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by David C. Hallford[1]

I. Summary.

The lower reaches of major river drainages in the Upper Colorado River Basin are designated critical habitat for four fish species listed as endangered pursuant to the Endangered Species Act ("ESA"). These species are the Colorado pikeminnow (f/k/a the Colorado squawfish), the razorback sucker, the humpback chub, and the bonytail. These species are the subject of two recovery action plans, one for the Upper Colorado River Basin upstream of Lake Powell but excluding the San Juan River Basin, and one for the San Juan River Basin. Those recovery plans are intended to mitigate or reverse several factors believed to be associated with the historical decline of these native species, such as predation by and competition for habitat and food supplies from non-native fish species, loss of "back water" nursery and rearing habitat, habitat segmentation (fish passage), and streamflow declines attributable to the diversion and storage of river water for human uses.

The South Platte River endangered species recovery effort presents a unique challenge for those who divert and use water from the Colorado River system in Colorado and, for that matter, in the Upper Colorado River Basin. This challenge arises from the fact that a significant amount of Colorado River water is diverted through facilities to the Colorado "Front Range" for use in the South Platte River and Arkansas River Basins. The amounts of transmountain diversions for municipal and irrigation uses vary annually depending on demands and hydrology. The transmountain diversions to Colorado's Front Range are made from the Colorado River and its principal tributaries upstream from the confluence

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of the Colorado and Gunnison Rivers at Grand Junction. The river at that location historically has flowed approximately 3.6 million acre feet ("MAF") of water on an average annual basis. The existing transmountain diversions to the South Platte and Arkansas Basins historically have depleted approximately 0.5 to 0.6 MAF, or about 15 percent, of the "virgin" river flow. The South Platte River Basin, home to Colorado's major municipal use, has a virgin flow of approximately 1.2 MAF. In summary, the Colorado River can be viewed as a major tributary of the South Platte River.

The existing transmountain diversion projects intend to increase their deliveries of water to the Front Range in the future as the demand for water increases. This is one reason why Colorado's plan for addressing Platte River ESA requirements is based upon the principle that "more people means more water." More expressly, the State of Colorado and the Colorado water users in the South Platte River Basin believe that increases in human population in that basin will result in increased South Platte River streamflow because additional Colorado River water and nontributary groundwater will be imported to the basin and the return flows and effluent which are not fully reused will accrete to the stream. From a West Slope perspective, this presents the paradox of depleting the Colorado River system, the habitat for four endangered fish species, in order to benefit endangered species in the Platte River Basin.

II. Recovering the Endangered Colorado River and Platte River Species.

A. Colorado River Endangered Fish Species. The recovery needs of the four Colorado River fish species listed as endangered are not known definitively. The U. S. Fish & Wildlife Service continues to work to define "recovery" for these species with more precision than the broad principle of "self-sustaining populations." This is a "trial-and-error" type of process because of the nature of the habitat and because several factors may have affected the species and contributed to their decline. The Upper Colorado River Basin Recovery Program is an experiment in "adaptive management." It is hoped that by addressing a range of problems, thereby increasing fish passage and habitat access and decreasing

non-native species competition, a mix of actions will stabilize the species and facilitate "recovery."

The Recovery Implementation Program Recovery Action Plan ("RIPRAP") identifies a detailed schedule of actions to be taken generally and in major sub-basins (Green River, Yampa River, Duchesne River, White River, Colorado River mainstem, Gunnison River). The future cost of those actions, both capital projects and related operation and maintenance, was projected at $100 million as of March 1998. Approximately $70 million already been spent on RIPRAP activities.

As a part of its effort to avoid jeopardy to and recover the endangered Colorado River fish species, the Fish & Wildlife Service has developed "flow recommendations" for the Colorado River mainstem and Yampa River, and will develop such recommendations for the other major rivers in the Upper Colorado River Basin. These recommended flows in some cases could not be met without eliminating a substantial amount of existing human water use. The Colorado River flow recommendations, unless revised downward, will become more and more unrealistic as Colorado River water use increases. This will be the case particularly during the spring runoff months when development (largely storage) of additional water can occur under the Colorado water rights system.

