SYNOPSIS

General

This year is the 52nd consecutive year that an Annual Operating Plans (AOP) has been prepared for the Federally-owned dams and reservoirs in the Niobrara, Lower Platte, and Kansas River Basins. The plan has been developed by the Water Operations Group in McCook, Nebraska for the 16 dams and reservoirs that are located in Colorado, Nebraska, and Kansas. These reservoirs, together with 9 diversion dams, 9 pumping plants, and 20 canal systems, serve approximately 265,411 acres of project lands in Nebraska and Kansas. In addition to irrigation and municipal water, these features serve flood control, recreation, and fish and wildlife purposes. A map at the end of this report shows the location of these features.

The reservoirs in the Niobrara and Lower Platte River Basins are operated by either irrigation or reclamation districts. The reservoirs in the Kansas River Basin are operated by either the Bureau of Reclamation (Reclamation), or the Corps of Engineers. Kirwin Irrigation District provides operational and maintenance assistance for Kirwin Dam. The diversion dams, pumping plants, and canal systems are operated by either irrigation or reclamation districts.

A Supervisory Control and Data Acquisition System (SCADA) located at McCook is used to assist in operational management of all 11 dams under Reclamation's jurisdiction that are located in the Kansas River Basin. A Hydromet system collects and stores near real-time data at selected stations in the Nebraska-Kansas Projects. The data includes water levels in streams, canals, and reservoirs and also gate openings. This data is transmitted to a satellite and downloaded to a Reclamation receiver in Boise, Idaho. The data can then be accessed by anyone interested in monitoring water levels or water usage in an irrigation system. The Nebraska-Kansas Projects currently has 109 Hydromet stations that can be accessed. The McCook Field Office has installed and maintains 55 Hydromet stations with plans to install more as time permits. When fully implemented, the projects will have a Hydromet station installed to provide real-time data on all reservoirs, most diversion dams, and most of the measuring structures in the irrigation systems. These stations can be found on the Internet by accessing Reclamation's home page at http://www.usbr.gov/gp. From the home page, select "Hydromet Data Center" under the Water Operations heading.

The Headlines 2004 that follows this synopsis is indicative of the awareness that the local people have of the natural resource development and conservation in the Niobrara, Lower Platte, and Kansas River Basins.

2004 Summary

Climatic Conditions

Precipitation at the project dams during 2004 ranged from 87 percent of normal at Davis Creek Dam to 142 percent of normal at Trenton Dam. Precipitation during the first four months of the year varied throughout the projects area. Precipitation totals were above normal at 9 of the 16 project dams, varying from 77 to 137 percent. Temperatures were generally well above normal during January and March and below normal in February. April brought weather that was generally drier than normal with temperatures averaging near to slightly above normal.

Precipitation during May and June was generally below normal throughout the basin. Only two project dams recorded above normal precipitation during May while six project dams were above normal in June. Precipitation totals for the first six months of the year were below normal at 14 of the 16 project dams, varying from 63 percent at Norton Dam to 125 percent at Lovewell Dam. Temperatures were above normal in May and averaged well below normal in June. July brought some much needed precipitation to the project reservoirs with only two dams having below normal precipitation for the month. Trenton and Enders Dams in southwest Nebraska recorded the highest July precipitation on record at the respective sites. Red Willow Dam recorded the second highest July precipitation total at the site. A few isolated thunderstorms in July did produce some localized short term runoff. The improvement turned out to be short lived as August precipitation was well below normal at all project dams with the exception of Merritt Dam. Precipitation during August was only 45 percent of normal over the projects. Temperatures in July were generally near to below normal throughout the projects area and near normal in August. Temperatures during September varied considerably while precipitation was generally above average throughout the projects.

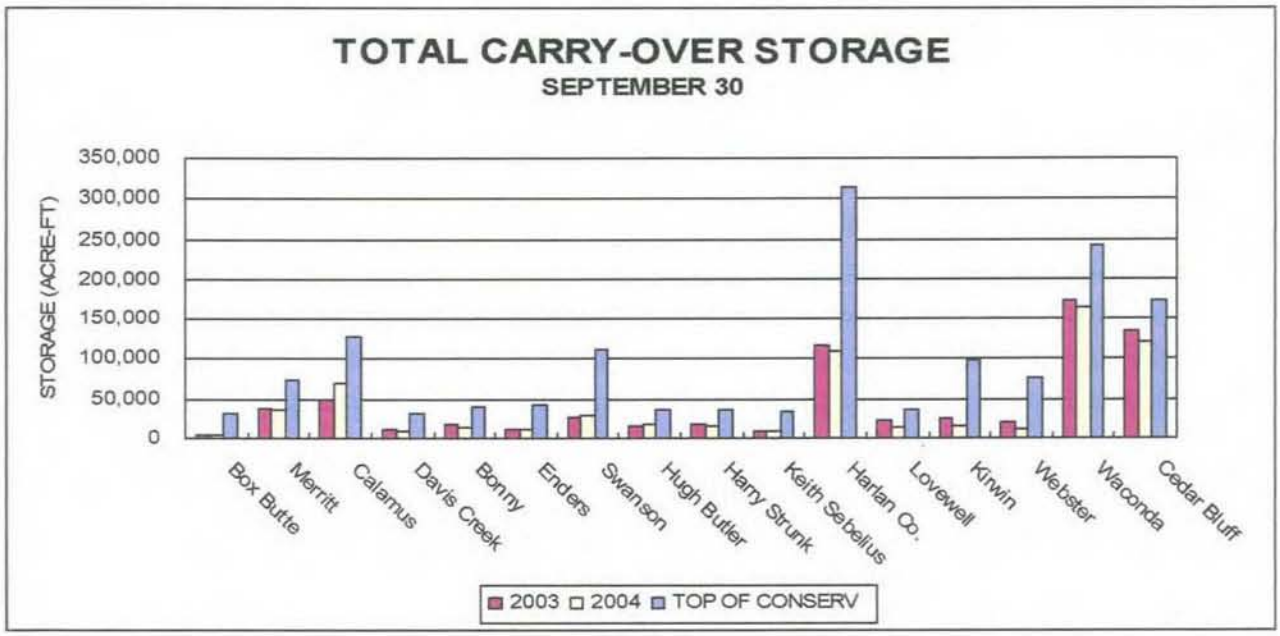
Total precipitation during October and November was generally above normal throughout the projects. Only six dams recorded below normal precipitation during October and only five during the month of November. Precipitation during December was well below normal at all project dams averaging only 17 percent of average. Temperatures averaged well above normal during October, November, and December.

Storage Reservoirs

1. Conservation Operations. The 2004 inflow was below the dry-year forecast at Box Butte, Bonny, Enders, Kirwin and Webster Reservoirs, and Swanson, Hugh Butler, Harry Strunk, Harlan County and Waconda Lakes. Merritt, Calamus, Davis Creek, Lovewell and Cedar Bluff Reservoirs along with Keith Sebelius Lake had inflows between the dry- and normal-year forecasts. None of the project reservoirs had inflows above the normal-year forecast.

Project reservoirs had below average carryover storage from the 2003 water year with the exception of Cedar Bluff Reservoir. Of the 12 project reservoirs in the Kansas River Basin, only Hugh Butler Lake and Lovewell Reservoir did not record below average inflows during all 12 months of 2004. Hugh Butler Lake recorded below average inflows during 11 months of 2004. Reservoir releases were made from Merritt and Virginia Smith Dams to maintain reservoir levels prior to the 2004 irrigation season. Just prior to the irrigation season, Enders, Kirwin, Webster and Box Butte Reservoirs, along with Keith Sebelius, Swanson, Hugh Butler, Harry Strunk and Harlan County Lakes, did not have sufficient storage to provide water users with a full water supply. Only Lovewell Reservoir had some flood storage occupied prior to the irrigation season. The high irrigation demand months of July and August significantly reduced storage in those project reservoirs that had storage available for irrigation. Precipitation during late July and August was of little help in reducing the demands on project reservoirs. Storage in the Kansas River Basin project reservoirs was below normal at the end of the irrigation season with the exception of Cedar Bluff Reservoir.

The following summarized graph shows a comparison of 2003 and 2004 carry-over storage conditions as compared to the top of conservation storage for all reservoirs in the Niobrara, Lower Platte, and Kansas River Basins as of September 30th.



2. Flood Control Operations. Lovewell Reservoir utilized flood pool storage in 2004. A flood release was made from Lovewell Reservoir from July $_8$th through July 19th to reduce pool levels. The fiscal year 2004 flood control benefits accrued by the operation of Reclamation's Nebraska-Kansas Projects facilities was $307,000 as determined by the Corps of Engineers. An additional benefit of $5,000 was credited to Harlan County Lake. The accumulative total of flood control benefits for the years 1951 through 2004 by facilities in this report total $1,872,447,000 (See Table 5). To date no benefits have been accrued by the operation of Box Butte, Merritt, Calamus, or Davis Creek Reservoirs.

A summary of precipitation, reservoir storage and inflows at Nebraska-Kansas Projects facilities can be found in Table 7.

Water Service

There was 277,458 acre-feet (AF) of water diverted to irrigate approximately 160,554 acres of project lands in the 12 irrigation districts (see Tables 3 and 6). The project water supply was either inadequate or limited for 169,024 acres of the total project lands. This includes lands in Mirage Flats, Frenchman Valley, H&RW, Frenchman-Cambridge, Almena, Bostwick in Nebraska, Kansas Bostwick, Kirwin and Webster Irrigation Districts. The project water supplies for the other units mentioned in this report were more than adequate in 2004.

The water requirements of three municipalities, one rural water district, and two fish hatchery facilities were furnished from storage releases or natural flows.

Irrigation Production

The 2004 crop yields on lands receiving project water in the Nebraska-Kansas Projects were higher than 2003 for five of the seven reporting districts. The average corn yield, the principal crop of all reporting districts, was 177 bushels per acre. This was approximately ten bushels per

acre more than in 2003. The average unit price of corn when harvested was lower than the previous year at approximately $2.10/bu. The start of irrigation releases from project reservoirs varied considerably depending on storage water available. Much of the growing season was cooler and drier than normal. Most districts experienced some relief from the dry conditions during the first part of July. Crop maturity progressed near normal during the growing season. Several irrigation districts had finished making irrigation releases by the first half of September. Nine canals did not divert water in 2004 as a result of extremely short water supplies. Nearly all irrigation districts had finished delivering water by the end of September with corn harvest commencing by mid October.

Fish and Wildlife and Recreation Benefits

The National Recreational Fisheries Policy declares that the Government's vested stewardship responsibilities must work in concert with the state managing agency's recreational fisheries constituency and the general public to conserve, restore, and enhance recreational fisheries and their habitats. As a result of this policy, Reclamation has developed fishery management guidelines for reservoirs within the Nebraska-Kansas Projects. These guidelines outline a program which considers public use, fisheries, fish habitat, and improved communication and coordination. The Nebraska-Kansas Area Office is available for meetings if requested with Nebraska, Colorado, and Kansas state management agencies to discuss the Annual Operating Plans (AOP). Information is solicited that will allow Reclamation the flexibility to enhance fisheries resources while still meeting contractual obligations with the various irrigation districts.

During the early part of the 2004 season, normal reservoir operations were favorable for recreation and fish and wildlife uses at most project reservoirs. Late in the season, irrigation operations substantially lowered the water levels of most reservoirs in the Kansas River Basin, limiting the recreation benefits. Normal summer drawdown due to irrigation releases did allow for late summer shoreline revegetation.

Re-authorization of the North Loup Project by the Act of October 18, 1986 [Public Law 99-591, Section 101(e)] authorized the construction of a fish hatchery below Virginia Smith Dam and Calamus Reservoir. The hatchery was constructed under Public Law 89-72 and a cost-sharing agreement with the Nebraska Game and Parks Commission (Commission) with 75 percent federal and 25 percent state funds. Administration of construction was accomplished by the Commission; construction began in July 1989, and was completed in September 1991. The hatchery consists of an office/visitor center, laboratory, 2 residences, a shop and feed storage building, 51 rearing ponds lined with VLDPE and covering 45.5 acres, 24 concrete raceways, 2 lined effluent ponds, 8 groundwater wells, a 36-inch diameter buried pipeline from Virginia Smith Dam, a groundwater degassing tank, and a computerized monitoring and alarm system. The hatchery is operated and maintained by the Commission and in full operation should produce about 53 million fish per year. The water supply is provided by natural flows passed through Virginia Smith Dam and from Calamus Reservoir storage through an agreement dated July 28, 1988, between the Commission and the Twin Loups Reclamation District.

