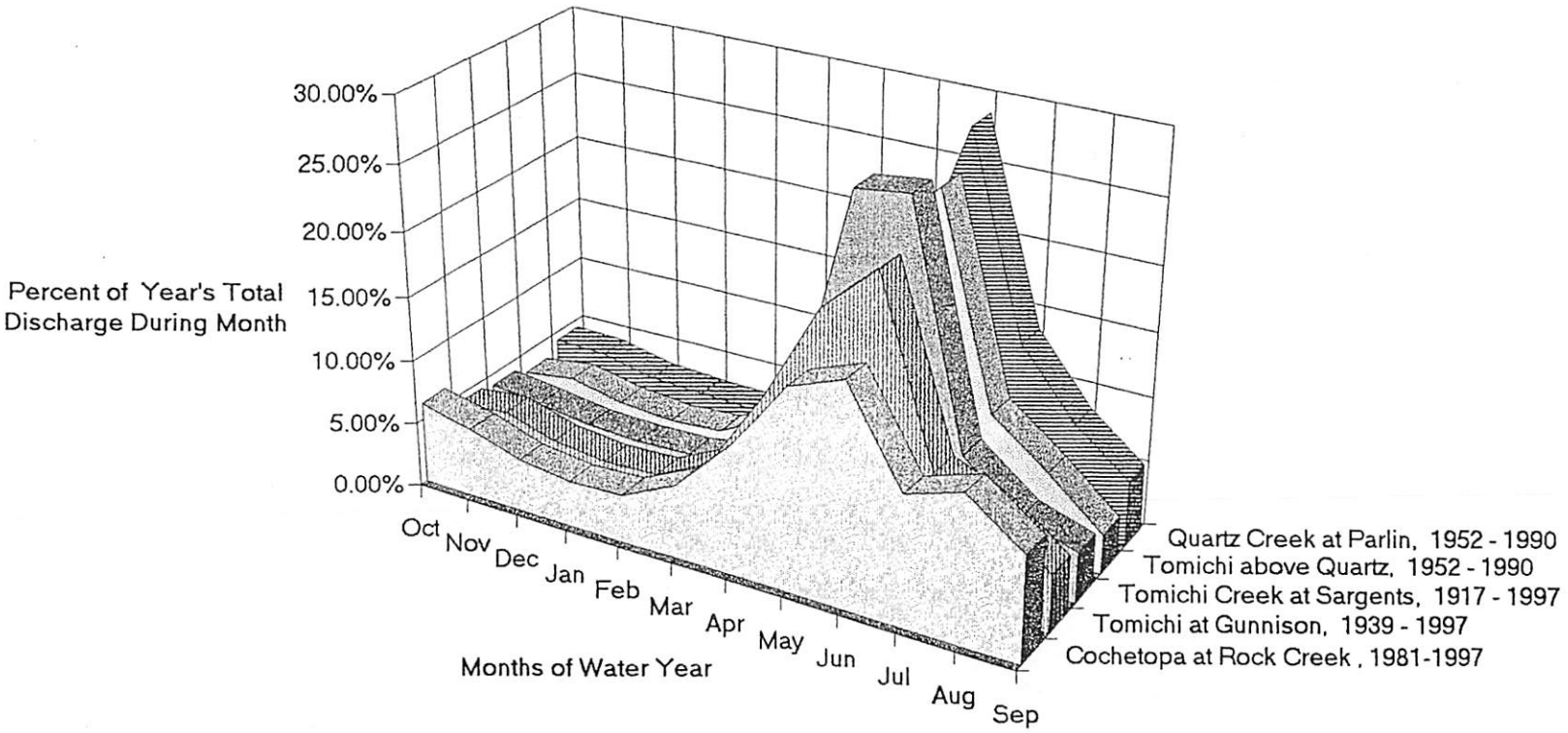
AVERAGE WATER FLOW PATTERNS REPORTED FOR UPPER GUNNISON RIVER BASIN
Tomichi Creek Basin

Data sources: U.S. Geological Survey (1998) Water Resources Data - Colorado, Water Year 1997, Water-Data Report CO-97-2, Denver, Colorado. Records from gaging stations.
Hydrosphere Resource Consultants (1993) Gunnison Basin Planning Model - beta release version 0.9, Boulder, Colorado. These are calculated as flows before diversions and depletions.

	Cochetopa C. at Rock Creek 1981 - 1997 USGS	Tomichi Creek near Gunnison 1939 - 1997 USGS	Quartz Creek at Parlin 1952 - 1990 Hydros.	Tomich C. abv. Quartz Creek 1952 - 1990 Hydros.	Tomichi Creek at Sargents 1917 - 1997 USGS
			(see note above about flows)		
Months of Water Year	Monthly average discharge flow in cubic feet per second (cfs)				
Oct	35.50	93.70	30.82	30.78	31.50
Nov	30.20	102.00	29.94	35.93	27.90
Dec	22.90	76.80	22.85	27.82	23.40
Jan	20.10	66.60	21.02	23.73	21.70
Feb	20.80	69.40	20.03	26.22	22.30
Mar	31.80	112.00	24.23	46.92	28.00
Apr	55.30	246.00	45.93	110.92	68.70
May	86.80	407.00	121.35	203.25	202.00
Jun	95.80	488.00	204.38	238.20	206.00
Jul	55.70	199.00	96.20	91.53	66.70
Aug	63.30	160.00	59.51	60.80	39.90
Sep	45.50	92.70	36.15	27.92	29.50
Average cfs	46.98	176.10	59.37	77.00	63.97
Total in cfs months	563.70	2,113.20	712.41	924.02	767.60
Total in acre-feet	34,010	127,496	42,982	55,749	46,312
	Percent of year's total discharge during month				
Oct	6.30%	4.43%	4.33%	3.33%	4.10%
Nov	5.36%	4.83%	4.20%	3.89%	3.63%
Dec	4.06%	3.63%	3.21%	3.01%	3.05%
Jan	3.57%	3.15%	2.95%	2.57%	2.83%
Feb	3.69%	3.28%	2.81%	2.84%	2.91%
Mar	5.64%	5.30%	3.40%	5.08%	3.65%
Apr	9.81%	11.64%	6.45%	12.00%	8.95%
May	15.40%	19.26%	17.03%	22.00%	26.32%
Jun	16.99%	23.09%	28.69%	25.78%	26.84%
Jul	9.88%	9.42%	13.50%	9.91%	8.69%
Aug	11.23%	7.57%	8.35%	6.58%	5.20%
Sep	8.07%	4.39%	5.07%	3.02%	3.84%
Total	100.00%	100.00%	100.00%	100.00%	100.00%

COMPARISON OF WATER FLOW PATTERNS
Tomichi Creek Basin

from monthly mean average data reported by U.S.G.S. and Hydrosphere



AVERAGE WATER FLOW PATTERNS REPORTED FOR UPPER GUNNISON RIVER BASIN

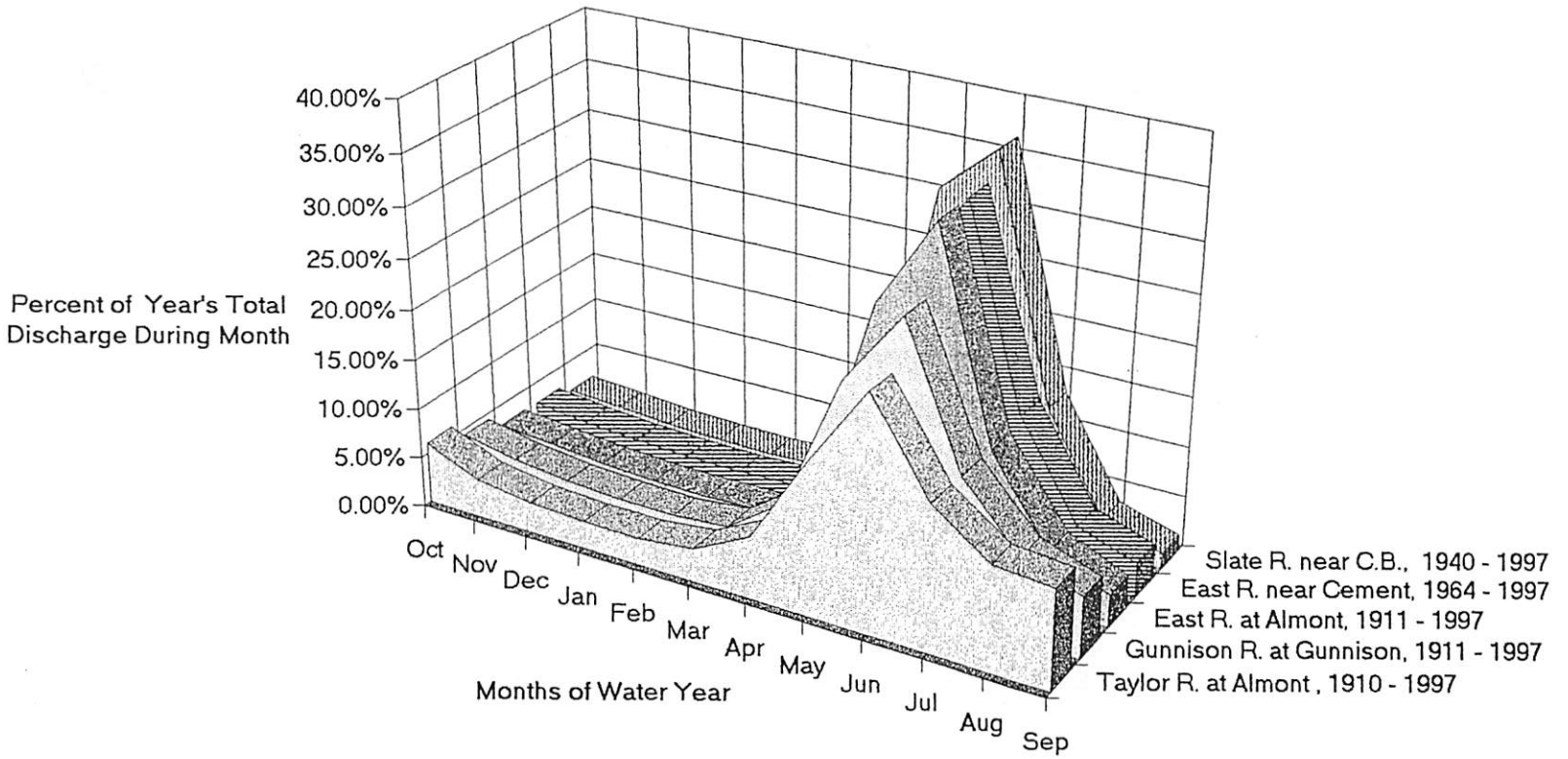
Gunnison River Basin above Gunnison, Colorado

Data sources: U.S. Geological Survey (1998) Water Resources Data - Colorado, Water Year 1997, Water-Data Report CO-97-2, Denver, Colorado. Breaks in the continunity of gaging for Slate River and East River above Cement Creek.

	Taylor River at Almont 1910 - 1997 USGS	Slate R. near Crested Butte 1940 - 1997 USGS	East R. near Cement Creek 1964 - 1997 USGS	East River at Almont 1911 -1997 USGS	Gunnison R. at Gunnison 1911 - 1997 USGS
Months of Water Year	Monthly average discharge flow in cubic feet per second (cfs)				
Oct	246.00	30.20	115.00	117.00	404.00
Nov	156.00	23.30	88.20	95.50	300.00
Dec	121.00	16.20	70.10	73.20	237.00
Jan	109.00	12.60	61.60	62.20	211.00
Feb	108.00	11.40	58.10	59.50	204.00
Mar	134.00	17.10	67.50	67.80	252.00
Apr	249.00	125.00	236.00	249.00	616.00
May	609.00	547.00	1,042.00	1034.00	1860.00
Jun	936.00	628.00	1,408.00	1396.00	2547.00
Jul	577.00	223.00	608.00	573.00	1301.00
Aug	417.00	57.30	223.00	237.00	747.00
Sep	396.00	27.30	142.00	130.00	552.00
Average cfs	338.17	143.20	343.29	341.18	769.25
Total in cfs months	4,058.00	1,718.40	4,119.50	4,094.20	9,231.00
Total in acre-feet	244,833	103,677	248,543	247,017	556,937
	Percent of year's total discharge during month				
Oct	6.06%	1.76%	2.79%	2.86%	4.38%
Nov	3.84%	1.36%	2.14%	2.33%	3.25%
Dec	2.98%	0.94%	1.70%	1.79%	2.57%
Jan	2.69%	0.73%	1.50%	1.52%	2.29%
Feb	2.66%	0.66%	1.41%	1.45%	2.21%
Mar	3.30%	1.00%	1.64%	1.66%	2.73%
Apr	6.14%	7.27%	5.73%	6.08%	6.67%
May	15.01%	31.83%	25.29%	25.26%	20.15%
Jun	23.07%	36.55%	34.18%	34.10%	27.59%
Jul	14.22%	12.98%	14.76%	14.00%	14.09%
Aug	10.28%	3.33%	5.41%	5.79%	8.09%
Sep	9.76%	1.59%	3.45%	3.18%	5.98%
Total	100.00%	100.00%	100.00%	100.00%	100.00%

COMPARISON OF WATER FLOW PATTERNS
Gunnison Basin above Gunnison

from monthly mean average data reported by U.S.G.S.



AVERAGE WATER FLOW PATTERNS REPORTED FOR UPPER GUNNISON RIVER BASIN

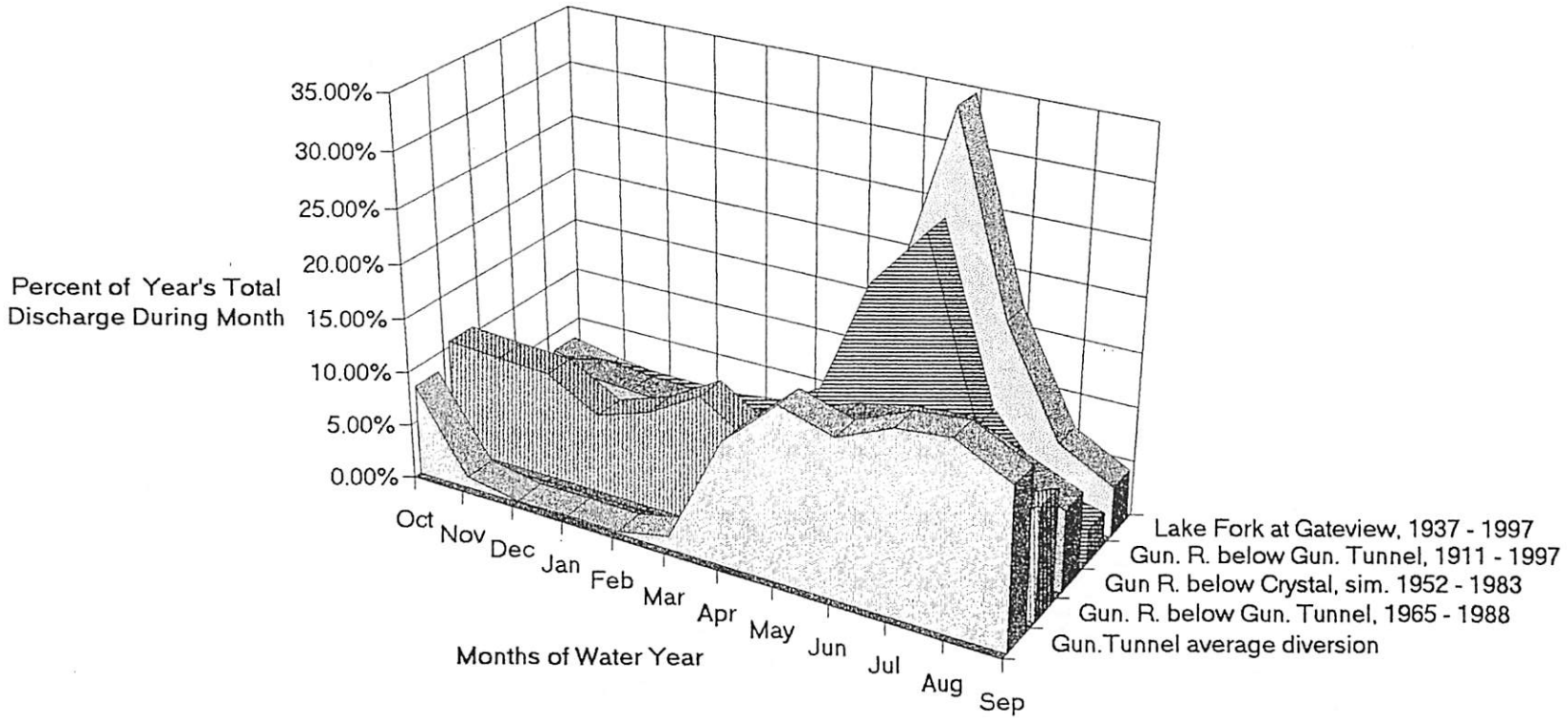
Gunnison River Basin below Gunnison, Colorado

Data sources: U.S. Geological Survey (1998) Water Resources Data - Colorado, Water Year 1997, Water-Data Report CO-97-2, Denver, Colorado.
Bureau of Reclamation (1990) AB lateral Hydropower Facility - Uncompahgre Valley Reclamation Project; FEIS, vol. 1, Salt Lake City, Utah. Flow pattern for Gunnison River below Crystal Reservoir is simulated to reflect operation of Aspinall Unit.

