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Governor



C. J. KUIPER
State Engineer

DIVISION OF WATER RESOURCES

DEPARTMENT OF NATURAL RESOURCES
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April 6, 1972

Mr. C. J. Kuiper
State Engineer of Colorado
101 Columbine Building
1845 Sherman Street
Denver, Colorado 80203

Dear Mr. Kuiper:

The Annual Report of the Division Engineer for Irrigation Division No. 1 of the State of Colorado for the 1971 water year is herewith submitted.

Included within this report is the Annual Report of Dean E. Thompson on the distribution of water through the east slope facilities of the Colorado-Big Thompson Project.

The courtesy and assistance extended to me by you, your staff and the personnel of Division No. 1 over the past year has been greatly appreciated.

Respectfully submitted,

W. G. Wilkinson
Division Engineer

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1971 ANNUAL REPORT

I. INTRODUCTORY STATEMENT

Division 1 covers an area of some 28,068 square miles or approximately the northeast one-fourth of the State of Colorado. Of this, approximately 19,500 square miles is in the South Platte River Basin, 8,165 square miles in the Republican River Basin, and 403 square miles in the Laramie River Basin.

SOUTH PLATTE RIVER

The South Platte River starts at the Continental Divide, flows through South Park, down mountain canyons, out onto the plains in the Denver area, thence northeasterly and into Nebraska near the northeast corner of Colorado. The flow of the South Platte is augmented by a number of tributaries in the South Park area, the principal ones being the Middle and North Forks of the South Platte and Tarryall Creek. After leaving the mountains, the South Platte is principally augmented by several major tributaries arising at and east of the Continental Divide and flowing to the South Platte from the north and west. These major tributaries entering the South Platte in the Denver to Greeley area are Bear, Clear, Boulder and St. Vrain Creeks, and the Big Thompson and Cache La Poudre Rivers. Only normally minor and intermittent streams supplement the river flow from the south and east. However some of these, such as Plum, Cherry, Boxelder, Kiowa, Bijou, Badger, Beaver as well as Lone Tree, Coal, Wild Cat and Pawnee Creeks from the north and west are each capable of producing a major flood due to the extent and topography of their individual watersheds when subjected to intense precipitation.

In addition to the obvious tributary streams, the South Platte River is further supplemented very extensively, as are the tributaries themselves, by what is commonly referred to as return flow. This is water from springs, waste ditches, drains, seepage, etc., resulting generally from diversions for various uses, precipitation, and high water tables. These additional sources enter the streams in relatively small amounts at extremely numerous locations along the entire reaches of the streams.

The water supply is further supplemented by a number of diversions from transmountain sources. The water from these transmountain sources is controlled and used by specific ownership entities and as such the first use of it is not subject to appropriation as a part of the waters of the South Platte Basin. These transmountain diversions are treated in more detail later in the report.

The elevations in the South Platte Basin vary from 14,000 feet at points along the Continental Divide to 3,400 feet at the Colorado-Nebraska line. The western one-third of the basin is mountainous in character and provides the principal source of water as the result of precipitation.

Of the 12,481,000 acres in the South Platte Basin, 8,694,000 acres are in farms and ranches. The balance of the area is owned by federal and state governments, public agencies, or included within municipalities. Within the farm areas are 852,000 irrigated acres and 7,842,000 acres of dry land according to the 1964 Agricultural Census.

Although the total precipitation for the year was good, the distribution of moisture by months was far from normal. The summer months produced little precipitation over most of the division. The only area of consequence with near normal rainfall during these months was along the eastern edge of the state. One beneficial side effect of this abnormal condition was the accompanying decrease in hail potential. The only hail damage of serious magnitude was in the Julesburg area. Another benefit to be recognized was the hot weather associated with the low rainfall which, in combination with the abundant stream flows, underground and reservoir supplies, produced excellent growing conditions for irrigated crops.

The greatest damage suffered as a result of the weather occurred in mid-October when heavy snow accumulated on unharvested corn, hay, beets, beans and vegetable crops on an area extending some 50 miles out from the mountains. The corn crop suffered the greatest loss from this snow.

The principal use of water in the mountain valleys is for meadow irrigation. Large volumes of water are released on meadows adjacent to the streams and of this volume a major proportion returns to the stream for reuse at lower elevations. The largest area of mountain valley irrigation is in South Park at elevations up to 11,000 feet. Other uses in the mountain areas include those of small municipalities, domestic, stock, power, mining, commercial and recreation.

The greatest use of water, by far, in the South Platte Basin is for agricultural purposes in the plains area at elevations between 3,500 and 5,000 feet. The water here supports a well developed, diversified agricultural economy that ranks high nationally in productivity. Much of the demand for water in areas downstream some 40-50 miles from the mountains is supplied by return flow from uses further upstream and from wells.

In the past 20 years a tremendous population increase has occurred in the area near the mountains and out as far as Greeley. Greatest growth is centered around Denver and its suburbs, followed by Boulder, Fort Collins, Greeley and the presently smaller municipalities. Consequently, the demand and use of water for municipal supplies is increasing rapidly with the burden being met from transmountain sources and transfers from agricultural uses.

The population forecasts by municipal, federal, and state agencies indicate the Front Range area will suffer a greatly accelerated population growth in the years ahead.

The following tabulation of 1970 and projected 1990 and 2020 population figures for some of the Front Range counties indicate the nature of some of our water supply problems both now and in the future:

POPULATION PROJECTIONS BASED ON 1970 CENSUS

<u>COUNTY</u>	<u>1970</u>	<u>1990</u>	<u>INCREASE</u>	<u>2020</u>	<u>INCREASE</u>
Adams	185,100	315,000	170%	480,000	259%
Arapahoe	160,291	340,000	222	505,000	315
Boulder	130,002	240,000	185	455,000	350
Denver	512,691	580,000	113	710,000	139
Douglas	8,315	25,000	302	100,000	1,202
Jefferson	252,232	415,000	164	650,000	257
Larimer	88,664	175,000	197	325,000	367
Weld	89,086	175,000	196	325,000	365
Total	1,426,381	2,265,000	159	3,550,000	248

This growth is occasioned by the influx of industry, agreeable climate, scenic beauty and the general prosperity of the area. Much of the industry coming in or originating here is of the, so called, sophisticated type which although attracting people does not tend, in itself, to degrade the environment to the degree experienced in some eastern states.

As the requirements for water to supply the needs of municipal, industrial and commercial uses increase, it is apparent that some change in water use will be necessary. The competition for water creates a market and the above mentioned uses, realizing a higher unit return from their water consumption are looking to agricultural water for their supply. Some of this change of use occurs as a normal function of urban growth when formerly irrigated agricultural lands are developed and annexed to municipalities which require the water rights theretofore used on the land to be transferred to the municipal water system.

The cities of Boulder, Estes Park, Fort Collins, Greeley, Longmont and Loveland have formed a subdistrict under the Northern Colorado Water Conservancy District to develop additional west slope water and import it to the South Platte Basin for their use through the facilities of the Colorado-Big Thompson Project. No construction has been made or approved at this time, however, progress in planning has been reported.

Mutual and private irrigation interests are constantly endeavoring to upgrade their systems by expansion of their facilities or making better use of water supplies.

The greatest development and expansion of use in the South Platte Basin during the past 25 years has been that of underground water. Not only have wells been used to supplement surface water supplies but also many have been drilled to irrigate what had previously been range land. Through the use of sprinkling systems this formerly dry, rough land has become highly productive.

Under the statutory provisions of 148-21-45, those wells defined as domestic and livestock wells are exempt from the requirements of adjudication and administration and as such the State Engineer must approve the drilling and use applications. Thousands of acres of land in the division have gone into subdivisions with the major part held by individual ownerships looking to domestic wells as a source of water. Domestic well applications are presently flooding into the State Engineer's office. The pattern of use will undoubtedly be changed as a result of domestic well development, and a substantial effect on surface rights may be expected.

Considerable controversy exists at the present time as to the effects of underground pumping upon surface supplies and the administrative methods necessary for the effective control of pumping. Although laws have been passed presuming to remedy this problem, some questions of interpretation and implementation of such laws are yet unanswered. In 1969 some well owners in Morgan County brought suit in the Water Court against the State Engineer and his staff to enjoin them from enforcing rules and regulations on the use of underground water. The Water Court upheld the contentions of the well owners and issued the permanent injunction so sought. This decision was appealed to the Supreme Court who by a decision released in October 1971 reversed in total the decision of the Water Court and in so doing went to some length in interpreting the law and giving direction to the state and division engineers. As a result, rules and regulations for underground water use for irrigation, commercial, industrial and municipal uses are anticipated for the 1972 irrigation season.

Many small water projects have been constructed, mostly of a private nature. The greatest activity numerically, after wells, has been in the construction of livestock water tanks. Although these are each small in capacity, they provide a type of water conservation and a small measure of local flood protection.

In Water District No. 1 the Riverside Irrigation District is proposing construction of a reservoir on Wildcat Creek which would add considerably to the versatility and capabilities of the system by providing additional storage and regulating space in the lower reaches of the District. No definite decision has been made for construction.

In Water Districts 1 and 64 some plans for alternate points of diversion involving wells have been presented to the Court. The action of the Court on these few, especially interesting, cases will no doubt serve as a guide for a number of future applications and decisions.

In Water District No. 3 the City of Fort Collins has contracted with the North Poudre Irrigation Company to take ownership of Joe Wright Reservoir near Cameron Pass as well as a transmountain diversion, the Michigan Ditch, which collects water in former Water District No. 47 for use in Water District No. 3. In return, Fort Collins will provide a fixed amount of water to the North Poudre system from water rights the city now owns. The city has made application to the Water Court for change in point of diversion for water represented by ownership of shares in the New Mercer, Larimer County No. 2, Arthur and Josh Ames Ditches to alternate points of diversion where the water would be available to the North Poudre system through exchange.

Engineering studies are underway for the enlargement of the Joe Wright Reservoir.

In a separate action the North Poudre Irrigating Company is seeking to transfer the point of diversion for some 200 cfs from their original point of diversion on the North Cache la Poudre River to the headgate of the Munroe Canal on the main river. They also have applied to change the place of storage on four small inefficient reservoirs into Park Creek Reservoir which was completed in 1970.

The Corps of Engineers has made further progress on Chatfield Dam this year. Work started on the outlet structure and water was delivered to the Last Chance, Nevada and City Ditches through the interim facilities provided by the project during construction. Earthwork on the spillway and dam embankment were continued as federal funds were provided. Closure of the dam is scheduled for August 1973.

Large areas of land in Division 1 are excellent for agricultural use. In recent years, extensive portions of this land have been annexed by cities along the Front Range, including especially the areas surrounding the cities of Fort Collins, Greeley, Loveland, Longmont and Boulder.

This removal of some of the best farm land from production forces the use of more and more marginal land. The result is decreased efficiencies in all of the factors of crop production. A given amount of labor, fertilizer, water, seed, etc., results in less production per acre.

The land in prime agricultural areas which is being converted into cities generally has sufficient water. The primary question that arises is -- can we afford to allow this trend to continue?

Most of the cities have or soon will have specific requirements for developers to comply with regarding an adequate water supply. The problem arises with rural and mountain subdivisions in the various counties. In many cases the counties don't have the staff or expertise to determine whether or not there is adequate water to supply a given proposed development. If proposed legislation is passed making it necessary for the State Engineer to pass on the adequacy of a particular water supply, we will be on the way to a solution.

REPUBLICAN RIVER

The Republican River Basin in Eastern Colorado covers 5,226,000 acres. Of this area 4,690,000 acres are in farm and ranch land with 86,000 acres under irrigation and 4,604,000 acres of dry land as reported in the 1964 Agricultural Census.

This area is relatively dry and the surface streams, many of which are intermittent, provide only enough water for some lands adjacent thereto. The normal precipitation in this area is about 17.1 inches of which 13.6 inches or 80 percent falls during the April through September period. This year, October 1970 through October 1971, the precipitation was 89 percent of normal.

During the past twenty years many wells have been drilled with a substantial proportion of the agricultural production attributable to irrigation from pumping. The greatest impact of groundwater development has been in the Burlington area where there is a thriving agricultural economy based mainly on irrigated row crops. The water in this area is being mined from the Ogallala Formation at the rate of 40 percent depletion in twenty-five years. The prospect of recharging this aquifer is in considerable doubt at this time. Consequently, it is unlikely that this high plains area will experience any major industrial or population change such as that in areas closer to the mountains.

LARAMIE RIVER

The Laramie River Basin in North Central Colorado contains 258,000 acres of which 4,800 acres are irrigated and 15,000 acres are non-irrigated ranch land according to the 1964 Agricultural Census.

This basin is a mountain valley with the principal water use being for meadow irrigation and livestock purposes. There are no municipalities or villages in this basin so the domestic uses are minimal.

Under a Supreme Court decree the water in the Laramie Basin is allocated volumetrically. The irrigated acreage of each ranch has been determined and 6.0887 day second feet per acre allotted for the season of which only .3715 day second feet may be used after July 31. Further, the above mentioned decree provides for transbasin diversions of up to 19,875 acre feet annually.

The past season started out with a heavy snow pack followed by adequate precipitation and stream flows all summer. The demand for water was such that the diversion allocations were not used to their full extent although the water was available.

The Laramie River Basin is becoming increasingly popular as a recreation area, particularly as related to fishing. Some changes of ownership to recreation interests have occurred and more are anticipated although the water use is expected to remain quite stable. The changes in ownership appear to be more concerned with control of fishing rights and public access now than in the past. No significant changes in the water use pattern are expected in the next few years.

II.

PERSONNEL

NAME	DISTRICT	POSITION	CLASSIFICATION		DATE OF LAST STEP CHANGE	MONTHS 70-71 WORKED	BUDGETED	MILEAGE	
			NOV. 31, 1971	GRADE				PERSONAL	STATE VEH.
<u>ADMINISTRATIVE</u>									
W. G. Wilkinson		WRE IV	36	5	7-1-71	12	12	-	18971
James R. Clark		WRE III	34	6	10-1-70	12	12	720	-
Dorothy Wankelman		Int.Ck.Typ.	13	3	3-1-71	12	12	-	-
Robert Samples	1	W.C. II	23	5	4-1-71	12	12	15168	11182
Paul Meehl	2	W.C. II	23	6	1-1-69	12	12	14068	-
John Neutze	3	W.C. III	25	3	3-1-71	12	12	14488	1573
Lloyd Blewitt	4	W.C. II	23	6	12-1-68	12	12	12311	-
Donald Palmer	5	W.C. II	23	6	12-1-68	12	12	11729	-
Thomas Platt	6	W.C. II	23	7	1-1-66	12	12	14600	-
Richard Drexel	7	W.C. II	23	7	5-1-71	12	12	12955	-
Joe Clayton	8	W.C. I	21	7	11-1-71	12	12	14378	-
Ralph Van Gorden	9	W.C. I	21	7	7-1-70	12	12	11496	-
Arthur Wenz	23	W.C. I	21	5	8-1-70	10.7	7	16293	5874
William Gleason	48	W.C. I	21	6	10-1-64	4.8	5	1408	-
Theodore Fisher	49-65	W.C. I	21	3	11-1-70	2	5	3264	-
Robert Littler	64	W.C. II	23	7	7-1-70	12	12	14701	-
Quinto Brunelli	1	D.W.C.	18	2	5-1-71	4.8	2	10553	-
Antone Heit	2	D.W.C.	18	7	7-1-70	5	5	4020	-
A. R. Lowery	3	D.W.C.	18	1	10-1-70	6	7	10154	-
Richard Robbins	4	D.W.C.	18	1	5-1-71	4.5	10	3149	-
Lawrence Young	5	D.W.C.	18	3	8-1-71	5	7	3447	-
Earnest Ward	6	D.W.C.	18	7	6-1-71	7	7	9566	-
Nick Bissel	8	D.W.C.	18	1	RESIGNED	2.5	8	1309	-
Roger Graham	8	D.W.C.	18	1	8-1-71	2.1	-	1057	-
Charles W. Hayman	23	D.W.C.	18	1	6-1-71	5.2	7	8801	-
Landon Schweer	23	D.W.C.	18	3	RESIGNED	3.4	3	220	-
Richard Vannorsdel	48	D.W.C.	18	1	5-1-71	2	0	3925	-
Bruce Smith	48	D.W.C.	18	1		2	0	1511	-

II.

PERSONNEL (CONTINUED)

NAME	CLASSIFICATION POSITION NOV. 31, 1971	DATE OF LAST STEP CHANGE	MONTHS WORKED	70-71 BUDGETED	MILEAGE PERSONAL	STATE	VEH.
Dean Thompson	WRE II	7-1-64	12	12	12430		#4483
Ted Bell	WRE I	2-1-71	12	12	11280		# 205
Darshan Walia	WRE I	7-1-71	12	12			#3638
R.D. Walcher	WRE II	8-1-71	12	12	2951		#4638
Jay Blum	WRE I	7-1-71	12	12	12933		# 206
Ahmed Andesha	WRE I	7-1-71	12	12	2329		#4637
Daragh Mac Fadden	WRE I	5-1-71	35	4			
Orlyn Bell	WRE II	11-1-71	4	12	16567		# 203
George Sievers	Eng. Tech.	7-1-70	3	3			
Dave Ferrin	WRE I	8-1-70	5	5			
Doug Walcher	Eng. Tech.	7-1-70	3	3			
Ray Marine	Eng. Tech.	7-1-70	3	3			

HYDROGRAPHIC

III.

A. SNOW PACK

The April 1st snow pack and soil moisture report is considered to be the key to the water supply for the season by farmers and soil conservation personnel. Their planning is based, to a large extent, on this report. The May 1st report is thought of as an adjustment to the April 1st information.

Northern Colorado snow courses indicated an excellent snow pack on April 1st, with the maximum of record on some courses. All stream flows were forecast above normal, based on normal precipitation for the remainder of the season. The soil moisture for the Division was well above normal and carry-over storage in the area reservoirs was approximately 130% of normal.

Late April storms added a considerable amount of moisture to the soils in the irrigated areas. These storms also added significant amounts to the snow pack in most areas.

The tables listed below summarize the snow measurements and soil moisture values as they stood on May 1st:

SUMMARY OF SNOW MEASUREMENTS (MAY 1st)

WATERSHED	NO. OF COURSES AVERAGED	This Year's Snow Water as Percentage of	
		LAST YEAR	AVERAGE*
Big Thompson	5	85	132
Boulder	3	75	129
Cache la Poudre	8	86	143
Clear Creek	5	68	106
Saint Vrain	3	133	224
South Platte	3	69	138

*1953 - 1967 period

SUMMARY OF SOIL MOISTURE (MAY 1st)

WATERSHED	NO. OF COURSES AVERAGED	This Year's Soil Moisture As Percentage of	
		LAST YEAR	AVERAGE*
Big Thompson	3	93	101
Boulder	1	76	81
Cache la Poudre	2	132	120
Clear Creek	2	-	138
Saint Vrain	2	111	117
South Platte	2	134	119

*1953 - 1967 period

Check with CSU on any weather modification programs in South Platte.

III.

B.

PRECIPITATION

Precipitation during the summer months of 1971 was considerably below normal. This kept yields on dry land farms down considerably. Above average runoff plus 12 days of "free" CBT water helped produce some very good crops on irrigated farms.

April was the only month with above average precipitation during the 1971 growing season. May, June, July and August were all considerably below average.

The National Weather Service River Forecast Center at Kansas City, Missouri, sent us precipitation figures for the 1971 water year (Oct. 1st to Sept. 30th) showing values ranging from 87 percent of average* at the Denver Weather Bureau to 136 percent at Conifer. Most figures for the South Platte Basin were considerably above normal for the water year.

The most damaging storm of the year occurred on September 17th. It was a high moisture content snow which damaged trees extensively. The corn harvest was interrupted with considerable damage and beans caught on the ground suffered some damage.

* Averages are for the 15 year period 1953-1967 and are computed by the Kansas City River Forecast Center.

B. PRECIPITATION

SOUTH PLATTE BASIN

	CHEESMAN	BOULDER	DENVER	ESTES PARK	FT. COLLINS	FT. MORGAN	GREELEY	IDAHO SPRINGS	LONGMONT	STERLING	
APRIL	TOTAL PRECIP.	1.93	6.01	1.98	3.95	4.42	2.47	3.18	2.72	4.45	2.87
	DEP. FROM NORMAL*	-0.04	3.26	-0.13	1.92	2.56	0.96	1.73		2.82	1.37
	% OF NORMAL	98	218	94	194	238	164	219		273	191
MAY	TOTAL PRECIP.	1.21	2.00	1.34	0.93	2.33	0.92	1.78	0.86	0.83	3.17
	DEP. FROM NORMAL*	-0.84	-1.36	-1.36	-1.29	-0.57	-1.66	-0.71		-1.83	0.57
	% OF NORMAL	59	60	50	42	80	36	71		31	122
JUNE	TOTAL PRECIP.	0.14	0.41	0.23	0.52	0.20	1.64	0.64	0.45	0.01	2.27
	DEP. FROM NORMAL*	-0.99	-1.48	-1.21	-1.20	-1.53	-0.09	-0.78		-1.44	-0.31
	% OF NORMAL	12	22	16	30	12	95	45		0.6	88
JULY	TOTAL PRECIP.	5.71	1.37	1.20	1.46	0.52	0.40	0.63	1.68	1.16	0.64
	DEP. FROM NORMAL*	3.38	-0.04	-0.33	-0.67	-0.63	-1.36	-0.56		0.07	-1.20
	% OF NORMAL	245	97	78	68	45	23	53		106	35
AUGUST	TOTAL PRECIP.	1.91	0.10	0.85	1.72	0.19	0.16	0.78	0.64	Tr.	0.81
	DEP. FROM NORMAL*	-0.15	-1.54	-0.43	-0.14	-1.34	-1.22	-0.03		-0.88	-0.73
	% OF NORMAL	93	6	66	92	12	12	96			52
SEPT.	TOTAL PRECIP.	2.37	4.21	2.85	2.52	3.55	2.43	3.36		3.83	2.19
	DEP. FROM NORMAL*	1.24	2.96	1.72	1.28	2.35	1.23	2.60		2.77	1.07
	% OF NORMAL	210	337	252	203	296	202	442		361	196

* BASED ON PERIOD 1931-1960

III.

