Colorado River Decision Support System

Yampa River Basin Water Resources Planning Model

FINAL REPORT

for

Colorado Water Conservation Board
Colorado Division of Water Resources

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by

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1.0 EXECUTIVE SUMMARY

The Yampa River Water Resources Planning Model (Yampa Model) was developed jointly by the Colorado Water Conservation Board and the Division of Water Resources as part of the Colorado River Decision Support System (CRDSS). The objective was to develop a monthly water allocation and accounting model which includes 100 percent of the basin's consumptive use and would be capable of making comparative analyses for the assessment of historical and future water management policies.

1.1 Background

The Yampa River basin in northwestern Colorado comprises an area measuring nearly 7,660 square miles. The basin includes portions of two counties (Routt and Moffat) and supplies an annual flow of approximately 1,623,000 acre-feet to the Green River at the Colorado-Utah state line. The river basin contains reservoirs, transbasin diversions, and large power generation stations.

The administration of portions of the Yampa river is extremely complex. The area from the Upper Bear River down to the Stagecoach Reservoir is the most complex. The Upper Bear River contains four reservoirs (Stillwater, Yamcolo, Allen Basin, and Stagecoach) along with two significant transbasin diversions (Stillwater Ditch and Sarvis Ditch) and one relatively minor one (Dome Creek Ditch). The reservoirs provide water to a number of divertors through a complex set of operational exchanges, water use agreements, and informal administration policies.

1.2 Approach

The Yampa Model was developed using StateMod, the State of Colorado's Stream Simulation Model, and is operated on a monthly time step from water years 1975 to 1991. It was developed in two steps as follows:

Phase II, completed in July, 1996, modeled 246 key diversion structures, 9 reservoirs, and 73 instream flow rights. Key structures were identified using the following approach:

- A list of diversion structures, based on the structure's net absolute decreed amounts, was compiled and ranked form largest to smallest.

- The list was shortened by including those structures that represent 75 percent of the basin's net absolute decreed amounts.

- Meetings were held with division and district engineers in the basin and the preliminary list of structures was refined to include structures that were considered important by the district engineers. Also, some structures were removed from the model because they historically diverted significantly less than the decree amount, they were abandoned or removed, or they had infrequent diversion records.

Phase IIIa enhanced the previous model to account for 100 percent of the basin's consumptive use. This enhancement featured the following changes from the Phase II model:

- Twenty-seven aggregated irrigation structures were added to represent 449 structures supplying 24,960 acres of irrigated land. These lands compose all land in the 1993 survey which were not explicitly modeled in the Phase II version of the model.

- Three aggregated reservoirs were added to represent 33,822 af of decreed storage not explicitly modeled in the Phase II model. This storage composes all decreed storage rights not explicitly modeled under Phase II.

- Three aggregated stock ponds were added to represent 15,958 af of stock pond storage not explicitly modeled in the Phase II model. These stock ponds represent all stock pond use as identified in Task Memo 2.09-12, "Consumptive Use Model Non-Irrigation Consumptive Use and Losses in the Yampa River Basin.".

- Three aggregated municipal and industrial (M&I) nodes were added to represent 8,163 af of consumptive use not explicitly modeled in Phase II. This use represents all consumptive use exclusive of irrigation diversions, transmountain diversions, and evaporation from reservoirs and ponds, as identified in Task Memo 2.09-12, "Consumptive Use Model Non-Irrigation Consumptive Use and Losses in the Yampa River Basin.".

- Consumptive use on the Green River within Colorado was added to the model as one aggregated node. This improvement assures that the model represents all use in Colorado above the Green River at the State Line.

- Miscellaneous refinements to the Phase II model.

1.3 Model Extent

The Yampa River originates at the Continental Divide and terminates near Colorado's western border, where it flows into the Green River. A fundamental objective in developing the Phase IIIa water resources planning models is to represent all the State's consumptive use of Colorado River basin water. To fulfill this objective, the in-state portion of the Green River basin was included in the Yampa model as a single aggregated diversion node representing approximately 1900 acres of irrigated land. The acreage was determined from the State's 1993 GIS database. The Green River hydrology was estimated to equal Colorado's contribution to the Green River and does not include inflow from Wyoming.

Portions of the Little Snake River basin, a major subbasin of the Yampa River, lie in Wyoming. Diversions on the Little Snake River in Wyoming were represented with four aggregated nodes. One node represents diversions to the City of Cheyenne for municipal supply, and the other three represent demands associated with approximately 14,000 acres of irrigated land in Wyoming. The most upstream of the four nodes was designated a baseflow node, where the flow contribution from Wyoming enters the modeled system. This approach assured that the model reasonably simulated physical water supply to the Little Snake River users in Colorado, and that consumptive use, in turn, could be accurately estimated by the model.

1.4 Results

The key results of the Yampa modeling effort are as follows:

1.) Using StateMod, a water resources planning model has been developed that can make comparative analyses of historical and future water management policies in the Yampa River basin.

2.) The model has been calibrated for a study period extending from water years 1975 to 1991, a time period in which basin operations have been relatively constant.

3.) The calibration is considered good, based on a comparison of historical to simulated streamflows, reservoir contents, and diversions.

4.) A baseline data set has been prepared which, unlike the calibration data set, assumes all existing water resources systems were on line and operational from water years 1975 to 1991. This baseline set is appropriate for evaluating various "what if" scenarios over a long hydrologic time period containing dry, average, and wet hydrologic cycles.

1.5 Future Enhancements

The Yampa Model was developed to include 100 percent of the basin's consumptive use through a combination of explicit and aggregated structures. Future enhancements to the Yampa Model include the following:

1.) More detailed modeling of lands near Colorado's border with Wyoming. Significantly large parcels of land in this area were modeled in aggregated fashion, because lands in Colorado are served by Wyoming water rights and vice versa. New work to clarify water use on these lands may be forthcoming within the next year from the Division 6 office. Only after that information becomes available would it be practical to pursue such an enhancement to the model.

2.) Incorporation of additional information through consultation with the division engineer and other major water users regarding historical and future reservoir operations

2.0 INTRODUCTION

2.1 Basin Description

The Yampa River basin is approximately 7,660 square miles in size, ranging in elevation from 12,200 feet in the headwater areas near the town of Yampa to 5,600 feet in the vicinity of Dinosaur National Monument at the lower end of the basin. The Yampa River is the primary stream in the basin, with major tributaries including the Bear River, Walton Creek, Fish Creek, Trout Creek, Elk River, Elkhead Creek, Fortification Creek, the Williams Fork River, and the Little Snake River. Average annual streamflow in the upper portions of the drainage (United States Geological Survey [USGS] gage near Stagecoach Reservoir) is approximately 62,000 acre-feet, which increases to an annual average of 1,623,000 acre-feet at the Dinosaur Monument (USGS gage near Deerlodge Park).

The principal water use in the basin is irrigation, with hundreds of small irrigation ditches diverting from the mainstem and the numerous tributary streams throughout the basin. This irrigation has remained relatively constant since the late 1800s, with only small increases in the irrigated acreage as new ditches and storage systems were constructed. The total irrigated acreage in the basin, according to the State's 1993 geographic information system (GIS) data, is estimated to be approximately 80,600 acres. Other major water uses in the Yampa River basin include diversions for power generation at the Hayden Station and Craig Station plants (historical diversions of approximately 16,500 acre-feet per year) and diversions for municipal use in the larger towns of Steamboat Springs and Craig, and in a number of smaller towns. Three transbasin diversions, the Sarvis Ditch, Stillwater Ditch, and Dome Creek Ditch export water from the Yampa River basin to the Colorado River drainage. There are also a number of smaller transbasin diversions from one tributary drainage to another. See **Figure 2.1a** for a general layout of the basin.

In addition to the direct ditch diversions, there are nine major reservoirs (greater than 4,000 acre-feet in capacity) in the Yampa River basin that are represented explicitly in the Yampa Model. Three of the reservoirs are used for irrigation (Stillwater Reservoir No. 1, Allen Basin Reservoir, and Yamcolo Reservoir); three are predominantly used for recreational and fishery purposes (Lake Catamount, Pearl Lake, and Steamboat Lake); and the remaining reservoirs are used for multiple uses, including municipal, industrial, irrigation, and recreation (Fish Creek Reservoir, Stagecoach Reservoir, and Elkhead Reservoir). For purposes of the Yampa Model, it is noted that these reservoirs were constructed prior to the 1975-1991 water year study period, with the exceptions of Lake Catamount (1977), Yamcolo Reservoir (1981), and Stagecoach Reservoir (1988).

2.2 Water Resources Developments

The Yampa River basin has seen substantial water resources developments in the form of private irrigation systems and municipal and industrial diversions. **Table 2.2a** presents a timeline of key developments within the basin.

Figure 2.1a
General Basin Layout

TABLE 2.2A
Key Water Resources Developments

Date	Description
1935	Stillwater Reservoir
1942	Fish Creek Reservoir
1961	Steamboat Lake
1963	Craig Station Ditch and Pipeline
1974	Elkhead Reservoir
1977	Lake Catamount
1981	Yamcolo Reservoir
1988	Stagecoach Reservoir

Irrigated Agriculture is by far the largest consumer of water in the Yampa River basin. Ditch construction for irrigation began in the 1800s and currently consists of over 1,500 active diversion structures serving approximately 80,600 acres of irrigated land. Ditches supplying pasture and hay crops are found along most streams in the basin.

Municipal and Industrial (M&I) water use in the Yampa River basin is relatively small compared to irrigated water use. Key M&I developments include the towns of Steamboat and Craig, the Colorado Utilities Ditch and Pipeline (Hayden Station), and the Craig Power Station Ditch and Pipeline.

Snowmaking Diversions are included in the model but are relatively small when compared to irrigated water use. One snowmaking diversion, Steamboat Ski and Resort Corporation, averages approximately 275 acre-feet per season.

Federal Systems are nonexistent in the Yampa River basin.

Appendix C, Section 10.1 provides a detailed description of all the modeled water resources developments within the basin.

2.3 Historical Water Rights Administration

Historical water rights administration in the Yampa River basin has been accomplished on the basis of direct flow priorities. The Yampa River below Steamboat Springs is usually water long and seldom experiences a river call. The upper Bear River, however, does not have an extreme abundance of water and is usually administered throughout the irrigation season.

Irrigation shortages on the upper Bear River are typically satisfied by storage releases from Yamcolo and Stillwater reservoirs.

3.0 MODEL DEVELOPMENT

The Yampa River Water Resources Planning Model (Yampa Model) was developed jointly by two agencies, the Colorado Water Conservation Board (CWCB) and the Division of Water Resources (DWR), as part of the Colorado River Decision Support System (CRDSS). The objective of the model was to develop a monthly water allocation and accounting model which would be capable of making comparative analyses for the assessment of historical and future water management policies. Typical comparative analyses for which the model is well suited include:

- Impact of potential future reservoir operations on existing water users
- Impact of potential future compact river calls on existing water users
- Impact of potential future instream flow requirements on existing water users
- Safe yield of a potential future reservoir or diversion

For a complete description of the types of comparative analyses for which the model was developed, see the *Colorado River Decision Support System Feasibility Study, 1993.*

3.1 Prior Yampa River Basin Modeling

The only recent water resources modeling effort for the Yampa River basin consists of a study conducted by Hydrosphere Resource Consultants for the Colorado River Water Conservation District and the CWCB entitled "Yampa River Basin - Alternatives Feasibility Study" (YRBAS).

The objective of the YRBAS operation model was essentially to develop a tool to evaluate reservoir storage options on the Yampa River without causing injury to existing and projected future uses. The assumption and data requirements for this objective are somewhat more generalized than the assumptions required for development of the Yampa Model.

There were no specific data or administrative policy procedures developed for the YRBAS that could be directly ported to the Yampa Model, given the different objectives and focus of the two efforts. However, the YRBAS documentation and discussion were found to be very helpful in developing an understanding of many of the existing water rights operations and administrative practices. The documentation was also helpful in enhancing the understanding of some of the policy decision that are facing the Yampa River basin in the near future.

A detailed discussion of prior modeling efforts can be found in **Appendix C, Section 6.**

3.2 Modeling Approach

The Yampa Model was developed using StateMod, the State of Colorado's Stream Simulation Model. The key components of the model include:

- Simulates tributaries and mainstem river systems through the use of a tree-structured network design
- Simulates direct flow, instream flow, storage, and operational rights under the Prior Appropriation System as a function of water availability, priority, decreed amount, demand, structure capacity, and location

- Simulates a wide variety of operating agreements and exchanges between one or more structures through user-supplied input data
- For a given structure, simulates one or more return flow patterns returning to one or more stream nodes to represent the impact of surface and ground water returns on the stream system
- Simulates transbasin imports and diversions from a basin
- Uses an efficient, direct solution algorithm which recognizes the impact of a diversion's return flows during the current time step without having to iterate
- Estimates a base or natural streamflow from gaged or estimated streamflow, diversion, and reservoir data
- Performs extensive input data checking
- Provides extensive output reporting capabilities
- Operates on both a PC and a workstation
- Is available to the public and maintained by the State of Colorado

The Yampa Model is operated on a monthly time step from water years 1975 to 1991. It was developed in two steps as follows:

Phase II, completed in July, 1996, modeled 246 key diversion structures, 9 reservoirs, and 73 instream flow rights. Key structures were identified using the following approach:

- A list of diversion structures, based on the structure's net absolute decreed amounts, was compiled and ranked form largest to smallest.
- The list was shortened by including those structures that represent 75 percent of the basin's net absolute decreed amounts.
- Meetings were held with division and district engineers in the basin and the preliminary list of structures was refined to include structures that were considered important by the district engineers. Also, some structures were removed from the model because they historically diverted significantly less than the decree amount, they were abandoned or removed, or they had infrequent diversion records.

Phase IIIa enhanced the model to account for 100 percent of the basin's consumptive use. This enhancement featured the following changes from the Phase II model:

- Twenty-seven aggregated irrigation structures were added to represent 449 structures supplying 24,960 acres of irrigated land. These lands compose all land in the 1993 survey which were not explicitly modeled in the Phase II version of the model.
- Three aggregated reservoirs were added to represent 33,822 af of decreed storage not explicitly modeled in the Phase II model. This storage composes all decreed storage rights not explicitly modeled under Phase II.
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identified in Task Memo 2.09-12, "Consumptive Use Model Non-Irrigation Consumptive Use and Losses in the Yampa River Basin."

- Three aggregated municipal and industrial (M&I) nodes were added to represent 8,163 af of consumptive use not explicitly modeled in Phase II. This use represents all consumptive use exclusive of irrigation diversions, transmountain diversions, and evaporation from reservoirs and ponds, as identified in Task Memo 2.09-12, "Consumptive Use Model Non-Irrigation Consumptive Use and Losses in the Yampa River Basin."

- Consumptive use on the Green River within Colorado was added to the model as one aggregated node. This improvement assures that the model represents all use in Colorado above the Green River at the State Line.

- Miscellaneous refinements to the Phase II model.

Three data sets were developed for the Yampa Model: historical, calculated, and baseline. The historical data set was used to develop baseflows and calibrate parameters such as return flows. It provides results which allow the modeled hydrology to be checked against recorded streamflows along with the ditch efficiencies and return flow patterns to be evaluated.

The calculated data set uses the historical data set as its foundation but allows irrigation ditch systems and reservoirs to operate by demand. The demands are computed using the State's 1993 geographic information service (GIS) cropping patterns, historical climate data, and the Blaney-Criddle technique for estimating irrigation water requirement.

The baseline data set uses the calculated data set as its foundation, thus allowing selected ditch systems and reservoirs to operate by demand. A baseline data set has been prepared which, unlike the calibration data set, assumes all existing water resources systems were on line and operational from water years 1975 to 1991. This baseline set is appropriate for evaluating various "what if" scenarios over a long hydrologic time period containing dry, average, and wet hydrologic cycles.

4.0 MODELED HISTORICAL DATA DESCRIPTION

Three data sets were developed for the Yampa River Water Resources Planning Model (Yampa Model): the historical, the calculated, and the baseline. The historical data set was used to develop baseflows and calibrate the model. It provides results that allow the hydrology to be checked and ditch efficiency and return flows to be evaluated. The calculated data set builds upon the historical data set by allowing selected ditch systems and reservoirs to operate by demand rather than by historical diversions or end-of-month (EOM) contents. The baseline data set builds upon the calculated data by allowing reservoirs, structures, and operating rules that were constructed or have changed during the study period to operate in a consistent manner for the entire study period. This chapter describes the historical data set. Chapter 5 describes changes made for the calculated and baseline data sets.

The historical data set is presented in these five subsections:

4.1 River System
4.2 Diversions
4.3 Reservoirs
4.4 Instream Flows
4.5 Operating Criteria File

A detailed generic description of the Statemod input files can be found in the **State of Colorado's Stream Simulation Model (StateMod) Users' Manual. Appendix A** of this document lists all the input files for the Yampa Model. **Appendix B** describes structures that were modeled in a manner that was not consistent with standard modeling procedure. **Appendix C** contains structure-specific information along with summary discussions on various aspects of the modeling effort. **Appendix D** describes the Phase IIIa enhancements.

To simplify review and maintenance of this document, small tables are included with the text while large tables or those generated by StateMod are included at the end of the chapter. Table numbering corresponds to the section that introduces the table. For example, Table 4.1.1a is the first table referenced in section 4.1.1.

4.1 River System

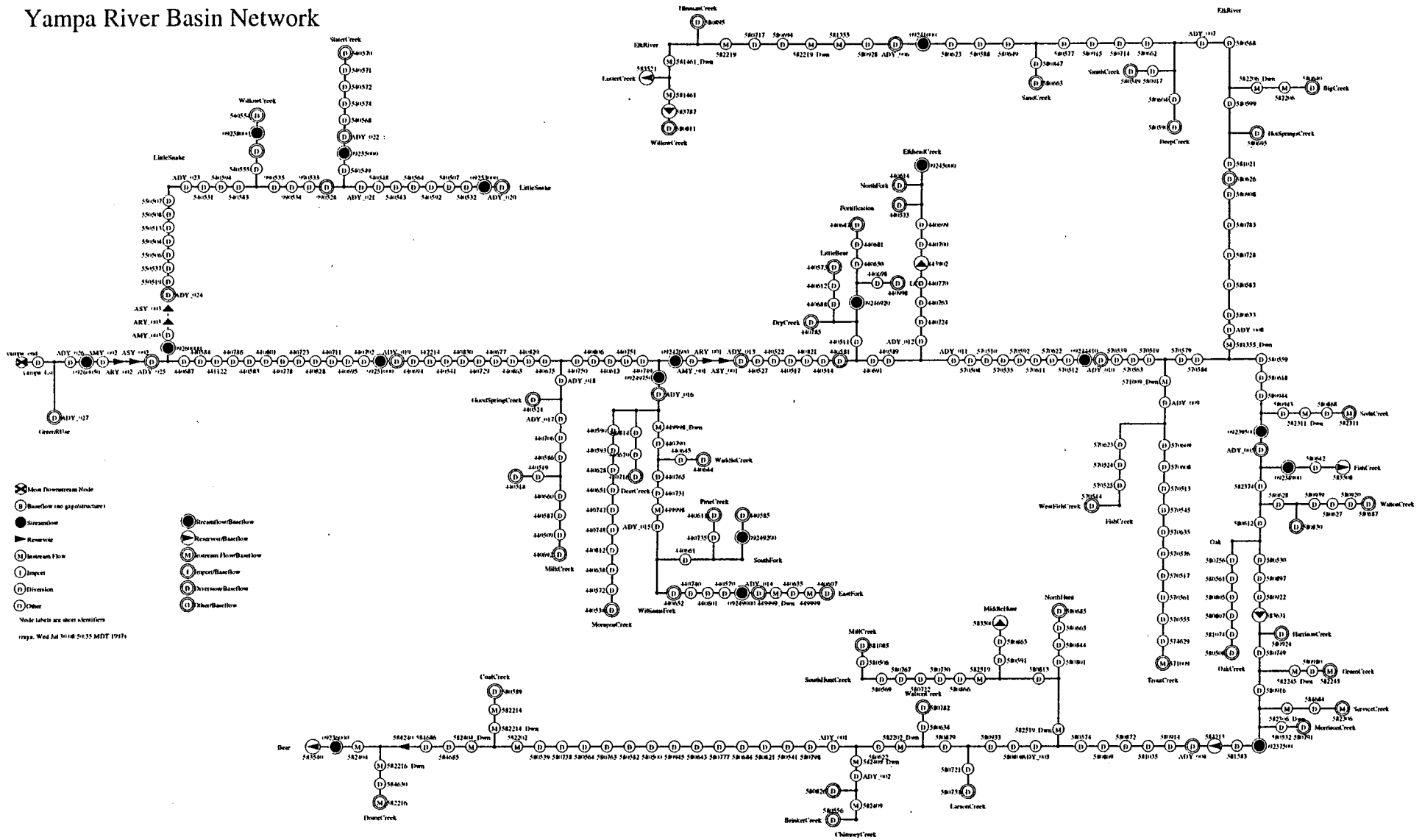
Five input files specify the Yampa River basin system in the Yampa model:

4.1.1 River Network File
4.1.2 River Station File
4.1.3 Base Streamflow File
4.1.4 Historical Streamflow File
4.1.5 Baseflow File

4.1.1 River Network File - yampaT.rin

The river network file describes the location and connectivity of each river location and structure modeled in the basin. The modeled network starts at the headwaters of the Bear River and ends at the Colorado-Utah state line. **Figure 4.1.1a** illustrates the modeled network. The river nodes use the same numbering convention as the United States Geological Survey (USGS) stream gaging stations,

Yampa River Basin Network



(i.e., 09000000). This convention allows the use of existing USGS stream gaging station IDs. **Appendix A** contains the yampa.rin file.

Phase IIIa enhancements that impacted the river network file included:

- adding twenty-seven aggregated irrigation demand nodes, three aggregated reservoirs, three aggregated stock ponds, and three aggregated municipal and industrial demand nodes (see Appendix D.3, D.10, and D.11);
- adding three nodes representing irrigation diversions in the Little Snake River basin within Wyoming to the Phase IIIa model; they replaced a single node in the Phase II model that represented irrigation consumptive use in the same basin within Wyoming (see Appendix D.14);
- adding a tributary, Dome Creek, to the Upper Bear River system, including a new instream flow reach and a small transmountain diverter located on the stream (see Appendix D.12(?));
- replacing 73 instream flow demand points in the Phase II model with 15 instream flow reaches (see Appendix D.1)
- adding Green River consumptive use (see Appendix D.4)
- adding a dummy diversion node immediately upstream of the terminus node; this change was required because StateMod does not permit return flows to the terminus node (see Appendix D.4).

Table 4.1.1a shows how many nodes of each type are in the Yampa Model.

TABLE 4.1.1A
River Network Elements

Type	Number
Diversion	279
Instream Flow	16
Reservoirs	15
USGS Gages	18
Total	328

4.1.2 River Station File - yampaT.ris

The river station file contains the name and location of base streamflow data in the river basin. The entries in this file correspond to the time series contained in the base streamflow file yampaTH.xbm. These input files are listed in **Appendix A**. As presented in **Table 4.1.1a**, gaged flows were included at 18 locations throughout the Yampa River basin. In addition, 68 ungaged baseflow points were included for a total of 86 hydrologic inflows to the Yampa Model.

Under Phase IIIa, 14 new baseflow nodes were added to the model. Twelve of these were aggregated irrigation structures that were placed immediately above either a gage or a Phase II baseflow node. These nodes (ADY_004, ADY_005, ADY_006, ADY_010, ADY_013, ADY_014, ADY_016, ADY_017, ADY_020, ADY_022, ADY_024, and ADY_025) became baseflow nodes with zero gain between them and the downstream gage or baseflow node. This approach was adopted for two reasons: 1) so that the total upstream depletions would be represented at the gage; and 2) so that the

gaged flow was available to the aggregated nodes. In addition, node ADY_027, representing the Green River use in Wyoming, was made a baseflow node in order to supply that use with water. Finally, the node at the head of Dome Creek (582216) was also configured as a baseflow node. Appendix D.3 and D.12 describe these Phase IIIa enhancements.

4.1.3 Base Streamflow File - yampaTH.xbm

Base streamflows represent gaged and ungaged streamflows that have had the impact of historical diversions, return flows, and reservoir operations removed. These are the flow conditions upon which diversion, reservoir, and minimum streamflow demands are superimposed. The file yampaTH.xbm contains base streamflows estimates from water years 1975 to 1991 at the locations listed in the river station file, yampaT.ris. It was generated by the baseflow module of StateMod using historical streamflows, diversions, EOM contents of modeled reservoirs, and estimated diversion efficiencies and return flow patterns. **Table 4.1.3a** shows the baseflows at all gage locations, comparing them with historical, measured streamflow.

Phase IIIa enhancements that impacted the base streamflow file included revision of drainage areas and average precipitation data at selected locations, as described in Appendix D.13.

TABLE 4.1.3A
Streamflow Comparison
Average Annual Flow (acre-feet/year) 1975-1991

#	USGS #	Name	Base Streamflow	Historical Streamflow	Difference
1	9236000	BEAR RIVER NEAR TOPO FLO	28361	28246	114
2	9237500	YAMPA RIVER BELOW ST FLO	80094	63374	16720
3	9238900	FISH CR AT UPPER STA FLO	46044	44097	1947
4	9239500	YAMPA RIVER AT STEAM FLO	353920	327050	26870
5	9241000	ELK RIVER AT CLARK FLO	238029	231396	6632
6	9244410	YAMPA RIVER BELOW DI FLO	799084	744721	54363
7	9245000	ELKHEAD CREEK NEAR E FLO	43001	43001	0
8	9246920	FORTIFICATION CREEK FLO	9745	8710	1035
9	9247600	YAMPA RIVER BELOW CR FLO	1021775	941676	80099
10	9249000	EAST FORK OF WILLIAM FLO	87995	86452	1543
11	9249200	SOUTH FORK OF WILLIA FLO	31397	31381	16
12	9249750	WILLIAMS FORK AT MOU FLO	175750	168243	7507
13	9251000	YAMPA RIVER NEAR MAY FLO	1249587	1142093	107494
14	9253000	LITTLE SNAKE RIVER N FLO	173532	171533	1999
15	9255000	SLATER FORK NEAR SLA FLO	65130	61880	3250
16	9258000	WILLOW CREEK NEAR DI FLO	8407	8108	299
17	9260000	LITTLE SNAKE RIVER N FLO	482123	422016	60107
18	9260050	YAMPA RIVER AT DEERL FLO	1754041	1591941	162099

4.1.4 Historical Streamflow File - yampa.rih

The yampa.rih file contains historical streamflow records or estimates that are used for baseflow generation and model calibration. **Table 4.1.3a** summarizes the gages used and their average annual flow. **Appendix C, Section 7** gives the technique used to fill data gaps, along with the data filling results. The locations of streamflow gages modeled are shown in **Figure 4.1.1a**. For a more detailed discussion on the historical streamflow file, see the **StateMod Users' Manual**.

Approximately 26 USGS streamflow gages were initially identified for inclusion in the Yampa Model. Not all gaging stations were in operation during the entire study period, and of the 26 gaging stations identified, 18 were used. **Table 4.1.3a** presents the historical flows for the water years 1975-1991 and the average estimated natural flows at each of the 18 USGS gages used in the baseflow development and model calibration.

The Phase IIIa enhancements did not impact the historical streamflow file.

4.1.5 Baseflow File - yampa.rib

The baseflow file contains the information that allows baseflows estimated at gaged locations to be distributed to ungaged locations throughout the basin. Proration factors were developed at selected points throughout the river basin using the following guidelines:

- The most upstream diversion structure in each tributary
- Critical points of interest, such as river confluence points
- All reservoir locations

The yampa.rib input file contains the proration factors used by StateMod to distribute gaged flows throughout the river basin. At a given baseflow location, proration factors were developed using one of two techniques, the gain approach or the nearby gage approach. For the gain approach, proration factors were defined as the fraction of the reach gain that was estimated to be tributary to a baseflow point. These factors were determined by normalizing the local volumetric runoff (local area times local average precipitation) by the corresponding incremental runoff. The incremental runoff was determined by taking the difference of the total volumetric runoff between successive USGS gage locations.

The gain approach was used as the default technique in the Yampa Model. However, at several locations, the prorated hydrograph developed using the gain approach showed an attenuated shape that was not representative of a "natural" hydrograph. This occurred predominantly in the headwater areas where the hydrograph is dominated by runoff from spring snow melt. In these situations, the nearby gage approach was used. For the nearby gage approach, the proration factor was determined as a function of a stream gage in a neighboring tributary, by comparing the local volumetric runoff. This procedure was applied to the following tributaries:

Tributary Name	Baseflow WDID	Neighboring Gage
Coal Creek	580589	09236000
Brinker Creek	580556	09236000
Fork Chimney Creek	580826	09236000
Watson Creek	580782	09236000
Larson Creek	580731	09236000
North Hunt Creek	580685	09236000
Mill Creek	581085	09236000
Upper Bear River	583540	09236000
Dome Creek	582216	09236000
Middle Hunt Creek	583500	09237500
Middle Hunt Creek	580590	09241000
Walton Creek	580687	09238900
Soda Creek	582311	09238900
Deep Creek	580590	09241000
Sand Creek	580663	09241000
Smith Creek	580549	09241000
Milk Creek	440692	09249750
Stincking Gulch	440518	09249750
Good Spring Creek	440524	09249750
Little Bear Creek	440573	09246920
Green River	ADY_027	09260000

All areas were taken from the original GIS computations. The final proration factor file (yampa.rib) for the StateMod implementation for the Yampa River basin can be found in **Appendix A.**

4.2 Diversions

Diversions are described in the Yampa Model by five files:

4.2.1 Direct Diversion Station File
4.2.2 Return Flow Delay File
4.2.3 Historical Diversion File
4.2.4 Direct Diversion Demand File
4.2.5 Direct Diversion Right File

4.2.1 Direct Diversion Station File - yampaT.dds

The file yampaT.dds describes the physical properties of each diversion simulated in the Yampa Model. As described in **Table 4.1.1a**, 279 diversion structures were modeled. **Table 4.2.1a** presents the structures that were modeled, their capacity, area served, average annual system efficiency, and average annual demand. Structures with zero or -999 acres, zero efficiency, or 100 percent efficiency represent municipal, industrial, and/or transbasin diversions.

Six-digit structure IDs are included in the direct diversion station file. The six-digit ID is a combination of water district number and structure ID obtained from the Division of Water Resources' (DWR's) structure and water rights tabulations. Aggregated irrigation structures were given the identifiers "ADY_xxx", for Aggregated Diversion Yampa; the "xxx" ranged from 001 to 027. Similarly, aggregated municipal and industrial structures were named "AMY_xxx" for Aggregated Municipal Yampa. The Wyoming diversion nodes were given custom identifiers 990528, 990533, 990534, and 990535, having no particular significance except that they are clearly different from identifiers drawn from the DWR database.

System efficiencies describe the percentage of diverted water that is consumed. The portion of the diversion that is not consumed returns to the stream system and is available for subsequent diversion. Efficiencies were estimated for different structure types as follows:

- For explicitly modeled irrigation structures, a constant efficiency was determined for each month of the year based on the ratio of average historical monthly diversions and the estimated farm irrigation requirement.
- For aggregated irrigation diversions, including the Wyoming irrigation structures, monthly efficiencies were assigned to be the basinwide average acreage-weighted efficiency of explicitly model structures.
- For explicitly modeled M&I diversions a constant efficiency was adopted based on use and engineering judgment.
- For aggregated M&I diversions, efficiency was set to 100 percent because demands were modeled as depletions.
- Transmountain diversions were given an efficiency of 100 percent because the water leaves the basin.

Return flow locations specify where return flows will re-enter the stream system. **Table 4.2.1b** presents the return flow locations and patterns for each modeled structure. The delay patterns are described in more detail in Section 4.2.2.

Phase IIIa enhancements that impacted the diversion structure file included addition of the twenty-seven aggregated irrigation nodes, one explicitly modeled transmountain diversion, and three aggregated municipal and industrial nodes; and replacement of one node representing Wyoming irrigation depletions with three nodes representing the same use as diversions. Appendix D.3 lists the individual structures associated with each aggregated diversion. Appendix D.10 describes inclusion of the aggregated municipal and industrial demands.

The data sources for each key field in yampaT.dds are listed in **Table 4.2.1c.**

TABLE 4.2.1C
Primary Data Source Summary

Key Field	Data Source
Explicit Diversion ID	State Engineer's Office
Aggregated Diversion ID	User-defined
Diversion Capacity	State Engineer's Office
Acre Irrigated	State Engineer's Office
Historical Diversions	State Engineer's Office
System Efficiencies	Calculated
Return Flow Locations	W.W. Wheeler

4.2.2 Return Flow Delay File - yampaT.dly

The yampaT.dly file describes the estimated re-entry of return flows into the river system. These lagged times typically represent the combination of surface and subsurface returns. As presented in **Table 4.2.2a,** five patterns were used; none exceeded six months in duration. Agricultural rights were assigned return flow Pattern 1. Municipal and industrial rights were assigned return flow Pattern 4. The Pattern 5 return flow was used by the snowmaking diversions. **Appendix C, Section 9** documents the development of the irrigation return flow patterns.

Phase IIIa enhancements did not affect the return flow delay file.

TABLE 4.2.2A
Return Flow Properties (percent)

Pattern	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Total
1	75.5	17.5	5.5	1.5	0	0	100
2	40	30	20	10	0	0	100
3	51	35	11	3	0	0	100
4	100	0	0	0	0	0	100
5	0	0	0	0	0	100	100

A separate study was conducted by W.W. Wheeler and Associates to determine the modifications to the return flow lag patterns based on the distance between the stream and the irrigated parcel. It was the conclusion of this study that the single lag pattern (Pattern 1) employed in the Yampa Model is adequate.

4.2.3 Historical Diversion File - yampaT.ddh

The historical diversion data file summarized in the rightmost column of **Table 4.2.1a** contains diversion estimates for each of the structures modeled in the basin. Monthly historical diversions were used to estimate baseflows at the stream gage locations and designated baseflow locations.

In addition, historical diversions were used for calibration. The following assumptions were made concerning the explicitly modeled historical diversions:

- A monthly historical demand time series for the entire study period, i.e. water years 1975-1991, was developed for each diversion structure.

- Missing monthly values were filled with averages if the structure existed during the study period or zero if it had not been constructed.

All data filling was accomplished through the **demandts** utility, which used diversion records from the Colorado River Decision Support System (CRDSS) database and formatted the time series for input into StateMod. The program reads the direct diversion station file (yampaT.dds) and accesses the CRDSS database for the appropriate diversion time series.

For aggregated irrigation structures, the CRDSS CU model was executed for all the individual structures represented by the aggregations. The irrigation water requirements for the individual structures within an aggregation were summed by **demandts,** to produce an irrigation water requirement for each aggregated structure. **Demandts** also divided this requirement for each aggregation by basinwide average system efficiency to produce an estimate of the historical diversions attributable to the structure.

For aggregated municipal and industrial structures, historical diversions were set to the depletions estimated for these structures, and efficiencies were set to 100 percent, as described in **Section 4.2.1**

Because of the Stillwater Ditch delivers water to both the Yampa and Colorado river basins, two historical time series were developed for this structure, one to represent inbasin deliveries and the other to represent transmountain deliveries. These time series were developed outside the CRDSS database for inclusion in the yampaT.ddh input file. The methodology employed to create the two time series is described in **Appendix B, Section 2.1.**

Because Wyoming diversion structures are not included in the CRDSS database, time series for their historical depletions were also developed outside the database. The depletion amounts used to model Wyoming diversions are discussed in **Appendix B, Section 2.2.**

Phase IIIa enhancements that impacted the historical diversion file included addition of twenty-seven aggregated irrigation nodes, one explicitly modeled transmountain diversion, and three aggregated municipal and industrial nodes; and replacement of one node representing Wyoming irrigation depletions with three nodes representing the same use as diversions. Appendix D.9 describes how these changes were made.

4.2.4 Direct Diversion Demand File - yampaTH.ddm

Three direct diversion demand files were developed: computed (yampaTC.ddm), baseline (yampaTB.ddm), and historical (yampaTH.ddm). The historical direct diversion demand file is

equivalent to the historical diversion file (yampaT.ddh). Section 5 describes how demands were estimated for the calculated and baseline data sets.

4.2.5 Direct Diversion Right File - yampaT.ddr

The yampaT.ddr file contains water rights information for each structure in the direct diversion station file, yampaT.dds. **Table 4.2.5a** presents the administration number and decreed amount for each structure modeled. These two values were determined for different structure types as follows:

- Water rights for explicitly modeled structures were taken from the CRDSS database and match the State Engineer's official water rights tabulation. Free water rights, with an extremely junior administration number of 999999.00000, were added for these structures whenever historical diversions were observed to exceed decreed rights during calibration.
- Aggregated irrigation structures were assigned up to eight water rights, one from each of eight classes or mutually exclusive ranges of administration number. The decreed amount for each right for a given aggregation was set to the sum of all water rights that 1) were associated with individual structures represented by the aggregation, and 2) had an administration number that fell within the water right class. The administration number for each right was calculated as the average administration number of the individual water rights in the class, weighted by their decreed amount. See Appendix D.5 for a description of the water rights classes and how they were established.
- Aggregated M&I water rights were assigned an amount equal to their depletion and assigned an administration number of 1.00000.

4.3 Reservoirs

Reservoirs are described in the Yampa Model by five input files:

4.3.1 Reservoir Station File
4.3.2 Net Evaporation File
4.3.3 EOM Content File
4.3.4 Reservoir Target File
4.3.5 Reservoir Right File

4.3.1 Reservoir Station File - yampaT.res

The yampaT.res file describes the physical properties of each reservoir simulated in the Yampa River basin. **Table 4.3.1a** summarizes the key data associated with each of the reservoirs modeled. **Appendix C, Section 10** discusses the specific operations of each explicitly modeled reservoir. **Appendix D.11** describes the aggregated reservoirs.