HEADLINES 2004

Farmers anxious about impact of Republican River settlement

McCook Daily Gazette
Bureau of Reclamation to build new office in McCook

Lower Republican NRD irrigators uneasy with Compact compliance

Impact of scaled-back irrigation may not be as grim as expected

Toxic algae blamed on drought

New water law faces challenges

NRD meetings seek input on Compact plans

Irrigation district members to vote on state water lease

Governor, local NRD committee talk about compliance issues

Heavy snow helps; won't end drought

Republican
State issues warnings on Enders, other lakes

Nebraska looks at conserving water by paying farmers not to pump

Water levels at Harlan County Lake reason for concern

Republican River Compact compliance
State faces 2007 deadline

Farm leaders seek drought aid

NRD adopts water regulations

Irrigators study strategies

Model links ground, surface water

Water shortage still is a major concern for 2004

Area lakes showing slow improvement

BY GLORIA MASONER

Salt cedar sucks up precious water

New water-shortage strategies are foreseen

CHAPTER I – INTRODUCTION

Purpose of This Report

This AOP advises water users, cooperating agencies, and other interested groups or persons of the actual operations during 2004 and serves as a guideline for the 2005 operations. This report also describes the responsibilities of Reclamation, Corps of Engineers, and the irrigation and reclamation districts in the Niobrara, Lower Platte, and Kansas River Basins.

Operational Responsibilities

Reclamation is responsible for irrigation operations at all federal reservoirs in the Nebraska-Kansas Projects. Reclamation is also responsible for the operation and maintenance (O&M), safety of the structure, and reservoir operations not specifically associated with regulation of the flood control storage at the reservoirs constructed by Reclamation. Regulation of the flood control storage is the responsibility of the Corps of Engineers. In addition to irrigation and flood control, these reservoirs provide recreation, fish and wildlife, and municipal benefits.

By contractual arrangements with Reclamation, the irrigation or reclamation districts in the Niobrara, Lower Platte, and Kansas River Basins are responsible for the O&M of the canals and irrigation distribution facilities constructed or rehabilitated by Reclamation. In addition, the appropriate irrigation or reclamation districts are responsible for operating and maintaining Box Butte, Merritt, Virginia Smith and Davis Creek Dams. The Corps of Engineers operates and maintains Harlan County Dam and Lake. The state of Colorado provides operational guidelines for Bonny Reservoir. Operational guidelines for Cedar Bluff Reservoir will be provided by the State of Kansas. Reclamation operates and maintains 11 dams and reservoirs in the Republican, Solomon, and Smoky Hill River Basins. Under a contract with Reclamation, Kirwin Irrigation District performs certain operational and maintenance functions at Kirwin Dam.

An updated Field Working Agreement was executed on July 17, 2001 between the Corps of Engineers and Reclamation regarding operation of Harlan County Dam and Lake. The agreement provides for a sharing of the decreasing water supply into Harlan County Lake. Storage capacity allocations were redefined based on the latest sediment survey (2000) and a procedure was established for sharing the reduced inflow and summer evaporation among the various lake uses.

The states of Nebraska, Colorado, and Kansas are responsible for the administration and enforcement of their state laws pertaining to the water rights and priorities of all parties concerned with the use of water. The states are also responsible for administering the water surface activities and the federal lands around the reservoir. The U.S. Fish and Wildlife Service administers the water surface activities and most of the federal lands at Kirwin Reservoir.

Reclamation cooperates with all state agencies and compact commissions to ensure that all operations are in compliance with state laws and compact requirements.

Tables and Exhibits

Records for the facilities reported in the AOP are included as tables and exhibits and are located following page 35.

Water Supply

For forecasting purposes, values of annual inflows that will be statistically equaled or exceeded 10, 50, and 90 percent of the time were selected from the probability data to be reasonable maximum (wet year), most probable (normal year), and reasonable minimum (dry year) inflow conditions, respectively.

Inflow records from 1985 through 2004 were used for the analysis of reservoirs in the Niobrara, Lower Platte and Kansas River Basins, with the exception of Calamus and Davis Creek Reservoirs. The more recent available record of 1986 through 2004 was used for Calamus Reservoir. Davis Creek Reservoir is an off-stream storage facility with only 6.3 square miles of drainage area. Inflow to Davis Creek Reservoir is supplied by diversions from Calamus Reservoir and the North Loup River.

Reservoir Operations

All operations are scheduled for optimum benefits of the authorized project functions. Monthly, or as often as runoff and weather conditions dictate, Reclamation evaluates the carry-over storage and estimated inflow at each reservoir to determine whether excess water is anticipated. If excess inflow is apparent, controlled releases will be made to maximize the downstream benefits, including flood control.

Major Features

The Mirage Flats Project was constructed under the Water Conservation and Utilization Act and includes an irrigation storage reservoir, diversion dam, and canal system. The other features discussed in this report are all a part of the Pick-Sloan Missouri Basin Program and include single and multipurpose reservoirs, diversion dams, pump stations, and canal systems. The 16 storage facilities now in operation are listed below.

Constructed by Reclamation

1. Operated by irrigation or reclamation districts--Box Butte and Merritt Dams in the Niobrara River Basin and Virginia Smith and Davis Creek Dams in the Lower Platte River Basin.

2. Operated by Reclamation--Bonny, Trenton, Enders, Red Willow, Medicine Creek, Norton, Lovewell, Kirwin, Webster, Glen Elder, and Cedar Bluff Dams in the Kansas River Basin. A contract provides for Kirwin Irrigation District to perform certain operational and maintenance functions at Kirwin Dam.

Constructed and Operated by the Corps of Engineers

1. Harlan County Dam in the Kansas River Basin.

Irrigation and Reclamation Districts

Twelve irrigation districts and one reclamation district in the Niobrara, Lower Platte, and Kansas River Basins have contracted with Reclamation for water supply and irrigation facilities. The Twin Loups Irrigation District has contracted their O&M responsibilities to the Twin Loups Reclamation District. Bostwick Irrigation District in Nebraska has contracted their O&M responsibilities for Courtland Canal between the headgates and the Nebraska-Kansas state line to Kansas Bostwick Irrigation District.

The contracted irrigation season for the Mirage Flats Irrigation District is April through September. The contracted irrigation season for Frenchman Valley, H&RW and Frenchman-Cambridge Irrigation Districts is from May 1 st through October 15 th or such additional period from April 1 st through May 1 st of each year as determined between the District and Reclamation. The contracted irrigation season for Almena, Bostwick in Nebraska, Kansas-Bostwick and Twin Loups Reclamation District is May 1 st through September 30 th or such additional period from April 1st through November 15 th of each year as determined between the District and Reclamation. For all other districts, the contracted irrigation season is from May 1 st through September 30th.

Long Term Water Service Contract Renewal

The renewal of the long term water service contracts with Frenchman-Cambridge, Kansas Bostwick, Nebraska Bostwick, and Almena Irrigation Districts was completed in 2000. The districts negotiated the conversion of their water service contracts to repayment contracts with a 40 year repayment period. These contracts were signed July 25, 2000 and confirmed in District Court. These contracts became effective January 1, 2001. These contracts include provisions that provide for water supply and distribution works reserve funds, water conservation commitments to improve efficiencies, environmental commitments, and provisions for irrigation policies/deliveries to help preserve lake levels.

The renewal of the long term water service contract with Frenchman Valley Irrigation District was completed in 2000. The district negotiated the renewal of their water service contract that includes a 40 year term. The contract was signed July 25, 2000 and was confirmed in District Court. The contract became effective January 1, 2001. This contract includes provisions that provide for a water supply reserve fund, water conservation commitments to improve efficiencies, environmental commitments, and provisions for irrigation policies/deliveries to help preserve lake levels.

The new contracts require that Reclamation meet with the districts listed above prior to March 1 st of each year for an annual water operations meeting. Discussions include the previous year's water operations season, the upcoming year's water supplies, historic water supplies and delivery efficiencies and potential water conservation measures.

The renewal of the long term water service contracts with Kirwin Irrigation District No. 1 and Webster Irrigation District No. 4 was completed in 2002. The districts negotiated the conversion of their water service contracts to repayment contracts with a 40 year repayment period. The repayment contracts were signed on June 20, 2002 and became effective January 1, 2003.

The long-term water service contract with the Ainsworth Irrigation District (AID) will expire December 31, 2006. The AID notified Reclamation that on February 16, 2005, the Board approved a motion to request renewal of the AID contract with Reclamation. The process for renewing the long term water service contract with AID will begin in the spring of 2005. The AID is currently working to secure a four year extension to their existing water service contract to ensure an uninterrupted water supply to the District during the renewal process.

Municipal Water

Three municipalities and one rural water district have executed water service contracts for full or supplemental water supplies.

Fish and Wildlife

The State of Kansas is presently using the fish hatchery facility below Cedar Bluff Reservoir for waterfowl habitat. The Calamus Fish Hatchery located below Calamus Reservoir is operated by the State of Nebraska for fish production.

State of Colorado Division of Wildlife

The Colorado Division of Wildlife provides operational guidelines for Bonny Reservoir. The entire conservation pool storage was purchased by the State of Colorado on June 24, 1982.

State of Kansas Department of Wildlife and Parks

The State of Kansas acquired the use and control of portions of the conservation capacity at Cedar Bluff Reservoir following the reformulation of the Cedar Bluff Unit in October of 1992. The City of Russell's existing water storage right and contract with the United States remained unchanged.

Power Interference Considerations

A Power Interference Agreement exists between Reclamation, the Twin Loups Reclamation District, and the Loup River Public Power District. Provisions of this agreement will be incorporated into the 2005 operations.

Environmental Considerations

A "Statement of Operational Objectives" for Harlan County Lake sets forth the general operational objectives and the specific reservoir uses that are desirable. The operational objectives indicate that fish and wildlife interests are best served by high reservoir levels with minimum fluctuations, and regulation of the outflow in excess of the minimum desired flows. Although the statement recognizes flood control and irrigation as primary purposes, it indicates that comprehensive operational plans should be developed for maximum integration of the secondary uses.

These objectives are also considered in the operation of all Reclamation reservoirs in the Kansas River Basin, Niobrara River Basin, and the Lower Platte River Basin. The regulated outflow will also benefit farmers, ranchers, cities, and other interests below the reservoirs.

Republican River Compact – Kansas v. Nebraska

On May 26, 1998, Kansas filed a petition with the U. S. Supreme Court complaining that Nebraska had violated the Republican River Compact by using more than its share of the Republican River water supply. On November 15, 1999, the Supreme Court appointed Vincent L. McKusick as the Special Master for the case. The three original parties to the Compact; Kansas, Nebraska and Colorado, became parties to the case. Because all of the major water development structures in the Republican River Basin were constructed by the Bureau of Reclamation and the Corps of Engineers, the United States was allowed to participate as an *amicus curiae*. After negotiations were completed the Final Settlement Stipulation was signed by each respective governor and attorney general and was filed with the Special Master on December 16, 2002.

On May 19, 2003, the United States Supreme Court approved the settlement and dismissed the case. On June 30, 2003, the three States reached agreement on the Republican River Compact Administration groundwater model. The model will be used to quantify groundwater consumptive use as part of the compact's accounting process. The settlement provides for a moratorium on new groundwater wells, special rules for administration of water during water-short years, protection of storage releases, minimized flood flow effects on the accounting, recognition by Nebraska of a 1948 priority date for the Kansas-Bostwick Irrigation District, inclusion of the impacts of groundwater pumping from tableland wells in the accounting, and accounting for all reservoirs 15 acre-feet and larger within the river basin.