B. PRECIPITATION

KANSAS BASIN

	BURLINGTON	HOLYOKE
APRIL		
TOTAL PRECIP.	2.43	3.08
DEP. FROM NORMAL *	0.79	1.17
% OF NORMAL	148	161
MAY		
TOTAL PRECIP.	4.23	4.35
DEP. FROM NORMAL *	1.70	1.16
% OF NORMAL	167	136
JUNE		
TOTAL PRECIP.		2.98
DEP. FROM NORMAL *		-0.39
% OF NORMAL		88
JULY		
TOTAL PRECIP.	1.04	2.74
DEP. FROM NORMAL *	-1.53	0.28
% OF NORMAL	40	111
AUGUST		
TOTAL PRECIP.	0.98	1.91
DEP. FROM NORMAL *	-1.25	-0.09
% OF NORMAL	44	96
SEPT.		
TOTAL PRECIP.	0.86	2.40
DEP. FROM NORMAL *	-0.37	0.92
% OF NORMAL	70	162
* BASED ON PERIOD 1931-1960		

III.

B. HAIL SUPPRESSION

The National Hail Research Experiment, centered at New Raymer, Colorado, continued to gather data this past summer (1971). This experiment is coordinated by the National Center for Atmospheric Research, which is sponsored in turn by the National Science Foundation.

Two major objectives have been set for NHRE: 1) to gain an increased understanding, by observation and analysis, of the cloud dynamics and micro-physics governing the severe convective storms that produce damaging hailfall and 2) equipped with this increased knowledge, to develop, if possible, a practicable method for suppressing the occurrence of damaging hail.

The summer of 1972 has been designated by NSF as the first full-scale field operation. Consequently, the field program in 1971 was designed to test, from June 1st to August 1st, the new systems and procedures to be used in the following years.

During the following summers, a randomized cloud seeding experiment for hail suppression will be undertaken. It is hoped that by the end of the project the increased knowledge of hailstorm mechanisms gained through field observations, laboratory studies and theoretical and numerical analysis will permit a definitive assessment of the feasibility of practical hail suppression.

III.

C. FLOODS

Although the mountain tributary areas in the northern half of the Division received an exceptionally heavy snow pack through the winter and early spring, the Division was very fortunate in that virtually no flooding developed during the spring runoff. No extended periods of high temperature occurred during this period nor were there any extensive spring rains on the snow pack to accelerate the melt. Consequently, stream flows, while above normal, were not of a flooding magnitude. Credit must be extended to our field personnel who substantially helped alleviate flood threats by wise management of ditch and reservoir flows to best cope with their local conditions. The cooperation of ditch and reservoir companies and other water interests with the water commissioners was most helpful and is herewith gratefully acknowledged. The most serious flood threat of the season occurred on April 27 when a peak flow of 7580 cfs passed the Kersey Station. Although some water overflowed the channel, no damage of consequence resulted. The channel in this area will accommodate nearly 10,000 cfs before flooding becomes a serious problem.

III.

C. FLOODS (CONTINUED)

The following tabulation shows the annual flows at the major control gaging stations in the Division and the highest daily flow during that period. Note that some of the flows are for the Water Year, October 1 - September 30, and others are for the Irrigation Year, November 1 - October 31. Most figures are preliminary reports and subject to revision.

STATION	WATER YEAR		IRRIGATION YEAR NOV. 1, 1970 to NOV. 1, 1971	HIGHEST DAILY FLOWS DATE	C.F.S.
	OCT. 1, 1970 to OCT. 1, 1971	NOV. 1, 1971			
South Platte at South Platte	276500	Ac. Ft.			
North Fork at South Platte					
Bear Creek at Morrison	34400				
Bear Creek at Sheridan	38190				
South Platte at Denver	212300				
Clear Creek at Golden	197700				
Clear Creek at Derby	95810				
Middle Boulder Creek at Ordell	71700				
South Boulder Creek at Eldorado	53330				
Coal Creek at Plainview	4800				
St. Vrain Creek at Lyons	103500				
St. Vrain Creek at Platteville			228080	Ac. Ft.	April 26
Big Thompson at Canyon	71800				
Big Thompson at La Salle	119600		120493		April 26
Cache la Poudre at Canyon	311800				
Cache la Poudre at Greeley	178500		179020		April 29
South Platte at Kersey	938000		934000		April 27
South Platte at Julesburg	598000		593470		May 11
South Platte at Julesburg					4080

D. GENERAL

A water budget is herewith submitted for the 1971 irrigation year. Due to the number of variables involved and the unavailability of complete and accurate data, the figures herein shown are, in many instances, estimates or approximations at best. Figures are omitted if there is no reasonable basis for making an estimate.

WATER BUDGET

DIST.	INFLOW INTO DISTRICT	YIELD OF DRAINAGE AREA	TOTAL SUPPLY	IRRIGATION DIVERSIONS	ESTIMATED DEPLETION BY IRRIGATION	MUNICIPAL DIVERSIONS	ESTIMATED DEPLETION BY MUNICIPALITIES	OTHER DIVERSIONS	ESTIMATED OTHER DEPLETIONS	RUNOFF @ STATELINE OR MOUTH
1	934080	32396	966476	532558	403312					563164
2	960569	198500	1260169	374457	224869			15150	120	934080
3	131114	473323	604437	532150	415063	20339	8136			181238
4	67677	226484	294161	217076	171078	6246	2500	2261	90	120493
5	73626	217526	296152	152827	50942	18140	12130			228080
6	51926	146398	198324	250100	88421	68311	59923			49980
7	964	196426	197390	116856	95911	12437	4975	2416	1208	95296
8	308198	102114	410312	58194	23388	157910	63164	3529	1210	332550
9		47014	47014	19168	6759	2094	1500	377	188	38190
23	15264	301680	316944	82232	16500	31627	31500			268944
48				37990	21026					
49				4768						
64	563164	126766	689930	280604	96460					593470
65				13570						

E. UNDERGROUND WATER

The most significant aquifer in Division 1 is the South Platte River Basin Alluvial Aquifer. This aquifer extends from Kassler, Colorado, southwest of Denver to the state line at Julesburg and has a maximum depth of approximately 200 feet. It is the source of water for approximately 10,000 large irrigation wells and contains about 10 million acre-feet in storage. This aquifer is vital to the economic health of the entire region. It has been estimated by Howard Propst of the Herman Miller Research Corporation in a paper entitled "Colorado's Future"*, produced for the Water Integration Committee of Sterling Colorado, that losses estimated at \$14,312,500 would result in only one year with a 25 percent reduction in pump usage. This estimate includes only the losses that would occur in corn, sugar beets and alfalfa. Even greater losses could and probably will result unless some method of integrated surface-ground water use is instituted.

Several other aquifers in Division 1 are noteworthy. In the Northern High Plains Designated Ground Water Basin we have the Ogallala Formation as the major aquifer. This formation underlies most of Water Districts 49 and 65. There are a total of 3200 irrigation wells in the Northern High Plains with an average yield of about 900 gallons per minute. The Ogallala Formation is underlain by Pierre Shale in the entire area and varies in thickness from 0 - 350 feet. The importance of this aquifer to the Northern High Plains can't be over emphasized. However, without some provision for recharge a large portion of the area will probably have to revert to dry land farming after 25 or 30 years. This is due to the fact that withdrawals far exceed the recharge at the present time.

The Lost Creek Designated Ground Water Basin is one area where considerable success has been experienced with groundwater recharge. Water is run into the Olds Reservoir with 35 cubic feet per second required to maintain the water level. The result has been increases of from 2 feet to 7 feet in wells in the southern part of the basin and from 1 foot to 1 1/2 feet in wells in the northern part of the basin.

The bedrock aquifers in the Denver Basin have also been developed significantly. Roughly, this covers Water Districts 2, 8, and that portion of District 1 lying south of the South Platte River. The aquifers included are the Laramie, Fox Hills, Arapahoe and Denver formations. The number of wells in these formations is between 7,000 and 8,000, with yields ranging from 5 to 50 gallons per minute for the most part. Many of these wells are used for commercial purposes, with the balance going for stock and domestic purposes. In the Franktown area the top of the Laramie-Fox Hills Formation is between 2500 and 3000 feet deep, making it economically infeasible for all but the more ambitious projects.

North of the South Platte River in Water Districts 1 and 64 we have the White River Formation. This formation is found from 100 to 500 feet below land surface, with wells drilled into it yielding between 50 and 500 gallons per minute. There are about 1000 known wells into this formation with rumors of many unregistered wells, especially in northern Weld County.

* See Appendix A - Page 9

The most significant court action in Division 1 this year was the reversal of W-2 by the Supreme Court. This makes it necessary for us to reenact rules and regulations for the operation of wells during the coming irrigation season.

The District Court of Larimer County upheld the State Engineer's position denying a well permit for a location 13 miles north of the Poudre on the basis of interference with the stream system. This decision is being appealed so it's not yet a case we can hang our hat on.

III. WATER SUPPLY

F.

TRANSMOUNTAIN DIVERSIONS

OCTOBER 1, 1970 - SEPTEMBER 31, 1971

DIVERTING STRUCTURE	SOURCE	SOURCE DISTRICT	RECEIVING DISTRICT	CONTROLLING OWNERSHIP	1ST DAY		LAST DAY		NO. OF DAYS		AVG. AMT. DIVERTED C.F.S.	TOTAL AMOUNT DIVERTED AC.F.T.
					WATER DIVERTED	WATER DIVERTED	WATER DIVERTED	WATER DIVERTED	WATER DIVERTED	WATER DIVERTED		
Wilson Supply Ditch	Sand & Deadman Creek	48	3	Divide Canal & Res. Co.	5-14	7-21	46	9.3	853			
Deadman Ditch	Deadman Creek	48	3	Divide Canal & Res. Co.	6-30	7-21	22	6.5	288			
(Incl. in Wilson Supply)												
Bob Creek Ditch	Nunn Creek	48	3	City of Greeley	No Water Diverted	This Season	"	"	"			
Columbine Ditch	Deadman Creek	48	3	City of Greeley	"	"	"	"	"			
Laramie Poudre Tunnel	Laramie River	48	3	Water Supply & Storage	6-29	9-17	81	87.1	14110			
Skyline Ditch	West Fork Laramie River	48	3	Water Supply & Storage	6-29	7-18	20	45.2	1810			
Cameron Pass Ditch	Michigan River	47	3	Water Supply & Storage	No Water Diverted	This Season	"	"	"			
Michigan Ditch	Michigan River	47	3	North Poudre Irr. Co.	"	"	"	"	"			
Grand River Ditch	Colorado River	51	3	Water Supply & Storage	6-12	9-16	97	77.0	14930			
Eureka	Colorado River	51	4	City of Loveland	7-27	8-21	26	0.2	12			
Alva B. Adams Tunnel	Colorado River	51	4	U.S.B.R.- N.C.C.D.	10-1	9-31	344	277.3	190800			
Moffatt Tunnel	Fraser River	51	6	City of Denver	10-1	9-31	365	54.7	39930			
Jones Pass Tunnel	Williams Fork	51	6	City of Denver	10-5	9-31	195	6.7	2620			
AKA August P. Gumlick or Williams Fork Tunnel												
Berthoud Pass Ditch	Fraser River	51	7	Farmers Res. & Highline	6-14	9-31	109	4.1	902			
Vidler Tunnel	Montezuma Creek	36	7	Hebert Young	6-26	7-6	11	2.9	64			
Roberts Tunnel	Blue River	36	23-8	City of Denver	7-7	8-31	55	17.0	18700			
Boreas Pass Ditch	Indiana Creek	36	23	City of Aurora	6-15	8-8	53	0.8	84			
Hoosier Pass Tunnel	Blue River	36	23	City of Colo.Springs	10-1	9-31	147	44.0	12940			
Aurora Homestake	Homestake Creek	37	23	City of Aurora	7-1	9-1	71	5.8	2240			
								TOTAL	300283			

ANNUAL REPORT
 COLORADO-BIG THOMPSON PROJECT
 1971

Water supply outlook for the summer of 1971 was very optimistic. Snow pack in the local basins was average or above average. Carry-over reservoir storage above normal and soil moisture good.

STREAM FLOWS

St. Vrain at Lyons	103,500. acre feet
Big Thompson at Canyon	143,000.
Cache La Poudre at Canyon	311,800.
St. Vrain at Mouth	229,800.
Big Thompson at Mouth	120,830.
Cache La Poudre at Mouth	172,400.
South Platte at Kersey	940,600.
South Platte at Balzac	
South Platte at Julesburg	598,000.

ACTIVE PROJECT STORAGE

<u>Western Slope</u>	<u>Nov. 1, 1970</u>	<u>Nov. 1, 1971</u>	<u>Diff.</u>
Willow Creek	8,126.	7,865.	-261.
Granby	415,897.	428,992.	+13,095.
Total Acre Feet	424,023.	436,857.	+12,834.
 <u>Eastern Slope</u>			
Carter	73,114.	56,416.	-16,698.
Horsetooth	80,099.	57,202.	-22,897.
Boulder	7,600.	7,770.	+170.
Total Acre Feet	160,813.	121,388.	-39,425.

DISTRIBUTION OF PROJECT WATER

<u>WATER DISTRICT</u>	<u>CARRIER</u>	<u>TOTAL ACRE FEET</u>
1	Hansen Feeder Canal via Big Thompson	3,693.6
3	Hansen Supply Canal via Cache La Poudre	62,855.7
	Direct Delivery	10,536.0
4	Hansen Feeder Canal via Big Thompson	37,408.2
	St. Vrain Supply Canal via Little Thompson	7,802.6
	Direct Delivery	4,759.1
5	St. Vrain Supply Canal via St. Vrain	15,042.0
	Direct Delivery	6,652.1
6	Boulder Cr. Supply Canal via Boulder Creek	11,151.0
	Direct Delivery	2,719.2
	Total to all districts, including replacement water	162,619.5

Quota water declared available was 60% or 186,000 a.f. Replacement water - 1,827.5 a.f.

COMPARISON BETWEEN ORDERED AND ACTUAL DELIVERIES

<u>STREAM</u>	<u>ORDERED</u>	<u>DELIVERED</u>	<u>DIFFERENCE</u>
Boulder	11,151.	13,556.	+ 2,405.
St. Vrain	15,042.	19,992.	+ 4,950.
Little Thompson	7,802.6	10,332.	+ 2,529.
Big Thompson	41,101.8	*52,965.	+11,863.
Cache La Poudre	62,855.7	95,039.	+32,183.
Turnouts	<u>24,666.4</u>	<u>30,701.</u>	<u>+ 6,035.</u>
Total	162,619.5	222,585.	+59,965.

* Deliveries less Big Thompson "Skim", Dille Tunnel diversions. Non-charged water delivered during period July 2-14 inclusive, accounts for over-delivery of 59,965 a.f. as compared to computed figure of 60,326. a.f. as furnished by Water Commissioners.

PROJECT GAIN AND LOSSESTES PARK AREA

<u>INFLOW</u>	<u>NOV. 1, 1970 - NOV. 1, 1971</u>	<u>TOTAL ACRE FEET</u>
Adams Tunnel	195,988.	
Wind River	1,021.	
Big Thompson River	104,110.	
Fish Creek	2,487.	
Storage Nov. 1, 1970	<u>3,019.</u>	
		306,625
 <u>OUTFLOW</u>		
Estes Park Water District	145.	
Town of Estes Park	386.	
Estes-Foothills Canal	241,961.	
Big Thompson River	61,627.	
Storage Nov. 1, 1971	<u>2,182.</u>	
		306,301.
Apparent loss 324. a.f.		

CARTER LAKE AREA

<u>INFLOW</u>		
Estes-Foothills Canal	241,961.	
Storage Pinewood, Flatiron	1,878.	
Storage Carter Lake Nov. 1, 1970	73,114.	
Dille Tunnel	<u>23,874.</u>	
		340,827.

CARTER LAKE AREA

<u>OUTFLOW</u>	<u>NOV. 1, 1970 - NOV. 1, 1971</u>	<u>TOTAL ACRE FEET</u>
Hansen Feeder Canal	92,627.	
Big Thompson River	122,963.	
St. Vrain Supply Canal	57,714.	
Little Thompson Water District	2,200.	
Storage Carter Lake Nov. 1, 1971	56,416.	
Storage Pinewood, Flatiron	2,101.	
Measured Seeps	<u>2,270.</u>	
		336,291.
Apparent loss	4,536 a.f.	

HORSETOOTH RESERVOIR AREA

<u>INFLOW</u>		
Hansen Feeder Canal	88,422	
Storage Nov. 1, 1970	<u>80,099</u>	
		168,521
<u>OUTFLOW</u>		
Hansen Supply Canal	95,039.	
Direct Delivery	11,869.	
Storage Nov. 1, 1971	57,202.	
Measured Seeps	<u>917.</u>	
		165,027.
Apparent loss	3,494. a.f.	

BOULDER RESERVOIR AREA

<u>INFLOW</u>		
Boulder Feeder Canal	*14,430.	
Storage Nov. 1, 1970	<u>7,600.</u>	
		22,030
* (Includes 312 a.f. Lefthand Creek water to storage)		
<u>OUTFLOW</u>		
Boulder Creek Supply Canal	13,556.	
Direct Delivery	4,308.	
Dry Creek Replacement	590.	
Storage Nov. 1, 1971	<u>7,770.</u>	
		26,224.
Apparent gain	4,194 a.f.	

Summations

Estes Park Area	-324.	
Carter Lake Area	-4,536.	
Horsetooth Reservoir Area	-3,494.	
Boulder Reservoir Area	<u>+4,194.</u>	
Total Apparent Project Loss	4,160. a.f.	

OPERATION "SKIM"

Computations are based on measured sum of Big Thompson River at Estes, Fish Creek and Wind River to Bureau system minus Big Thompson near Estes.

Big Thompson "Skim" extended from April 19 to October 13, 1971, except for zero skim days on July 5, 6, 17, 20, and 24th.

<u>Apr.</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug.</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Total cfs</u>	<u>Total a.f.</u>
381.	5,036.	14,105.	1,191.	1,427.	952.	162.	23,254.	46,124.

RIVER OPERATION

Previous year river operations proved so successful that the same plan was followed for the 1971 irrigation season. A steady flow was held out of Lake Estes with a delayed "Skim" delivered at the Mouth of Canyon.

Lake Estes and Estes Foothills Canal capacities are limited and require increased releases out of Lake Estes at times. This changes the daily river pattern for short periods.

Surplus water used or stored in Bureau system during May and June amounted to 1,965 acre feet.

Granby Reservoir spilled approximately 50,000 acre feet due to the high runoff in the upper reaches of the Colorado River Basin the later part of June and the first part of July.

AREA PRECIPITATION

Estes Park	14.55 inches	Longmont	13.61 inches
Waterdale	17.66 inches	Greeley	14.37 inches
Ft. Collins	14.76 inches		

STREAMFLOW MEASUREMENTS MADE FROM DIVISION 1 OFFICE

	<u>STREAMS</u>	<u>CANALS</u>	<u>MILEAGE</u>
T. Bell	135	31	10,420
D. Walia	244	3	14,040
D. Thompson	<u>102</u>	<u>120</u>	<u>13,045</u>
Totals	481	154	37,505.

The majority of ditches in Districts 2, 3, 4, 5, 6, and 8 were checked this past season. District 5 should be updated with the installation of recorders and maintenance work on weirs. Commissioners in the districts mentioned were present to locate ditches and unlock recorder houses. Each received the results of the current meter measurements.

Ditches need to be measured more frequently, however the work load is more than can be handled by the Greeley office with the present number of hydrographers.

Respectfully submitted,

Dean E. Thompson

III.

G. RESERVOIR STORAGE DISTRICT NO. 1

NAME	SOURCE	AMOUNT - A.F.		
		11-1-70	5-1-71	10-31-71
Empire	South Platte	10,010	35,898	2,315
Riverside	South Platte	18,233	63,576	Dead Storage
Jackson Lake	South Platte	20,943	34,937	11,161
Bijou No. 2	South Platte	4,300	4,300	4,140
Klug No. 1	Box Elder	0	209	0
Heart	Little Crow	140	367	Dead Storage
Snyder	South Platte	0	0	380 E

III.

G. RESERVOIR STORAGE DISTRICT NO. 2

NAME	SOURCE	AMOUNT - A.F.		
		11-1-70	5-1-71	10-31-71
Barr - Oasis	South Platte	25,144	29,207	12,440
Behrns	South Platte	30	12	35
Beulah	South Platte	1	0	1
Bowles No. 1	South Platte	500	3	30
Bowles No. 2	South Platte	475	190	190
Brantner No. 2	Brantner Gulch	11	11	11
Carlin	South Platte	0	0	0
Church Lower Lake	Dry Creek	100	100	100
Coal Ridge (Sandhill)	Little Dry Creek	603	548	696
Fulton Waste	South Platte	367	400	250
German No. 2	Big Dry Creek	45	20	45
German No. 3	Big Dry Creek	8	3	3
German No. 4	Big Dry Creek	25	5	18
German No. 6	Big Dry Creek	20	10	20
German No. 8 & 9	Big Dry Creek	20	10	40
German No. 12	Big Dry Creek	92	92	90
Great Western	Clear Creek	2,699	2,954	2,654
H. A. Smith	South Platte	10	10	30
Henry	South Platte	0	1	1
Horse Creek	South Platte	10,405	14,945	3,540
Ireland No. 1	South Platte	54	54	40
Ireland No. 5	South Platte	73	40	35
J. B. Smith	Todd Creek	130	142	150
L. A. Dore	Seepage	203	381	388
Loloff	South Platte	100	100	94
Lord	South Platte	113	527	118
Lower Latham	South Platte	5,315	5,740	5,268
Marshall	Brantner Gulch	27	32	30
Maul	First Creek	33	33	33
Meek No. 1	South Platte	45	3	15
Meek No. 2	South Platte	65	0	8
Milton	South Platte	13,410	16,371	11,575
Mose Davis Lake No. 2		0	20	20
North Starr	Big Dry Creek	65	129	100
Olds	South Platte	0	15	0
Parson-Holmes	Second Creek	18	0	0
Prospect	South Platte	1,125	6,107	2,030
Standley - Kinnear	Clear Creek	30,564	34,708	20,614
Thompson	Big Dry Creek	203	203	200

III.