TABLE 4.3.1A
Reservoir Summary

#	ID #	Name	Location	Capacity (acre-feet)	# Owners
1	583540	STILLWATER RES NO 1	YAMP_STILLWATER RES_RES	6392.	8
2	584240	YAMCOLA RES	YAMP_YAMCOLA RES_RES	9096.	12
3	583500	ALLEN BASIN RES	MIDD_ALLEN BASIN RES_RES	2250.	3
4	584213	STAGECOACH RESERVOIR	YAMP_BEAR RES WESSEL_RES	33275.	5
5	583631	LAKE CATAMOUNT	YAMP_LAKE CATAMOUNT RES	7422.	1
6	583508	FISH CREEK RES	MIDD_FISH CREEK RES_RES	4042.	1
7	583787	STEAMBOAT LAKE	WILL_UPPER WILLOW CR_RES	26364.	2
8	583521	LESTER CR RES	LEST_LESTER CR RES_RES	5657.	1
9	443902	ELKHEAD RESERVOIR	ELKH_ELK HEAD RESERV_RES	13699.	3
10	ARY_001	ARY_001_YampaRbelCraig	ARY_001_YampaRbelCra_RES	23206.	1
11	ARY_002	ARY_002_Yampa@Deerlodge	ARY_002_YampaR@Deerl_RES	9122.	1
12	ARY_003	ARY_003_LSnakeRnrLily	ARY_003_LSnakeRnrLil_RES	1494.	1
13	ASY_001	ASY_001_YampaRbelCraig	ASY_001_YampaRbelCra_RES	8344.	1
14	ASY_002	ASY_002_YampaR@Deerlodge	ASY_002_YampaR@Deerl_RES	4441.	1
15	ASY_003	ASY_003_LSnakeRnrLily	ASY_003_LSnakeRnrLil_RES	3173.	1

Nine reservoirs were modeled explicitly in the Yampa Model; these included eight reservoirs that have a capacity greater than the cutoff value of 4,000 acre-feet and one reservoir with a capacity less than the cutoff value. Of the smaller reservoirs, Fish Creek Reservoir was included because it is the major municipal storage facility for the city of Steamboat Springs and the Mt. Werner Water & Sanitation District and because it is presently being enlarged to a total capacity of approximately 4,042 acre-feet. The enlargement was completed in the fall of 1995. Although Fish Creek Reservoir is modeled at its current, enlarged capacity, its storage target for the study period was set to 1,842 acre-feet, which is the pre-enlargement storage volume. Allen Basin Reservoir was included because it was identified as a key storage source for many of the direct flow water rights in the upper reaches of Hunt Creek and because it is directly related to a large transbasin feeder ditch, the Allen Basin Supply Ditch.

Six aggregated reservoirs were added to the model under Phase IIIa to represent all of the absolute decreed storage (ARY_001, ARY_002, and ARY_003) and all of the stockponds (ASY_001,

ASY_002, and ASY_003) in the basin that were not modeled explicitly. The geographical areas represented by each structure are shown in **Table 4.3.1b.**

TABLE 4.3.1B
Areas Represented by Aggregated Reservoirs

ARY_001	Water Districts	57 & 58
ARY_002	Water District	44
ARY_003	Water Districts	54 & 55
ASY_001	Hydrologic Unit	14050001
ASY_002	Hydrologic Unit	14050002
ASY_003	Hydrologic Unit	14050003

Parameters related to the physical capacity of the reservoirs included dead storage, where applicable, total active storage, and area-capacity tables. For the explicitly modeled reservoirs, these data were obtained from either the Division Engineer or the reservoir owners. For the aggregated reservoirs, the data were estimated based on storage decrees and Task Memo 2:09-12, "Consumptive Use Model Non-Irrigation Consumptive Use and Losses in the Yampa River Basin, as described in Appendix D.11.

The initial yampaT.res file was modified manually to reflect the operational ownerships within each reservoir. The reservoir account ownership information was obtained from interviews with the division engineer, the assistant division engineer, the local water commissioners, and in most cases the owner/operator of the subject reservoirs. A more detailed discussion of the operations of these reservoirs is presented in **Appendix C, Section 10.**

Each account in the explicitly modeled reservoir was tied to a diversion structure that had rights to reservoir water. For situations in which the owner of storage water irrigates land under more than one ditch system, an assumption was made that the storage account will be allocated equally to each ditch system. Although this procedure may not accurately reflect actual use of reservoir storage water from year to year, it was considered adequate for purposes of the Yampa Model, particularly since the amounts of storage water so allocated were relatively small (typically less than 300 acre-feet). For each diversion structure having storage rights, the cumulative storage water available from each individual ownership is summarized in **Appendix C, Section 10.** All data required to construct the yampaT.res file were obtained from either the Division engineer or directly from the Owners.

The One Fill Rule Administration date was set to April 1 for all explicitly modeled reservoirs, and October 1 for the aggregated reservoirs.

Phase IIIa enhancements that impacted the reservoir station file include adding three aggregated reservoirs and three aggregated stockponds. Appendix D.11 describes these Phase IIIa enhancements.

4.3.2 Net Evaporation File - yampaT.eva

The evaporation file (yampaT.eva) contains annual evaporation data (12 average values for every year).

4.3.2.1 Estimation of Annual Net Evaporation

The annual net reservoir evaporation was estimated by subtracting the weighted average effective monthly precipitation from the estimated gross monthly free water surface evaporation.

Annual estimates of gross free water surface evaporation were taken from the National Oceanic and Atmospheric Administration (NOAA) Technical Report NWS 33. The annual estimates of evaporation were distributed to monthly values based on elevation through the distributions listed in **Table 4.3.2a**. These monthly distributions are those used by the State Engineer's Office.

TABLE 4.3.2A
Monthly Distribution of Evaporation as a Function of Elevation (percent)

Month	Greater than 6,500 ft	Less than 6,500 ft
Jan	3.0	1.0
Feb	3.5	3.0
Mar	5.5	6.0
Apr	9.0	9.0
May	12.0	12.5
Jun	14.5	15.5
Jul	15.0	16.0
Aug	13.5	13.0
Sep	10.0	11.0
Oct	7.0	7.5
Nov	4.0	4.0
Dec	3.0	1.5

Table 4.3.2b shows the net monthly free water surface evaporation estimates for the Yampa River basin.

TABLE 4.3.2B
Net Monthly Free Water Surface Evaporation (inches)

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Yampa	.13	-.01	-.11	-.12	-.03	.06	.15	.28	.40	.39	.29	.25

The following precipitation stations were used in the calculation of annual net reservoir evaporation for the Yampa basin.

- Steamboat Springs
- Yampa

The Phase IIIa enhancements did not impact the annual net evaporation file.

4.3.3 EOM Content File - yampaT.eom

The historical EOM reservoir contents for the water years 1975-1991 for each reservoir modeled in the Yampa River basin are used by the baseflow simulation component to simulate reservoir storage

and evaporation impacts on gaged streamflows. The contents are also used in the historical reservoir target file for calibration.

The following assumptions were made to create the EOM reservoir content data file:

- If an observation for the last day of the month was available from the CRDSS database, it was used directly as the EOM value.

- If an observation for the last day of the month was not available from the CRDSS database, the observation closest to the last day of the month within 15 days of the last day of the month was used.

- If no observations existed within 15 days of the last day of the month, a search for the nearest observation forward and backward in time from the last day of the month was made, and a linear interpolation was made to obtain the EOM value.

- The period prior to the construction of a reservoir was filled with values of zero. It was assumed that the first date encountered in the database was the date of construction

- End-of-month content for the aggregated reservoirs was assigned as follows: 100 percent full from October to June, 75 percent full at the end of July, 25 percent full at the end of August, and empty at the end of September. This schedule was developed to simulate reservoir use as a supplemental irrigation supply during late summer.

- End-of-month content for aggregated stockponds was estimated as full at all times, because historical data are unavailable.

Appendix C, Section 7.3 discusses the alternate data sources for each reservoir. **Table 4.3.3a** presents the data period available for each explicitly modeled reservoir as well as target levels.

TABLE 4.3.3A
Reservoir EOM and Target Data

Reservoir	Period of Record	Operational Target
Stillwater	1950-1993	Full
Yamcolo	1980-1993	Full
Allen Basin	1909-1993	Full
Stagecoach	1988-1993	Full
Lake Catamount	1977-1993	Full
Fish Creek	1956-1993	Full
Steamboat Lake	1974-1993	Full
Lester Creek	1974-1993	Full
Elkhead	1976-1993	Full

Phase IIIa enhancements that impacted the reservoir end-of-month content file included adding three aggregated reservoirs and three aggregated stockponds. Appendix D.11 describes these Phase IIIa enhancements

4.3.4 Reservoir Target File - yampaT.tar

Reservoir EOM content targets (or monthly rule curves) are required to operate the Yampa Model.

Two target files were created for the Yampa River basin, a historical target file (yampaTH.tar) and a target file that reflects the current operating policies at each reservoir (yampaTB.tar). The yampaTB.tar file sets the maximum target at each explicitly modeled reservoir to full and the minimum content to zero. For the aggregated reservoirs the targets were set to meet a 25% release in July, 50% release in August, 25% release in September and 100% full the remainder of the year. For the aggregated stockponds, the targets were set to full capacity. The yampaTH.tar file sets the maximum target at each explicitly modeled reservoir to its historical EOM content and the minimum content to zero.

Phase IIIa enhancements that impacted the reservoir target file include adding three aggregated reservoirs and three aggregated stockponds. Appendix D.11 describes these Phase IIIa enhancements

4.3.5 Reservoir Right File - yampaT.rer

The yampaT.rer file contains the water rights associated with each reservoir in the reservoir station file. **Table 4.3.5a** summarizes for each modeled reservoir and right the administration number, decreed amount, and whether the right is used as a first or second fill. Attributes of the water rights were determined for different structure types as follows:

- Water rights for explicitly modeled reservoirs were taken from the CRDSS database and correspond to the State Engineer's official water rights tabulation.

- Aggregated reservoirs were assigned up to eight rights, one from each of eight classes of water rights. Each aggregated right was given a decreed amount equal to the sum of the decreed storage for all water rights for the individual reservoirs represented by the aggregation, which fell within the given water right class. Each aggregated right was given an administration number calculated as the average administration number of all individual storage rights in the class (as tabulated in the CRDSS database), weighted by the decree amount. Water right classes were the same as those used for aggregating irrigation diversion rights (see Appendix D.5).

- Aggregated stock ponds were assigned a decreed amount equal to their capacity, and an administration number of 1.00000.

Phase IIIa enhancements that impacted the reservoir right file include adding three aggregated reservoirs and three aggregated stockponds. Appendix D.11 describes these Phase IIIa enhancements

4.4 Instream Flows

Instream flows are described in the Yampa Model by three files:

4.4.1 Instream Station File
4.4.2 Instream Demand File
4.4.3 Instream Right File

4.4.1 Instream Station File - yampaT.isf

Table 4.4.1a shows the instream flow reaches included in the Yampa Model along with their location and average annual demand based on decree amount. **Section 4.4.2** describes how instream demands were estimated.

Phase IIIa enhancements that impact the instream station file include replacing 73 instream flow points with 15 instream flow reaches. This enhancement, which involved revising the StateMod program, was implemented to satisfy instream flow decree requirements. Secondly, an instream flow reach was added to the Yampa model on Dome Creek, a Bear River tributary that was newly included under Phase IIIa. Appendixes D.1 and D.12 describe these Phase IIIa enhancements.

4.4.2 Instream Demand File- yampaT.ifa

Instream flow demands were developed from decreed amounts and comments in the state engineer's water rights tabulation. Twelve monthly instream flow demands were used for each year of the simulation. The file yampaT.ifa contains monthly demands for each instream flow structure included in the Yampa Model.

Phase IIIa enhancements that impacted the instream demand file are the same as those described in Section 4.4.1. Appendixes D.1 and D.12 describe these Phase IIIa enhancements.

4.4.3 Instream Right File - yampaT.ifr

Water rights for each instream flow reach modeled in the Yampa River basin are contained in the yampaT.ifr file. **Table 4.4.3a** summarizes the administration number and decreed amount for each instream flow reach modeled. These data were obtained from the CRDSS database and correspond to the State Engineer's official water rights tabulation.

4.5 Operating Criteria File

The operating criteria file (yampaTH.opr) describes unique reservoir operations required to simulate the Yampa River basin. Entries for explicitly modeled reservoirs were based on the special water rights operations developed by W.W.Wheeler, **Appendix C, Section 10**. To simplify review, they are arranged by water supply into the following:

4.5.1 Stillwater Reservoir
4.5.2 Yamcolo Reservoir
4.5.3 Allen Basin Reservoir
4.5.4 Stagecoach Reservoir
4.5.5 Lake Catamount
4.5.6 Fish Creek Reservoir
4.5.7 Steamboat Lake Reservoir
4.5.8 Elkhead Reservoir
4.5.9 Lester Creek Reservoir
4.5.10 Aggregated Operational Reservoirs

Phase IIIa enhancements that impacted the operating criteria file include adding three aggregated reservoirs. Appendix D.11 describes these Phase IIIa enhancements.

4.5.1 Stillwater Reservoir

Stillwater Reservoir No. 1 (WDID 583540) is the most upstream of the major reservoirs in the Yampa River (Bear River) drainage. It is owned by the Bear River Reservoir Company and is used to provide supplemental irrigation water supplies to a number of individuals served by several of the major direct flow structures in the upper Bear River. The reservoir has a decreed capacity of 6,392 acre-feet and carries an appropriation date of January 9, 1935 (State Administration Number 33782.31054), making it one of the most senior storage decrees in the Yampa River basin. Although it is reported that the outlet for the reservoir is at the bottom of the reservoir, the reservoir company and the water commissioner consider the active storage to be approximately 5,175 acre-feet. This is further evidenced by the reservoir shareholder list, which allocates 5,175 acre-feet among 22 shareholders. Using reservoir and ditch ownership data provided by the division engineer, the individually owned storage accounts in Stillwater Reservoir No. 1 were grouped according to the ditch structures that serve the irrigated land owned by those individuals. Because of the relatively small size of some of these sub-accounts, the smaller ownerships were aggregated into a single account (agg-pool). Stillwater is operated with eight accounts and one water right as shown in **Tables 4.5.1a-c**:

TABLE 4.5.1A
Stillwater Reservoir Accounts

Reservoir	Account	Owner	Capacity (acre-feet)
Stillwater	1	BIGMESA	444
Stillwater	2	COALCR	435
Stillwater	3	LINDSEY	394
Stillwater	4	MANDALL	386
Stillwater	5	STILLWTRCO	979

TABLE 4.5.1A
Stillwater Reservoir Accounts

Reservoir	Account	Owner	Capacity (acre-feet)
Stillwater	6	STILLWTRYA	1,352
Stillwater	7	AGG-POOL	1,185
Stillwater	8	UNALLOC	1,217

Note: The last account (Unalloc) is used to store water that is not released operationally. Water is stored in this account to reduce the total decreed storage (6,392 acre-feet) so that it matches the active storage (5,175 acre-feet).

TABLE 4.5.1B
Stillwater Reservoir Storage Rights

Structure ID	Reservoir	Administration No.	Amount (acre-feet)	Fill
583540	Stillwater	33782.31054	6,392	1

Note: The single storage right for Stillwater Reservoir is used to fill all eight accounts.

TABLE 4.5.1C
Stillwater Reservoir Operating Rights

System	Admin #	Type	Description
OPR STILLWATER TO ACTON	33782.31055	2	Release to direct diversion
OPR STILLWR TO BIGMESA	35924.00002	2	Release to direct diversion
OPR STILLWATER TO BIRD	33782.31055	2	Release to direct diversion
OPR STILLWR TO BUCK-MAND	33782.31055	2	Release to direct diversion
EXCHSTILLWATER TO COALCR	35320.34866	4	Exchange to direct diversion
OPR STILLWATER TO FIX	33782.31055	2	Release to direct diversion
OPR STILLW TO HERN-KOLBE	51134.44105	2	Release to direct diversion
OPR STILLWTR TO LINDSEY	33782.31055	2	Release to direct diversion
OPR STILLWTR TO MANDALL	33782.31055	2	Release to direct diversion
OPR STILLWTR TO MILL-NOI	51134.44105	2	Release to direct diversion
OPR STILLWATER TO PENN	33782.31055	2	Release to direct diversion
OPR STILLW TO STILLWTRD	33782.31055	2	Release to direct diversion
OPR STILLW TO STILLWTRD	33782.31055	2	Release to direct diversion

There are three types of StateMod operations used to model the operating policies of Stillwater Reservoir: 1) a release from storage to a direct diversion downstream (type 2), 2) a release from storage in exchange for a direct diversion elsewhere in the system (type 4), and 3) a release from storage to an instream demand (type 3).

Operating right 1 releases water from account 7 to the Acton Ditch (580500). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Stillwater Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 2 releases water from account 1 to the Big Mesa Ditch (580539). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the

storage right at Stillwater Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 3 releases water from account 7 to the Bird Ditch (580541). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Stillwater Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 4 releases water from account 7 to the Buckingham Mandall Ditch (580564). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Stillwater Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 5 releases water from account 2 in exchange for water diverted by the Coal Creek Ditch (580589). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Stillwater Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 6 releases water from account 7 to the Fix Ditch (580643). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Stillwater Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 7 releases water from account 7 to the Hernage and Kolbe Ditch (580684). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Stillwater Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 8 releases water from account 3 to the Lindsey Ditch (580738). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Stillwater Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 9 releases water from account 4 to the Mandall Ditch (580763). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Stillwater Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 10 releases water from account 7 to the Mill Ditch No. 1 (580777). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Stillwater Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 11 releases water from account 7 to the Pennsylvania Ditch (580821). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Stillwater Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 12 releases water from account 6 to the Stillwater Ditch irrigating in Division 6 (584685). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Stillwater Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 13 releases water from account 5 to the Stillwater Ditch irrigating in Division 5 (584686). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Stillwater Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

4.5.2 Yamcolo Reservoir

Yamcolo Reservoir (WDID 584240) is owned and operated by the Upper Yampa Water Conservancy District (UYWCD) and is used to provide supplemental irrigation water supplies to the critically water short reaches of the upper Yampa River (Bear River). According to an elevation-area-capacity table obtained from the UYWCD, the total capacity of the reservoir at the spillway is approximately 9,096 acre-feet, and the capacity at the invert of the outlet works (dead storage) is approximately 1,068 acre-feet, resulting in an active capacity of approximately 8,028 acre-feet. Yamcolo is operated with 12 accounts and 6 water rights as shown in **Tables 4.5.2a-c**.

TABLE 4.5.2A
Yamcolo Reservoir Accounts

Reservoir	Account	Owner	Capacity (acre-feet)
Yamcolo	1	BIGMESA	500
Yamcolo	2	BIRD	300
Yamcolo	3	COALCR	300
Yamcolo	4	LINDSEY	550
Yamcolo	5	YAMCOIRRCO	241
Yamcolo	6	YAMCOIRRYA	272
Yamcolo	7	STAGECONCO	343
Yamcolo	8	STAGECONYA	3,092
Yamcolo	9	YAMCONOOWN	837
Yamcolo	10	STAGENOOWN	565
Yamcolo	11	YAMCOLOM&I	1,010
Yamcolo	12	CONSVPOOL	1,086

The active storage in Yamcolo Reservoir is allocated by assigning 1,010 acre-feet for municipal uses, 3,000 acre-feet to the Yamcolo Irrigators Association for irrigation in the upper reaches of the Bear River, and 4,000 acre-feet to the Colorado-Ute Electric Association (Tri-State Generation and Transmission Association [Tri-State's] predecessor) for industrial uses. The dead storage of approximately 1,086 acre-feet is reserved as a conservation pool.

The Yamcolo Irrigators' Association currently consists of approximately 18 individuals who irrigate land under several of the major ditch structures in the upper Bear River. Using reservoir account and land ownership data provided by the water commissioner, the reservoir accounts were grouped according to the structures that are used to serve the irrigated land owned by those individuals. Because of the relatively small size of some of these sub-accounts, the smaller ownerships were aggregated into a single account (Yamconoown).

TABLE 4.5.2B
Yamcolo Reservoir Storage Rights

Structure ID	Reservoir	Admin #	Amount (acre-feet)	Fill
584240	Yamcolo	41329.00000	6,531	1
584240	Yamcolo	41727.39991	2,500	1
584240	Yamcolo	47481.37136	1,000	1
584240	Yamcolo	51134.47905	314	1

Based on the 1992 agreement, the storage right for 6,531 acre-feet is used to fill the following accounts:

- Yamcolo municipal and industrial pool, account 11 - 1,010 acre-feet
- Yamcolo Irrigators' Association, accounts 1 through 6 - 3,000 acre-feet
- Yamcolo Irrigators' Association and Stagecoach contract, - 2,521 acre-feet accounts 1 through 8

It is also noted that among the three general accounts in Yamcolo Reservoir, the municipal account has the senior priority with respect to filling its 1,010 acre-foot account, the Yamcolo Irrigators' Association has the second priority to fill its 3,000 acre-foot account, and the Stagecoach Contract water has the last priority during years when the reservoir cannot fill because of an insufficient physical supply.

The storage rights for 2,500, 1,000, and 314 acre-feet are used to fill all 12 accounts.

TABLE 4.5.2C
Yamcolo Reservoir Operating Rights

System	Admin #	Type	Description
OPR YAMCOLO TO ACTON	51134.47906	2	Release to direct diversion
OPR YAMCOLO TO BIGMESA	51134.47906	2	Release to direct diversion
OPR YAMCOLO TO BIRD	51134.47906	2	Release to direct diversion
OPR YAMCOLO TO BUCK-MAND	51134.47906	2	Release to direct diversion
EXCHYAMCOLO TO COALCR	51134.47906	4	Exchange to direct diversion
OPR YAMCOLO TO FIX	51134.47906	2	Release to direct diversion
OPR YAMCOLO TO HERN-KOLBE	51134.47906	2	Release to direct diversion
OPR YAMCOLO TO LINDSEY	51134.47906	2	Release to direct diversion
OPR YAMCOLO TO MANDALL	51134.47906	2	Release to direct diversion
OPR YAMCOLO TO EGERIA	51134.47906	2	Release to direct diversion
OPR YAMCOLO TO WOOLEY	51134.47906	2	Release to direct diversion
OPR YAMCOLO TO MILL-NO1	51134.47906	2	Release to direct diversion
OPR YAMCOL TO STILLWTRD	51134.47906	2	Release to direct diversion
OPR YAMCOL TO STILLWTRD	51134.47906	2	Release to direct diversion
OPR YAMSTAGETO ACTON	51134.47906	2	Release to direct diversion
OPR YAMSTAGETO BUCK-MAND	51134.47906	2	Release to direct diversion
OPR YAMSTAGE TO EGERIA	51134.47906	2	Release to direct diversion
OPR YAMSTAGETO HERN-	51134.47906	2	Release to direct diversion

TABLE 4.5.2C
Yamcolo Reservoir Operating Rights

System	Admin #	Type	Description
KOLBE			
OPR YAMSTAGETO MANDALL	51134.47906	2	Release to direct diversion
OPR YAMSTAGETOSTILLWTRD	51134.47906	2	Release to direct diversion
OPR YAMSTAGETOSTILLWTRD	51134.47906	2	Release to direct diversion
EXCHYAMCOLO M&I MTW&SS	51134.47906	4	Exchange to direct diversion

There are two types of StateMod operations used to model the operating policies of Yamcolo Reservoir: 1) a release from storage to a direct diversion downstream (type 2) and 2) a release from storage in exchange for a direct diversion elsewhere in the system (type 4).

Operating right 1 releases water from account 9 to the Acton Ditch (580500). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Yamcolo Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 2 releases water from account 1 to the Big Mesa Ditch (580539). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Yamcolo Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 3 releases water from account 2 to the Bird Ditch (580541). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Yamcolo Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 4 releases water from account 9 to the Buckingham Mandall Ditch (580564). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Yamcolo Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 5 releases water from account 3 in exchange for water diverted by the Coal Creek Ditch (580589). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Stillwater Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 6 releases water from account 9 to the Fix Ditch (580643). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Yamcolo Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 7 releases water from account 9 to the Hernage and Kolbe Ditch (580684). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Yamcolo Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

The reservoir stores water from Middle Hunt Creek as well as water imported from tributaries of South Hunt Creek via the Allen Basin Supply Ditch (WDID 580506). This supply canal, although large in decreed capacity at 60 cfs, diverts relatively small quantities of water during the spring runoff before the more senior rights on the streams call for water.

Storage water in Allen Basin Reservoir is used to provide supplemental irrigation supplies to several direct flow ditch structures in the Hunt Creek drainage. Using information provided by the Water Commissioner, the ownership sub-accounts for the Bull Creek Ditch (179 acre feet), the Lateral A Ditch (333 acre-feet), the Simon Ditch (287 acre-feet), and the Unmodeled Structures (276 acre-feet) are aggregated into a single pool (1,075 acre-feet) in the reservoir. The sub-accounts for the Collins Ditch and the Mill Creek Ditch are explicitly modeled. Allen Basin is operated with three accounts and one water right as shown in **Tables 4.5.3a-c.**

TABLE 4.5.3A
Allen Basin Reservoir Accounts

Reservoir	Account	Owner	Capacity (acre-feet)
Allen Basin	1	Collins	593
Allen Basin	2	MillCr	582
Allen Basin	3	Agg-pool	1,075

TABLE 4.5.3B
Allen Basin Reservoir Storage Rights

Structure ID	Reservoir	Admin #	Amount (acre-feet)	Fill
583500	Allen Basin	39254.37913	2,250	1

Note: The single storage right for Allen Basin Reservoir is used to fill all three accounts.

TABLE 4.5.3C
Allen Basin Reservoir Operating Rights

System	Admin #	Type	Description
OPR ALLEN TO COLLINS	39254.37914	2	Release to direct diversion
OPR ALLEN TO SIMON	39254.37914	2	Release to direct diversion
OPR ALLEN TO LAT A	39254.37914	3	Release to diversion by carrier
OPR ALLEN TO MILL CR	40753.00001	3	Release to diversion by carrier
OPR ALLEN TO BULL CR	39254.37914	3	Release to diversion by carrier
OPR ALLEN TO COLLINS	39254.37915	2	Release to direct diversion
OPR ALLEN SUPPLY TO RES	39254.37914	11	Direct flow demand through intervening structure

There are three types of StateMod operations used to model the operating policies of Allen Basin Reservoir: 1) a release from storage to a direct diversion downstream (type 2), 2) a release from storage to a direct diversion through a carrier structure (type 3), and 3) an intervening structure supplying water to a storage demand at the reservoir (type 11).

Operating right 1 releases water from account 1 to the Collins Ditch (580591). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the

storage right at Allen Basin Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 2 releases water from account 3 to the Simon Ditch (580863). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Allen Basin Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 3 releases water from account 3 to the Lateral A Ditch (580730). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Allen Basin Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 4 releases water from account 2 to the Mill Creek Ditch (581085). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Allen Basin Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 5 releases water from account 3 to the Bull Creek Ditch (580566). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Allen Basin Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 6 releases water from account 3 to the Collins Ditch (580591). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Allen Basin Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 7 supplies water to Allen Basin Reservoir from the South Hunt Creek via the Allen Basin Supply Ditch (580506). The administration number for this operating right is junior to both the direct flow right at the Allen Basin Supply Ditch and the storage right at Allen Basin Reservoir. This allows the reservoir to fill under its own priorities before calling for water through the Allen Basin Supply Ditch.

4.5.4 Stagecoach Reservoir

Stagecoach Reservoir is the largest storage facility in the Yampa River basin and is owned and operated by the UYWCD. The reservoir is intended to provide supplemental industrial, agricultural, and municipal water supplies, as well as a significantly sized conservation pool for recreational purposes. According to an elevation capacity table obtained from the UYWCD, the total capacity of the reservoir at the spillway elevation is approximately 33,275 acre-feet and the capacity at the invert of the outlet works (dead storage) is approximately 3,275 acre-feet, resulting in an active capacity of approximately 30,000 acre-feet.

The UYWCD originally allocated a total of 15,000 acre-feet of storage water in Stagecoach Reservoir for sale annually as follows: municipal users - 2,000 acre-feet, industrial users (Tri- State) - 9,000 acre-feet, and agricultural users - 4,000 acre-feet. The historic conditions were developed pursuant to two agreements between the UYWCD and Tri-State. The parties agreed to exchange the 4,000 acre-feet of water to which Tri-State is entitled in Yamcolo Reservoir to a Tri-State account in Stagecoach. Similarly, there is an exchange of 4,000 acre-feet of agricultural water in Stagecoach upstream to storage in Yamcolo Reservoir. Pursuant to these agreements, Tri-State also reduced its original

industrial allocation from 9,000 acre-feet to 7,000 acre-feet. As a result of these agreements, Stagecoach Reservoir is modeled using the accounts and storage rights shown in **Tables 4.5.4a-c**.

TABLE 4.5.4A
Stagecoach Reservoir Accounts

Reservoir	Account	Owner	Capacity (acre-feet)
Stagecoach	1	Tri-state	11,000
Stagecoach	2	Muni-pool	2,000
Stagecoach	3	No-own M&I	2,000
Stagecoach	4	Rec-pool	15,000
Stagecoach	5	DeadPool	3,275

TABLE 4.5.4B
Stagecoach Reservoir Storage Rights

Structure ID	Reservoir	Admin #	Amount (acre-feet)	Fill
584213	Stagecoach	40815.00000	11,614	1
584213	Stagecoach	41727.39991	20,854	1
584213	Stagecoach	39599.00000	86 cfs	1

The first storage right for 11,614 acre-feet was part of the former Wessels Project and shares the same priority date as the Wessels Canal, which is owned in part by Tri-State, for direct flow industrial use at the Craig Station. Pursuant to a 1992 agreement between UYWCD and Tri-State, the UYWCD's storage decree is subordinated to the priority of Tri-State's Wessels Canal flow right to the extent that there is insufficient flow for both. Because Tri-State reduced its original industrial allocation from 9,000 acre-feet to 7,000 acre-feet, 7,000 acre-feet of the full storage right is used to fill Tri-State's account (account 1), and the remaining 4,614 acre-feet is used to fill the first three accounts.

The second storage right is part of the 40,720 acre-feet, conditional storage decree that was transferred from the former Pleasant Valley Reservoir site, which is now the location of Lake Catamount. The UYWCD made 20,854 acre-feet of this conditional water right absolute at Stagecoach Reservoir. This right is used to fill all five accounts.

The third water right is associated with the former Four Counties Ditch No. 1 and No. 3, a conditional direct flow right owned by the UYWCD that has been changed to allow storage in Stagecoach Reservoir. From prior studies performed by W. W. Wheeler, it was determined that the yield of the Four Counties water rights is generally limited to the seasonal runoff period (April through mid-July). After mid-July, low streamflows and local calls on the tributaries preclude diversions by the Four Counties rights. Based on this information, the 86 cfs is represented as a volumetric storage right of 12,979 acre-feet in the model. This right is used to fill all five accounts.

TABLE 4.5.4C
Stagecoach Reservoir Operating Rights

System	Admin #	Type	Description
OPR STAGECTOCRAIG(TRI)	45290.44866	2	Release to direct diversion
OPR STAGEC TO MT.W&SSP	42156.00002	4	Release to diversion by exchange
OPR STAGECOACH HYDRO	41727.39992	2	Release to direct diversion

There are two types of StateMod operations used to model the operating policies of Stagecoach Reservoir: 1) a release from storage to a direct diversion downstream (type 2) and 2) a release from storage in exchange for a direct diversion elsewhere in the system (type 4).

Operating right 1 releases water from account 1 to the Craig Power Station (440522). This right allows for the transfer of Tri-State's water from Stagecoach Reservoir to the Craig Station as a result of the Wessels transfer case. The administration number for this operating right is junior to both the direct flow right at the Craig Station and the storage right at Stagecoach Reservoir. This operating right is needed to allow the Craig Station to satisfy its demand using direct flow rights before calling for storage water. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

Operating right 2 releases water from account 4 in exchange for water diverted by the Fish Creek Municipal Intake (580642). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at Stillwater Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

The UYWCD installed a hydroelectric generation facility on the outlet works of Stagecoach Dam and produces electrical energy from the flows that pass through the reservoir, either as bypassed inflows or as reservoir releases. Operating right 3 releases water from the UYWCD's 15,000 acre-feet recreation pool to the hydroelectric plant if the bypassed inflows, together with the other project releases, are less than 40 cfs.

Note that the operating policies modeled at Stagecoach Reservoir exercise only Tri-State's account and the recreation pool. The other accounts were established in anticipation of future modeling activities, such as modeling 100 percent of the water rights in the basin.

4.5.5 Lake Catamount

Lake Catamount Reservoir (WDID 583631) is located on the main stem of the Yampa River between Stagecoach Dam and Steamboat Springs. The reservoir is used primarily for recreational for the planned residential and ski development near the lake. The maximum (and active) storage capacity of the reservoir is approximately 7,422 acre-feet.

Lake Catamount is modeled using the accounts and storage rights shown in **Tables 4.5.5a** and **b**.

TABLE 4.5.5A
Lake Catamount Accounts

Reservoir	Account	Owner	Capacity (acre-feet)
Lake Catamount	1	Cons-pool	7,422

TABLE 4.5.5B
Lake Catamount Storage Rights

Structure ID	Reservoir	Admin #	Amount (acre-feet)	Fill
583631	Lake Catamount	44761.00000	7,800	1
583631	Lake Catamount	51134.46995	4,000	2

Note: The first storage right is in excess of the reported physical capacity. The reservoir was modeled with a physical capacity of 7,422 acre-feet.

There are no operating policies modeled at Lake Catamount. According to the Division 6 engineer and water commissioner, the reservoir is normally operated to keep it full. Historically, there has been a practice to lower the reservoir by releasing approximately 2,000 acre-feet in October to provide a measure of protection against the formation of frazil ice near the reservoir inlet during the winter months. This practice is being discontinued and was therefore not reflected as an operational storage target in the CRDSS modeling effort.

4.5.6 Fish Creek Reservoir

The existing Fish Creek Reservoir (WDID 583508) is owned by the city of Steamboat Springs and is used as reserve raw water storage for the city and for the Mt. Werner Water & Sanitation District. The present capacity, all of which is active, is approximately 1,842 acre-feet.

Fish Creek Reservoir is operated with the accounts and water rights shown in **Tables 4.5.6a-c**.

TABLE 4.5.6A
Fish Creek Reservoir Accounts

Reservoir	Account	Owner	Capacity (acre-feet)
Fish Creek	1	SSpgs-MtWer	4,042

TABLE 4.5.6B
Fish Creek Reservoir Storage Rights

Structure ID	Reservoir	Admin #	Amount (acre-feet)	Fill
583508	Fish Creek	33782.33648	1,175	1
583508	Fish Creek	40406.00000	667	1

Fish Creek Reservoir is operated with storage targets to keep the reservoir full when its storage rights are in priority. Releases from the reservoir are made when there are water shortages at the city's municipal intake (the Fish Creek Municipal Intake (WDID 580642)).

TABLE 4.5.6C
Fish Creek Reservoir Operating Rights

System	Admin #	Type	Description
OPR FISH CR M&I MTW&SS	42156.00001	2	Release for direct diversion

Operating right 1 releases water from account 1 to the Fish Creek Municipal Intake (580642). The administration number for this operating right is junior to both the direct flow right at the Fish Creek Municipal Intake and the storage right at Fish Creek Reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

4.5.7 Steamboat Lake Reservoir

Steamboat Lake (WDID 583787) is located on Willow Creek, a tributary of the Elk River. The reservoir is owned and operated by the Colorado Division of Parks and Outdoor Recreation (CPOR) and is used primarily for recreational and industrial purposes. According to the design plans for the reservoir and the elevation-capacity table, the capacity at the normal spillway elevation is approximately 23,064 acre-feet. This capacity represents the active capacity of the reservoir because there is no dead storage below the elevation of the outlet works. Historically, CPOR has been allowed to store water above the normal spillway elevation, encroaching upon the flood surcharge capacity of the reservoir. This arrangement has been made permanent with the installation of gates in the spillway to allow this storage and by obtaining an additional water right to store in the additional capacity (approximately 3,300 acre-feet).

Steamboat Lake Reservoir is operated with the accounts and storage rights shown in **Tables 4.5.7a-c.**

TABLE 4.5.7A
Steamboat Lake Reservoir Accounts

Reservoir	Account	Owner	Capacity (acre-feet)
Steamboat Lake	1	HaydenSt	5,000
Steamboat Lake	2	Consv-pool	21,364

TABLE 4.5.7B
Steamboat Lake Reservoir Storage Rights

Structure ID	Reservoir	Admin #	Amount (acre-feet)	Fill
583787	Steamboat Lake	41727.40833	5,000	1
583787	Steamboat Lake	41727.40833	18,064	1
583787	Steamboat Lake	51134.43234	3,300	1

Note: All the storage rights for Steamboat Lake fill both accounts. Although the first two rights have the same administration number, they are separate decrees.

TABLE 4.5.7C
Steamboat Lake Reservoir Operating Rights

System	Admin #	Type	Description
OPR STEAMBT TO HAYDENST	51134.43235	2	Release to direct diversion

Operating right 1 releases water in account 1 (HaydenSt) at times when the direct flow rights decreed for operating the Hayden Station (570512) are insufficient to satisfy the demands at the power plant. The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at the reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

CPOR's interest in the Steamboat Lake water rights is that they be used solely for recreational and conservation pool purposes at the reservoir itself. The second account represents CPOR's 21,364 acre-feet of storage in the reservoir, which includes 125 acre-feet leased by Cyprus Empire. Given the small size of the Cyprus Empire storage water, it was not included in the model. The reservoir is modeled to keep CPOR's account full.