Unlike the South Platte River Basin, the water users in the Colorado River Basin and its principal tributaries in the State cannot project that additional West Slope growth dependent on imported water will increase river flows. While uses within these basins will cause some level of future river depletions, those will be offset to some extent by inevitable "ag-to-municipal" transfers of water use, as evidenced by the constant adjudication of consumptive use credits in the West Slope's Water Courts. The demand for Colorado River water on the Front Range will constitute most of the foreseeable additional depletions to the Colorado River Basin, but the return flows from those uses will accrete to the Platte River system. Thus, water users in the Colorado River Basin face the reality that state-wide growth will

deplete, not accrete, their river system and cause continued environmental and regulatory uncertainty as long as the Colorado River fish have not been de-listed under the ESA.

B. Platte River Endangered Species. I expect that much has already been said by prior speakers about the recovery effort for the Platte River species. In summary, the July 1997 Cooperative Agreement among the U. S. Department of the Interior and the States of Colorado, Nebraska and Wyoming is focused on activities to recover four "target species" dependent on the Platte River for habitat (three bird species and one fish species: the interior least tern, whooping crane, piping plover and pallid sturgeon). That agreement creates an "agreement-to-agree" framework for the development and implementation of mechanisms to improve habitat for those species, including as a "first increment" a minimum of 60,000 acre feet per year of "net hydrologic benefits" for those habitats through water conservation and supply programs. A "proposed alternative" recovery implementation program identifies an initial objective of improving Platte River flows at Grand Island, Nebraska by an average of 130,000 to 150,000 acre feet annually through the conservation/supply program and reregulation of water projects.

The State of Colorado's "Plan for Future Depletions" under the Platte River Cooperative Agreement clearly anticipates that population growth in the South Platte Basin will increase the flow of water in the South Platte River, mostly because of unused return flows, new transbasin imports and additional use of nontributary groundwater, and to a lesser extent from "ag-to-urban" transfers of irrigation water supplies. Those supply components will have "accretive" effects to the extent that the effluent and return flows from the new municipal uses are not reused to extinction. The reuse of such effluent, which would extend the utility of "imported" supplies and, in theory, reduce the need for increases in transmountain diversions, would have a net "depletive" effect on the South Platte flows. Thus, the logic of Colorado's strategy for addressing the Platte River ESA problem is to

avoid limits on future depletions in that basin through a supply and use regime that will encourage more transmountain diversions.

III. Meeting the Front Range's Municipal Water Needs.

Unquestionably, municipal and recreational water demands have increased dramatically in Colorado since approximately the end of World War II. Those municipal demands will only continue to increase as Colorado's human population grows, unless we experience a radical shift in social thinking about the utility and need for pervasive irrigation of lawns, parks, and open spaces within urbanized and suburban areas. During the same time frame, use of water for agricultural irrigation has declined in some parts of the state[2], in part because municipal development has occupied agricultural lands and municipal suppliers have acquired agricultural water rights and converted them to municipal use.

The future municipal needs on Colorado's West Slope are small in comparison with those projected for the Front Range's municipal corridor from Fort Collins on the North to Pueblo on the South. Much of the West Slope's future municipal demand will occur and be met, as it has been historically, through the conversion of agricultural lands and water rights into residential/commercial developments and municipal supplies. Those conversions have little material impact on the existing river flow regime.

In contrast, transmountain diversions to the Front Range deplete the Colorado River 100 percent of the diverted amount. Current levels of transmountain diversions are generally portrayed in Attachment 1 (the Colorado State Engineer's depiction of TMDs based on Water Year 1978) and Attachment 2 (UCRC's presentation of Colorado's TMDs during the last ten years).

The Colorado Water Conservation Board's ("CWCB") Compact Development Workgroup examined population projections of a 50% population increase on the Western

[2] The Colorado Farm Bureau reports that total Colorado irrigated agriculture has been stable since the 1970's but now uses less water, in part because of efficiency improvements.