G. RESERVOIR STORAGE DISTRICT NO. 3

NAME	SOURCE	AMOUNT - A.F.		
		11-1-70	5-1-71	10-31-71
Barnes Meadow	Barnes Meadow	0	0	906
Big Beaver	Big Beaver Creek	0	486	0
Comanche	Big Beaver Creek	272	410	366
Peterson	Unnamed Creek	0	0	0
Portner	Fossil Creek	44	44	52
Seaman	N Fk Cache la Poudre	1,986	4,460	2,412
Twin Lake	Trib of Pennock Ck	0	0	0
North Gray	Boxelder Creek	144	238	134
South Gray	Boxelder Creek	470	700	420
Gray No. 3	Boxelder Creek	10	116	0
Larimer & Weld	Cache la Poudre	6,184	7,284	4,352
Worster	Sheep Creek	110	782	88
Cache la Poudre	Cache la Poudre	7,790	9,300	7,680
Windsor Lake	Cache la Poudre	1,058	1,160	0
Seeley			686	840
Clarks Lake	N Fk Cache la Poudre	690	690	870
Fossil Creek	Cache la Poudre	8,282	10,294	7,240
Halligan	N Fk Cache la Poudre	0	6,428	524
Indian Creek	N Fk Cache la Poudre	1,556	1,556	914
Joe Wright	Joe Wright Creek	0	0	0
N. Poudre No. 2	N Fk Cache la Poudre	2,586	3,362	1,696
N. Poudre No. 3	N Fk Cache la Poudre	1,275	2,188	2,374
N. Poudre No. 4	N Fk Cache la Poudre	810	773	580
N. Poudre No. 5	Cache la Poudre	6,622	6,500	6,214
N. Poudre No. 6	Cache la Poudre	4,898	4,936	6,054
N. Poudre No. 15	N Fk Cache la Poudre	4,082	4,532	4,618
Park Creek	N Fk Cache la Poudre	2,524	5,952	5,630
Black Hollow	Cache la Poudre	3,972	4,544	4,000
Chambers	Wright, Trap & Fall Cks	2,216	5,044	700
Curtis	Cache la Poudre	876	898	948
Kliver	Cache la Poudre	844	836	836
Lindenmeir	Cache la Poudre	348	612	456
Long Draw	Long Draw	206 E	742 E	210
Long Pond	Cache la Poudre	2,720	2,816	2,832
Richards	Cache la Poudre	670	704	712
Rocky Ridge	Cache la Poudre	3,124	3,928	3,322
W S & S No. 3	Cache la Poudre	3,488	4,100	3,920
W S & S No. 4	Cache la Poudre	584	662	564
Cobb	Cache la Poudre	22,220	21,980	21,020
Douglas	Cache la Poudre	6,680	7,454	6,348
Res. No. 8	Cache la Poudre	7,764	7,582	7,136
Res. No. 8 Annex	Cache la Poudre	2,734	2,658	2,468

III.

G. RESERVOIR STORAGE - DISTRICT NO. 3 (Continued)

NAME	SOURCE	AMOUNT - A.F.		
		11-1-70	5-1-71	10-31-71
Windsor Reservoir	Cache la Poudre	0	12,110	14,150
Claymore	Cache la Poudre	482	902	722
Dowdy	Pine Creek	906	822	852
Warren Lake	Cache la Poudre	1,652	1,374	1,096
Woods Lake	Cache la Poudre	2,064	2,364	2,280
Horsetooth	Colo. Big T	88,364	136,848	65,528

III.

G. RESERVOIR STORAGE DISTRICT NO. 4

NAME	SOURCE	AMOUNT - A.F.		
		11-1-70	5-1-71	10-31-71
Lone Tree	Big Thompson	7,254	8,819	7,996
Lon Hagler	Big Thompson	1,262	5,248	4,550
Mariano	Big Thompson	5,182	5,851	3,803
Lake Loveland	Big Thompson	12,153	12,153	11,820
Boyd Lake	Big Thompson	43,960	44,622	38,741
Horseshoe	Big Thompson	6,274	7,353	6,686
Welsh	Big Thompson	6,514	6,990	6,654
Rist Benson	Big Thompson	450	377	372
Geo. Rist (Buckingham)	Big Thompson	371	308	265
Fairport	Big Thompson	308	296	308
Cemetary	Big Thompson	364	369	379
Boulder-Larimer (Ish)	Little Thompson	3,264	5,168	2,705
Donath	Big Thompson	351	1,105	325
Oklahoma	Big Thompson	434	434	434
Loveland Lake	Big Thompson	1,545	1,951	1,375
Ryan Gulch	Ryan Gulch	828	863	710
South Side	Big Thompson	339	507	500
Hertha	Dry Creek	764	1,490	1,140
Lawn Lake	Roaring Fork	817	817	817
Carter	Colo. Big T	75,918	112,367	59,041

III.

G. RESERVOIR STORAGE DISTRICT NO. 5

NAME	SOURCE	AMOUNT - A.F.		
		11-1-70	5-1-71	10-31-71
Allen Lake	Left Hand	700		
Akers & Tarr	St. Vrain	550		
Arbucle No. 2	M. Fk. N. St. Vrain	944		
Arbucle No. 4	S. Fk. N. St. Vrain	420		
Ballinger	St. Vrain	6		
Baxter	St. Vrain	60		
Beaver Park	Beaver Creek	2,046		
Bellmire	St. Vrain	20		
Calkins Lake	St. Vrain	44		
Clennon	St. Vrain	45		
Clark	St. Vrain	80		
Clover Basin	St. Vrain	350		
Copeland	N. St. Vrain	50		
Crystal	St. Vrain	110		
Culver	St. Vrain	130		
Divide	St. Vrain	340		
Foothills	St. Vrain	2,225		
Genevieve	St. Vrain	50		
Gold Lake	Left Hand	280		
Hartford	Middle St. Vrain	60		
Green Lake	St. Vrain	120		
Hayden	St. Vrain	39		
Hewitt	St. Vrain	34		
Highland Lake	St. Vrain	500		
Highland No. 1	St. Vrain	874		
Highland No. 2	St. Vrain	2,398		
Highland No. 3	St. Vrain	1,184		
Hill	St. Vrain	120		
Holt	St. Vrain	150		
Ide & Starbird No. 1	St. Vrain	110		
Ide & Starbird No. 2	St. Vrain	50		
Independent	St. Vrain	120		
Isabelle	S. Fk. St. Vrain			
Kistler & Holliday	St. Vrain	5		
Knouth	St. Vrain	138		
Left Hand	Left Hand	184		
Little Gem	St. Vrain	80		
Logan	St. Vrain	28		
Lagerman	Left Hand	240		
McCall	St. Vrain	500		
McCaslin	St. Vrain	110		
McIntosh	St. Vrain	2,202		

III.

G. RESERVOIR STORAGE DISTRICT NO. 5 (Continued)

NAME	SOURCE	AMOUNT - A.F.		
		11-1-70	5-1-71	10-31-71
McKay	St. Vrain	45		
Marie	St. Vrain	150		
Marshall	St. Vrain	24		
Miantenoma	St. Vrain	100		
Minnie	St. Vrain	70		
Moeller	Walker Gulch	50		
Mulligan	St. Vrain	50		
Myron Isabell	St. Vrain	70		
Oligarchy No. 1	St. Vrain	1,640		
Parmalee	St. Vrain	40		
Pleasant Valley	St. Vrain	2,428		
Sanborn	St. Vrain	140		
Swede	Left Hand	180		
Supply No. 1	Big Cascade	296		
Thomas	St. Vrain	230		
Union	St. Vrain	12,715		
Walker	St. Vrain	50		
Zimbeck	St. Vrain	50		
Left Hand Valley	Left Hand	3,783		
Left Hand Park	Left Hand	1,496		
Button Rock	N. St. Vrain	13,398		

III.

G. RESERVOIR STORAGE DISTRICT NO. 6

NAME	SOURCE	AMOUNT - A.F.		
		11-1-70	5-1-71	10-31-71
Albion	Albion Creek	1,111	1,111	1,111
Baseline	S. & M. Boulder Creek	2,592	2,930	0
Barker	M. Boulder Creek	9,340	3,638	10,165
Ballinger Hollow	N O T A C T I V E			
Boulder	Big Thompson Project	8,918	9,304	9,074
Davis No. 1 & 2	Middle Boulder Ck	159	218	168
Elmwood	South Boulder Ck	85	0	85
Erie	South Boulder Ck	128	6	16
Glacier Summer	North Boulder Ck	228	228	189
Green Lake No. 1	North Boulder Ck	197	197	197
Green Lake No. 2	North Boulder Ck	333	333	333
Green Lake No. 3	North Boulder Ck	285	285	285
Green Lake No. 4	North Boulder Ck	88	88	88
Green Lake No. 5	North Boulder Ck	70	70	70
Goose Lake	North Boulder Ck	1,036	1,036	1,036
Great Western	Clear & Coal Cks	2,900	2,968	2,661
Gross	S. Boulder Ck & Moffat	30,555	34,374	29,927
Haden	Middle Boulder Ck	413	468	346
Hillcrest	S Bldr Ck & M Bldr Ck	1,872	1,992	1,909
Island	North Boulder Ck	334	334	334
Jasper	Middle Boulder Ck	0	326	0
Lower Boulder Ext.	Middle Boulder Ck	308	140	329
Louisville	South Boulder Creek	120	109	86
Last Chance No. 1	Coal Creek	0	0	0
Leggett	S & M Boulder Creeks	1,350	1,439	1,378
Mesa Park	Middle Boulder Ck	100	110	110
Mesa	Middle Boulder Ck	250	225	225
Marfell Lake No. 1	South Boulder Ck	79	0	10
Marfell Lake No. 2	South Boulder Ck	0	0	0
McKay	South Boulder Ck	241	674	181
Marshall	South Boulder Ck	3,998	9,510	4,054
Prince No. 1	South Boulder Ck	40	0	60
Prince No. 2	South Boulder Ck	42	83	62
Panama No. 1	Middle Boulder Creek	3,331	4,989	3,267
Smart	Coal Creek	589	705	553
Sky Scraper	Middle Boulder Creek	146	146	146
Silver Lake	North Boulder Creek	3,987	2,275	3,781
Six Mile	Middle Boulder Creek	1,008	1,088	745
Teller Lake No. 1	South Boulder Creek	11	34	6
Teller Lake No. 5	South Boulder Creek	16	16	4
Thomas	South Boulder Creek	89	0	11
Valmont	S & M Boulder Creeks	6,656	6,934	6,743
West Lake	South Boulder Creek	350	0	0
Waneka	South Boulder Creek	237	710	355

III.

G. RESERVOIR STORAGE DISTRICT NO. 7

NAME	SOURCE	AMOUNT - A.F.		
		11-1-70	5-1-71	10-31-71
Adams	Clear Creek	NO RESERVOIR		
Beardsley	" "	3	3 (June)	3
Blackham Ponds	" "			
Beaver Brook No. 1 & Enl.	N & S Beaver Brook	NO RESERVOIR		
Beaver Brook No. 2	N Beaver Brook	NO RESERVOIR		
Beaver Brook No. 3 & 4	N & S Beaver Brook	NO RESERVOIR		
Beaver Brook No. 3A	S Beaver Brook & Blue Creek		200 E (March)	
Braukman	Fall River	NO RESERVOIR		
Brewer	Clear Creek, Ralston, Van Bibber, Leyden	4	4	4
Bright View No. 2	Clear Creek	0		0
Bright View No. 1	" "	0		1
Broad	" "	10	FULL	60
Broomfield	" "	0	2	0
Brown	" "	30 (Dec)	5 (June)	0
Calkins H. D.	" "	FULL	FULL	FULL
Campbell No. 2	Ralston Creek			
Campbell No. 1 (Long Lake)	" "	987	1,580 (June)	955
Church J.M. No. 1 & 2	Clear Creek	FULL	FULL	FULL
Church's Lower	" "	230 E	210	200
Clear Reservoir	Leavenworth Ck			
Clover Knolls	Clear Creek	NO RESERVOIR		
Clover Knolls South	" "	NO RESERVOIR		
Cole	" "		90 (June)	85
Copeland	" "	130	125 (June)	130
Croke 7	" "	190	200 E (June)	200 E (June)
Croke 12	" "			
Crosley & Westfield	" "	NO RESERVOIR		
Crown Hill Cemetary	" "	NO RESERVOIR		
Currier No. 1	" "			
Currier No. 2	" "			
Davy	" "			
Dewey	" "	10	40 (June)	40
Dierks No. 1 & 2	" "		3 (June)	2
Downing	" "	FULL	FULL	FULL
Dumphy	" "	DRY - NOT USED		
East	" "	0	180	190
East Lake No. 1	" "	0	120	100
East Lake No. 2	" "	720	720	720
East Lake No. 3	" "	0	100	140

III.

G. RESERVOIR STORAGE DISTRICT NO. 7 (Continued)

NAME	SOURCE	AMOUNT - A.F.		
		11-1-70	5-1-71	10-31-71
Eppinger Reservoir	Clear Ck, Van Bibber, Ralston	NO RESERVOIR		
Erie	Clear Creek	280	280	285
Fall River Group of Reservoirs	Fall River	FULL	FULL (July)	
Fitzgerald	Clear Creek			
Funk	" "	NO RESERVOIR		
Furrer	" "	1 (Dec)	2	3
Gangl	" "			
Georgetown	Leavenworth Ck	NO RECORD		
Ginther Res. No. 1	Clear Creek			10
Ginther Res. No. 2	" "			2
Ginther Res. No. 3,4,5	" "			9
Graves No. 1, 2, 3	" "			
Green Lake	Leavenworth Ck	NO RECORD		
Guthrie No. 1	Clear Creek			
Guthrie No. 2	" "			
Hallack (East, NORTH, South)	" "			
Hansen No. 1 & 2	" "	FULL		3
Harris	" "	DRY - NOT USED		
Hartley	" "	30	54 (June)	54
Home No. 1	" "	10	65 (June)	10
Hyatt	" "	300	600 E	530
Idaho Springs Res. No. 1, 2 & 3 Enl.	Soda & Chicago Creeks	NO RECORD		
Johnson	Clear Creek	4	4	0
Joint	" "	NO RESERVOIR		
Kalsevic	" "			
Kelley	Little Dry Ck			50
Kingsbury	Clear Creek	DRY - NOT USED		
Koleski Helen	" "	FULL		FULL
Krosky	" "	0	0	0
Larson	" "	NO RESERVOIR		
Lee (Henry) North & South	" "			
Leyden	" "	680	800 E	700
Linscott	" "	0	0	0
Little Tynon	" "		0	FULL
Loch Lomond Group	Fall River			
Main	Clear Creek	830	550	360
Marshall	" "	0		0
Mayhem	Clear Ck & Seepage	FULL		FULL

III.

G. RESERVOIR STORAGE DISTRICT NO. 7 (Continued)

NAME	SOURCE	AMOUNT - A.F.		
		11-1-70	5-1-71	10-31-71
Moir Res. & Enl.	Clear Creek			
Morgan No. 1	" "	25	25	25
Morgan No. 2	" "	35	35	30
Moxley	" "	0	0	0
Myers No. 1, 2 & 3	" "	FULL	FULL	FULL
Nelson	" "			
Newlander	" "	NO RECORD		
Nissen No. 2 & Enl.	" "			160
Nissen No. 6	" "	NO RESERVOIR		
Oberon No. 1 & 2	" "	FULL	FULL	FULL
Ohio	" "			
Pavlinic	" "	NO RESERVOIR		
Plaster	" "			
Poitz & 1st Enl.	" "	50	65	60
Pomona No. 1 & 1st Enl.	" "	150	150 (July)	200
Pomona No. 2 & 1st Enl.	Dry Creek	0	0	0
Pomona No. 3	Clear Creek	NOT - USED		
Ralston	Moffat via Gross	10,343	8,277	9,332
Richards	Clear Creek	10	10	10
Robinson	" "	NO RESERVOIR		
Savory Ponds	" "	FULL		
School	" "	NO RESERVOIR		
Signal No. 1	" "	45 E	350 E	80 E
Signal No. 2	" "	200 E	200	90
Silver Lake	Silver Creek			
Smith J.B. (Horseshoe)	Clear Creek	250 E	250 E (April)	250
Smith Reservoir	" "	550 E	40 E (April)	
Soper No. 1,2,3 & 4	" "	0	3	5
Standley	" "	30,480	34,520	18,601
St. Mary's Lake	Chesapeake		FULL (June)	
Stonehouse	Clear Creek	NO RESERVOIR		
Storm	Clear Creek	NOT - USED		
Talbot	" "	30 E	30 E	18 E
Timm	" "			1
Tom Frost	" "	NO RECORD		
Tucker	Ralston	218	613	333
Union No. 1 & 2	Clear Creek			
Vogel Ponds	" "	FULL		
Wadley No. 1	" "	0	30	0
Wadley No. 2	" "	0	0	0
Wadley No. 3	" "	110	30	75
Ward No. 1 & Enl.	" "	FULL		
Watts No. 1	" "	9		1

III.

G. RESERVOIR STORAGE DISTRICT NO. 7 (Continued)

NAME	SOURCE	AMOUNT - A.F.		
		11-1-70	5-1-71	10-31-71
Watts Reservoir No. 2	Clear Creek			3
Webster Res. & Enl.	" "	FULL		FULL
Wesley Chapel	Clear Ck, Ralston Van Bibber	NO RESERVOIR		
Westminister Orchards	Clear Creek	NO RESERVOIR		
Wiesel Reservoir	" "	27		15
Zang Res. No. 1 & 2	" "	NO RESERVOIRS		

III.

G. RESERVOIR STORAGE DISTRICT NO. 8

NAME	SOURCE	AMOUNT - A.F.		
		11-1-70	5-1-71	10-31-71
Allis Reservoir	Carpenter Creek		22.5	5
Aurora Rampart	South Platte	1,261	1,261	984
Baird	Russellville Gulch	0	0	0
Cherry Creek	Cherry Creek	14,242	14,762	13,404
Derby	No. Colo. Highline (South Platte)			
Fairview & Enl.	Deer Creek		160 (June)	
Fairview No. 2	Deer Creek		125 (June)	
Greenwood	No. Colo. Highline (South Platte)			
Haystack	W. Branch W. Plum			
Lambert	Willow Creek			
Linhart No. 2	Seep & Palmer Gulch			
Lininger	Beaver Creek	673	673	673
Mann	Deer Creek	FEEDER WASHED OUT 1969		
Marston	South Platte	15,221	16,958	17,054
McLellen	South Platte	5,254	5,146	5,452
Platte Canon	South Platte	782	911	925
Tinker & Shaffer & Enl.	Gulch	61	61 (June)	0
Wakeman & Enl.	Willow Creek	121	90	90
Waucundah	Bear Springs Creek	43	185	136
Mitchell	Mitchell Gulch			

DISTRICT NO. 23 - 8

Altura R. (Duck)	Geneva		564 (July)	0
Cheesman	S. FK. South Platte	78,160	76,922	79,257
Wellington	Buffalo Creek	4,400	4,400	2,450

III.

G. RESERVOIR STORAGE DISTRICT NO. 9

NAME	SOURCE	AMOUNT - A.F.		
		11-1-70	5-1-71	10-31-71
Harwood	Turkey Creek	75 E	230 E	105 E
Kendrick	Bear Creek	125 E	100 E	70 E
Bergen No. 1 (East)	Turkey Creek	75	460	180
Bergen No. 2 (West)	" "	450	800	30
Carmody	Bear Creek	0	0	0
Johnston	" "	500	560	450
Bowles	" "	1,700	2,100	1,760
Ward	" "	900 E	850 E	700 E
Deane	Turkey Creek	315	480	85
Harriman	Bear Creek	500	550	515
Henry Lake	" "	160	160	185
Grant A (West)	" "	70	70	35
Grant B (South)	" "	125	125	80
Grant C (East)	" "	65	65	45
Patrick	" "	750	900	850
Tule No.1 (Upper)	South Platte	65	80	60
Tule No. 2 (Lower)	South Platte	90	90	75
Soda No. 1 (West)	Bear Creek	240	240	200
Soda No. 2 (East)	" "	1,450	1,500	1,210

III.

G. RESERVOIR STORAGE DISTRICT NO. 23

NAME	SOURCE	AMOUNT - A.F.		
		11-1-70	5-1-71	10-31-71
Antero	So. Fk. South Platte	15,469		
Eleven Mile	" " " "	96,574		
Jefferson	Jefferson Creek	NO STAFF	GAGE	
Montgomery	Md. Fk. South Platte and Hoosier Tunnel	4,750		
Tarryall	Tarryall Creek	2,250		

III.

G. RESERVOIR STORAGE DISTRICT NO. 64

NAME	SOURCE	AMOUNT - A.F.		
		11-1-70	5-1-71	10-31-71
Julesburg R.	South Platte	19,794	23,257	19,794
North Sterling	" "	21,290	69,200	33,740
Prewitt	" "	26,990	29,060	28,250

IV.

AGRICULTURE

As has been previously mentioned in this report, agriculture, which is quite diversified in Division 1, enjoyed a relatively good year as far as production is concerned. The weather and generally adequate water supply combined in a manner to promote good growing conditions. The major adversity encountered in crop production was the mid-September snowfall and accompanying freeze which reduced the corn harvest in quantity and quality for both grain and ensilage approximately 30 percent. The sudden freeze also tended to set the sugar content in the immature beet crop with resulting low tests upon delivery. Normally the sugar content increases as the crop matures with the latest delivery beets showing the best tests. On the average, beet tonnage was very good but sugar content was low.

The pinto bean crop was good and the harvest was virtually complete before the above mentioned storm.

Much of the third cutting of hay was flattened in the snow affected area. Most of the hay was later salvaged with an approximate 40 percent loss in value.