4.5.8 Elkhead Reservoir

Elkhead Creek Reservoir (WDID 443902) is located on Elkhead Creek, a tributary of the Yampa River, just upstream of the city of Craig. The reservoir was originally constructed by the Colorado Division of Wildlife (CDOW) and the Yampa Project Participants (the operating consortium for the Craig Station power plant) and was intended for recreational and industrial purposes. The Yampa Participants funded a portion of the construction in return for full use of the active storage capacity in the reservoir higher than 6,340.5 feet (amsl), which was estimated to be approximately 8,310 acre-feet. CDOW retained the use of the storage capacity below this elevation, including the dead storage below the outlet works.

In 1990, the city of Craig acquired all of CDOW's interests in the reservoir, subject to a contractual commitment to not encroach upon the dead storage below the elevation of the outlet work invert, which is reserved as a conservation pool for the benefit of CDOW. In 1991, the reservoir was emptied to the approximate dead storage level to perform maintenance on the outlet works and at the same time, to survey the capacity of the reservoir. From this new survey data, the city has estimated that the active capacity above the outlet works invert is about 10,422 acre-feet. Of this storage, the Yampa Participants' entitlement is estimated to be about 8,754 acre-feet and the city's entitlement about 1,668 acre-feet. Assuming that the original capacity of the total reservoir, as decreed, is 13,699 acre-feet, this results in a dead storage capacity of about 3,277 acre-feet. The 1990 agreement served to formalize the reservoir operations, which did not change. The reservoir operations at Elkhead Reservoir are consistent throughout the entire study period.

Elkhead Reservoir is operated with the accounts and storage rights shown in **Tables 4.5.8a-c.**

TABLE 4.5.8A
Elkhead Reservoir Accounts

Reservoir	Account	Owner	Capacity (acre-feet)
Elkhead	1	CraigSt	8,754
Elkhead	2	Craig-muni	1,668
Elkhead	3	Consv-pool	3,277

TABLE 4.5.8B
Elkhead Reservoir Storage Rights

Structure ID	Reservoir	Admin #	Amount (acre-feet)	Fill
443902	Elkhead	42642.00000	5,389	1
443902	Elkhead	44925.44731	8,310	1

The first priority represents CDOW's original storage right for recreational and fishery purposes; the second right is the Yampa Participants' right for industrial storage. Based on the new capacity survey and the 1990 agreements, the allocated storage is now 8,754 acre-feet for industrial uses by the Yampa Participants, 1,668 acre-feet for municipal uses by the city and an estimated 3,277 acre-feet for conservation purposes in the dead storage capacity.

TABLE 4.5.8C
Elkhead Reservoir Operating Rights

System	Admin #	Type	Description
OPR ELKHD TO CRAIG STA	45290.44866	2	Release to direct diversion
OPR ELKHD TO CRAIG CTY	44925.44734	2	Release to direct diversion

The first operational right supplies industrial water to satisfy shortages which may occur at the Craig Station Units 1 and 2 after exercise of the senior direct flow rights diverted through the Craig Station Ditch and Pipeline (440522). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at the reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

The second operational right supplies the city's storage water to satisfy shortages that may occur after utilization of the city's direct flow water rights on the Yampa River, specifically the Craig Water Supply Pipeline (440581). The administration number for this operating right is junior to both the direct flow right at the direct diversion and the storage right at the reservoir. The amount of water released to the direct diversion is restricted by the amount currently available in the account.

4.5.9 Lester Creek Reservoir

Lester Creek Reservoir (WDID 583521) is located on Lester Creek, a tributary of the Elk River downstream of Steamboat Lake. The reservoir is owned and operated by CDOW and used exclusively for recreational and fishery purposes.

According to elevation - capacity - area data provided by the Division 6 engineer, the total capacity of the reservoir is estimated to be approximately 5,657 acre-feet, which corresponds to the amount described in the water storage right. The storage right was decreed on March 30, 1964 and was granted an appropriation date of May 5, 1959 (Administration No. 39936.00000). All of the capacity is considered active.

Lester Creek Reservoir is operated with the accounts and storage rights shown in **Tables 4.5.9a and b.**

TABLE 4.5.9A
Lester Creek Reservoir Accounts

Reservoir	Account	Owner	Capacity (acre-feet)
Lester Creek	1	Consv-pool	5,657

TABLE 4.5.9B
Lester Creek Reservoir Storage Rights

Structure ID	Reservoir	Admin #	Amount (acre-feet)	Fill
583521	Lester Creek	39936.00000	5,657	1

There are no special operations modeled for Lester Creek Reservoir. Lester Creek Reservoir is operated to keep the reservoir full when its water right is in priority and there is sufficient physical streamflow. When out of priority, the inflows to the reservoir are bypassed.

4.5.10 Aggregated Operational Reservoirs

Three reservoir structures are used in the Yampa Model to simulate the combined absolute storage of reservoirs that are not explicitly modeled. These reservoirs, which have only one account in them, each have targets in the reservoir target files as follows: 100 percent of capacity from October through June, 75 percent of capacity at the end of July, 25 percent of capacity at the end of August, and empty at the end of September. Each reservoir has a type 9 rule in the operating criteria file, which triggers a release from the reservoir in order to meet the targeted storage volume. **Table 4.5.10a** summarizes the aggregated reservoirs' operational rights.

TABLE 4.5.10 A
Aggregated Reservoir Operating Rights

System	Admin #	Type	Description
ARY_001	1.00	9	Release to meet storage target
ARY_002	1.00	9	Release to meet storage target
ARY_003	1.00	9	Release to meet storage target

TABLE 4.2.1A
Direct Flow Diversion Summary
Average 1975-1991

#	ID	Name	Location	Cap (cfs)	Area (ac)	Eff (%)	Demand (af)
1	440509	WILSON DITCH	MILK_WILSON DITCH_DIV	17.	187.	36.	1167.
2	440511	WISCONSIN DITCH	FORT_WISCONSIN DITCH_DIV	21.	675.	38.	2212.
3	440514	WOOLEY AND JOHNSON D	YAMP_WOOLEY AND JOHN_DIV	9.	129.	34.	598.
4	440517	YAMPA VAL STOCK BR CO D	YAMP_YAMPA VAL STOCK_DIV	15.	598.	54.	901.
5	440518	YELLOW JACKET DITCH NO 1	BEAV_YELLOW JACKET D_DIV	5.	150.	45.	280.
6	440519	YELLOW JACKET DITCH NO 2	BEAV_YELLOW JACKET D_DIV	7.	60.	41.	201.
7	440522	CRAIG STA D + PL	YAMP_CRAIG STA D + P_DIV	29.	52.	100.	6441.
8	440524	AQ NO 1 DITCH	JAME_AQ NO 1 DITCH_DIV	27.	5.	20.	199.
9	440527	AIR LINE IRR D	YAMP_AIR LINE IRR D _DIV	6.	126.	27.	585.
10	440533	ANDERSON DITCH	LITT_ANDERSON DITCH _DIV	5.	64.	36.	150.
11	440538	AVERILL DITCH	MORA_AVERILL DITCH_DIV	11.	233.	47.	195.
12	440541	BAILEY DITCH	YAMP_BAILEY DITCH_DIV	14.	97.	15.	832.
13	440570	CARD DITCH	EAST_CARD DITCH _DIV	18.	182.	13.	1470.
14	440572	CARRIGAN-AVERILL D	MORA_CARRIGAN-AVERIL_DIV	8.	46.	23.	184.
13	440570	CARD DITCH	EAST_CARD DITCH _DIV	18.	182.	13.	1470.
14	440572	CARRIGAN-AVERILL D	MORA_CARRIGAN-AVERIL_DIV	8.	46.	23.	184.
15	440573	CATARACT DITCH	LITT_CATARACT DITCH _DIV	21.	659.	50.	776.
16	440581	CRAIG WATER SUPPLY PL	YAMP_CRAIG WATER SUP_DIV	8.	-999.	36.	1582.
17	440583	CROSS MTN PUMP GROUNDS	YAMP_CROSS MTN PUMP _DIV	16.	463.	18.	3010.
18	440584	CROSS MTN PUMP NO 1 + 2	YAMP_CROSS MTN PUMP _DIV	25.	385.	24.	2531.
19	440585	CRYSTAL CK DITCH	CRYS_CRYSTAL CK DITC_DIV	6.	30.	17.	457.
20	440586	D D AND E DITCH	MILK_D D AND E DITCH_DIV	49.	631.	42.	1829.
21	440587	D D FERGUSON D NO 2	MILK_D D FERGUSON D _DIV	30.	514.	43.	1318.
22	440589	DEEP CUT IRR D	YAMP_DEEP CUT IRR D _DIV	49.	583.	14.	5673.
23	440590	DEER CK A MORAPOS D	MORA_DEER CK A MORAP_DIV	19.	240.	34.	1233.
24	440593	DENNISON A MARTIN D	MORA_DENNISON A MART_DIV	11.	222.	48.	285.
25	440601	DUNSTON DITCH	EAST_DUNSTON DITCH_DIV	7.	40.	5.	696.
26	440607	EGRY MESA DITCH	EAST_EGRY MESA DITCH_DIV	20.	357.	11.	2527.
27	440611	ELK TRAIL DITCH	PINE_ELK TRAIL DITCH_DIV	11.	223.	24.	720.
28	440612	ELKHORN IRR DITCH	LITT_ELKHORN IRR DIT_DIV	13.	235.	37.	641.
29	440613	ELLGEN DITCH	YAMP_ELLGEN DITCH _DIV	7.	210.	54.	305.
30	440614	ELLIS A KITCHENS D	NORT_ELLIS A KITCHEN_DIV	2.	27.	23.	125.
31	440628	GIBBONS WILSON A JORDAN	MORA_GIBBONS WILSON _DIV	10.	128.	32.	334.
32	440635	GRIESER DITCH	EAST_GRIESER DITCH_DIV	5.	95.	32.	397.
33	440638	HADDEN BASE DITCH	MORA_HADDEN BASE DIT_DIV	9.	206.	47.	263.
34	440644	HARPER NO 1 DITCH	WADD_HARPER NO 1 DIT_DIV	8.	187.	48.	327.
35	440645	HARPER NO 2 D	WADD_HARPER NO 2 D_DIV	8.	31.	42.	108.
36	440647	HAUGHEY IRR DITCH	FORT_HAUGHEY IRR DIT_DIV	14.	239.	42.	840.
37	440650	MESA HL BK COTWOOD PUMP	FORT_MESA HL BK COTW_DIV	5.	146.	60.	45.
38	440651	HIGHLAND DITCH	MORA_HIGHLAND DITCH _DIV	15.	856.	47.	1439.
39	440652	HIGHLAND DITCH	EAST_HIGHLAND DITCH _DIV	14.	147.	31.	633.
40	440660	J A MARTIN DITCH	MILK_J A MARTIN DITC_DIV	8.	96.	36.	328.
41	440661	J P MORIN DITCH	SOUT_J P MORIN DITCH_DIV	9.	125.	26.	512.
42	440670	JOHN W KELLOGG NO 2 D	DEER_JOHN W KELLOGG _DIV	6.	78.	35.	258.
43	440675	JUNIPER MTN TUNNEL	YAMP_JUNIPER MTN TUN_DIV	40.	503.	33.	3575.
44	440677	K DIAMOND DITCH	YAMP_K DIAMOND DITCH_DIV	21.	462.	24.	2335.
45	440681	LAMB IRR DITCH	FORT_LAMB IRR DITCH _DIV	6.	63.	31.	340.
46	440687	LILY PARK D NO 1	YAMP_LILY PARK D NO _DIV	37.	557.	30.	2987.
47	440688	LITTLE BEAR DITCH	LITT_LITTLE BEAR DIT_DIV	23.	636.	46.	1684.
48	440691	M DITCH	YAMP_M DITCH_DIV	6.	106.	37.	424.
49	440692	MARTIN CK DITCH	MART_MARTIN CK DITCH_DIV	62.	374.	38.	1830.
50	440694	MAYBELL CANAL	YAMP_MAYBELL CANAL_DIV	129.	1183.	10.	14292.
51	440695	MAYBELL MILL PIPELINE	YAMP_MAYBELL MILL PI_DIV	2.	-999.	100.	115.
52	440698	MC DONALD DITCH	LITT_MC DONALD DITCH_DIV	12.	100.	42.	205.
53	440699	MC KINLEY DITCH NO 1	ELKH_MC KINLEY DITCH_DIV	14.	196.	33.	888.
54	440700	MC KINLEY DITCH NO 2	ELKH_MC KINLEY DITCH_DIV	17.	414.	35.	1493.
55	440702	MCINTYRE DITCH	YAMP_MCINTYRE DITCH _DIV	20.	159.	12.	2346.
56	440706	MILK CK DITCH	MILK_MILK CK DITCH_DIV	20.	373.	49.	815.
57	440711	MOCK DITCH	YAMP_MOCK DITCH _DIV	12.	168.	28.	912.
58	440716	MULLEN DITCH	DEER_MULLEN DITCH _DIV	2.	129.	46.	159.
59	440723	NICHOLS DITCH NO 1	YAMP_NICHOLS DITCH N_DIV	7.	124.	19.	950.
60	440724	NORVELL DITCH	ELKH_NORVELL DITCH_DIV	30.	393.	39.	1505.

TABLE 4.2.1A
Direct Flow Diversion Summary
Average 1975-1991

#	ID	Name	Location	Cap (cfs)	Area (ac)	Eff (%)	Demand (af)
61	440729	PATRICK SWEENEY D	YAMP_PATRICK SWEENEY_DIV	15.	195.	17.	1805.
62	440731	PECK IRRIG D	WILL_PECK IRRIG D _DIV	7.	199.	30.	867.
63	440735	PINE CK DITCH	PINE_PINE CK DITCH_DIV	12.	169.	23.	642.
64	440740	RATCLIFF DITCH	EAST_RATCLIFF DITCH _DIV	11.	41.	11.	604.
65	440747	ROBY D AKA ROBY D NO 1	MORA_ROBY D AKA ROBY_DIV	7.	201.	58.	153.
66	440748	ROBY DITCH NO 2	MORA_ROBY DITCH NO 2_DIV	8.	110.	39.	177.
67	440749	ROUND BOTTOM D NO 1	YAMP_ROUND BOTTOM D _DIV	6.	30.	21.	180.
68	440750	ROUND BOTTOM D NO 2	YAMP_ROUND BOTTOM D _DIV	8.	35.	28.	285.
69	440751	ROUND BOTTOM DITCH	YAMP_ROUND BOTTOM DI_DIV	6.	143.	60.	61.
70	440763	SMITH DITCH	ELKH_SMITH DITCH_DIV	21.	340.	35.	1041.
71	440765	SOUTH SIDE DITCH	WILL_SOUTH SIDE DITC_DIV	8.	19.	7.	654.
72	440770	STARR IRRIG DITCH	ELKH_STARR IRRIG DIT_DIV	6.	26.	39.	106.
73	440778	SUNBEAM DITCH	YAMP_SUNBEAM DITCH_DIV	10.	129.	8.	1855.
74	440785	TIPTON IRR DITCH	DRY _TIPTON IRR DITC_DIV	17.	289.	43.	711.
75	440786	TISDEL D NO 2	YAMP_TISDEL D NO 2_DIV	15.	356.	26.	1806.
76	440790	UTLEY DITCH	WILL_UTLEY DITCH_DIV	13.	75.	17.	963.
77	440801	CROSS MTN PUMP GUESS	YAMP_CROSS MTN PUMP _DIV	8.	47.	5.	1401.
78	440806	ELLGEN NO 2 DITCH	YAMP_ELLGEN NO 2 DIT_DIV	10.	85.	36.	311.
79	440812	HART DITCH	MORA_HART DITCH _DIV	15.	88.	27.	364.
80	440814	HIGHLINE DITCH	DEER_HIGHLINE DITCH _DIV	6.	145.	43.	410.
81	440820	LOWRY SEELEY PUMP	YAMP_LOWRY SEELEY PU_DIV	11.	284.	38.	1013.
82	440821	MACK DITCH	YAMP_MACK DITCH _DIV	8.	119.	38.	383.
83	440828	MOCK DITCH NO 3	YAMP_MOCK DITCH NO 3_DIV	5.	63.	17.	450.
84	440830	OLD SWEENEY DITCH	YAMP_OLD SWEENEY DIT_DIV	14.	149.	15.	1396.
85	440863	HENRY SWEENEY DITCH	YAMP_HENRY SWEENEY D_DIV	13.	163.	14.	1661.
86	440998	DRY COTTONWOOD DITCH	LITT_DRY COTTONWOOD _DIV	6.	107.	35.	474.
87	441122	VAUGHN PUMP	YAMP_VAUGHN PUMP_DIV	9.	271.	53.	333.
88	442214	BAILEY DITCH-UTAH INT.	YAMP_BAILEY DITCH-UT_DIV	4.	171.	60.	110.
89	540507	BEELER DITCH	LITT_BEELER DITCH _DIV	16.	139.	17.	1162.
90	540531	HEELEY DITCH	LITT_HEELEY DITCH _DIV	35.	1003.	50.	2495.
91	540532	HOME SUPPLY DITCH	LITT_HOME SUPPLY DIT_DIV	14.	158.	26.	1051.
92	540543	LUCHINGER DITCH	LITT_LUCHINGER DITCH_DIV	11.	101.	17.	953.
93	540548	MORGAN AND BEELER D	LITT_MORGAN AND BEEL_DIV	10.	205.	25.	1230.
94	540549	MORGAN SLATER DITCH	SLAT_MORGAN SLATER D_DIV	9.	388.	52.	638.
95	540554	PERKINS FOX DITCH	WILL_PERKINS FOX DIT_DIV	16.	447.	60.	497.
96	540555	PERKINS IRR DITCH	WILL_PERKINS IRR DIT_DIV	19.	497.	51.	804.
97	540564	SALISBURY DITCH	BATT_SALISBURY DITCH_DIV	7.	51.	11.	740.
98	540568	SLATER FORK DITCH	SLAT_SLATER FORK DIT_DIV	8.	226.	34.	862.
99	540570	SLATER PARK DITCH NO1	SLAT_SLATER PARK DIT_DIV	6.	387.	54.	482.
100	540571	SLATER PARK DITCH NO 2	HENR_SLATER PARK DIT_DIV	5.	101.	45.	273.
101	540572	SLATER PARK DITCH NO 3	HENR_SLATER PARK DIT_DIV	7.	8.	4.	336.
102	540574	SLATER PARK DITCH NO 5	SLAT_SLATER PARK DIT_DIV	11.	233.	47.	591.
103	540583	TROWEL DITCH	LITT_TROWEL DITCH _DIV	40.	678.	39.	2712.
104	540591	WILLOW CK DITCH	WILL_WILLOW CK DITCH_DIV	100.	696.	44.	2070.
105	540592	WILSON DITCH	BATT_WILSON DITCH _DIV	6.	61.	19.	417.
106	540594	WOODBURY DITCH	LITT_WOODBURY DITCH _DIV	14.	430.	47.	804.
107	550504	ESCALANTA DITCH NO 2	YAMP_ESCALANTA DITCH_DIV	18.	101.	19.	691.
108	550506	MAJORS DITCH NO 2	YAMP_MAJORS DITCH NO_DIV	19.	388.	27.	2117.
109	550507	NINE MILE IRR DITCH	YAMP_NINE MILE IRR D_DIV	13.	91.	17.	829.
110	550508	NINE MILE IRR PL	YAMP_NINE MILE IRR P_DIV	6.	73.	19.	737.
111	550513	VISINTAINER DITCH	YAMP_VISINTAINER DIT_DIV	13.	69.	17.	678.
112	550519	RINKER DITCH	YAMP_RINKER DITCH _DIV	12.	64.	21.	637.
113	550537	LEFEVRE NO 1 PUMP	YAMP_LEFEVRE NO 1 PU_DIV	11.	342.	35.	1513.
114	570508	BROCK DITCH	YAMP_BROCK DITCH_DIV	37.	419.	23.	1932.
115	570510	CARY DITCH CO DITCH	YAMP_CARY DITCH CO D_DIV	38.	746.	29.	3371.
116	570512	COLO UTILITIES D A PL	YAMP_COLO UTILITIES _DIV	30.	-999.	100.	5025.
117	570513	CONNELL DITCH	TROU_CONNELL DITCH_DIV	16.	109.	48.	188.
118	570517	DAVID M CHAPMAN DITCH	TROU_DAVID M CHAPMAN_DIV	7.	115.	22.	655.
119	570519	DENNIS AND BLEWITT D	YAMP_DENNIS AND BLEW_DIV	15.	239.	32.	1034.
120	570524	EAST SIDE DITCH	FISH_EAST SIDE DITCH_DIV	10.	122.	29.	579.

TABLE 4.2.1A
Direct Flow Diversion Summary
Average 1975-1991

#	ID	Name	Location	Cap (cfs)	Area (ac)	Eff (%)	Demand (af)
121	570525	EAST SIDE DITCH NO 2	FISH_EAST SIDE DITCH_DIV	11.	429.	51.	682.
122	570535	ERWIN IRRIGATING DITCH	YAMP_ERWIN IRRIGATIN_DIV	6.	62.	10.	537.
123	570539	GIBRALTAR DITCH	YAMP_GIBRALTAR DITCH_DIV	80.	1079.	18.	8868.
124	570544	HIGHLAND DITCH	WEST_HIGHLAND DITCH _DIV	17.	148.	21.	991.
125	570545	HOMESTEAD DITCH	TROU_HOMESTEAD DITCH_DIV	16.	229.	28.	1091.
126	570555	LAST CHANCE DITCH	TROU_LAST CHANCE DIT_DIV	19.	165.	23.	784.
127	570561	MALE MOORE CO DITCH ENL	TROU_MALE MOORE CO D_DIV	13.	29.	3.	588.
128	570563	MARSHALL ROBERTS DITCH	YAMP_MARSHALL ROBERT_DIV	38.	541.	12.	4090.
129	570576	ORNO DITCH	TROU_ORNO DITCH _DIV	6.	140.	28.	473.
130	570579	R E CLARK DITCH	YAMP_R E CLARK DITCH_DIV	14.	156.	28.	831.
131	570584	SADDLE MTN DITCH	YAMP_SADDLE MTN DITC_DIV	11.	102.	26.	622.
132	570592	SHELTON DITCH	YAMP_SHELTON DITCH_DIV	54.	1110.	12.	8106.
133	570608	TROUT CK DITCH NO 3	TROU_TROUT CK DITCH _DIV	13.	295.	38.	938.
134	570609	TROUT CREEK DITCH NO 2	TROU_TROUT CREEK DIT_DIV	8.	56.	23.	367.
135	570611	WALKER IRRIG DITCH	YAMP_WALKER IRRIG DI_DIV	48.	1298.	20.	5588.
136	570622	WILLIAMS IRRIG DITCH	YAMP_WILLIAMS IRRIG _DIV	22.	288.	13.	2488.
137	570623	WILLIAMS PARK DITCH	FISH_WILLIAMS PARK D_DIV	30.	283.	36.	903.
138	570635	KOLL DITCH	TROU_KOLL DITCH _DIV	13.	164.	16.	1137.
139	574629	RICH D	TROU_RICH D _DIV	19.	-999.	100.	1468.
140	580500	ACTON DITCH	YAMP_ACTON DITCH_DIV	15.	265.	20.	1693.
141	580506	ALLEN BASIN SUPPLY D	MILL_ALLEN BASIN SUP_DIV	60.	-999.	0.	274.
142	580508	ALPHA DITCH	OAK _ALPHA DITCH_DIV	12.	310.	23.	1134.
143	580530	BAXTER DITCH	YAMP_BAXTER DITCH _DIV	36.	585.	35.	2411.
144	580532	BEAVER CREEK D	BEAV_BEAVER CREEK D _DIV	8.	133.	31.	396.
145	580539	BIG MESA DITCH	YAMP_BIG MESA DITCH _DIV	53.	805.	27.	4520.
146	580541	BIRD DITCH	YAMP_BIRD DITCH _DIV	14.	440.	27.	1684.
147	580549	BORLAND VAIL DITCH	SMIT_BORLAND VAIL DI_DIV	13.	301.	47.	303.
148	580556	BRINKER CREEK DITCH	BRIN_BRINKER CREEK D_DIV	6.	89.	24.	330.
149	580559	BROOKS DITCH	YAMP_BROOKS DITCH _DIV	8.	130.	22.	641.
150	580561	BRUMBACK DITCH	OAK _BRUMBACK DITCH _DIV	5.	64.	17.	430.
151	580564	BUCKINGHAM MANDALL D	YAMP_BUCKINGHAM MAND_DIV	23.	603.	37.	2296.
152	580568	BURNETT DITCH	ELK _BURNETT DITCH_DIV	20.	325.	36.	1237.
153	580569	BURNT MESA D	SOUT_BURNT MESA D _DIV	14.	136.	40.	310.
154	580574	C R BROWN MOFFAT COAL C	YAMP_C R BROWN MOFFA_DIV	6.	79.	28.	372.
155	580577	CAMPBELL DITCH	ELK _CAMPBELL DITCH _DIV	13.	324.	39.	1021.
156	580582	CHARLES LEIGHTON D	YAMP_CHARLES LEIGHTO_DIV	6.	32.	9.	431.
157	580583	CHARLES H KEMMER D	ELK _CHARLES H KEMME_DIV	7.	65.	33.	290.
158	580588	CLARKE BURKE DITCH	ELK _CLARKE BURKE DI_DIV	8.	158.	24.	689.
159	580589	COAL CREEK DITCH	COAL_COAL CREEK DITC_DIV	28.	123.	27.	520.
160	580590	COLEMAN DITCH E	DAY _COLEMAN DITCH E_DIV	6.	160.	55.	147.
161	580591	COLLINS DITCH	MIDD_COLLINS DITCH_DIV	10.	183.	21.	891.
162	580599	CULLEN DITCH NO 2	ELK _CULLEN DITCH NO_DIV	10.	68.	7.	976.
163	580604	DAY DITCH	DAY _DAY DITCH_DIV	6.	190.	56.	199.
164	580612	DEVER D	YAMP_DEVER D_DIV	8.	117.	28.	554.
165	580618	DUQUETTE DITCH	YAMP_DUQUETTE DITCH _DIV	16.	234.	21.	1536.
166	580622	EGERIA DITCH	YAMP_EGERIA DITCH _DIV	17.	274.	39.	1460.
167	580623	EKHART DITCH	ELK _EKHART DITCH _DIV	16.	160.	23.	1260.
168	580626	ELK VALLEY D	ELK _ELK VALLEY D _DIV	30.	441.	21.	2557.
169	580627	ENTERPRISE DITCH	WALT_ENTERPRISE DITC_DIV	28.	581.	30.	2270.
170	580628	EXCELSIOR D	WALT_EXCELSIOR D_DIV	13.	96.	30.	404.
171	580633	FELIX BORGHI D	ELK _FELIX BORGHI D _DIV	18.	188.	15.	1087.
172	580634	FERGUSON DITCH	WATS_FERGUSON DITCH _DIV	15.	195.	22.	970.
173	580640	FIRST CHANCE DITCH	BIG _FIRST CHANCE DI_DIV	6.	74.	12.	563.
174	580642	FISH CR PIPELINE A	FISH_FISH CR PIPELIN_DIV	14.	-999.	36.	1804.
175	580643	FIX DITCH	YAMP_FIX DITCH_DIV	24.	372.	29.	1508.
176	580649	FRANZ DITCH	ELK _FRANZ DITCH_DIV	24.	575.	34.	1876.
177	580662	GRAHAM + BENNETT D	ELK _GRAHAM + BENNET_DIV	20.	384.	42.	1303.
178	580663	GREER DITCH	SAND_GREER DITCH_DIV	8.	184.	52.	305.
179	580665	GUIDO DITCH	NORT_GUIDO DITCH_DIV	5.	90.	24.	326.
180	580684	HERNAGE + KOLBE DITCH	YAMP_HERNAGE + KOLBE_DIV	9.	111.	15.	973.

TABLE 4.2.1A
Direct Flow Diversion Summary
Average 1975-1991

#	ID	Name	Location	Cap (cfs)	Area (ac)	Eff (%)	Demand (af)
181	580685	HIGH MESA IRR D	NORT_HIGH MESA IRR D_DIV	7.	160.	34.	376.
182	580687	HIGHLINE BEAVER DITCH	STOR_HIGHLINE BEAVER_DIV	12.	111.	36.	415.
183	580694	HOOVER JACQUES DITCH	ELK _HOOVER JACQUES _DIV	22.	474.	18.	2472.
184	580695	HOT SPGS CR HIGHLINE D	HOT _HOT SPGS CR HIG_DIV	25.	96.	23.	512.
185	580714	KELLER DITCH	ELK _KELLER DITCH _DIV	25.	598.	36.	1951.
186	580717	KINNEY DITCH	ELK _KINNEY DITCH _DIV	9.	222.	26.	950.
187	580721	L L WILSON D	LAWS_L L WILSON D _DIV	6.	71.	21.	438.
188	580722	LAFON DITCH	SOUT_LAFON DITCH_DIV	7.	125.	33.	436.
189	580728	LARSON DITCH	ELK _LARSON DITCH _DIV	17.	199.	28.	734.
190	580730	LATERAL A DITCH	SOUT_LATERAL A DITCH_DIV	12.	290.	41.	589.
191	580731	LAUGHLIN DITCH	SOUT_LAUGHLIN DITCH _DIV	7.	62.	34.	238.
192	580738	LINDSEY DITCH	YAMP_LINDSEY DITCH_DIV	10.	563.	42.	1196.
193	580749	LOWER PLEASANT VALLEY D	YAMP_LOWER PLEASANT _DIV	14.	83.	32.	605.
194	580756	LYON DITCH NO 2	OAK _LYON DITCH NO 2_DIV	10.	71.	25.	495.
195	580763	MANDALL DITCH	YAMP_MANDALL DITCH_DIV	37.	697.	20.	4741.
196	580767	MAYFLOWER DITCH	SOUT_MAYFLOWER DITCH_DIV	6.	70.	27.	402.
197	580777	MILL DITCH	YAMP_MILL DITCH _DIV	12.	102.	26.	431.
198	580782	MOODY DITCH	MOOD_MOODY DITCH_DIV	5.	118.	45.	289.
199	580783	MORIN DITCH	ELK _MORIN DITCH_DIV	23.	463.	22.	2773.
200	580791	MUDDY D NO 1	MUDD_MUDDY D NO 1 _DIV	7.	78.	27.	337.
201	580798	NICKELL DITCH	YAMP_NICKELL DITCH_DIV	9.	284.	32.	900.
202	580801	NORTH HUNT CREEK DITCH	NORT_NORTH HUNT CREE_DIV	8.	131.	39.	342.
203	580805	OAK CREEK DITCH	OAK _OAK CREEK DITCH_DIV	11.	138.	25.	759.
204	580807	OAK DALE DITCH	OAK _OAK DALE DITCH _DIV	7.	108.	25.	631.
205	580808	OAKTON DITCH	YAMP_OAKTON DITCH _DIV	17.	147.	33.	1170.
206	580809	OLD CABIN DITCH	YAMP_OLD CABIN DITCH_DIV	5.	88.	35.	222.
207	580811	OLIGARCHY DITCH	DUTC_OLIGARCHY DITCH_DIV	5.	91.	42.	216.
208	580813	PALISADE DITCH	HUNT_PALISADE DITCH _DIV	6.	63.	26.	534.
209	580821	PENNSYLVANIA DITCH	YAMP_PENNSYLVANIA DI_DIV	13.	177.	12.	1579.
210	580826	PONY CREEK D	_PONY CREEK D _DIV	8.	94.	30.	389.
211	580830	PRIEST DITCH	PRIE_PRIEST DITCH _DIV	6.	34.	21.	271.
212	580844	SAGE HEN DITCH	NORT_SAGE HEN DITCH _DIV	6.	66.	18.	440.
213	580847	SAND CREEK DITCH	SAND_SAND CREEK DITC_DIV	9.	157.	40.	383.
214	580863	SIMON DITCH	MIDD_SIMON DITCH_DIV	13.	586.	34.	1881.
215	580866	SNOW BANK DITCH	SOUT_SNOW BANK DITCH_DIV	10.	166.	32.	844.
216	580868	SODA CREEK DITCH	SODA_SODA CREEK DITC_DIV	24.	330.	16.	1833.
217	580872	SOUTH SIDE DITCH	YAMP_SOUTH SIDE DITC_DIV	6.	101.	23.	708.
218	580879	STAFFORD DITCH	YAMP_STAFFORD DITCH _DIV	23.	298.	20.	2385.
219	580895	SUNNYSIDE DITCH 1	HINM_SUNNYSIDE DITCH_DIV	14.	148.	32.	995.
220	580897	SUTTLE DITCH	YAMP_SUTTLE DITCH _DIV	43.	643.	25.	3371.
221	580908	TRULL MORIN DITCH	ELK _TRULL MORIN DIT_DIV	6.	125.	30.	479.
222	580914	UNION DITCH	YAMP_UNION DITCH_DIV	9.	56.	5.	1131.
223	580915	UPPER ELK RIVER D	ELK _UPPER ELK RIVER_DIV	14.	130.	17.	940.
224	580916	UPPER PLEASANT VALLEY D	YAMP_UPPER PLEASANT _DIV	17.	270.	33.	1188.
225	580917	VAIL SAVAGE DITCH	SMIT_VAIL SAVAGE DIT_DIV	6.	167.	37.	444.
226	580920	WALTON CREEK DITCH	WALT_WALTON CREEK DI_DIV	71.	1641.	19.	9074.
227	580922	WEISKOPF DITCH	YAMP_WEISKOPF DITCH _DIV	7.	77.	23.	641.
228	580924	WELCH MONSON D	HARR_WELCH MONSON D _DIV	5.	21.	13.	248.
229	580928	WHEELER BROS DITCH	ELK _WHEELER BROS DI_DIV	10.	114.	29.	611.
230	580933	WHIPPLE DITCH	YAMP_WHIPPLE DITCH_DIV	8.	128.	32.	560.
231	580939	WINDSOR DITCH	WALT_WINDSOR DITCH_DIV	6.	31.	6.	452.
232	580943	WOODCHUCK DITCH	SODA_WOODCHUCK DITCH_DIV	15.	371.	55.	220.
233	580944	WOOLERY DITCH	YAMP_WOOLERY DITCH_DIV	37.	469.	28.	2307.
234	580945	WOOLEY DITCH	YAMP_WOOLEY DITCH _DIV	8.	318.	26.	1209.
235	580980	GABIOUD DITCH	GREE_GABIOUD DITCH_DIV	5.	136.	38.	484.
236	581021	LEE IRRIGATION D	ELK _LEE IRRIGATION _DIV	12.	94.	12.	982.
237	581035	NORTH SIDE DITCH	YAMP_NORTH SIDE DITC_DIV	6.	68.	19.	603.
238	581074	ROSSI HIGHLINE	OAK _ROSSI HIGHLINE _DIV	8.	74.	24.	561.
239	581085	MILL CREEK DITCH	MILL_MILL CREEK DITC_DIV	12.	273.	48.	481.
240	581583	HEADGATE DERIVED FROM DI	_HEADGATE DERIVE_DIV	75.	-999.	0.	4222.