With the support of Kansas and Nebraska, Reclamation completed an Appraisal Study which analyzed system improvement alternatives in the lower portion of the basin that would provide for more efficient use of the water supply. This study was completed in 2004 and distributed to interested parties in February of 2005. The study met requirements of the Final Settlement Stipulation by investigating system improvements in the Basin, including measures to improve the ability to utilize the water supply below Hardy, Nebraska. This study also met the responsibilities of the Republican River Compact by investigating the most efficient use of the water of the Republican River Basin for multiple purposes. The Stipulation also required that the States, in cooperation with the United States, form a Conservation Committee and by April 30, 2004, develop a proposed study plan to determine the quantitative effects of non-federal reservoirs and land terracing practices on water supplies in the Republican River Basin above Hardy, Nebraska. The Study Plan supported by the three states, the Natural Resources Conservation Service, and Reclamation was completed and signed on April 28, 2004. Cooperative agreements for completing the five year study were developed between Reclamation, the University of Nebraska-Lincoln (UNL), and Kansas State University. Installation of data loggers on 35 reservoirs throughout the basin was completed in 2004. More detailed monitoring equipment for terraces and additional reservoirs will be installed by UNL in the spring of 2005.

Water-Short Year Administration will be in effect in those years in which the projected or actual irrigation supply is less than 119,000 acre feet of storage available for use from Harlan County Lake as determined by Reclamation. It was determined in 2004 that a "Water-Short Year Administration" was in effect.

Emergency Management

The Nebraska-Kansas Area Office (NKAO) continued to coordinate with local jurisdictions that could potentially be impacted by flooding from large operational releases and/or dam failure. Five tabletop exercises were conducted during calendar year 2004 and orientation

meetings were held for all of the NKAO dams. Tabletop exercises were held for the Bonny Dam Emergency Action Plan (EAP), Enders Dam EAP, Lovewell Dam EAP, Kirwin Dam EAP, and the Webster Dam EAP. Emergency radios have been installed at all dams. These radios will be used as a backup means of communication when notifying the local emergency management officials in the event of an emergency at the dam. Both the Nebraska-Kansas Area Office and the McCook Field Office have a satellite phone that can be used in an emergency. Management and the dam operators have been trained on the use of these phones.

There was one internal alert declared at NKAO projects in 2004. At Enders Dam, an Internal Alert was declared after a small depression was found near the outlet works stilling basin. The cause of the depression is still being investigated. An internal alert at Virginia Smith Dam is still in effect until the repairs of the spillway drainage system are complete. The repair contract is scheduled for the fall of 2005.

Two functional exercises and three table top exercises are planned in 2005. EAP orientation meetings will be held at all NKAO dams. A program of annual meetings with local law enforcement and the facility managers has been established. Risk assessments were conducted for Trenton, Lovewell and Glen Elder Dams in 2004. The risk assessment process for the remaining 11 dams will begin in 2005. Site security plans for each dam are scheduled to be written in 2005.

Public Safety Reviews

NKAO continues the ongoing safety reviews of project facilities to identify potential safety hazards to the public and operating personnel. During 2004, NKAO combined the Safety Reviews of the major facilities with the Dam Safety Facility Reviews. This format provided for input from both the Area Safety Manager, and teams of Dam Safety Specialists. Some recommendations included enhanced confined space signage, expand the public knowledge of safety issues around our facilities, and provide training to employees regarding some of the new OSHA requirements for record keeping.

NKAO was again involved with emergency personnel at several sites, specifically to brief them on special and unique considerations at our facilities. Many of these visits were required as part of a contracting process when a major construction job was to be conducted at that facility.

In order to ensure facility accessibility, reliability and safety, additional focus was placed on compliance with accessibility standards. Specialists from the Denver Technical Center performed four accessibility evaluations at public access sites at four different reservoirs. These evaluations were comprehensive, and set out specific suggestions as to improvements at public facilities. These evaluations will continue throughout 2005.

During the planning stages of the NKAO Annual Safety Training, an informational letter, and invite was sent to all of the water users within the NKAO jurisdiction. This letter included some safety tips, an invitation to the Annual Safety Training, and promoted the utilization of Reclamation when developing or maintaining safety programs for the water districts.

Particular attention was directed at awareness of issues concerning West Nile Virus. Employees were given information related to protection, and identification of this virus.

The NKAO continues to monitor compliance of the Life Safety Code at all applicable facilities. A new simplified code assessment tool was developed during FY 2004 in conjunction with the Regional Office and will be very helpful, during FY 2005, to reevaluate the facilities with the NKAO jurisdiction.

Facility Reviews, Maintenance and Construction

Comprehensive Facility Reviews were conducted at Enders, Trenton, Lovewell, Box Butte and Glen Elder Dams during 2004. Annual Site Inspections were conducted at the other ten NKAO dams in 2004.

Associated Facility Reviews were conducted in 2004 for the following canal systems: Almena, Culbertson, Culbertson Extension, Meeker-Driftwood, Red Willow, Bartley, Cambridge, Kirwin and Osborne.

Technical surveys were completed at Kirwin, Lovewell, and Glen Elder Dams in 2004.

Construction of a new Reclamation office building in McCook, Nebraska began in June of 2004. The new building will replace the existing structure built more than 70 years ago. Construction is expected to be completed in May 2005.

Security enhancements continue at NKAO dams.

Video inspections of the toe drain systems at Trenton and Glen Elder Dams were attempted with varying degrees of success during 2004. A program to examine all of our toe drain systems was initiated in 2001.

CHAPTER II - NIOBRARA AND LOWER PLATTE RIVER BASINS

Mirage Flats Project in Nebraska

General

Flows in the Niobrara River along with Box Butte Reservoir storage provide a water supply for the 11,662 acre Mirage Flats Project. From 1995 to 2004, the project water supply averaged 12,500 AF, which is about 1.07 acre-foot per irrigable acre. Many irrigators supplement their water supply with private wells.

The Mirage Flats Irrigation District cooperates with the Nebraska Game and Parks Commission (Commission) by operating the Box Butte Dam outlet works gate and the Dunlap Diversion Dam gates in a manner to avoid sudden large changes in the flows of the Niobrara River. A 30-year agreement was made in 1990 between the district and the Commission whereby the district would not draw the reservoir water level below elevation 3978.00 feet (2,819 AF). In return the district received an up-front payment which was used to improve the efficiency of the project's delivery system. On March 17, 2000, the district agreed to increasing the minimum reservoir level by one additional foot to elevation 3979.00 feet (3,244 AF). In return the district received an additional payment from the Commission for the 20 years left on the original agreement.

A data collection platform (DCP) was installed in May of 1992 to monitor the reservoir elevation and outflow at Box Butte Dam. A telephone (primary communication system) and a radio (backup communication system) have been installed at the outlet works for contacting the Region 23 Emergency Management Agency.

2004 Summary

The flows of the Niobrara River plus the carry-over storage in Box Butte Reservoir were not adequate to provide a full water supply for the project lands. Precipitation at the Mirage Flats Irrigation District Office totaled 16.15 inches, which is 94 percent of normal. The 2004 total inflow of 12,527 AF was below the dry-year forecast and the second lowest ever recorded at Box Butte Reservoir.

From mid July through early September, diversions of 8,553 AF to the Mirage Flats Canal provided irrigation water for approximately 11,092 acres, 95 percent of the service available acreage. The farm deliveries from the project water supply totaled 3,490 AF (0.31 acre-foot per irrigable acre), which is a delivery efficiency of 41 percent. Total reservoir storage was only 3,479 AF at the end of the irrigation season. Privately owned irrigation wells supplemented the project water supply.

The Standing Operating Procedures (SOP) for Box Butte Dam was updated and republished in May 2004.

An orientation meeting to review the Box Butte Dam EAP took place in May 2004 and a Comprehensive Facility Review of Box Butte Dam was conducted in August.

The Mirage Flats Irrigation District continued to implement water conservation measures as outlined in their Water Management Plan and their Long Range Plan. The district continued to

assist irrigators with delivery improvements that provide on-farm efficiency improvements, such as relocation of turnouts, burying pipe for better access, and on-farm efficiency incentives. The district continues to modify and update their computer software to improve system operations, scheduling, and accounting and continued development of their web page that allows irrigators to place water orders, review water accounts, and keep updated on district operations. The district continues to develop and expand on the canal automation and remote monitoring system.

Ainsworth Unit, Sandhills Division in Nebraska

General

Within the Ainsworth Irrigation District, there are 34,539 acres with service available. The project water supply is provided by storage of Snake River flows in Merritt Reservoir. The reservoir is filled each fall after the irrigation season to elevation 2944.0 feet. This level is approximately two feet below the top of conservation capacity and within the repaired area of soil cement on the upstream face of the dam. The reservoir is regulated to maintain this level until the ice clears each spring. Maintaining the reservoir at this elevation during the winter will help avoid ice damage to the older existing soil cement at lower elevations. Upon ice-out the outlet pipe is drained, inspected, and repaired as necessary. The reservoir will then be rapidly filled to elevation 2946.0 feet to reduce shoreline erosion around the reservoir and minimize sand accumulations on the face of the dam. This filling process generally takes place in April. The reservoir level is maintained until irrigation releases begin to draw on the pool around mid May. A minimum release of 75 cubic feet per second (cfs) should be made to the river during spring filling operations if at all possible. This operation enhances the spring fish spawn. Seepage, pickup and toe drain flow normally result in flows of up to 15 cfs below Merritt Dam. Whenever possible, daily changes in releases to the river should be made in no more than 50 cfs increments. This will minimize adverse impacts on the Snake River trout fishery downstream of the dam.

The district has a basic water supply. If available, additional water can be purchased by the district as a supplemental supply.

2004 Summary

Precipitation, as recorded near Merritt Dam, totaled 24.21 inches, which was 120 percent of normal. February precipitation was the highest on record for the month. The inflow for the year totaled 180,572 AF. This inflow was between the dry- and normal-year forecasts. The water supply was more than adequate to meet the project's irrigation requirement. There were 84,275 AF diverted from Merritt Reservoir into Ainsworth Canal, with 54,164 AF delivered to the farm headgates (delivery efficiency of 64 percent). There were 34,031 acres of land irrigated in 2004.

The district executed several temporary water service contracts which provided a total of 552 AF of irrigation water from holding ponds located within the district's service area.

An orientation meeting to review the Merritt Dam EAP and on-site dam operator training took place in May 2004.

North Loup Division in Nebraska

General

The North Loup Division is located in the Loup River drainage basin. Water is diverted from both the Calamus and North Loup Rivers for the irrigation of approximately 55,000 acres of

project lands. Operation of the division will also provide a sustained groundwater supply for an additional 17,000 acres. Principal features of the division include Virginia Smith Dam and Calamus Reservoir, Calamus Fish Hatchery, Kent Diversion Dam, Davis Creek Dam and Reservoir, five principal canals, one major and one small pumping plant and numerous open ditch and buried pipe laterals.

Calamus Reservoir is normally regulated at three to four feet below the top of conservation capacity during the winter months. Maintaining the reservoir at this elevation during the winter will help avoid ice damage to the soil cement on the upstream face of the dam. After the ice clears in the spring, the reservoir will be filled to conservation capacity. The North Loup Division project operation is restricted to no water diversions from the Calamus and North Loup Rivers during the months of July and August, and also during the month of September whenever sufficient water is available in storage reservoirs to deliver canal design capacity. During this time, inflows to Calamus Reservoir are required to be bypassed under the Power Interference Agreement between Reclamation, the Twin Loups Reclamation District, and the Loup River Public Power District and as required in the authorizing legislation.

Davis Creek Reservoir will be regulated near elevation 2048.0 feet following the irrigation season and throughout the winter months. This carry-over elevation provides a minimal recreational pool while reducing increases in groundwater storage due to reservoir seepage. The reservoir is filled via Mirdan Canal, starting in April and reaching full content by the end of June. A 160-acre recreation area adjoining the reservoir was constructed and is managed by the Lower Loup Natural Resources District. The area includes a boat ramp, a handicapped fishing pier, a day-use area, a primitive camping area, shelter and a hiking path. Kent Diversion Dam is also open to day-use fishing with handicapped accessibility provided.

2004 Summary

Precipitation at Virginia Smith Dam was 20.86 inches which is 88 percent of normal. The inflow totaled 249,768 AF which was between the dry- and normal-year forecasts. There were 84,616 AF of water released into Mirdan Canal and 26,842 AF diverted through Kent Canal from the North Loup River. A total of 51,880 AF was diverted for district use above Davis Creek Reservoir. The farm headgate delivery was 28,343 AF which is a delivery efficiency of 55 percent. Land irrigated in 2004 totaled 33,932 acres above Davis Creek Reservoir. Reservoir inflows were bypassed during July, August, and September as required. The reservoir elevation at the end of the year was at 2238.37 feet. The Calamus Fish Hatchery used bypassed natural flows and storage from Calamus Reservoir totaling 7,091 AF during 2004.