No final production figures are available for the '71 season. The accompanying tabulations for the 1969 crop, taken from the Colorado Agricultural Statistics Bulletin 1-71 are the latest production figures available and are indicative of the agricultural capabilities of this Division.

CORN FOR GRAIN

1969 FINAL

1970 PRELIMINARY

NON IRRIGATED

IRRIGATED

COUNTY	IRRIGATED			NON IRRIGATED			TOTAL VALUE x \$1000	ACRES	BUSHELLS x 1000	VALUE x \$1000
	ACRES	YIELD bu/acre	VALUE x \$1000	ACRES	YIELD bu/acre	VALUE x \$1000				
Adams	6200	101	763.0	1100	22	30.5	793.5	6300	706.3	834.0
Arapahoe	200	75	18.1				18.1	400	38.4	45.3
Boulder	3000	91	324.9				324.9	3800	402.8	475.0
Cheyenne	1600	115	204.0	120	28	3.6	207.6	3900	364.0	429.0
Clear Creek										
Denver										
Douglas				180	20	4.3	4.3			
Elbert	140	95	15.7	280	18	6.0	21.7	69	6.9	8.1
Gilpin										
Jefferson	200	108	25.3				25.3			
Kit Carson	30000	100	3437.8	300	24	8.3	3446.1	28200	2755.2	3245.0
Larimer	6800	99	794.4	100	20	2.4	796.8	3900	405.6	478.0
Lincoln	106	96	6.2	32	20	6.6	12.8	240	21.5	25.4
Logan	17300	98	1985.5	1500	27	45.4	2030.9	23900	2205.4	2600.0
Morgan	44700	104	5532.1				5532.1	48400	5348.3	6310.0
Park										
Phillips	6500	103	763.5	7550	22	191.1	954.6	10900	661.0	729.0
Sedgwick	5700	115	753.8	1400	29	46.7	800.5	7900	650.8	767.8
Teller										
Washington	4700	95	518.0	1700	10	19.7	537.7	9900	991.8	1170.0
Weld	52800	101	6428.3	500	23	13.8	6442.1	62100	6807.0	803.5
Yuma	34700	102	4199.3	4900	19	108.1	4307.4	38700	3706.7	4370.0
TOTALS	214146		25769.9	19662		486.5	26256.4	248609	25071.7	22290.1

BARLEY

1969 FINAL

1970 PRELIMINARY

NON IRRIGATED

IRRIGATED

COUNTY	IRRIGATED			NON IRRIGATED			TOTAL VALUE x \$1000	ACRES	BUSHELS x 1000	VALUE x \$1000
	ACRES	YIELD bu/acre	VALUE x \$1000	ACRES	YIELD bu/acre	VALUE x \$1000				
Adams	4700	43	181.8	40300	21	756.9	938.7	48000	1773.8	1665.6
Arapahoe	60	30	1.5	8340	12	89.2	90.7	8100	245.3	230.3
Boulder	6900	52	333.6	3600	42	140.6	474.2	9100	479.8	450.5
Cheyenne	32	35	1.0	359	14	4.7	5.7	780	19.1	17.9
Clear Creek										
Denver										
Douglas	50	35	1.6	1450	29	37.8	39.4	900	26.1	24.5
Elbert	35	43	1.5	2160	25	53.8	55.3	5520	166.3	156.1
Gilpin										
Jefferson	400	46	16.4	800	40	28.5	44.9	1400	56.8	53.3
Kit Carson	210	47	8.7	1990	14	24.5	33.2	4400	109.3	102.6
Larimer	11800	65	719.1	6700	37	232.5	951.6	18500	993.6	933.0
Lincoln	13	35	0.8	225	21	4.0	4.8	636	16.6	15.6
Logan	1600	54	76.6	2300	38	79.8	156.4	3900	167.4	157.2
Morgan	2300	65	137.9	2600	24	59.2	197.1	4200	212.4	199.4
Park										
Phillips	60	36	1.9	1540	20	26.5	28.4	2000	95.7	89.7
Sedgwick				1000	20	18.0	18.0	400	16.0	15.0
Teller										
Washington	600	36	21.8	7400	17	124.1	145.9	9600	349.1	327.8
Weld	21500	60	1225.5	27500	26	683.4	1908.9	44500	2200.0	2065.8
Yuma	40	36	1.4	2060	21	42.0	43.4	3200	84.9	79.7
TOTALS	50300		2731.1	110324		2405.5	5136.6	165136	7012.2	6584.0

WINTER WHEAT

1969 FINAL

1970 PRELIMINARY

NON IRRIGATED

IRRIGATED

COUNTY	IRRIGATED			NON IRRIGATED			TOTAL VALUE x \$1000	ACRES	BUSHELLS x 1000	VALUE x \$1000
	ACRES	YIELD bu/acre	VALUE x \$1000	ACRES	YIELD bu/acre	VALUE x \$1000				
Adams	2500	32	88.2	109500	20	2408.8	2497.0	139500.	4496.5	5075.0
Arapahoe	200	24	4.9	54800	17	1043.9	1048.8	58000.	1800.2	2032.0
Boulder	1600	28	48.8	5400	20	117.8	166.6	6300.	224.0	253.2
Cheyenne	1170	32	43.8	42500	17	846.2	890.0	4370.	925.0	
Clear Creek										
Denver	800	26	22.6	7200	22	172.7	195.3	320.	10.2	11.5
Douglas	69	34	2.6	38200	21	874.9	877.5	47650.	914.5	
Elbert										
Gilpin	900	32	31.7	6600	29	210.5	242.2	7400.	251.2	284.0
Jefferson	2200	34	85.9	174800	15	3015.4	3101.3	185000.	4323.0	4881.0
Kit carson	700	27	19.6	35300	25	990.0	1009.6	44000.	1464.0	1655.0
Larimer	26	33	1.0	25420	16	464.0	465.0	26500.	555.0	627.0
Lincoln	1200	38	50.5	132300	25	3628.9	3679.4	119000.	4375.7	4945.0
Logan	8500	39	376.0	41500	21	1002.5	1378.5	49300.	1836.1	2075.0
Morgan										
Park										
Phillips	1200	35	47.5	125800	29	3939.2	3986.7	118000.	4494.0	5070.0
Sedgwick	1000	36	40.3	74000	34	2817.9	2858.2	60000.	2344.0	2651.0
Teller										
Washington	10500	35	412.6	214000	17	4147.5	4560.1	222000.	6804.4	7695.0
Weld	7100	35	279.0	173900	21	4095.6	4374.6	197000.	5818.0	6570.0
Yuma	2000	35	78.1	134500	19	2849.6	2927.7	140000.	4647.0	5246.0
TOTALS	41665		1633.1	1395720		32625.4	34258.5	1424340.	45282.8	49070.7

SPRING WHEAT

1969 FINAL

IRRIGATED

NON IRRIGATED

COUNTY	IRRIGATED			NON IRRIGATED			TOTAL VALUE x \$1000
	ACRES	YIELD bu/acre	VALUE x \$1000	ACRES	YIELD bu/acre	VALUE x \$1000	
Adams	500	26	14.5	2500	13	36.1	50.6
Arapahoe				70	13	1.0	1.0
Boulder	80	24	2.1	380	20	8.4	10.5
Cheyenne				820	18	17.0	17.0
Clear Creek							
Denver				40	12	0.5	0.5
Douglas				100	10	1.0	1.0
Elbert							
Gilpin							
Jefferson	20	28	0.6	360	18	7.2	7.8
Kit Carson	80	27	2.4	470	10	5.3	7.7
Larimer	350	22	8.6	500	19	10.7	19.3
Lincoln				150	9	0.4	0.4
Logan	20	30	0.7	470	23	12.0	12.7
Morgan	130	33	33.3	20	12	2.7	36.0
Park							
Phillips	240	28	7.4	2260	14	34.8	42.2
Sedgwick				70	16	1.2	1.2
Teller							
Washington	110	28	3.4				3.4
Weld	600	33	22.2	1700	16	30.7	52.9
Yuma	70	28	2.2	630	15	10.4	12.6
TOTALS	2900		97.4	10530		179.4	276.8

DRY BEANS

1969 FINAL

1970 PRELIMINARY

NON IRRIGATED

IRRIGATED

COUNTY	IRRIGATED			NON IRRIGATED			TOTAL VALUE x \$1000	ACRES	BUSHELLS x 1000	VALUE x \$1000
	ACRES	YIELD lbs/acre	VALUE x \$1000	ACRES	YIELD lbs/acre	VALUE x \$1000				
Adams	1000	1400	130.2				130.2	1500	21.0	197.4
Arapahoe										
Boulder	1900	2000						1900	30.4	285.8
Cheyenne	110	1400	14.3	10	250	0.2	14.5	120	1.6	15.0
Clear Creek										
Denver										
Douglas										
Elbert				180	340	5.5	5.5	280	3.9	36.7
Gilpin										
Jefferson										
Kit Carson	4220	1350	530.0	480	310	14.0	544.0	8000	109.7	1031.2
Larimer	4900	1725	794.3				794.3	4500	79.8	750.1
Lincoln	15	1475	1.8	25	300	0.8	2.6	50	0.1	0.9
Logan	4350	1775	725.7	50	500	2.3	728.0	4600	77.1	724.7
Morgan	11600	1850	2017.2				2017.2	11000	180.4	1695.8
Park										
Phillips	4750	1523	673.0	600	300	16.7	689.7	8800	142.6	1340.4
Sedgwick	4950	1900	884.5	150	600	8.5	893.0	6500	101.3	952.2
Teller										
Washington	850	1600	126.5	150	450	6.3	132.8	2000	35.0	329.0
Weld	23400	1847	4062.6	100	500	4.7	4067.3	25000	415.0	3901.0
Yuma	2650	1450	358.1	850	400	31.6	389.7	6000	98.2	923.1
TOTALS	64695		10318.2	2595		90.6	10408.8	80250	1305.1	12183.3

SUGAR BEETS

1969 FINAL

1970 PRELIMINARY

COUNTY	1969 FINAL		1970 PRELIMINARY		
	ACRES	YIELD TONS/ACRE	VALUE x \$1000	TOTAL TONS x 1000	VALUE x \$1000
Adams	2400	17.4	351.1	37.9	330.3
Arapahoe	80	16.3	10.9	1.1	9.9
Boulder	3100	17.6	457.0	35.2	307.2
Cheyenne	320	17.3	48.2	4.3	3.7
Clear Creek					
Denver					
Douglas					
Elbert					
Gilpin					
Jefferson					
Kit Carson	21300	17.4	3118.9	351.2	3060.4
Larimer	9300	19.4	1508.3	111.9	975.1
Lincoln					
Logan	12220	17.9	1823.8	167.4	1459.1
Morgan	18150	18.6	2827.4	236.6	2061.7
Park					
Phillips	10300	13.4	1159.2	100.8	878.5
Sedgwick	4750	16.2	643.6	64.4	560.7
Teller					
Washington	2210	13.3	247.0	27.0	87.1
Weld	57700	19.1	9230.9	772.4	6730.3
Yuma	15700	14.8	1952.2	205.4	1789.7
TOTALS	157530		23378.5	2115.6	18253.7

1969 FINAL

HAY

CORN SILAGE

POTATOES

COUNTY	ACRES	YIELD cwt/acre	VALUE x \$1000	ACRES	YIELD tons/acre	VALUE x \$1000	ACRES	TONS	VALUE x \$1000
Adams	10	210	4.4	7200	18.0	1124.9	31700	75920	1917.7
Arapahoe				1050	14.0	127.6	5200	8130	205.4
Boulder	10	200	4.2	7940	13.7	968.1	29500	69900	1769.9
Cheyenne				1170	14.0	142.1	6350	6150	155.0
Clear Creek							150	210	5.6
Denver				1690	16.0	234.7	19500	39470	997.0
Douglas				2520	14.0	306.0	21000	27120	685.0
Elbert				770	16.7	114.4	570	810	21.6
Gilpin				11700	18.6	1887.1	11000	18800	476.0
Jefferson				22760	16.6	3362.6	37400	65280	1649.0
Kit Carson	50	200	21.0	390	10.0	34.1	56100	150940	3821.8
Larimer	3	200	1.1	14020	15.2	1896.6	5540	6200	157.0
Lincoln	70	190	27.9	17230	15.7	2407.5	64200	138520	3507.3
Logan							37700	53920	1317.8
Morgan	3900	230	1883.7				19900	19600	524.0
Park				1650	11.0	157.5	11800	24620	621.9
Phillips	30	250	15.0	4360	19.2	745.0	11300	24970	632.2
Sedgwick	70	205	30.1				1160	2020	54.0
Teller				4280	14.0	520.1	37800	48270	1219.3
Washington	30	230	14.5	80420	17.3	12389.9	147200	377240	9556.0
Weld	6200	216	2806.0	6000	18.0	937.9	41500	76550	1931.7
Yuma	800	305	512.4						
TOTALS	11173		5320.3	185150		27356.1	596570	1234640	31225.2

OATS

1969 FINAL

NON IRRIGATED

IRRIGATED

COUNTY	IRRIGATED			NON IRRIGATED			TOTAL VALUE x \$1000
	ACRES	YIELD bu/acre	VALUE x \$1000	ACRES	YIELD bu/acre	VALUE x \$1000	
Adams	1300	43	37.9	4000	36	97.9	135.8
Arapahoe	150	45	4.9	950	42	29.1	34.0
Boulder	1400	64	61.8	100	27	1.9	63.7
Cheyenne							
Clear Creek							
Denver							
Douglas	50	38	1.4	950	22	15.2	16.6
Elbert	140	45	4.5	1920	23	31.9	36.4
Gilpin							
Jefferson	200	40	5.5	600	37	15.3	20.8
Kit Carson	200	35	4.5	1600	33	33.8	38.3
Larimer	1400	70	63.7	500	25	8.1	71.8
Lincoln				110	25	2.0	2.0
Logan	1600	54	61.4	5400	27	103.5	164.9
Morgan	1800	80	96.5	700	18	8.4	104.9
Park							
Phillips	400	38	9.0	5600	39	129.0	138.0
Sedgwick	200	60	7.8	5600	48	174.7	182.5
Teller							
Washington	700	39	16.1	2700	27	43.0	59.1
Weld	3900	60	160.3	6600	35	159.3	319.6
Yuma	850	32	18.5	1850	24	30.2	48.7
TOTALS	14290		553.8	39180		883.3	1437.1

SORGHUMS FOR GRAIN

1969 FINAL

IRRIGATED

NON IRRIGATED

1970 PRELIMINARY

COUNTY	IRRIGATED			NON IRRIGATED			TOTAL VALUE x \$1000	ACRES	BUSHEL x 1000	VALUE x \$1000
	ACRES	YIELD bu/acre	VALUE x \$1000	ACRES	YIELD bu/acre	VALUE x \$1000				
Adams	800	69	61.3	400	14	6.2	67.5	750	30.0	33.3
Arapahoe				700	15	11.4	11.4	600	21.3	23.2
Boulder	100	68	7.6				7.6	50	2.2	2.5
Cheyenne	200	63	12.5	2930	20	59.7	72.2	4485	124.5	127.0
Clear Creek										
Denver				200	15	3.3	3.3	100	2.4	2.6
Douglas				420	22	10.3	20.7	240	8.4	9.5
Elbert	140	67	10.4							
Gilpin										
Jefferson										
Kit Carson	800	66	52.8	5200	20	104.0	156.8	10500	260.4	260.4
Larimer	100	60	6.7				6.7	450	12.7	14.2
Lincoln	50	67	3.9	1750	14	27.2	31.1	1850	38.6	42.8
Logan	150	68	11.2	700	28	21.6	32.8	300	7.7	8.5
Morgan	950	69	70.5	1250	27	36.3	106.8	1900	51.4	55.5
Park										
Phillips	300	67	20.7	4000	26	107.1	127.8	2500	67.9	69.9
Sedgwick	150	68	11.0	800	35	30.3	41.3	1150	35.1	37.9
Teller										
Washington	300	68	20.8	2200	18	40.4	61.2	2300	53.9	55.0
Weld	50	71	4.0	1250	15	21.0	25.0	650	19.8	22.2
Yuma	1400	67	99.9	21600	21	480.8	580.7	27500	751.0	796.1
TOTALS			393.3			959.6	1352.9	55325	1487.3	1560.6

V. COMPACTS AND COURT STIPULATIONS

The South Platte River Compact, Colorado and Nebraska being the signatory states, specifies that the flow of the river at the state line between April 1st and October 15th of each year shall be at least 120 cfs. Otherwise, diversions below the Washington-Morgan County Line, junior to June 14, 1897, will be curtailed sufficiently to provide said 120 cfs or such portion thereof as might be produced by suspending those diversions.

The flow did fall below 120 cfs in 1971 for a period of about ten weeks (July 7th to September 14th). The most junior ditch diverting during this period was the Harmony No. 1 with an appropriation date of April 28, 1895.

The Republican River Compact allocates water to the signatory states, Colorado, Kansas and Nebraska, on the basis of beneficial consumptive use. Colorado's total allocation of 54,100 acre-feet is broken down as follows:

North Fork of the Republican River Drainage Basin	10,000 acre-feet
Arikaree River Drainage Basin	15,400 acre-feet
South Fork of the Republican River Drainage Basin	25,000 acre-feet
Beaver Creek Drainage Basin	3,300 acre-feet
and IN addition, for beneficial consumptive use in Colorado, annually, the entire water supply of the Frenchman Creek (River) Drainage Basin in Colorado and the Red Willow Creek Drainage Basin in Colorado.	

The 1970 Water Year figures are as follows:

North Fork of Republican River	7,210 acre-feet
South Fork of Republican River	4,671 acre-feet
Arikaree	0
Beaver Creek	0

Figures for the 1971 Water Year are not available at this time.

The Laramie River Agreement presented no difficulties this year. It was a very high runoff year with some minor flooding encountered. The decree of the United States Supreme Court, in the case of Wyoming vs. Colorado, limits Colorado allocations to 49,375 acre-feet per calendar year. Of this amount 19,875 acre-feet is allocated to the Transmountain Users. The Meadowland Users are entitled to the remaining 29,500 acre-feet, with the restriction that not more than 1,800 acre-feet shall be diverted after July 31 in any calendar year. The Meadowland Users are also entitled to use any Non-diverted Transmountain Water.

In 1971 the Meadowland Users diverted a total of 21,217 acre feet. The Transmountain Users diverted a total of 16,208 acre feet.

VI.

A. DAMS

The Dams and Reservoir Section has made routine inspections on most of the dams in the Division which are over 10 feet in height. Where problems or inadequacies are found, the owners have been notified of the required repairs or maintenance. If dangerous conditions exist, limitations are placed on the depth of storage.

The structure causing the greatest concern again this year was Standley Reservoir in Water District 2. The dam has shown some signs of distress in past years and the storage has been limited to various depths ranging from 83 to 92 feet. In December of 1970, high winds caused erosion and settling of riprap on the upstream face and the owners were ordered to lower the water to a level of 77 feet above the outlet tube, submit plans and specifications for the repair and make such repairs before more water could be stored. The owners complied with these orders and the restriction was lifted to a level of 85.75 on December 16, 1970. On June 17, 1971, inspection revealed further movement in the dam structure, the most serious being revealed by horizontal movement and shearing approximately 75 feet out from the downstream toe. No further filling of the reservoir will be permitted until approved repairs are made.

In December of 1970 the Baseline Reservoir in Water District 6 revealed some settlement and slipping in the embankment. The storage level was restricted to a gage height of 25 feet until approved repairs were made. Plans and specifications for such repairs have later been approved and it is expected that such repairs will be completed prior to the spring of 1972.

Also in District 6 the widening of the spillway to 125 feet on Barker Reservoir Dam has been completed and approved.

In Water District 23-8 the City of Denver is presently making major repairs in the outlet works of Cheesman Reservoir. New steel liners are being grouted in place within the outlet tunnels. New control valves will be installed at the downstream end of these conduits. The placement of these valves is necessitated by the fact that the reservoir must be kept full during the repair process to discharge over the spillway that water required by downstream users.

Many orders have been issued during the year for repair and maintenance work of a more minor nature than those above mentioned. Most of these are concerned with small reservoirs and lakes. Due to personnel limitations in past years, these small structures have received inadequate inspection and consequently poor maintenance. The expansion and increased staffing of the Dams and Reservoir Section has fortunately helped alleviate this problem. With the increase in structures being built, there will undoubtedly be an ever growing number of problems with dams and reservoirs.

VI.

B. LIVESTOCK WATER TANKS

The total number of livestock water tanks approved between November 1, 1970 and October 31, 1971 are presented below in tabular form by water district:

<u>DISTRICT</u>	<u>NO. OF TANKS</u>	<u>TOTAL CAPACITY (A.F.)</u>
1	28	149.4
2		
3	2	10.0
4	4	4.0
5	5	11.0
6		
7		
8	2	3.5
9		
23	5	19.5
48		
49	8	31.9
64	3	7.0
65	5	18.0
	<u>62</u>	<u>254.3</u>

Most all of these sites were investigated by the local water commissioners who then submitted their recommendations prior to approval of the applications. The most common problem effecting such approval was whether a gated outlet pipe was necessary to prevent downstream injury and if so determining the proper size and placement.

A reasonable question has been raised, particularly in Water District No. 3, as to the inclusion or requirements for outlet controls in livestock water structures. With such a facility the owners could easily release captured water for their own irrigation uses and thus make a series of fills annually with the attendant unlawful but extended uses. The large number and location of these livestock water tanks preclude close surveillance of their operation by the water commissioners.

At the present time these structures are seldom visited or inspected after their construction unless a particular complaint or problem arises.

VII. WATER RIGHTS

A. TABULATION

We would like to compliment the Engineering Records and Decrees Section for keeping us informed and up-to-date on tabulation policy. They have also been prompt in getting answers for us on questions which take some research. We will be working diligently to meet the April 30, 1972 deadline for the tabulation corrections.

B. REFEREE'S FINDINGS AND DECREES

First, we will list all applications received by the Water Court under Senate Bill 81 through October 31, 1971.