Slope by 2020 and an overall 140% increase for the entire state in that time frame. Colorado's Front Range is the location where most of the current population exists and where most of its increase will occur. The issue of how to meet future municipal water needs has been the subject of detailed studies both by the State of Colorado and by individual water supply agencies.

A. Colorado Farm Bureau Study. In 1996 the Colorado Farm Bureau conducted a study, which it published in January 1997, to project the State's water supply needs and uses to the year 2100 and to make related assessments about current and future water supplies. The study included a state-wide survey of water supply and development agencies. The study concluded that only the Colorado River and South Platte River Basins have the potential for additional depletions, based on current uses and compact provisions. The study projects a potential statewide increase in annual demand for municipal and industrial ("M&I") water supplies from 930,000 AF to 2,200,000 AF. The study identifies, in very broad concept, a range of potential alternatives to meeting future demands, including efficiency improvements, agricultural water leases for M&I uses, groundwater development, and new surface water projects.

The Farm Bureau's identification of the Colorado River Basin as the remaining source of most of Colorado's reliable undeveloped surface water (450,000 AF per year) presents a fundamental dilemma. The growing demand is on the Eastern Slope and renewable water is on the Western Slope, but increases in depletions from the Colorado River main stem and its headwaters will only complicate recovery of the Colorado River endangered fish.

B. Senate Bill 96-74 Study. Additional surface water is sought by the Front Range in part to supplement the "nonrenewable" groundwater supplies of the Eastern Slope's "Denver Basin" aquifers. The SB 96-74 study was authorized by the Colorado General Assembly in 1996 and was completed in April 1998. The final report analyzed twelve surface and groundwater issues related to the resources of

the Denver area. This report quantified the "recoverable" yield of the Denver Basin aquifers. The SB 96-74 study and the related SB 96-153 evaluations demonstrate that the Denver Basin groundwater supplies available to Front Range municipal suppliers are substantial and are not being utilized to the extent of their legal availability.

The SB 96-74 Technical Study's Executive Summary states that the Denver Basin aquifer system contains 300 million acre feet of drainable storage, while 1996 production from the aquifers was only 56,000 acre feet (less than 2% of the legally allowable annual pumping). Further, the Summary notes that, notwithstanding some localized drawdown issues, "the overall Denver Basin aquifer life at this level of production (56,000 AF/year) may exceed 1,000 years."

One of the needs identified by the SB 96-74 final report was a better understanding of the interconnection between the Denver Basin aquifers and the South Platte River system. This is particularly important when analyzing the future depletion of the South Platte River due to increases in groundwater withdrawals and quantifying the augmentation necessary to protect surface water rights from the effects of Denver Basin groundwater pumping. The Colorado State Engineer's Office has built a complex simulation model of the Denver Basin aquifers. The State is looking for private-sector participation in upgrading the data input to the existing model and in creating an additional simulation of the alluvial aquifer adjacent to the South Platte River channel.

C. Metropolitan Water Supply Investigation ("MWSI"). MWSI was initiated by Governor Romer and the General Assembly in 1993 to evaluate potential cooperative solutions to meeting future water supply needs in the metropolitan area in the South Platte Basin (Denver and its suburbs). It was intended to seek solutions that would minimize potential conflicts over large new water storage projects and transbasin diversion projects. The MWSI final report was issued in January 1999. It will serve as a reference document for explaining how Denver

area water suppliers operate and obtain their water supplies. It explores water supplies available to the Denver Metro area in the future, and identifies cooperative ventures among water suppliers that could enhance water service to the Metro area as a whole. The study process resulted in improved communications among Front Range suppliers.

The MWSI study was not bound by legal and policy constraints but looked at what might be technically possible within the existing infrastructure. A notable exception was the examination of the potential for large-scale agriculture-to-municipal conversion which was not addressed in detail because of alleged "institutional" barriers.