Months of Water Year	Gun. Tunnel Diversions 1910 - 1997 BofRec.	Gun. R. below Gun.Tunnel 1965 - 1988 BofRec.	Gun. R. below Gun.Tunnel 1911 - 1997 USGS	Gun. R. below Crystal Res. 1952 - 1983 BofRec. simulated	Lake Fork at Gateview 1937 - 1997 USGS
	Monthly average discharge flow in cubic feet per second (cfs)				
Oct	464.00	1,576.00	542.00	1275.00	94.00
Nov	56.00	1,520.00	748.00	1233.00	68.30
Dec	8.00	1,483.00	790.00	1459.00	52.20
Jan	11.00	1,086.00	780.00	1393.00	46.20
Feb	8.00	1,326.00	773.00	1346.00	43.70
Mar	66.00	1,744.00	878.00	1247.00	56.40
Apr	624.00	1,269.00	1,319.00	1545.00	133.00
May	875.00	745.00	3,223.00	1878.00	537.00
Jun	795.00	724.00	4,113.00	2082.00	993.00
Jul	914.00	773.00	1,562.00	2180.00	488.00
Aug	944.00	1,182.00	673.00	1788.00	206.00
Sep	803.00	1,517.00	488.00	1382.00	130.00
Average cfs	464.00	1,245.42	1,324.08	1,567.33	237.32
Total in cfs months	5,568.00	14,945.00	15,889.00	18,808.00	2,847.80
Total in acre-feet	335,936	901,682	958,636	1,134,749	171,817
	Percent of year's total discharge during month				
Oct	8.33%	10.55%	3.41%	6.78%	3.30%
Nov	1.01%	10.17%	4.71%	6.56%	2.40%
Dec	0.14%	9.92%	4.97%	7.76%	1.83%
Jan	0.20%	7.27%	4.91%	7.41%	1.62%
Feb	0.14%	8.87%	4.87%	7.16%	1.53%
Mar	1.19%	11.67%	5.53%	6.63%	1.98%
Apr	11.21%	8.49%	8.30%	8.21%	4.67%
May	15.71%	4.98%	20.28%	9.99%	18.86%
Jun	14.28%	4.84%	25.89%	11.07%	34.87%
Jul	16.42%	5.17%	9.83%	11.59%	17.14%
Aug	16.95%	7.91%	4.24%	9.51%	7.23%
Sep	14.42%	10.15%	3.07%	7.35%	4.56%
Total	100.00%	100.00%	100.00%	100.00%	100.00%

COMPARISON OF WATER FLOW PATTERNS
Gunnison Basin below Gunnison

from monthly mean average data reported by U.S.G.S and B. of Reclamation



AVERAGE WATER FLOW PATTERNS REPORTED FOR UPPER GUNNISON RIVER BASIN

Representative Inflows and Releases from Blue Mesa Reservoir

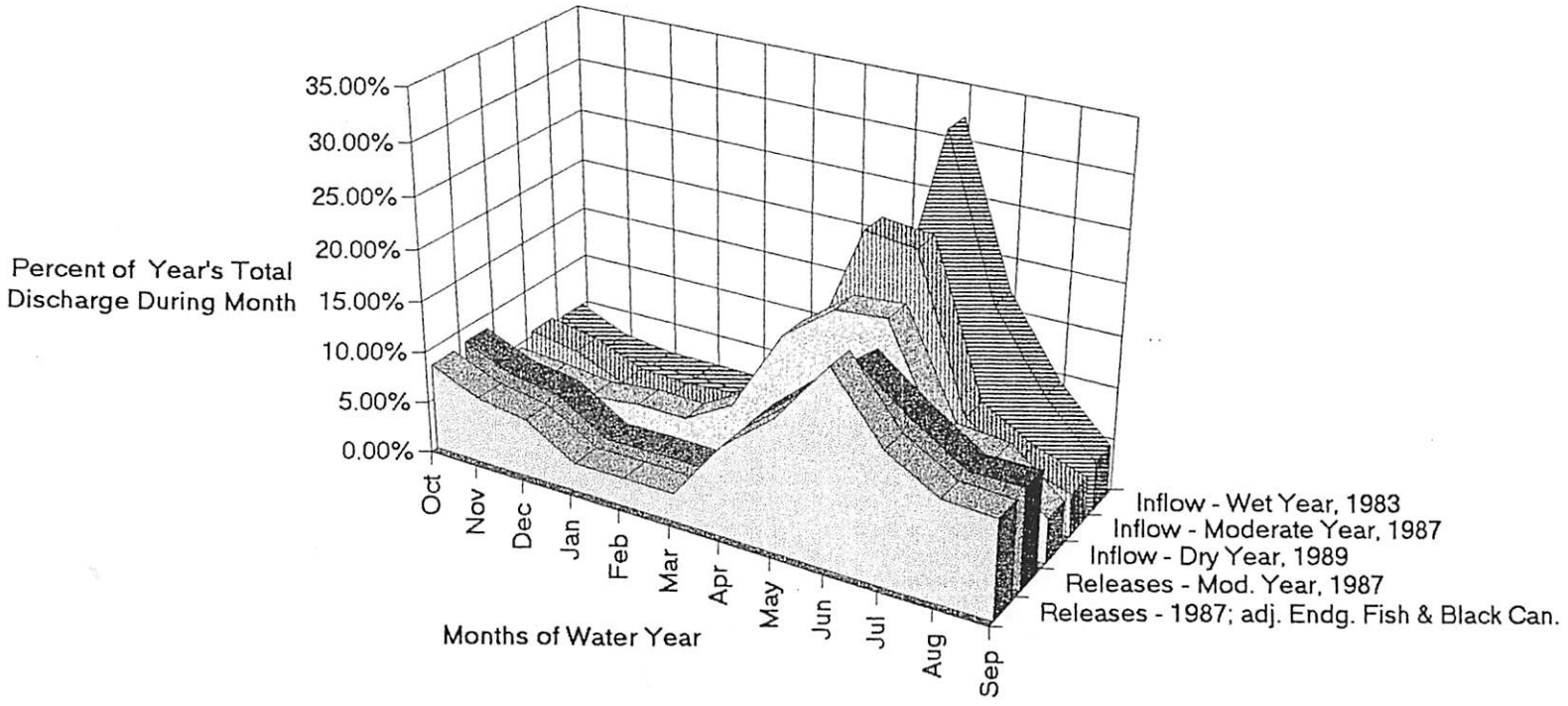
Data sources: Western Area Power Administration - US Dept. of Energy (1994) Salt Lake City Area Integrated Project Electrical Power Marketing, DEIS, vol. 4, Salt Lake City, Utah.
Clark R. E. III (1997) Assessment of Proposed AB Lateral - Average Year. Reflects some additional flows required for recovery of endangered fish and Black Canyon National Monument.

Evaporation from reservoir is about 10,000 acre-feet in a moderate or average year.

Months of Water Year	Dry Year 1989 inflows WAPA	Moderate Year 1987 inflows WAPA	Wet Year 1983 inflows WAPA	Moderate Year 1987 releases WAPA	Year 1987 with endangered fish and Black Canyon releases Clark
	Monthly average flow in cubic feet per second (cfs)				
Oct	492.00	1,017.00	1,046.00	1,570.00	1,570.00
Nov	448.00	862.00	616.00	1,200.00	1,200.00
Dec	385.00	497.00	475.00	1,050.00	1,050.00
Jan	439.00	452.00	477.00	500.00	500.00
Feb	431.00	517.00	468.00	510.00	510.00
Mar	729.00	903.00	689.00	500.00	500.00
Apr	1,622.00	2,114.00	978.00	1,600.00	1,630.50
May	2,033.00	4,415.00	2,676.00	2,370.00	2,370.00
Jun	2,077.00	4,299.00	6,702.00	3,050.00	3,514.40
Jul	968.00	1,581.00	3,554.00	2,350.00	2,350.00
Aug	915.00	1,051.00	2,010.00	1,750.00	1,802.40
Sep	469.00	745.00	975.00	1,750.00	1,753.20
Average cfs	917.33	1,537.75	1,722.17	1,516.67	1,562.54
Total in cfs months	11,008.00	18,453.00	20,666.00	18,200.00	18,750.50
Total in acre-feet	664,149	1,113,331	1,246,849	1,098,067	1,131,280
	Percent of year's total discharge during month				
Oct	4.47%	5.51%	5.06%	8.63%	8.37%
Nov	4.07%	4.67%	2.98%	6.59%	6.40%
Dec	3.50%	2.69%	2.30%	5.77%	5.60%
Jan	3.99%	2.45%	2.31%	2.75%	2.67%
Feb	3.92%	2.80%	2.26%	2.80%	2.72%
Mar	6.62%	4.89%	3.33%	2.75%	2.67%
Apr	14.73%	11.46%	4.73%	8.79%	8.70%
May	18.47%	23.93%	12.95%	13.02%	12.64%
Jun	18.87%	23.30%	32.43%	16.76%	18.74%
Jul	8.79%	8.57%	17.20%	12.91%	12.53%
Aug	8.31%	5.70%	9.73%	9.62%	9.61%
Sep	4.26%	4.04%	4.72%	9.62%	9.35%
Total	100.00%	100.00%	100.00%	100.00%	100.00%

COMPARISON OF WATER FLOW PATTERNS
Blue Mesa Reservoir

from monthly mean average data reported by W.A.P.A. and Clark



RATIO COMPARISONS OF WATER RUNOFF AND WATER DEMANDS IN PORTIONS OF UPPER GUNNISON BASIN

R. E. Clark III - February, 1999

Flow of 1 cubic foot per second (cfs) for one month equals: 60.2 acre-feet (acft)

Assumptions: using larger of irrigated acreage given by USGS or GunMod Source:	Basic Data: Area of basin in sq. miles (USGS)	Basic Data: Average Annual Runoff in acft (USGS)	Basic Data: Irrigated Land in acres (USGS/GunM)	Basic Data: Absolute Rights Senior to Up. Gunnison Project in cfs (GunMod)	Ratio Comparisons: Runoff acft per sq. mile	Ratio Comparisons: Runoff acft per irr. acre	Ratio Comparisons: Runoff acft per decreed cfs	Ratio Comparisons: Potential for Diversion in 3 months as acft per acre irrigated	Ratio Comparisons: Runoff in acft per decreed cfs as a percentage of Potential Diversion in acft
Major Basins									
Tomichi Creek at Gunnison GunMod gives 22,310 acres	1,061	127,600	24,000	3,023.73	120.26	5.32	42.20	22.75	185%
East River at Almont GunMod gives 7,320 acres	289	247,770	7,400	939.00	857.34	33.48	263.87	22.92	1151%
Lake Fork at Gateview (6 miles abv. Blue Mesa) USGS is same as GunMod	334	172,200	1,600	570.13	515.57	107.63	302.04	64.35	469%
Cebolla Creek near Powderhorn GunMod; USGS gives no figure	248	45,400	4,600	404.26	183.06	9.87	112.30	15.87	708%
Gunnison River at Gunnison USGS gives 22,000	1,012	558,500	25,022	3,390.17	551.88	22.32	164.74	24.47	673%
Taylor River at Almont USGS gives 360 acres	477	245,800	460	106.94	515.30	534.35	2,298.49	41.99	5474%
Portions of Tomichi Creek Basin									
Quartz Creek (below Gold C. near Ohio City) USGS gives 900 acres.	106	39,170	1,833	238.89	369.53	21.37	163.97	23.54	697%
Tomichi Creek at Parlin (above Quartz C.) GunMod gives 10,348 acres	427	47,060	11,000	1,451.77	110.21	4.28	32.42	23.84	136%
Tomichi Creek at Sargents (below Marshall C.) USGS; GunMod gives no figure	149	46,420	1,900	154.41	311.54	24.43	300.63	14.68	2048%
Cochetopa Creek near Parlin GunMod; USGS gives no figure	334	34,210	5,720	598.09	102.43	5.98	57.20	18.88	303%
Portions of Ohio Creek Basin									
Ohio Creek at Baldwin (below Castle C.) GunMod gives 222 acres	48	32,870	1,580	222.85	684.79	20.80	147.50	25.47	579%
Ohio Creek near Baldwin (below Mill C.) GunMod gives 3,354 acres	184	64,940	3,850	613.23	352.93	16.87	105.90	28.77	368%

irrigated acreage between this gauge and Gunnison River receives diversions from Gunnison River

Data Sources:

U.S. Geological Survey (1970) Surface Water Supply of the United States 1961-65; Part 9 Colorado River Basin, vol. 1; Water Supply Paper 1924.
U.S. Geological Survey (1998) Water Resources Data, Colorado; Water Year 1997 - Colorado River Basin; vol. 2
Hydrosphere Resource Consultants (1993) Gunnison Basin Planning Model -- Draft, Beta 0.9, Boulder, Colorado

CoTom

The Cochetopa To Tomichi Pumped Diversion Project

c/o Ralph E. Clark III
519 East Georgia Ave.
Gunnison, Colorado 81230
Tel. 970-641-2907

April 1999

CoTom (the Cochetopa To Tomichi Pumped Diversion Project) is a proposed transbasin diversion to move water between drainages in the Upper Gunnison Basin. CoTom would pump water from lower Cochetopa Creek up and eastward over the ridge between it and the Razor Creek drainage of the upper Tomichi Creek Valley. If additional water is needed in the upper Tomichi Creek Valley, CoTom offers a cost effective alternative for providing this water from the contemplated development of conditional water rights in the Cochetopa Creek basin held by the Upper Gunnison River Water Conservancy District.

CoTom's features are located in Saguache County and would be on federal land managed by the Bureau of Land Management. Water is withdrawn, when it is available under the District's rights, from near the middle of Cochetopa Canyon and very close to the U.S. Geological Survey stream gage called Cochetopa Creek at Rock Creek. Water is diverted and pumped through a short pipeline to the Tomichi Creek Valley where it is distributed, physically or by exchange, through the existing Arch Ditch. This large irrigation ditch runs along the southern side of the valley and can be supplied from Razor Creek on its western end and Tomichi Creek on its eastern end.

CoTom is intended to be straight forward, cost effective, and flexible in its operation. Its design seeks to make use of existing facilities, natural features, and available information. CoTom is also designed with consideration for minimizing adverse environmental impacts - if additional water must be provided to the Upper Tomichi Creek Valley.