(1) Underground Water Right (Total Wells)	2658
(2) Change of Water Right	40
(3) Plan For Augmentation (Alternate Point of Diversion)	58
(4) Water Right	322
(5) Diligence (Conditional Decrees)	25
(6) Water Storage Right	165

We also have the total number of decrees and rights issued by the Water Court through December 31, 1971. Two figures are shown due to the fact that several structures may be shown on one decree. The total figures are:

Rights	1086
Decrees	549

For a more complete breakdown of these figures see page 54.

There has been considerable reluctance on the part of the water users to involve their wells in plans of augmentation or as alternate points of diversion. Most are waiting for a precedent setting case that will indicate what kind of decree they might expect. It is felt that much of the reluctance stems from the fact that the Statutes do not make it clear what will be allowed. The term "alternate point of diversion" is used in the definition of both "change of water right" and "plan of augmentation." This is found in subsections 11 and 12 of 148-21-3, Colorado Revised Statutes. The intent of the Statute was to make the present law more flexible by encouraging various water supply plans.

Some of the various plans which have been suggested are:

1. Exchange - obtain water from any source available, deliver it to the river, then pump an equal amount without injury to the stream system.

VII. WATER RIGHTS (Continued)

2. Artificial Recharge - run excess water into facility whereby it can be introduced into the alluvial aquifer; keep track of this amount of water and pump it during the irrigation season without injury to the stream system.
3. Salvage water - put battery of wells or system of drainage ditches in swamp or area of high water table and deliver water to stream. The water saved from evaporation or transpiration could then be appropriated directly or put in the stream and pumped elsewhere.
4. Senior Ditch water - junior water users could go together to install wells to supply senior ditch rights or pay senior ditch owners with wells to pump their water.

These plans and others could be used to more efficiently utilize underground water in conjunction with surface supplies. It is not felt that these plans can work as small independent projects, but must be part of a well organized basin wide plan. If attempts are made on a smaller scale than this, it is inevitable that conflicts will arise between water users in various plans. Also, competition for available supplies will tend to drive the price clear beyond reason.

Needless to say, with all of this concern and uncertainty the response to alternative plans involving wells has been considerably less than overwhelming. The Water Court reports plans involving 58 wells as alternate points of diversion had been filed through December 31, 1971, but none had been decreed. The vast majority were filed claiming their appropriation date only.

Due to the large number of decrees coming out of the Water Court and ever expanding duties of the Division Engineer, it has not been possible to look into the decrees in much detail. With the present staff, it will not be possible to administer the wells, unless they are administered strictly according to the priority system and the complete cooperation of the water users is obtained.

Another type of decree which will be difficult if not impossible to administer is the gravel pit storage decree. Gravel pits are normally directly adjacent to a stream and the water level in them fluctuates with the level in the stream. It is very difficult to distinguish water which has been legally stored from water which seeps in during a time when there is a call on the river.

WATER DIVISION ONE
 DECREES ENTERED THRU 12-31-71

	1970	1971
DITCHES:		
Decreases	6	27
Rights	6	40
PIPELINES:		
Decreases	7	9
Rights	8	14
SPRINGS:		
Decreases	9	29
Rights	15	88
SUMPS:		
Decreases	2	4
Rights	4	6
MINE WATER:		
Decreases	3	1
Rights	3	1
MISCELLANEOUS SURFACE:		
Decreases	1	15
Rights	1	21
STORAGE:		
Decreases	8	33
Rights	8	60
CHANGE OF WATER RIGHTS:		
Involving Ditch Rights		
Decreases	3	7
Rights	3	7
Involving Storage Rights		
Decreases	3	
Rights	3	
BIENNIALS:		
Involving Ditches		
Decreases	1	
Rights	2	
Involving Reservoirs		
Decreases	20	
Rights	21	
Involving Other Rights		
Decreases	2	1
Rights	3	1
WELLS:		
Decreases	13	345
Rights	14	757

VIII.

A. ORGANIZATIONS

CONSERVANCY DISTRICTS

Upper South Platte Water Conservancy District	James Settele	Pres.	Fairplay
Central Colorado Water Conservancy District	David J. Miller	Attorney	1004 9th Avenue Greeley
Northern Colorado Water Conservancy District	J. R. Barkley	Manager	P.O. Box 679 Loveland
Lower South Platte Water Conservancy District	Eric Wendt	Secretary- Treasurer	P.O. Box 1725 Sterling
St. Vrain & Left Hand Water Conservancy District	David J. Miller	Attorney	1004 9th Avenue Greeley

VIII.

B. ORGANIZATIONS

WATER DISTRICT NO. I

DITCH AND RESERVOIR COMPANIES

A. A. Smith Irrigating Canal Reservoir, Milling & Pipeline Company	Dick Mitchell	Pres.	Snyder
Beaver Creek Ditch Company	Robert Hansen	Secy.	Rt. 1 Brush
Beaver Ditch Company	Charles Henry	Pres.	Brush
Bijou Irrigation Company	John Samples	Secy.	104 West Beaver Fort Morgan
Bijou Irrigation District	John Samples	Secy.	104 West Beaver Fort Morgan
Corona Ditch Company	R. L. Twist	Owner	Masters
Duell and Snyder	E. L. Caneva	Pres.	Rt. 1 Fort Morgan
Fort Morgan Canal Company	Edward Heidbrink	Secy.	111 East Railroad Ave Fort Morgan
Gill & Stevens Ditch Company	Harold Hansen	Pres.	Rt. 1 Brush
Hillrose Irrigation District	F. L. Gill	Secy.	Hillrose
Hoover Ditch Company	Wally Roth	Pres.	Kersey
Iliiff Irrigation District	Adam Koelher	Secy.	Sterling
Illinois Ditch Company	George Allard	Pres.	Kersey
Jackson Lake Reservoir Company	Edward Heidbrink	Secy.	111 East Railroad Ave. Fort Morgan
Johnson & Edwards Ditch Company	William Tramp	Pres.	Hillrose
Lower Platte & Beaver Irrigation Company	F. L. Gill	Secy.	Hillrose
Logan Irrigation District	John Elsenach	Pres.	Sterling
Morgan, Prewitt Reservoir Co.	John Samples	Secy.	104 West Beaver Fort Morgan
North Sterling Irrigation District	Alec Michel	Supt.	Poote Building Sterling
Putnam Ditch Company	Harlan Snider	Pres.	Masters
Riverside Irrigation Company	Cecil Osborne	Supt.	Box 455 Fort Morgan
Riverside Irrigation District	Cecil Osborne	Supt.	Box 455 Fort Morgan
Snyder Ditch & Reservoir Company	Gene Peterson	Pres.	Snyder
Tetsel Ditch Company	Major Gilfrey	Pres.	Snyder
Trowell Ditch Company	Willis Elson	Pres.	Hillrose
Upper Platte & Beaver Canal Co.	Keith Lindell	Secy.	First National Bank Brush
Union Ditch Company	B. B. Peterson	Pres.	Snyder
Weldon Valley Ditch Company	Don Christensen	Pres.	Weldona

WATER DISTRICT NO. 2

DITCH AND RESERVOIR COMPANIES

Big Dry Creek Ditch & Reservoir CO.	Mrs. G. R. Norden	Secy.	Rt. 1 Ft. Lupton
Burlington Ditch Reservoir & Land Co.	Joseph Zajonckowski	Supt.	Brighton
Brighton Ditch Company	George Stieber	Pres.	Rt. 1 Box 104 Ft. Lupton
Coal Ridge Ditch Company	George Gerhardt	Pres.	Ft. Lupton
Delta Ditch Company	Robert Davis	Pres.	712 10th Street Greeley
Denver Water Board	James Ogilvie	Manager	144 W. Colfax Denver
Farmers Independent Ditch Co.	John Henderson	Secy.	1st National Bank Greeley
Farmers Reservoir & Irrigation Co.	Mel Sarchet	Pres.	Hudson
Fulton Ditch Company	W. W. Gaunt	Secy.	25 South 4th Avenue Brighton
Gardners Ditch Company	Sollie James	Pres.	6610 York Denver
German Ditch Company	Albert Sack	Pres.	Brighton
Godfrey Ditch Company	Jerome Loeffler	Pres.	La Salle
Henrylyn Irrigation District	Ralph Rouse	Manager	Box 141 Hudson
Highland Ditch Company	Mary Nix	Secy.	P.O. Box 15 Lucerne
Little Burlington Ditch Company	Mell Sarchet	Pres.	Hudson
Lower Latham Ditch Company	Victor R. Klein	Pres.	Kersey
Lupton Bottom Ditch Company	Ray Sarchet	Pres.	Ft. Lupton
McCanne Ditch & Reservoir Co.	John Stewart	Secy.	Great Western Sugar C Brighton
Meadow Island Irrigation Co.	Wm. Mayer	Secy.	Rt. 2 Box 74 Platteville
Meadow Island No. 2 Irrigation Co.	Ruben Gustafson	Secy.	Rt. 2 Box 145 Ft. Lupton
New Brantner Ditch Company	W. W. Gaunt	Secy.	25 South 4th Avenue Brighton
North Star Reservoir Company	G. R. Norden	Pres.	Rt. 1 Ft. Lupton
Platte Valley Irrigation Company	Delbert Shable	Pres.	Platteville
Platteville Irr. & Milling Co.	John Kunzman	Secy.	Rt. 2 Box 120 Ft. Lupton
Slate Ditch Company	George Breikler	Pres.	Ft. Lupton
Union Ditch Company	Mrs. Frances Hill	Secy.	LaSalle
Walter & Roberts Ditch Company	Roy Lunvall	Pres.	Greeley
Western Mutual Ditch Company	Ed. Fritzler	Pres.	LaSalle
Wellington Reservoir Company	Bernice McConnell	Secy.	301 S. Main Brighton
Thompson Ditch Company	G. R. Norden	Secy.	Rt. 1 Box 196 Ft. Lupton

WATER DISTRICT NO. 3

DITCH AND RESERVOIR COMPANIES

Arthur Irrigation Company	Ronald Strahle	Secy.	1st National Bank Bldg. Ft. Collins
B. H. Eaton Ditch Company	Mrs. Carol Schelowitz	Secy.	Rt. 2 Box 311 Greeley
Boxelder Ditch Company	Wm. Stover	Secy.	Poudre Valley National Bank Building Greeley
Boyd Irrigation Company	Rodger Houtchens	Secy.	1007 9th Avenue Greeley
Cache la Poudre Irrigation Co.	Cecil Elliott	Pres.	Ft. Collins
Divide Canal & Reservoir Co.	Don E. Engel	Secy.	106 Elm Eaton
Dixon Canyon Ditch & Reservoir Co.	Ronald Strahle	Secy.	1st National Bank Bldg. Ft. Collins
Greeley Irrigation Company	Edgar Bartels	Secy.	1227 8th Avenue Greeley
Jackson Ditch Company	Vivienne Woodward	Secy.	2319 E. Mulberry Ft. Collins
Josh Ames Ditch Company	Great Western Sugar Co.	Secy.	11 Factory Road Loveland
Kern Reservoir & Ditch Company	C. W. Kirby	Pres.	P.O. Box 220 Windsor
Kitchell Reservoir Company	Alice Fisher	Secy.	Rt. 4 Ft. Collins
Lake Canal Company	John Hartman	Secy.	Poudre Valley National Bank Building Ft. Collins
Lake Canal Reservoir Company	John Hartman	Secy.	Poudre Valley National Bank Building Ft. Collins
Larimer County Canal No. 2 Irr. Co.	Ronald Strahle	Secy.	1st National Bank Bldg. Ft. Collins
Larimer & Weld Irr. Company	Don E. Engel	Secy.	106 Elm Eaton
Larimer & Weld Reservoir Co.	Don E. Engel	Secy.	106 Elm Eaton
Mail Creek Ditch Company	Ronald Strahle	Secy.	1st National Bank Bldg. Ft. Collins
New Cache la Poudre Irr. Co.	H. E. Meyer	Secy.	708 8th Street Greeley
New Mercer Ditch Company	Ronald Strahle	Secy.	1st National Bank Bldg. Ft. Collins
North Poudre Irrigating Co.	Lawrence Cox	Mgr.	North Poudre Irrl Office Wellington
No. 10 Ditch Company	Alden Hill	Secy.	160 W. Mountain Ave. Ft. Collins
Ogilvy Land & Irr. Company	Mrs. Shirley Wayman	Secy.	1007 9th Avenue Greeley
Pleasant Valley & Lake Canal Co.	Ward Fischer	Secy.	1st National Bank Bldg. Ft. Collins
Taylor & Gill Canal Company	Wm. Seaworth	Pres.	Rt. 3 Ft. Collins
Tunnel Water Company	Vivienne Woodward	Secy.	2319 E. Mulberry Ft. Collins

WATER DISTRICT NO. 3 (continued)

DITCH AND RESERVOIR COMPANIES

Warren Lake Reservoir Company	Ronald Strahle	Secy.	1st National Bank Bldg. Ft. Collins
Water Supply & Storage Company	Vivienne Woodward	Secy.	2319 E. Mulberry Ft. Collins
Whitney Irrigation Company	Mrs. Carol Scheldwitz	Secy.	Rt. 2 Box 311 Greeley
Wm. Jones Irrigation Company	Geo. Firestien	Pres.	Farmers Spur Greeley
Windsor Reservoir & Canal Co.	Don Engel	Secy.	106 Elm Eaton

WATER DISTRICT NO. 4

DITCH AND RESERVOIR COMPANIES

Arkins Water Association	Mrs. Joy Cross	Secy.	P.O. Box 6 Masonville
Bald Mountain Water Association	Charles McAfee	Secy.	Rt. 2 Box 319N Loveland
Beeline Ditch Company	Guy A. Shable	Secy.	Rt. 1 Box 65 Milliken
Big Thompson Manufacturing Ditch Company	Robert Christensen	Secy.	P.O. Box 642 Loveland
Big Thompson & Platte River Ditch Company	Guy A. Shable	Secy.	Rt. 1 Box 65 Milliken
Blower Ditch Company	Henry Pope Jr.	Supt.	Rt. 1 Box 138 Longmont
Boulder & Larimer County Irrigation & Manufacturing Ditch Co. (ISH)	L. V. French	Secy.	Rt. 2 Box 23 Berthoud
Buckhorn Highline Ditch Co.	Mrs. Zella R. Soderberg	Secy.	Star Route Box 317 Loveland
Buckhorn Water Users Association	Mrs. Helen L. Mettlen	Secy.	Masonville
Central Weld County Water Dist.	Dale D. Olhausen	Secy.	115 18th Street Greeley
Consolidated Hillsborough Ditch Company	Don Davis	Secy.	1st National Bank Bldg. Johnstown
Consolidated Home Supply Ditch & Reservoir Company	W. R. Keirnes	Secy.	Star Route Box 450 Loveland
Culver Irrigation Company	George Landers	Secy.	P.O. Box 209 Longmont
Diagonal Water & Sanitation District	Jim Hudson	Secy.	1200 28th Street Boulder
Eagle Ditch Company	Mrs. Donald H. Lemmon	Secy.	Rt. 2 Box 120 Berthoud
Elgin Ditch Company	Troy Buehler	Secy.	Rt. 2 Box 127 Berthoud
Evans Ditch Company	Town Clerk of Evans	Secy.	Evans
Fairport Reservoir Company	Nellie Ver Straten	Secy.	Rt. 1 Ft. Collins
Farmers Irrigation Ditch & Reservoir Company	F. Ray DeGood	Secy.	P.O. Box 657 Loveland
Greeley-Loveland Irrigation Co.	Carroll E. Flack	Secy.	808 23 Avenue Greeley
George Rist Ditch Company	W. R. Keirnes	Secy.	Star Route Box 450 Loveland
Handy Ditch Company	Louis Bein	Secy.	Box 460 Berthoud
Hill & Brush Ditch Company	Jim Nelson	Secy.	Rt. 1 Milliken
Kershner Ditch Company	Harry Soderberg	Secy.	Star Rt. Box 317 Loveland
Little Thompson Valley Water Dist.	Lovilo Fagan	Mgr.	307 Welch Avenue Berthoud
Longs Peak Water Users Assn.	Mrs. Joanne Macy	Secy.	P.O. Box 714 Longmont

WATER DISTRICT NO. 4
(continued)

Louden Irrigation Reservoir & Canal Company	Ralph Benson		925 West 29th Loveland
Loveland & Greeley Reservoir Company	Carroll E. Flack	Secy.	808 23 Avenue Greeley
Mariana Water District	Lovilo Fagan	Secy.	307 Welch Avenue Berthoud
Masonville Union Ditch & Reservoir Company	Ben Milner	Secy.	Star Route Loveland
Minor Longdon Ditch Company	Elmer Rutt		Rt. 1 Box 3 Johnstown
New Ish Ditch & Reservoir Co.	Horace G. McCarty	Secy.	P.O. Box 658 Longmont
North Carter Lake Water District	Lovilo Fagan	Secy.	307 Welch Avenue Berthoud
Osborn & Caywood Ditch Company	Alvin Stumpf	Secy.	Rt. 2 Box 32 Berthoud
Perkins Ditch Company	Arnold Friend	Owner	Star Route Loveland
Rist & Benson Reservoir Co.	Ralph Benson	Supt.	925 West 29th Loveland
Rockwell Ditch Company	Max H. Schaal	Secy.	Rt. 1 Box 50 Berthoud
Ryan Gulch Reservoir Co.	Stanley Johnson	Secy.	Rt. 2 Loveland
Seven Lakes Reservoir Co.	Carroll Flack	Secy.	808 23 Avenue Greeley
South Side Irrigation & Reservoir Company	Robert Ausenhus	Secy.	203 East 5th Street Loveland
Victory Irrigating Canal Co.	Cal Carter	Secy.	Star Route Loveland
Wind Cliff Water Association Inc.	Mrs. Vivien Wylene Buser	Secy.	62 Elmhurst Lane, River- dale Bettendorf, Iowa

WATER DISTRICT NO. 5

DITCH AND RESERVOIR COMPANIES

Allen Lake Reservoir Company	A. D. Steel	Secy.	Rt. 3, Longmont
Beckwith Ditch & Reservoir Co.	Lloyd Dickens	Secy.	Rt. 2, Longmont
Bonus Ditch Company	Fred Pace	Secy.	Rt. 2, Longmont
Boulder & Left Hand Irrigation Co.	J. D. Williamson	Secy.	384 Main Street Longmont
Clover Basin Ditch & Reservoir Co.	Wayne Jurgens	Secy.	Longmont
Davis & Downing Ditch Company	Gordon Kennedy	Secy.	Rt. 3, Longmont
Denio & Taylor Ditch Company	Ray Reynolds	Secy.	Longmont
Highland Ditch Company	George Landers	Secy.	1st National Bank Longmont
Highland Lake Reservoir Co.	George Landers	Secy.	1st National Bank Longmont
Ide & Starbird Reservoir Co.	Louis Bein	Secy.	Berthoud
Independent Reservoir Co.	Ray Reynolds	Secy.	Longmont
James Ditch Company	Don Andrews	Secy.	Rt. 3, Box 171 Longmont
Last Chance Ditch Company	^{Al Kurtz} Harold Nelson	Secy.	Rt. 4, Longmont
Left Hand Ditch Company	A. P. Steele	Secy.	Rt. 4, Longmont
Longmont Supply Ditch Company	Geo. Landers	Secy.	P.O. Box 209 Longmont
Lower Baldwin Ditch Company	Walter Iverson	Secy.	Rt. 2, Longmont
Niwot Irrigation Ditch Company	Lloyd Dickens	Secy.	Rt. 2, Longmont
Oligarchy Irrigating Company	George Landers	Secy.	P.O. Box 209 Longmont
Peck Ditch Company	George Wagner	Secy.	Rt. 3, Longmont
Pella Ditch Company	Rueben Fredstrom	Secy.	Rt. 3, Longmont
Palmerton Consolidated Ditch Co.	James Goss	Secy.	Rt. 3, Longmont
Pleasant Valley Reservoir & Ditch Co.	Harold Dawson	Secy.	1st National Bank Longmont
Rough & Ready Ditch Co.	Harold Dawson	Secy.	1st National Bank Longmont
Smead Ditch Company	Warren Bashor	Secy.	Rt. 3, Longmont
South Flat Ditch Company	David Wagner	Secy.	Rt. 3, Longmont
South Ledge Ditch Company	Reinhold Loukonen	Secy.	Lyons
Supply Ditch Company	George Landers	Secy.	1st National Bank Longmont
Swede Ditch Company	Myron Gingery	Secy.	Rt. 3, Longmont
Upper Baldwin Ditch Company	Walter Iverson	Secy.	Rt. 2, Longmont
Union Ditch Company	Frances Hill	Secy.	LaSalle
Union Reservoir Company	Frances Hill	Secy.	LaSalle
Zweck and Turner Ditch Company	Russel Zweck	Secy.	Rt. 3, Longmont