The precipitation of 20.58 inches near Davis Creek Dam was 87 percent of normal. Inflow to Davis Creek Reservoir totaled 51,783 AF during 2004. Beginning in mid April, Davis Creek Reservoir was filled from an elevation of approximately 2048.5 feet to a peak elevation of 2075.97 feet on June 28th using diversions from the North Loup River and Calamus Reservoir. A release of 43,729 AF was made from Davis Creek Dam into Fullerton Canal, with 26,658 AF delivered to the farm headgates (61 percent delivery efficiency). There were 20,847 acres irrigated below Davis Creek Reservoir. The reservoir elevation at the end of 2004 was near the normal wintering level at 2048.63 feet.

On-site dam operator training was conducted in May at Virginia Smith Dam.

An orientation meeting to review the Virginia Smith Dam and Davis Creek Dam EAPs took place in December 2004.

Data collection platforms (DCPs) were installed in the spring of 2004 along the Mirdan Canal system to allow for remote monitoring at key delivery system sites to improve operations, scheduling, and accounting. The newly installed stations include Kent Canal, Mirdan Canal below Virginia Smith Dam, Mirdan Canal above Davis Creek Dam, and Fullerton Canal below Davis Creek Dam. Real-time data from these stations can be found on the Internet by accessing Reclamation's home page.

In December of 2002, the irrigation district reported a small depression along the right side of the river outlet works stilling basin wall at Virginia Smith Dam. Safety of Dams personnel in both Denver and Billings were notified and discussions were conducted with the Technical Service Center. Investigations determined that a problem existed with the under-drain system in the outlet works stilling basin. Gravel material beneath the outlet works chute structure and stilling basin was being transported creating a void. Reclamation personnel drilled holes into the floor of the structure and filled the voids and under-drain system with grout. Grouting was completed in March of 2003. Investigations then began on the under-drain system at the spillway stilling basin because of the similarity to the outlet works system. A risk analysis of the spillway chute and stilling basin under-drain system was completed in September 2003. The risk analysis recommends that the drain system under the spillway basin be grouted. Grouting was originally scheduled to start in October of 2004 but was delayed due to a contract default for construction of bulkheads needed to dewater the basin. Grouting of the drains is expected to begin in September 2005.

CHAPTER III - REPUBLICAN RIVER BASIN

Armel Unit, Upper Republican Division in Colorado

General

Normal reservoir operations for Bonny Reservoir are primarily for recreation and fish and wildlife support, although water will be available for water right administration and irrigation purposes.

Bonny Reservoir inflows from the South Fork of the Republican River and Landsman Creek are released into Hale Ditch as requested by the Colorado State Engineer. The state will make Bonny storage water available to Hale Ditch and other natural flow appropriators under short-term water service contracts. Most of the 700 acres served by Hale Ditch are now owned and operated by the Division of Wildlife, Colorado Department of Natural Resources.

The normal operation pattern of Bonny Reservoir, with a slowly rising or stable pool, enhances fish spawning in the spring and provides excellent fishing opportunities during the summer and hunting conditions each fall.

Toe drains were added at Bonny Dam in 1988 and 1994 to address Safety of Dams concerns. These drains were constructed to minimize the potential for dam failure due to piping when the reservoir elevation exceeds 3691.0 feet.

2004 Summary

The annual precipitation total of 15.60 inches at Bonny Dam was 90 percent of normal. The annual computed inflow of 5,390 AF to Bonny Reservoir was below the dry-year forecast and the lowest ever recorded at this site. Below normal inflows were recorded during every month of the year. January, February, March, April, and June inflows were the lowest on record for the respective months since first filling. The reservoir level was 15.1 feet below the top of conservation at the first of the year. Due to dry conditions during the first four months of the year, the reservoir level only increased 0.5 foot to a maximum reservoir level of 3657.39 feet on May 6th. Bonny Dam recorded a maximum one day precipitation total of 1.34 inches overnight on July 1st. The reservoir level gradually decreased throughout the remainder of the year. A new historical low reservoir elevation of 3654.39 feet was recorded on December 23rd. The reservoir elevation at the end of the year was 17.6 feet below the top of conservation at 3654.42. The Corps of Engineers determined that $4,000 in flood prevention benefits were realized from the operation of Bonny Reservoir during 2004.

The Colorado Water Commissioner did not direct reservoir inflows from the South Fork of the Republican River and Landsman Creek to be passed through Bonny Reservoir into Hale Ditch. Likewise, the Colorado Department of Natural Resources did not request storage releases for irrigation purposes into Hale Ditch.

A tabletop exercise of the Bonny Dam EAP took place in April 2004 and the Annual Site Inspection of Bonny Dam was conducted in June.

Frenchman Unit, Frenchman-Cambridge Division in Nebraska

General

The Culbertson Canal and the Culbertson Extension Canal systems serve 9,295 acres in the Frenchman Valley Irrigation District and 11,695 acres in the H&RW Irrigation District. The water supply for these lands is furnished by flows from Frenchman and Stinking Water Creeks and off-season storage in Enders Reservoir located on Frenchman Creek, a tributary of the Republican River in southwest Nebraska. Irrigation releases are conveyed via Frenchman Creek from Enders Reservoir to Culbertson Diversion Dam. Reclamation maintains/clears this section of Frenchman Creek prior to the irrigation season each spring.

The normal operation of Enders Reservoir, with the gradual rise in water surface during the spring months, provides desirable fish spawning conditions. Irrigation releases will normally deplete the conservation storage by late summer, thereby limiting the fishing and recreational usage.

Construction of a filtered drainage collection pipe and monitoring system in the existing open drain below Enders Dam was completed in the spring of 2002. This Safety of Dams modification was deemed necessary to control seepage and improve the level of safety, ensuring the continuation of project benefits and public safety downstream from the dam. The installation of additional piezometer wells was completed in 1999 and data collection was initiated. Several years of data collection will likely be necessary to better evaluate the need for additional modifications. The need for additional corrective measures was evaluated in conjunction with the 2004 Comprehensive Facility Review, and it was determined that no further risk reduction measures were justified at this time.

2004 Summary

The annual precipitation total of 22.77 inches at Enders Dam was above normal (120 percent). The 2004 inflow into Enders Reservoir of 4,876 AF was below the dry-year forecast. This inflow was the lowest ever recorded at the site. Seven of the twelve months recorded record low inflows during 2004. Due to extensive groundwater pumping above the reservoir, the inflow was only eight percent of the average historical preconstruction runoff at the Enders Dam site (60,700 AF from 1929-1947). This year was the 37 th consecutive year with below-normal inflows in which the conservation pool did not fill. The reservoir level was 26.5 feet below the top of conservation at the first of the year. The reservoir pool gradually increased with late winter and spring inflows peaking at 3087.07 feet (25.2 feet below the top of conservation) on May 1 st. This was the lowest annual peak since initial filling of the reservoir. Due to the extremely low water

supply available, no water was released from Enders Reservoir. The greatest 24-hour precipitation total recorded during the year at Enders Dam was 1.66 inches overnight on July 22 nd. July precipitation (7.44 inches) was the greatest precipitation total ever for the month. The end of the year reservoir level was 26.0 feet below the top of conservation. The Corps of Engineers determined that $5,000 in flood prevention benefits were realized from the operation of Enders Reservoir during 2004.

The Frenchman Valley Irrigation District reports that approximately 2,048 acres received water in 2004 from natural flow diversions from Frenchman Creek. Farm delivery averaged about 0.26 foot per irrigable acre in the Irrigation District. Some farmers were able to supplement their project water supply from private irrigation wells. Farm delivery efficiency was 28 percent for the district. The H&RW Irrigation District did not divert water into Culbertson Extension Canal in 2004 due to the extremely low water supply. This was the third consecutive year that the district did not deliver water. H&RW Irrigation District storage water in Enders Reservoir was carried over into 2005.

In August, a small depression was discovered near the outlet works stilling basin at Enders Dam. An Internal Alert remains in effect until investigations to the cause of the depression are completed. Reclamation has installed instrumentation in the area to collect additional data. Investigations and additional analysis are scheduled in 2005.

A Comprehensive Facility Review of Enders Dam was conducted in 2004 and repairs and resurfacing of the spillway bridge deck was completed.

An orientation meeting to review the Enders Dam EAP took place in July and a tabletop exercise of the EAP was conducted in October.

The spillway stilling basin was lowered to facilitate the investigation of the small depression found near the outlet works. A total of 76 AF was conserved by pumping back seepage into the reservoir that was collected in the spillway stilling basin.

In 2004, the district (along with Reclamation) again provided support for a Limited Irrigation Demonstration Project with the University of Nebraska Extension Service. The demonstration site was located just east of Culbertson and demonstrated various irrigation strategies with a short water supply.

Meeker-Driftwood, Red Willow, and Cambridge Units, Frenchman-Cambridge Division in Nebraska

General

During the spring months, Swanson, Hugh Butler, and Harry Strunk Lakes normally have a rising or stable pool which enhances the spawning of northern pike and walleye. These lakes provide excellent opportunities for fishing, water sports, and recreation.

Service is provided for Frenchman-Cambridge Irrigation District by Meeker-Driftwood Canal to 16,562 acres; Red Willow Canal to 4,877 acres; Bartley Canal to 6,435 acres; and Cambridge Canal to 17,297 acres. The water supply for these lands is provided by storage in Swanson, Hugh Butler, and Harry Strunk Lakes, and inflows of the Republican River and Red Willow and Medicine Creeks. The Frenchman-Cambridge Irrigation District has replaced all of the open laterals which were physically or economically feasible with pipe laterals which has significantly increased both system and on-farm efficiencies.

2004 Summary

The annual precipitation total of 28.43 inches at Trenton Dam was 142 percent of normal, the third greatest annual precipitation total ever recorded. The inflow of 12,714 AF to Swanson Lake was well below the dry-year forecast. This was the lowest annual computed inflow ever recorded at the lake exceeding the previous low by nearly 1,700 AF. The inflow was below normal for all twelve months. Precipitation during July (10.94 inches) was the greatest ever recorded at the dam for the month. The reservoir level began the year approximately 24.2 feet below the top of conservation pool. The reservoir level gradually increased during the spring and summer and peaked at 2730.20 feet on July 26th (approximately 21.8 feet below full). This was the lowest annual peak since first filling of the reservoir. Due to the extremely low water supply available, no water was released from Swanson Lake. Irrigation diversions were not made into Meeker-Driftwood or Bartley Canals. This was the second consecutive year that the district did not deliver water from the two canals. At the end of the year the reservoir level was 22.5 feet below the top of conservation at 2729.49 feet. The Corps of Engineers determined that $3,000 of flood damages were prevented by the operation of Swanson Lake.

The annual precipitation total of 21.70 inches at Red Willow Dam was 110 percent of normal. The greatest precipitation event recorded at Red Willow Dam in 2004 was 1.36 inches overnight on July 4th. Precipitation during July totaled 6.58 inches, the second highest ever recorded for the month. The annual inflow of 9,632 AF into Hugh Butler Lake was below the dry-year forecast and the second lowest ever recorded at the site. The computed inflow for eleven of the twelve months was below normal. February, March, May, and June computed inflows were the lowest ever recorded for the respective month. The reservoir level at the first of the year was 15.9 feet below the top of conservation. Inflows gradually increased the level of the reservoir to a peak of 2568.80 feet (13.0 feet below full) on August 2". Releases were not made from Hugh Butler Lake

in 2004 due to the extremely low water supply available. Irrigation diversions were not made into Red Willow Canal for the second consecutive year. The level of Hugh Butler Lake at the end of the year was 13.2 feet below the top of conservation, the fifth lowest end of year storage ever recorded. The Corps of Engineers determined that $3,000 of flood damages were prevented by the operation of Hugh Butler Lake.