The MWSI report does not endorse any particular project for satisfying Front Range demands. It has served as a springboard, however, to four Metro area regional studies which are looking at specific projects to cover regional demands. The study identified and evaluated four primary categories of supply-side options: conjunctive use; effluent management; interruptible supply arrangements; and other system integration opportunities.

Among the study conclusions are several items of particular interest to the West Slope:

1. There is no present or easily identified future Metro area water supply "crisis." The Metro area has experienced very localized water shortages, primarily due to small-capacity and/or shallow wells tapping perched aquifers with low recharge potential, but the overall supply is adequate to meet municipal needs through the year 2030 planning horizon without building any major new water supply projects.

2. There is a need for additional water storage within the Metro area to effectively manage legally reusable effluent and to facilitate exchanges along the South Platte River.

3. There is undeveloped groundwater beneath the Denver area that is being underutilized (300 million AF of recoverable supply within the Denver Basin aquifers). Most "conjunctive use" schemes seek to reduce dependence on this resource and divert more surface water from various sources, including the West Slope. Use of this vast local groundwater resource is expected to continue at low levels, with or without conjunctive use.

4. Just north of the Metro area is an active agricultural area annually using over 2.5 MAF for irrigation. Present plans call for conversion of only about 76,000 AF (three percent) to municipal and industrial uses.

5. Present plans anticipate an increase in transmountain diversions from the Colorado River Basin under existing rights and completed projects by 100,000 AF annually.

6. Flow in the South Platte River reaching Nebraska is expected to continue to increase in response to growth in population and urban development. The primary reason is the expected increase in return flow from municipal use of new water supplies (i.e., transmountain diversions from the Colorado River Basin and nontributary groundwater).

D. Arkansas River Basin Needs Assessment. The Southeastern Colorado Water Conservancy District and its major municipal and agricultural water supply members are engaged in an assessment of water and storage needs within the District. The executive summary of the December 1998 "Needs Assessment" study contains several conclusions of interest to the West Slope:

1. The planning process is focused by a philosophy of meeting new water demands without reducing agricultural water use. Since the Basin is over-appropriated, this suggests that ag-to-municipal transfers are not viewed as an acceptable strategy for development of additional municipal and industrial water supplies and that such new supplies will be derived from other sources such as expanded transmountain diversions from the Colorado River Basin.

2. Future M&I sector demands may range from 97,000 AF to 187,000 AF of total additional annual demand, depending on which growth projection is considered. At the lower level, the available water supplies will be generally adequate. Most of the municipal suppliers have sufficient water rights to meet anticipated demands through the year 2040.

3. Water use in the District averages 1 MAF/year, and 80 percent of that is use for irrigation. If agricultural irrigation use is not reduced to meet future M&I sector demands, the report projects that District use could grow to 1.2 MAF annually.

4. Additional storage facilities will be needed to manage both existing supplies and future supply increments in order to meet anticipated needs.

IV. Conclusion.

As long as the native Colorado River fishes remain listed as endangered it will be important, particularly to West Slope water users, that Front Range municipal water supply planning begins with options which will not exacerbate the conditions believed by the Fish and Wildlife Service to jeopardize those species. Unfortunately, the Colorado prior-appropriation doctrine rewards the early use of water, the "vesting" of rights based upon "historical use" which encourages water suppliers to develop available surface water

before groundwater. The Platte River recovery planning also seems dependent upon accelerated imports of Colorado River water. Nevertheless, the West Slope looks hopefully toward a reasoned prioritization of Front Range supply activities that sequences local supply opportunities ahead of additional large increments in transmountain diversions.

General References

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Metropolitan Water Supply Investigation Final Report by Hydrosphere Resource Consultants, Inc., HRS Water Consultants, Inc., Mulhern MRE, Inc., and Spronk Water Engineers, Inc. (January 1999).

SECWCD/Arkansas Basin Future Water and Storage Needs Assessment by GEI Consultants, Inc. in association with Helton & Williamsen, P.C. and David Bamberger & Assoc. (December 1998).