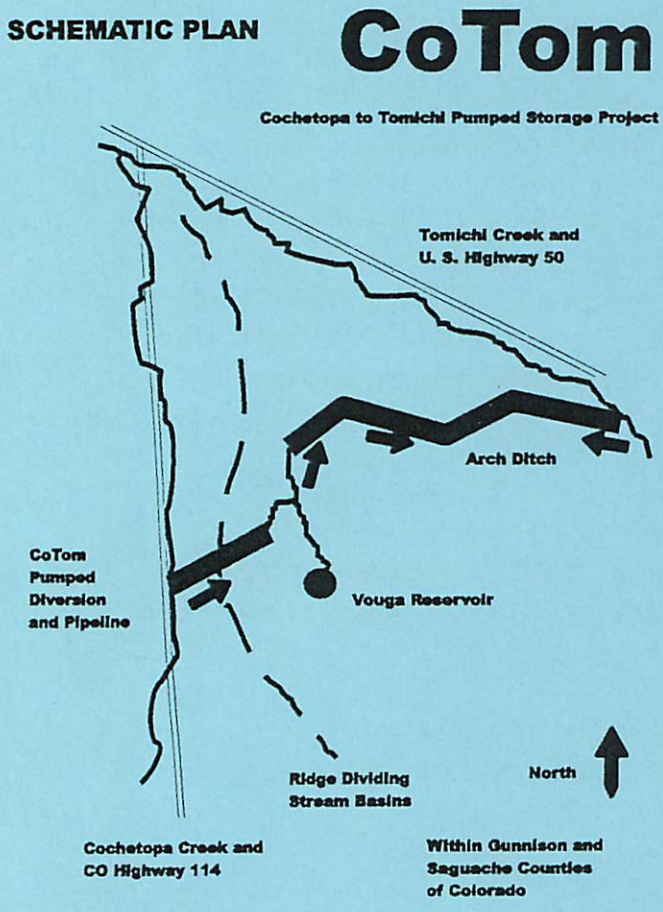
Comments, suggestions, and criticisms of CoTom are appreciated. For additional information on CoTom, please write to the address above.

CoTom is estimated to cost $15.5 million and designed to deliver more than 12,000 acre-feet of water yearly, if this water is physically available in priority in Cochetopa Creek to the Upper Gunnison River Water Conservancy District's rights. CoTom is a more realistic, viable, and acceptable alternative to the District's recent proposal to build a $144 million reservoir called Monarch No. 5. This reservoir would have a capacity of 12,000 acre-feet and be built high in the headwaters of Tomichi Creek inundating the Snowblind Campground. The District proposes to transfer its water rights from the Cochetopa Creek basin to Monarch No. 5. This transfer for development is down one stream system and up to the top of another.

Presently Tomichi Creek is "over appropriated" - too many water rights for the available water. If more water is really needed in the upper Tomichi Valley, CoTom can provide it at a cost of about $130 per acre-foot including operations and maintenance. CoTom pumps water actually physically available under the District's water rights in the Cochotopa Creek basin from the lower part of the basin. When water is actually available under the District's rights, it would be physically available at the U.S.G.S. water gage to CoTom. By contrast, transfer of water to Monarch No. 5 is a "paper transfer." It requires many questionable assumptions about the availability of water in both the Cochetopa Creek basin and at the site of Monarch No. 5.

Water from Monarch No. 5 could cost more than $860 per acre-foot to cover construction costs and close to $1,000 per acre-foot with provision for operations and maintenance of the facility. This cost is double the price per acre-foot available from household taps in the City of Gunnison. Ranchers can not afford water at this price unless their cost is greatly reduced by an enormous subsidy from taxpayers. All 24,000 acres of irrigated land with water rights in the Cochetopa, Quartz Creek, and Tomichi Valleys could be bought at $3,000 per acre for a total of only $72 million. Then this land could still be irrigated by ranchers as it is now. Monarch No. 5 is the center piece of the District's new proposal for its water development. The District's plan is for three new reservoirs with a total cost of over $160 million. So far no specific users who will pay the price for this expensive water have been identified, perhaps because those wanting more water have cheaper options. CoTom is one.

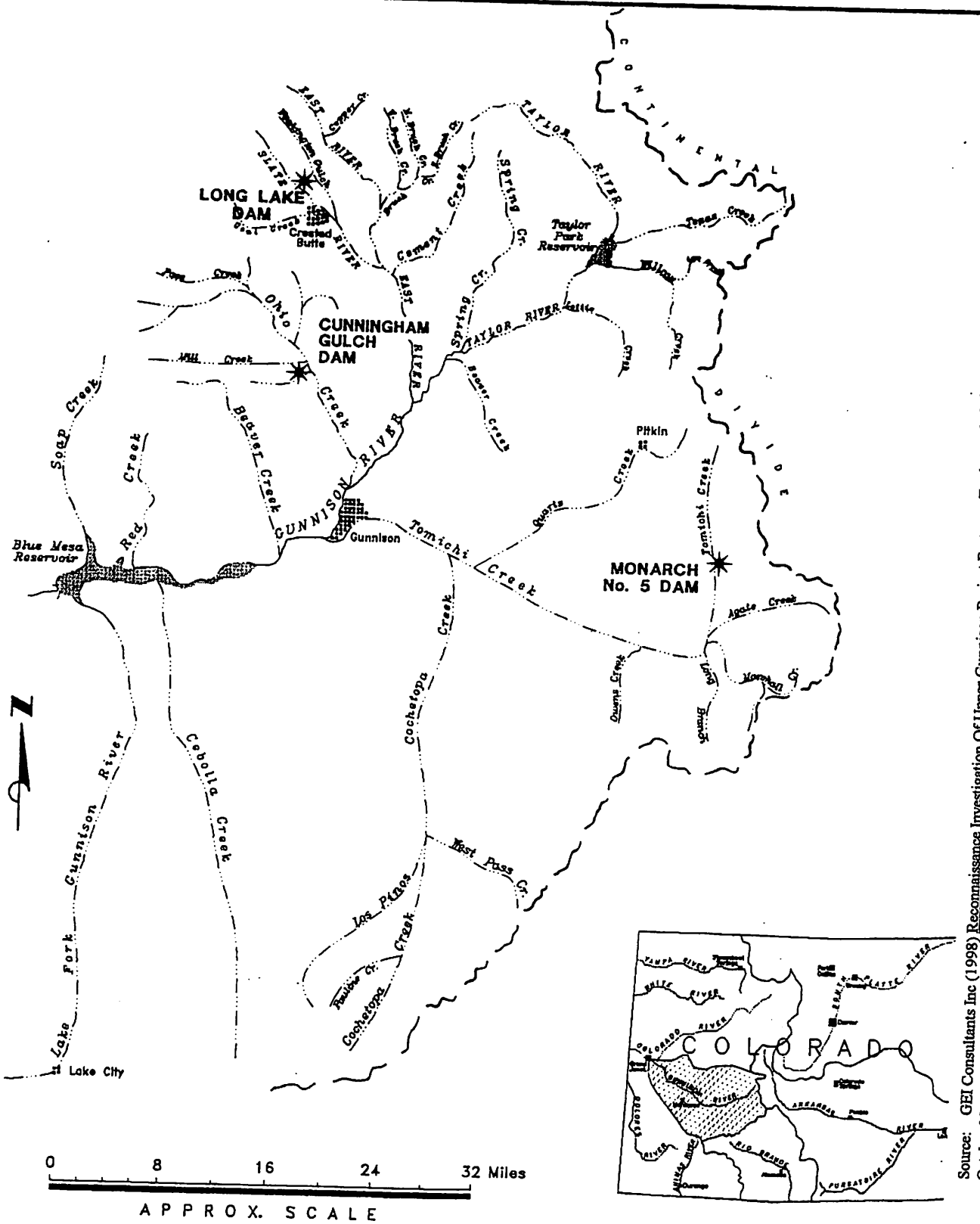
CoTom pumps water, when available under the District's rights, from lower Cochetopa Creek over the ridge between it and Tomichi Creek. The water then flows into the western end of the existing Arch Ditch running along the southern side of the upper Tomichi Valley. The size, depth, length, and relative flatness of the Arch Ditch make it possible for CoTom water to be available, physically or by exchange, to almost all water users in the upper Tomichi Valley.



Why would the District seek Monarch No. 5? Though high in price, its water is within upper limits of prices considered by Front Range providers for future water sources. Of all possible locations available to the District for the transfer of its water rights from the Cochetopa Creek Basin, Monarch No. 5 offers the easiest delivery of water from the Tomichi Basin to the Arkansas River. Just a seven mile gravity-flow tunnel is required to reach downstream Garfield. This would be shorter and cheaper than other proposals considered by the District some 10 years ago for transmountain diversion of its own water.

On the Western Slope, partnering local water development with transmountain diverters is an established practice. The City of Aurora is now searching for water in the Arkansas River Valley. The District wants water stored in Monarch No. 5 to be totally consumable. This means that this water can be removed and never returned to Gunnison Valley streams - in other words it would be available for transmountain diversion. Will our District once again consider transmountain diversion to obtain funds for its proposed water development?

CoTom does <u>not</u> facilitate or encourage future transmountain diversion of Gunnison Basin water; it simply costs about $125 million less than Monarch No. 5. CoTom's designer has asked for 2% of the costs savings to the District for use of the CoTom concept.



Source: GEI Consultants Inc (1998) Reconnaissance Investigation Of Upper Gunnison Project Features, Englewood, Colorado, (report submitted October 30 to the Upper Gunnison River Water Conservancy District)

UPPER GUNNISON RIVER WATER CONSERVANCY DISTRICT	RECONNAISSANCE INVESTIGATION OF UPPER GUNNISON PROJECT FEATURES	PROJECT LOCATION MAP
GEI Consultants, Inc.	PROJECT 97528	OCT. 30 1998 FIGURE 1

FILE: P:\PROJECTS\BW\PROJECTS\97528\FINAL\FIGURE1.DWG PLOT @ 1=1 10:59

Table 2.3c

Monarch #5
RECONNAISSANCE INVESTIGATION
OPINION OF PROBABLE PROJECT COST
(Storage: 12,000 AF)

Item No.	Description	Quantity	Unit	Unit Price	Total Cost
1	Dewatering	1	LS	$1,507,700	$1,507,700
2	Site Work (Includes Site Clearing, Foundation Excavation and Stripping, Furnishing and Placing Riprap and Bedding)	1	LS	$9,646,000	$9,646,000
3	Foundation Grouting	1	LS	$2,218,000	$2,218,000
4	Furnishing and Placing RCC	1,110,000	CY	$40	$44,400,000
5	Spillway Discharge Chute, Stilling Basin and Channel	1	LS	$5,448,000	$5,448,000
6	Outlet Works	1	LS	$1,330,000	$1,330,000
7	Road Relocation	10,560	LF	$70	$739,200
8	Campground Relocation			(allowance)	$500,000
9	Trail Relocation	7,500	LF	$10	$75,000
10	Instrumentation (Staff Gage, Piezometers, Siting Points, Station Markers)	1	LS	$1,000,000	$1,000,000
11	Restoration and Reclamation	1	LS	$200,000	$200,000
	Base Construction Subtotal (BCS)				**$67,063,900**
	Unscheduled Items @ 15% BCS				$10,059,585
	Mobilization @ 10% BCS + Unscheduled Items				$7,712,349
	Direct Construction Subtotal (DCS)				**$84,836,000**
	Construction Contingency @ 20% of DCS				$16,967,200
	Opinion of Probable Construction Cost (OPCC)				**$101,803,000**
	Project Administrative and Engineering Costs				
	Engineering: Design and Administrative @ 15% of OPCC				$15,270,450
	Owner Administrative @ 2% of OPCC				$2,036,060
	Legal Fees @ 5% of OPCC				$5,090,150
	Permitting and Mitigation @ 20% of OPCC				$20,360,600
	Opinion of Probable Project Cost (October 1998)				**$144,560,000**
	~~($11,635~~ per AF for 12,000 AF of Storage)				

$144,560,000/12,000 = $12,047

LS: Lump Sum; CY: Cubic Yards; .LF: Linear Foot; AF: Acre Feet

$144,560,000/12,000 = $12,047
12,000 at 5.5% for 30 years is about $825

Source: GEI Consultants Inc (1998) Reconnaissance Investigation Of Upper Gunnison Project Features, Englewood, Colorado, (report submitted October 30 to the Upper Gunnison River Water Conservancy District)

Table 2.4

Cunningham Gulch

RECONNAISSANCE INVESTIGATION
OPINION OF PROBABLE PROJECT COST
(Storage: 2,900 AF)

Item No.	Description	Quantity	Unit	Unit Price	Total Cost
1	Dewatering	1	LS	$90,000	$90,000
2	Site Work (Includes Stripping, Foundation Excavation, Grouting)	1	LS	$823,200	$823,200
3	Dam Embankment (Includes Riprap, Bedding and Cutoff Trench Quantities)	378,400	CY	$6	$2,221,208
4	Appurtenances (Includes Spillway, Impact Basin, Excavation and Stripping)	1	LS	$1,416,900	$1,416,900
5	Outlet Works	1	LS	$460,000	$460,000
6	Feeder Canal	14,300	LF	$40	$572,000
7	Discharge Channel (Includes Excavation and Riprap)	3,250	LF	$100	$325,000
8	Access Road	4,300	LF	$15	$64,500
9	Instrumentation (Staff Gage, Piezometers, Siting Points, Station Markers)	1	LS	$10,000	$10,000
10	Reclamation	1	LS	$65,700	$65,700
	Base Construction Subtotal (BCS)				**$6,048,508**
	Unscheduled Items @ 15% BCS				$907,276
	Mobilization @ 10% BCS + Unscheduled Items				$695,578
	Direct Construction Subtotal (DCS)				**$7,651,000**
	Construction Contingency @ 20% of DCS				$1,530,200
	Opinion of Probable Construction Cost (OPCC)				**$9,181,000**
	Project Administrative and Engineering Costs				
	Engineering: Design and Administrative @ 15% of OPCC				$1,377,150
	Owner Administrative @ 5% of OPCC				$459,050
	Legal Fees @ 2% of OPCC				$183,620
	Permitting and Mitigation @ 20% of OPCC				$1,836,200
	Opinion of Probable Project Cost (October 1998) **($4,496 per AF for 2,900 AF of Storage)**				**$13,037,000**

LS: Lump Sum; CY: Cubic Yards; LF: Linear Foot; AF: Acre Feet

Table 2.1

Long Lake

RECONNAISSANCE INVESTIGATION
OPINION OF PROBABLE PROJECT COST
(Storage: 890 AF)

Item No.	Description	Quantity	Unit	Unit Price	Total Cost
1	Dewatering	1	LS	$80,000	$80,000
2	Site Work (Includes Site Clearing, Foundation Excavation and Misc. Earthwork)	1	LS	$250,000	$250,000
3	Foundation Treatment (Grouting, Drains)	1	LS	$150,000	$150,000
4	Furnishing and Placing RCC (Facing Concrete, Dam Drains, Drainage Gallery)	13,000	CY	$100	$1,300,000
5	Spillway (Discharge Chute, Stilling Basin and Channel)	1	LS	$850,000	$850,000
6	Outlet Works (Tower, Pipe and Gates)	1	LS	$205,000	$205,000
7	Feeder Canal	12,100	LF	$30	$363,000
8	Access Road	4,000	LF	$15	$60,000
9	Instrumentation (Staff Gage, Piezometers, Siting Points, Station Markers)	1	LS	$110,000	$110,000
10	Restoration and Reclamation	1	LS	$20,000	$20,000
	Base Construction Subtotal (BCS)				**$3,388,000**
	Unscheduled Items @ 15% BCS				$508,200
	Mobilization @ 10% BCS + Unscheduled Items				$389,620
	Direct Construction Subtotal (DCS)				**$4,286,000**
	Construction Contingency @ 20% of DCS				$857,200
	Opinion of Probable Construction Cost (OPCC)				**$5,143,000**
	Project Administrative and Engineering Costs				
	Engineering: Design and Administrative @ 15% of OPCC				$771,450
	Owner Administrative @ 2% of OPCC				$102,860
	Legal Fees @ 5% of OPCC				$257,150
	Permitting and Mitigation @ 20% of OPCC				$1,028,600
	Opinion of Probable Project Cost (October 1998) **($8,206 per AF for 890 AF of Storage)**				**$7,303,000**