TABLE 4.2.1A
Direct Flow Diversion Summary
Average 1975-1991

#	ID	Name	Location	Cap (cfs)	Area (ac)	Eff (%)	Demand (af)
241	582374	STMBT SKI SNOWMAKING PL	YAMP_STMBT SKI SNOWM_DIV	2.	-999.	80.	52.
242	584630	Dome_Creek_Ditch	DOME_DOME CR DITCH_DIV	5.	-999.	100.	309.
243	584684	SARVIS DITCH	SERV_SARVIS DITCH _DIV	15.	-999.	100.	515.
244	584685	STILLWATER DITCH	YAMP_STILLWATER DITC_DIV	40.	2602.	49.	4346.
245	ADY_001	ADY_001_UpperBearRiver	ADY_001_UpperBearRiv_DIV	20.	292.	19.	851.
246	ADY_002	ADY_002_ChimneyCreek	ADY_002_ChemneyCreek_DIV	44.	952.	19.	2779.
247	ADY_003	ADY_003_BearRabvHuntCk	ADY_003_BearRabvHunt_DIV	54.	882.	19.	2634.
248	ADY_004	ADY_004_BearRabvStagecoa	ADY_004_BearRabvStag_DIV	36.	661.	19.	2070.
249	ADY_005	ADY_005_YampaRabvSteambt	ADY_005_YampaRabvSte_DIV	73.	1163.	19.	3631.
250	ADY_006	ADY_006_ElkRivernrClark	ADY_006_ElkRivernrCl_DIV	42.	609.	19.	1790.
251	ADY_007	ADY_007_MiddleElkRiver	ADY_007_MiddleElkRiv_DIV	45.	1062.	19.	3152.
252	ADY_008	ADY_008_LowerElkRiver	ADY_008_LowerElkRive_DIV	58.	672.	19.	2041.
253	ADY_009	ADY_009_TroutCreek	ADY_009_TroutCreek_DIV	33.	474.	19.	1499.
254	ADY_010	ADY_010_YampaRnrHayden	ADY_010_YampaRnrHayd_DIV	18.	166.	19.	501.
255	ADY_011	ADY_011_YampaRabvElkhead	ADY_011_YampaRabvElk_DIV	18.	485.	19.	1457.
256	ADY_012	ADY_012_ElkheadCreek	ADW_012_ElkheadCreek_DIV	10.	437.	19.	1359.
257	ADY_013	ADY_013_YampaRbelCraig	ADY_013_YampaRbelCra_DIV	75.	1204.	19.	4846.
258	ADY_014	ADY_014_EFkWilliamsFork	ADY_014_EFkWilliamsF_DIV	31.	1493.	19.	3692.
259	ADY_015	ADY_015_SFkWilliamsFork	ADY_015_SFkWilliamsF_DIV	50.	683.	19.	2173.
260	ADY_016	ADY_016_WilliamsFork	ADY_016_WilliamsFork_DIV	58.	1024.	19.	3868.
261	ADY_017	ADY_017_MilkCrabvGSpring	ADY_017_MilkCrabvGSp_DIV	15.	435.	19.	1592.
262	ADY_018	ADY_018_MilkCreek	ADY_018_MilkCreek _DIV	35.	966.	19.	4400.
263	ADY_019	ADY_019_YampaRnrMaybell	ADY_019_YampaRnrMayb_DIV	33.	684.	19.	2889.
264	ADY_020	ADY_020_LSnakeRnrSlater	ADY_020_LSnakeRnrSla_DIV	43.	1388.	19.	6350.
265	ADY_021	ADY_021_LSnakeRabvSlater	ADY_021_LSnakeRabvSl_DIV	1017.	714.	19.	3135.
266	ADY_022	ADY_022_SlaterCreek	ADY_022_SlaterCreek _DIV	67.	1686.	19.	7198.
267	ADY_023	ADY_023_LSnakeabvDryGlch	ADY_023_LSnakeabvDry_DIV	1029.	3982.	19.	17527.
268	ADY_024	ADY_024_LSnakeRnrLily	ADY_024_LSnakeRnrLil_DIV	37.	365.	19.	1552.
269	ADY_025	ADY_025_YampaR@DeerLodge	ADY_025_YampaR@Deerl_DIV	25.	555.	19.	2373.
270	ADY_026	ADY_026_YampaR@GreenR	ADY_026_YampaR@Green_DIV	7.	48.	19.	197.
271	ADY_027	ADY_027_GreenRiver	ADY_027_GreenRiver_DIV	55.	1879.	19.	8061.
272	584686	Stillwater_Colo	_FOUR COUNTIES D_DIV	20.	1212.	100.	1688.
273	AMY_001	AMY_001_YampaRbelCraig	AMY_001_YampaRbelCra_DIV	999.	-999.	100.	6732.
274	990528	Cheyenne_City	CHEYENNE CITY _DIV	999.	-999.	100.	16526.
275	990533	Wyoming_Irrig1	WYOMING IRRIGATION1 _DIV	999.	-999.	19.	23452.
276	990534	Wyoming_Irrig2	WYOMING IRRIGATION2 _DIV	999.	-999.	19.	23452.
277	990535	Wyoming_Irrig3	WYOMING IRRIGATION3 _DIV	999.	-999.	19.	23452.
278	AMY_003	AMY_003_LSnakeRnrLily	AMY_003_LSnakeRnrLil_DIV	999.	-999.	100.	696.
279	AMY_002	AMY_002_Yampa@Deerlodge	AMY_002_YampaR@Deerl_DIV	999.	-999.	100.	732.

TABLE 4.2.1B
Return Flow Summary

	Structure:		Returns To:			
#	ID	Name	ID	Name	%	Pattern
1	440509	WILSON DITCH	440660	MILK_J A MARTIN DITC_DIV	100.00	1
2	440511	WISCONSIN DITCH	440514	YAMP_WOOLEY AND JOHN_DIV	100.00	1
3	440514	WOOLEY AND JOHNSON D	440517	YAMP_YAMPA VAL STOCK_DIV	100.00	1
4	440517	YAMPA VAL STOCK BR CO D	440527	YAMP_AIR LINE IRR D _DIV	50.00	1
			440749	YAMP_ROUND BOTTOM D _DIV	50.00	1
5	440518	YELLOW JACKET DITCH NO 1	440519	BEAV_YELLOW JACKET D_DIV	100.00	1
6	440519	YELLOW JACKET DITCH NO 2	440586	MILK_D D AND E DITCH_DIV	100.00	1
7	440522	CRAIG STA D + PL	440527	YAMP_AIR LINE IRR D _DIV	100.00	1
8	440524	AQ NO 1 DITCH	ADY_018	ADY_018_MilkCreek _DIV	100.00	1
9	440527	AIR LINE IRR D	440749	YAMP_ROUND BOTTOM D _DIV	100.00	1
10	440533	ANDERSON DITCH	440699	ELKH_MC KINLEY DITCH_DIV	100.00	1
11	440538	AVERILL DITCH	440675	YAMP_JUNIPER MTN TUN_DIV	100.00	1
12	440541	BAILEY DITCH	440694	YAMP_MAYBELL CANAL_DIV	100.00	1
13	440570	CARD DITCH	440601	EAST_DUNSTON DITCH_DIV	75.00	1
			440740	EAST_RATCLIFF DITCH _DIV	25.00	1
14	440572	CARRIGAN-AVERILL D	440638	MORA_HADDEN BASE DIT_DIV	100.00	1
15	440573	CATARACT DITCH	440511	FORT_WISCONSIN DITCH_DIV	100.00	1
16	440581	CRAIG WATER SUPPLY PL	440514	YAMP_WOOLEY AND JOHN_DIV	100.00	4
17	440583	CROSS MTN PUMP GROUNDS	440786	YAMP_TISDEL D NO 2_DIV	100.00	1
18	440584	CROSS MTN PUMP NO 1 + 2	440687	YAMP_LILY PARK D NO _DIV	100.00	1
19	440585	CRYSTAL CK DITCH	09249200	SOUTH FORK OF WILLIA_FLO	100.00	1
20	440586	D D AND E DITCH	440706	MILK_MILK CK DITCH_DIV	10.00	1
			440675	YAMP_JUNIPER MTN TUN_DIV	90.00	1
21	440587	D D FERGUSON D NO 2	440660	MILK_J A MARTIN DITC_DIV	100.00	1
22	440589	DEEP CUT IRR D	440691	YAMP_M DITCH_DIV	40.00	1
			440581	YAMP_CRAIG WATER SUP_DIV	40.00	1
			440514	YAMP_WOOLEY AND JOHN_DIV	20.00	1
23	440590	DEER CK A MORAPOS D	ADY_016	ADY_016_WilliamsFork_DIV	100.00	1
24	440593	DENNISON A MARTIN D	440675	YAMP_JUNIPER MTN TUN_DIV	100.00	1
25	440601	DUNSTON DITCH	440740	EAST_RATCLIFF DITCH _DIV	100.00	1
26	440607	EGRY MESA DITCH	449999	EAST FK WILL MSF_ISF	100.00	1
27	440611	ELK TRAIL DITCH	440661	SOUT_J P MORIN DITCH_DIV	100.00	1
28	440612	ELKHORN IRR DITCH	440511	FORT_WISCONSIN DITCH_DIV	100.00	1
29	440613	ELLGEN DITCH	440806	YAMP_ELLGEN NO 2 DIT_DIV	100.00	1
30	440614	ELLIS A KITCHENS D	440699	ELKH_MC KINLEY DITCH_DIV	100.00	1
31	440628	GIBBONS WILSON A JORDAN	440590	MORA_DEER CK A MORAP_DIV	100.00	1
32	440635	GRIESER DITCH	09249000	EAST FORK OF WILLIAM_FLO	100.00	1
33	440638	HADDEN BASE DITCH	440812	MORA_HART DITCH _DIV	100.00	1
34	440644	HARPER NO 1 DITCH	440790	WILL_UTLEY DITCH_DIV	100.00	1
35	440645	HARPER NO 2 D	440790	WILL_UTLEY DITCH_DIV	100.00	1
36	440647	HAUGHEY IRR DITCH	440650	FORT_MESA HL BK COTW_DIV	100.00	1
37	440650	MESA HL BK COTWOOD PUMP	440511	FORT_WISCONSIN DITCH_DIV	100.00	1
38	440651	HIGHLAND DITCH	440675	YAMP_JUNIPER MTN TUN_DIV	100.00	1
39	440652	HIGHLAND DITCH	ADY_015	ADY_015_SFkWilliamsF_DIV	100.00	1
40	440660	J A MARTIN DITCH	440586	MILK_D D AND E DITCH_DIV	100.00	1
41	440661	J P MORIN DITCH	ADY_015	ADY_015_SFkWilliamsF_DIV	100.00	1
42	440670	JOHN W KELLOGG NO 2 D	440814	DEER_HIGHLINE DITCH _DIV	100.00	1
43	440675	JUNIPER MTN TUNNEL	440820	YAMP_LOWRY SEELEY PU_DIV	10.00	1
			440863	YAMP_HENRY SWEENEY D_DIV	30.00	1
44	440677	K DIAMOND DITCH	440677	YAMP_K DIAMOND DITCH_DIV	60.00	1
			442214	YAMP_BAILEY DITCH-UT_DIV	45.00	1
45	440681	LAMB IRR DITCH	440541	YAMP_BAILEY DITCH _DIV	55.00	1
46	440687	LILY PARK D NO 1	440650	FORT_MESA HL BK COTW_DIV	100.00	1
47	440688	LITTLE BEAR DITCH	ADY_025	ADY_025_YampaR@Deerl_DIV	100.00	1
48	440691	M DITCH	440511	FORT_WISCONSIN DITCH_DIV	100.00	1
			440581	YAMP_CRAIG WATER SUP_DIV	40.00	1
49	440692	MARTIN CK DITCH	440514	YAMP_WOOLEY AND JOHN_DIV	60.00	1
			440509	MILK_WILSON DITCH _DIV	100.00	1

TABLE 4.2.1B
Return Flow Summary

	Structure:		Returns To:			
#	ID	Name	ID	Name	%	Pattern
50	440694	MAYBELL CANAL	440702	YAMP_MCINTYRE DITCH _DIV	35.00	1
			440711	YAMP_MOCK DITCH _DIV	25.00	1
			440828	YAMP_MOCK DITCH NO 3_DIV	10.00	1
			440723	YAMP_NICHOLS DITCH N_DIV	20.00	1
			440695	YAMP_MAYBELL MILL PI_DIV	10.00	1
51	440695	MAYBELL MILL PIPELINE	440711	YAMP_MOCK DITCH _DIV	100.00	1
52	440698	MC DONALD DITCH	440511	FORT_WISCONSIN DITCH_DIV	100.00	1
53	440699	MC KINLEY DITCH NO 1	440700	ELKH_MC KINLEY DITCH_DIV	5.00	1
			443902	ELKH_ELK HEAD RESERV_RES	95.00	1
54	440700	MC KINLEY DITCH NO 2	443902	ELKH_ELK HEAD RESERV_RES	100.00	1
55	440702	MCINTYRE DITCH	440695	YAMP_MAYBELL MILL PI_DIV	100.00	1
56	440706	MILK CK DITCH	ADY_017	ADY_017_MilkCrabvGSp_DIV	100.00	1
57	440711	MOCK DITCH	440828	YAMP_MOCK DITCH NO 3_DIV	60.00	1
			440723	YAMP_NICHOLS DITCH N_DIV	40.00	1
58	440716	MULLEN DITCH	440670	DEER_JOHN W KELLOGG _DIV	100.00	1
59	440723	NICHOLS DITCH NO 1	440778	YAMP_SUNBEAM DITCH_DIV	100.00	1
60	440724	NORVELL DITCH	440589	YAMP_DEEP CUT IRR D _DIV	65.00	1
			440691	YAMP_M DITCH_DIV	35.00	1
61	440729	PATRICK SWEENEY D	440830	YAMP_OLD SWEENEY DIT_DIV	55.00	1
			442214	YAMP_BAILEY DITCH-UT_DIV	45.00	1
62	440731	PECK IRRIG D	440765	WILL_SOUTH SIDE DITC_DIV	40.00	1
			440790	WILL_UTLEY DITCH_DIV	60.00	1
63	440735	PINE CK DITCH	440661	SOUT_J P MORIN DITCH_DIV	100.00	1
64	440740	RATCLIFF DITCH	440652	EAST_HIGHLAND DITCH _DIV	70.00	1
			440731	WILL_PECK IRRIG D _DIV	30.00	1
65	440747	ROBY D AKA ROBY D NO 1	440651	MORA_HIGHLAND DITCH _DIV	10.00	1
			440593	MORA_DENNISON A MART_DIV	80.00	1
			440590	MORA_DEER CK A MORAP_DIV	10.00	1
66	440748	ROBY DITCH NO 2	440651	MORA_HIGHLAND DITCH _DIV	30.00	1
			440628	MORA_GIBBONS WILSON _DIV	70.00	1
67	440749	ROUND BOTTOM D NO 1	440751	YAMP_ROUND BOTTOM DI_DIV	100.00	1
68	440750	ROUND BOTTOM D NO 2	440675	YAMP_JUNIPER MTN TUN_DIV	100.00	1
69	440751	ROUND BOTTOM DITCH	440806	YAMP_ELLGEN NO 2 DIT_DIV	100.00	1
70	440763	SMITH DITCH	440724	ELKH_NORVELL DITCH_DIV	100.00	1
71	440765	SOUTH SIDE DITCH	440790	WILL_UTLEY DITCH_DIV	100.00	1
72	440770	STARR IRRIG DITCH	440763	ELKH_SMITH DITCH_DIV	100.00	1
73	440778	SUNBEAM DITCH	440801	YAMP_CROSS MTN PUMP _DIV	100.00	1
74	440785	TIPTON IRR DITCH	440511	FORT_WISCONSIN DITCH_DIV	100.00	1
75	440786	TISDEL D NO 2	441122	YAMP_VAUGHN PUMP_DIV	100.00	1
76	440790	UTLEY DITCH	09249750	WILLIAMS FORK AT MOU_FLO	100.00	1
77	440801	CROSS MTN PUMP GUESS	440583	YAMP_CROSS MTN PUMP _DIV	100.00	1
78	440806	ELLGEN NO 2 DITCH	440750	YAMP_ROUND BOTTOM D _DIV	100.00	1
79	440812	HART DITCH	440748	MORA_ROBY DITCH NO 2_DIV	100.00	1
80	440814	HIGHLINE DITCH	ADY_016	ADY_016_WilliamsFork_DIV	100.00	1
81	440820	LOWRY SEELEY PUMP	440677	YAMP_K DIAMOND DITCH_DIV	70.00	1
			440863	YAMP_HENRY SWEENEY D_DIV	30.00	1
82	440821	MACK DITCH	440517	YAMP_YAMPA VAL STOCK_DIV	100.00	1
83	440828	MOCK DITCH NO 3	440723	YAMP_NICHOLS DITCH N_DIV	100.00	1
84	440830	OLD SWEENEY DITCH	442214	YAMP_BAILEY DITCH-UT_DIV	100.00	1
85	440863	HENRY SWEENEY DITCH	440677	YAMP_K DIAMOND DITCH_DIV	100.00	1
86	440998	DRY COTTONWOOD DITCH	440511	FORT_WISCONSIN DITCH_DIV	100.00	1
87	441122	VAUGHN PUMP	440584	YAMP_CROSS MTN PUMP _DIV	100.00	1
88	442214	BAILEY DITCH-UTAH INT.	440694	YAMP_MAYBELL CANAL_DIV	100.00	1
89	540507	BEELER DITCH	540592	BATT_WILSON DITCH _DIV	10.00	1
			540543	LITT_LUCHINGER DITCH_DIV	90.00	1
90	540531	HEELEY DITCH	ADY_023	ADY_023_LSnakeabvDry_DIV	100.00	1
91	540532	HOME SUPPLY DITCH	540507	LITT_BEELER DITCH _DIV	100.00	1

TABLE 4.2.1B
Return Flow Summary

	Structure:		Returns To:			
#	ID	Name	ID	Name	%	Pattern
92	540543	LUCHINGER DITCH	540548	LITT_MORGAN AND BEEL_DIV	100.00	1
93	540548	MORGAN AND BEELER D	990528	CHEYENNE CITY _DIV	100.00	1
94	540549	MORGAN SLATER DITCH	990528	CHEYENNE CITY _DIV	100.00	1
95	540554	PERKINS FOX DITCH	09258000	WILLOW CREEK NEAR DI_FLO	100.00	1
96	540555	PERKINS IRR DITCH	540583	LITT_TROWEL DITCH _DIV	100.00	1
97	540564	SALISBURY DITCH	540543	LITT_LUCHINGER DITCH_DIV	100.00	1
98	540568	SLATER FORK DITCH	ADY_022	ADY_022_SlaterCreek _DIV	100.00	1
99	540570	SLATER PARK DITCH NO1	540571	HENR_SLATER PARK DIT_DIV	25.00	1
			540574	SLAT_SLATER PARK DIT_DIV	25.00	1
			540568	SLAT_SLATER FORK DIT_DIV	50.00	1
100	540571	SLATER PARK DITCH NO 2	540572	HENR_SLATER PARK DIT_DIV	25.00	1
			540568	SLAT_SLATER FORK DIT_DIV	75.00	1
101	540572	SLATER PARK DITCH NO 3	540568	SLAT_SLATER FORK DIT_DIV	100.00	1
102	540574	SLATER PARK DITCH NO 5	540568	SLAT_SLATER FORK DIT_DIV	100.00	1
103	540583	TROWEL DITCH	540594	LITT_WOODBURY DITCH _DIV	100.00	1
104	540591	WILLOW CK DITCH	540555	WILL_PERKINS IRR DIT_DIV	100.00	1
105	540592	WILSON DITCH	540564	BATT_SALISBURY DITCH_DIV	10.00	1
			540543	LITT_LUCHINGER DITCH_DIV	90.00	1
106	540594	WOODBURY DITCH	540531	LITT_HEELEY DITCH _DIV	100.00	1
107	550504	ESCALANTA DITCH NO 2	550506	YAMP_MAJORS DITCH NO_DIV	100.00	1
108	550506	MAJORS DITCH NO 2	550537	YAMP_LEFEVRE NO 1 PU_DIV	100.00	1
109	550507	NINE MILE IRR DITCH	550508	YAMP_NINE MILE IRR P_DIV	100.00	1
110	550508	NINE MILE IRR PL	550513	YAMP_VISINTAINER DIT_DIV	100.00	1
111	550513	VISINTAINER DITCH	550504	YAMP_ESCALANTA DITCH_DIV	100.00	1
112	550519	RINKER DITCH	ADY_024	ADY_024_LSnakeRnrLil_DIV	100.00	1
113	550537	LEFEVRE NO 1 PUMP	550519	YAMP_RINKER DITCH _DIV	100.00	1
114	570508	BROCK DITCH	ADY_011	ADY_011_YampaRabvElk_DIV	100.00	1
115	570510	CARY DITCH CO DITCH	570508	YAMP_BROCK DITCH_DIV	100.00	1
116	570512	COLO UTILITIES D A PL	570622	YAMP_WILLIAMS IRRIG _DIV	100.00	1
117	570513	CONNELL DITCH	570608	TROU_TROUT CK DITCH _DIV	100.00	1
118	570517	DAVID M CHAPMAN DITCH	570576	TROU_ORNO DITCH _DIV	100.00	1
119	570519	DENNIS AND BLEWITT D	570563	YAMP_MARSHALL ROBERT_DIV	100.00	1
120	570524	EAST SIDE DITCH	570519	YAMP_DENNIS AND BLEW_DIV	100.00	1
121	570525	EAST SIDE DITCH NO 2	570524	FISH_EAST SIDE DITCH_DIV	50.00	1
			570519	YAMP_DENNIS AND BLEW_DIV	25.00	1
			570623	FISH_WILLIAMS PARK D_DIV	25.00	1
122	570535	ERWIN IRRIGATING DITCH	570510	YAMP_CARY DITCH CO D_DIV	100.00	1
123	570539	GIBRALTAR DITCH	570611	YAMP_WALKER IRRIG DI_DIV	10.00	1
			570535	YAMP_ERWIN IRRIGATIN_DIV	15.00	1
			570592	YAMP_SHELTON DITCH_DIV	75.00	1
124	570544	HIGHLAND DITCH	570524	FISH_EAST SIDE DITCH_DIV	40.00	1
			570623	FISH_WILLIAMS PARK D_DIV	15.00	1
			570519	YAMP_DENNIS AND BLEW_DIV	45.00	1
125	570545	HOMESTEAD DITCH	570608	TROU_TROUT CK DITCH _DIV	100.00	1
126	570555	LAST CHANCE DITCH	570517	TROU_DAVID M CHAPMAN_DIV	30.00	1
			570576	TROU_ORNO DITCH _DIV	70.00	1
127	570561	MALE MOORE CO DITCH ENL	570576	TROU_ORNO DITCH _DIV	100.00	1
128	570563	MARSHALL ROBERTS DITCH	570611	YAMP_WALKER IRRIG DI_DIV	50.00	1
			570622	YAMP_WILLIAMS IRRIG _DIV	50.00	1
129	570576	ORNO DITCH	570635	TROU_KOLL DITCH _DIV	100.00	1
130	570579	R E CLARK DITCH	570519	YAMP_DENNIS AND BLEW_DIV	100.00	1
131	570584	SADDLE MTN DITCH	570519	YAMP_DENNIS AND BLEW_DIV	100.00	1
132	570592	SHELTON DITCH	570535	YAMP_ERWIN IRRIGATIN_DIV	10.00	1
			570510	YAMP_CARY DITCH CO D_DIV	90.00	1
133	570608	TROUT CK DITCH NO 3	570609	TROU_TROUT CREEK DIT_DIV	40.00	1
			570519	YAMP_DENNIS AND BLEW_DIV	60.00	1

TABLE 4.2.1B
Return Flow Summary

Structure: #	Structure: ID	Structure: Name	Returns To: ID	Returns To: Name	%	Pattern
134	570609	TROUT CREEK DITCH NO 2	570519	YAMP_DENNIS AND BLEW_DIV	100.00	1
135	570611	WALKER IRRIG DITCH	570592	YAMP_SHELTON DITCH_DIV	100.00	1
136	570622	WILLIAMS IRRIG DITCH	570611	YAMP_WALKER IRRIG DI_DIV	100.00	1
137	570623	WILLIAMS PARK DITCH	570519	YAMP_DENNIS AND BLEW_DIV	100.00	1
138	570635	KOLL DITCH	570545	TROU_HOMESTEAD DITCH_DIV	100.00	1
139	574629	RICH D	570508	YAMP_BROCK DITCH_DIV	100.00	1
140	580500	ACTON DITCH	580643	YAMP_FIX DITCH_DIV	10.00	1
			580777	YAMP_MILL DITCH _DIV	30.00	1
			580798	YAMP_NICKELL DITCH_DIV	60.00	1
141	580506	ALLEN BASIN SUPPLY D	580569	SOUT_BURNT MESA D _DIV	100.00	1
142	580508	ALPHA DITCH	581074	OAK _ROSSI HIGHLINE _DIV	100.00	1
143	580530	BAXTER DITCH	580612	YAMP_DEVER D_DIV	100.00	1
144	580532	BEAVER CREEK D	580916	YAMP_UPPER PLEASANT _DIV	100.00	1
145	580539	BIG MESA DITCH	580738	YAMP_LINDSEY DITCH_DIV	100.00	1
146	580541	BIRD DITCH	580879	YAMP_STAFFORD DITCH _DIV	100.00	1
147	580549	BORLAND VAIL DITCH	580568	ELK _BURNETT DITCH_DIV	100.00	1
148	580556	BRINKER CREEK DITCH	582409	PHILLIPS CR MSF _ISF	100.00	1
149	580559	BROOKS DITCH	570584	YAMP_SADDLE MTN DITC_DIV	100.00	1
150	580561	BRUMBACK DITCH	580612	YAMP_DEVER D_DIV	100.00	1
151	580564	BUCKINGHAM MANDALL D	580798	YAMP_NICKELL DITCH_DIV	100.00	1
152	580568	BURNETT DITCH	580599	ELK _CULLEN DITCH NO_DIV	100.00	1
153	580569	BURNT MESA D	580813	HUNT_PALISADE DITCH _DIV	100.00	1
154	580574	C R BROWN MOFFAT COAL C	580809	YAMP_OLD CABIN DITCH_DIV	100.00	1
155	580577	CAMPBELL DITCH	580915	ELK _UPPER ELK RIVER_DIV	10.00	1
			580662	ELK _GRAHAM + BENNET_DIV	30.00	1
156	580582	CHARLES LEIGHTON D	580568	ELK _BURNETT DITCH_DIV	60.00	1
157	580583	CHARLES H KEMMER D	580500	YAMP_ACTON DITCH_DIV	100.00	1
158	580588	CLARKE BURKE DITCH	580633	ELK _FELIX BORGHI D _DIV	100.00	1
			580649	ELK _FRANZ DITCH_DIV	85.00	1
159	580589	COAL CREEK DITCH	580577	ELK _CAMPBELL DITCH _DIV	15.00	1
160	580590	COLEMAN DITCH E	582214	COAL CREEK MSF_ISF	100.00	1
161	580591	COLLINS DITCH	580568	ELK _BURNETT DITCH_DIV	100.00	1
162	580599	CULLEN DITCH NO 2	580813	HUNT_PALISADE DITCH _DIV	100.00	1
163	580604	DAY DITCH	581021	ELK _LEE IRRIGATION _DIV	100.00	1
164	580612	DEVER D	ADY_007	ADY_007_MiddleElkRiv_DIV	100.00	1
165	580618	DUQUETTE DITCH	582374	YAMP_STMBT SKI SNOWM_DIV	100.00	1
			570584	YAMP_SADDLE MTN DITC_DIV	35.00	1
166	580622	EGERIA DITCH	580559	YAMP_BROOKS DITCH _DIV	65.00	1
			580879	YAMP_STAFFORD DITCH _DIV	10.00	1
			580808	YAMP_OAKTON DITCH _DIV	15.00	1
167	580623	EKHART DITCH	580933	YAMP_WHIPPLE DITCH_DIV	75.00	1
			580649	ELK _FRANZ DITCH_DIV	50.00	1
168	580626	ELK VALLEY D	580577	ELK _CAMPBELL DITCH _DIV	50.00	1
			580908	ELK _TRULL MORIN DIT_DIV	40.00	1
			580783	ELK _MORIN DITCH_DIV	40.00	1
169	580627	ENTERPRISE DITCH	580728	ELK _LARSON DITCH _DIV	20.00	1
			580612	YAMP_DEVER D_DIV	85.00	1
170	580628	EXCELSIOR D	582374	YAMP_STMBT SKI SNOWM_DIV	15.00	1
171	580633	FELIX BORGHI D	582374	YAMP_STMBT SKI SNOWM_DIV	100.00	1
172	580634	FERGUSON DITCH	ADY_008	ADY_008_LowerElkRive_DIV	100.00	1
173	580640	FIRST CHANCE DITCH	580879	YAMP_STAFFORD DITCH _DIV	100.00	1
174	580642	FISH CR PIPELINE A	582206	BIG CREEK MSF _ISF	100.00	1
175	580643	FIX DITCH	580559	YAMP_BROOKS DITCH _DIV	100.00	4
			580777	YAMP_MILL DITCH _DIV	20.00	1
			580684	YAMP_HERNAGE + KOLBE_DIV	10.00	1
			580821	YAMP_PENNSYLVANIA DI_DIV	70.00	1

TABLE 4.2.1B
Return Flow Summary

	Structure:		Returns To:			
#	ID	Name	ID	Name	%	Pattern
176	580649	FRANZ DITCH	580577	ELK _CAMPBELL DITCH _DIV	85.00	1
			580915	ELK _UPPER ELK RIVER_DIV	15.00	1
177	580662	GRAHAM + BENNETT D	580568	ELK _BURNETT DITCH_DIV	25.00	1
			580599	ELK _CULLEN DITCH NO_DIV	75.00	1
178	580663	GREER DITCH	580577	ELK _CAMPBELL DITCH _DIV	100.00	1
179	580665	GUIDO DITCH	580844	NORT_SAGE HEN DITCH _DIV	100.00	1
180	580684	HERNAGE + KOLBE DITCH	580541	YAMP_BIRD DITCH _DIV	50.00	1
			580798	YAMP_NICKELL DITCH_DIV	50.00	1
181	580685	HIGH MESA IRR D	580844	NORT_SAGE HEN DITCH _DIV	50.00	1
			580801	NORT_NORTH HUNT CREE_DIV	50.00	1
182	580687	HIGHLINE BEAVER DITCH	580939	WALT_WINDSOR DITCH_DIV	100.00	1
183	580694	HOOVER JACQUES DITCH	580928	ELK _WHEELER BROS DI_DIV	15.00	1
			580623	ELK _EKHART DITCH _DIV	20.00	1
			580577	ELK _CAMPBELL DITCH _DIV	65.00	1
184	580695	HOT SPGS CR HIGHLINE D	580626	ELK _ELK VALLEY D _DIV	100.00	1
185	580714	KELLER DITCH	580599	ELK _CULLEN DITCH NO_DIV	100.00	1
186	580717	KINNEY DITCH	580649	ELK _FRANZ DITCH_DIV	100.00	1
187	580721	L L WILSON D	580933	YAMP_WHIPPLE DITCH_DIV	100.00	1
188	580722	LAFON DITCH	580866	SOUT_SNOW BANK DITCH_DIV	100.00	1
189	580728	LARSON DITCH	570584	YAMP_SADDLE MTN DITC_DIV	100.00	1
190	580730	LATERAL A DITCH	580813	HUNT_PALISADE DITCH _DIV	100.00	1
191	580731	LAUGHLIN DITCH	580879	YAMP_STAFFORD DITCH _DIV	20.00	1
			580721	LAWS_L L WILSON D _DIV	80.00	1
192	580738	LINDSEY DITCH	580763	YAMP_MANDALL DITCH_DIV	20.00	1
			580643	YAMP_FIX DITCH_DIV	40.00	1
			580798	YAMP_NICKELL DITCH_DIV	40.00	1
193	580749	LOWER PLEASANT VALLEY D	583631	YAMP_LAKE CATAMOUNT _RES	100.00	1
194	580756	LYON DITCH NO 2	580612	YAMP_DEVER D_DIV	100.00	1
195	580763	MANDALL DITCH	580798	YAMP_NICKELL DITCH_DIV	100.00	1
196	580767	MAYFLOWER DITCH	580722	SOUT_LAFON DITCH_DIV	100.00	1
197	580777	MILL DITCH	580798	YAMP_NICKELL DITCH_DIV	85.00	1
			580821	YAMP_PENNSYLVANIA DI_DIV	15.00	1
198	580782	MOODY DITCH	580634	WATS_FERGUSON DITCH _DIV	100.00	1
199	580783	MORIN DITCH	580728	ELK _LARSON DITCH _DIV	15.00	1
			570584	YAMP_SADDLE MTN DITC_DIV	55.00	1
			580633	ELK _FELIX BORGHI D _DIV	30.00	1
200	580791	MUDDY D NO 1	580916	YAMP_UPPER PLEASANT _DIV	100.00	1
201	580798	NICKELL DITCH	580622	YAMP_EGERIA DITCH _DIV	85.00	1
			580879	YAMP_STAFFORD DITCH _DIV	15.00	1
202	580801	NORTH HUNT CREEK DITCH	582519_Dwn	HUNT CREEK MSF DOWN _ISF	100.00	1
203	580805	OAK CREEK DITCH	580872	YAMP_SOUTH SIDE DITC_DIV	100.00	1
204	580807	OAK DALE DITCH	580561	OAK _BRUMBACK DITCH _DIV	100.00	1
205	580808	OAKTON DITCH	580574	YAMP_C R BROWN MOFFA_DIV	65.00	1
			580809	YAMP_OLD CABIN DITCH_DIV	35.00	1
206	580809	OLD CABIN DITCH	580872	YAMP_SOUTH SIDE DITC_DIV	50.00	1
			581035	YAMP_NORTH SIDE DITC_DIV	50.00	1
207	580811	OLIGARCHY DITCH	583787	WILL_UPPER WILLOW CR_RES	100.00	1
208	580813	PALISADE DITCH	582519_Dwn	HUNT CREEK MSF DOWN _ISF	100.00	1
209	580821	PENNSYLVANIA DITCH	580798	YAMP_NICKELL DITCH_DIV	100.00	1
210	580826	PONY CREEK D	580556	BRIN_BRINKER CREEK D_DIV	100.00	1
211	580830	PRIEST DITCH	582374	YAMP_STMBT SKI SNOWM_DIV	100.00	1
212	580844	SAGE HEN DITCH	580801	NORT_NORTH HUNT CREE_DIV	100.00	1
213	580847	SAND CREEK DITCH	580577	ELK _CAMPBELL DITCH _DIV	100.00	1
214	580863	SIMON DITCH	580801	NORT_NORTH HUNT CREE_DIV	25.00	1
			580844	NORT_SAGE HEN DITCH _DIV	30.00	1
			580813	HUNT_PALISADE DITCH _DIV	45.00	1

TABLE 4.2.1B
Return Flow Summary

	Structure:		Returns To:			
#	ID	Name	ID	Name	%	Pattern
215	580866	SNOW BANK DITCH	582519	HUNT CREEK MSF_ISF	100.00	1
216	580868	SODA CREEK DITCH	580944	YAMP_WOOLERY DITCH_DIV	100.00	1
217	580872	SOUTH SIDE DITCH	581035	YAMP_NORTH SIDE DITC_DIV	20.00	1
			580914	YAMP_UNION DITCH_DIV	80.00	1
218	580879	STAFFORD DITCH	580933	YAMP_WHIPPLE DITCH_DIV	100.00	1
219	580895	SUNNYSIDE DITCH 1	582219	ELK RIVER MSF UPPER _ISF	100.00	1
220	580897	SUTTLE DITCH	580530	YAMP_BAXTER DITCH _DIV	100.00	1
221	580908	TRULL MORIN DITCH	580783	ELK _MORIN DITCH_DIV	30.00	1
			580728	ELK _LARSON DITCH _DIV	70.00	1
222	580914	UNION DITCH	584213	YAMP_BEAR RES WESSEL_RES	100.00	1
223	580915	UPPER ELK RIVER D	580568	ELK _BURNETT DITCH_DIV	100.00	1
224	580916	UPPER PLEASANT VALLEY D	580749	YAMP_LOWER PLEASANT _DIV	80.00	1
			583631	YAMP_LAKE CATAMOUNT _RES	20.00	1
225	580917	VAIL SAVAGE DITCH	ADY_007	ADY_007_MiddleElkRiv_DIV	100.00	1
226	580920	WALTON CREEK DITCH	580612	YAMP_DEVER D_DIV	100.00	1
227	580922	WEISKOPF DITCH	580897	YAMP_SUTTLE DITCH _DIV	100.00	1
228	580924	WELCH MONSON D	583631	YAMP_LAKE CATAMOUNT _RES	100.00	1
229	580928	WHEELER BROS DITCH	580623	ELK _EKHART DITCH _DIV	60.00	1
			580649	ELK _FRANZ DITCH_DIV	40.00	1
230	580933	WHIPPLE DITCH	580808	YAMP_OAKTON DITCH _DIV	60.00	1
			580574	YAMP_C R BROWN MOFFA_DIV	40.00	1
231	580939	WINDSOR DITCH	582374	YAMP_STMBT SKI SNOWM_DIV	100.00	1
232	580943	WOODCHUCK DITCH	580626	ELK _ELK VALLEY D _DIV	35.00	1
			580618	YAMP_DUQUETTE DITCH _DIV	65.00	1
233	580944	WOOLERY DITCH	580618	YAMP_DUQUETTE DITCH _DIV	85.00	1
			580559	YAMP_BROOKS DITCH _DIV	15.00	1
234	580945	WOOLEY DITCH	580798	YAMP_NICKELL DITCH_DIV	100.00	1
235	580980	GABIOUD DITCH	580749	YAMP_LOWER PLEASANT _DIV	100.00	1
236	581021	LEE IRRIGATION D	580626	ELK _ELK VALLEY D _DIV	100.00	1
237	581035	NORTH SIDE DITCH	580914	YAMP_UNION DITCH_DIV	100.00	1
238	581074	ROSSI HIGHLINE	580807	OAK _OAK DALE DITCH _DIV	100.00	1
239	581085	MILL CREEK DITCH	580866	SOUT_SNOW BANK DITCH_DIV	100.00	1
240	581583	HEADGATE DERIVED FROM DI	09237500	YAMPA RIVER BELOW ST_FLO	100.00	1
241	582374	STMBT SKI SNOWMAKING PL	580944	YAMP_WOOLERY DITCH_DIV	100.00	5
242	584630	Dome_Creek_Ditch	582216_Dwn	DOME CREEK MSF DOWN _ISF	100.00	1
243	584684	SARVIS DITCH	582306_Dwn	SERVICE CR MSF DOWN _ISF	100.00	1
244	584685	STILLWATER DITCH	580826	_PONY CREEK D _DIV	14.00	1
			580798	YAMP_NICKELL DITCH_DIV	54.00	1
			580798	YAMP_NICKELL DITCH_DIV	32.00	1
245	ADY_001	ADY_001_UpperBearRiver	580622	YAMP_EGERIA DITCH _DIV	100.00	1