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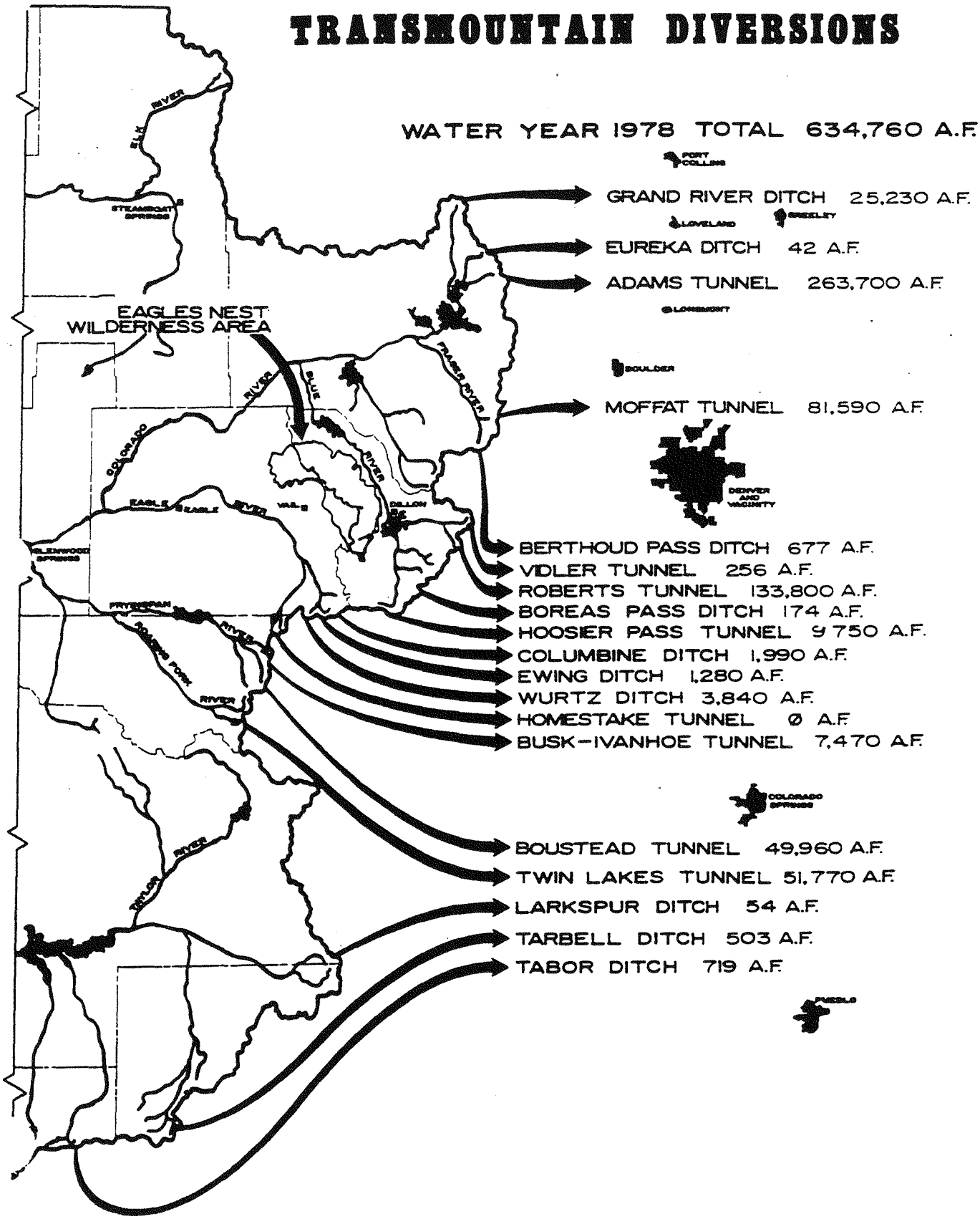
U. S. Department of the Interior, Fish & Wildlife Service Region 6 Section 7 Consultation, Sufficient Progress and Historic Projects Agreement and Recovery Action Plan (RIPRAP) for Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (revised March 1998).