LS: Lump Sum; CY: Cubic Yards; LF: Linear Foot; AF: Acre Feet

1999 ABSTRACT OF ASSESSMENT
GUNNISON COUNTY

PROPERTY CLASSIFICATION	VALUATION
VACANT LAND	
Residential (vacant lots)	$52,418,860
Commercial (vacant lots)	$4,410,740
Industrial (vacant lots)	$953,460
PUD (vacant lots)	
All other vacant land	
less than 1 acre	$147,630
1 to 5 acres	$2,663,400
5 to 10 acres	$580,670
10 to 35 acres	$2,025,160
35 to 100 acres	$2,820,740
100 acres and up	$1,641,250
Minor Structures	$58,010
TOTAL VACANT LAND	$67,719,920

RESIDENTIAL	LAND	IMPROVEMENTS	VALUATION
Single family residences	$24,804,230	$64,497,360	$89,301,590
Farm/ranch residences	$0	$4,214,380	$4,214,380
Duplex/triplex	$726,780	$1,820,210	$2,546,990
Multi-units (4-8)	$181,770	$555,310	$737,080
Multi-units (9 & up)	$199,170	$1,062,990	$1,262,160
Condominiums	$0	$17,626,310	$17,626,310
Manufactured housing (mobile Homes)	$237,750	$1,032,480	$1,270,230
Farm/ranch manufact.housing (mobile homes)	$0	$89,180	$89,180
Manufactured housing (land, park, etc.)	$537,670	$56,790	$594,460
Partially exempt (taxable part)	$10,400	$14,870	$25,270
			$0
TOTAL RESIDENTIAL REAL PROPERTY	$26,697,770	$90,969,880	$117,667,650

COMMERCIAL	LAND	IMPROVEMENTS	VALUATION
Merchandising	$5,226,050	$8,405,660	$13,631,710
Lodging	$6,059,730	$12,748,020	$18,807,750
Offices	$795,630	$2,264,820	$3,060,450
Recreation	$771,960	$1,303,410	$2,075,370
Special purpose	$3,817,850	$7,458,780	$11,276,630
Warehouse/storage	$1,314,130	$2,558,890	$3,873,020
Multi-use (3+ uses)	$918,240	$1,922,250	$2,840,490
Recreation lands	$774,520	$0	$774,520
Partially exempt property	$54,540	$75,940	$130,480
Residential furniture and equipment	$0	$262,460	$262,460
Commercial furniture and equipment	$0	$9,119,000	$9,119,000
TOTAL COMMERCIAL PROPERTY	$19,732,650	$46,119,230	$65,851,880

INDUSTRIAL	LAND	IMPROVEMENTS	VALUATION
Contract/service	$77,940	$199,390	$277,330
Manufacturing/processing	$170,200	$295,210	$465,410
Equipment, furniture & machinery	0	$340,980	$340,980
TOTAL INDUSTRIAL PROPERTY	$248,140	$835,580	$1,083,720

AGRICULTURAL	ACRES	VALUATION
Meadow hay land $57.20/ac	45,750	$2,617,150
Grazing land $6.21/ac	284,311	$1,765,600
Farm/ranch waste land $1.71/ac	4,331	$7,410
Forest land	84	$740
Farm/ranch support buildings		$1,075,980
All other agricultural property		$11,190
TOTAL AGRICULTURAL PROPERTY	334,476	$5,478,070
		1.79%

NATURAL RESOURCES (excludes producing mines, oil & gas)	ACRES	VALUATION
COAL:		
Land		$12,032,650
Improvements		$11,430,310
Equipment, furniture & machinery		$13,135,310
EARTH OR STONE PRODUCTS:		
Land		$193,920
Improvements		$34,510
Equipment, furniture & machinery		$157,130
NON-PRODUCING (Patented)		
Land	11,899	$1,864,640
Improvements		$619,070
SEVERED MINERAL INTERESTS		
Land	58,875	$147,960
TOTAL NATURAL RESOURCE PROPERTY		$39,615,500

PRODUCING MINES	VALUATION
EQUIPMENT, FURNITURE & MACHINERY FOR:	
Molybdenum	$219,640
Precious metals	$3,740
TOTAL PRODUCING MINES PROPERTY	$223,380

OIL AND GAS	
Producing oil (primary) land	$0
Producing gas (primary) land	$118,200
EQUIPMENT FURNITURE & MACHINERY:	
Producing oil (primary)	$0
Producing gas (primary)	$58,820
TOTAL OIL AND GAS PROPERTY	$177,020

GRAND TOTAL ASSESSED VALUATION OF GUNNISON COUNTY FOR 1999

BY ASSESSOR	$297,817,140
STATE ASSESSED UTILITIES	$10,670,700
TOTAL	$308,487,840
CHANGES BY COUNTY BOARD OF EQUALIZATION	($2,778,440)
CHANGES BY STATE BOARD OF EQUALIZATION	$0
GRAND TOTAL 1999 ASSESSED VALUATION	$305,709,400

REMARKS

The County Assessor does not set the tax levies. County Commissioners set the County levy. School Boards set the School levy, and all special tax levies are set by the officers of such special districts.

It is the duty of the Assessor to assess all property on a fair basis. The Assessor must certify to School Boards, City Officials, and all other taxing entities, the amount of valuation in each district or city. After the levies are set and certified to the Assessor, it is her duty to extend the taxes to the tax rolls, and deliver them to the County Treasurer.

Taxes are due January 1 each year. Taxes may be paid in full or in two equal installments, the first such installment to be paid no later than June 15th. If the full amount of taxes is paid in a single payment no later than the last day of April, no penalty will accrue on any portion of taxes. The exception to the above is: Any tax less than $25.00 must be paid in full, in one payment.

GUNNISON COUNTY OFFICERS - 1999

Marlene Zanetell.....Commissioner - District 1
Fred Field.....Commissioner - District 2
Jim Starr.....Commissioner - District 3
J. Steven Patrick.....County Judge
Joanne Reitinger.....Clerk-Recorder
Alva May Dunbar.....Treasurer
Judith M. Smith.....Assessor
Richard Murdie.....Sheriff
Joyce Gray.....Clerk of District Court
David Baumgarten.....County Attorney
Anne Steinbeck.....Director of Social Services
C.J. Miller.....County Coroner
John DeVore.....County Manager

The assessor's office is ready at all times to give courteous answers to inquiries pertaining to valuation and to adjust erroneous or illegal assessments Please contact the assessor's office if there is any question about your valuation. 200 E. Virginia Ave., Gunnison, CO 81230 (970)641-1085

1999	LEVYING BODIES	100	20	620	701	702	801	VALUATION*	REVENUE
COUNTY	GENERAL - 14.778 WELFARE - 0.284 TEMP TAX CR. - (4.694) ROAD & BRIDGE - 0 LIBRARY - 1.106 ABATE - 0.051 HOSPITAL/HEALTH CARE - .905 TOTAL LEVY - 12.432	12.432	12.2	12.432	12.432	12.432	12.432	$305,709,400	$3,800,579
RE1J	GENERAL - 25.301 ABATEMENTS - 0.161 BOND REDEMPTION - 6.518 TOTAL LEVY - 31.98	31.980	31.9	31.980				$261,911,260	$8,375,922
50J	GENERAL - 28.575 ABATEMENTS - 0.039 BOND REDEMPTION - 0 TOTAL LEVY - 28.614				28.614	28.614		$40,757,440	$1,166,233
RE1J-M	GENERAL - 25.912 BOND REDEMPTION - 0.218 ABATEMENTS - 0.142 TOTAL LEVY - 29.272						29.272	$3,040,700	$89,007
CRESTED BUTTE	GENERAL - 7.300 STREETS & ALLEYS - 4.190 TEMPORARY TAX CREDIT - (3.514) TOTAL LEVY - 7.976		7.9					$37,172,680	$296,489
GUNNISON	GENERAL - 3.868 TOTAL LEVY - 3.868	3.868						$45,231,660	$174,956
MARBLE	GENERAL - 6.505 TOTAL LEVY - 6.505							$2,263,660	$14,725
MT CRESTED BUTTE	CAPITAL EXPENDITURES - 5.378 TEMP TAX CREDIT - (0.208) TOTAL LEVY = 5.170							$46,413,910	$239,960
MT CRESTED BUTTE DDA	DDA REVENUE BASED ON INCREMENT X MILL LEVY / 1000							$21,264,670	
PITKIN	GENERAL - 3.376 TOTAL LEVY - 3.376							$2,187,090	$7,384
BOSTWICK PARK WATER DISTRICT	GENERAL - 0.961 TEMPORARY TAX CREDIT - (0.093) ABATEMENTS - .006 TOTAL LEVY = .894							$1,613,030	$1,442
CARBONDALE & RURAL FIRE PROTECTION DISTRICT	GENERAL - 3.233 DEBT RETIREMENT - 1.006 ABATEMENTS 0.614 TOTAL LEVY - 4.253							$7,449,760	$31,684
COLORADO RIVER WATER DISTRICT	GENERAL - 0.281 ABATEMENTS - .001 TOTAL LEVY - 0.282	0.282	0.2	0.282	0.282	0.282	0.282	$305,709,400	$86,210
CRAWFORD WATER DISTRICT	GENERAL = .648 WATER ASSESSMENT $4.80 PER ACRE FOOT)							$18,230	$12
CRESTED BUTTE FIRE PROTECTION DISTRICT	GENERAL - 6.079 DEBT RETIREMENT - 0 ABATE - 0.007 TEMPORARY TAX CREDIT - (2.206) TOTAL LEVY - 3.880		3.8					$132,824,420	$515,359
CRESTED BUTTE SOUTH METRO DISTRICT	GENERAL - 14.378 ABATEMENTS - 0 DEBT RETIREMENT - 2.357 TOTAL LEVY - 16.735							$8,827,360	$147,726
EAST RIVER REGIONAL SANITATION DISTRICT	B & I - 13.120 TOTAL LEVY - 13.120		0					$9,382,140	$123,094
FRUITLAND MESA WATER DISTRICT	GENERAL - 0 TOTAL LEVY - 0							$45,610	
GUNNISON CEMETERY DISTRICT	GENERAL - 0.764 TEMP. TAX CREDIT - (.021) ABATEMENTS - 0.006 TOTAL LEVY - 0.749	0.749						$105,023,920	$78,663
GUNNISON COUNTY FIRE PROTECTION DISTRICT	GENERAL - 1.765 TEMP. TAX CREDIT - (.072) ABATEMENTS - 0.007 TOTAL LEVY - 1.700			1.700			1.700	$77,841,200	$132,330
GUNN. COUNTY METRO-POLITAN RECREATION DIST.	TV TRANSLATOR FACILITIES - 0.880 ABATEMENTS - 0 TEMPORARY TAX CREDIT - (0.227) TOTAL LEVY - 0.653	0.653	0.6				0.653	$255,346,220	$166,741
MT CRESTED BUTTE WATER & SANITATION DISTRICT	GENERAL - 9.082 TEMP TAX CREDIT - (188) ABATEMENTS - 0 DEBT RETIREMENT - 1.882 TOTAL LEVY - 10.776							$50,618,000	$545,480
NORTH FORK WATER DISTRICT	GENERAL - 0.100 B & I - 0.500 TOTAL LEVY - 0.600				0.600			$39,520,340	$23,712
SKYLAND METROPOLITAN DISTRICT	GENERAL - 0.000 B & I - 22.080 TOTAL LEVY 22.080							$7,793,540	$172,081
UPPER GUNNISON WATER DISTRICT	GENERAL - 2.000 ABATEMENTS - TEMPORARY TAX CREDIT - (.054) TOTAL LEVY - 1.946	1.946	1.9					$249,012,540	$484,578
	TOTAL LEVY FOR 1999	51.910	59.3	46.394	41.928	41.328	44.339	*GROSS ASSESSED VALUE	
	1998 LEVY	56.086	63.2	50.533	46.620	46.008	48.871		

ANALYSIS FOR OPERATIONS OF WAYNE N. ASPINALL UNIT, COLORADO --- R. Clark

Purpose: Determination of water available to Aspinall Unit operations after satisfaction of two senior rights downstream and the extent of upstream "call protection." The downstream senior rights are for the Gunnison Tunnel and the flow quantified for the Black Canyon of the Gunnison National Park.

Method and Source: Sequent-Peak and Mass Curve (Rippl diagram)
Linsley R. K. and Franzini J. P. (1979) Water Resources Engineering, 3rd int. ed., McGraw Hill, Singapore.

Data Sources:

Bureau of Reclamation (1990) AB Lateral Hydropower Facility - Final Environmental Impact Statement, Upper Colorado Region Office, Salt Lake City, Utah.
Bureau of Reclamation (April 2000) Operation Plan For Colorado River System Reservoirs, Western Colorado Area Offfice, Grand Junction, Colorado.
Bureau of Reclamation (August 2000) Crystal Reservoir Parameter Releases - Monthly Data For Archive Years: 1977-1999, Western Colorado Area Office, Grand Junction, Colorado.
USDoE - Western Area Power Administration (1994) Salt Lake City Area Integrated Projects Electric Power Marketing - DEIS, Salt Lake City Area Office, Salt Lake City, Utah.
Seaholm D. R. and Baessler J. (1991) Instream Flow Determination For the Nature Conservancy Donation of a Conditional Water Right in the Gunnison River Basin - draft, Colorado Water Conservation Board, Denver, Colorado.

Assumptions:

a. Yearly flows and releases reflect evaporation loss from Aspinall Unit reservoirs and upstream consumption.
b. Current irrigation diversion requirement for Gunnison Tunnel in average year is 365,000 acre-feet (BoRec. April 2000).
c. Flow required for the Black Canyon water right mimics the natural hydrograph and is the given percent of the natural hydrograph for the canyon between years 1910 - 1937 with an annual average flow of 1,176,292 acre-feet (BoRec. 1990, Table B. 1). Designation of the Black Canyon as a national monument was in 1933 and as a national park was in 1999.
d. Average requirements of Gunnison Tunnel and Black Canyon are adjusted to water supply conditions of specific year.

Constants:

1 cubic foot per second for 1 month equals 60.34 acre-feet; 724 acre-feet in one year

1.00	factor to adjust Gunnison Tunnel requirement to water supply conditions average tunnel diversion x (factor+(1-percentage of average water supply)) or not less than 275,000 ac-ft
365,000	acre-feet as current Gunnison Tunnel requirement in average year (BoRec. April 2000)
275,000	acre-feet as the minimum annual diversion requirement of the Gunnison Tunnel
450,000	acre-feet as the maximum annual diversion allowed for the Gunnison Tunnel
68.00%	as the percentage of average annual flow through the Black Canyon in years 1910 - 1937 or the period of record before operation of the Taylor Park Reservoir which was 1,176,292 acre-feet a year.
799,879	acre-feet average annual flow through Black Canyon (BoR 1990p. 94). At 68% or greater, most canyon requirements can be served - if this amount is provided in a pattern which follows the natural hydrograph and is adjusted by the percent of water supply for the specific year.

Black Canyon flow requirement in a given year is the assumed annual average times the percentage of year's water supply.
Note: In a currently projected average year, the flow through the Black Canyon is 869,000 acre-feet (BoR April 2000).