TABLE 4.2.1B
Return Flow Summary

	Structure:		Returns To:			
#	ID	Name	ID	Name	%	Pattern
246	ADY_002	ADY_002_ChimneyCreek	582409_Dwn	PHILLIPS CR MSF DOWN_ISF	100.00	1
247	ADY_003	ADY_003_BearRabvHuntCk	580574	YAMP_C R BROWN MOFFA_DIV	100.00	1
248	ADY_004	ADY_004_BearRabvStagecoa	584213	YAMP_BEAR RES WESSEL_RES	100.00	1
249	ADY_005	ADY_005_YampaRabvSteambt	09239500	YAMPA RIVER AT STEAM_FLO	100.00	1
250	ADY_006	ADY_006_ElkRivernrClark	09241000	ELK RIVER AT CLARK	_FLO	100.00
251	ADY_007	ADY_007_MiddleElkRiver	580568	ELK _BURNETT DITCH_DIV	100.00	1
252	ADY_008	ADY_008_LowerElkRiver	581355_Dwn	ELK R MSF LOWER DOWN_ISF	100.00	1
253	ADY_009	ADY_009_TroutCreek	571009_Dwn	TROUT CR MSF LWR DOW_ISF	100.00	1
254	ADY_010	ADY_010_YampaRnrHayden	09244410	YAMPA RIVER BELOW DI_FLO	100.00	1
255	ADY_011	ADY_011_YampaRabvElkhead	440589	YAMP_DEEP CUT IRR D _DIV	100.00	1
256	ADY_012	ADY_012_ElkheadCreek	440589	YAMP_DEEP CUT IRR D _DIV	100.00	1
257	ADY_013	ADY_013_YampaRbelCraig	ASY_001	ASY_001_YampaRbelCra_RES	100.00	1
258	ADY_014	ADY_014_EFkWilliamsFork	09249000	EAST FORK OF WILLIAM_FLO	100.00	1
259	ADY_015	ADY_015_SFkWilliamsFork	449998	WILLIAMS FK R MSF _ISF	100.00	1
260	ADY_016	ADY_016_WilliamsFork	09249750	WILLIAMS FORK AT MOU_FLO	100.00	1
261	ADY_017	ADY_017_MilkCrabvGSpring	ADY_018	ADY_018_MilkCreek _DIV	100.00	1
262	ADY_018	ADY_018_MilkCreek	440675	YAMP_JUNIPER MTN TUN_DIV	100.00	1
263	ADY_019	ADY_019_YampaRnrMaybell	09251000	YAMPA RIVER NEAR MAY_FLO	100.00	1
264	ADY_020	ADY_020_LSnakeRnrSlater	09253000	LITTLE SNAKE RIVER N_FLO	100.00	1
265	ADY_021	ADY_021_LSnakeRabvSlater	990528	CHEYENNE CITY _DIV	100.00	1
266	ADY_022	ADY_022_SlaterCreek	09255000	SLATER FORK NEAR SLA_FLO	100.00	1
267	ADY_023	ADY_023_LSnakeabvDryGlch	550507	YAMP_NINE MILE IRR D_DIV	100.00	1
268	ADY_024	ADY_024_LSnakeRnrLily	ASY_003	ASY_003_LSnakeRnrLil_RES	100.00	1
269	ADY_025	ADY_025_YampaR@DeerLodge	ASY_002	ASY_002_YampaR@Deerl_RES	100.00	1
270	ADY_026	ADY_026_YampaR@GreenR	yampa_Lst	YAMPA DUMMY _DIV	100.00	1
271	ADY_027	ADY_027_GreenRiver	yampa_Lst	YAMPA DUMMY _DIV	100.00	1
272	584686	Stillwater_Colo	580826	_PONY CREEK D _DIV	100.00	1
273	AMY_001	AMY_001_YampaRbelCraig	09247600	YAMPA RIVER BELOW CR_FLO	100.00	1
274	990528	Cheyenne_City	990533	WYOMING IRRIGATION1 _DIV	100.00	1
275	990533	Wyoming_Irrig1	990534	WYOMING IRRIGATION2 _DIV	100.00	1
276	990534	Wyoming_Irrig2	990535	WYOMING IRRIGATION3 _DIV	100.00	1
277	990535	Wyoming_Irrig3	540583	LITT_TROWEL DITCH _DIV	100.00	1
278	AMY_003	AMY_003_LSnakeRnrLily	09260000	LITTLE SNAKE RIVER N_FLO	100.00	1
279	AMY_002	AMY_002_Yampa@Deerlodge	09260050	YAMPA RIVER AT DEERL_FLO	100.00	1

TABLE 4.2.5A
Direct Flow Water Right Summary (cfs)

#	ID	Name	Admin #	Decree
1	440509	WILSON DITCH	13089.00000	5.00
			36295.28022	5.61
			36768.00000	5.00
2	440511	WISCONSIN DITCH	14019.00000	17.00
			40421.20948	5.00
			51864.51651	10.00
3	440514	WOOLEY AND JOHNSON D	36295.20902	6.04
			99999.00000	6.04
4	440517	YAMPA VAL STOCK BR CO D	13809.00000	12.50
			14541.00000	4.20
5	440518	YELLOW JACKET DITCH NO 1	20613.15324	4.00
			36295.15324	4.65
			36295.18413	12.00
6	440519	YELLOW JACKET DITCH NO 2	20613.13666	3.00
			36295.19143	3.88
7	440522	CRAIG STA D + PL	40815.00000	45.70
			45290.44865	44.93
8	440524	AQ NO 1 DITCH	36295.18609	5.30
			36295.22035	7.56
			36295.23131	8.20
			36338.00000	1.80
9	440527	AIR LINE IRR D	17778.00000	6.00
			99999.00000	6.00
10	440533	ANDERSON DITCH	20605.00000	5.00
11	440538	AVERILL DITCH	36295.25719	2.50
			36295.28184	3.40
			37212.00000	14.00
12	440541	BAILEY DITCH	19621.17745	2.08
			40421.33372	13.50
13	440570	CARD DITCH	19250.13675	2.08
			19250.18018	2.84
			36295.25353	6.87
			99999.00000	6.87
14	440572	CARRIGAN-AVERILL D	36295.23892	8.32
15	440573	CATARACT DITCH	28102.21358	7.40
			28102.22808	2.46
			36295.36050	10.94
16	440581	CRAIG WATER SUPPLY PL	12552.00000	7.00
			12754.00000	8.29
			14700.00000	1.33
			36295.24105	7.92
17	440583	CROSS MTN PUMP GROUNDS	19250.18514	9.16
			40421.39186	6.84
			99999.00000	5.00
18	440584	CROSS MTN PUMP NO 1 + 2	19250.18514	17.78
			99999.00000	17.78
19	440585	CRYSTAL CK DITCH	36295.21914	5.90
			99999.00000	5.90
20	440586	D D AND E DITCH	13940.00000	8.40
			36295.16617	6.60
			36295.22279	10.00
			36295.25932	10.00
			38498.00000	14.33
21	440587	D D FERGUSON D NO 2	16699.14789	3.50
			18529.17723	3.33
			36295.21397	4.50
			36295.29219	3.50
			36295.32750	3.50

TABLE 4.2.5A
Direct Flow Water Right Summary (cfs)

#	ID	Name	Admin #	Decree
22	440589	DEEP CUT IRR D	12754.00000	20.29
			45655.12754	5.79
			46386.46151	34.37
23	440590	DEER CK A MORAPOS D	13646.00000	5.83
			19250.17055	0.67
			36295.23496	13.00
24	440593	DENNISON A MARTIN D	18529.17997	11.33
25	440601	DUNSTON DITCH	14380.00000	1.33
			19250.14380	1.42
			36295.25353	3.38
26	440607	EGRY MESA DITCH	23982.18417	2.25
			24141.19914	3.00
			24141.20085	1.33
			25918.23942	1.33
			45290.20085	12.00
			50372.00000	3.00
27	440611	ELK TRAIL DITCH	36295.23898	10.60
			49308.23898	8.40
28	440612	ELKHORN IRR DITCH	20973.15256	5.50
			36295.35934	7.80
29	440613	ELLGEN DITCH	38837.00000	4.05
			41402.00000	3.55
30	440614	ELLIS A KITCHENS D	19990.19503	1.66
			45655.42657	6.00
31	440628	GIBBONS WILSON A JORDAN	25772.19266	2.67
			36295.26141	5.13
			99999.00000	5.13
32	440635	GRIESER DITCH	19250.14370	1.34
			23538.20282	0.75
			40421.35946	3.66
33	440638	HADDEN BASE DITCH	36295.26141	5.80
			37390.00000	9.20
34	440644	HARPER NO 1 DITCH	12205.00000	2.83
			36295.20970	5.59
35	440645	HARPER NO 2 D	13737.00000	0.50
			19250.16907	0.50
			36295.20970	6.93
36	440647	HAUGHEY IRR DITCH	21465.19467	6.65
			21465.20939	1.25
			99999.00000	8.00
37	440650	MESA HL BK COTWOOD PUMP	17432.14567	5.00
			17432.15191	3.77
			30831.19103	2.20
38	440651	HIGHLAND DITCH	12601.00000	8.00
			26209.21981	3.50
			26209.23396	2.70
			99999.00000	14.00
39	440652	HIGHLAND DITCH	14363.00000	3.84
			23970.20179	4.92
			36295.34119	4.79
40	440660	J A MARTIN DITCH	13270.00000	3.33
			36295.19143	4.72
41	440661	J P MORIN DITCH	12205.00000	2.00
			36295.25353	4.60
			99999.00000	10.00

TABLE 4.2.5A
Direct Flow Water Right Summary (cfs)

#	ID	Name	Admin #	Decree
42	440670	JOHN W KELLOGG NO 2 D	15430.00000	1.00
			25474.19083	0.67
			36295.23192	4.00
43	440675	JUNIPER MTN TUNNEL	19250.14702	14.87
			19250.17107	9.00
			19250.18108	2.67
			27850.20069	5.25
			40421.28488	35.88
44	440677	K DIAMOND DITCH	19250.15475	4.84
			19621.19448	5.34
			99999.00000	10.00
45	440681	LAMB IRR DITCH	17432.15096	2.00
			36295.32963	4.00
46	440687	LILY PARK D NO 1	13249.00000	36.67
47	440688	LITTLE BEAR DITCH	13797.00000	11.50
			36295.33566	11.00
48	440691	M DITCH	19250.17683	6.00
			99999.00000	6.00
49	440692	MARTIN CK DITCH	19621.18412	8.34
			36295.33753	6.06
			36295.33758	47.60
50	440694	MAYBELL CANAL	26810.18172	42.20
			40421.35168	86.80
51	440695	MAYBELL MILL PIPELINE	39057.00000	2.23
52	440698	MC DONALD DITCH	31325.20948	1.25
			39319.00000	11.20
53	440699	MC KINLEY DITCH NO 1	14731.00000	8.33
			99999.00000	8.33
54	440700	MC KINLEY DITCH NO 2	14731.00000	11.66
			23170.19981	2.00
			45655.42656	8.00
			45857.00000	4.00
55	440702	MCINTYRE DITCH	38359.00000	18.70
			99999.00000	10.00
56	440706	MILK CK DITCH	19253.16005	5.33
			36295.16005	14.67
57	440711	MOCK DITCH	36760.00000	6.20
			50261.00000	3.30
			99999.00000	6.00
58	440716	MULLEN DITCH	19250.16192	1.00
			22876.19868	1.50
			36295.23192	3.00
59	440723	NICHOLS DITCH NO 1	36295.31602	4.80
			50261.00000	1.93
			99999.00000	6.80
60	440724	NORVELL DITCH	12918.00000	10.00
			36295.32627	20.00
			99999.00000	10.00
61	440729	PATRICK SWEENEY D	37639.00000	15.10
62	440731	PECK IRRIG D	19250.14007	4.84
			40421.39704	5.00
63	440735	PINE CK DITCH	23549.19880	2.69
			36295.19880	9.21
64	440740	RATCLIFF DITCH	19250.13969	1.17
			40421.28641	9.47
65	440747	ROBY D AKA ROBY D NO 1	25490.16705	0.94
			36295.26141	6.20

TABLE 4.2.5A
Direct Flow Water Right Summary (cfs)

#	ID	Name	Admin #	Decree
66	440748	ROBY DITCH NO 2	25490.15495	1.11
			36295.26141	6.00
			40421.38120	8.95
67	440749	ROUND BOTTOM D NO 1	21077.14305	4.00
			40421.36374	2.80
68	440750	ROUND BOTTOM D NO 2	21077.14305	1.33
			40421.36009	7.27
69	440751	ROUND BOTTOM DITCH	19621.15432	1.50
			40421.36374	4.80
70	440763	SMITH DITCH	13489.00000	5.46
			13965.00000	2.20
			36295.32627	13.33
			50769.50509	2.00
71	440765	SOUTH SIDE DITCH	14000.00000	1.42
			19250.13738	1.50
			40421.39642	4.00
			99999.00000	4.00
72	440770	STARR IRRIG DITCH	20350.18435	6.10
			46327.00000	0.50
73	440778	SUNBEAM DITCH	38135.00000	6.70
			99999.00000	6.70
74	440785	TIPTON IRR DITCH	19997.19525	3.20
			20090.00000	1.50
			29883.21183	1.83
			37537.00000	10.63
75	440786	TISDEL D NO 2	19250.18514	2.87
			36295.34746	8.75
			46112.00000	2.38
			99999.00000	2.38
76	440790	UTLEY DITCH	40421.33753	4.10
			43968.00000	4.00
			99999.00000	4.00
77	440801	CROSS MTN PUMP GUESS	40421.39932	7.14
			99999.00000	7.14
78	440806	ELLGEN NO 2 DITCH	41363.00000	8.00
			99999.00000	8.00
79	440812	HART DITCH	37098.00000	7.00
			40421.40312	9.00
80	440814	HIGHLINE DITCH	14020.00000	1.00
			19250.17288	3.34
			36295.23496	4.90
81	440820	LOWRY SEELEY PUMP	40694.00000	10.00
			99999.00000	10.00
82	440821	MACK DITCH	43255.00000	7.50
			99999.00000	7.50
83	440828	MOCK DITCH NO 3	19250.18514	4.40
			40694.00000	4.30
84	440830	OLD SWEENEY DITCH	40421.18108	12.00
			99999.00000	12.00
85	440863	HENRY SWEENEY DITCH	40421.17107	11.10
			99999.00000	11.10
86	440998	DRY COTTONWOOD DITCH	22444.15432	2.33
			40421.38259	6.67
87	441122	VAUGHN PUMP	49051.00000	25.00
88	442214	BAILEY DITCH-UTAH INT.	19250.14032	2.00
			99999.00000	4.00
89	540507	BEELER DITCH	13310.00000	2.50
			50403.50190	4.00
			99999.00000	12.00

TABLE 4.2.5A
Direct Flow Water Right Summary (cfs)

#	ID	Name	Admin #	Decree
90	540531	HEELEY DITCH	20769.13265	8.50
			22071.17637	11.08
			99999.00000	20.00
91	540532	HOME SUPPLY DITCH	24948.16904	2.10
			37433.19875	11.00
			99999.00000	11.00
92	540543	LUCHINGER DITCH	37433.18779	10.80
93	540548	MORGAN AND BEELER D	12950.00000	5.48
			37433.18428	2.00
			99999.00000	4.00
94	540549	MORGAN SLATER DITCH	12936.00000	2.50
			46386.29371	2.50
			99999.00000	4.50
95	540554	PERKINS FOX DITCH	17431.14377	1.30
			17431.15139	1.04
			17431.16976	7.66
			40298.00000	4.00
96	540555	PERKINS IRR DITCH	19250.17334	1.66
			20722.20683	5.00
			27542.24806	1.60
			27544.25834	2.17
			27741.24727	1.10
			27741.25352	0.55
			99999.00000	10.00
97	540564	SALISBURY DITCH	12540.00000	0.83
			27169.16741	1.50
			41812.29400	3.87
			99999.00000	3.87
98	540568	SLATER FORK DITCH	12936.00000	6.00
			99999.00000	6.00
99	540570	SLATER PARK DITCH NO1	37433.18079	12.00
100	540571	SLATER PARK DITCH NO 2	37433.30862	5.10
101	540572	SLATER PARK DITCH NO 3	37433.30862	6.60
102	540574	SLATER PARK DITCH NO 5	37433.30862	11.30
103	540583	TROWEL DITCH	13255.00000	5.83
			18514.00000	3.97
			19990.13270	4.60
			22071.17656	10.32
			99999.00000	10.32
104	540591	WILLOW CK DITCH	12646.00000	14.00
			16028.00000	2.17
			99999.00000	14.00
105	540592	WILSON DITCH	12960.00000	1.25
			37433.18779	4.50
106	540594	WOODBURY DITCH	22071.16583	6.98
			99999.00000	6.98
107	550504	ESCALANTA DITCH NO 2	15080.00000	1.75
			18171.00000	3.00
			18746.00000	2.09
			19050.00000	1.17
108	550506	MAJORS DITCH NO 2	14731.00000	0.85
			15080.00000	1.75
			18171.00000	3.00
			18746.00000	3.57
			19050.00000	2.17
			42155.00000	7.30
109	550507	NINE MILE IRR DITCH	36572.00000	12.60
110	550508	NINE MILE IRR PL	40768.00000	5.35
			41058.00000	1.15
			99999.00000	5.00

TABLE 4.2.5A
Direct Flow Water Right Summary (cfs)

#	ID	Name	Admin #	Decree
111	550513	VISINTAINER DITCH	29106.00000	3.60
			42641.00000	9.00
112	550519	RINKER DITCH	45290.24283	5.00
			48577.48364	5.00
			48734.00000	2.00
			99999.00000	5.00
113	550537	LEFEVRE NO 1 PUMP	45915.00000	10.00
			99999.00000	10.00
114	570508	BROCK DITCH	12142.00000	4.50
			14154.00000	1.50
			21450.19707	3.00
			24276.19707	9.00
			24280.24241	0.83
			36295.20191	2.67
			99999.00000	20.00
115	570510	CARY DITCH CO DITCH	13825.00000	23.33
			20350.16710	2.66
			99999.00000	20.00
116	570512	COLO UTILITIES D A PL	35987.27982	27.00
			36295.17380	3.00
117	570513	CONNELL DITCH	14472.00000	2.66
			39925.37741	13.00
118	570517	DAVID M CHAPMAN DITCH	18885.15127	2.66
			34139.31532	2.66
119	570519	DENNIS AND BLEWITT D	14198.00000	5.83
			39925.35549	3.00
			39925.35915	5.83
120	570524	EAST SIDE DITCH	18158.16594	1.50
			41226.41042	8.00
121	570525	EAST SIDE DITCH NO 2	25918.20976	3.58
			39925.28641	7.07
122	570535	ERWIN IRRIGATING DITCH	20350.16710	4.02
			34139.20319	1.84
			99999.00000	4.00
123	570539	GIBRALTAR DITCH	13957.00000	19.66
			34139.13947	19.66
			44559.38137	40.68
124	570544	HIGHLAND DITCH	14501.00000	13.33
			25918.14501	2.33
125	570545	HOMESTEAD DITCH	18885.18748	4.66
			19251.19236	1.66
			25393.23101	4.05
			39925.37529	5.55
126	570555	LAST CHANCE DITCH	22828.19144	3.00
			23167.20672	4.50
			23167.21781	1.50
			26551.22817	0.54
			29723.24428	0.75
			39925.38259	9.00
127	570561	MALE MOORE CO DITCH ENL	23544.21829	7.90
			34139.29371	4.72
128	570563	MARSHALL ROBERTS DITCH	11616.00000	8.79
			14206.00000	3.37
			19250.19052	2.42
			34139.14206	3.36
			99999.00000	20.00
129	570576	ORNO DITCH	14011.00000	1.83
			23544.21352	0.58
			39925.35198	3.60

TABLE 4.2.5A
Direct Flow Water Right Summary (cfs)

#	ID	Name	Admin #	Decree
130	570579	R E CLARK DITCH	13671.00000	1.77
			14366.00000	0.89
			34139.25719	5.33
			39925.25719	3.00
			41226.27149	1.44
131	570584	SADDLE MTN DITCH	39925.38307	11.00
			99999.00000	11.00
132	570592	SHELTON DITCH	12158.00000	6.69
			14183.00000	20.07
			34139.14183	26.76
133	570608	TROUT CK DITCH NO 3	14318.00000	7.66
			39925.35184	5.00
134	570609	TROUT CREEK DITCH NO 2	14001.00000	1.66
			14385.00000	1.00
			19116.00000	5.00
			99999.00000	5.00
135	570611	WALKER IRRIG DITCH	11809.00000	8.75
			14154.00000	8.75
			23541.19144	2.00
			23549.18809	2.00
			34139.14154	21.50
			45655.42169	0.50
			99999.00000	20.00
136	570622	WILLIAMS IRRIG DITCH	11616.00000	2.51
			12700.00000	3.55
			14154.00000	1.78
			14206.00000	0.96
			34139.14154	6.66
			34139.14206	0.97
			39925.34819	3.00
			99999.00000	20.00
137	570623	WILLIAMS PARK DITCH	15077.00000	6.66
			41226.41042	8.04
			99999.99999	30.00
138	570635	KOLL DITCH	16698.16202	2.08
			18885.16202	1.82
			21092.19509	2.83
			39925.36280	6.49
139	574629	RICH D	19251.17083	3.61
			22436.22033	0.83
			29923.27667	4.00
			34139.19621	3.80
			34139.27028	3.26
			39925.37395	3.83
140	580500	ACTON DITCH	14372.00000	3.00
			15070.00000	3.16
			33782.23162	6.16
141	580506	ALLEN BASIN SUPPLY D	39254.37913	60.00
142	580508	ALPHA DITCH	17067.14870	7.20
			99999.00000	7.20
143	580530	BAXTER DITCH	14182.00000	1.50
			14567.00000	10.80
			33236.32780	12.30
			45655.40359	25.00
144	580532	BEAVER CREEK D	21077.19484	1.08
			35320.25932	7.00
145	580539	BIG MESA DITCH	18898.18414	5.83
			19990.15938	28.00
			35924.00000	8.50

TABLE 4.2.5A
Direct Flow Water Right Summary (cfs)

#	ID	Name	Admin #	Decree
146	580541	BIRD DITCH	12232.00000	6.60
			19250.17684	3.33
			33782.23892	1.62
147	580549	BORLAND VAIL DITCH	24950.20986	2.13
			25470.20986	1.33
			29051.24330	0.50
			29573.21076	1.50
			32097.20986	1.33
			33782.25719	6.04
148	580556	BRINKER CREEK DITCH	15098.00000	1.00
			33782.29006	4.60
149	580559	BROOKS DITCH	13649.00000	2.66
			33782.23892	4.04
			99999.00000	4.04
150	580561	BRUMBACK DITCH	15606.15562	2.00
			33782.23527	3.00
			99999.00000	3.00
151	580564	BUCKINGHAM MANDALL D	14155.00000	13.80
			19253.18546	1.83
			33782.24988	7.10
152	580568	BURNETT DITCH	18898.13758	5.70
			23545.22166	3.00
			35672.00000	5.00
			48884.00000	6.00
			99999.00000	6.00
153	580569	BURNT MESA D	23544.20664	5.33
			23929.18823	1.83
			23929.20643	1.50
			23929.22585	0.33
			33782.22066	5.33
			33782.25353	0.17
154	580574	C R BROWN MOFFAT COAL C	33782.14762	4.00
			37807.00000	1.77
155	580577	CAMPBELL DITCH	13442.00000	4.60
			23944.16618	1.50
			33782.28641	2.50
			37688.35885	2.00
			39254.35215	2.70
156	580582	CHARLES LEIGHTON D	14776.00000	1.66
			33782.16437	4.34
			99999.00000	4.00
157	580583	CHARLES H KEMMER D	19628.18902	2.00
			33782.26814	3.00
			99999.00000	3.00
158	580588	CLARKE BURKE DITCH	14003.00000	4.00
			25473.24975	0.90
			33782.23162	2.00
			48167.00000	0.50
159	580589	COAL CREEK DITCH	35320.34864	28.00
160	580590	COLEMAN DITCH E	14345.00000	2.50
			33782.25719	4.00
161	580591	COLLINS DITCH	22074.17819	2.33
			22479.21780	2.16
			37688.25331	4.83
162	580599	CULLEN DITCH NO 2	18898.15476	1.66
			33782.19250	4.34
			41727.32293	2.00
			99999.00000	4.00
163	580604	DAY DITCH	24312.13727	2.00
			33782.25719	4.00

TABLE 4.2.5A
Direct Flow Water Right Summary (cfs)

#	ID	Name	Admin #	Decree
164	580612	DEVER D	18898.14154	3.75
			19250.18079	1.25
			39254.23527	2.00
			41523.00000	1.50
165	580618	DUQUETTE DITCH	14722.00000	6.00
			19622.14750	1.66
			33782.23892	9.00
			45522.00000	1.00
166	580622	EGERIA DITCH	14001.00000	8.40
			33782.14001	8.62
			46751.14001	14.00
167	580623	EKHART DITCH	13284.00000	4.70
			14138.00000	1.30
			22544.22517	0.66
			33782.30467	4.70
			39254.36325	1.21
			44925.42885	2.00
			99999.00000	2.00
168	580626	ELK VALLEY D	13799.00000	9.27
			33782.19875	9.97
			45290.43995	1.85
			45496.00000	0.15
169	580627	ENTERPRISE DITCH	13795.00000	14.00
			33145.30467	14.00
170	580628	EXCELSIOR D	19630.14755	4.00
			19997.19846	1.50
			33145.30467	7.00
171	580633	FELIX BORGHI D	14745.00000	1.00
			29573.15289	1.62
			45290.14745	11.70
			99999.00000	5.00
172	580634	FERGUSON DITCH	13279.00000	3.00
			33782.29371	12.00
173	580640	FIRST CHANCE DITCH	19253.18871	5.00
			35320.29371	0.50
			99999.00000	5.00
174	580642	FISH CR PIPELINE A	14466.00000	7.30
			19985.18830	3.04
			22438.22048	2.56
			22544.22156	3.42
			26805.26495	1.50
			34546.00000	2.10
			35320.33181	3.00
			35320.35215	3.70
			37688.28397	1.00
			37688.33723	1.00
			41457.00000	1.00
			41851.00000	3.50
			42156.00000	3.86
175	580643	FIX DITCH	12198.00000	1.20
			12586.00000	5.43
			19986.17297	0.66
			33782.12586	10.75
176	580649	FRANZ DITCH	13696.00000	6.00
			14616.00000	4.00
			33782.28641	7.80
			37688.37224	6.00
177	580662	GRAHAM + BENNETT D	14001.00000	5.30
			19622.18767	3.33
			33782.21336	9.36
			49474.00000	1.00

TABLE 4.2.5A
Direct Flow Water Right Summary (cfs)

#	ID	Name	Admin #	Decree
178	580663	GREER DITCH	29324.17817	1.66
			35320.34850	6.14
179	580665	GUIDO DITCH	41184.00000	11.00
180	580684	HERNAGE + KOLBE DITCH	14002.00000	4.00
			33782.25353	4.00
			51134.44103	0.50
181	580685	HIGH MESA IRR D	31725.29852	5.33
			33782.30832	1.67
182	580687	HIGHLINE BEAVER DITCH	15148.00000	11.66
			19630.16932	0.50
183	580694	HOOVER JACQUES DITCH	13696.00000	3.75
			31000.24056	4.43
			33782.30993	6.74
			44559.24056	7.00
			44673.00000	2.50
			44897.00000	0.50
			45190.00000	1.00
184	580695	HOT SPGS CR HIGHLINE D	19993.18567	3.83
			24276.22082	8.00
185	580714	KELLER DITCH	13058.00000	2.66
			18898.16364	3.33
			18898.17325	2.66
			19992.16011	1.25
			33782.16954	15.49
			49673.34803	6.00
186	580717	KINNEY DITCH	21077.19280	3.00
			33782.24988	2.60
			47819.00000	2.00
			99999.00000	2.00
187	580721	L L WILSON D	23178.19875	1.18
			37688.19875	2.14
			50769.32627	3.00
188	580722	LAFON DITCH	18529.13985	3.33
			39254.33007	3.50
189	580728	LARSON DITCH	14366.00000	5.20
			99999.00000	20.00
190	580730	LATERAL A DITCH	26107.22479	3.20
			37688.34828	8.64
191	580731	LAUGHLIN DITCH	23178.21406	0.50
			37688.26814	6.64
192	580738	LINDSEY DITCH	18898.14345	10.33
			99999.00000	20.33
193	580749	LOWER PLEASANT VALLEY D	18898.14720	7.00
			31361.19327	0.54
			33782.30467	3.46
			99999.00000	3.46
194	580756	LYON DITCH NO 2	17798.15491	3.00
			33782.23162	5.20
			99999.00000	5.20
195	580763	MANDALL DITCH	13077.00000	3.16
			13977.00000	15.80
			33782.24988	12.18
196	580767	MAYFLOWER DITCH	22074.21711	3.00
			39254.33007	3.00
197	580777	MILL DITCH	12198.00000	2.29
			33782.30832	12.00
			51134.44103	0.50
198	580782	MOODY DITCH	13362.00000	1.75
			33782.29371	3.25

TABLE 4.2.5A
Direct Flow Water Right Summary (cfs)

#	ID	Name	Admin #	Decree
199	580783	MORIN DITCH	13314.00000	2.66
			13994.00000	5.00
			24123.13994	5.00
			45655.37779	11.00
200	580791	MUDDY D NO 1	24146.19567	3.00
			37688.19567	3.70
201	580798	NICKELL DITCH	12232.00000	1.70
			12254.00000	4.24
			19997.19599	2.33
			99999.00000	2.33
202	580801	NORTH HUNT CREEK DITCH	14348.00000	3.53
			22446.21349	0.66
			33782.22431	2.00
			48178.00000	2.00
			50403.48698	1.00
203	580805	OAK CREEK DITCH	13720.00000	5.50
			35320.32779	3.00
			39254.36307	2.50
204	580807	OAK DALE DITCH	18449.16258	1.33
			18449.17076	1.50
			41727.34102	5.20
205	580808	OAKTON DITCH	14331.00000	6.00
			22177.14319	1.66
			22177.19163	0.50
			33782.24988	8.42
206	580809	OLD CABIN DITCH	12937.00000	2.00
			33782.23162	3.40
207	580811	OLIGARCHY DITCH	18450.18175	5.00
208	580813	PALISADE DITCH	15097.00000	0.70
			19997.15095	2.50
			37688.20209	3.50
			99999.00000	5.50
209	580821	PENNSYLVANIA DITCH	12210.00000	5.30
			33782.19509	5.30
			99999.00000	5.30
210	580826	PONY CREEK D	35320.25749	8.10
211	580830	PRIEST DITCH	18529.15200	1.00
			22073.15202	1.40
			22542.22431	0.83
			37688.33723	2.44
212	580844	SAGE HEN DITCH	14348.00000	1.77
			26987.17003	1.66
			33782.26084	2.31
			99999.00000	5.00
213	580847	SAND CREEK DITCH	18529.16741	2.66
			25473.15617	1.83
			33782.23162	4.13
214	580863	SIMON DITCH	14032.00000	10.00
			23537.22471	2.00
			99999.00000	10.00
215	580866	SNOW BANK DITCH	19997.18789	1.75
			26096.22114	1.50
			41727.39668	4.75
216	580868	SODA CREEK DITCH	13675.00000	5.98
			14129.00000	0.33
			18488.00000	3.00
			18872.00000	5.30
			35320.23892	9.32
217	580872	SOUTH SIDE DITCH	14341.00000	4.70
			33782.23162	1.28
			99999.00000	4.00

TABLE 4.2.5A
Direct Flow Water Right Summary (cfs)

#	ID	Name	Admin #	Decree
218	580879	STAFFORD DITCH	12584.00000	3.33
			19250.16011	1.75
			21456.21330	1.25
			33782.16011	8.28
			33782.21330	0.43
			39254.37696	4.24
			39254.37757	0.76
			48598.00000	2.00
219	580895	SUNNYSIDE DITCH 1	33782.22766	6.60
			44194.42498	6.40
			99999.00000	6.40
220	580897	SUTTLE DITCH	14182.00000	20.17
			33782.21701	22.80
221	580908	TRULL MORIN DITCH	14731.00000	3.70
			33782.19875	2.80
			99999.00000	2.80
222	580914	UNION DITCH	14563.00000	7.00
			33782.24988	2.00
			99999.00000	7.00
223	580915	UPPER ELK RIVER D	18898.17325	5.34
			33782.21336	8.45
224	580916	UPPER PLEASANT VALLEY D	18898.13655	5.00
			22073.20999	3.83
			36433.00000	5.33
			47650.00000	0.50
225	580917	VAIL SAVAGE DITCH	19985.19462	4.50
			33782.25719	2.07
226	580920	WALTON CREEK DITCH	13715.00000	15.00
			16699.15151	2.00
			17433.15657	2.67
			18886.14194	3.33
			18898.15166	2.00
			20351.16588	5.00
			22187.22121	2.50
			23270.15523	1.67
			33145.30467	32.83
227	580922	WEISKOPF DITCH	20450.14492	2.00
			33782.19509	3.00
			99999.00000	3.00
228	580924	WELCH MONSON D	17798.14537	3.00
			27125.14528	2.00
			99999.00000	3.00
229	580928	WHEELER BROS DITCH	14128.00000	2.80
			39254.34546	2.80
			99999.00000	5.00
230	580933	WHIPPLE DITCH	13650.00000	2.00
			15263.00000	0.20
			33782.13650	5.88
231	580939	WINDSOR DITCH	16699.15523	3.00
			33145.30467	3.00
			99999.00000	9.00
232	580943	WOODCHUCK DITCH	13675.00000	1.98
			13971.00000	0.75
			24481.21765	12.06
233	580944	WOOLERY DITCH	12949.00000	10.00
			33782.24988	27.40
234	580945	WOOLEY DITCH	12198.00000	0.71
			12586.00000	2.87
			13977.00000	3.16
			33782.12586	4.92
235	580980	GABIOUD DITCH	41727.15493	1.66
			43829.35184	3.73
			99999.00000	3.73

TABLE 4.2.5A
Direct Flow Water Right Summary (cfs)

#	ID	Name	Admin #	Decree
236	581021	LEE IRRIGATION D	18898.14045	0.83
			19995.14823	1.42
			33782.26084	2.47
			41727.39963	5.28
			99999.00000	5.28
237	581035	NORTH SIDE DITCH	33782.14776	5.40
			99999.00000	15.40
238	581074	ROSSI HIGHLINE	41727.34102	5.66
			99999.00000	4.00
239	581085	MILL CREEK DITCH	18529.16726	4.00
			39254.33007	3.00
			40753.00000	3.00
			99999.00000	3.00
240	581583	HEADGATE DERIVED FROM DI	50769.48498	110.00
241	582374	STMBT SKI SNOWMAKING PL	47859.00000	8.00
242	584630	Dome_Creek_Ditch	17431.15910	5.00
243	584684	SARVIS DITCH	39254.22423	43.00
244	584685	STILLWATER DITCH	22071.19623	20.96
			99999.99999	10.00
245	ADY_001	ADY_001_UpperBearRiver	13800.00000	1.00
			14806.00000	1.00
			21416.74816	2.16
			33782.24637	10.04
			36266.34595	5.66
			46386.33408	1.50
246	ADY_002	ADY_002_ChimneyCreek	13414.39938	6.46
			14376.89189	1.85
			20894.19814	4.82
			31714.19723	7.71
			35320.26869	8.81
			39254.32150	2.00
			45290.30823	13.80
247	ADY_003	ADY_003_BearRabvHuntCk	13165.85262	4.75
			14547.33898	1.18
			23514.98022	5.52
			32720.26742	43.06
			35320.12936	1.70
			37688.24623	3.27
			41601.49736	5.20
			47229.60862	2.90
248	ADY_004	ADY_004_BearRabvStagecoa	12893.80782	3.07
			14767.43411	6.45
			21526.94408	1.16
			32794.66892	5.75
			38406.41518	19.00
			42656.50693	5.30
			48814.24086	5.00
249	ADY_005	ADY_005_YampaRabvSteambt	13991.45274	6.03
			15931.77978	9.51
			21147.58570	23.34
			33721.24377	10.02
			35320.34893	3.00
			37688.27061	2.75
			43841.23032	8.85
			49039.50267	10.30
250	ADY_006	ADY_006_ElkRivernrClark	19252.16612	4.00
			22370.09474	10.50
			32266.20596	3.74
			35320.30594	2.00
			39254.37339	6.50

TABLE 4.2.5A
Direct Flow Water Right Summary (cfs)

#	ID	Name	Admin #	Decree
251	ADY_007	ADY_007_MiddleElkRiver	14277.00000	1.50
			18219.98060	7.00
			21613.48926	10.10
			33148.70774	17.51
			39445.44043	7.60
			40677.00000	2.50
			49474.00000	1.00
252	ADY_008	ADY_008_LowerElkRiver	18328.71107	7.00
			22671.34480	9.65
			31982.04400	3.20
			37688.23695	29.60
			41906.51169	10.95
			45933.64948	3.40
253	ADY_009	ADY_009_TroutCreek	14049.70492	3.66
			18523.48862	9.18
			22911.53233	3.60
			34022.70661	11.03
			39925.34499	5.10
			45655.34479	0.50
254	ADY_010	ADY_010_YampaRnrHayden	13276.57140	3.50
			18471.78962	6.00
			23177.19569	0.50
			35320.23162	2.00
			41108.00000	0.50
			46218.78477	7.16
255	ADY_011	ADY_011_YampaRabvElkhead	13676.75001	3.24
			23295.83149	4.67
			34139.14183	3.24
			40095.62865	6.50
			48090.53776	3.00
256	ADY_012	ADY_012_ElkheadCreek	19250.17658	0.34
			22053.58573	4.16
			42943.99161	3.57
			47609.89852	1.47
257	ADY_013	ADY_013_YampaRbelCraig	13404.63519	8.39
			14700.00000	1.62
			22362.48478	2.53
			30935.04225	2.41
			36295.30589	42.40
			38590.22853	6.87
			42232.29305	12.48
			48076.02270	8.60
258	ADY_014	ADY_014_EFkWilliamsFork	19250.14954	12.45
			24120.83883	15.23
			43101.30765	7.27
			46263.90321	6.00
259	ADY_015	ADY_015_SFkWilliamsFork	13123.57923	1.83
			19250.15902	13.66
			21274.76100	5.63
			36295.21812	24.56
			40881.06480	5.62
			50268.03679	2.42
260	ADY_016	ADY_016_WilliamsFork	19250.14717	8.42
			20946.41856	6.91
			31062.81061	3.30
			36295.23444	14.27
			39826.00000	0.06
			41358.16875	19.82
			50109.16433	4.66
261	ADY_017	ADY_017_MilkCrabvGSpring	24280.23131	1.08
			27004.21929	2.95
			36295.25424	3.81
			37010.00000	3.00