The annual precipitation total of 24.66 inches at Medicine Creek Dam was 120 percent of normal. The inflow of 28,707 AF was below the dry-year forecast and the lowest annual total ever recorded. The computed inflow was below normal during all twelve months with record lows recorded during February, March, October and November. The reservoir level at the beginning of 2004 was 9.5 feet below the top of conservation. The reservoir pool gradually increased into late June peaking at 2363.91 feet on June 29th (2.2 foot below full). Medicine Creek Dam recorded over 6 inches of precipitation in July. Irrigation releases began on June 20th and were shut off on September 3rd with nearly 23,700 AF of water released from the reservoir for irrigation. The Nebraska Department of Natural Resources directed that some reservoir inflow be bypassed into Medicine Creek for livestock watering in 2004. Releases were made from June 1st through June 14th and again on September 17th. The greatest 24-hour precipitation event recorded at Medicine Creek Dam was 1.89 inches overnight on September 28th. Harry Strunk Lake was 9.8 feet below the top of conservation at the end of the year. The Corps of Engineers determined that the reservoir prevented $16,000 in flood damages.

The water supply was limited with 21,964 AF of water diverted to irrigate 15,192 acres of land served by the Cambridge Canal (farm delivery efficiency was 52 percent).

An EAP orientation meeting took place in August of 2004 for Red Willow, Medicine Creek and Trenton Dams. A Comprehensive Facility Review was conducted in October at Trenton and Annual Site Inspections were conducted at Red Willow and Medicine Creek Dams in 2004.

The Standing Operating Procedures for Red Willow and Medicine Creek Dams were republished in 2004.

In 2004, the district (along with Reclamation) continued to provide support for a Limited Irrigation Demonstration Project with the University of Nebraska Extension Service. The demonstration site was located just north of Holbrook and demonstrated various irrigation strategies with a short water supply. The project received water from the Cambridge Canal and a field day was well attended. The district continued working with Reclamation on a remote monitoring program. The program allows the district to remotely monitor wasteways and other key system measurement sites helping improve system operations and accounting.

Almena Unit, Kanaska Division in Kansas

General

Service is available to 5,764 acres in the Almena Irrigation District. The project water supply is provided by Prairie Dog Creek flows and Keith Sebelius Lake storage.

The water service contract for the City of Norton, Kansas, provides for a maximum annual use of 1,600 AF from Keith Sebelius Lake.

2004 Summary

The annual precipitation at Norton Dam totaled 23.11 inches, which is 93 percent of normal. The total inflow of 3,704 AF was between the dry- and normal-year forecasts. The reservoir level was 16.9 feet below the top of conservation on December 31, 2003. Late winter and spring inflows gradually increased the reservoir level to a peak elevation of 2287.99 feet on April 15th (16.3 feet below full pool). The greatest 24-hour precipitation event occurred overnight on July 30th with 1.71 inches recorded. Approximately 6.9 inches of rain was recorded at the dam during July. Irrigation releases were not made from the reservoir in 2004. Keith Sebelius Lake was 17.9 feet below the top of conservation (2286.38 feet) at the end of the year. The Corps of Engineers determined that the reservoir prevented $4,000 in flood damages.

The city of Norton used 539 AF of municipal water during 2004.

An Annual Site Inspection was conducted at Norton Dam in May and an orientation meeting to review the Norton Dam EAP took place in September 2004.

A Safety of Dams recommendation was made in 2000 concerning the seepage through the left abutment and around the outlet works house at Norton Dam. Technical Service Center personnel inspected the seepage areas in June 2001 and recommended consideration of monitoring improvement and additional instrumentation. A final issue evaluation report of findings (Technical Memorandum ND-8312-2) in 2003 concluded that the assessed risks for seepage and piping through the foundation in the left abutment falls in the range of "justification to take action to reduce risk." Topographic surveys and additional instrumentation were installed near the outlet works in 2004. Plans and specifications are scheduled to be completed in 2005.

Franklin, Superior-Courtland, and Courtland Units, Bostwick Division in Nebraska and Kansas

General

Harlan County Lake storage and Republican River flows provide a project water supply for 22,935 acres in the Bostwick Irrigation District in Nebraska, and 13,378 acres in the Kansas-Bostwick Irrigation District No. 2 above Lovewell Reservoir. These flows, together with White Rock Creek flows and Lovewell Reservoir storage, furnish a water supply for 29,122 acres below Lovewell Reservoir in the Kansas-Bostwick Irrigation District.

The lands in the Franklin and Superior-Courtland Units are in the Bostwick Irrigation District in Nebraska. The lands in the Courtland Unit downstream of the Kansas state line are in the Kansas-Bostwick Irrigation District.

In accordance with the off-season flow alternative outlined in Reclamation's final environmental assessment dated December 16, 1983, and amended on November 21, 2002, Harlan County Lake releases will be 10 cfs during the months of December, January, and February, except when the reservoir is at low levels. During water-short years releases for these three months will be either zero or 5 cfs depending on reservoir levels. At the request of the State of Nebraska, releases of 30 cfs for a maximum 5-day period may be made to relieve icing conditions in the river.

Natural gain in streamflow, plus irrigation return flows, and operational bypass at Superior-Courtland Diversion Dam will provide some flow downstream.

The Kansas Department of Wildlife and Parks has requested that the Kansas-Bostwick Irrigation District and Reclamation maintain, when possible, a flow of 20 cfs into Lovewell Reservoir when the Courtland Canal is in operation and the conservation pool is below capacity. This recommended inflow provides excellent fishing around the canal inlet to the reservoir. The seepage below Lovewell Dam into White Rock Creek maintains a small live stream throughout the year.

2004 Summary - Bostwick Division - Harlan County Lake Operations

The annual precipitation at Harlan County Dam totaled 22.83 inches of rainfall, which is 100 percent of normal. The 2004 inflow of 25,099 AF was below the dry-year forecast and the lowest ever recorded. The inflow was below normal for all twelve months with record lows recorded during February, March, April, May, June, and October. A release was not required during January, February or December in accordance to the environmental assessment and the annual operating plan.

Harlan County Lake began 2004 approximately 19.4 feet below the top of conservation pool, at 1926.34 feet. Inflows during the first five months of the year slowly increased the reservoir pool to a peak of 1926.96 feet on May 23 rd (top of conservation pool is elevation 1945.73 feet). Harlan County Dam recorded 1.31 inches of rain overnight on September 22 nd (the greatest one day total in 2004). Due to the extremely low water supply available, no water was released from Harlan County Lake. This was the first time since deliveries began in the early 50's that irrigation deliveries were not made from the lake. The reservoir level continued to decline throughout the remainder of the year. A new historical low reservoir elevation of 1925.44 was recorded on December 26 th. The level of Harlan County Lake at the end of 2004 was 1925.44 feet (20.3 feet below the top of conservation). Harlan County Lake prevented $5,000 of downstream flood damages during 2004 according to the Corps of Engineers.

A total of 14,130 AF (approximately 46 percent of total inflow) was delivered to Lovewell Reservoir through the Courtland Canal.

2004 Summary - Bostwick Division - Nebraska

The Bostwick Irrigation District in Nebraska diverted 5,800 AF of natural flows for the irrigation of 3,127 acres on Superior Canal. Farm delivery efficiency averaged 25 percent in the district. Irrigation diversions were not made into Franklin, Naponee, Franklin Pump, or Courtland Canal in Nebraska in 2004.

The district continued to replace open ditch laterals with buried pipe to reduce losses and improve system operations. In 2004 the district again applied a canal sealant on the Superior Canal to reduce seepage losses.

2004 Summary - Bostwick Division - Kansas

The 2004 precipitation at Lovewell Dam totaled 30.73 inches, which was 113 percent of normal. Lovewell Reservoir began 2004 with a water surface elevation only 2.6 feet below the top of conservation. Inflows from White Rock Creek and diversion of Republican River flows via Courtland Canal slowly increased the reservoir level to within .9 foot of full pool by mid February. Diversion of Republican River flows into Lovewell Reservoir were discontinued on February 19th and resumed March 22nd. The diversions combined with inflows from White Rock Creek to fill the reservoir conservation pool on March 29 th (elevation 1582.6 feet), and in filling the reservoir to an elevation of 1584.20 feet on May 17 th. Releases were made into the lower Courtland Canal beginning on May 13 th to season the canal and maintain the reservoir level. A strong storm system stalled out over Lovewell Reservoir on the evening of July 1st dropping 2.35 inches of precipitation overnight. The reservoir pool increased 0.4 foot as a result of the storm, peaking at elevation 1584.10 feet (1.5 feet into the flood pool). Lovewell Dam recorded another 2.79 inches of rainfall from July 7th through July 9th. Runoff from these storms increased the reservoir level to

1584.7 feet with a peak average daily inflow of 650 cfs. A flood release of 200 cfs began on July 5 from Lovewell Dam and was gradually staged down and discontinued on July 19th, reducing the pool to elevation 1583.0 feet. Irrigation demands reduced the pool elevation to 1573.02 feet on August 29th. The pool elevation was maintained below the spillway crest (elevation 1573.0 feet) until mid December while a construction contract to rehabilitate the spillway and outlet works gates was completed. The reservoir was credited with preventing $113,000 in flood damages as determined by the Corps of Engineers. Diversions of Republican River natural flows into Lovewell Reservoir continued after the completion of the contract and were maintained throughout the remainder of December. The water surface elevation gradually increased to 1574.30 feet on December 31, 2004 (8.3 feet below the top of active conservation).

The Kansas-Bostwick Irrigation District diverted a total of 33,402 AF to serve 1,107 acres above Lovewell Dam and 23,034 acres below Lovewell Dam. Farm delivery efficiency averaged 47 percent in the district.

A major construction contract was completed at Lovewell Dam in December 2004. It involved the painting of all metal work in the spillway and outlet structure and rehabilitation of the spillway and outlet works gates.

A Comprehensive Facility Review of Lovewell Dam was conducted in September and a tabletop exercise of the Lovewell Dam EAP took place in October.

In 2004 the district continued to replace open ditch laterals with buried pipe. The district and Reclamation also provided assistance to Kansas State University (KSU) for a sprinkler irrigation demonstration located northeast of Courtland, Kansas. Courtland Canal supplies water for this demonstration and a field day was held at the site in the fall. The district is also providing support to KSU for the installation of a sub-surface drip irrigation project. In the fall of 2004, the District began to replace open ditch lateral 41.4 with buried pipe. This project should be completed in the spring of 2005. This project eliminates lateral seepage losses, eliminates a wasteway, and provides on-farm benefits by allowing land owners the opportunity to convert to sprinkler irrigation. The District is also planning on replacing open ditch lateral 48.9 with buried pipe in the spring/fall of 2005.

CHAPTER IV - SMOKY HILL RIVER BASIN

Kirwin Unit, Solomon Division in Kansas

General

The water supply for the 11,465 acres of land in the Kirwin Irrigation District is furnished by Kirwin Reservoir storage and inflows from the North Fork Solomon River and Bow Creek.

The operation of Kirwin Dam and Reservoir affords many opportunities for recreation, fishing, hunting, water sports, fish spawning, and preservation of waterfowl species.

2004 Summary

The annual precipitation total of 21.51 inches at Kirwin Dam was 92 percent of normal. The inflow of 4,009 AF was below the dry-year forecast and the second lowest ever recorded at the site. Kirwin Reservoir was 20.8 feet below the top of conservation pool at the first of the year. The reservoir level gradually increased to a peak elevation of 1708.81 feet (20.4 feet below full) on March 9th. Irrigation releases began on June 20 th and continued through August 20th reducing the pool level 6.2 feet. August precipitation (.13 inch) was the lowest ever recorded for the month. During 2004, 7,937 AF was released into Kirwin Canal. The reservoir level continued to gradually decrease following the irrigation season and by the end of the year was at 1702.05 feet (27.2 feet below the top of conservation). The greatest 24-hour precipitation event occurred overnight on July 28th with 1.80 inches recorded. The reservoir was credited with preventing $9,000 in flood damages as determined by the Corps of Engineers.

The water supply was inadequate to meet diversion requirements for Kirwin Canal. A total of 6,464 acres received project water during 2004 with 3,154 AF delivered to farms. Farm delivery efficiency was 40 percent.

Major concrete repairs were performed by Reclamation personnel at the Kirwin Dam spillway. The effort was concentrated on the downstream row of dentates. Additional repairs still need to be completed on the upstream row of spillway blocks. This work will be scheduled in future years.

An Annual Site Inspection of Kirwin Dam was conducted and exercise of the Kirwin Dam EAP took place in March 2004. On-site dam operator training was conducted in January.