Reference comparisons for water years:

Note 1: The first full year of Crystal Reservoir operation was 1977. Figures for earlier years are simulated with the assumption of operational practices applied at the Aspinall Unit in late 1980's (BoR 1990, p. 86)

Note 2: In 1989 the Gunnison Tunnel diverted 430,000 acre-feet (USDOE- WAPA 1994; p. 3-39)
In future, the requirement for the Gunnison Tunnel can exceed 560,000 acre-feet a year (Seaholm and Baessler 1991; p. 26)

Note 3: Currently the amount projected for delivery to Black Canyon in an average year is 869,000 ac-ft; however delivery of this amount does not follow the pattern of the natural hydrograph (BoRec. April 2000).

Note 4: USDoE - WAPA uses as representative year conditions: 1987 for Moderate; 1989 for Dry; and 1983 for Wet (1994; Apn. C).

	Annual Flow below Aspinall Unit			Two Senior Downstream Demands based on assumptions for:				Cumulative Totals for Aspinall Unit Operations			
	Estimated and Reported Releases from Crystal Res.		% of Average Water Supply	Gunnison Tunnel	Black Canyon	Annual Total	Available for Storage in year	Inflow	Demand	Availabe for Storage	
Year	in cfs	acre-feet		acre-feet	acre-feet	acre-feet	acre-feet	acre-feet	acre-feet	acre-feet	
Comparisons:											
dry - 1989 (USDOE)		645,163	54%	450,000	431,916	881,916	-236,753				
dry - 1989 (BoR)		658,840	55%	450,000	441,073	891,073	-232,233				
average - 1952 to 1983		1,135,979	95%	382,968	760,502	1,143,470	-7,491				
average - 1952 to 1999		1,194,796	100%	365,000	799,879	1,164,879	29,918				
average - WY2001 (BoR)		1,233,000	103%	353,329	825,455	1,178,784	54,216				
moderate - 1987 (USDOE)		1,385,063	116%	306,875	927,256	1,234,131	150,932				
moderate - 1987 (BoR)		1,432,796	120%	292,293	959,212	1,251,505	181,291				
wet - 1983 (USDOE)		1,628,131	136%	275,000	1,089,983	1,364,983	263,148				
wet - 1983 (BoR)		1,622,484	136%	275,000	1,086,202	1,361,202	261,282				
Annual Average Flows Below Crystal Reservoir 1952 -1977				(BoR 1990 AB Lateral FEIS, p.86)							
Annual Average Flows Below Crystal Reservoir 1978 -1999				(BoR Aug 2000)							
1952	2,392.0	1,731,808	145%	275,000	1,159,391	1,434,391	297,417	1,731,808	1,434,391	297,417	1st peak
1953	1,401.0	1,014,324	85%	420,133	679,058	1,099,191	-84,867	2,746,132	2,533,582	212,550	
1954	861.0	623,364	52%	450,000	417,323	867,323	-243,959	3,369,496	3,400,905	-31,409	
1955	910.0	658,840	55%	450,000	441,073	891,073	-232,233	4,028,336	4,291,977	-263,641	
1956	1,246.0	902,104	76%	450,000	603,930	1,053,930	-151,826	4,930,440	5,345,908	-415,468	
1957	2,877.0	2,082,948	174%	275,000	1,394,468	1,669,468	413,480	7,013,388	7,015,376	-1,988	
1958	2,086.0	1,510,264	126%	275,000	1,011,074	1,286,074	224,190	8,523,652	8,301,451	222,201	
1959	1,092.0	790,608	66%	450,000	529,287	979,287	-188,679	9,314,260	9,280,738	33,522	
1960	1,406.0	1,017,944	85%	419,027	681,482	1,100,508	-82,564	10,332,204	10,381,246	-49,042	
1961	1,087.0	786,988	66%	450,000	526,864	976,864	-189,876	11,119,192	11,358,110	-238,918	
1962	2,033.0	1,471,892	123%	280,350	985,386	1,265,735	206,157	12,591,084	12,623,845	-32,761	
1963	987.0	714,588	60%	450,000	478,394	928,394	-213,806	13,305,672	13,552,240	-246,568	
1964	1,288.0	932,512	78%	445,126	624,288	1,069,413	-136,901	14,238,184	14,621,653	-383,469	
1965	2,391.0	1,731,084	145%	275,000	1,158,907	1,433,907	297,177	15,969,268	16,055,559	-86,291	

Available for Storage in the Aspinall Unit and Provision of Call Protection

A positive amount available for storage in a year after meeting requirements of the Gunnison Tunnel and the Black Canyon can be used for storage or released for other commitments. The extent of a potential call by these two water rights within a year is indicated by a negative amount.

	Net Reservoir Inflow			Senior Downstream Demands				Cumulative Totals for Aspinall Unit Operations			
	Estimated and Reported Flow Below Crystal Res.		% of Average Water Supply	based on assumptions for			Available for Storage	Inflow	Demand	Availabe for Storage	
Year	in cfs	acre-feet		Gunnison Tunnel acre-feet	Black Canyon acre-feet	Annual Total acre-feet	in year acre-feet	acre-feet	acre-feet	acre-feet	
1966	1,291.0	934,684	78%	444,462	625,742	1,070,204	-135,520	16,903,952	17,125,763	-221,811	
1967	1,079.0	781,196	65%	450,000	522,986	972,986	-191,790	17,685,148	18,098,749	-413,601	
1968	1,604.0	1,161,296	97%	375,234	777,451	1,152,685	8,611	18,846,444	19,251,435	-404,991	
1969	1,629.0	1,179,396	99%	369,705	789,569	1,159,273	20,123	20,025,840	20,410,708	-384,868	
1970	2,254.0	1,631,896	137%	275,000	1,092,503	1,367,503	264,393	21,657,736	21,778,211	-120,475	
1971	1,936.0	1,401,664	117%	301,804	938,370	1,240,174	161,490	23,059,400	23,018,385	41,015	
1972	1,274.0	922,376	77%	448,222	617,502	1,065,724	-143,348	23,981,776	24,084,109	-102,333	
1973	1,756.0	1,271,344	106%	341,615	851,125	1,192,740	78,604	25,253,120	25,276,849	-23,729	
1974	1,359.0	983,916	82%	429,422	658,701	1,088,123	-104,207	26,237,036	26,364,972	-127,936	
1975	1,843.0	1,334,332	112%	322,373	893,293	1,215,666	118,666	27,571,368	27,580,639	-9,271	
1976	1,160.0	839,840	70%	450,000	562,247	1,012,247	-172,407	28,411,208	28,592,885	-181,677	
1977	840.0	608,160	51%	450,000	407,144	857,144	-248,984	29,019,368	29,450,029	-430,661	
* 1978	980.0	709,520	59%	450,000	475,001	925,001	-215,481	29,728,888	30,375,031	-646,143	
1979	1,923.0	1,392,252	117%	304,679	932,069	1,236,748	155,504	31,121,140	31,611,779	-490,639	
1980	1,858.0	1,345,192	113%	319,055	900,564	1,219,619	125,573	32,466,332	32,831,398	-365,066	
1981	1,324.0	958,576	80%	437,163	641,737	1,078,900	-120,324	33,424,908	33,910,298	-485,390	
1982	1,225.0	886,900	74%	450,000	593,752	1,043,752	-156,852	34,311,808	34,954,049	-642,241	trough
1983	2,241.0	1,622,484	136%	275,000	1,086,202	1,361,202	261,282	35,934,292	36,315,252	-380,960	
1984	3,134.0	2,269,016	190%	275,000	1,519,035	1,794,035	474,981	38,203,308	38,109,287	94,021	
1985	2,574.0	1,863,576	156%	275,000	1,247,606	1,522,606	340,970	40,066,884	39,631,893	434,991	
1986	2,293.0	1,660,132	139%	275,000	1,111,406	1,386,406	273,726	41,727,016	41,018,299	708,717	
1987	1,979.0	1,432,796	120%	292,293	959,212	1,251,505	181,291	43,159,812	42,269,804	890,008	2nd peak
1988	1,423.0	1,030,252	86%	415,267	689,721	1,104,988	-74,736	44,190,064	43,374,792	815,272	
1989	910.0	658,840	55%	450,000	441,073	891,073	-232,233	44,848,904	44,265,865	583,039	
1990	909.0	658,116	55%	450,000	440,588	890,588	-232,472	45,507,020	45,156,453	350,567	
1991	1,416.0	1,025,184	86%	416,815	686,329	1,103,144	-77,960	46,532,204	46,259,597	272,607	
1992	1,382.0	1,000,568	84%	424,335	669,849	1,094,184	-93,616	47,532,772	47,353,781	178,991	
1993	2,042.0	1,478,408	124%	278,359	989,748	1,268,107	210,301	49,011,180	48,621,888	389,292	
1994	1,424.0	1,030,976	86%	415,046	690,206	1,105,252	-74,276	50,042,156	49,727,139	315,017	
1995	2,583.0	1,870,092	157%	275,000	1,251,968	1,526,968	343,124	51,912,248	51,254,107	658,141	
1996	2,049.0	1,483,476	124%	276,811	993,141	1,269,951	213,525	53,395,724	52,524,059	871,665	
1997	2,273.0	1,645,652	138%	275,000	1,101,712	1,376,712	268,940	55,041,376	53,900,771	1,140,605	
1998	1,690.0	1,223,560	102%	356,213	819,135	1,175,348	48,212	56,264,936	55,076,119	1,188,817	
1999	1,499.0	1,085,276	91%	398,457	726,558	1,125,016	-39,740	57,350,212	56,201,135	1,149,077	
Average	1,650.3	1,194,796	100%	365,000	799,879	1,170,857	23,939				

Part 6-g How "Call Protection" is historically provided.

Historically, the call protection provided by operations of the Aspinall Unit to water users junior and upstream of the Gunnison Tunnel and the Black Canyon rights has usually been achieved by reducing flows through the Black Canyon below the assumed percentage of the natural hydrograph, as given by average gauged monthly flows from 1910 - 1937 through the canyon (Bureau of Reclamation 1990, AB Lateral FEIS, Table B.1).

Actual and projected releases from Crystal Reservoir are given in the portion pertaining to the Aspinall Unit of the Operation Plan For Colorado River Reservoirs (Bureau of Reclamation 10 April 2000). The requirements for diversion through the Gunnison Tunnel are also given in this data source. From the given releases and demands for the Gunnison Tunnel, it is assumed the Gunnison Tunnel will be fully satisfied before water is made available for the Black Canyon. The flow requirement for the Black Canyon shown below is 68% of the natural hydrograph.

		Given the actual and projected releases from Crystal Res. (Part 3)	Given the Gunnison Tunnel Requirement (Part 6-e)	Amount Remaining for Black Canyon and below	Amount required for the Black Canyon at 68% (Part 6-c)	Negative Difference ( ) is a shortage	Shortage ( ) to requirements of the Black Canyon	
		in cfs	in cfs	in cfs	in cfs	in cfs	in ac-ft	in ac-ft
WY 1999	APR	1,357.2	844.1	513.1	1,080.1	(567.0)	34,260	
95% year	MAY	1,754.4	893.7	860.6	3,272.0	(2,411.3)	145,694	Total for
	JUN	1,737.8	976.5	761.3	4,061.4	(3,300.1)	199,390	given
	JUL	1,737.8	993.0	744.8	1,274.6	(529.8)	32,009	months
	AUG	1,754.4	1,009.6	744.8	505.2	136.2	0	of WY year
	SEP	1,671.6	579.3	1,092.4	303.0	789.4	0	411,353
WY 2000	OCT	1,373.7	446.9	926.8	332.9	593.9	0	
90% year	NOV	1,075.8	16.6	1,059.3	366.6	692.7	0	
	DEC	1,224.8	0.0	1,224.8	300.0	924.8	0	
	JAN	860.6	0.0	860.6	300.0	560.6	0	
	FEB	430.3	0.0	430.3	300.0	130.3	0	
Actual	MAR	910.3	182.1	728.2	427.8	300.4	0	
Projected	APR	1,655.1	496.5	1,158.6	1,023.3	135.3	0	
	MAY	1,919.9	910.3	1,009.6	3,099.8	(2,090.2)	126,289	
	JUN	1,853.7	993.0	860.6	3,847.6	(2,987.0)	180,475	
	JUL	1,919.9	1,075.8	844.1	1,207.5	(363.4)	21,956	Total for
	AUG	1,919.9	1,075.8	844.1	478.6	71.2	0	water year
	SEP	1,853.7	910.3	943.4	300.0	643.4	0	328,719
WY 2001	OCT	1,622.0	496.5	1,125.5	369.9	755.5	0	
100% year	NOV	1,257.9	0.0	1,257.9	407.3	850.5	0	
	DEC	1,274.4	0.0	1,274.4	328.4	946.0	0	
	JAN	1,108.9	0.0	1,108.9	300.0	808.9	0	
	FEB	877.2	0.0	877.2	310.8	566.4	0	
	MAR	1,506.1	82.8	1,423.4	475.3	948.0	0	
	APR	1,853.7	496.5	1,357.2	1,137.0	(164.8)	9,955	
	MAY	1,919.9	910.3	1,009.6	3,444.2	(2,434.6)	147,099	
	JUN	1,853.7	993.0	860.6	4,275.2	(3,414.5)	206,305	
	JUL	1,919.9	1,075.8	844.1	1,341.6	(497.5)	30,062	Total for
	AUG	1,919.9	1,075.8	844.1	531.8	(345.0)	20,843	water year
	SEP	1,853.7	910.3	943.4	318.9	582.3	0	414,264
WY 2002	OCT	1,605.4	496.5	1,108.9	369.9	739.0	0	
100% year	NOV	1,324.1	0.0	1,324.1	407.3	916.7	0	Total for
	DEC	1,324.1	0.0	1,324.1	328.4	995.6	0	given
	JAN	1,125.5	0.0	1,125.5	300.0	825.5	0	months
	FEB	1,009.6	0.0	1,009.6	310.8	698.8	0	of WY year
	MAR	1,555.8	82.8	1,473.0	475.3	997.7	0	0
TOTALS in ac-ft							1,154,335	

Water Allocation & Administration Practices

The following is a brief description of water allocation and administration practices in the East River above the confluence with the Taylor River. In Colorado, the water in streams and rivers is divided among water rights according to Colorado's Prior Appropriation Doctrine. In a time of water shortage, owners of earlier (senior) water rights are entitled to "call" for the full amount of water decreed in their water right to be in the river and available at the point they wish to divert the water from the river. The call requires the State Engineer to cause owners of later (junior) water rights to shut off as much of their use of water as necessary so there is enough water in the river to completely fill the calling right. The calls affect all uses of water equally including irrigation, domestic, municipal, industrial, and environmental, etc. Calls may last from 1 day to many months. When calls are made, a river is said to be under administration. When ample water is available so that all water users can obtain all of their needed water supplies without any calls being made, the river is said to be under free river conditions. When a river is placed under administration, holders of junior water rights may not be able to obtain the water they need, unless they take special steps to develop supplemental supplies of water. Such steps may include the development of a plan for augmentation that will provide an alternate source of water to the calling right, thus permitting a junior's diversion of water to continue even though a river call is in effect.

Present Allocation & Administration Practices

Water shortages are common in the East River and its tributaries. Some shortage occurs annually at nearly every location where water is diverted in the East River Basin. Shortages are most common in July, August, and September. Shortages are not usually experienced during the runoff months of May and June.

There are four major sub-basins in the East River Basin. They are listed below with examples of controlling senior rights that often experience shortages.

1. East River and Brush Creek above Veltri's Cold Springs Ranch:
Shortages are experienced on Brush Creek annually. Often, Brush Creek ditches, such as the Mead No. 1 and the Strand No. 1, can't be filled after about the last week in June or first week in July. The Mead No. 1 and Strand No. 1 often command the flow of Brush Creek.