TABLE 4.2.5A
Direct Flow Water Right Summary (cfs)

#	ID	Name	Admin #	Decree
262	ADY_018	ADY_018_MilkCreek	12333.57094	20.16
			19253.13665	1.00
			36298.37581	13.80
			47847.31136	1.50
263	ADY_019	ADY_019_YampaRnrMaybell	11848.00000	6.66
			18595.18648	3.33
			36467.97305	8.70
			47522.38000	10.00
264	ADY_020	ADY_020_LSnakeRnrSlater	19252.15072	9.10
			22462.12396	3.35
			27125.23527	1.33
			39067.03792	22.20
			41812.19723	3.47
			45534.00000	0.30
265	ADY_021	ADY_021_LSnakeRabvSlater	14105.29273	5.50
			15077.00000	0.92
			23880.60248	5.02
			27569.68080	3.32
			37433.18815	10.50
			41485.00000	1.50
			47991.03176	6.10
266	ADY_022	ADY_022_SlaterCreek	15636.00000	2.33
			24244.44787	22.29
			37433.26326	52.00
			47768.19552	18.50
267	ADY_023	ADY_023_LSnakeabvDryGlch	13075.00000	2.33
			23488.06901	12.63
			30593.04742	16.25
			37433.25434	10.67
			47740.78603	22.50
268	ADY_024	ADY_024_LSnakeRnrLily	17259.24583	9.64
			32810.00000	2.20
			48942.35545	10.00
269	ADY_025	ADY_025_YampaR@DeerLodge	36295.32068	14.60
			38007.19354	6.20
			47090.97115	16.70
270	ADY_026	ADY_026_YampaR@GreenR	48212.31624	6.70
271	ADY_027	ADY_027_GreenRiver	11900.02404	6.24
			16096.51648	4.50
			25366.38744	3.11
			31725.11084	17.20
			38960.00000	3.00
			44788.02554	39.50
			50038.45594	10.00
272	584686	Stillwater_Colo	22071.19623	9.87
273	AMY_001	AMY_001_YampaRbelCraig	1.00000	11.00
274	990528	Cheyenne_City	12900.00000	120.00
275	990533	Wyoming_Irrig1	12910.00000	121.00
276	990534	Wyoming_Irrig2	12910.00000	121.00
277	990535	Wyoming_Irrig3	12910.00000	121.00
278	AMY_003	AMY_003_LSnakeRnrLily	1.00000	1.00
279	AMY_002	AMY_002_Yampa@Deerlodge	1.00000	1.00

TABLE 4.3.5A
Reservoir Water Right Summary (af)

#	ID	Name	Admin #	Decree (af)	Fill	On/ Off
1	583540	STILLWATER RES NO 1	33782.31054	6392.00	1	1
2	584240	YAMCOLA RES	47481.37136	1000.00	1	1
			41727.39991	2500.00	1	1
			51134.47905	314.00	1	1
			41329.00000	1010.00	1	1
			41329.00001	3000.00	1	1
			41329.00002	2521.00	1	1
3	583500	ALLEN BASIN RES	39254.37913	2249.00	1	1
4	584213	STAGECOACH RESERVOIR	40815.00000	7000.00	1	1
			40815.00001	4614.00	1	1
			41727.39991	20854.00	1	1
			39599.00000	12979.00	1	0
5	583631	LAKE CATAMOUNT	51134.46995	4000.00	2	1
			44761.00000	7800.00	1	1
6	583508	FISH CREEK RES	33782.33648	1175.00	1	1
			40406.00000	666.00	1	1
7	583787	STEAMBOAT LAKE	41727.40833	18064.00	1	1
			51134.43234	3300.00	1	1
			41727.40833	5000.00	1	1
8	583521	LESTER CR RES	39936.00000	5657.00	1	1
9	443902	ELKHEAD RESERVOIR	42642.00000	5389.00	1	1
			44925.44731	8310.00	1	1
10	ARY_001	ARY_001_YampaRbelCraig	13658.93733	593.00	1	1
			17141.85279	147.00	1	1
			22843.23175	4516.00	1	1
			31222.56867	2719.00	1	1
			36069.30760	1726.00	1	1
			38486.99640	1399.00	1	1
			41890.96559	6684.00	1	1
			46699.22870	5554.00	1	1
11	ARY_002	ARY_002_Yampa@Deerlodge	13658.93733	232.00	1	1
			17141.85279	57.00	1	1
			22843.23175	1767.00	1	1
			31222.56867	1064.00	1	1
			36069.30760	675.00	1	1
			38486.99640	547.00	1	1
			41890.96559	2615.00	1	1
			46699.22870	2173.00	1	1

TABLE 4.3.5A
Reservoir Water Right Summary (af)

#	ID	Name	Admin #	Decree (af)	Fill	On/ Off
12	ARY_003	ARY_003_LSnakeRnrLily	13658.93733	34.00	1	1
			17141.85279	9.00	1	1
			22843.23175	262.00	1	1
			31222.56867	158.00	1	1
			36069.30760	100.00	1	1
			38486.99640	81.00	1	1
			41890.96559	387.00	1	1
			46699.22870	322.00	1	1
13	ASY_001	ASY_001_YampaRbelCraig	1.00000	8344.00	1	1
14	ASY_002	ASY_002_YampaR@Deerlodge	1.00000	4441.00	1	1
15	ASY_003	ASY_003_LSnakeRnrLily	1.00000	3173.00	1	1

TABLE 4.4.1A
Instream Flow Summary
Average (af/yr) 1975-1991

#	ID	Name	Location	Demand (af)
1	571009	TROUT CREEK MSF LOWER	TROUT CREEK MSF LOWE_ISF	3620.
2	581355	ELK RIVER MSF LOWER	ELK RIVER MSF LOWER _ISF	47059.
3	581461	WILLOW CK MSF	WILLOW CK MSF _ISF	3620.
4	582202	BEAR RIVER MSF	BEAR RIVER MSF_ISF	8688.
5	582206	BIG CREEK MSF	BIG CREEK MSF _ISF	10860.
6	582214	COAL CREEK MSF	COAL CREEK MSF_ISF	3620.
7	582216	DOME CREEK MSF	DOME CREEK MSF_ISF	1448.
8	582219	ELK RIVER MSF UPPER	ELK RIVER MSF UPPER _ISF	47059.
9	582245	GREEN CREEK MSF	GREEN CREEK MSF _ISF	3620.
10	582306	SERVICE CREEK MSF	SERVICE CREEK MSF _ISF	4344.
11	582311	SODA CREEK MSF	SODA CREEK MSF_ISF	3620.
12	582404	BEAR RIVER MSF	BEAR RIVER MSF_ISF	5744.
13	582409	PHILLIPS CR MSF	PHILLIPS CR MSF _ISF	4344.
14	582519	HUNT CREEK MSF	HUNT CREEK MSF_ISF	3620.
15	449999	East FK Williams FK MSF	EAST FK WILL MSF_ISF	10275.
16	449998	Williams Fork River MSF	WILLIAMS FK R MSF _ISF	14991.

TABLE 4.4.3A
Instream Water Right Summary (cfs)

#	ID	Name	Admin #	Decree
1	571009	TROUT CREEK MSF LOWER	46652.00000	5.00
2	581355	ELK RIVER MSF LOWER	46652.00000	65.00
3	581461	WILLOW CK MSF	46649.00000	5.00
4	582202	BEAR RIVER MSF	46652.00000	12.00
5	582206	BIG CREEK MSF	46652.00000	15.00
6	582214	COAL CREEK MSF	46652.00000	5.00
7	582216	DOME CREEK MSF	46652.00000	2.00
8	582219	ELK RIVER MSF UPPER	46652.00000	65.00
9	582245	GREEN CREEK MSF	46652.00000	5.00
10	582306	SERVICE CREEK MSF	46652.00000	6.00
11	582311	SODA CREEK MSF	46652.00000	5.00
12	582404	BEAR RIVER MSF	46652.00000	5.00
13	582409	PHILLIPS CR MSF	47455.00000	6.00
14	582519	HUNT CREEK MSF	47455.00000	5.00
15	449999	East FK Williams FK MSF	52124.00000	20.00
16	449998	Williams Fork River MSF	52124.00000	30.00

5.0 CALIBRATION

Three data sets were developed for the Yampa Model: the historical, the calculated, and the baseline.

- The historical data set was used to develop baseflows and calibrate the model. It provides results that allow the hydrology to be checked and ditch efficiency and return flows to be evaluated.

- The calculated data set builds upon the historical data set by allowing selected ditch systems and reservoirs to operate by demand rather than by historical diversions or end-of-month (EOM) contents.

- The baseline data set allows reservoirs, structures, and operating rules that were constructed or have changed during the study period to operate in a consistent manner for the entire study period This data set provides results which can be used directly for a "what if "analysis.

This chapter describes the calibration period, special data changes, and results of the calibration effort for all three data sets.

5.1 Calibration Period

The calibration period selected for the Yampa Model extends from water years 1975 to 1991. As described in **Sections 2.1** and **2.2**, this time period includes most of the major reservoir developments and current administrative policies of the basin.

5.2 Calibration Procedure

Calibration was performed in three phases, Historical (H), Calculated (C), and Baseline (B). Following is a brief description of each phase.

5.2.1 Historical (H) Calibration

This data set simulates the basin using historical diversions as demands (for explicitly modeled structures), computed efficiencies, and historical reservoir EOM contents as reservoir fill targets. Calibration activities performed on this data set include:

Diversions
- Compare simulated diversions to historical to identify shortages.
- Identify any shortages and determine why - (demand > supply, demand > water rights).
- If required, adjust proration factors, return flow patterns, and/or operational rights.
- Regenerate base flows and rerun simulation.

Reservoirs
- Compare simulated reservoir EOM contents with historical EOM contents.
- Identify EOM content differences and why - (target > supply, target > water rights).
- If required, adjust proration factors, and/or operational rights.
- Regenerate base flows and rerun simulation.

Stream Gages

- Compare simulated stream gage flows to historical flows.
- Repeat diversion and reservoir steps until simulated stream gage flows approximate historical.
- Document reasons for differences in simulated and historical.

5.2.2 Calculated (C) Data Set

This data set simulates the basin using computed demands from the consumptive use model, computed efficiencies, and operational reservoir fill targets. The calculated data set builds upon the historical data set by allowing diversion structures and reservoirs to operate by derived consumptive use demand. . Calibration activities performed on this data set include:

- Display results compared to historical.
- Document reasons for differences between simulated and historical.
- Adjust historical data set as required

5.2.3 Baseline (B) Data Set

This data set builds upon the calculated data set by creating a baseline scenario to evaluate "what if" modeling questions. The baseline data set makes the following assumptions regarding time series data:

- All irrigation demands are taken directly from the calculated data set.
- Municipal and industrial demands are set to an estimated current demand level.
- Reservoirs are operated for the entire study period regardless of when they came on-line.
- Operational reservoir fill targets are employed.

Results from this run are not compared to historical gaged diversions.

5.3 Calibration Results

The Yampa Model is a monthly water allocation and accounting model which simulates 100 percent of the basin's consumptive use. It can be used to make comparative analyses of historical and future water management policies. Phase IIIa enhancements, which used the Phase II model calibration as a starting point, are presented in Appendix D.

5.3.1 Historical Data Set

The historical data set was used to develop baseflows and to calibrate the model. It provides results that allow the hydrology to be checked and ditch efficiency and return flow patterns to be evaluated. **Section 4.0** describes the input data used for this data set. The main characteristics of this data set are as follows:

- The direct flow diversion demand file (yampaTH.ddm) is essentially the same as the historical diversion file (yampaT.ddh), with the following exceptions: demands for carrier structures are set to zero, basin imports are set to zero, secondary multi-structures have demands set to zero, primary multi-structures have demands equal to the sum of the historical diversions for the common acreage. The structures with demands set to zero are modeled with rules in the yampaTH.opr file.

- Reservoir targets are estimated to equal historical EOM contents or a full reservoir.

The results of the historical operation are summarized in the following tables and figures:

- **Table 5.3.1a** summarizes annual average stream flow for 1975 to 1991, as estimated by the historical calibration run (H), compared to historical gaged flows. Average annual differences between gaged and estimated streamflows are within one percent, with the exception of Fortification Creek gage. Here the model overestimates streamflow by four percent. Flow at the Deer Lodge Park gage is estimated, on an average annual basis, as 1,597,000 af/yr.

- **Table 5.3.1b** summarizes the average annual shortage for water years 1975 to 1991, for each ditch, from the historical calibration run(H). The average annual difference between recorded and estimated diversions is approximately four percent.

- **Table 5.3.1c** summarizes the water balance for the Yampa River basin from the historical calibration run(H). Average annual consumptive use was estimated as approximately 154,000 af/ft. The column labeled "Inflow-Outflow" represents the net result of gain terms (inflow, return flow, and negative change in reservoir storage) less outflow terms (diversions, outflow, evaporation, and positive changes in reservoir storage). Values between 1 and -1 are due to rounding, and indicate that the model correctly conserves mass.

The results of the historical simulation are considered good, with most streamflow gages deviating less than one percent on an average annual basis and diversions deviating less than 500 acre-feet a year from their historical amount. Differences between gaged and estimated streamflows are attributable to the following:

- The distribution of gaged streamflow data to ungaged locations.

- Measurement error associated with diversions and streamflows.

- The Allen Basin Supply Ditch (580506) is driven by available storage in Allen Basin Reservoir, which causes the structure to divert more than it did historically.

- The structures on Hunt Creek (730,866; 863,591; 813,574) show minimal shortages (less than 3 percent, which are due to the distribution of a gaged hydrograph into an ungaged tributary, inaccurate diversion records, and an incomplete understanding of how this tributary is administered.

- The Walton Creek Ditch (580920) experiences shortages that are due to a combination of the distribution of a gaged hydrograph into an ungaged area, inaccurate diversion records, the possible influence of tributaries and diversion structures not included in the model, and an incomplete understanding of how this tributary is administered.

- Several structures on Fortification Creek and Little Bear Creek experience shortages which are attributable to the development of hydrology for these ungaged tributaries and inaccurate diversion records. A further review of both USGS gage records as well as the diversion records for these tributaries is required to completely address why shortages occur. Such a review is outside the scope of the current modeling activities.

- Currently, the computed hydrology at Little Bear Creek is a function of the USGS gage on Fortification Creek. The Fortification Creek gage was chosen because of its proximity and similar tributary characteristics (area). The use of another USGS gage to develop hydrology into Little Bear Creek was not investigated. The USGS gage on Fortification Creek has missing data prior to 1985, and its data were filled using the USGS gage near Elkhead Creek, Elkhead, Colorado. The correlation coefficients from the filling procedure look reasonable (.83 - .92), although only 7 years of overlapping data are used to develop the regression equations.

- Shortages throughout the Little Snake basin are attributable to distribution of gaged flow into an ungaged area, and coarse assumptions related to both diversions and hydrology in Wyoming. In particular, the aggregated groups ADY_020 through ADY_023 represent large amounts of acreage. In reality, individual structures within these groups can divert return flows from other structures within the group. This repeated use of water is not replicated by the aggregated structure, resulting in modeled shortages to the diversions.

- Several structures on the lower Williams Fork are shorted in the historical calibration run, probably due to either inaccurate diversion records or inaccurate gage records. Several approaches were tested to distribute gaged flow through the basin (see Appendix D.13). Shortages could not be alleviated without violating basic principles of hydrology.

Figures 5.3.1a through 5.3.1f present monthly streamflow, diversion, and reservoir EOM results from water years 1975 to 1991, estimated by the model compared to historical observations at selected key structures from the historical data set (H). Whenever only one line appears on a graph it indicates that the simulated and historical results are the same at the scale presented.

5.3.2 Calculated Data Set

The calculated data set builds upon the historical data set by the following:

- Agricultural structures operate by demands calculated from consumptive use estimates, rather than from historical diversions.

- Reservoirs operate by targets rather than historical EOM contents.

Calculated demands for agricultural diversions for each month of the simulation period were developed based on estimates of consumptive use and efficiencies. The following steps were taken to produce these demands:

- Estimate the consumptive crop requirement (yampaT.ddc) file by running the consumptive use model.

- Generate the headgate demands based on the consumptive crop requirement and estimates of monthly structure efficiency. Demands were computed by dividing the consumptive use estimates by the estimated monthly structure efficiencies. Monthly efficiencies were estimated by dividing the consumptive use estimates by the gaged diversion amounts. The efficiency values resulting from this computation were allowed to range from 0.00 to 0.60. All computed efficiencies greater than 0.60 were rounded down to 0.60.

Diversion Nickell Ditch

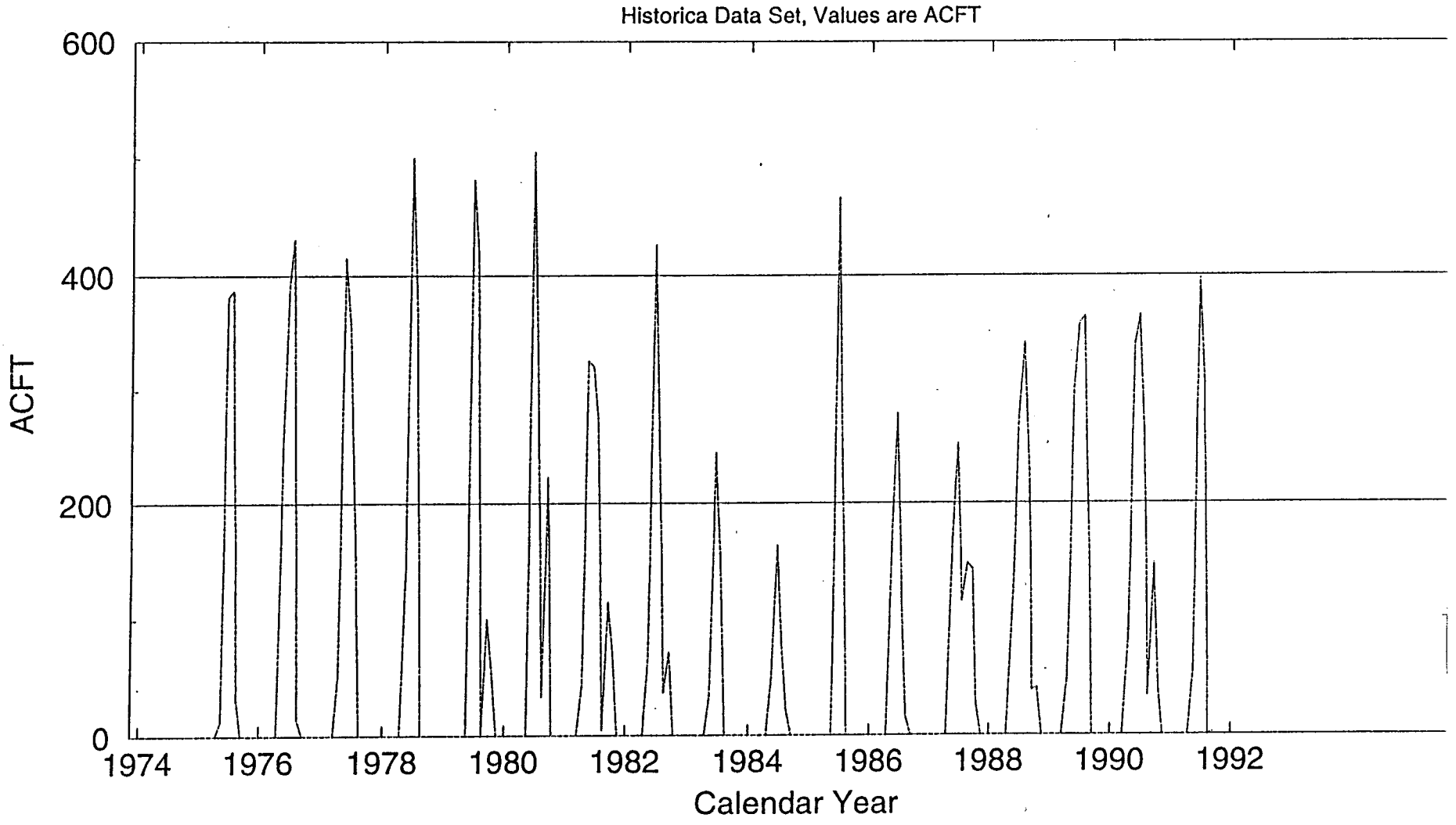


Figure 5.3.1a Historical Data Set Nickell Ditch

Diversion Maybell Canal

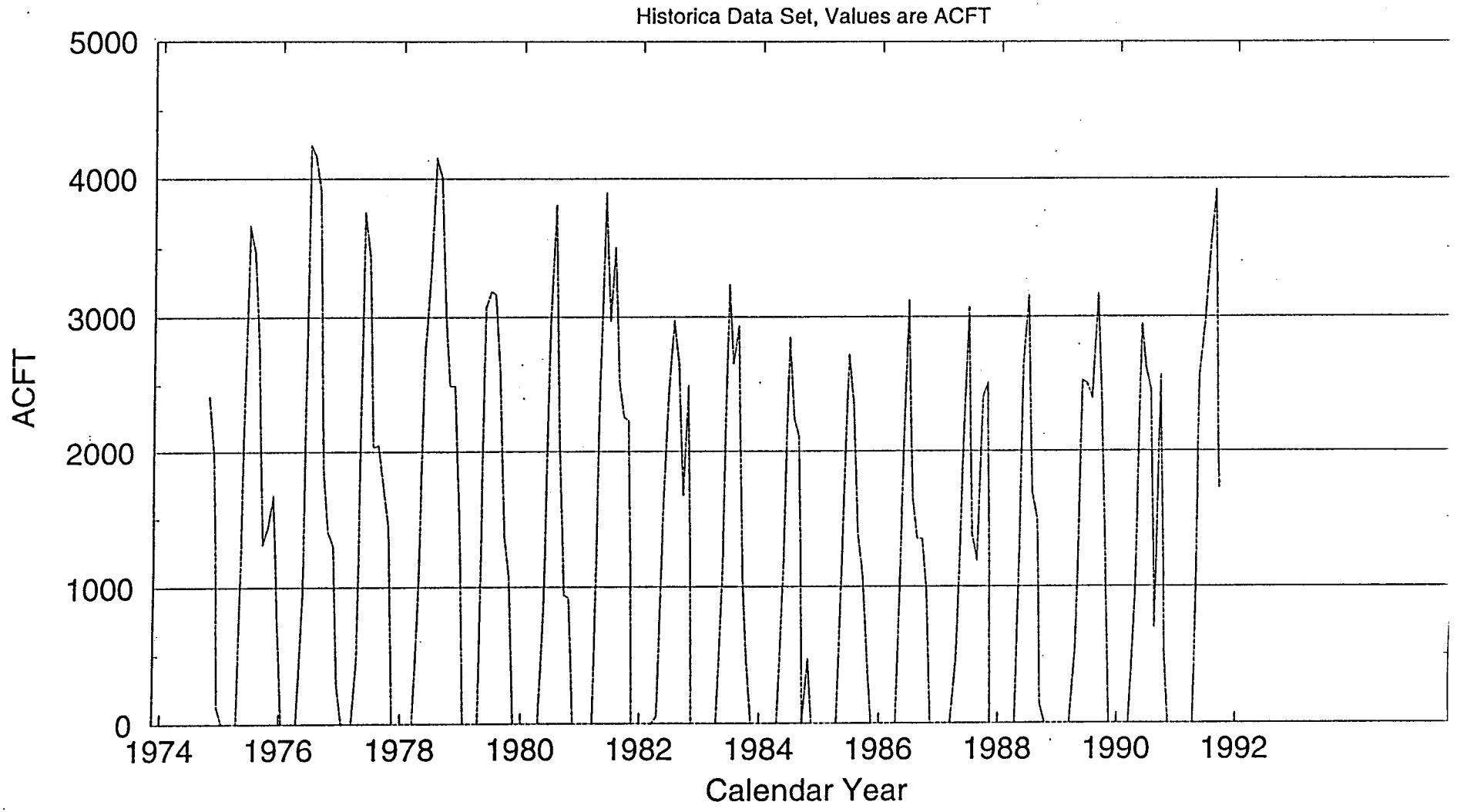


Figure 5.3.1b Historical Data Set Maybell Canal

Gage Yampa River below Stagecoach Reservoir

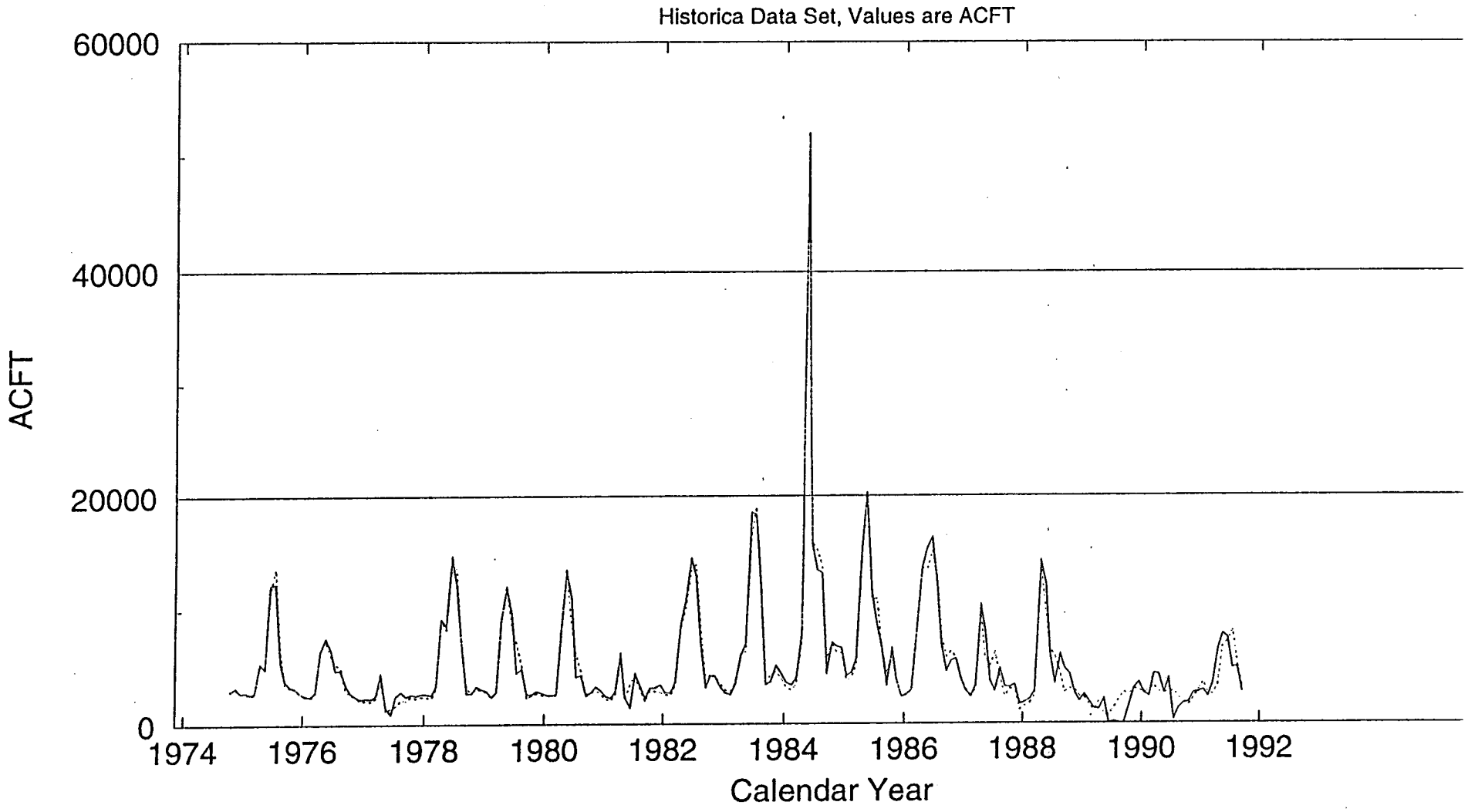


Figure 5.3.1c Historical Data Set
USGS Gage Below Stagecoach Reservoir

Gage Yampa River at Maybell

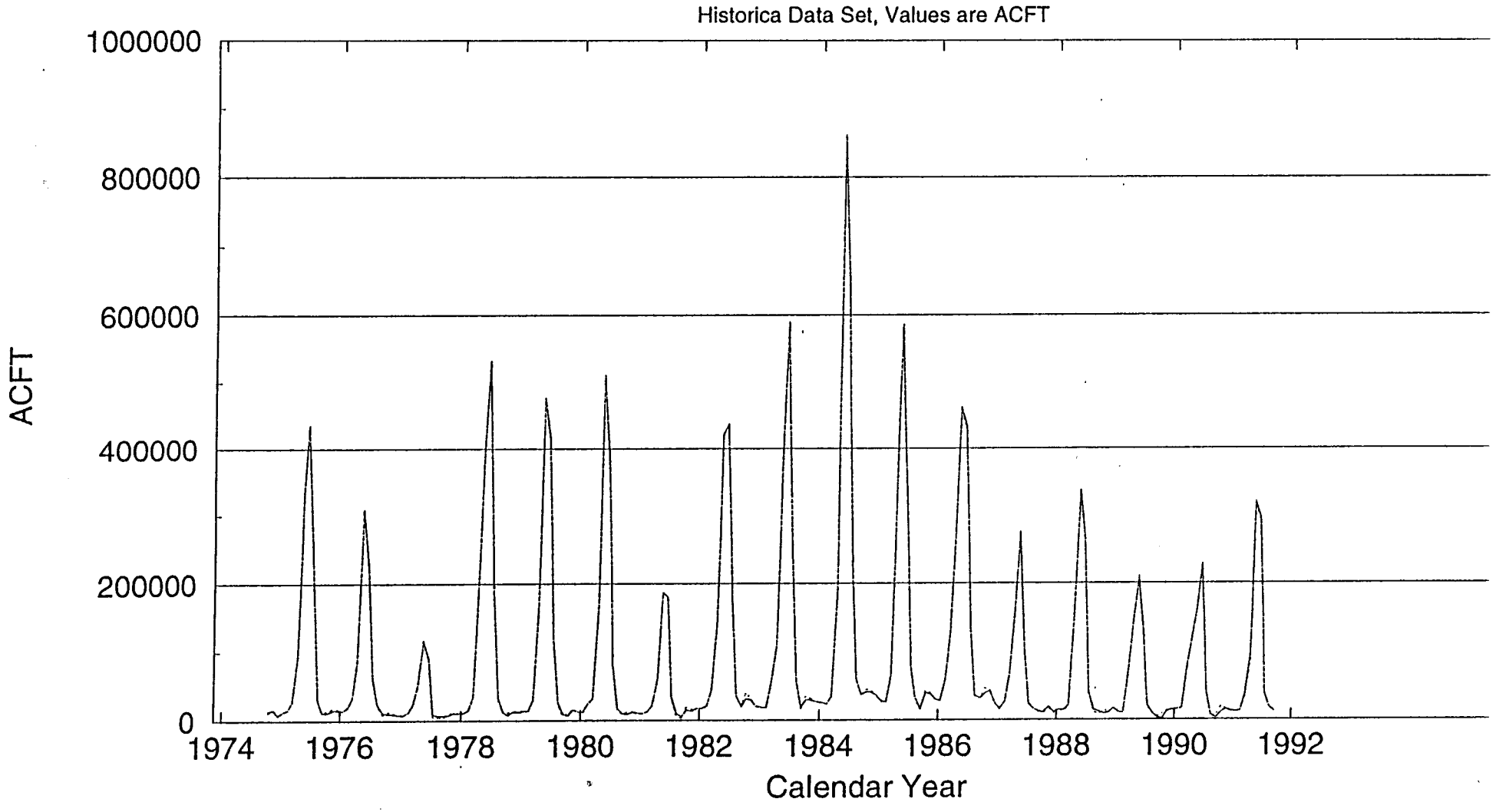


Figure 5.3.1d Historical Data Set USGS Gage at Maybell

Streamboat Lake End of Month Content

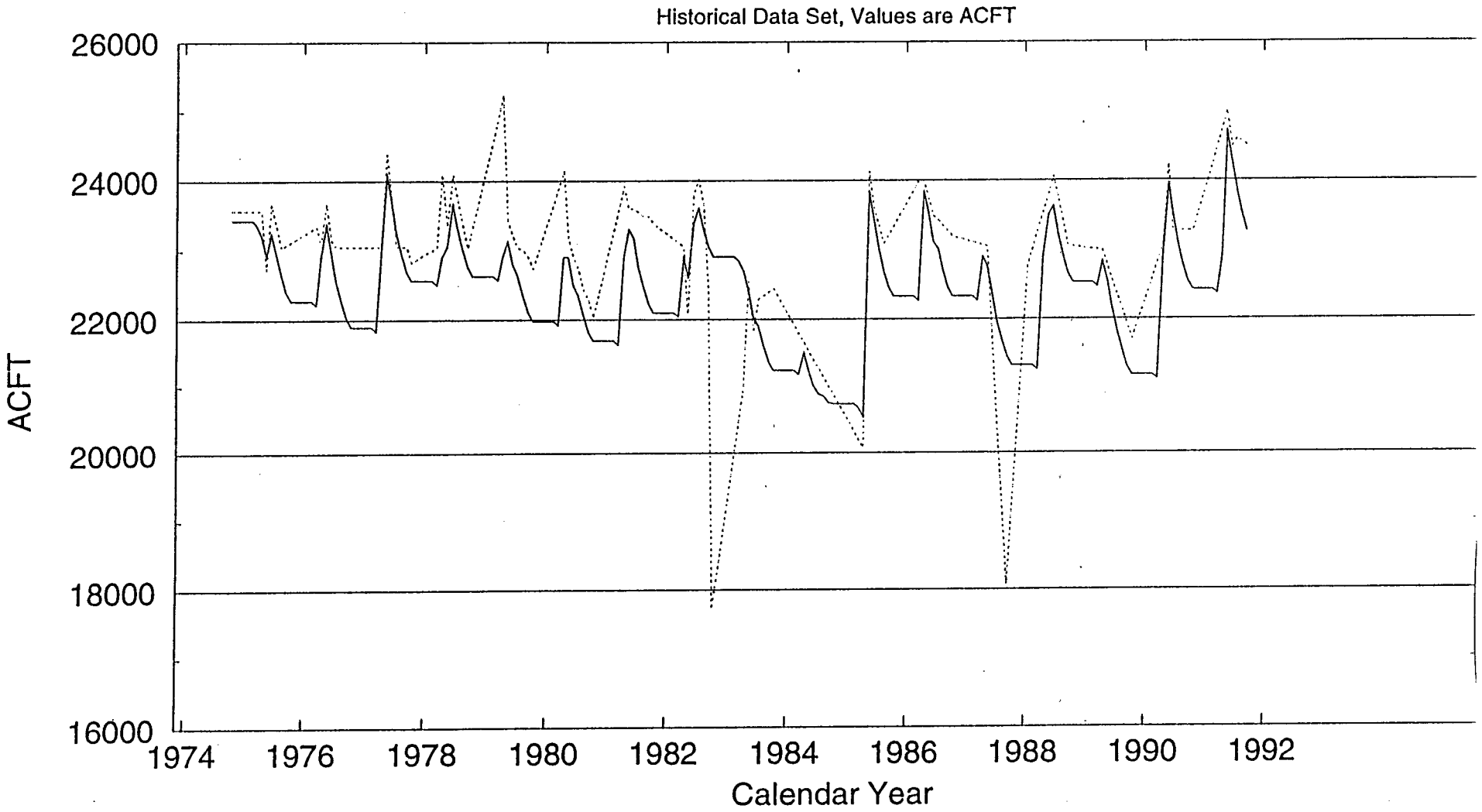


Figure 5.3.1e Historical Data Set Steamboat Lake

Stillwater Reservoir End of Month Content

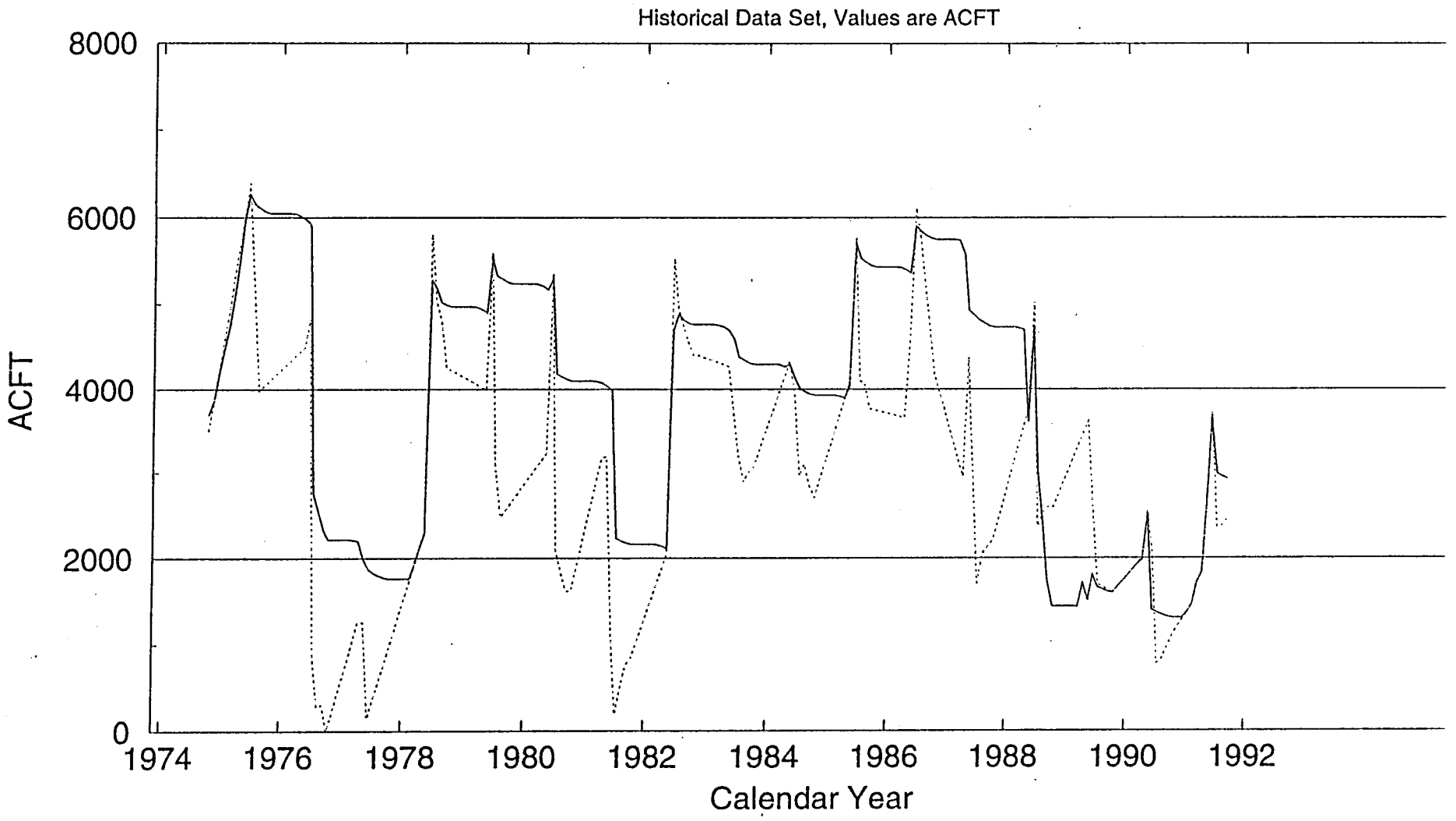


Figure 5.3.1f Historical Data Set Stillwater Reservoir

The development of consumptive demands for the Yampa River basin is discussed in the **Colorado River Decision Support System (CRDSS) Users' Manual, Consumptive Use Model.**

Three target files were created for the Yampa River basin, a historical target file (yampaH.tar) and a target file that reflects the current operating policies at each reservoir (yampaB.tar and yampaC.tar). There were no special reservoir operating policies included in the implementation for the Yampa basin, therefore the yampaB.tar and yampaC.tar files set the maximum target at each reservoir to full and the minimum content to zero. The yampaH.tar file sets the maximum target at each reservoir to its historical EOM content (in this case full) and the minimum content to zero.