WATER DISTRICT NO. 6

DITCH AND RESERVOIR COMPANIES

Andrews & Farwell Ditch & Reservoir Company	Forest White	Secy.	Rt. 3 Boulder
Baseline Land & Reservoir Co.	Mrs. Margaret Nelson	Secy.	Rt. 1 Box 218 Erie
Boulder & Left Hand Irrigation Co.	Niels Jensen	Secy.	Longmont National Bank Longmont
Boulder & Weld County Ditch Co.	Geo. Landers	Secy.	P.O. Box 209 Longmont
Boulder & Weld Reservoir Co.	Geo. Landers	Secy.	P.O. Box 209 Longmont
Boulder & White Rock Ditch & Reservoir Company	Frank F. Flanders	Secy.	P.O. Box 209 Longmont
Butte Irrigation & Milling Co.	Cliff Hodgson	Pres.	7996 Valmont Drive Boulder
Carr & Tyler Ditch Company	Milton Nelson	Pres.	2040 W. Longs Peak Longmont
Coal Ridge Ditch	Mrs. Mildred Sarchet	Secy.	Rt. 2 Box 162 Ft. Lupton
Community Ditch	M. L. Sarchet	Pres.	402 Cochran Building 1031 15th Street Denver
Consolidated Lower Boulder Reservoir & Ditch Co.	Mrs. Ray Nelson	Secy.	Rt. 1 Box 218 Erie
Davidson Ditch & Reservoir Co.	J. D. Mayhoffer	Secy.	Rt. 1 Lafayette
Dry Creek No. 2 Ditch Company	C. B. Beitelshes	Secy.	Rt. 1 Box 322 Boulder
East Boulder Ditch Company	Public Service Co. of Colorado (%Leonard Reichwein)		P.O. Box 840 Denver
Enterprise Irrigating Ditch Co.	Lloyd Hodgson	Pres.	726 Cherryvale Rt. Boulder
Erie Coal Creek Ditch & Reservoir Company	Dave Oscarson	Pres.	Rt. 1 Erie
Farmers Ditch Company	H. O. Dilsaver	Secy.	Woolworth Building Boulder
Godding Daily & Plumb Ditch	Niels Jensen	Secy.	384 Main Street Boulder
Godding Ditch Co. Highland South Side	Niels Jensen	Secy.	Longmont National Bank Longmont
Goodhue Ditch & Reservoir Co.	Mrs. Gale Harmon	Secy.	Lafayette
Houck No. 2 Ditch Co.	Milton Nelson	Owner	2040 W. Longs Peak Longmont
Howard Ditch Company	Ernest J. Coleman	Secy.	5678 Baseline Road Boulder
Leggett Ditch & Reservoir Co.	Niels Jensen	Secy.	Longmont National Bank Longmont
Leyner-Cottonwood Consolidated Ditch Company	Walter Wise	Secy.	11587 Jasper Road Canfield Erie

WATER DISTRICT NO. 6
(continued)

Lower Boulder Ditch Company	Mrs. Margaret Nelson	Secy.	Rt. 1 Box 218 Erie
McGinn Ditch Company	Mrs. W. A. Thomas	Secy.	1232 Grand View Avenue Boulder
McKay Reservoir	M. L. Sarchet	Pres.	402 Cochran Building 1031 15th Street Denver
Marshall Reservoir	M. L. Sarchet	Pres.	402 Cochran Building 1031 15th Street Denver
Marshallville Ditch Co.	Ewalt Anderson	Secy.	Rt. 3 Box 325 Boulder
New Anderson Ditch Company	Grovner L. Ketterman	Secy.	3055 25th Street Boulder
Niwot Irrigating Ditch Co.	Mrs. John Schlagel	Secy.	Rt. 2 Box 112 Longmont
N. K. Smith & Tyler Ditch	Lee Powell	Owner	Rt. 4 Longmont
North Boulder Farmers Ditch Co.	John Reich	Secy.	P.O. Box 227 Boulder
Original Cottonwood No. 2 Ditch Company	Albert Kold	Secy.	Rt. 3 Box 316 Boulder
Rural Ditch Company	Catherine C. Owen	Secy.	1020 Emery Street Longmont
Silver Lake Ditch Company	Thomas Waugh	Secy.	3737 Broadway Boulder
Smith & Emmons Ditch Co.	Ward Burrett	Secy.	Rt. 4 Box 54 Longmont
South Boulder & Bear Creek Ditch	Tim Shanahan	Secy	Marshall Boulder
South Boulder & Coal Creek Irrigating Ditch Co.	Richard Viella	Secy.	Louisville
Tom Delahant Ditch	Milton Nelson	Pres.	2040 W. Longs Peak Longmont
West Lake Company	M. L. Sarchet	Pres.	402 Cochran Building 1031 15th Street Denver
Williamson Ditch Company	Gordon Knaus	Secy.	Rt. 2 Longmont

WATER DISTRICT NO. 7

DITCH AND RESERVOIR COMPANIES

Bayou Association of Ditches	Earnest R. Schultz	Secy.	4315 Xenon Street Wheatridge
Boyle	A. T. DeBell		3951 W. 56 Way Denver
Church (Golden City & Ralston Cr.) and Croke Canal	G. A. Pelz	Secy.	Farmers Reservoir & Irrigation Company Denham Building 1845 California Denver
Colorado Agricultural	Louis Rullo	Secy.	Rt. 1, Box 043 Denver
Cort Graves & Hughes	Sam Spano		6640 W. 52 Avenue Arvada
Denver View Water Company	Wayne Harkness	Secy.	Rt. 1 Box 590 Golden
Farmers Highline	Mrs. Virginia Collins	Secy.	Farmers Highline Canal & Reservoir Company 8889 Washington Av Denver
Fisher	John DiTirro Jr.	Secy.	4400 Wynkoop Denver
Kershaw	Jack Calabrese		5801 Lowell Denver
Lee Stewart & Eskins	Albert F. Ervin	Secy.	12703 W. 52 Avenue Arvada
Lower Clear Creek Company (Clear Creek & Platte River Ditch)	Frank Wooley	Secy.	Rt. 1 Box 515 Denver
Manhart	George Ditolla		6030 Wolff Arvada
Ouelette	Ira Fox		4298 Kipling Wheatridge
Reno Juchem & Swadley Longan	Mrs. Ernest Delva	Secy.	Consolidated Juchem Ditch & Reservoir Co. 6501 W. 60 Avenue Arvada
Rocky Mountain, Miles & Eskins and South Side	W. F. Moses	Secy.	Adolph Coors Co. Golden
United Water Company	Henry J. Johnson	Secy.	Box 840 Denver
Wannemaker	Ernie Bergman	Secy.	10285 Ridge Road Wheatridge
Welch and Agricultural	Wilson B. Roup	Secy.	Agricultural Ditch & Reservoir Company 10080 W. 27 Avenue Lakewood

WATER DISTRICT NO. 8

DITCH AND RESERVOIR COMPANY

City & County of Denver	Wm. Schuler	Board of Water Commissioners 144 West Colfax Denver
F. L. Green Ditch Company	Edith Jurgens	Secy. 5480 West Arizona Place Denver
Last Chance Ditch Company	Wm. Schuler	Board of Water Commissioners 144 West Colfax Denver
Nevada Ditch Holding Company	Wm. Schuler	" " " " " " "
Northern Colorado Irrigation Co.	" "	" " " " " " "
Tri City Trust	" "	" " " " " " "

WATER DISTRICT NO. 9

Bergen Ditch & Reservoir Co.	Wm. Grant	Owner Western Federal Savings Building Denver
Bowles Ditch Company	Wm. Grant	Owner Western Federal Savings Building Denver
Colorado Central Power Company	Leonard Reichwein	Engr. Evergreen
Hodgson Ditch Operating Ass'n.	B. F. Lowell	Pres. Mt. Morrison
Independent Highline Ditch Co.	Stan Harwood	Owner Mt. Morrison
Pioneer Union Ditch Company	Jack McCoy	Pres. Mt. Morrison
Ward Ditch Company	Wm. V. Hodges Jr.	Secy. Denver Club Building Denver
Warrior Ditch Company	Earl Maddox	Pres. Mt. Morrison

WATER DISTRICT NO. 23

Jefferson Lake Ditch Company	Paul Anschutz	Pres. Jefferson
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WATER DISTRICT NO. 48

Tunnel Water Company	Viviene Woodward	Secy. 2319 East Mulberry Fort Collins
Water Supply & Storage Company	Viviene Woodward	Secy. 2319 East Mulberry Fort Collins

WATER DISTRICT NO. 49

Hale Ditch Company		Hale
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WATER DISTRICT NO. 64

DITCH AND RESERVOIR COMPANIES

Batton Ditch Company	Clifford Sherwin	Owner	P.O. Box 63 Sterling
Bravo Ditch Company	Ivan Barden	Secy.	Illiff
Carlson Ditch Company	James V. Jankovsky	Secy.	Sedgwick
Chambers Ditch Company	Wm. Condon	Owner	916 Fairhurst Street Sterling
Davis Brothers Ditch Co.	Paris Occomasso	Secy.	Atwood
Farmers Pawnee Ditch Co.	Robert Roberts	Secy.	P.O. Box 70 Sterling
Harmony Ditch Co. No. 1	Mrs. Howard Hamilton	Secy.	P.O. Box 205 Crook
Henderson & Smith Ditch Co.	Scalva Brothers	Owner	R.R. Sterling
Iliff & Platte Valley Ditch Co.	Earl E. Reynolds	Secy.	205½ Main Street Sterling
J. B. Ditch Company	Frank Manuela	Owner	Iliff
Liddle Ditch Company	Don Liddle	Pres.	Ovid
Lone Tree Ditch Company	Kent L. Reynolds	Secy.	P.O. Box 111 Sterling
Low Line Ditch Company	Earl E. Reynolds	Secy.	205½ Main Street Sterling
Peoples Ditch Company	Sam Carg	Secy.	Rt. 2 Sterling
Peterson Canal & Reservoir Co.	Jacob Sanger	Pres.	Ovid
Proctor Water Company	Kent L. Reynolds	Secy.	P.O. Box 1111 Sterling
Ramsey Ditch Company	Don DeMers	Secy.	708 Elm Street Sterling
Red Lion Ditch Company	Maynard Sonneberg	Secy.	P.O. Box 1271 Sterling
Schneider Ditch Company	James Williamson	Secy.	Atwood
South Platte Ditch Company	Melvin Bartlett	Secy.	Merino
South Reservation Ditch Co.	James Parker	Secy.	Ovid
Springdale Ditch Company	Robert Roberts	Secy.	P.O. Box 70 Sterling
Sterling Irrigation Company	Lawrence Giacomini	Secy.	P.O. Box 1013 Sterling
Sterling No. 2 Ditch Company	Lester Garner	Secy.	327 Taylor Sterling
Upper Harmony Ditch Company	Carold Merick	Secy.	Crook
Julesburg Irrigation District	Herbert Bonesteel	Secy.	Julesburg
North Sterling Irrigation District	Alex Michel	Secy.	205½ Main Street Sterling
Prewitt Reservoir Company	Alex Michel	Secy.	205½ Main Street Sterling

WATER DISTRICT NO. 65

DITCH AND RESERVOIR COMPANIES

Laird Ditch Company
Pioneer Ditch Company
Wray Ditch Company

Warren Noffsinger
Paul Wiley
Henry Wiltfang

Secy.
Pres.
Pres.

Laird
Laird
Vernon

VIII.

C.

GROUND WATER MANAGEMENT DISTRICTS

Arikaree Management District	Dave Idler	Secy.	Kirk
Central Yuma Management District	Elbert Zion	Secy.	Rt. 1 Vernon
Frenchman Management District	Doyle Neiman	Secy.	Holyoke
Plains Management District	Cliff Hawthorne		1454 Martin Avenue Burlington
Sandhills Management District	Richard Wisdom	Secy.	Holyoke Route Wray
W-Y Management District	Roy L. Mekelburg	Secy.	Rt. 1 Box 19 Yuma

WATER COMMISSIONER'S SUMMARY

DIST.	TOTAL DITCHES REPORTING (ACTIVE) RECORDS	DIRECT DIVERSIONS AC. FT.	NO. OF ACRES	AC. FT. PER ACRE	TOTAL RESERVOIRS REPORTING (ACTIVE) RECORDS	AMOUNT IN STORAGE ACRE FEET			DELIVERY FROM STORAGE
						11-1-70	5-1-70	10-31-71	
1	13	282,242	186,107	1.52	5	53,626	139,287	17,996	130,628
2	38	285,865	202,468	1.41	40	91,998	113,126	60,872	4,320
3	31	258,567	287,205	0.90	48	203,307	291,857	194,064	33,036
4	37	120,203	107,706	1.12	20	168,352	217,088	147,481	7,262
5	47	150,614	96,480	1.56	63	54,701	58,064	52,247	11,652
6	62	111,233	166,700	0.67	43	83,592	69,093	80,100	27,807
7	29	102,177	51,250	1.95	82	46,981	50,565	34,141	988
8	148	203,122	30,120	6.74	23	120,218	122,240	120,430	25,764
9	15	18,151	10,760	1.69	20	7,655	9,440	6,635	3,488
23	46	66,483	15,000	4.42		119,043	114,233	119,486	749
48	59	21,217	4,845	4.38	0				
64	45	146,522	99,484	1.47		68,074	121,517	81,784	7,960
49	5	4,768	1,555	3.07	0				
65	8	13,570	4,740	2.86	0				

188

1,261,134

1,214,110

344

653,654

X.

RECOMMENDATIONS AND SUGGESTIONS

Most of the problems we are presently facing administratively are associated with, or the result of, the Water Rights Determination and Administration Act of 1969. The interest in water generated by this recodification of Colorado water law and the increasing demands upon the water supply have greatly expanded the responsibilities of our administrative agency. Although there have been significant increases in staffing in several sections of our Division, the administrative field staff is practically the same as it has been for several years. In fact, it is difficult to secure budget appropriations to maintain the same level of personnel, time and travel. To even approach adequate administration of underground use, our field and clerical staff would need to be tripled.

Our Division office staff is presently overloaded with paper work. The increase is generated mainly by the activity in the Water Court with the attendant applications, rulings, decrees and inquiries -- all of which require consideration, indexing, filing, tabulating and often copying. To properly handle this increase would require the addition of a clerk typist and a Water Resources Engineer 11.

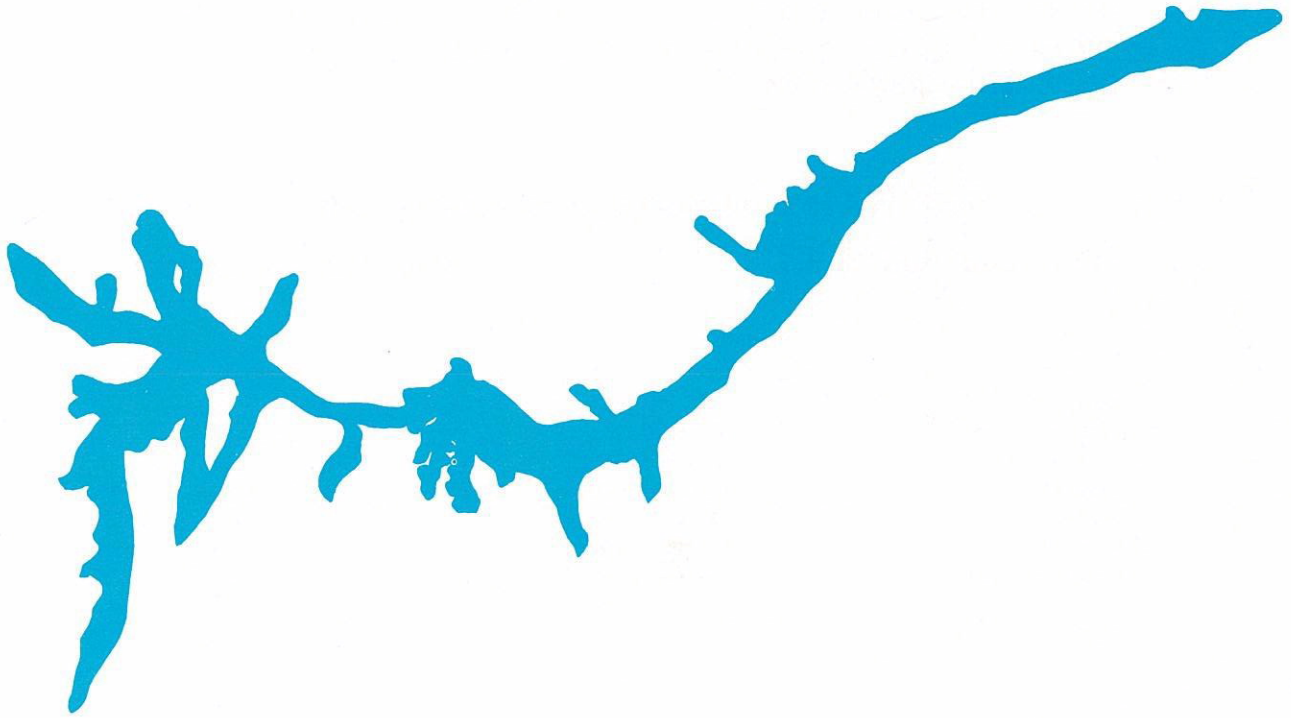
Additional employees will bring up the problem of space and equipment. For instance, the Division office would require some 200 square feet of additional floor space for personnel and storage.

Another problem of office space has never been equitably resolved. The water commissioners all need room for their clerical activities, reporting and files. They have, with their own funds, provided this space, utilities and the attendant equipment in their own homes. This is the only place where their work can be successfully conducted since they are on call 24 hours per day. Secretarial help is not provided these officials so others of the family, ordinarily the wife, provide a telephone answering service, relay messages and information and, in many instances, help with reports, records and correspondence.

It would seem much more equitable and be conducive to a better working attitude if equipment such as a desk, chair and adequate filing cabinets were furnished to these employees and a monthly allowance made for the space, utilities, and other services provided in their homes. A flat rate of \$100 per month to each commissioner should be adequate to provide for office furnishing, rent, utilities, extra services and supplies. There is a precedent for this means of reimbursement in the field positions for the Division of Game, Fish and Parks.

COLORADO'S FUTURE

A Full Water Use Policy



THE SOUTH PLATTE BASIN

A Demonstration of the Benefits of
Integrated Use of the Renewable
Water Resources.

WATER has long been recognized as the natural resource most critical to the future of Colorado. What is not so well recognized is that a whole new irrigation technology has revolutionized the use of water.

This change in water utilization methods is now a keystone of Colorado's economy.

Believing that a constructive new water policy must be developed that will both protect the historic rights under the priority system and promote the fullest use of water, we commissioned Howard Propst of the Herman Miller Research Corporation to produce this publication.

THE WATER INTEGRATION COMMITTEE

Third and Main Street



Sterling, Colorado 80751

Harry Bostron
William Condon
Tom Cooper
Gene Curlee
Lee Dalton
Robert Fritzler
Robert Hogsett

Donald Jensen
Victor Klein
Robert Kula
Clay Lambeth
John Lebsack
Sonny Mapelli
Dale McDonald

Kenneth Monfort
Kish Otsuka
Keith Propst
Robert Sakata
Henry Schaffer
Frank Seckler
William Webster

Herb Vandemoer, Secretary

"Agriculture in the developed counties has become the most productive, the most capital intensive, the most highly mechanized and altogether the most 'industrial' of all modern industries.

"It is an industry with a very high input of scientific knowledge per unit of production. From being the most traditional sector, it has become the most progressive."

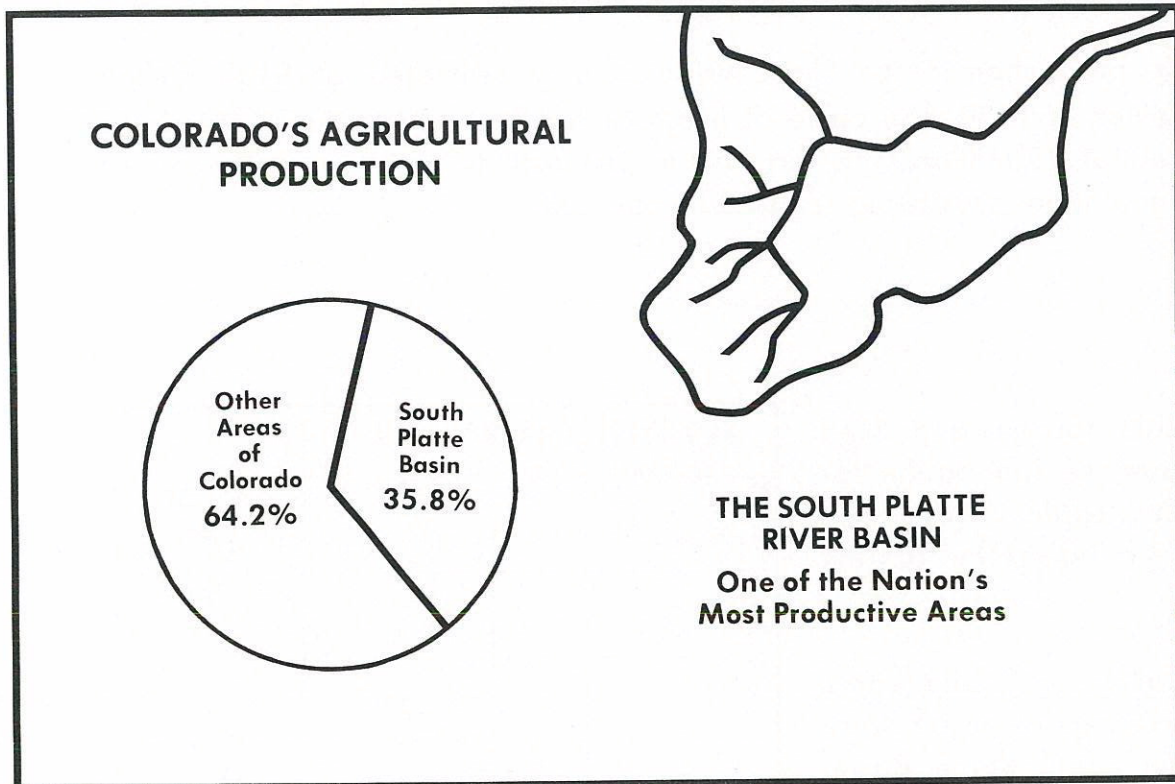
— *Peter Drucker, from the book,
THE AGE OF DISCONTINUITY*

THE SOUTH PLATTE RIVER BASIN

A demonstration of the integrated use of the renewable water resources of Colorado.