The district continued to replace problem sections of open ditch laterals with buried pipe in 2004. The district also replaced a number of smaller laterals by relocating field delivery points which provided on-farm improvements, eliminated the need for lateral maintenance in the areas and improved water accounting with the use of flowmeters. Kirwin Lateral S-8.0 buried pipe project was completed in the spring of 2004. This project improved delivery service and allowed one landowner to convert from furrow to sprinkler irrigation. In the fall of 2004, the District also replaced the remaining open ditch section of lateral 13.1 with buried pipe.

Webster Unit, Solomon Division in Kansas

General

The Webster Irrigation District has service available to 8,537 acres. The project water supply is provided by Webster Reservoir storage and flows of the South Fork Solomon River.

2004 Summary

In 2004, the precipitation at Webster Dam was 91 percent of normal (21.47 inches). The inflow of 4,033 AF was below the dry-year forecast and the lowest ever recorded at the site. Webster Reservoir began 2004, 21.3 feet (elevation 1871.12 feet) below the top of conservation pool. The reservoir pool gradually increased to a peak elevation of 1871.29 feet (21.2 feet below full) on March 5th. Irrigation releases began on July 20th and continued through August 19th reducing the pool level to 1865.92 feet. August precipitation (.98 inch) was the fourth lowest ever recorded for the month. Approximately 6,932 AF was released for irrigation. Webster Dam received 1.20 inches of rainfall overnight on September 22nd, the greatest 24-hour precipitation event during the year. The Corps of Engineers determined that the reservoir prevented $5,000 in flood damages. The reservoir level continued to decline during the final four months of the year and was 27.2 feet below the top of conservation on December 31, 2004.

The district diverted 4,253 AF for irrigation of 3,145 acres. Farm deliveries totaled 1,569 AF for an efficiency of 37 percent. Project water demands were not met in full.

An Annual Site Inspection of Webster Dam was conducted in May and a tabletop exercise of the Webster Dam EAP took place in July. The Standing Operating Procedures for Webster Dam were updated and republished in 2004.

A special inspection was done on the spillway counterweights at Webster Dam in 2004. Prior facility examinations had documented cracks in the metal supporting the concrete counterweights. The cracking has reached a point where repairs are needed to correct the problem.

The district continued to explore opportunities to cost share with Reclamation and district irrigators for the replacement of open ditch laterals with buried pipe.

Glen Elder Unit, Solomon Division in Kansas

General

Releases from Waconda Lake will be regulated as outlined in two memorandums of understanding between the State of Kansas and Reclamation. Releases are made for the city of Beloit, the Mitchell County Rural Water District, the long-term water service contract with Glen Elder Irrigation District, and for water right administration.

The water service contract with Beloit, Kansas, provides for the annual use of up to 2,000 AF of Waconda Lake storage. Water is measured at the Glen Elder Dam river outlet works. In any year that the city's water supply is insufficient and there is surplus water in Waconda Lake, such additional water may be released for the city at a rate of $15.00 per acre-foot.

The water service contract with the Mitchell County Rural Water District No. 2 provides for 1,009 AF of storage water as available from Waconda Lake. Based on the current State of Kansas Certificate of Appropriation, water usage is not to exceed 737 AF per calendar year.

The water service contract with the Glen Elder Irrigation District provides for the use of up to 18,000 AF of storage water each year. Based on the current State of Kansas Certificate of Appropriation, water usage is not to exceed 15,170 AF per calendar year. Water is released and measured through the river outlet works.

The available facilities along the shores of Waconda Lake and the large water surface area afford opportunities to thousands of people for picnics, sightseeing, recreation, water sports, hunting, and fishing.

When compatible with flood control operations, the operating criteria for Waconda Lake provide for a stable or rising pool level during the fish spawning period each spring.

When possible, Waconda Lake will be allowed to fill during the late summer and early fall to flood exposed shoreline vegetation. This flooded aquatic vegetation is very beneficial to waterfowl management.

Waconda Lake will normally be regulated at one to two feet below the top of conservation capacity during the winter months. Maintaining the lake at this level will reduce shoreline erosion, provide a buffer for spring runoff and lessen ice damage to the upstream face of Glen Elder Dam. Releases from Waconda Lake will be regulated each year to maintain a constant water surface level while the lake is ice-covered.

2004 Summary

The annual precipitation total of 24.41 inches at Glen Elder Dam was 95 percent of normal. The inflow of 49,217 AF was below the dry-year forecast. Waconda Lake began the year only 4.4 feet below the top of conservation. Dry conditions and minimal inflows prevailed throughout most of the year. The lake level peaked at elevation 1452.19 feet on July 31 st (3.4 feet below the top of conservation). This was the lowest annual peak since first filling of the reservoir. Irrigation releases began on May 6 th and continued through September 20 th reducing the lake level to 1450.75 feet. Glen Elder Dam recorded 3.61 inches of precipitation from July 5 th through July 9th Runoff from these storms increased the storage in Waconda Lake by over 11,000 AF, with a peak average daily inflow of approximately 2,100 cfs. The Corps of Engineers determined Waconda Lake prevented $142,000 in flood damages. On December 31, 2004 the lake level was 1450.32 feet (5.3 feet below full). The end of December storage was the lowest ever recorded for the month since initial filling.

A total of 20,853 AF of water was released from Glen Elder Dam in 2004. Storage releases of 6,991 AF combined with natural flow releases of 5,646 AF for the irrigation of 6,535 acres in the Glen Elder Irrigation District. Four individual temporary water service contracts received storage water totaling 289 AF for the irrigation of approximately 274 acres. Storage releases totaling 1,027 AF were made for the City of Beloit, with an additional 6,179 AF bypassed for quality control as directed by the State Water Commissioner. Releases to the Mitchell County Rural Water District No. 2 totaled 721 AF.

An orientation meeting to review the Glen Elder Dam EAP took place in July 2004 and a Comprehensive Facility Review of Glen Elder Dam was conducted in September.

A construction contract was completed for spillway concrete repairs in the Glen Elder Dam spillway. Repairs were completed on the concrete downstream of the spillway drain outlets.

A new perimeter drain system was installed by contract at the Cawker City sewer lagoon in 2004.

Cedar Bluff Unit, Smoky Hill Division in Kansas

General

Cedar Bluff Reservoir storage furnishes a maximum of 2,000 AF each year for the City of Russell, Kansas when required. Prior to 1993, Cedar Bluff Reservoir storage and Smoky Hill River flows had provided a water supply for 6,800 acres in the Cedar Bluff Irrigation District. No water had been available for delivery to the district since 1978. Reformulation of the Cedar Bluff Unit in October of 1992 allowed the Cedar Bluff Irrigation District to begin the proceedings to disband, and the Kansas Water Office and Kansas Department of Wildlife and Parks to acquire the use and control of portions of the reservoir conservation capacity. The district completed all activities necessary to accomplish disbandment in 1994. A "designated operating pool" has been established for Cedar Bluff Reservoir and includes the following sub allocation pools: The City of Russell's existing water storage right which remained unchanged (2,700 AF); an artificial recharge pool under control of the Kansas Water Office (5,110 AF); and a fish, wildlife and recreation pool under control of the Kansas Department of Wildlife and Parks (21,061 AF). A "joint-use pool" has been established between the operating pool and the flood control pool for water supply, flood control, environmental and fish, wildlife and recreation purposes. Water rights for the "joint-use pool" are held jointly between the Kansas Department of Wildlife and Parks and the Kansas Water Office. A Contract Administration Memorandum between the United States of America, represented by Reclamation, the State of Kansas and the City of Russell was signed in November/December of 2003, establishing a continuous accounting procedure for water storage in Cedar Bluff Reservoir.

2004 Summary

The annual precipitation total at Cedar Bluff Dam was 19.51 inches which is 92 percent of normal. The inflow (10,496 AF) was between the dry- and normal-year forecasts. At the beginning of the year, the level of Cedar Bluff Reservoir was 2137.31 feet (top of active conservation is 2144.00 feet). Dry conditions and minimal inflows prevailed during the late winter and spring months. The peak reservoir level recorded during the year was 2137.32 feet on March 1st. Above normal precipitation was recorded during June and July with the greatest 24-hour precipitation event occurring overnight on June 17th with 2.99 inches of rainfall. The reservoir gradually decreased throughout the remainder of the year and by December 31, 2004, the reservoir level had decreased to 2134.93 feet (9.1 feet below the top of active conservation). Cedar Bluff Reservoir was estimated to have prevented $3,000 in flood damages by the Corps of Engineers.

The State of Kansas used the fish hatchery facility located below Cedar Bluff Dam for waterfowl habitat with 227 AF released to the facility. Water was not released from Cedar Bluff Reservoir during 2004 for the City of Russell.

An Annual Site Inspection of Cedar Bluff Dam was conducted in May and an orientation meeting to review the Cedar Bluff Dam EAP took place in October 2004.

TABLE 1

RESERVOIR DATA - NIOBRARA, LOWER PLATTE AND KANSAS RIVER BASINS
CAPACITY ALLOCATIONS 1/

RESERVOIR		LIVE CONSERVATION DEAD	Inactive	Active	FLOOD CONTROL
Box Butte	- Elevation Ft.	3969.0	3976.5	4007.0	---
	Total Acre-feet	640	2,275	31,060	---
	Net Acre-feet	640	1,635	28,785	---
Merritt 4/	- Elevation Ft.	2875.0	2896.0	2946.0	---
	Total Acre-feet	774	4,662	66,726	---
	Net Acre-feet	774	3,888	62,064	---
Calamus	- Elevation Ft.	2185.0	2213.3	2244.0	---
	Total Acre-feet	817	24,646	127,400	---
	Net Acre-feet	817	23,829	102,754	---
Davis Creek	- Elevation Ft.	1998.5	2003.0	2076.0	---
	Total Acre-feet	76	172	31,158	---
	Net Acre-feet	76	96	30,986	---
Bonny	- Elevation Ft.	3635.5	3638.0	3672.0	3710.0
	Total Acre-feet	1,418	2,134	41,340	170,160
	Net Acre-feet	1,418	716	39,206	128,820
Enders	- Elevation Ft.	3080.0	3082.4	3112.3	3127.0
	Total Acre-feet	7,516	8,948	42,910	72,958
	Net Acre-feet	7,516	1,432	33,962	30,048
Swanson Lake	- Elevation Ft.	2710.0	2720.0	2752.0	2773.0
	Total Acre-feet	2,118	12,430	112,214	246,291
	Net Acre-feet	2,118	10,312	99,784	134,077
Hugh Butler Lake	- Elevation Ft.	2552.0	2558.0	2581.8	2604.9
	Total Acre-feet	5,185	8,921	36,224	85,070
	Net Acre-feet	5,185	3,736	27,303	48,846
Harry Strunk Lake	- Elevation Ft.	2335.0	2343.0	2366.1	2386.2
	Total Acre-feet	4,160	8,859	35,705	88,420
	Net Acre-feet	4,160	4,699	26,846	52,715
Keith Sebelius Lake	- Elevation Ft.	2275.0	2280.4	2304.3	2331.4
	Total Acre-feet	1,636	3,993	34,510	133,740
	Net Acre-feet	1,636	2,357	30,517	99,230
Harlan County Lake 3/	- Elevation Ft.	1885.0	1927.0	1945.73	1973.5
	Total Acre-feet	0	118,099	314,111	814,111
	Net Acre-feet	0	118,099	196,012	500,000
Lovewell	- Elevation Ft.	1562.07	1571.7	1582.6	1595.3
	Total Acre-feet	1,674	11,644	35,666	86,131
	Net Acre-feet	1,674	9,970	24,022	50,465
Kirwin	- Elevation Ft.	1693.0	1697.0	1729.25	1757.3
	Total Acre-feet	4,969	8,515	98,154	313,290
	Net Acre-feet	4,969	3,546	89,639	215,136
Webster	- Elevation Ft.	1855.5	1860.0	1892.45	1923.7
	Total Acre-feet	1,256	4,231	76,157	259,510
	Net Acre-feet	1,256	2,975	71,926	183,353
Waconda Lake	- Elevation Ft.	1407.8	1428.0	1455.6	1488.3
	Total Acre-feet	248	26,237	219,420	942,408
	Net Acre-feet	248	25,989	193,183	722,988
Cedar Bluff	- Elevation Ft.	2090.0	2107.8	2144.0	2166.0
	Total Acre-feet	4,402	28,574	172,452	364,342
	Net Acre-feet	4,402	24,172	143,878	191,890
Total Storage (A.F.)		36,889	274,340	1,475,207	3,909,611 2/
Total Net Acre-feet		36,889	237,451	1,200,867	2,357,568

1/ Includes space tor sediment storage.
2/ Includes total active storage for Box Butte, Merritt, Calamus, and Davis Creek Reservoirs.
3/ Bottom of irrigation pool for Harlan County Lake is 1932.5 feet, 164,111 AF.
4/ New Area-Capacity Tables in effect 1-1-05. Sedimentation survey conducted in June 2003.