Shortages are also experienced on this reach of the East River. The available water currently serves irrigation purposes in the summer,

Source: Bureau of Reclamation (1996) East River Water Supply and Water Quality Study - Final Report Western Colorado Area Office, Grand Junction, Colorado, 117 pages

GUNNISON COUNTY ASSESSOR'S OFFICE

IRRIGATED PARCELS >= 960 ACRES

R011232	602	398300000086	N2SW4. SW4SW4. SEC 2, LOTS 7,9,13,14,15,16. S2. SEC 3 & LOTS 15,16,SE4. SEC 4 & N2NE4. SEC 9 & NW4.SW4NE4. SEC 10 ALL 48N4W 1065.723 ACRES #472611 #503507 #503509 #505869	LAND:	$23,990
ALEXANDER WILLIAM M ETAL				IMP	$111,430
21957 UNCOMPAHGRE RD				TOTAL:	$135,420
				acres	1065.723
MONTROSE	CO 81401				
R015880	701	292100000020	984.07 ACRES IN SEC 22,23,25,26,27 11S90W #499757	LAND:	$107,740
ASPEN LEAF RANCH INC				IMP	$325,390
498 1550 RD				TOTAL:	$433,130
				acres	984.07
DELTA	CO 81416				
R025302	801	398500000020	994.93A IN SEC 8,17,20,21,29 48N5W B686 P540 B726 P423	LAND:	$84,100
BLUE CREEK PARTNERS				IMP	$0
C/O DALBY WENDLAND & CO				TOTAL:	$84,100
P O BOX 1605				acres	994.93
MONTROSE	CO 814021605				
R026847	801	398500000046	3313.5A IN SEC 20,21,28,29,32,33 48N5W B665 P330 B686 P568 B726 P417 #485520	LAND:	$130,720
BLUE CREEK PARTNERS				IMP	$644,400
C/O DALBY WENDLAND & CO				TOTAL:	$775,120
P O BOX 1605				acres	3313.5
MONTROSE	CO 814021605				
R017963	601	343500000051	1015.83 ACRES IN SEC 3,4,10 15S85W #505234	LAND:	$23,480
COCKRELL INVESTMENT PARTNERS LP				IMP	$0
) SMITH ST SUITE 3900				TOTAL:	$23,480
				acres	1015.83
HOUSTON	TX 77002				
R008402	601	343500000040	2209.63 ACRES IN SEC 21,22,23 25,26,27,28,34,35 15S85W B718 P394 B751 P795,797 #439791	LAND:	$121,360
ESTESS FAMILY LIMITED PARTNERSHIP				IMP	$20,760
5315 SO DENTWOOD				TOTAL:	$142,120
				acres	2209.63
DALLAS	TX 75220				
R015867	701	291900000003	1849.69A IN SEC 7,8,17,18,19 11S89W #473835	LAND:	$82,470
FALCON SEABOARD DIVERSIFIED INC A				IMP	$139,610
5 POST OAK STE 1400				TOTAL:	$222,080
				acres	1849.69
HOUSTON	TX 77027				
R016364	801	398500000050	1675.339 ACRES IN SEC 22,23,25,26,27,34,35,36 48N5W #498479 #510610	LAND:	$73,820
GERDIN FAMILY INVESTMENTS LP				IMP	$230,840
2310 LAKERIDGE PLACE				TOTAL:	$304,660
				acres	1675.339
NORTH LIBERTY	IA 52317				
R015838	701	298700000004	S2. SEC 1, SW4SE4. E2SE4. SEC 2 (LESS 240' WIDE STRIP), E2. E2NW4. NW4NW4. SEC 11, SEC 12. (LESS SE4SW4) 12S90W B378 P260	LAND:	$48,210
HOTCHKISS RANCHES INC				IMP	$73,970
PO BOX 479				TOTAL:	$122,180
				acres	1501.84
HOTCHKISS	CO 81419				
R015843	701	291900000007	1150.048A IN SEC 17,18,19,20,29 LYING EAST OF HWY 50 11S89W B385 P184 B561 P108-143 B684 P221	LAND:	$87,740
JACOBS FAMILY PARTNERSHIP				IMP	$51,580
P O BOX 693				TOTAL:	$139,320
				acres	1150.048
HOTCHKISS	CO 81419				

GUNNISON COUNTY ASSESSOR'S OFFICE

IRRIGATED PARCELS >= 960 ACRES

R040199	601	379300000055	TRACT IN N2NE4. NE4NW4 SEC 17 AND IN W2SE4 SEC 8. 49N3E #490846	LAND:	$1,850
KATHEISER JAMES GREGORY ETAL				IMP	$138,320
3500 COUNTY ROAD 44				TOTAL:	$140,170
PARLIN	CO 81239			acres	1827.04
R016138	702	318300000002	2211.41 IN SEC 1,2,3,10,11 & TR 37,38,47,48 13S89W B672 P548	LAND:	$131,310
L RANCH A GENERAL PARTNERSHIP				IMP	$796,100
P O BOX 500				TOTAL:	$927,410
SOMERSET	CO 81434			acres	2211.41
R015812	701	298900000035	8.35A IN SE4SE4. SEC 21 (-.43A & -31.65A SE4SE4 SEC 21), S2SW4. SEC 22, W2. SEC 26, E2. N2NW4. N2SW4. SEC 27, NE4NE4. N2SE4. SEC 28 B291 P404 B706 P564 B712 P832	LAND:	$67,410
LEE RICHARD N ETAL				IMP	$257,160
P O BOX 509				TOTAL:	$324,570
HELPER	UT 84526			acres	5005.31
R015965	701	292100000016	2477.74 ACRES IN SEC 2,10,11,13,14,15,22,23,24,25,26 11S90W (INC HES 80 & 160 A IN UTE PLACER) B258 P461,462 B354 P278 B498 P13	LAND:	$88,340
MCINTYRE LIVESTOCK CORPORATION				IMP	$86,010
1690 M ROAD				TOTAL:	$174,350
FRUITA	CO 81521			acres	2477.74
R008369	601	351500000004	1282.42 ACRES IN SEC 17,18,19,20, 29,30 51N1W GOVT PATENT B264 P145 B338 P411 B579 P945-950	LAND:	$72,270
MILLER HARRY E				IMP	$286,340
COUNTY ROAD 7				TOTAL:	$358,610
GUNNISON	CO 81230			acres	1282.42
R010330	601	378700000024	SE4.S2NE4.LOT 4(SW4SW4. 36.849A) SE4SW4. SEC 18 150A IN NW4.SW4. SEC 17, NE4NW4.N2NE4. 34.29A SE4NE4. 20.71A IN E2SE4. SEC 19, N2NW4.SW4NW4.NW4SW4. SEC 20 49N1W TOTAL 961.849 ACRES B682 P83	LAND:	$118,920
MONCRIEF W A JR				IMP	$181,520
950 COMMERCE STREET				TOTAL:	$300,440
FORT WORTH	TX 761025418			acres	961.85
R015907	701	318500000005	1666.72 ACRES IN SEC 8,9,16,17,18 ALL 13S90W #483286	LAND:	$21,120
MOUNTAIN COAL COMPANY				IMP	$12,590
C/O ARK LAND COMPANY				TOTAL:	$33,710
CITYPLACE ONE SUITE 300				acres	1663.72
ST LOUIS	MO 63141				
R007234	601	343700000009	1451.97 ACRES IN SEC 5,6,7,8,9 15S86W, B422 P194	LAND:	$52,670
MUNIS ROSALIE C				IMP	$0
BOX 246				TOTAL:	$52,670
PHILIPSBURG	MT 59858			acres	1451.97
R012371	602	424500000022	3079.91 ACRES IN SEC 17,20,21,22,27 28,29,32,33,34 46N3W B626 P158	LAND:	$51,860
NORSWORTHY LAMAR				IMP	$6,990
C/O HOLLY CORP				TOTAL:	$58,850
100 CRESCENT CT SUITE 1600				acres	3079.91
DALLAS	TX 75201				
007213	601	379900000022	TRACTS 41-43, 45-48, 50-57, PART OF TRACT 44 SEC 8,9,16,17,20,21,28,33 49N5E RESURVEY #507191 #507193	LAND:	$210,790
OCONNOR TRUST				IMP	$690,210
MICHAEL A AND KAREN L OCONNOR TR				TOTAL:	$901,000
PO BOX 2466				acres	2032
CORPUS CHRISTI	TX 78403				

GUNNISON COUNTY ASSESSOR'S OFFICE

IRRIGATED PARCELS >= 960 ACRES

R007291	601	378500000004	W2. W2E2. E2NE4. SEC 3, SE4. S2NE4. LOTS 1 & 2 (N2NE4, 81.10A). E2NW4. NW4NW4. SEC 4, NE4NE4. SEC 9, NW4. E2SW4. SEC 10, 49N2W B505 P598-602 B425 P1-6 B550 P322 B425 P89 B760 P555 B692 P845	LAND:	$43,970
ROBBINS HAROLD R (AKA ROBERT H R ETAL				IMP	$0
615 N SPRUCE				TOTAL:	$43,970
GUNNISON	CO 81230			acres	1201.1
R011269	602	405500000008	2282.62A IN SEC 12,13,14,23,24,25, 26,36, 47N1 1/2W B357 P34	LAND:	$58,190
SODERQUIST RANCHES INC				IMP	$0
61986 OAK GROVE RD				TOTAL:	$58,190
MONTROSE	CO 81401			acres	2282.62
R013251	606	325700000121	PT OF S2NE4. SE4. SEC 19 N2. N2SE4. NE4SW4. SEC 29 E2. E2SW4. SEC 30 E2NW4. N2SW4. SEC 31 14S85W (CAMP 1160.62 ACRES) B380 P21 B788 P845	LAND:	$43,720
SPANN VIRGIL & LEE RANCHES INC				IMP	$0
36781 W HWY 50				TOTAL:	$43,720
GUNNISON	CO 81230			acres	1160.62
R007345	601	343700000040	1492.77 ACRES IN SECTIONS 21,22,27,28,34 15S86W B382 P189 B384 P337	LAND:	$78,900
STRATMAN CATTLE CO				IMP	$141,750
TN MAC STRATMAN				TOTAL:	$220,650
10458 COUNTY ROAD 730				acres	1492.77
GUNNISON	CO 81230				
R007374	601	369900000078	NE4. SE4. S2SW4. SEC 6, NW4. SW4. SW4NE4. SE4 NORTH OF HWY 135 SEC 5, NW4NW4. SW4NW4 LYING NORTH OF HWY 135 SEC 8, PT OF LOTS 1,2. S2NE4. SE4NW4. NE4SW4. TR IN LOT 3. SE4 NORTH OF HWY 135 SEC 7, NW4NW4NE4 LYING NORTH OF HWY 135, SEC 18 50N1E B404 P239-254 #495144 #500944	LAND:	$166,900
TRAMPE DORA MAE				IMP	$277,040
COUNTY ROAD 8				TOTAL:	$443,940
GUNNISON	CO 81230			acres	1102.415
R013231	606	325700000008	S2 SEC 4,SE4SE4 SEC 5, E2E2. W2SE4.SW4NE4. PART OF E2SW4. LYING E OF THE EAST RIVER SEC 8 ALL SEC 9 N2NE4 SEC 17 14S85W 1392.661A #508713	LAND:	$60,640
TRAMPE RANCHES PARTNERSHIP LLLP				IMP	$0
244 TOMICHI TR				TOTAL:	$60,640
GUNNISON	CO 81230			acres	1392.66
R007110	601	343700000050	1601.32 ACRES IN SEC 18,19,20,29,30 15S86W #500872 #500873	LAND:	$178,440
TROPHY RANCHES LLC				IMP	$340,190
777 EAST WISCONSIN AVE STE 3020				TOTAL:	$518,630
MILWAUKEE	WI 53202			acres	1601.32
R007972	601	343700000047	1227.26A IN: SEC 9,16,17,20,21 15S86W B674 P374 #499497	LAND:	$63,540
WALSH JOHN L ETAL				IMP	$330,480
11900 COUNTY RD 730				TOTAL:	$394,020
GUNNISON	CO 81230			acres	1227.26
R009687	601	370100000128	1265.3 ACRES IN SEC 1,2,3,5,6,8,10, 11,12 50N1W #509007 #509098	LAND:	$217,780
WESTSIDE LAND & TIMBER COMPANY I A SOUTH CAROLINA CORP				IMP	$626,880
210 BIRCHTREE DR				TOTAL:	$844,660
GREENWOOD	SC 29649			acres	1265.3
025330	602	424700000025	978.03 ACRES IN SEC 25,26,35,36 46N4W B416 P113, B700 P371, B700 P375, B709 P149	LAND:	$12,850
WHINNERY HELEN E				IMP	$0
2557 HWY 149				TOTAL:	$12,850
POWDERHORN	CO 81243			acres	978.03

COMPARISON OF WATER FLOW PATTERNS REPORTED FOR UPPER GUNNISON AND SAN JUAN RIVER BASINS

~~Representative Inflows and Releases from Blue Mesa Reservoir~~

Data sources: Western Area Power Administration - US Dept. of Energy (1994) Salt Lake City Area Integrated Project Electrical Power Marketing, DEIS, vol. 4, Salt Lake City, Utah.
Clark R. E. III (1997) Assessment of Proposed AB Lateral - Average Year. Reflects some additional flows required for recovery of endangered fish and Black Canyon National Monument.
Bureau of Reclamtion (2000) Animas - La Plata – DSEIS, vol. 2, Apn. G., p. 27, Salt Lake City, Utah.

Evaporation from Aspinall Unit reservoirs is about 10,000 acre-feet in a moderate or average year.