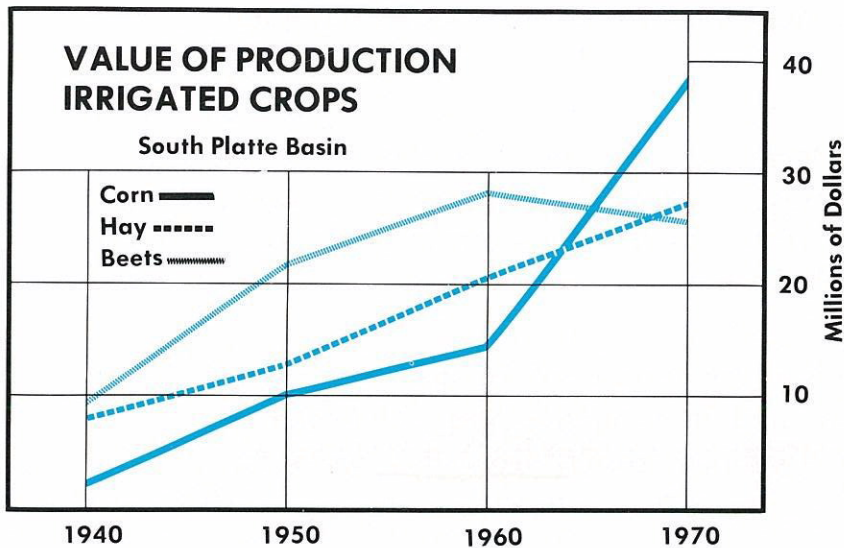
The South Platte Basin serves as an example in this report to bring the importance of integrated water use into sharp focus. Similar water use trends, with comparable benefits, are apparent in other major irrigation areas.

Studies costing hundreds of thousands of dollars have been made of the Platte River and its economy. This publication is an effort to correlate significant results from this research.



THE COVER — An outline of the 10 million acre foot underground reservoir of the South Platte as mapped by the U.S. Geological Survey.

SPECTACULAR GAINS IN FOOD PRODUCTION



Source: Colorado Crop and Livestock Reporting Service

Increased Yields Per Acre from Scientific Irrigated Farming.

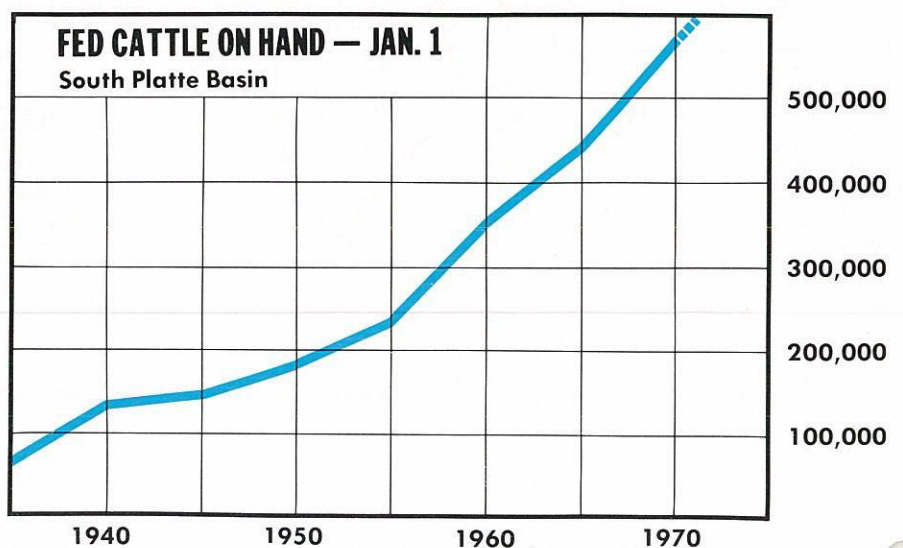
Crop	1939	1969
CORN	34 Bu.	101 Bu.
SILAGE	8.5 Tons	18 Tons
HAY	1.4 Tons	2.8 Tons
BEETS	13 Tons	16 Tons

The shift toward intensive, high production farming has resulted in a 400% increase in corn acreage with a drop in small grains from 1/3 of the acreage to 1/10 since 1939.

Total crop production in the Platte Basin is now estimated at \$100 million — up from \$25-30 million in 1939. The value of livestock fed for market now exceeds \$250 million — up from about 20 million. This increase in productivity was accomplished at the same time the farm population was being reduced by one-half.

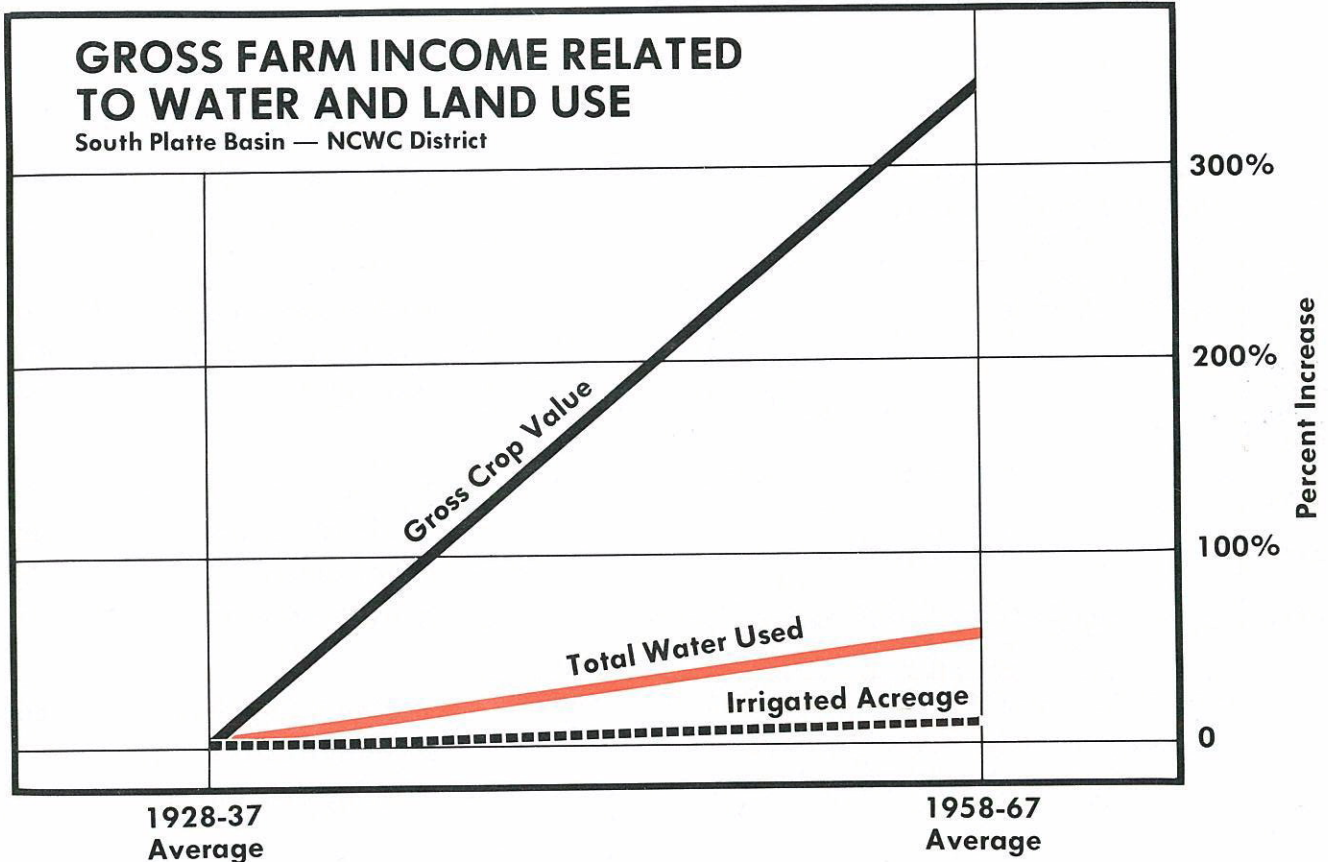
Dependable forage and feed supplies are the foundation for the Basin's cattle feeding industry — a pacesetter for the nation.

Three-quarters of Colorado's total marketings of cattle were fed in the South Platte Basin. In 1969, 1.5 million cattle were marketed from this area. At the same time, there was major growth in meat processing.



Source: Colorado Crop and Livestock Reporting Service, USDA and Colorado Department of Agriculture

WATER — THE BASIS FOR INCREASING INCOME

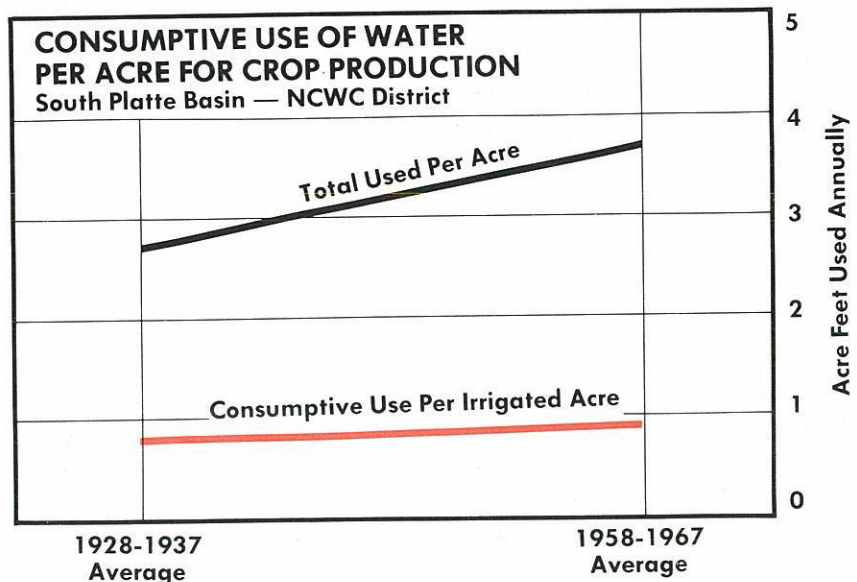


Source: Thirtieth Annual Report, Northern Colorado Water Conservancy District

Increases in farm production have been achieved primarily through the use of new technology to increase the **DEPENDABILITY** of the water supply. Farmers with only an increase of 11% in acreage have increased gross crop value more than 300% through better water management and intensive farming.

Consumptive use per irrigated acre has increased from .88 to .96 acre feet of water, while average yields increased 212%.

Return flow and re-use make it possible to divert 2.5 acre feet for every acre foot of primary supply.



Source: Thirtieth Annual Report, Northern Colorado Water Conservancy District

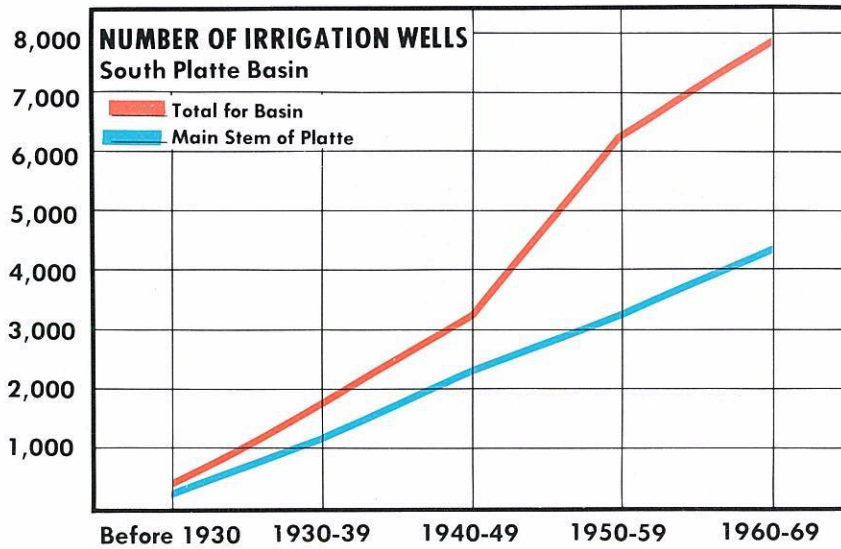
THE 40 YEAR WATER-USE REVOLUTION

A NEW TECHNOLOGY

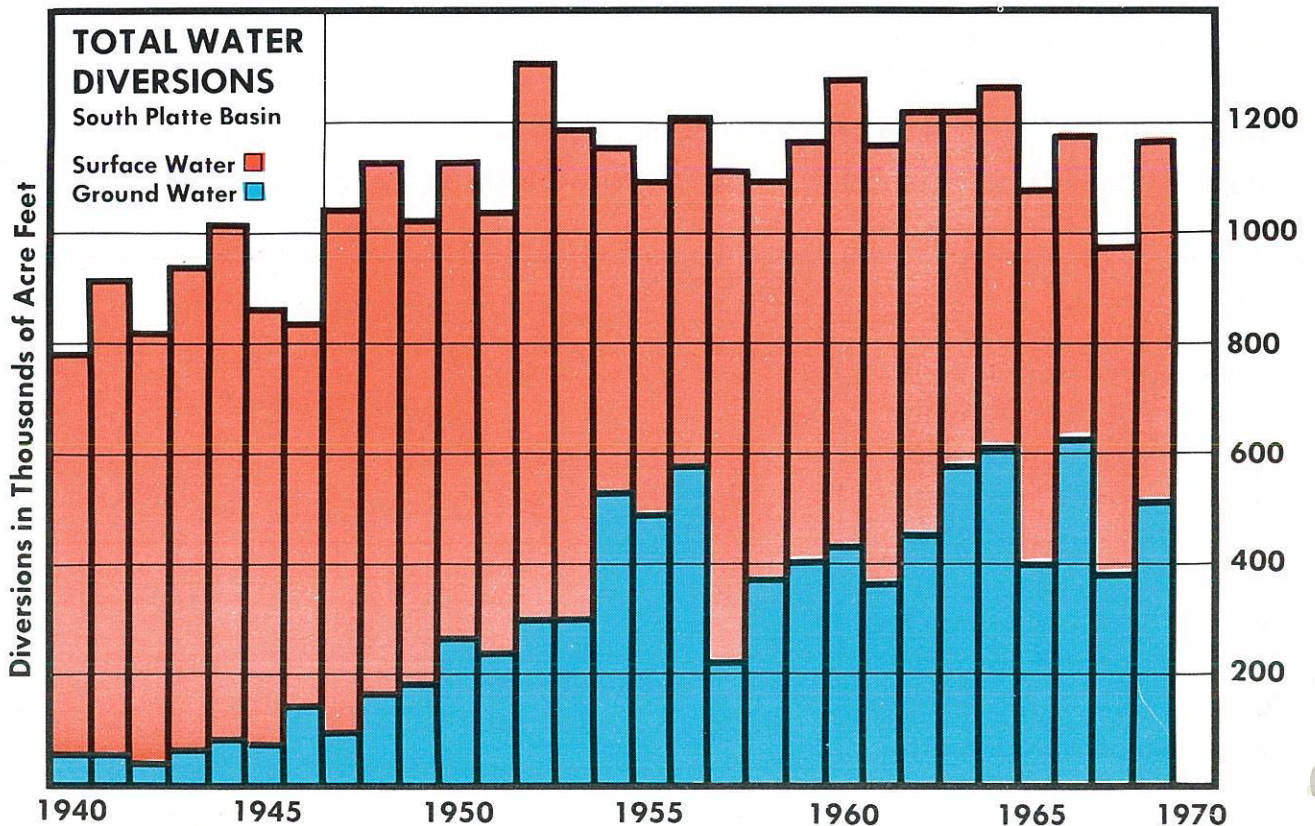
Efficient irrigation pumps, gated pipe, concrete ditches, sprinklers, infra-red photography and other new developments are now an integral part of the irrigation system.

Engineering studies show the available supply to be nearly doubled for the critical growth periods.

Water tables have been consistently restored after the irrigating season.

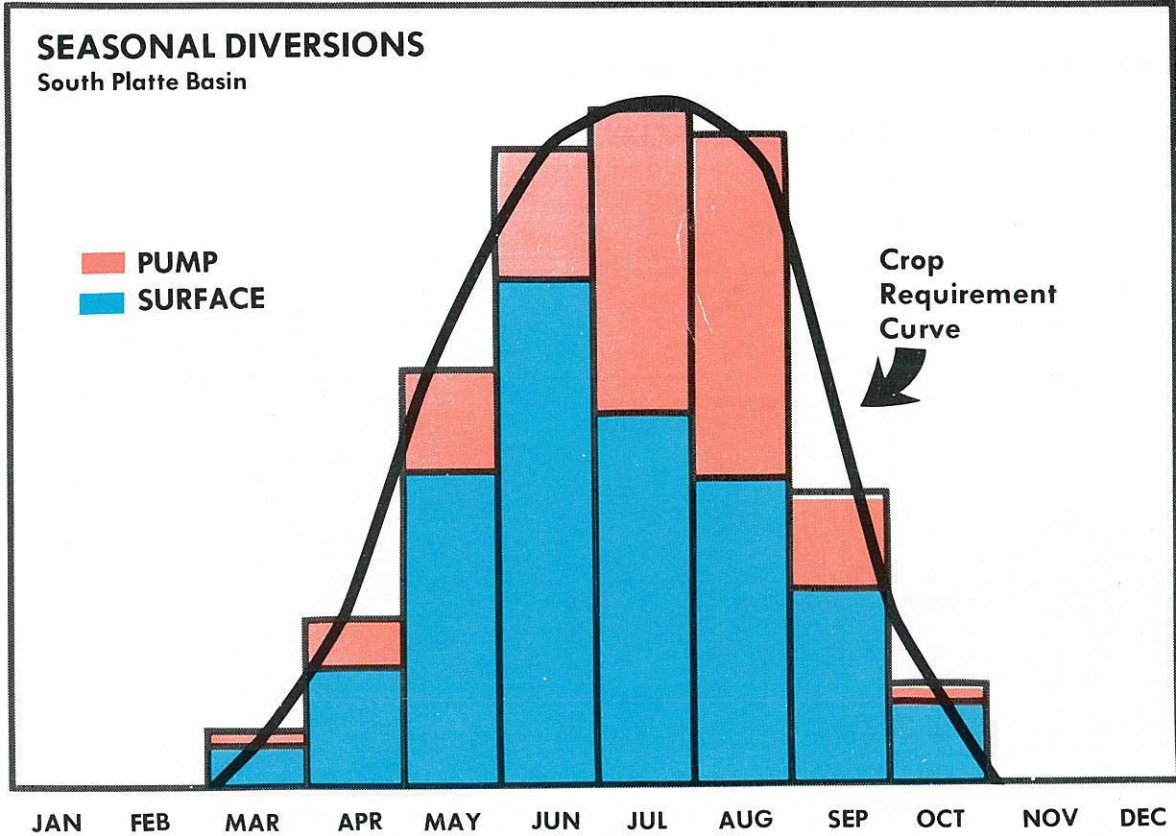


Sources: Total Basin Information — Colorado State Engineer
Main Stem Information — U.S. Geological Survey, Dept. of Interior



Source: U.S. Geological Survey, Department of Interior.

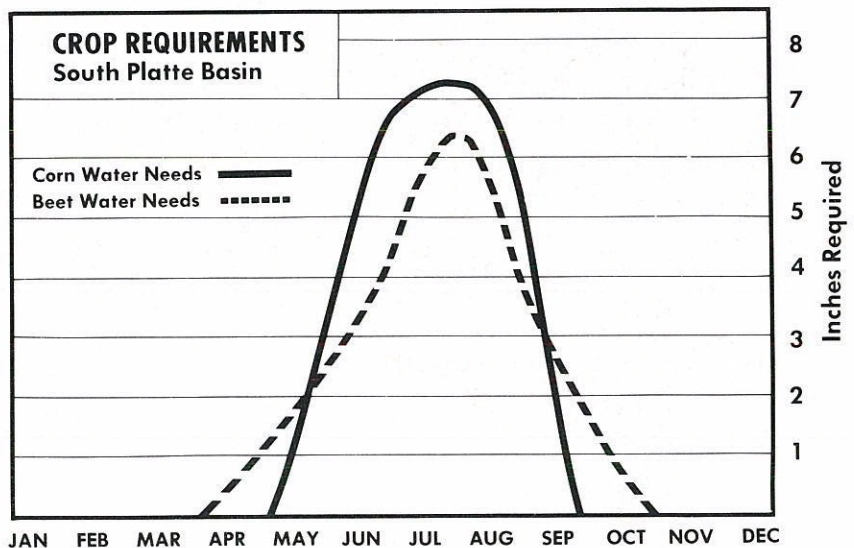
A DEPENDABLE SUPPLY — KEY TO PRODUCTIVITY



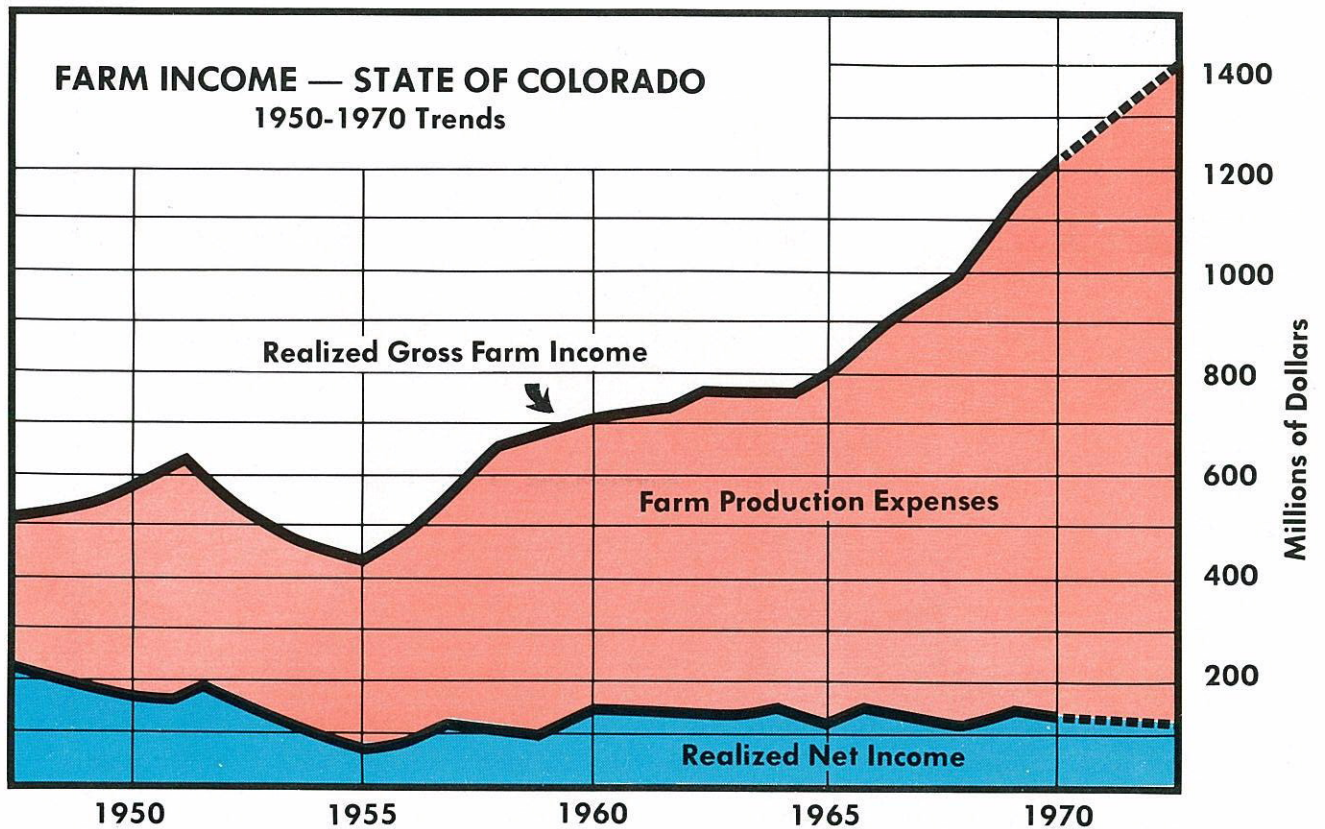
This chart shows general crop requirements and water use patterns that are subject to wide seasonal variations in precipitation, snow pack and flooding. Information sources: Narrows Dam studies of the Bureau of Reclamation and U.S. Geological Survey.