TABLE 2
SUMMARY OF 2004 OPERATIONS
MIRAGE FLATS PROJECT

BOX BUTTE RESERVOIR — MIRAGE FLATS CANAL

Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content (AF)	Diversions To Canal (AF)	Delivered To Farms (AF)
Jan.	908	61	61	0.29	7,681	0	0
Feb.	1,234	58	83	0.19	8,774	0	0
Mar.	1,396	61	159	0.57	9,950	0	0
Apr.	1,382	71	276	1.44	10,985	0	0
May	1,179	79	343	1.43	11,742	0	0
June	409	71	450	2.43	11,630	0	0
July	202	4,336	380	2.95	7,116	4,375	1,449
Aug.	708	4,149	252	0.62	3,423	3,989	1,964
Sep.	1,436	121	172	3.95	4,566	189	77
Oct.	1,334	61	145	1.81	5,694	0	0
Nov.	1,165	60	88	0.42	6,711	0	0
Dec.	1,174	61	56	0.05	7,768	0	0
TOTAL	12,527	9,189	2,465	16.15	–	8,553	3,490

NOTE -- Acres irrigated 2004: Mirage Flats Canal - 11,092 acres.

SANDHILLS DIVISION
AINSWORTH UNIT

MERRITT RESERVOIR — AINSWORTH CANAL

Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content (AF)	Release To Canal (AF)	Delivered To Farms (AF)
Jan.	14,101	14,132	240	0.20	68,560	0	0
Feb.	14,274	13,140	305	1.33	69,389	0	0
Mar.	16,505	11,833	435	1.83	73,626	0	0
Apr.	13,581	12,841	740	1.67	73,626	0	0
May	14,812	12,978	1,261	3.72	74,199	4,300	330
June	13,416	12,375	1,327	3.91	73,913	6,046	1,044
July	14,798	32,420	1,449	3.38	54,842	29,423	20,106
Aug.	15,007	33,219	916	2.42	35,714	30,530	22,124
Sep.	16,996	16,937	688	3.45	35,085	13,976	10,560
Oct.	17,421	2,690	535	1.31	49,281	0	0
Nov.	16,275	893	395	0.96	64,268	0	0
Dec.	13,386	8,231	313	0.03	69,110	0	0
TOTAL	180,572	171,689	8,604	24.21	–	84,275	54,164

NOTE - Acres irrigated 2004: Ainsworth Canal - 34,031 acres.

NORTH LOUP DIVISION
CALAMUS RESERVOIR — ABOVE DAVIS CREEK MIRDAN CANAL

Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content (AF)	Release to Calamus Fish Hatch. (AF)	Release to Canal (AF)	Canal Use (AF)	Delivered To Farms (AF)
Jan.	20,521	5,839	410	0.00	101,926	343	0	0	0
Feb.	19,233	3,663	562	0.85	116,934	330	0	0	0
Mar.	22,194	19,200	1,046	2.43	118,882	434	0	0	0
Apr.	20,426	10,060	1,745	1.26	127,503	591	0	0	0
May	22,427	20,616	1,862	3.43	127,452	500	5,375	1,116	39
June	21,117	22,143	2,278	3.36	124,148	688	11,831	3,503	1,176
July	22,075	39,943	2,485	1.44	103,795	1,039	23,974	16,051	9,360
Aug	21,719	41,240	1,911	1.63	82,363	916	25,658	21,948	12,436
Sep.	20,643	32,955	1,168	4.63	68,883	1,009	17,778	9,262	5,332
Oct.	20,048	9,531	1,020	0.22	78,380	569	0	0	0
Nov.	20,242	8,150	601	1.57	89,871	258	0	0	0
Dec.	19,123	7,968	377	0.04	100,649	414	0	0	0
TOTAL	249,768	221,308	15,465	20.86	--	7,091	84,616	51,880	28,343

NOTE -- Acres irrigated 2004: Mirdan Canal - 33,932 acres.

NORTH LOUP DIVISION (Continued)
DAVIS CREEK RESERVOIR — BELOW DAVIS CREEK FULLERTON CANAL

Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Mo. Content (AF)	Release To Canal (AF)	Delivered To Farms (AF)
Jan.	0	216	51	0.00	9,844	0	0
Feb.	49	147	62	1.17	9,684	0	0
Mar.	32	161	109	0.74	9,446	0	0
Apr.	5,160	1,008	198	1.95	13,400	0	0
May	14,586	3,648	300	3.29	24,038	2,279	0
June	13,876	6,460	444	1.88	31,010	4,927	1,555
July	6,826	12,307	445	3.45	25,084	11,163	7,138
Aug.	3,266	18,155	351	1.45	9,844	18,097	13,644
Sep.	7,766	7,535	215	4.47	9,860	7,263	4,321
Oct.	174	95	147	0.62	9,792	0	0
Nov.	45	155	79	1.50	9,603	0	0
Dec.	3	216	45	0.06	9,345	0	0
TOTAL	51,783	50,103	2,446	20.58	–	43,729	26,658

NOTE - Acres irrigated 2004: Fullerton Canal - 20,847 acres.

TABLE 2
SUMMARY OF 2004 OPERATIONS

UPPER REPUBLICAN DIVISION
ARMEL UNIT
BONNY RESERVOIR

Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content (AF)	Outflow To Hale Ditch (AF)
Jan.	352	307	119	0.14	16,652	0
Feb.	636	288	134	0.51	16,866	0
Mar.	646	307	203	0.56	17,002	0
Apr.	1,004	298	438	2.52	17,270	0
May	571	307	656	1.08	16,878	0
June	236	298	645	1.57	16,171	0
July	542	307	674	3.69	15,732	0
Aug.	137	307	598	0.41	14,964	0
Sep.	412	298	682	2.39	14,396	0
Oct.	121	307	250	0.61	13,960	0
Nov.	421	298	211	1.81	13,872	0
Dec.	312	307	123	0.31	13,754	0
TOTAL	5,390	3,629	4,733	15.60	–	0

TABLE 2
SUMMARY OF 2004 OPERATIONS

FRENCHMAN-CAMBRIDGE DIVISION
FRENCHMAN UNIT

ENDERS RESERVOIR

Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of CULBERTSON CANAL Month Content (AF)	Diversions To Canal (AF)	Delivered To Farms (AF)	CULBERTSON EXT.CANAL Diversions To Canal (AF)	Delivered To Farms (AF)
Jan.	506	184	53	0.43	11,536	0	0	0	0
Feb.	507	173	61	0.39	11,809	0	0	0	0
Mar.	442	184	109	0.59	11,958	741	0	0	0
Apr.	603	179	229	2.32	12,153	1,748	304	0	0
May	404	184	303	1.33	12,070	1,733	568	0	0
June	326	179	349	3.07	11,868	1,309	421	0	0
July	578	184	349	7.44	11,913	1,413	490	0	0
Aug.	44	184	310	0.84	11,463	1,487	569	0	0
Sep.	194	151	282	2.38	11,224	243	89	0	0
Oct.	380	177	138	2.40	11,289	0	0	0	0
Nov.	465	179	119	1.39	11,456	0	0	0	0
Dec.	427	184	67	0.19	11,632	0	0	0	0
TOTAL	4,876	2,142	2,369	22.77	–	8,674	2,441	0	0

NOTE: Acres irrigated 2004: Culbertson Canal - 2,048 acres; Culbertson Extension Canal - 0 acres.

FRENCHMAN-CAMBRIDGE DIVISION (Continued)
MEEKER-DRIFTWOOD UNIT

SWANSON LAKE

Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of MEEKER-DRIFTWOOD Month Content (AF)	Release To Canal (AF)	Delivered To Farms (AF)	BARTLEY CANAL Diversions To Canal (AF)	Delivered To Farms (AF)
Jan.	196	61	157	0.23	26,577	0	0	0	0
Feb.	1,147	58	184	0.42	27,482	0	0	0	0
Mar.	2,082	61	330	1.26	29,173	0	0	0	0
Apr.	1,994	60	758	2.04	30,349	0	0	0	0
May	772	61	1,059	0.80	30,001	0	0	0	0
June	1,081	60	1,114	5.30	29,908	0	0	0	0
July	3,376	61	1,151	10.94	32,072	0	0	0	0
Aug.	0	61	1,218	1.19	30,793	0	0	0	0
Sep.	231	60	1,056	2.55	29,908	0	0	0	0
Oct.	100	61	476	2.02	29,471	0	0	0	0
Nov.	537	60	385	1.63	29,563	0	0	0	0
Dec.	1,198	61	211	0.05	30,489	0	0	0	0
TOTAL	12,714	725	8,099	28.43	--	0	0	0	0

NOTE: Acres irrigated 2004: Meeker-Driftwood Canal - 0 acres; Bartley Canal - 0 acres.

FRENCHMAN-CAMBRIDGE DIVISION (Continued)
RED WILLOW UNIT

HUGH BUTLER LAKE

Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content (AF)	RED WILLOW CANAL Diversions To Canal (AF)	Delivered To Farms (AF)
Jan.	791	246	64	0.44	16,068	0	0
Feb.	814	230	74	0.42	16,578	0	0
Mar.	980	246	141	1.75	17,171	0	0
Apr.	1,024	238	390	1.98	17,567	0	0
May	688	246	547	0.94	17,462	0	0
June	529	238	562	2.34	17,191	0	0
July	2,149	246	589	6.58	18,505	0	0
Aug.	390	246	563	1.82	18,086	0	0
Sep.	405	238	539	2.82	17,714	0	0
Oct.	460	246	193	1.31	17,735	0	0
Nov.	728	238	171	1.26	18,054	0	0
Dec.	674	246	95	0.04	18,387	0	0
TOTAL	9,632	2,904	3,928	21.70	--	0	0

NOTE -- Acres irrigated 2004: Red Willow Canal - 0 acres.

FRENCHMAN-CAMBRIDGE DIVISION (Continued)
CAMBRIDGE UNIT

HARRY STRUNK LAKE

Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content (AF)	CAMBRIDGE CANAL Diversions To Canal (AF)	Delivered To Farms (AF)
Jan.	2,250	61	82	0.50	23,647	0	0
Feb.	2,263	58	92	0.37	25,760	0	0
Mar.	2,742	61	193	2.01	28,248	0	0
Apr.	2,605	60	582	1.66	30,211	0	0
May	2,025	61	764	1.30	31,411	0	0
June	2,037	3,477	872	4.46	29,099	2,751	819
July	3,640	8,543	742	6.18	23,454	8,064	3,716
Aug.	2,342	10,612	509	0.51	14,675	10,231	6,103
Sep.	2,078	1,182	468	4.50	15,103	918	666
Oct.	2,116	61	205	1.24	16,953	0	0
Nov.	2,331	60	169	1.88	19,055	0	0
Dec,	2,278	61	95	0.05	21,177	0	0
TOTAL	28,707	24,297	4,773	24.66	–	21,964	11,304

NOTE - Acres irrigated 2004: Cambridge Canal - 15.192 acres.

TABLE 2
SUMMARY OF 2004 OPERATIONS

KANASKA DIVISION
ALMENA UNIT

KEITH SEBELIUS LAKE

Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content (AF)	Release To City Of Norton (AF)	ALMENA CANAL Diversions To Canal (AF)	ALMENA CANAL Delivered To Farms (AF)
Jan.	246	61	60	0.40	9,297	30	0	0
Feb.	270	56	70	0.52	9,441	27	0	0
Mar.	353	63	128	1.26	9,603	33	0	0
Apr.	460	83	377	1.86	9,603	53	0	0
May	392	92	553	1.72	9,350	61	0	0
June	237	91	543	2.15	8,953	61	0	0
July	580	86	529	6.91	8,918	55	0	0
Aug.	161	95	511	1.11	8,473	65	0	0
Sep.	384	88	530	3.89	8,239	58	0	0
Oct.	204	69	218	1.68	8,156	38	0	0
Nov.	270	60	135	1.61	8,231	30	0	0
Dec.	147	59	72	0.00	8,247	28	0	0
TOTAL	3,704	903	3,726	23.11	--	539	0	0

NOTE: Acres irrigated 2004: Almena Canal - 0 acres.