	Dry Year 1989 inflows WAPA	Moderate Year 1987 inflows WAPA	Wet Year 1983 inflows WAPA	Moderate Year 1987 releases WAPA	Year 1987 with endangered fish and Black Canyon releases Clark	San Juan River at 4 Corners 1929 -1993 mean flow	preferred alt. mean flow
Months of Water Year	Monthly average flow in cubic feet per second (cfs)					Animas-LaPlata - SDEIS	
Oct	492.00	1,017.00	1,046.00	1,570.00	1,570.00	948.00	901.00
Nov	448.00	862.00	616.00	1,200.00	1,200.00	756.00	720.00
Dec	385.00	497.00	475.00	1,050.00	1,050.00	693.00	679.00
Jan	439.00	452.00	477.00	500.00	500.00	653.00	647.00
Feb	431.00	517.00	468.00	510.00	510.00	796.00	787.00
Mar	729.00	903.00	689.00	500.00	500.00	1,333.00	1221.00
Apr	1,622.00	2,114.00	978.00	1,600.00	1,630.50	2,432.00	2280.00
May	2,033.00	4,415.00	2,676.00	2,370.00	2,370.00	4,593.00	4355.00
Jun	2,077.00	4,299.00	6,702.00	3,050.00	3,514.40	5,113.00	4954.00
Jul	968.00	1,581.00	3,554.00	2,350.00	2,350.00	1,512.00	1409.00
Aug	915.00	1,051.00	2,010.00	1,750.00	1,802.40	1,031.00	999.00
Sep	469.00	745.00	975.00	1,750.00	1,753.20	901.00	877.00
Average cfs	917.33	1,537.75	1,722.17	1,516.67	1,562.54	1,730.08	1,652.42
Total in cfs months	11,008.00	18,453.00	20,666.00	18,200.00	18,750.50	20,761.00	19,829.00
Total in acre-feet	664,149	1,113,331	1,246,849	1,098,067	1,131,280	1,252,580	1,196,350
	Percent of year's total discharge during month						
Oct	4.47%	5.51%	5.06%	8.63%	8.37%	4.57%	4.54%
Nov	4.07%	4.67%	2.98%	6.59%	6.40%	3.64%	3.63%
Dec	3.50%	2.69%	2.30%	5.77%	5.60%	3.34%	3.42%
Jan	3.99%	2.45%	2.31%	2.75%	2.67%	3.15%	3.26%
Feb	3.92%	2.80%	2.26%	2.80%	2.72%	3.83%	3.97%
Mar	6.62%	4.89%	3.33%	2.75%	2.67%	6.42%	6.16%
Apr	14.73%	11.46%	4.73%	8.79%	8.70%	11.71%	11.50%
May	18.47%	23.93%	12.95%	13.02%	12.64%	22.12%	21.96%
Jun	18.87%	23.30%	32.43%	16.76%	18.74%	24.63%	24.98%
Jul	8.79%	8.57%	17.20%	12.91%	12.53%	7.28%	7.11%
Aug	8.31%	5.70%	9.73%	9.62%	9.61%	4.97%	5.04%
Sep	4.26%	4.04%	4.72%	9.62%	9.35%	4.34%	4.42%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

RATIO COMPARISONS OF WATER RUNOFF AND WATER DEMANDS IN PORTIONS OF UPPER GUNNISON BASIN
R. E. Clark III - February, 1999

Flow of 1 cubic foot per second (cfs) for one month equals: 60.2 acre-feet (acft)

	Basic Data				Ratio Comparisons				
Assumptions: using larger of irrigated acreage given by USGS or GunMod Source:	Area of basin in sq. miles (USGS)	Average Annual Runoff in acft (USGS)	Irrigated Land in acres (USGS/GunM)	Absolute Rights Senior to Up. Gunnison Project in cfs (GunMod)	Runoff acft per sq. mile	Runoff acft per irr. acre	Runoff acft per decreed cfs	Potential for Diversion in 3 months as acft per acre irrigated	Runoff in acft per decreed cfs as a percentage of Potential Diversion in acft
Major Basins									
Tomichi Creek at Gunnison GunMod gives 22,310 acres	1,061	127,600	24,000	3,023.73	120.26	5.32	42.20	22.75	185%
East River at Almont GunMod gives 7,320 acres	289	247,770	7,400	939.00	857.34	33.48	263.87	22.92	1151%
Lake Fork at Gateview (6 miles abv. Blue Mesa) USGS is same as GunMod	334	172,200	1,600	570.13	515.57	107.63	302.04	64.35	469%
Cebolla Creek near Powderhorn GunMod; USGS gives no figure	248	45,400	4,600	404.26	183.06	9.87	112.30	15.87	708%
Gunnison River at Gunnison USGS gives 22,000	1,012	558,500	25,022	3,390.17	551.88	22.32	164.74	24.47	673%
Taylor River at Almont USGS gives 360 acres	477	245,800	460	106.94	515.30	534.35	2,298.49	41.99	5474%
Portions of Tomichi Creek Basin									
Quartz Creek (below Gold C. near Ohio City) USGS gives 900 acres.	106	39,170	1,833	238.89	369.53	21.37	163.97	23.54	697%
Tomichi Creek at Parlin (above Quartz C.) GunMod gives 10,348 acres	427	47,060	11,000	1,451.77	110.21	4.28	32.42	23.84	136%
Tomichi Creek at Sargents (below Marshall C.) USGS; GunMod gives no figure	149	46,420	1,900	154.41	311.54	24.43	300.63	14.68	2048%
Cochetopa Creek near Parlin GunMod; USGS gives no figure	334	34,210	5,720	598.09	102.43	5.98	57.20	18.88	303%
Portions of Ohio Creek Basin									
Ohio Creek at Baldwin (below Castle C.) GunMod gives 222 acres	48	32,870	1,580	222.85	684.79	20.80	147.50	25.47	579%
Ohio Creek near Baldwin (below Mill C.) GunMod gives 3,354 acres	184	64,940	3,850	613.23	352.93	16.87	105.90	28.77	368%

irrigated acreage between this gauge and Gunnison River receives diversions from Gunnison River

Data Sources:
U.S. Geological Survey (1970) Surface Water Supply of the United States 1961-65; Part 9 Colorado River Basin, vol. 1; Water Supply Paper 1924.
U.S. Geological Survey (1998) Water Resources Data, Colorado; Water Year 1997 - Colorado River Basin; vol. 2
Hydrosphere Resource Consultants (1993) Gunnison Basin Planning Model – Draft, Beta 0.9, Boulder, Colorado

TABLE 8.13

Summary of Irrigation Demand Computation

BASIN / PROJECT	UNIT RATES			DIVERSIONS			CONSUMPTIVE USE		
	Unit Diversion Requirement (af/ac)	Unit Consumptive Use (af/ac)	Average Shortage (%)	Baseline Condition (af/yr)	Moderate Growth Condition (af/yr)	High Growth Condition (af/yr)	Baseline Condition (af/yr)	Moderate Growth Condition (af/yr)	High Growth Condition (af/yr)
Upper Gunnison									
East / Slate	3.92 1/	0.94 5/	25.1 6/	21,492	28,694	34,222	5,154	6,881	8,206
Gunnison River (Above Blue Mesa)	4.25 2/	1.02 5/	25.1 6/	20,787	27,753	30,303	4,989	6,661	7,273
Ohio Creek	4.25 3/	1.02 5/	21.8 7/	35,595	45,518	61,243	8,543	10,924	14,698
Tomichi Creek	3.92 4/	0.94 5/	25.1 6/	48,710	65,033	101,175	11,680	15,595	24,261
Cochetopa Creek	3.92 2/	0.94 5/	25.1 6/	16,794	22,422	39,984	4,027	5,377	9,588
Quartz Creek	3.92 4/	0.94 5/	25.1 6/	7,399	9,878	9,878	1,774	2,369	2,369
Lake Fork Creek	4.25 2/	1.02 5/	25.1 6/	5,093	6,800	6,800	1,222	1,632	1,632
Cebolla Creek	4.25 2/	1.02 5/	25.1 6/	14,643	19,550	19,550	3,514	4,692	4,692
Soap Creek	4.25 2/	1.02 5/	25.1 6/	1,273	1,700	1,700	306	408	408
Taylor River	3.92 2/	0.94 5/	25.1 6/	1,057	1,411	1,411	253	338	338
Big Blue	4.25 2/	1.02 5/	25.1 6/	3,183	4,250	4,250	764	1,020	1,020
Crystal Creek	4.25 2/	1.02 5/	25.1 6/	2,005	2,678	2,678	481	643	643
Subtotal				178,031	235,687	313,193	42,708	56,539	75,128
Bostwick Park Project									
Bostwick Park Area	5.14 8/	1.44 5/	2.7 9/	14,614	15,019	21,588	4,094	4,208	6,048
Cedar Creek Area	3.43 8/	1.44 5/	2.7 9/	728	748	792	305	314	333
Shinn Park & Kinikin Heights Area	4.64 8/	1.44 5/	2.7 9/	7,553	7,763	8,969	2,344	2,409	2,784
Cimarron Area	3.60 8/	1.44 5/	2.7 9/	7,499	7,708	8,082	3,000	3,083	3,233
Subtotal				30,394	31,237	39,431	9,743	10,014	12,397
Uncompahgre									
South Canal	5.11 10/	1.80 5/	2.3 11/	35,047	35,872	36,690	12,345	12,636	12,924
West Canal	5.11 10/	1.80 5/	2.3 11/	28,707	29,383	30,047	10,112	10,350	10,584
M&D Canal	5.11 10/	1.80 5/	2.3 11/	126,060	129,028	131,991	44,405	45,450	46,494
Loutzenhizer Canal	5.11 10/	1.80 5/	2.3 11/	30,953	31,682	32,397	10,903	11,160	11,412
Selig Canal	5.11 10/	1.80 5/	2.3 11/	49,725	50,896	52,071	17,516	17,928	18,342
Ironstone Canal	5.11 10/	1.80 5/	2.3 11/	112,580	115,231	117,837	39,656	40,590	41,508
East Canal	5.11 10/	1.80 5/	2.3 11/	38,292	39,194	40,062	13,488	13,806	14,112
Garnet Canal	5.11 10/	1.80 5/	2.3 11/	7,938	8,125	8,329	2,796	2,862	2,934
Non-project lands within project boundaries	5.11 10/	1.80 5/	2.3 11/	39,940	40,880	40,880	14,069	14,400	14,400
Log Hill Mesa	3.12 12/	1.25 5/	19.8 13/	1,551	1,934	24,430	622	775	9,788
Dallas Creek / Colona	3.12 12/	1.25 5/	19.8 13/	18,642	23,244	23,244	7,469	9,313	9,313
Cow Creek	3.12 12/	1.25 5/	19.8 13/	8,257	10,296	10,296	3,308	4,125	4,125
Subtotal				497,693	515,763	548,274	176,689	183,395	195,935
TOTAL				706,118	782,687	900,898	229,141	249,947	283,460

1/ From Upper Gunnison Concluding Report, Water Supply Appendix, August 1973, Table 37, page 46.
2/ Weighted average diversion requirement from Upper Gunnison Concluding Report, Water Supply Appendix, August 1973, Tables 36, 37, and 38, page 46.
3/ From Upper Gunnison Concluding Report, Water Supply Appendix, August 1973, Table 38, page 46.
4/ From Upper Gunnison Concluding Report, Water Supply Appendix, August 1973, Table 36, page 46.
5/ From Blainey-Criddle consumptive use study, November 1987.
6/ Weighted average irrigation shortage from Upper Gunnison Concluding Report, Water Supply Appendix, August 1973, Tables 45, 46, 47, and 48, pages 60, 68, 75, and 81.
7/ From Upper Gunnison Concluding Report, Water Supply Appendix, August 1973, Table 48, page 81.
8/ From Bostwick Park Definite Plan Report, Supplemental Water Supply Appendix, September 1965, Tables 10-13, pages 35-38.
9/ From Bostwick Park Definite Plan Report, Supplemental Water Supply Appendix, September 1965, Table 16, page 55.
10/ From Uncompahgre Project History, 1984, Volume 76. Value derived from average annual delivery 1980-84.
11/ From Dallas Creek Definite Plan Report, Water Supply Appendix, November 1976, Table 76, page 21.
12/ From Dallas Creek Definite Plan Report, Water Supply Appendix, November 1976, Tables 29 and 30, page 63.
13/ From Dallas Creek Definite Plan Report, Water Supply Appendix, November 1976, Table 40, page 69.

DUTY OF WATER STUDY FOR UPPER GUNNISON BASIN R.E.Clark III - rev. Oct98; f:upgduty

source: Hydrosphere Resource Consultants (1993). Gunnison Basin Planning Model – Draft - Beta -0.9, Boulder, Colorado.

assume: 1 cfs for 1 month is 60.1 acre-feet
irrigation season is 3 months of diversion

Aggregated demands set out in model

Key Administration Numbers (p. 4-8):

Gunnison Tunnel	20,393.18779
Black Canyon Nat. Mon. reserved right	30,450.00000
Blue Mesa Reservoir	40,266.39388

(A) Stream Reach (names for reaches as used by model)	(B) Number of Decrees	(C) Totaling cfs	(D) Total potential diversion for season acre-feet	(E) From the water model documentation the amounts decreed in cfs with administration numbers less than 20,393.18779 (before Gunnison Tunnel)	between 20,393.18779 30,450.00000	between 30,450.00000 40,266.39388	over 40,266.39388 (after Aspinall Unit)	(F) Sum check	(G) Irrigated Acres: Found acres	Modeled acres	(H) Diversion to each acre of modeled irrigated land from all absolute decrees for 3 months gives each modeled acre in acre-feet	(I) Diversion only by decrees senior to Gunnison Tunnel: in acre-feet for 3 full months	for each modeled acre
District 28													
BananaRResSiteVcty	16	200.64	36,175	7.62	114.82	19.20	59.00	200.64	1,460	1,744	20.74	1,374	0.79
CochAbWPassBelPauline	35	201.85	36,394	65.50	12.00	124.35	0.00	201.85	1,378	1,759	20.69	11,810	6.71
FlyingMResSiteVcnty	12	53.30	9,610	12.46	40.84	0.00	0.00	53.30	589	707	13.59	2,247	3.18
LowerCochetopaCr	41	116.60	21,023	19.70	71.80	22.80	2.30	116.60	693	1,082	19.43	3,552	3.28
LowerQuartzCreek	24	226.93	40,915	14.70	199.23	3.00	10.00	226.93	228	459	89.14	2,650	5.77
PaulineResSiteVcnity	2	48.00	8,654	0.00	48.00	0.00	0.00	48.00	0	295	29.34	0	0.00
RazorCreek	24	158.69	28,612	19.85	117.34	21.40	0.10	158.69	660	753	38.00	3,579	4.75
TomichiCrBelCoch	98	538.89	97,162	92.48	384.75	60.40	1.25	538.88	1,465	3,950	24.60	16,674	4.22
TmchCrBtwElko&RzrCr	61	322.09	58,073	65.52	169.22	87.35	0.00	322.09	2,043	2,916	19.92	11,813	4.05
TomichiCrBtwQtz&Coch	4	8.50	1,533	0.80	3.20	3.50	1.00	8.50	16	37	41.42	144	3.90
TomichiCrAbove Elko	101	971.31	175,127	121.41	705.98	138.92	5.00	971.31	3,700	6,642	26.37	21,890	3.30
Upper CochetopaCr	11	16.70	3,011	2.20	12.00	2.50	0.00	16.70	0	133	22.64	397	2.98
UpperQuartzCreek	40	240.89	43,432	17.70	182.32	38.87	2.00	240.89	1,580	1,833	23.69	3,191	1.74
Sub-total		3104.39	559,722	439.94	2061.50	522.29	80.65	3104.38		22,310	25.09	79,321	3.56
District 59													
BMTTribsDemands	16	168.13	30,314	42.19	48.39	158.92	0.02	249.52	0	400	75.78	7,607	19.02
BTMTribsDemands	22	81.39	14,675	BTM and BMT combined in model				0.00	0	400	36.69		
BrushCreek	10	52.25	9,421	12.18	0.00	40.08	0.00	52.26	0	583	16.16	2,196	3.77
CastleCreek	15	167.84	30,262	28.50	3.54	135.80	0.00	167.84	0	1,289	23.48	5,139	3.99
CementCreek	9	54.24	9,779	9.83	0.00	44.41	0.00	54.24	0	296	33.04	1,772	5.99
EastRAbCrstButte1	12	135.61	24,450	0.00	16.00	119.61	0.00	135.61	0	989	24.72	0	0.00
EastRiverBelCementCr	70	421.72	76,036	68.20	10.84	341.78	1.00	421.82	0	3,742	20.32	12,286	3.29
ERBtwCrButte1&CmntCr	4	67.45	12,161	30.08	10.27	27.10	0.00	67.45	0	298	41.09	5,423	18.32
GunnisonAboveOhioCr	67	701.22	126,430	193.45	29.77	472.07	6.00	701.29	0	4,125	30.65	34,879	8.46
GunnisonBtwOhioCr&Tomichi	57	373.85	67,405	83.69	9.44	279.73	1.00	373.86	0	2,405	28.03	15,089	6.27
MillCreek	27	218.88	39,464	20.51	32.71	165.69	0.00	218.91	0	942	41.89	3,698	3.93
OhioCrBelCastleCr	12	55.00	9,917	18.63	0.00	36.38	0.00	55.01	0	222	44.67	3,359	15.13
OhioCrBelowMillCr	80	674.26	121,569	183.68	1.63	483.00	6.00	674.31	0	7,357	16.52	33,118	4.50
OhioCrBtwCPRes&MillCr	32	171.45	30,912	42.21	7.50	116.51	5.25	171.47	0	901	34.31	7,610	8.45
SlateRiver	33	210.38	37,932	24.43	19.34	164.66	2.00	210.43	0	1,415	26.81	4,405	3.11
TaylorRAboveSpringCr	5	19.58	3,530	0.00	5.33	12.75	1.50	19.58	0	187	18.88	0	0.00
TaylorRBelowSpringCr	10	68.84	16,018	0.00	20.84	68.02	0.00	88.86	0	273	58.67	0	0.00
Sub-total		3662.09	660,275	757.58	215.60	2666.51	22.77	3662.46		25,822	25.57	136,592	5.29
District 62													
BlueRiver&Tributaries	23	116.66	21,070	0.00	72.61	43.41	0.64	116.66	0	1,000	21.07	0	0.00
CebollaCreek	134	457.26	82,444	78.63	270.48	54.95	53.00	457.26	0	4,600	17.92	14,213	3.09
GunRTribsBtwTmchi&BM	28	117.66	21,214	24.54	88.12	5.00	0.00	117.66	0	4,000	5.30	4,425	1.11
LowerCimarronR	20	85.99	17,305	19.73	44.08	29.18	3.00	85.99	0	2,534	6.83	3,557	1.40
LowerLakeFork	23	135.41	24,414	15.40	79.00	19.50	20.73	134.63	0	479	50.97	2,777	5.80
UpperCimarronR	25	67.18	12,113	22.63	16.35	28.10	0.10	67.18	0	1,966	8.16	4,060	2.06
UpperLakeFork	98	491.25	88,572	27.15	142.20	286.88	35.02	491.25	0	1,121	79.01	4,895	4.37
Sub-total		1481.60	267,132	188.28	712.84	467.02	112.69	1480.83		15,700	17.01	33,947	2.16
Total		8248.08	1,487,129							63,832	23.30	249,860	3.91