Modern, high production farming requires maximum use of water during the period when surface flows have historically fallen off. New Technology has provided the indispensable ingredient needed for a growing, prosperous economy.

Older cropping patterns that include large acreages of wild hay and small grains can no longer produce the income level needed to meet the rising costs of production.



WHY FULL PRODUCTION IS A MUST



Sources: Colorado Crop and Livestock Reporting Service, USDA and Colorado Department of Agriculture

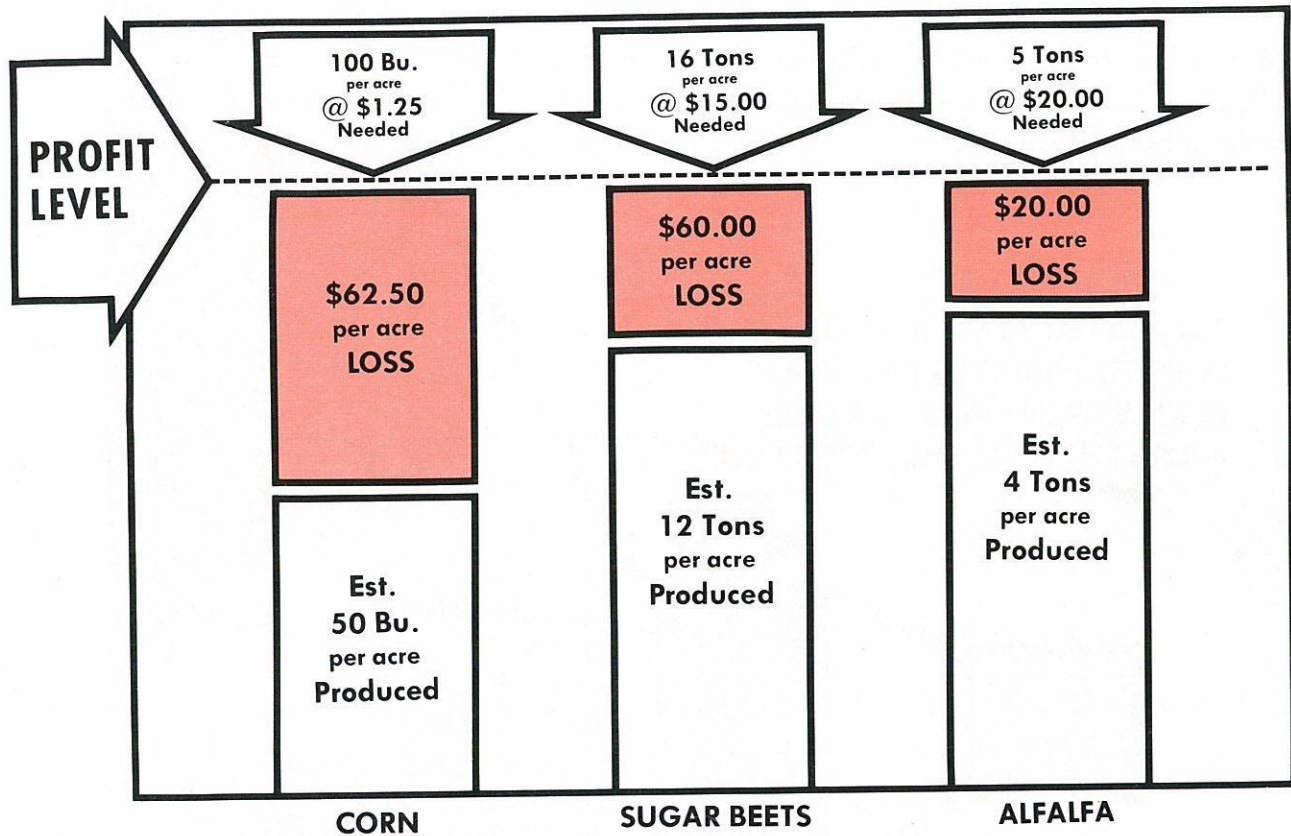
Farmers in Colorado will spend more than \$1 BILLION to produce the 1971 crop. All of this money is fed directly into the economy in the form of wages and purchases of machinery, chemicals, rubber products, petroleum, fertilizer and other supplies.

The chart above illustrates why the farmer, with little control over either **costs of production** or the **price of his product**, is forced to get top production to keep up with rapidly rising costs.

Property taxes for the support of education and local government are a fixed cost that has now risen to an estimated \$50 million annually.

DISASTROUS EFFECTS OF WATER CURTAILMENT

Estimated results of a 25% cut in pump diversions during July and August in the South Platte Basin



Source: Survey of major agricultural producers of South Platte Basin — Herman Miller Research Corp.

CURRENT COSTS OF PRODUCTION PER ACRE

	Labor	Fuel	Fertilizer & Chemicals	Interest & Depreciation	Land Cost	Misc.	Total
Corn	\$24.42	\$13.21	\$43.36	\$17.56	\$21.00	\$ 7.07	\$125.81
Beets	98.70	29.90	54.04	28.80	21.00	21.00	240.67
Hay	29.20	11.90	19.08	14.04	21.00	4.72	106.15

Today, farmers in the South Platte Basin are growing approximately 250,000 acres of corn, 100,000 acres of beets and 250,000 acres of irrigated hay.

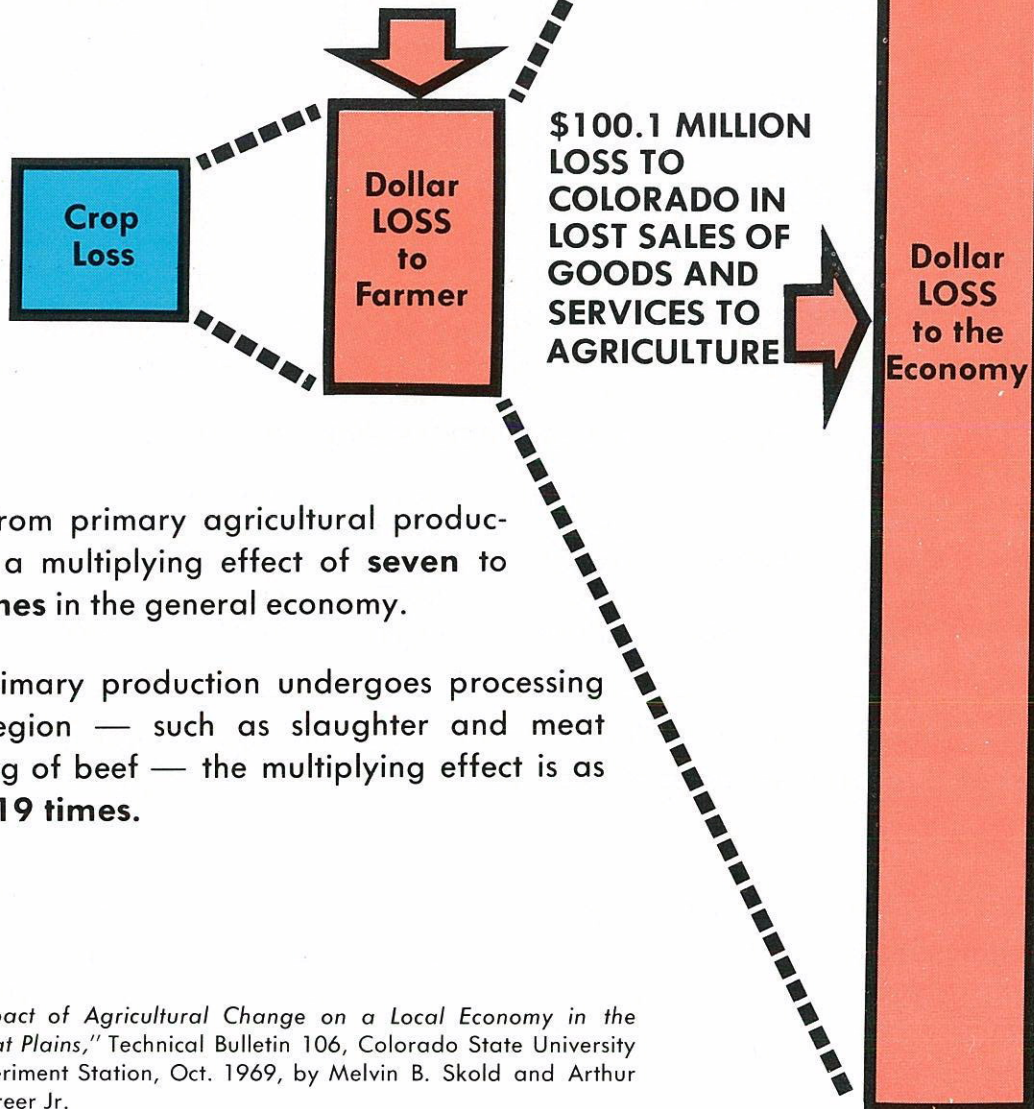
ASSUMING THAT ONLY ONE-HALF OF THESE ACRES WERE AFFECTED BY WELL RESTRICTIONS, LOSSES ARE ESTIMATED AT \$14,312,500 IN ONLY ONE YEAR WITH A 25% REDUCTION IN PUMP USAGE. THIS ESTIMATE DOES NOT INCLUDE LOSSES THAT WOULD OCCUR IN OTHER CROPS SUCH AS SMALL GRAINS, BEANS OR POTATOES.

THE ECONOMIC CONSEQUENCE OF RETREAT

The potential losses from arbitrary water regulation in basic crop production.

Permanent damage to the economy in the form of bankruptcies, loss of farms and secondary effects on agri-businesses are practically impossible to estimate.

**ESTIMATED \$14.3 MILLION
LOSS TO FARMERS IN THE
PLATTE BASIN IN ONE YEAR-
FROM THREE BASIC CROPS ONLY**



Dollars from primary agricultural production has a multiplying effect of **seven to eight times** in the general economy.

When primary production undergoes processing in the region — such as slaughter and meat processing of beef — the multiplying effect is as much at **19 times**.

Source: "Impact of Agricultural Change on a Local Economy in the Great Plains," Technical Bulletin 106, Colorado State University Experiment Station, Oct. 1969, by Melvin B. Skold and Arthur J. Greer Jr.

QUESTIONS FOR THOSE IN LEADERSHIP POSITIONS

1

CAN WE AFFORD THE TIME AND MONEY INVOLVED IN ATTEMPTING TO RESOLVE OUR WATER USE PROBLEMS THROUGH NEGATIVE AND COSTLY LITIGATION?

2

DOESN'T THE STATE — AFTER YEARS OF AVOIDING THE WATER DEVELOPMENT ISSUE — HAVE AN OBLIGATION TO EXPLORE ALTERNATIVES TO ARBITRARY REGULATION?

3

SHOULD NOT A MODERN, INTEGRATED WATER MANAGEMENT SYSTEM BE DEVELOPED TO ALLOW MAXIMUM BENEFICIAL USE OF THE RENEWABLE WATER RESOURCES OF COLORADO?

RESEARCH DOCUMENTS THE FEASIBILITY OF NEW SYSTEMS OF INTEGRATED WATER MANAGEMENT

*The major conclusions of a \$200,000 study of the South Platte authorized by the Legislature.**

FINDINGS:

- The average annual supply is adequate to meet present requirements. However, because of wide fluctuations in runoff, the distribution of water availability is far from satisfactory.
- The ground water reservoir along the main stem of the South Platte contains approximately 10 million acre feet. Only a small part of this capacity is utilized and this only in a haphazard, unplanned way.
- Ground water and trans-mountain importations have been major factors in stabilizing water supplies. However, pumping of ground water has infringed upon prior surface rights. Studies indicate that this infringement is not as severe as many felt it to be.
- Water supplies are not being administered and utilized as efficiently and effectively as they could be. Deficiencies exist in the completeness and accuracy of water use records.

CONCLUSIONS:

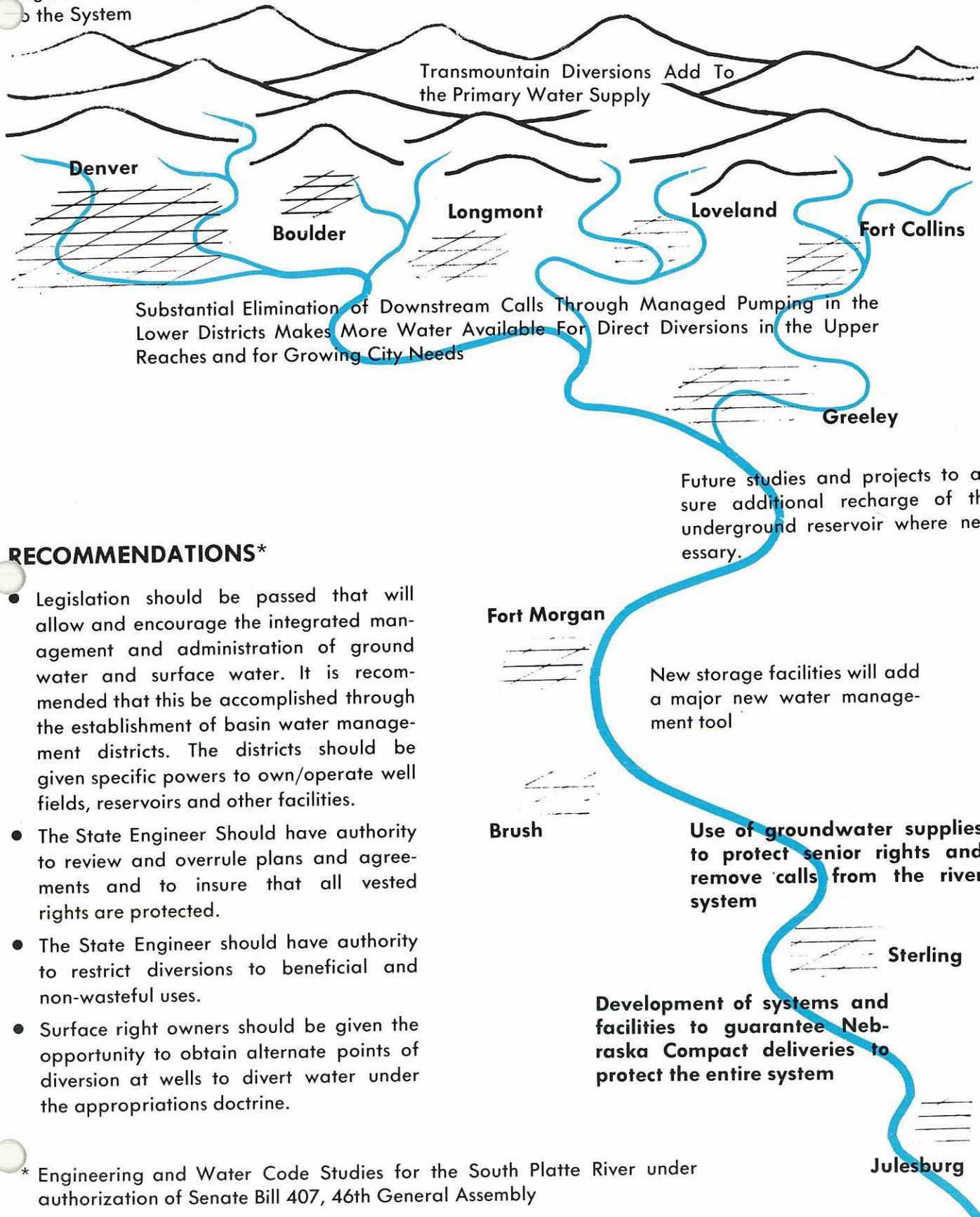
- Planned utilization of 10 to 15 percent of the available ground water storage capacity is reasonably attainable. Use of ground water storage capacity can provide more efficient utilization of the total resources of the basin, reduce shortages and minimize conflicts between water users. This planned utilization in conjunction with surface water supplies would basically involve a heavier draft on the ground water supplies during low runoff years with provision for replenishment of those supplies during years of surplus runoff.
- To achieve more optimum distribution of water supplies and accomplish desired goals, certain water rights should be served from ground water sources during low runoff periods. Such operations would allow more surface water to be diverted in the upper regions, making greater use of return flows possible.
- Since the ground water in storage adjacent to the main stem of the South Platte is currently being used to support the flowing stream and many users are dependent upon, and have rights in, the return flow which joins the river via the ground water system, provisions must be made to protect these rights and supply them with alternate sources of water in insure continued utilization of the ground water supply. The cost of providing such facilities should be borne by those who benefit.

* **Engineering and Water Code Studies for the South Platte River** — Under authorization of Senate Bill 407, 46th General Assembly of Colorado.

INTEGRATED WATER MANAGEMENT CAN WORK FOR THE BENEFIT OF ALL WATER USERS

High Altitude Storage Adds Capacity to the System

Transmountain Diversions Add To the Primary Water Supply



Substantial Elimination of Downstream Calls Through Managed Pumping in the Lower Districts Makes More Water Available For Direct Diversions in the Upper Reaches and for Growing City Needs

Future studies and projects to assure additional recharge of the underground reservoir where necessary.

RECOMMENDATIONS*

- Legislation should be passed that will allow and encourage the integrated management and administration of ground water and surface water. It is recommended that this be accomplished through the establishment of basin water management districts. The districts should be given specific powers to own/operate well fields, reservoirs and other facilities.
- The State Engineer Should have authority to review and overrule plans and agreements and to insure that all vested rights are protected.
- The State Engineer should have authority to restrict diversions to beneficial and non-wasteful uses.
- Surface right owners should be given the opportunity to obtain alternate points of diversion at wells to divert water under the appropriations doctrine.

Fort Morgan

New storage facilities will add a major new water management tool

Brush

Use of groundwater supplies to protect senior rights and remove calls from the river system

Sterling

Development of systems and facilities to guarantee Nebraska Compact deliveries to protect the entire system

Julesburg

* Engineering and Water Code Studies for the South Platte River under authorization of Senate Bill 407, 46th General Assembly

THE PUBLIC INTEREST

THE BROAD PUBLIC INTEREST WILL BE SERVED BY:

- An increasingly beneficial use of the total renewable water supplies.
- A balancing of interests to assure fair and reasonable treatment for all.
- A full use of the new technologies to improve the water system



THE PUBLIC INTEREST WILL **NOT** BE SERVED BY:

- Continuing and bitter conflicts between water users
- Imposing losses on agriculture that will destroy thousands of family operations and severely damage the state's economy.
- Arbitrary and outmoded regulatory and delivery systems that stop the use of advancing technology.

THE IMMEDIATE NEED

The first priority is the development of a modern water management system for each major basin that encourages full use of the renewable water resources and integrates surface and pump uses.

New technology provides the means by which historic water rights can be protected without sacrificing the advances of the past 40 years.

Irreparable damage to Colorado's economy and lasting animosities can be avoided through an all-out campaign to set up the organization necessary to develop a new operating format. The effort needs the constructive support of every responsible leader and water user.

This pioneering move must be constructive, immediate and with a vision of the future of Colorado.

THE LONGER VIEW

With the creation of modern basin management organizations, constructive new ideas can be explored in the future:

- DEVELOPMENT OF OPTIMUM WATER USE TOOLS.
- EFFECTIVE WATER TRANSPORT SYSTEMS.
- EVAPORATION CONTROL AND IMPROVEMENT OF SURFACE STORAGE.
- MOST EFFECTIVE MANAGEMENT OF SURPLUS WINTER RUNOFF.
- UNDERGROUND STORAGE AND RECHARGE SYSTEMS.
- UPDATING LEGAL CONCEPTS TO MEET FUTURE NEEDS.

“The dogmas of the quiet past are inadequate to the stormy present. The occasion is piled high with difficulty and we must rise with the occasion. As our case is new, so we must think anew and act anew.” Abraham Lincoln, Message to Congress, Dec. 1, 1862.

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U.S. AGRICULTURE — THE URBAN AREA'S BEST CUSTOMER

- Farmers spend \$36 billion a year in the U.S. for goods and services to produce crops and livestock, and another \$12 billion in consumer goods.
- Each year in the U.S., farmers purchase:
 - \$4.8 billion in new tractors, machinery and vehicles.**
 - \$3.7 Billion for fuel, lubricants and maintenance —
More than any other industry.**
 - \$2.2 Billion for commercial fertilizers.**
 - \$3.2 Billion KWH of electricity — enough for Chicago, Baltimore,
Boston, Detroit and Washington, D.C.**
 - 360 Million pounds of rubber products — the equivalent
of tires for 7-1/2 million automobiles.**
- Three out of every 10 jobs in private employment are related to agriculture.
- The investment in agriculture is more than \$200 billion — Equal to two-thirds of the value of the current assets of ALL corporations in the United States.