The results of the calculated data set are summarized in the following tables:

- **Table 5.3.2a** summarizes annual average stream flow for 1975 to 1991, as estimated by the calculated calibration run (C), compared to historical gaged flows. Average annual differences between gaged and estimated streamflows are within one percent, with the exception of Fortification Creek gage. Here the model overestimates streamflow by three percent. Flow at the Deer Lodge Park gage is estimated, on an average annual basis, as 1,593,000 af/yr.

- **Table 5.3.2b** summarizes the annual average diversion for each structure estimated by the model for water years 1975 to 1991 as compared to historical observations. The average annual difference between recorded and estimated diversions is approximately four percent.

- **Table 5.3.2c** summarizes the water balance for the Yampa River basin. Average annual consumptive use was estimated as approximately 158,000 af/ft. The column labeled "Inflow-Outflow" represents the net result of gain terms (inflow, return flow, and negative change in reservoir storage) less outflow terms (diversions, outflow, evaporation, and positive changes in reservoir storage). Values between 1 and -1 are due to rounding, and indicate that the model correctly conserves mass.

Figures 5.3.2a through 5.3.2f present monthly streamflows, diversions, and reservoir EOM results from water years 1975 to 1991, estimated by the model compared to historical observations at six key structures.

The results of the calculated data set are considered good, with all streamflow gages and most diversions diverting close to their historical amounts. Deviations from historical are attributable to measurement error, distribution of gaged streamflow data to ungaged locations, and error associated with calculating demand. Headgate demands were computed by dividing the monthly consumptive use estimates by an average monthly efficiency. The average monthly efficiency was computed for each month at each structure by dividing the monthly consumptive use estimate by the monthly historical gaged diversion amount, and averaging these values for the entire study period. This procedure introduces a discrepancy between historical gaged diversion amounts and the computed headgate demand by using an average efficiency.

Also, the computed efficiencies were limited to a range of 0.00 to 0.60. Discrepancies between computed demand and historical gaged diversions are introduced if the computed monthly efficiency is greater than 60 percent because the limited efficiency of 60 percent was used to compute the demand.

Diversion Nickell Ditch

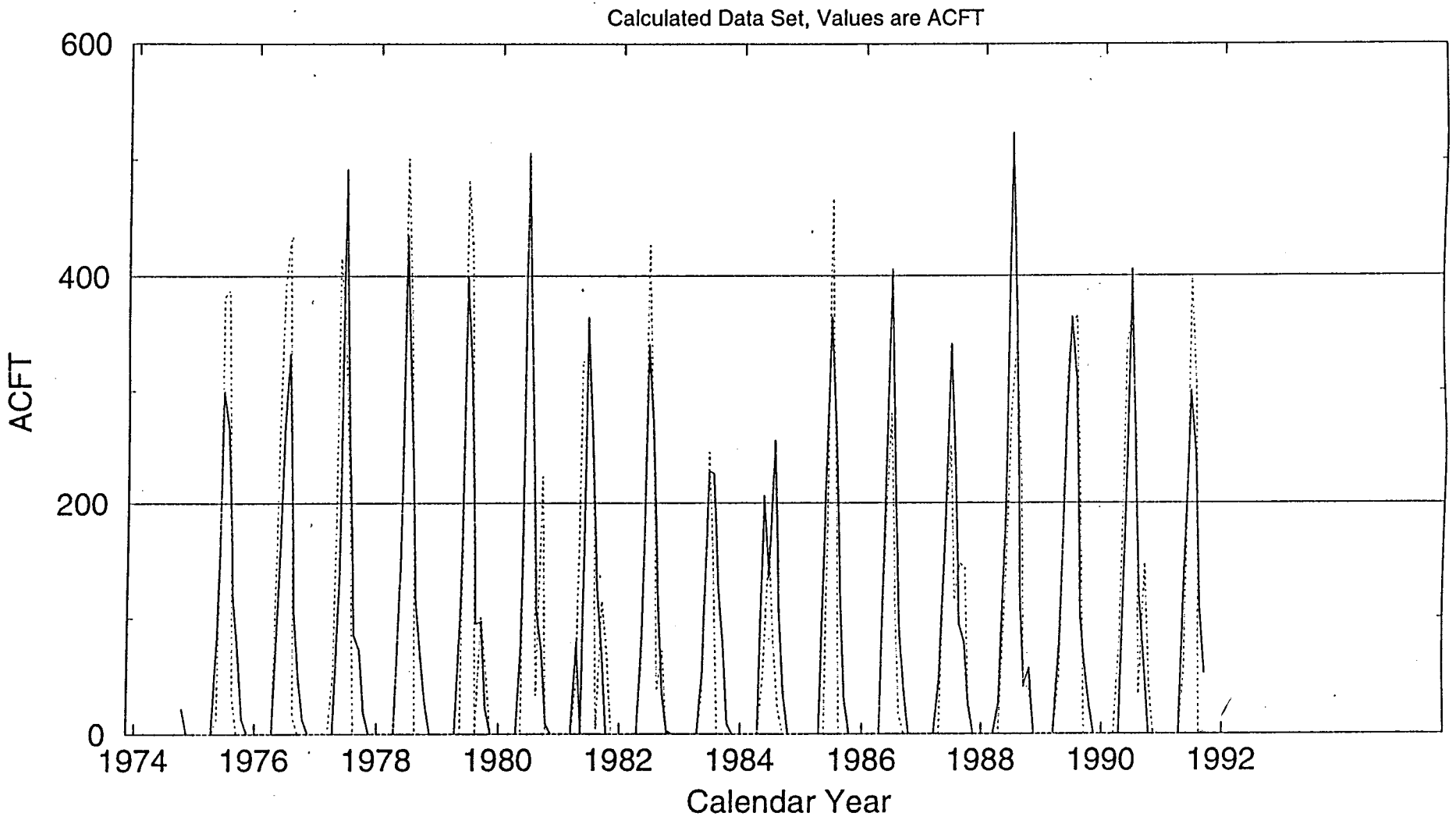


Figure 5.3.2a Calculated Data Set Nickell Ditch

Diversion Maybell Canal

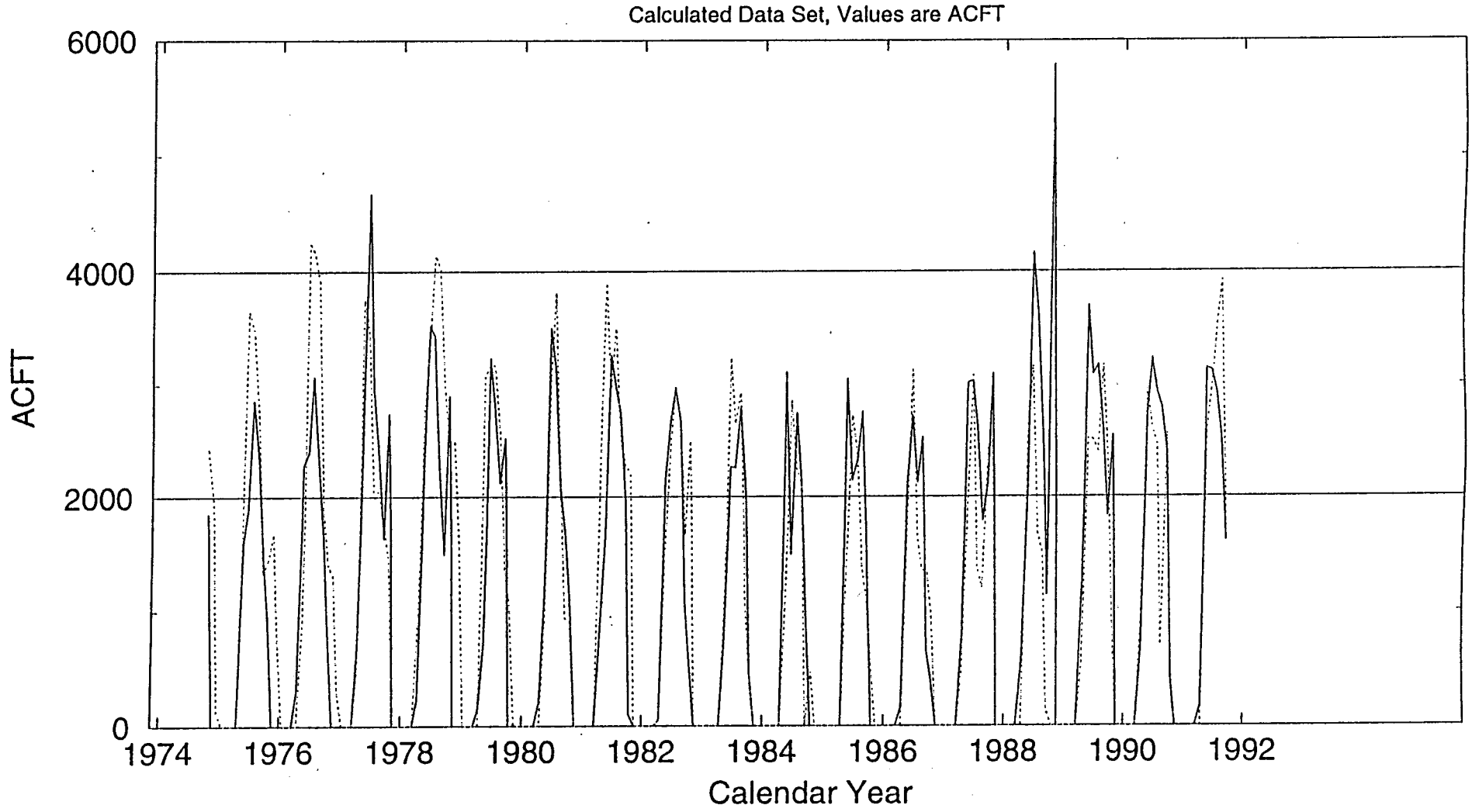


Figure 5.3.2b Calculated Data Set Maybell Canal

Gage Yampa River below Stagecoach Reservoir

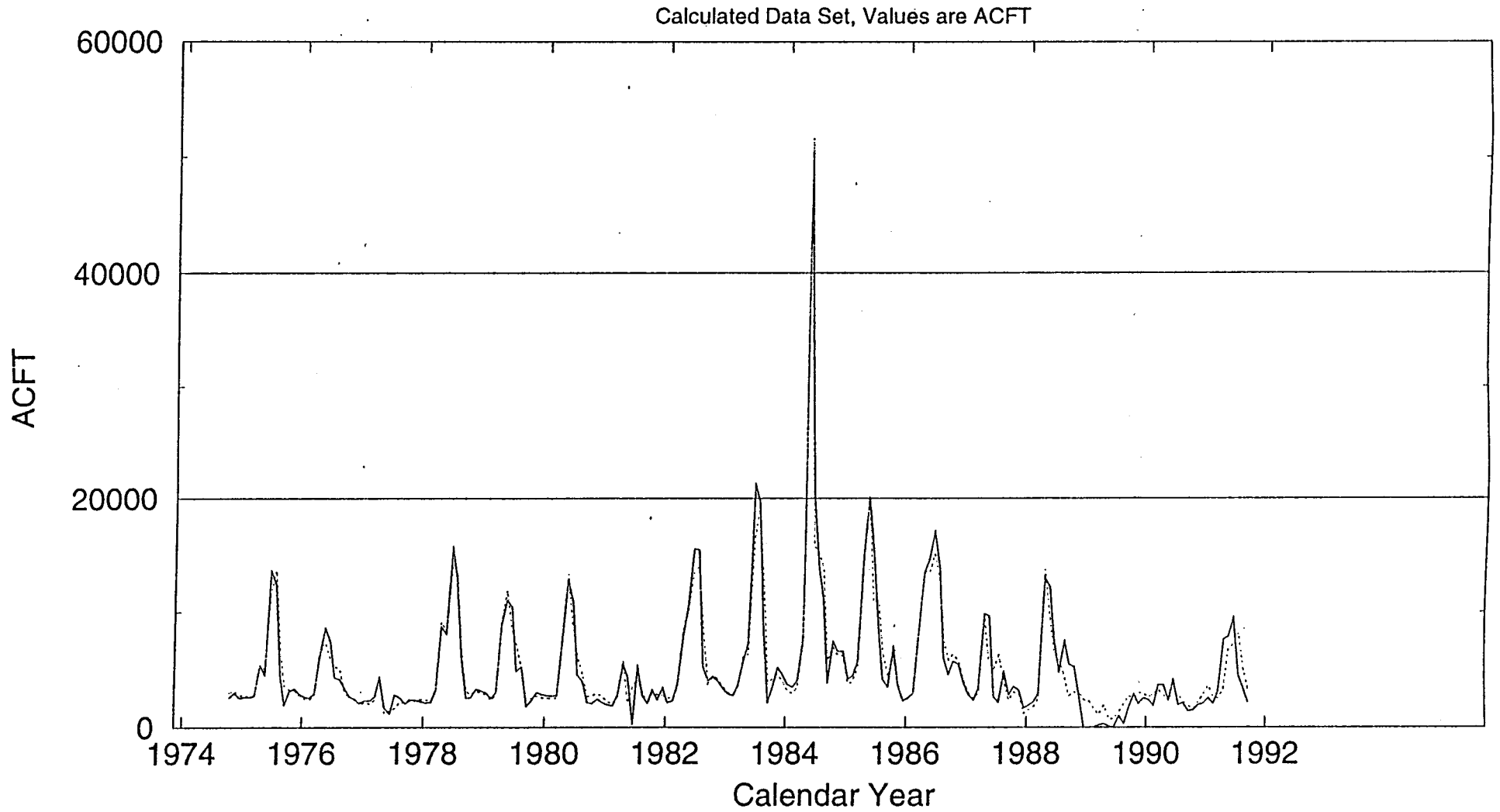


Figure 5.3.2c Calculated Data Set
USGS Gage below Stagecoach Reservoir

Gage Yampa River at Maybell

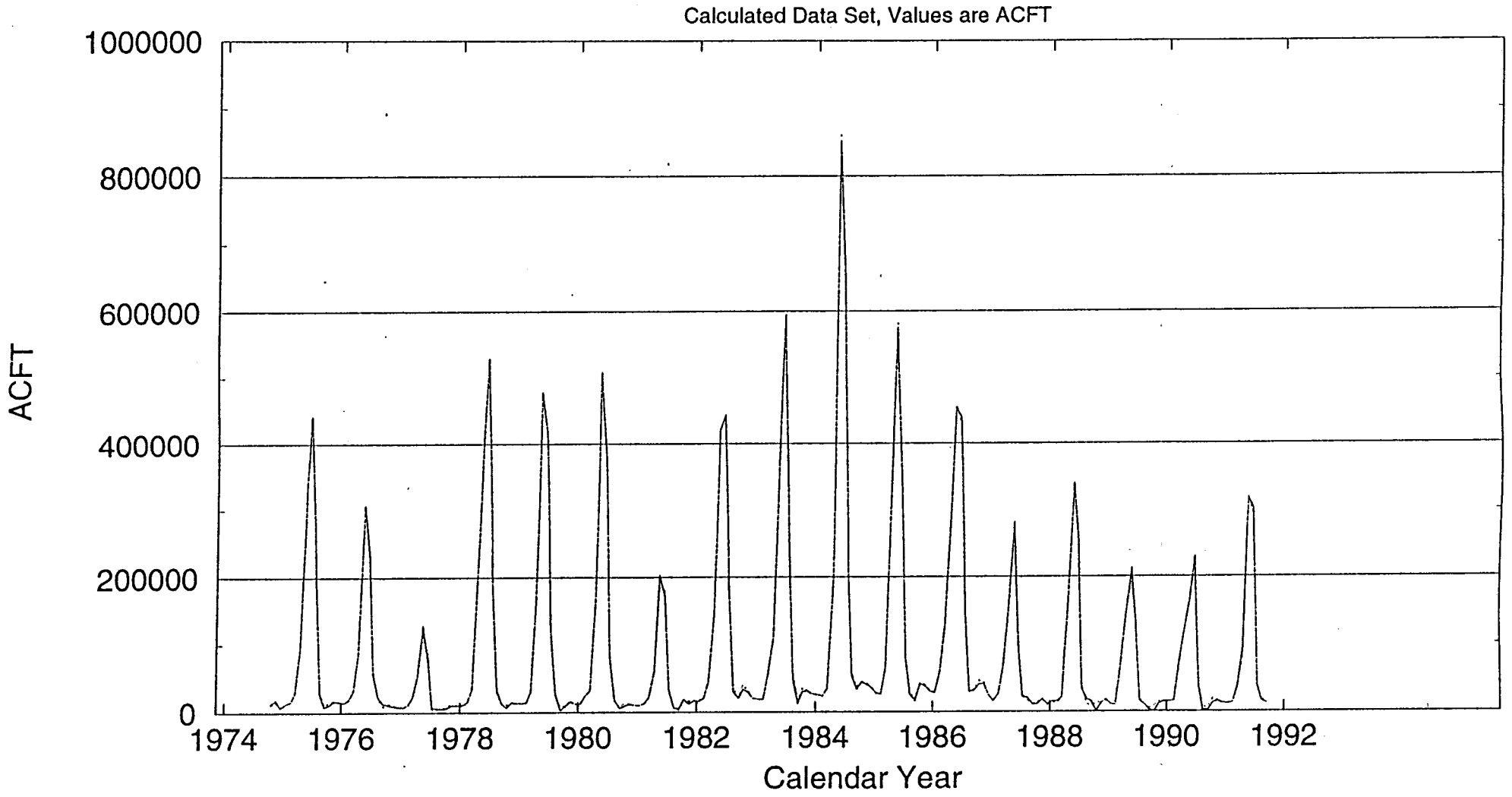


Figure 5.3.2d Calculated Data Set USGS Gage at Maybell

Steamboat Lake End of Month Content

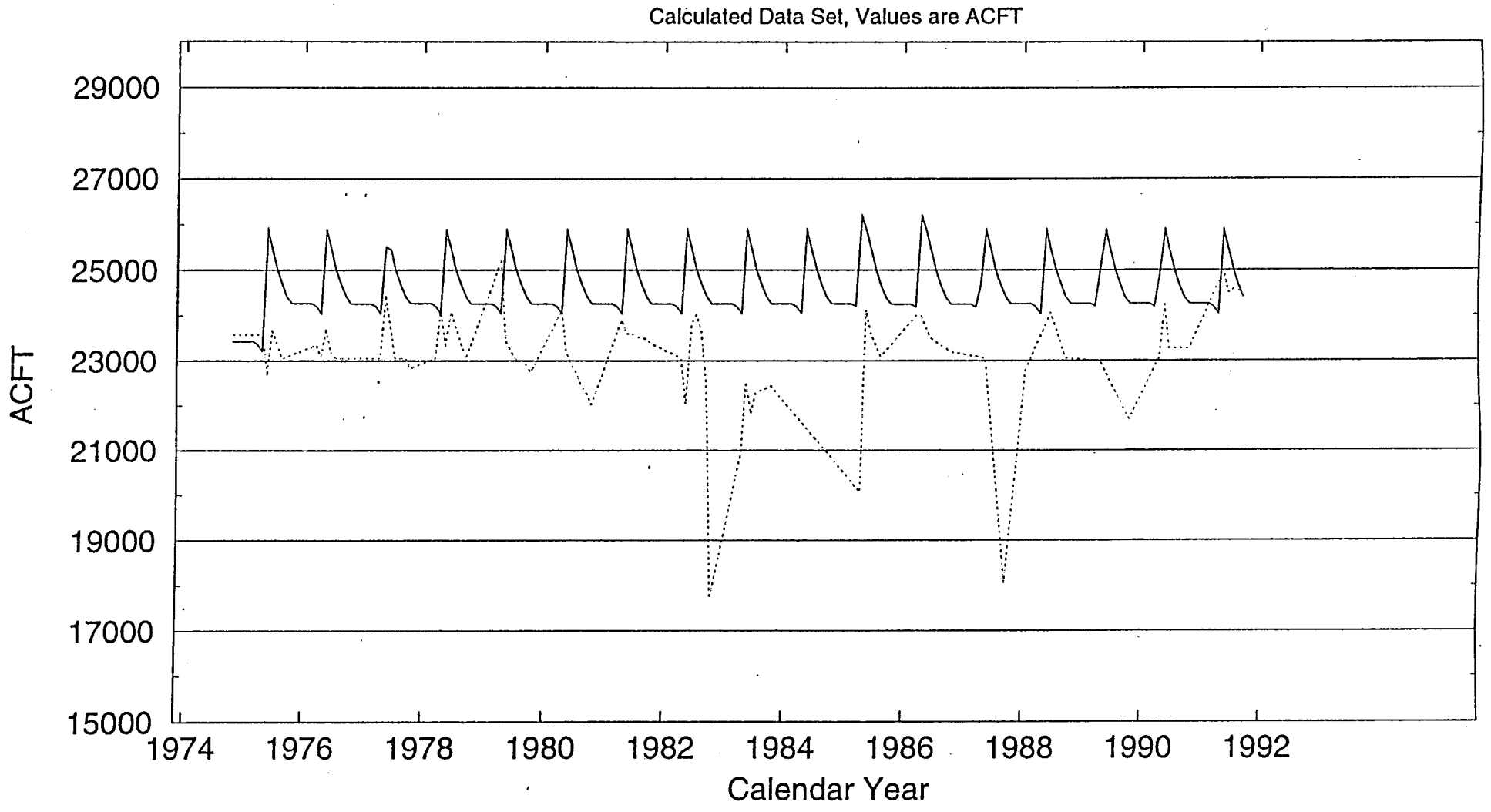


Figure 5.3.2e Calculated Data Set Steamboat Lake

Stillwater Reservoir End of Month Contents

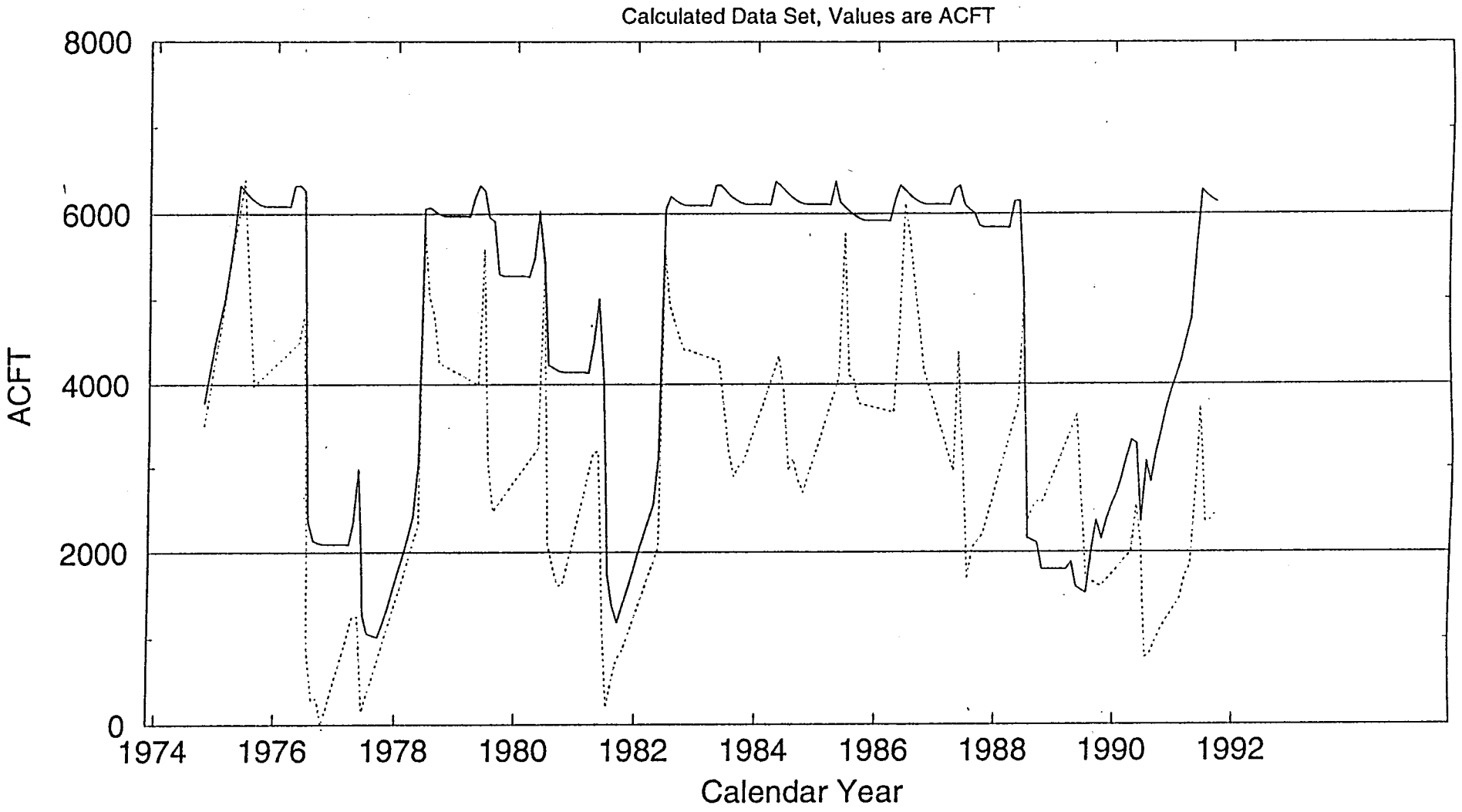


Figure 5.3.2f Calculated Data Set Stillwater Reservoir

5.3.3 Baseline Data Set

The baseline data set builds upon the calculated data set by allowing future demands, diversions, and reservoirs to operate at current (1991) levels. The primary purpose of this data set is to form the base scenario upon which future scenarios can be compared and evaluated. Results from this run are not compared to historical gaged diversions.

The baseline operations (yampaB.opr) were developed pursuant to a 1992 agreement between the UYWCD and Tri-State. The UYWCD may store in and deliver from Stagecoach Reservoir the 4,000 acre-feet of agricultural water to which Tri-State is entitled annually from Yamcolo Reservoir. This exchange arrangement effectively increases the agricultural water supplies in Yamcolo by another 4,000 acre-feet and moves all of Tri-State's industrial water into Stagecoach Reservoir. Based on the 1992 agreement, the 4,000 acre-feet is divided into the following accounts; Stagecoach contract water to the Colorado River basin, 343 acre-feet; Stagecoach contract water to the Yampa River, basin 3,092 acre-feet; and an aggregated irrigation account (Stagenoown), 565 acre-feet.

The Fish Creek Reservoir is presently (1994-95) undergoing an enlargement that will increase the total storage to approximately 4,042 acre-feet. The enlargement is intended to provide additional raw water storage for both the city and the Mt. Werner Water & Sanitation District. Therefore, the baseline conditions at Fish Creek Reservoir are modeled with a capacity of 4,042 acre-feet, and storage targets are set to 4,042 acre-feet for the study period.

The following assumptions were made to develop the baseline (yampaB.ddm) conditions:

1.) The Fish Creek Municipal Water Intake (580642) demands were determined by taking the 1991 diversions and increasing them by a factor of 10 percent. This time series yields a cumulative annual diversion of 2,825 acre-feet for each year of the study period. The 10 percent represents an estimated future growth rate.

2.) The demands for the city of Craig were determined by taking the 1991 diversions and increasing them by a factor of 35 percent which yields a cumulative annual diversion of 2,070 acre-feet. The 35 percent represents an estimated growth rate for this municipality, based on the actual 1994 diversion records.

3.) The demands for the Hayden and Craig stations were estimated by assuming a plant capacity factor of 85 percent. The plant capacity factor, the rated generation capacity, and the average historical water use were used to determine the projected annual water demand. The monthly distribution was determined by looking at the 1985-1989 monthly water use records. The projected annual water demand for the Hayden station is 5,515 acre-feet and for the Craig station is 14,025 acre-feet.

TABLE 5.3.1A

Comparison Between Historical and Estimated Average Annual Streamflow Volumes
Historical Data Set (H) (acre-feet/year) 1975-1991

Gage ID	Historical	Estimated	Historical-Estimated		Gage Name
			Volume	Percent	
9236000	28246	28167	79	0	BEAR RIVER NEAR TOPO_FLO
9237500	63374	63744	-370	-1	YAMPA RIVER BELOW ST_FLO
9238900	44097	44071	26	0	FISH CR AT UPPER STA_FLO
9239500	327050	327561	-511	0	YAMPA RIVER AT STEAM_FLO
9241000	231396	231204	193	0	ELK RIVER AT CLARK,_FLO
9244410	744721	745979	-1258	0	YAMPA RIVER BELOW DI_FLO
9245000	43001	43001	0	0	ELKHEAD CREEK NEAR E_FLO
9246920	8710	9028	-318	-4	FORTIFICATION CREEK_FLO
9247600	941676	942987	-1312	0	YAMPA RIVER BELOW CR_FLO
9249000	86452	86459	-7	0	EAST FORK OF WILLIAM_FLO
9249200	31381	31381	0	0	SOUTH FORK OF WILLIA_FLO
9249750	168243	169274	-1031	-1	WILLIAMS FORK AT MOU_FLO
9251000	1142093	1145057	-2964	0	YAMPA RIVER NEAR MAY_FLO
9253000	171533	171754	-221	0	LITTLE SNAKE RIVER N_FLO
9255000	61880	62446	-567	-1	SLATER FORK NEAR SLA_FLO
9258000	8108	8116	-8	0	WILLOW CREEK NEAR DI_FLO
9260000	422016	423500	-1484	0	LITTLE SNAKE RIVER N_FLO
9260050	1591941	1596091	-4150	0	YAMPA RIVER AT DEERL_FLO

TABLE 5.3.1B

Comparison Between Historical and Estimated Average Annual Diversion Volumes
Historical Data Set (H) (acre-feet/year) 1975 - 1991

Gage ID	Historical	Estimated	Historical-Estimated		Gage Name
			Volume	Percent	
584630	309	257	52	17	Dome_Creek_Ditch
584686	1688	1612	76	5	Stillwater_Colo
584685	4346	4286	60	1	STILLWATER DITCH
580589	520	504	16	3	COAL CREEK DITCH
580539	4520	4477	43	1	BIG MESA DITCH
580738	1196	1196	0	0	LINDSEY DITCH
580564	2296	2296	0	0	BUCKINGHAM MANDALL D
580763	4741	4741	0	0	MANDALL DITCH
580582	431	428	3	1	CHARLES LEIGHTON D
580500	1693	1693	0	0	ACTON DITCH
580945	1209	1209	0	0	WOOLEY DITCH
580643	1508	1508	0	0	FIX DITCH

TABLE 5.3.1B (Continued)
Comparison Between Historical and Estimated Average Annual Diversion Volumes
Historical Data Set (H) (acre-feet/year) 1975 - 1991

Gage ID	Historical	Estimated	Historical-Estimated		Gage Name
			Volume	Percent	
580777	431	425	6	1	MILL DITCH
580684	973	966	8	1	HERNAGE + KOLBE DITCH
580821	1579	1570	8	1	PENNSYLVANIA DITCH
580541	1684	1684	0	0	BIRD DITCH
580798	900	900	0	0	NICKELL DITCH
ADY_001	851	851	0	0	ADY_001_UpperBearRiver
580556	330	46	284	86	BRINKER CREEK DITCH
580826	389	24	365	94	PONY CREEK D
ADY_002	2779	1464	1315	47	ADY_002_ChimneyCreek
580622	1460	1460	0	0	EGERIA DITCH
580782	289	289	0	0	MOODY DITCH
580634	970	919	51	5	FERGUSON DITCH
580879	2385	2379	7	0	STAFFORD DITCH
580731	238	238	0	0	LAUGHLIN DITCH
580721	438	438	0	0	L L WILSON D
580933	560	560	0	0	WHIPPLE DITCH
580808	1170	1170	0	0	OAKTON DITCH
ADY_003	2634	2634	0	0	ADY_003_BearRabvHuntCk
580685	376	376	0	0	HIGH MESA IRR D
580665	326	326	0	0	GUIDO DITCH
580844	440	440	0	0	SAGE HEN DITCH
580801	342	342	0	0	NORTH HUNT CREEK DITCH
581085	481	481	0	0	MILL CREEK DITCH
580506	274	293	-18	-7	ALLEN BASIN SUPPLY D
580569	310	310	0	0	BURNT MESA D
580767	402	402	0	0	MAYFLOWER DITCH
580722	436	435	1	0	LAFON DITCH
580730	589	589	0	0	LATERAL A DITCH
580866	844	816	28	3	SNOW BANK DITCH
580863	1881	1881	0	0	SIMON DITCH
580591	891	885	6	1	COLLINS DITCH
580813	534	534	0	0	PALISADE DITCH
580574	372	372	0	0	C R BROWN MOFFAT COAL C
580809	222	222	0	0	OLD CABIN DITCH
580872	708	708	0	0	SOUTH SIDE DITCH
581035	603	603	0	0	NORTH SIDE DITCH
580914	1131	1131	0	0	UNION DITCH
ADY_004	2070	2070	0	0	ADY_004_BearRabvStagecoa
581583	4222	3771	451	11	HEADGATE DERIVED FROM DI

TABLE 5.3.1B (Continued)
Comparison Between Historical and Estimated Average Annual Diversion Volumes
Historical Data Set (H) (acre-feet/year) 1975 - 1991

Gage ID	Historical	Estimated	Historical-Estimated		Gage Name
			Volume	Percent	
580791	337	299	38	11	MUDDY D NO 1
580532	396	334	62	16	BEAVER CREEK D
584684	515	513	2	0	SARVIS DITCH
580916	1188	1175	13	1	UPPER PLEASANT VALLEY D
580980	484	455	29	6	GABIOUD DITCH
580749	605	605	0	0	LOWER PLEASANT VALLEY D
580924	248	248	0	0	WELCH MONSON D
580922	641	641	0	0	WEISKOPF DITCH
580897	3371	3371	0	0	SUTTLE DITCH
580530	2411	2411	0	0	BAXTER DITCH
580508	1134	1119	15	1	ALPHA DITCH
581074	561	537	25	4	ROSSI HIGHLINE
580807	631	613	18	3	OAK DALE DITCH
580805	759	759	0	0	OAK CREEK DITCH
580561	430	425	5	1	BRUMBACK DITCH
580756	495	486	9	2	LYON DITCH NO 2
580612	554	554	0	0	DEVER D
580687	415	402	13	3	HIGHLINE BEAVER DITCH
580920	9074	8654	419	5	WALTON CREEK DITCH
580627	2270	2089	181	8	ENTERPRISE DITCH
580939	452	451	0	0	WINDSOR DITCH
580830	271	246	25	9	PRIEST DITCH
580628	404	387	17	4	EXCELSIOR D
582374	52	52	0	0	STMBT SKI SNOWMAKING PL
580642	1804	1804	0	0	FISH CR PIPELINE A
ADY_005	3631	3631	0	0	ADY_005_YampaRabvSteambt
580868	1833	1804	28	2	SODA CREEK DITCH
580943	220	198	23	10	WOODCHUCK DITCH
580944	2307	2307	0	0	WOOLERY DITCH
580618	1536	1536	0	0	DUQUETTE DITCH
580559	641	640	1	0	BROOKS DITCH
580811	216	216	0	0	OLIGARCHY DITCH
580895	995	991	4	0	SUNNYSIDE DITCH 1
580717	950	935	15	2	KINNEY DITCH
580694	2472	2460	11	0	HOOVER JACQUES DITCH
580928	611	602	9	1	WHEELER BROS DITCH
ADY_006	1790	1790	0	0	ADY_006_ElkRivernrClark
580623	1260	1260	0	0	EKHART DITCH
580588	689	688	1	0	CLARKE BURKE DITCH