RATIO COMPARISONS OF WATER RUNOFF AND WATER DEMANDS IN PORTIONS OF UPPER GUNNISON BASIN

Flow of 1 cubic foot per second (cfs) for one month equals: 60.1 acre-feet (acft)

Assumptions: using larger of irrigated acreage given by USGS or GunMod Source:	Basic Data Area of basin in sq. miles (USGS)	Average Annual Runoff in acft (USGS)	Irrigated Land in acres (USGS/GunM)	Absolute Rights Senior to Up. Gunnison Project in cfs (GunMod)	Ratio Comparisons Runoff acft per sq. mile	Runoff acft per irr. acres	Runoff acft per decreed cfs	Potential for Diversion in 3 months as acft per acre irrigated	Runoff in acft per decreed cfs as a percentage of Potential Diversion in acft
Major Basins									
Tomichi Creek at Gunnison GunMod gives 22,310 acres	1,061	127,600	24,000	3,023.73	120.26	5.32	42.20	22.72	186%
East River at Almont GunMod gives 7,320 acres	289	247,770	7,400	939.00	857.34	33.48	263.87	22.88	1153%
Lake Fork at Gateview (6 miles abv. Blue Mesa) USGS is same as GunMod	334	172,200	1,600	570.13	515.57	107.63	302.04	64.25	470%
Cebolla Creek near Powderhorn GunMod; USGS gives no figure	248	45,400	4,600	404.26	183.06	9.87	112.30	15.85	709%
Gunnison River at Gunnison USGS gives 22,000	1,012	558,500	25,022	3,390.17	551.88	22.32	164.74	24.43	674%
Taylor River at Almont USGS gives 360 acres	477	245,800	460	106.94	515.30	534.35	2,298.49	41.92	5484%
Portions of Tomichi Creek Basin									
Quartz Creek (below Gold C. near Ohio City) USGS gives 900 acres.	106	39,170	1,833	238.89	369.53	21.37	163.97	23.50	698%
Tomichi Creek at Parlin (above Quartz C.) GunMod gives 10,348 acres	427	47,060	11,000	1,451.77	110.21	4.28	32.42	23.80	136%
Tomichi Creek at Sargents (below Marshall C.) USGS; GunMod gives no figure	149	46,420	1,900	154.41	311.54	24.43	300.63	14.65	2052%
Cochetopa Creek near Parlin GunMod: USGS gives no figure	334	34,210	5,720	598.09	102.43	5.98	57.20	18.85	303%

Data Sources:
U.S. Geological Survey (1970) Surface Water Supply of the United States 1961-65; Part 9 Colorado River Basin, vol. 1; Water Supply Paper 1924.
U.S. Geological Survey (1998) Water Resources Data, Colorado; Water Year 1997 - Colorado River Basin; vol. 2
Hydrosphere Resource Consultants (1993) Gunnison Basin Planning Model -- Draft, Beta 0.9. Boulder, Colorado

Figure 1.

DUTY OF WATER STUDY FOR UPPER GUNNISON BASIN

R.E.Clark III - Sep. 2001

Data Source: Hydrosphere Resource Consultants (1993) Gunnison Basin Planning Model - Draft - Beta 0.9 and User Documentation, published by consultant, Boulder, Colorado, multiple sections with approx. 250 pages.

Assumptions:

1 cfs for 1 month equals 60.3 acre-feet
Diversion is over 4.0 full months in irrigation season

Key Administration Numbers (p. 4-8):
Gunnison Tunnel is 20,393.18779
Black Canyon Nat. Park reserved right is 30,450.00000
Blue Mesa Reservoir (Aspinall Unit) is 40,266.39398

Results: The irrigation season is May through October with an annual water demand of 5.32 acre-feet per acre irrigated (Helton and Williamsen P. C. (2000) pp. 9 - 11). If water is physically available, then diversion with rights senior to the Gunnison Tunnel would be sufficient in most reaches and with rights senior to the Black Canyon would provide a generous supply. Note that actual irrigated acreage may be less than amounts in model and some water rights have been abandoned since 1993. This would generally increase figures for acre-feet per acre from those shown.

(A) Stream Reach (name for reaches as used by model)	(B) Number of Decrees number	(C) Total Amount in cfs in cfs	(D) Total Potential Diversion for Season in acre-feet in ac-ft	(E) From the water model's documentation, the amounts decreed in cfs with administration numbers: before Gunnison Tunnel: less than 20,393.18779 in cfs	between the Gun. Tun. and Black Canyon: 20,393.18179 - 30,450.00000 in cfs	between the Black Canyon and Aspinall: 30,450.00000 - 40,266.39398 in cfs	after the Aspinall Unit: greater than 40.266.39398 in cfs	(F) sum check between model and user doc. in cfs	(G) Irrigated Acres (When preparing model, records on acreage not searched for all reaches.) Found acres	Modeled acres	(H) Amount that could be diverted over months to each acre of modeled irrigated land using: total of all absolute decrees ac-ft /ac	(I) decrees senior to: Gunnison Tunnel ac-ft /ac	Black Canyon ac-ft /ac
District 28													
BananaRResSiteVcty	16	200.64	48,394	7.62	114.82	19.20	59.00	200.64	1,460	1,744	27.75	1.05	16.93
CochAbWPassBelPauline	35	201.85	48,686	65.50	12.00	124.35	0.00	201.85	1,378	1,759	27.68	8.98	10.63
FlyingMResSiteVcnty	12	53.30	12,856	12.46	40.84	0.00	0.00	53.30	589	707	18.18	4.25	18.18
LowerCochetopaCr	41	116.60	28,124	19.70	71.80	22.80	2.30	116.60	693	1,082	25.99	4.39	20.40
LowerQuartzCreek	24	226.93	54,736	14.70	199.23	3.00	10.00	226.93	228	459	119.25	7.72	112.42
PaulineResSiteVcnity	2	48.00	11,578	0.00	48.00	0.00	0.00	48.00	0	295	39.25	0.00	39.25
RazorCreek	24	158.69	38,276	19.85	117.34	21.40	0.10	158.69	680	753	50.83	6.36	43.94
TomichiCrBelCoch	98	538.89	129,980	92.48	384.75	60.40	1.25	538.88	1,465	3,950	32.91	5.65	29.14
TmchCBtwQtz&Coch	61	322.09	77,688	65.52	169.22	87.35	0.00	322.09	2,043	2,916	26.64	5.42	19.42
TmchCrBtwElko&RzrCr	4	8.50	2,050	0.80	3.20	3.50	1.00	8.50	16	37	55.41	5.22	26.08
TomchiCrAboveElko	101	971.31	234,280	121.41	705.98	138.92	5.00	971.31	3,700	6,642	35.27	4.41	30.05
UpperCochetopaCr	11	16.70	4,028	2.20	12.00	2.50	0.00	16.70	0	133	30.29	3.99	25.75
UpperQuartzCreek	40	240.89	58,103	17.70	182.32	38.87	2.00	240.89	1,560	1,833	31.70	2.33	26.32
Sub-total		3,104.39	748,779	439.94	2,061.50	522.29	80.65	3,104.38		22,310	33.56	4.76	27.04

(A) Stream Reach (name for reaches as used by model)	(B) Number of Decrees	(C) Total Amount in cfs	(D) Total Potential Diversion for Season in acre-feet	(E) From the water model's documentation, the amounts decreed in cfs with administration numbers: before Gunnison Tunnel: less than 20,393.18779	between the Gun. Tun. and Black Canyon: 20,393.18179 - 30,450.00000	between the Black Canyon and Aspinall: 30,450.00000 - 40,266.39398	after the Aspinall Unit: greater than 40.266.39398	(F) sum check between model and user doc.	(G) Irrigated Acres (When preparing model, records on acreage not searched for all reaches.) Found acres	Modeled acres	(H) total of all absolute decrees	(I) Amount that could be diverted over months to each acre of modeled irrigated land using: decrees senior to: Gunnison Tunnel	Black Canyon
	number	in cfs	in ac-ft	in cfs	in cfs	in cfs	in cfs	in cfs			ac-ft /ac	ac-ft /ac	ac-ft /ac
District 59													
BMTTribsDemands	16	168.13	40,553	42.19	48.39	158.92	0.02	249.52	0	400	101.38	25.44	54.62
BTMTribsDemands	22	81.39	19,631	BTM and BMT combined in model				0.00	0	400	49.08		
BrushCreek	10	52.25	12,603	12.18	0.00	40.08	0.00	52.26	0	583	21.62	5.04	5.04
CastleCreek	15	167.84	40,483	28.50	3.54	135.80	0.00	167.84	0	1,289	31.41	5.33	6.00
CementCreek	9	54.24	13,083	9.83	0.00	44.41	0.00	54.24	0	296	44.20	8.01	8.01
EastRAbCrstButte-1	12	135.61	32,709	0.00	16.00	119.61	0.00	135.61	0	989	33.07	0.00	3.90
EastRiverBelCementCr	70	421.72	101,719	68.20	10.84	341.78	1.00	421.82	0	3,742	27.19	4.40	5.09
ERBtwCrButte&CmntCr	4	67.45	16,269	30.08	10.27	27.10	0.00	67.45	0	296	54.96	24.51	32.88
GunnisonAboveOhioCr	67	701.22	169,134	193.45	29.77	472.07	6.00	701.29	0	4,125	41.01	11.31	13.05
GunnisonBtwOhio&Tomichi	57	373.85	90,173	83.69	9.44	279.73	1.00	373.86	0	2,405	37.49	8.39	9.34
MillCreek	27	218.88	52,794	20.51	32.71	165.69	0.00	218.91	0	942	56.05	5.25	13.63
OhioCrBelCastleCr	12	55.00	13,266	18.63	0.00	36.38	0.00	55.01	0	222	59.77	20.24	20.24
OhioCrBelowMillCr	80	674.26	162,632	183.68	1.63	483.00	6.00	674.31	0	7,357	22.11	6.02	6.08
OhioCrBtwCPRes&MillCr	32	171.45	41,354	42.21	7.50	116.51	5.25	171.47	0	901	45.90	11.30	13.31
SlateRiver	33	210.38	50,744	24.43	19.34	164.66	2.00	210.43	0	1,415	35.87	4.16	7.46
TaylorRAboveSpringCr	5	19.58	4,723	0.00	5.33	12.75	1.50	19.58	0	187	25.26	0.00	6.87
TaylorRBelowSpringCr	10	88.84	21,428	0.00	20.84	68.02	0.00	88.86	0	273	78.51	0.00	18.41
Sub-total		3,662.09	883,296	757.58	215.60	2,666.51	22.77	3,662.46		25,822	34.21	7.08	9.09
District 59													
BlueRiver&Tributaries	23	116.86	28,187	0.00	72.61	43.41	0.84	116.86	0	1,000	28.19	0.00	17.51
CebollaCreek	134	457.26	110,291	78.83	270.48	54.95	53.00	457.26	0	4,600	23.98	4.13	18.32
GunRTribsBtwTmchi&BM	28	117.66	28,380	24.54	88.12	5.00	0.00	117.66	0	4,000	7.09	1.48	6.79
LowerCimarronR	20	95.98	23,150	19.73	44.08	29.18	3.00	95.99	0	2,534	9.14	1.88	6.07
LowerLakeFork	23	135.41	32,661	15.40	79.00	19.50	20.73	134.63	0	479	67.79	7.75	47.54
UpperCimarronR	25	67.18	16,204	22.63	16.35	28.10	0.10	67.18	0	1,966	8.24	2.78	4.78
UpperLakeFork	96	491.25	118,490	27.15	142.20	286.88	35.02	491.25	0	1,121	105.70	5.84	36.44
Sub-total		1,481.60	357,362	188.28	712.84	467.02	112.69	1,480.83		15,700	22.75	2.89	13.84
Total		8,248.08	1,989,437	1,385.80	2,989.94	3,655.82	216.11	8,247.67		63,832	31.17	5.24	16.53

WATER FLOWS IN THE UPPER GUNNISON BASIN

prepared by Butch Clark (970-641-2907) for the
Watershed Planning meeting on November 17, 1999

How much water flows through our Upper Gunnison Basin - where and when? Attached is information to answer this question.

Average water flows by month for various places in the Upper Gunnison Basin are reported by the U.S. Geological Survey. Beginning as early as 1910, the USGS gaged, recorded, and reported stream flows in our basin. During the past ten years the Upper Gunnison River Water Conservancy District, Gunnison County and its municipalities, Colorado and various federal agencies, and others have contributed towards expanding the system of gaging stations placed around the basin. Both water quantity and quality conditions are now monitored at many sites. The data are used for water development, flood control, coping with drought, managing fisheries and recreation, water quality planning, and many other purposes.

Attached charts and graphs show reported average flow by month for selected locations and the percentage of annual flow by month during a water year - October through the next September. How water flows through streams over time is largely determined by river size, climate, geology, topography, and vegetative cover (see Poff and others; 1997). Streamflow quantity and timing are the most critical components of water supply, water quality, and ecosystem integrity of stream systems. Streamflow can be described in terms of magnitude, frequency, duration, predictability, and rate of change or flashiness (Poff and others 1997; pp. 770 - 771). This pattern of flow over the water year, or longer periods, is called a hydrograph. How much water flows, and when, gives both form and process to rivers (Rosgen 1996; chapters 2 and 3). Presentation of this information by percentage allows comparisons of streams having different sizes.

Typically, hydrographs for streams in the upper Gunnison River Basin show a high peak for the months of spring runoff. This peak is sharpest for the smaller upper elevation streams and during "wet" years as shown in the chart for Blue Mesa Reservoir. At other locations the pattern is more spread-out and reflects operation of an upstream reservoir (for example Taylor River at Almont and hydrographs for averages from different time periods for flows of the Gunnison River below the Aspinall Unit). An notable exception is the hydrograph for Cochetopa Creek. It shows a rise in August and into September which largely reflects return of water back into the stream that had rapidly entered upstream aquifers during the spring runoff. In effect, this an example of naturally provided water management which increases late season flow.

Useful References:

Bentrup G. and Hoag J. B. (1998) The Practical Streambank Bioengineering Guide, USDA - Natural Resources Conservation Service, Plant Materials Center, Aberdine, Idaho, multiple sections with approx. 350 pages.

Poff N. L., Allan D., Bain M. B., and others (1997) The Natural Flow Regime in BioScience vol. 47 n. 11, December, pages 769 - 784.

Rosgen D. (1996) Applied River Morphology, Wildland Hydrology, Pagosa Springs, Colorado, multiple sections, approx. 300 pages.