Upper Colorado River Commission 50th Annual Report (September 30, 1998).

ATTACHMENT 1



COMPILED BY THE COLORADO RIVER WATER CONSERVATION

TRANSMOUNTAIN DIVERSIONS FROM
COLORADO RIVER BASIN IN COLORADO
1989-1998

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998[1]	10 Year AVERAGE
TO PLATTE RIVER BASIN											
Grand River Ditch	18,830	20,980	18,410	21,360	24,770	17,870	19,808	23,260	17,948	21,140	20,438
Eureka Ditch	60	60	60	212	95	0	160	0	0	0	67
Alva B. Adams Tunnel	273,200	213,700	199,200	196,300	206,400	233,200	238,500	207,300	229,000	203,800	220,260
Berthoud Pass Ditch	843	623	624	1,010	1,260	874	815	1,530	2,610	1,570	1,176
Moffat Water Tunnel	66,530	67,390	64,900	49,890	34,470	43,310	24,220	51,050	50,860	35,620	48,824
Boreas Pass Ditch	0	0	82	175	334	83	0	209	282	178	134
Vidler Tunnel	975	660	1,240	1,150	1,150	465	760	268	420	425	751
Harold D. Roberts Tunnel	74,380	59,420	65,850	65,530	124,100	73,690	52,176	36,920	53,480	30,550	65,630
Straight Creek Tunnel	N/A	370	269	363	408	330	320	399	393	295	315
TO ARKANSAS RIVER BASIN											
Hoosier Pass Tunnel	10,720	11,200	12,400	11,570	11,186	9,188	4,532	12,306	8,312	10,400	10,181
Columbine Ditch	1,420	746	1,602	1,610	2,478	1,470	2,390	2,500	1,730	1,669	1,762
Ewing Ditch	786	785	869	934	1,622	796	1,410	1,440	1,350	759	1,075
Wurtz Ditch	2,070	1,702	2,260	2,173	4,031	2,073	4,241	4,210	4,180	2,183	2,912
Homestake Tunnel	26,840	27,460	838	26,910	28,110	24,230	23,505	38,690	37,130	23,316	25,685
Twin Lakes Tunnel	37,410	41,368	42,980	41,970	62,664	42,850	33,120	34,850	34,190	47,441	41,884
Charles H. Boustead Tunnel	37,240	47,270	61,130	57,060	88,740	55,040	91,300	38,540	79,380	53,986	60,969
Busk-Ivanhoe Tunnel	3,760	5,170	5,660	5,210	4,980	4,100	5,817	2,450	4,640	4,174	4,596
Larkspur Ditch	30	8	95	205	334	146	116	60	185	67	125
TO RIO GRANDE BASIN											
Tarbell Ditch	344	79	0	344	109	207	68	368	753	830	310
Tabor Ditch	487	627	997	684	1,060	639	1,240	375	1,340	1,010	846
Treasure Pass Ditch	163	53	9	63	113	94	0	15	245	223	98
Don La Font Ditches No. 1 & 2	339	138	473	480	0	364	50	112	64	0	202
Williams Creek-Squaw Pass Ditch	238	205	235	475	441	279	374	124	421	289	308
Pine River-Weminuche Pass Ditch	508	451	257	520	246	172	672	42	1,050	396	431
Weminuche Pass Ditch	878	960	685	2,630	0	0	0	0	1,090	459	670
TOTAL	558,051	501,445	480,925	510,828	599,101	511,870	505,814	457,018	531,053	440,760[1]	509,649

TRANSMOUNTAIN DIVERSIONS FROM COLORADO RIVER BASIN
IN COLORADO TO RIO GRANDE BASIN IN NEW MEXICO
1989-1998

San Juan-Chama Diversions	51,416	71,710	119,440	87,090	98,800	82,300	85,100	57,239	141,174	107,765	90,203

ATTACHMENT 2