TABLE 5.3.1B (Continued)
Comparison Between Historical and Estimated Average Annual Diversion Volumes
Historical Data Set (H) (acre-feet/year) 1975 - 1991

Gage ID	Historical	Estimated	Historical-Estimated		Gage Name
			Volume	Percent	
580649	1876	1876	0	0	FRANZ DITCH
580663	305	298	7	2	GREER DITCH
580847	383	383	0	0	SAND CREEK DITCH
580577	1021	1021	0	0	CAMPBELL DITCH
580915	940	940	0	0	UPPER ELK RIVER D
580714	1951	1951	0	0	KELLER DITCH
580662	1303	1300	4	0	GRAHAM + BENNETT D
580590	147	147	0	0	COLEMAN DITCH E
580604	199	199	0	0	DAY DITCH
580549	303	303	0	0	BORLAND VAIL DITCH
580917	444	444	0	0	VAIL SAVAGE DITCH
ADY_007	3152	3152	0	0	ADY_007_MiddleElkRiver
580568	1237	1237	0	0	BURNETT DITCH
580640	563	439	124	22	FIRST CHANCE DITCH
580599	976	976	0	0	CULLEN DITCH NO 2
580695	512	339	173	34	HOT SPGS CR HIGHLINE D
581021	982	982	0	0	LEE IRRIGATION D
580626	2557	2468	88	3	ELK VALLEY D
580908	479	479	0	0	TRULL MORIN DITCH
580783	2773	2773	0	0	MORIN DITCH
580728	734	734	0	0	LARSON DITCH
580583	290	290	0	0	CHARLES H KEMMER D
580633	1087	1087	0	0	FELIX BORGHI D
ADY_008	2041	2041	0	0	ADY_008_LowerElkRiver
570584	622	622	0	0	SADDLE MTN DITCH
570579	831	821	10	1	R E CLARK DITCH
574629	1468	1014	454	31	RICH D
570555	784	606	179	23	LAST CHANCE DITCH
570561	588	385	203	34	MALE MOORE CO DITCH ENL
570517	655	476	179	27	DAVID M CHAPMAN DITCH
570576	473	434	39	8	ORNO DITCH
570635	1137	969	168	15	KOLL DITCH
570545	1091	952	140	13	HOMESTEAD DITCH
570513	188	167	20	11	CONNELL DITCH
570608	938	852	86	9	TROUT CK DITCH NO 3
570609	367	343	24	7	TROUT CREEK DITCH NO 2
570544	991	873	119	12	HIGHLAND DITCH
570525	682	549	133	19	EAST SIDE DITCH NO 2
570524	579	466	112	19	EAST SIDE DITCH

TABLE 5.3.1B (Continued)
Comparison Between Historical and Estimated Average Annual Diversion Volumes
Historical Data Set (H) (acre-feet/year) 1975 - 1991

Gage ID	Historical	Estimated	Historical-Estimated		Gage Name
			Volume	Percent	
570623	903	740	163	18	WILLIAMS PARK DITCH
ADY_009	1499	1374	126	8	ADY_009_TroutCreek
570519	1034	1031	4	0	DENNIS AND BLEWITT D
570563	4090	4090	0	0	MARSHALL ROBERTS DITCH
570539	8868	8868	0	0	GIBRALTAR DITCH
ADY_010	501	501	0	0	ADY_010_YampaRnrHayden
570512	5025	5025	0	0	COLO UTILITIES D A PL
570622	2488	2488	0	0	WILLIAMS IRRIG DITCH
570611	5588	5588	0	0	WALKER IRRIG DITCH
570592	8106	8099	7	0	SHELTON DITCH
570535	537	537	0	0	ERWIN IRRIGATING DITCH
570510	3371	3371	0	0	CARY DITCH CO DITCH
570508	1932	1932	0	0	BROCK DITCH
ADY_011	1457	1457	0	0	ADY_011_YampaRabvElkhead
440614	125	102	23	18	ELLIS A KITCHENS D
440533	150	135	15	10	ANDERSON DITCH
440699	888	858	30	3	MC KINLEY DITCH NO 1
440700	1493	1376	117	8	MC KINLEY DITCH NO 2
440770	106	101	5	4	STARR IRRIG DITCH
440763	1041	1037	4	0	SMITH DITCH
440724	1505	1499	6	0	NORVELL DITCH
ADY_012	1359	1253	106	8	ADY_012_ElkheadCreek
440589	5673	5673	0	0	DEEP CUT IRR D
440691	424	424	0	0	M DITCH
440647	840	620	220	26	HAUGHEY IRR DITCH
440681	340	275	65	19	LAMB IRR DITCH
440650	45	45	0	1	MESA HL BK COTWOOD PUMP
440998	474	360	114	24	DRY COTTONWOOD DITCH
440698	205	117	87	43	MC DONALD DITCH
440785	711	655	56	8	TIPTON IRR DITCH
440573	776	449	327	42	CATARACT DITCH
440612	641	325	315	49	ELKHORN IRR DITCH
440688	1684	1167	517	31	LITTLE BEAR DITCH
440511	2212	2210	2	0	WISCONSIN DITCH
440581	1582	1582	0	0	CRAIG WATER SUPPLY PL
440514	598	598	0	0	WOOLEY AND JOHNSON D
440821	383	383	0	0	MACK DITCH
440517	901	901	0	0	YAMPA VAL STOCK BR CO D
440522	6441	6441	0	0	CRAIG STA D + PL

TABLE 5.3.1B (Continued)
Comparison Between Historical and Estimated Average Annual Diversion Volumes
Historical Data Set (H) (acre-feet/year) 1975 - 1991

Gage ID	Historical	Estimated	Historical-Estimated		Gage Name
			Volume	Percent	
440527	585	585	0	0	AIR LINE IRR D
ADY_013	4846	4846	0	0	ADY_013_YampaRbelCraig
AMY_001	6732	6732	0	0	AMY_001_YampaRbelCraig
440607	2527	2460	67	3	EGRY MESA DITCH
440635	397	397	0	0	GRIESER DITCH
ADY_014	3692	3692	0	0	ADY_014_EFkWilliamsFork
440570	1470	1470	0	0	CARD DITCH
440601	696	692	4	1	DUNSTON DITCH
440740	604	604	0	0	RATCLIFF DITCH
440652	633	633	0	0	HIGHLAND DITCH
440585	457	457	0	0	CRYSTAL CK DITCH
440611	720	92	628	87	ELK TRAIL DITCH
440735	642	427	215	33	PINE CK DITCH
440661	512	511	1	0	J P MORIN DITCH
ADY_015	2173	2173	0	0	ADY_015_SFkWilliamsFork
440731	867	867	0	0	PECK IRRIG D
440765	654	654	0	0	SOUTH SIDE DITCH
440644	327	320	7	2	HARPER NO 1 DITCH
440645	108	103	5	5	HARPER NO 2 D
440790	963	953	10	1	UTLEY DITCH
440538	195	30	165	85	AVERILL DITCH
440572	184	47	137	75	CARRIGAN-AVERILL D
440638	263	38	224	85	HADDEN BASE DITCH
440812	364	67	296	81	HART DITCH
440748	177	53	124	70	ROBY DITCH NO 2
440747	153	60	93	61	ROBY D AKA ROBY D NO 1
440651	1439	1269	170	12	HIGHLAND DITCH
440628	334	141	193	58	GIBBONS WILSON A JORDAN
440593	285	122	162	57	DENNISON A MARTIN D
440590	1233	797	436	35	DEER CK A MORAPOS D
440716	159	153	5	3	MULLEN DITCH
440670	258	249	9	3	JOHN W KELLOGG NO 2 D
440814	410	391	19	5	HIGHLINE DITCH
ADY_016	3868	3868	0	0	ADY_016_WilliamsFork
440749	180	180	0	0	ROUND BOTTOM D NO 1
440751	61	61	0	0	ROUND BOTTOM DITCH
440613	305	305	0	0	ELLGEN DITCH
440806	311	311	0	0	ELLGEN NO 2 DITCH
440750	285	285	0	0	ROUND BOTTOM D NO 2

TABLE 5.3.1B (Continued)
Comparison Between Historical and Estimated Average Annual Diversion Volumes
Historical Data Set (H) (acre-feet/year) 1975 - 1991

Gage ID	Historical	Estimated	Historical-Estimated		Gage Name
			Volume	Percent	
440692	1830	1446	385	21	MARTIN CK DITCH
440509	1167	920	247	21	WILSON DITCH
440587	1318	1121	197	15	D D FERGUSON D NO 2
440660	328	278	49	15	J A MARTIN DITCH
440518	280	159	121	43	YELLOW JACKET DITCH NO 1
440519	201	156	44	22	YELLOW JACKET DITCH NO 2
440586	1829	1682	148	8	D D AND E DITCH
440706	815	689	125	15	MILK CK DITCH
ADY_017	1592	848	744	47	ADY_017_MilkCrabvGSpring
440524	199	183	15	8	AQ NO 1 DITCH
ADY_018	4400	3937	463	11	ADY_018_MilkCreek
440675	3575	3575	0	0	JUNIPER MTN TUNNEL
440820	1013	1013	0	0	LOWRY SEELEY PUMP
440863	1661	1661	0	0	HENRY SWEENEY DITCH
440677	2335	2328	7	0	K DIAMOND DITCH
440729	1805	1805	0	0	PATRICK SWEENEY D
440830	1396	1396	0	0	OLD SWEENEY DITCH
440541	832	832	0	0	BAILEY DITCH
442214	110	110	0	0	BAILEY DITCH-UTAH INT.
440694	14292	14292	0	0	MAYBELL CANAL
ADY_019	2889	2889	0	0	ADY_019_YampaRnrMaybell
440702	2346	2346	0	0	MCINTYRE DITCH
440695	115	115	0	0	MAYBELL MILL PIPELINE
440711	912	912	0	0	MOCK DITCH
440828	450	450	0	0	MOCK DITCH NO 3
440723	950	950	0	0	NICHOLS DITCH NO 1
440778	1855	1855	0	0	SUNBEAM DITCH
440801	1401	1401	0	0	CROSS MTN PUMP GUESS
440583	3010	3010	0	0	CROSS MTN PUMP GROUNDS
440786	1806	1806	0	0	TISDEL D NO 2
441122	333	333	0	0	VAUGHN PUMP
440584	2531	2531	0	0	CROSS MTN PUMP NO 1 + 2
440687	2987	2987	0	0	LILY PARK D NO 1
ADY_020	6350	5802	547	9	ADY_020_LSnakeRnrSlater
540532	1051	1000	51	5	HOME SUPPLY DITCH
540507	1162	1133	29	2	BEELER DITCH
540592	417	404	12	3	WILSON DITCH
540564	740	700	40	5	SALISBURY DITCH
540543	953	912	41	4	LUCHINGER DITCH

TABLE 5.3.1B (Continued)
Comparison Between Historical and Estimated Average Annual Diversion Volumes
Historical Data Set (H) (acre-feet/year) 1975 - 1991

Gage ID	Historical	Estimated	Historical-Estimated		Gage Name
			Volume	Percent	
540548	1230	1214	16	1	MORGAN AND BEELER D
ADY_021	3135	3040	95	3	ADY_021_LSnakeRabvSlater
540570	482	388	94	20	SLATER PARK DITCH NO1
540571	273	200	73	27	SLATER PARK DITCH NO 2
540572	336	227	109	32	SLATER PARK DITCH NO 3
540574	591	431	160	27	SLATER PARK DITCH NO 5
540568	862	856	6	1	SLATER FORK DITCH
ADY_022	7198	6261	938	13	ADY_022_SlaterCreek
540549	638	622	16	3	MORGAN SLATER DITCH
990528	16526	16526	0	0	Cheyenne_City
990533	23452	23431	21	0	Wyoming_Irrig1
990534	23452	23452	0	0	Wyoming_Irrig2
990535	23452	23391	61	0	Wyoming_Irrig3
540554	497	483	13	3	PERKINS FOX DITCH
540591	2070	1976	94	5	WILLOW CK DITCH
540555	804	804	0	0	PERKINS IRR DITCH
540583	2712	2694	17	1	TROWEL DITCH
540594	804	804	0	0	WOODBURY DITCH
540531	2495	2494	2	0	HEELEY DITCH
ADY_023	17527	15491	2036	12	ADY_023_LSnakeabvDryGlch
550507	829	829	0	0	NINE MILE IRR DITCH
550508	737	737	0	0	NINE MILE IRR PL
550513	678	678	0	0	VISINTAINER DITCH
550504	691	691	0	0	ESCALANTA DITCH NO 2
550506	2117	2117	0	0	MAJORS DITCH NO 2
550537	1513	1513	0	0	LEFEVRE NO 1 PUMP
550519	637	637	0	0	RINKER DITCH
ADY_024	1552	1552	0	0	ADY_024_LSnakeRnrLily
AMY_003	696	694	2	0	AMY_003_LSnakeRnrLily
ADY_025	2373	2373	0	0	ADY_025_YampaR@DeerLodge
AMY_002	732	721	11	2	AMY_002_Yampa@Deerlodge
ADY_026	197	197	0	0	ADY_026_YampaR@GreenR
ADY_027	8061	7984	77	1	ADY_027_GreenRiver
Total	486,923	468,544	18,379	4	

TABLE 5.3.1C
Water Balance
Historical Data Set (H) (acre-feet/year)

Year	Inflow	Diversion	Return Flow	Reserv Evap	Outflow	Res Storage Change	Inflow - Outflow	CU
1975	1934638	458703	308289	13446	1770578	200	1	151854
1976	1448620	463986	327350	13368	1303646	-5030	0	150416
1977	599492	454885	328423	13308	460155	-433	0	141653
1978	2295434	508874	358796	14234	2119113	12009	1	160969
1979	2006687	506582	357605	14392	1844014	-697	1	163539
1980	2138591	472072	332082	14402	1984314	-115	0	155316
1981	1003844	445855	309484	14647	850641	2184	1	151561
1982	2271733	477292	330148	14743	2102428	7417	1	162625
1983	2729337	382268	256680	14756	2590453	-1459	-1	141130
1984	3436094	366837	242064	14671	3297787	-1137	0	142099
1985	2568723	412397	272836	14784	2411583	2794	1	152213
1986	2714062	431492	293878	14833	2561030	585	0	152924
1987	1337524	470754	317990	14741	1173489	-3470	0	163927
1988	1549242	529549	370868	14733	1378111	-2284	1	174732
1989	1019179	523800	367488	15500	823529	23838	0	172003
1990	1078562	528694	374686	15894	903356	5304	0	169042
1991	1301561	526299	375315	16135	1129901	4539	1	166481
Ave	1849019	468255	324940	14623	1688478	2603	0	157205

TABLE 5.3.2A
Comparison Between Historical and Estimated Average Annual Streamflow Volumes
Calculated Data Set (C) (acre-feet/year) 1975-1991

Gage ID	Historical	Estimated	Historical-Estimated		Gage Name
			Volume	Percent	
9236000	28246	28132	114	0	BEAR RIVER NEAR TOPO_FLO
9237500	63374	63501	-128	0	YAMPA RIVER BELOW ST_FLO
9238900	44097	44071	26	0	FISH CR AT UPPER STA_FLO
9239500	327050	327149	-99	0	YAMPA RIVER AT STEAM_FLO
9241000	231396	231213	183	0	ELK RIVER AT CLARK,_FLO
9244410	744721	744654	67	0	YAMPA RIVER BELOW DI_FLO
9245000	43001	43001	0	0	ELKHEAD CREEK NEAR E_FLO
9246920	8710	8910	-200	-2	FORTIFICATION CREEK_FLO
9247600	941676	940826	850	0	YAMPA RIVER BELOW CR_FLO
9249000	86452	86465	-13	0	EAST FORK OF WILLIAM_FLO
9249200	31381	31379	1	0	SOUTH FORK OF WILLIA_FLO
9249750	168243	168954	-711	0	WILLIAMS FORK AT MOU_FLO

TABLE 5.3.2A (Continued)
Comparison Between Historical and Estimated Average Annual Streamflow Volumes
Calculated Data Set (C) (acre-feet/year) 1975-1991

Gage ID	Historical	Estimated	Historical-Estimated		Gage Name
			Volume	Percent	
9251000	1142093	1142683	-591	0	YAMPA RIVER NEAR MAY_FLO
9253000	171533	171777	-244	0	LITTLE SNAKE RIVER N_FLO
9255000	61880	62325	-445	-1	SLATER FORK NEAR SLA_FLO
9258000	8108	7992	116	1	WILLOW CREEK NEAR DI_FLO
9260000	422016	422402	-386	0	LITTLE SNAKE RIVER N_FLO
9260050	1591941	1592032	-90	0	YAMPA RIVER AT DEERL_FLO

TABLE 5.3.2B
Comparison Between Historical and Estimated Average Annual Diversion Volumes
Calculated Data Set (C) (acre-feet/year) 1975-1991

Gage ID	Historical	Estimated	Historical-Estimated		Gage Name
			Volume	Percent	
584630	309	257	52	17	Dome_Creek_Ditch
584686	1688	1102	586	35	Stillwater_Colo
584685	4346	4339	7	0	STILLWATER DITCH
580589	520	489	31	6	COAL CREEK DITCH
580539	4520	4298	222	5	BIG MESA DITCH
580738	1196	1395	-199	-17	LINDSEY DITCH
580564	2296	2561	-265	-12	BUCKINGHAM MANDALL D
580763	4741	4383	358	8	MANDALL DITCH
580582	431	393	37	9	CHARLES LEIGHTON D
580500	1693	1498	195	12	ACTON DITCH
580945	1209	1186	23	2	WOOLEY DITCH
580643	1508	1564	-56	-4	FIX DITCH
580777	431	398	33	8	MILL DITCH
580684	973	907	66	7	HERNAGE + KOLBE DITCH
580821	1579	1530	49	3	PENNSYLVANIA DITCH
580541	1684	1684	0	0	BIRD DITCH
580798	900	979	-78	-9	NICKELL DITCH
ADY_001	851	850	1	0	ADY_001_UpperBearRiver
580556	330	49	281	85	BRINKER CREEK DITCH
580826	389	15	374	96	PONY CREEK D
ADY_002	2779	1472	1307	47	ADY_002_ChimneyCreek
580622	1460	1517	-58	-4	EGERIA DITCH
580782	289	307	-18	-6	MOODY DITCH
580634	970	955	14	1	FERGUSON DITCH

TABLE 5.3.2B (Continued)
Comparison Between Historical and Estimated Average Annual Diversion Volumes

Calculated Data Set (C) (acre-feet/year) 1975-1991

Gage ID	Historical	Estimated	Historical-Estimated		Gage Name
			Volume	Percent	
580879	2385	2434	-49	-2	STAFFORD DITCH
580731	238	265	-27	-12	LAUGHLIN DITCH
580721	438	434	4	1	L L WILSON D
580933	560	567	-7	-1	WHIPPLE DITCH
580808	1170	1241	-71	-6	OAKTON DITCH
ADY_003	2634	2634	0	0	ADY_003_BearRabvHuntCk
580685	376	449	-73	-19	HIGH MESA IRR D
580665	326	295	31	10	GUIDO DITCH
580844	440	459	-19	-4	SAGE HEN DITCH
580801	342	387	-45	-13	NORTH HUNT CREEK DITCH
581085	481	603	-122	-25	MILL CREEK DITCH
580506	274	278	-4	-1	ALLEN BASIN SUPPLY D
580569	310	302	9	3	BURNT MESA D
580767	402	405	-3	-1	MAYFLOWER DITCH
580722	436	469	-34	-8	LAFON DITCH
580730	589	560	29	5	LATERAL A DITCH
580866	844	811	33	4	SNOW BANK DITCH
580863	1881	1869	11	1	SIMON DITCH
580591	891	757	134	15	COLLINS DITCH
580813	534	532	2	0	PALISADE DITCH
580574	372	377	-5	-1	C R BROWN MOFFAT COAL C
580809	222	253	-30	-14	OLD CABIN DITCH
580872	708	715	-7	-1	SOUTH SIDE DITCH
581035	603	609	-6	-1	NORTH SIDE DITCH
580914	1131	1177	-46	-4	UNION DITCH
ADY_004	2070	2070	0	0	ADY_004_BearRabvStagecoa
581583	4222	3559	663	16	HEADGATE DERIVED FROM DI
580791	337	326	11	3	MUDDY D NO 1
580532	396	392	4	1	BEAVER CREEK D
584684	515	511	4	1	SARVIS DITCH
580916	1188	1257	-70	-6	UPPER PLEASANT VALLEY D
580980	484	457	26	5	GABIOUD DITCH
580749	605	623	-18	-3	LOWER PLEASANT VALLEY D
580924	248	271	-22	-9	WELCH MONSON D
580922	641	630	11	2	WEISKOPF DITCH
580897	3371	3105	267	8	SUTTLE DITCH
580530	2411	2471	-61	-3	BAXTER DITCH
580508	1134	1105	28	2	ALPHA DITCH
581074	561	525	36	6	ROSSI HIGHLINE

TABLE 5.3.2B (Continued)
Comparison Between Historical and Estimated Average Annual Diversion Volumes
Calculated Data Set (C) (acre-feet/year) 1975-1991

Gage ID	Historical	Estimated	Historical-Estimated		Gage Name
			Volume	Percent	
580807	631	620	11	2	OAK DALE DITCH
580805	759	758	1	0	OAK CREEK DITCH
580561	430	422	8	2	BRUMBACK DITCH
580756	495	455	40	8	LYON DITCH NO 2
580612	554	577	-23	-4	DEVER D
580687	415	403	12	3	HIGHLINE BEAVER DITCH
580920	9074	7644	1429	16	WALTON CREEK DITCH
580627	2270	1882	388	17	ENTERPRISE DITCH
580939	452	428	24	5	WINDSOR DITCH
580830	271	239	32	12	PRIEST DITCH
580628	404	396	7	2	EXCELSIOR D
582374	52	52	0	0	STMBT SKI SNOWMAKING PL
580642	1804	1804	0	0	FISH CR PIPELINE A
ADY_005	3631	3631	0	0	ADY_005_YampaRabvSteambt
580868	1833	1680	153	8	SODA CREEK DITCH
580943	220	554	-334	-151	WOODCHUCK DITCH
580944	2307	2278	29	1	WOOLERY DITCH
580618	1536	1517	19	1	DUQUETTE DITCH
580559	641	657	-16	-3	BROOKS DITCH
580811	216	230	-13	-6	OLIGARCHY DITCH
580895	995	1008	-13	-1	SUNNYSIDE DITCH 1
580717	950	916	34	4	KINNEY DITCH
580694	2472	2458	13	1	HOOVER JACQUES DITCH
580928	611	602	9	1	WHEELER BROS DITCH
ADY_006	1790	1790	0	0	ADY_006_ElkRivernrClark
580623	1260	1278	-18	-1	EKHART DITCH
580588	689	695	-6	-1	CLARKE BURKE DITCH
580649	1876	1870	6	0	FRANZ DITCH
580663	305	348	-43	-14	GREER DITCH
580847	383	442	-59	-15	SAND CREEK DITCH
580577	1021	1075	-54	-5	CAMPBELL DITCH
580915	940	979	-39	-4	UPPER ELK RIVER D
580714	1951	2016	-65	-3	KELLER DITCH
580662	1303	1327	-23	-2	GRAHAM + BENNETT D
580590	147	274	-127	-87	COLEMAN DITCH E
580604	199	317	-118	-59	DAY DITCH
580549	303	560	-258	-85	BORLAND VAIL DITCH
580917	444	520	-76	-17	VAIL SAVAGE DITCH
ADY_007	3152	3152	0	0	ADY_007_MiddleElkRiver

TABLE 5.3.2B (Continued)
Comparison Between Historical and Estimated Average Annual Diversion Volumes
Calculated Data Set (C) (acre-feet/year) 1975-1991

Gage ID	Historical	Estimated	Historical-Estimated		Gage Name
			Volume	Percent	
580568	1237	1264	-27	-2	BURNETT DITCH
580640	563	453	110	19	FIRST CHANCE DITCH
580599	976	1000	-24	-2	CULLEN DITCH NO 2
580695	512	352	160	31	HOT SPGS CR HIGHLINE D
581021	982	987	-6	-1	LEE IRRIGATION D
580626	2557	2619	-63	-2	ELK VALLEY D
580908	479	476	4	1	TRULL MORIN DITCH
580783	2773	2808	-36	-1	MORIN DITCH
580728	734	739	-5	-1	LARSON DITCH
580583	290	293	-4	-1	CHARLES H KEMMER D
580633	1087	1012	76	7	FELIX BORGHI D
ADY_008	2041	2041	0	0	ADY_008_LowerElkRiver
570584	622	636	-15	-2	SADDLE MTN DITCH
570579	831	852	-21	-3	R E CLARK DITCH
574629	1468	1006	463	31	RICH D
570555	784	560	224	29	LAST CHANCE DITCH
570561	588	404	183	31	MALE MOORE CO DITCH ENL
570517	655	459	196	30	DAVID M CHAPMAN DITCH
570576	473	467	6	1	ORNO DITCH
570635	1137	868	269	24	KOLL DITCH
570545	1091	868	224	20	HOMESTEAD DITCH
570513	188	208	-21	-11	CONNELL DITCH
570608	938	835	102	11	TROUT CK DITCH NO 3
570609	367	362	5	1	TROUT CREEK DITCH NO 2
570544	991	940	51	5	HIGHLAND DITCH
570525	682	609	73	11	EAST SIDE DITCH NO 2
570524	579	492	87	15	EAST SIDE DITCH
570623	903	836	67	7	WILLIAMS PARK DITCH
ADY_009	1499	1344	155	10	ADY_009_TroutCreek
570519	1034	1098	-64	-6	DENNIS AND BLEWITT D
570563	4090	3866	224	5	MARSHALL ROBERTS DITCH
570539	8868	9090	-222	-2	GIBRALTAR DITCH
ADY_010	501	501	0	0	ADY_010_YampaRnrHayden
570512	5025	5025	0	0	COLO UTILITIES D A PL
570622	2488	2493	-5	0	WILLIAMS IRRIG DITCH
570611	5588	5547	41	1	WALKER IRRIG DITCH
570592	8106	7673	433	5	SHELTON DITCH
570535	537	527	10	2	ERWIN IRRIGATING DITCH
570510	3371	3371	0	0	CARY DITCH CO DITCH

TABLE 5.3.2B (Continued)
Comparison Between Historical and Estimated Average Annual Diversion Volumes
Calculated Data Set (C) (acre-feet/year) 1975-1991

Gage ID	Historical	Estimated	Historical-Estimated		Gage Name
			Volume	Percent	
570508	1932	1913	18	1	BROCK DITCH
ADY_011	1457	1457	0	0	ADY_011_YampaRabvElkhead
440614	125	101	24	20	ELLIS A KITCHENS D
440533	150	138	12	8	ANDERSON DITCH
440699	888	874	14	2	MC KINLEY DITCH NO 1
440700	1493	1411	82	6	MC KINLEY DITCH NO 2
440770	106	104	1	1	STARR IRRIG DITCH
440763	1041	1145	-104	-10	SMITH DITCH
440724	1505	1713	-208	-14	NORVELL DITCH
ADY_012	1359	1189	170	13	ADY_012_ElkheadCreek
440589	5673	5652	22	0	DEEP CUT IRR D
440691	424	437	-13	-3	M DITCH
440647	840	574	266	32	HAUGHEY IRR DITCH
440681	340	235	105	31	LAMB IRR DITCH
440650	45	197	-152	-336	MESA HL BK COTWOOD PUMP
440998	474	359	116	24	DRY COTTONWOOD DITCH
440698	205	106	99	48	MC DONALD DITCH
440785	711	691	20	3	TIPTON IRR DITCH
440573	776	444	333	43	CATARACT DITCH
440612	641	321	320	50	ELKHORN IRR DITCH
440688	1684	1151	534	32	LITTLE BEAR DITCH
440511	2212	2389	-177	-8	WISCONSIN DITCH
440581	1582	1582	0	0	CRAIG WATER SUPPLY PL
440514	598	617	-18	-3	WOOLEY AND JOHNSON D
440821	383	440	-57	-15	MACK DITCH
440517	901	1427	-527	-58	YAMPA VAL STOCK BR CO D
440522	6441	6441	0	0	CRAIG STA D + PL
440527	585	608	-22	-4	AIR LINE IRR D
ADY_013	4846	4846	0	0	ADY_013_YampaRbelCraig
AMY_001	6732	6732	0	0	AMY_001_YampaRbelCraig
440607	2527	2050	477	19	EGRY MESA DITCH
440635	397	396	1	0	GRIESER DITCH
ADY_014	3692	3692	0	0	ADY_014_EFkWilliamsFork
440570	1470	1497	-27	-2	CARD DITCH
440601	696	706	-10	-1	DUNSTON DITCH
440740	604	576	28	5	RATCLIFF DITCH
440652	633	637	-3	-1	HIGHLAND DITCH
440585	457	466	-9	-2	CRYSTAL CK DITCH
440611	720	108	612	85	ELK TRAIL DITCH

TABLE 5.3.2B (Continued)
Comparison Between Historical and Estimated Average Annual Diversion Volumes
Calculated Data Set (C) (acre-feet/year) 1975-1991

Gage ID	Historical	Estimated	Historical-Estimated		Gage Name
			Volume	Percent	
440735	642	432	210	33	PINE CK DITCH
440661	512	509	2	0	J P MORIN DITCH
ADY_015	2173	2173	0	0	ADY_015_SFkWilliamsFork
440731	867	866	1	0	PECK IRRIG D
440765	654	693	-39	-6	SOUTH SIDE DITCH
440644	327	468	-142	-43	HARPER NO 1 DITCH
440645	108	102	7	6	HARPER NO 2 D
440790	963	942	22	2	UTLEY DITCH
440538	195	31	164	84	AVERILL DITCH
440572	184	30	155	84	CARRIGAN-AVERILL D
440638	263	80	183	70	HADDEN BASE DITCH
440812	364	71	293	81	HART DITCH
440748	177	70	107	61	ROBY DITCH NO 2
440747	153	63	90	59	ROBY D AKA ROBY D NO 1
440651	1439	1374	65	5	HIGHLAND DITCH
440628	334	118	215	65	GIBBONS WILSON A JORDAN
440593	285	151	134	47	DENNISON A MARTIN D
440590	1233	699	534	43	DEER CK A MORAPOS D
440716	159	247	-88	-56	MULLEN DITCH
440670	258	288	-31	-12	JOHN W KELLOGG NO 2 D
440814	410	483	-73	-18	HIGHLINE DITCH
ADY_016	3868	3868	0	0	ADY_016_WilliamsFork
440749	180	189	-9	-5	ROUND BOTTOM D NO 1
440751	61	275	-214	-351	ROUND BOTTOM DITCH
440613	305	469	-165	-54	ELLGEN DITCH
440806	311	354	-42	-14	ELLGEN NO 2 DITCH
440750	285	296	-10	-4	ROUND BOTTOM D NO 2
440692	1830	1370	461	25	MARTIN CK DITCH
440509	1167	915	251	22	WILSON DITCH
440587	1318	1080	238	18	D D FERGUSON D NO 2
440660	328	297	30	9	J A MARTIN DITCH
440518	280	144	136	49	YELLOW JACKET DITCH NO 1
440519	201	126	75	37	YELLOW JACKET DITCH NO 2
440586	1829	1748	81	4	D D AND E DITCH
440706	815	626	189	23	MILK CK DITCH
ADY_017	1592	691	901	57	ADY_017_MilkCrabvGSpring
440524	199	153	46	23	AQ NO 1 DITCH
ADY_018	4400	3937	463	11	ADY_018_MilkCreek
440675	3575	3755	-180	-5	JUNIPER MTN TUNNEL

TABLE 5.3.2B (Continued)
Comparison Between Historical and Estimated Average Annual Diversion Volumes
Calculated Data Set (C) (acre-feet/year) 1975-1991

Gage ID	Historical	Estimated	Historical-Estimated		Gage Name
			Volume	Percent	
440820	1013	1075	-62	-6	LOWRY SEELEY PUMP
440863	1661	1658	2	0	HENRY SWEENEY DITCH
440677	2335	2357	-22	-1	K DIAMOND DITCH
440729	1805	1792	13	1	PATRICK SWEENEY D
440830	1396	1380	16	1	OLD SWEENEY DITCH
440541	832	840	-8	-1	BAILEY DITCH
442214	110	348	-238	-216	BAILEY DITCH-UTAH INT.
440694	14292	13921	371	3	MAYBELL CANAL
ADY_019	2889	2889	0	0	ADY_019_YampaRnrMaybell
440702	2346	2422	-76	-3	MCINTYRE DITCH
440695	115	115	0	0	MAYBELL MILL PIPELINE
440711	912	918	-7	-1	MOCK DITCH
440828	450	449	2	0	MOCK DITCH NO 3
440723	950	947	2	0	NICHOLS DITCH NO 1
440778	1855	1871	-16	-1	SUNBEAM DITCH
440801	1401	1414	-13	-1	CROSS MTN PUMP GUESS
440583	3010	3041	-31	-1	CROSS MTN PUMP GROUNDS
440786	1806	1811	-5	0	TISDEL D NO 2
441122	333	602	-268	-81	VAUGHN PUMP
440584	2531	2554	-23	-1	CROSS MTN PUMP NO 1 + 2
440687	2987	2956	31	1	LILY PARK D NO 1
ADY_020	6350	5749	601	9	ADY_020_LSnakeRnrSlater
540532	1051	1010	41	4	HOME SUPPLY DITCH
540507	1162	1095	66	6	BEELER DITCH
540592	417	399	18	4	WILSON DITCH
540564	740	668	72	10	SALISBURY DITCH
540543	953	894	59	6	LUCHINGER DITCH
540548	1230	1117	114	9	MORGAN AND BEELER D
ADY_021	3135	2969	166	5	ADY_021_LSnakeRabvSlater
540570	482	619	-138	-29	SLATER PARK DITCH NO1
540571	273	197	77	28	SLATER PARK DITCH NO 2
540572	336	199	137	41	SLATER PARK DITCH NO 3
540574	591	406	185	31	SLATER PARK DITCH NO 5
540568	862	851	12	1	SLATER FORK DITCH
ADY_022	7198	6245	953	13	ADY_022_SlaterCreek
540549	638	882	-244	-38	MORGAN SLATER DITCH
990528	16526	16526	0	0	Cheyenne_City
990533	23452	23433	19	0	Wyoming_Irrig1
990534	23452	23452	0	0	Wyoming_Irrig2

TABLE 5.3.2B (Continued)
Comparison Between Historical and Estimated Average Annual Diversion Volumes

Calculated Data Set (C) (acre-feet/year) 1975-1991

Gage ID	Historical	Estimated	Historical-Estimated		Gage Name
			Volume	Percent	
990535	23452	23397	55	0	Wyoming_Irrig3
540554	497	695	-199	-40	PERKINS FOX DITCH
540591	2070	2166	-96	-5	WILLOW CK DITCH
540555	804	1174	-370	-46	PERKINS IRR DITCH
540583	2712	2898	-187	-7	TROWEL DITCH
540594	804	1139	-335	-42	WOODBURY DITCH
540531	2495	2939	-443	-18	HEELEY DITCH
ADY_023	17527	15260	2267	13	ADY_023_LSnakeabvDryGlch
550507	829	819	9	1	NINE MILE IRR DITCH
550508	737	733	4	1	NINE MILE IRR PL
550513	678	674	5	1	VISINTAINER DITCH
550504	691	726	-36	-5	ESCALANTA DITCH NO 2
550506	2117	2157	-40	-2	MAJORS DITCH NO 2
550537	1513	1551	-39	-3	LEFEVRE NO 1 PUMP
550519	637	703	-65	-10	RINKER DITCH
ADY_024	1552	1552	0	0	ADY_024_LSnakeRnrLily
AMY_003	696	694	2	0	AMY_003_LSnakeRnrLily
ADY_025	2373	2373	0	0	ADY_025_YampaR@DeerLodge
AMY_002	732	721	11	2	AMY_002_Yampa@Deerlodge
ADY_026	197	197	0	0	ADY_026_YampaR@GreenR
ADY_027	8061	7984	77	1	ADY_027_GreenRiver
Total	486,923	471,375	15,548	3	

TABLE 5.3.2C
Water Balance Summary
Calculated Data Set (C) (acre-feet/year)

Year	Inflow	Diversion	Return Flow	Reserv Evap	Outflow	Resvr Storage Change	Inflow - Outflow	CU
1975	1934638	441308	289752	13453	1769005	623	1	152751
1976	1448620	444967	308616	13363	1304826	-5921	0	150982
1977	599492	448433	317357	13270	456119	-972	0	144472
1978	2295434	496985	347805	14230	2118850	13174	1	162256
1979	2006687	490781	339153	14392	1842357	-1692	2	163864
1980	2138591	488264	343237	14391	1978917	255	1	161663
1981	1003844	444075	298662	14602	845071	-1242	0	159531
1982	2271733	426042	287463	14732	2106869	11551	2	156103
1983	2729337	391385	253835	14760	2578264	-1236	-1	149477
1984	3436094	404499	272054	14680	3289842	-871	-1	150265
1985	2568723	465897	315497	14792	2400829	2701	1	164129
1986	2714062	436154	296230	14839	2559090	209	0	156382
1987	1337524	474333	320907	14753	1172510	-3165	0	164562
1988	1549242	570406	401506	14722	1368434	-2816	2	185068
1989	1019179	558920	394765	15409	819877	19737	0	179234
1990	1078562	529400	369765	15852	895373	7701	1	174005
1991	1301561	496913	346800	16123	1128863	6462	1	166876
Ave	1849019	471104	323730	14610	1684417	2617	1	161272