BOSTWICK DIVISION
FRANKLIN UNIT

HARLAN COUNTY LAKE
Data from Corps of Engineers

Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content (AF)	FRANKLIN CANAL Release To Canal (AF)	FRANKLIN CANAL Delivered To Farms (AF)	NAPONEE CANAL Release To Canal (AF)	NAPONEE CANAL Delivered To Farms (AF)
Jan.	833	0	468	0.80	113,706	0	0	0	0
Feb.	819	0	460	0.68	114,066	0	0	0	0
Mar.	2,489	0	755	1.99	115,795	0	0	0	0
Apr.	2,638	0	1,989	2.02	116,443	0	0	0	0
May	2,638	0	2,563	2.86	116,731	0	0	0	0
June	1,650	0	4,243	2.30	114,139	0	0	0	0
July	4,354	0	2,780	4.09	114,715	0	0	0	0
Aug.	2,009	0	5,177	1.41	111,546	0	0	0	0
Sep.	3,917	0	6,558	2.63	108,905	0	0	0	0
Oct.	1,993	0	2,818	2.30	108,081	0	0	0	0
Nov.	1,567	0	1,773	1.75	107,874	0	0	0	0
Dec.	192	0	1,017	0.00	107,050	0	0	0	0
TOTAL	25,099	0	30,601	22.83	--	0	0	0	0

NOTE: Acres irrigated 2004: Franklin Canal - 0 acres; Naponee Canal - 0 acres.

BOSTWICK DIVISION (Continued)
SUPERIOR-COURTLAND UNIT

Month	FRANKLIN PUMP CANAL Diverted To Canal (AF)	FRANKLIN PUMP CANAL Delivered To Farms (AF)	SUPERIOR CANAL Diverted To Canal (AF)	SUPERIOR CANAL Delivered To Farms (AF)	Total Diversion (AF)	COURTLAND CANAL - ABOVE LOVEWELL NEBRASKA USE Total (AF)	NEBRASKA USE Delivered To Farms (AF)	KANSAS USE Diversion To Canal (AF)	KANSAS USE Delivered To Farms (AF)
Jan.	0	0	0	0	4,530	0	0	0	0
Feb.	0	0	0	0	2,350	0	0	0	0
Mar.	0	0	0	0	1,950	0	0	0	0
Apr.	0	0	0	0	5,439	0	0	0	0
May	0	0	554	0	3,910	0	0	0	0
June	0	0	1,961	241	1,302	0	0	0	0
July	0	0	2,077	711	1,779	0	0	280	43
Aug.	0	0	1,015	456	186	0	0	186	11
Sep.	0	0	193	49	525	0	0	0	0
Oct.	0	0	0	0	2,557	0	0	2,536	0
Nov.	0	0	0	0	3,204	0	0	266	90
Dec.	0	0	0	0	3,769	0	0	0	0
TOTAL	0	0	5,800	1,457	31,501	0	0	3,268	144

NOTE: Acres irrigated 2004: Franklin Pump Canal - 0 acres; Superior Canal - 3,127 acres.
Courtland Canal-Nebraska use - 0 acres.
Courtland Canal-Kansas use - 1,107 acres.

BOSTWICK DIVISION (Continued)
COURTLAND UNIT

LOVEWELL RESERVOIR

Month	Est. Flow from White Rock Creek (AF)	Inflow from Courtland 34.8 (AF)	Total Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content (AF)	COURTLAND (Below) Release To Canal (AF)	COURTLAND (Below) Delivered To Farms (AF)
Jan.	364	2,685	3,049	12	150	0.94	31,245	0	0
Feb.	912	1,398	2,310	12	190	0.76	33,353	0	0
Mar.	1,904	1,128	3,032	12	378	3.79	35,995	0	0
Apr.	1,281	3,776	5,057	18	974	1.47	40,060	0	0
May	955	2,150	3,105	1,014	1,285	4.58	40,866	982	0
June	883	104	987	1,349	1,366	5.00	39,138	1,417	0
July	6,848	230	7,078	13,730	1,351	7.44	31,135	9,713	4,043
Aug.	2,320	0	2,320	19,042	884	2.09	13,529	18,022	11,413
Sep.	251	0	251	18	747	2.62	13,015	0	0
Oct.	39	0	39	12	343	1.20	12,699	0	0
Nov.	188	831	1,019	12	242	0.80	13,464	0	0
Dec.	746	1,828	2,574	12	122	0.04	15,904	0	0
TOTAL	16,691	14,130	30,821	35,243	8,032	30.73	--	30,134	15,456

NOTE: Acres irrigated 2004: Courtland Canal below Lovewell - 23,034 acres.

TABLE 2
SUMMARY OF 2004 OPERATIONS

SOLOMON DIVISION
KIRWIN UNIT

	KIRWIN RESERVOIR					KIRWIN CANAL	
Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content (AF)	Release To Canal (AF)	Delivered To Farms (AF)
Jan.	142	0	122	0.76	24,595	0	0
Feb.	331	0	155	0.45	24,771	0	0
Mar.	709	0	276	2.63	25,204	0	0
Apr.	579	0	717	1.66	25,066	0	0
May	337	0	1,002	1.21	24,401	0	0
June	378	0	1,004	3.06	23,775	0	0
July	680	2,344	864	5.85	21,247	2,548	594
Aug.	214	5,595	808	0.13	15,058	5,389	2,560
Sep.	365	0	716	2.76	14,707	0	0
Oct.	124	0	245	1.35	14,586	0	0
Nov.	119	0	212	1.57	14,493	0	0
Dec.	31	0	110	0.08	14,414	0	0
TOTAL	4,009	7,939	6,231	21.51	–	7,937	3,154

NOTE: Acres irrigated 2004: Kirwin Canal - 6,464 acres.

SOLOMON DIVISION (Continued)
WEBSTER UNIT

	WEBSTER RESERVOIR					OSBORNE CANAL	
Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content (AF)	Diversions To Canal (AF)	Delivered To Farms (AF)
Jan.	83	0	118	0.45	19,108	0	0
Feb.	223	0	136	1.40	19,195	0	0
Mar.	235	0	253	0.77	19,177	0	0
Apr.	187	0	599	1.11.	18,765	0	0
May	364	0	940	1.55	18,189	0	0
June	707	0	959	5.17	17,937	0	0
July	1,350	3,344	817	5.17	15,126	1,621	405
Aug.	81	3,588	789	0.98	10,830	2,632	1,164
Sep.	254	0	797	2.46	10,287	0	0
Oct.	267	0	347	1.72	10,207	0	0
Nov	205	0	219	0.65	10,193	0	0
Dec.	77	0	117	0.04	10,153	0	0
TOTAL	4,033	6,932	6,091	21.47	--	4,253	1,569

NOTE: Acres irrigated 2004: Osborne Canal - 3,145 acres.

SOLOMON DIVISION (Continued)
GLEN ELDER UNIT

	WACONDA LAKE					OUTFLOW TO RIVER				
							City of Beloit	Irrig.District		
Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content (AF)	Storage Release (AF)	Quality Bypass (AF)	Storage Release (AF)	Other Controlled Releases (AF)	Release To Mitchell Co. RWD No. 2 (AF)
Jan.	1,616	1,189	635	0.43	168,417	0	1,134	0	0	55
Feb.	3,531	916	741	1.47	170,291	0	862	0	0	54
Mar.	6,131	983	1,458	2.48	173,981	0	923	0	0	60
Apr.	3,225	886	3,717	1.41	172,603	0	825	0	0	61
May	3,036	1,475	5,539	1.21	168,625	0	187	111	1,107	70
June	4,155	3,311	5,660	3.53	163,809	0	0	1,644	1,599	68
July	22,053	2,076	4,530	7.56	179,256	29	213	242	1,537	55
Aug.	1,493	4,848	4,982	1.46	170,919	0	0	3,382	1,408	58
Sep.	1,125	2,258	5,572	2.50	164,214	254	42	1,612	284	66
Oct.	962	984	1,996	1.32	162,196	744	178	0	0	62
Nov.	1,123	949	1,575	0.94	160,795	0	893	0	0	56
Dec.	767	978	783	0.10	159,801	0	922	0	0	56
TOTAL	49,217	20,853	37,188	24.41	--	1,027	6,179	6,991	5,935	721

NOTE: Acres irrigated 2004: Glen Elder District - 6,535 acres.

SMOKY HILL DIVISION
ELLIS UNIT

	CEDAR BLUFF RESERVOIR					
Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content (AF)	Release To Fish Hatchery (AF)
Jan.	0	0	740	0.14	129,485	0
Feb.	477	0	477	0.83	129,485	0
Mar.	502	0	899	1.46	129,088	0
Apr.	814	0	2,167	1.18	127,735	0
May	940	0	3,280	0.83	125,395	0
June	3,405	14	3,059	5.14	125,727	14
July	3,044	78	2,911	3.84	125,782	78
Aug.	0	89	3,203	1.28	122,490	89
Sep.	1,038	46	3,362	2.49	120,120	46
Oct.	1	0	1,277	1.44	118,844	0
Nov.	275	0	909	0.85	118,210	0
Dec.	0	0	999	0.03	117,211	0
TOTAL	10,496	227	23,283	19.51	–	227

TABLE 3

ACRES IRRIGATED IN 2004

Irrigation District and Canal	Acres With Service Available	Acres Irrigated in 2004
Mirage Flats Irrigation District		
Mirage Flats Canal	11,662	11,092
Ainsworth Irrigation District		
Ainsworth Canal	34,539	34,031
Twin Loups Irrigation District		
Above Davis Creek	33,932	33,932
Below Davis Creek	20,916	20,847
Total Twin Loups Irrigation District	54,848	54,779
Frenchman Valley Irrigation District		
Culbertson Canal	9,295	2,048
H & RW Irrigation District		
Culbertson Extension Canal	11,695	0
Frenchman-Cambridge Irrigation District		
Meeker-Driftwood Canal	16,562	0
Red Willow Canal	4,877	0
Bartley Canal	6,435	0
Cambridge Canal	17,297	15,192
Total Frenchman-Cambridge Irrigation District	45,171	15,192
Almena Irrigation District		
Almena Canal	5,764	0
Bostwick Irrigation District in Nebraska		
Franklin Canal	11,262	0
Naponee Canal	1,628	0
Franklin Pump Canal	2,106	0
Superior Canal	5,972	3,127
Courtland Canal (Nebraska)	1,967	0
Total Bostwick Irrigation Dist. in Nebraska	22,935	3,127
Kansas-Bostwick Irrigation District		
Courtland Canal above Lovewell	13,378	1,107
Courtland Canal below Lovewell	29,122	23,034
Total Kansas-Bostwick Irrigation District	42,500	24,141
Kirwin Irrigation District		
Kirwin Canal	11,465	6,464
Webster Irrigation District		
Osborne Canal	8,537	3,145
Glen Elder Irrigation District	7,000	6,535
TOTAL PROJECT USES	265,411	160,554
Non-Project Uses		
Hale Ditch	700	0
TOTAL PROJECT AND NON-PROJECT	266,111	160,554

TABLE 5

FLOOD DAMAGES PREVENTED BY NEBRASKA-KANSAS PROJECTS RESERVOIRS

RESERVOIR	DURING FY 2004	PRIOR TO 2004	ACCUMULATED TOTAL
BONNY	$4,000	$2,685,000	$2,689,000
ENDERS	$5,000	$3,276,000	$3,281,000
SWANSON	$3,000	$19,063,000	$19,066,000
HUGH BUTLER	$3,000	$2,571,000	$2,574,000
HARRY STRUNK	$16,000	$4,908,000	$4,924,000
KEITH SEBELIUS	$4,000	$3,954,000	$3,958,000
HARLAN COUNTY	$5,000	$150,085,000	$150,090,000
LOVEWELL	$113,000	$146,495,000	$146,608,000
KIRWIN	$9,000	$86,850,000	$86,859,000
WEBSTER	$5,000	$110,308,000	$110,313,000
WACONDA	$142,000	$1,213,053,000	$1,213,195,000
CEDAR BLUFF	$3,000	$128,887,000	$128,890,000
TOTAL	$312,000	$1,872,135,000	$1,872,447,000

Estimates of damages prevented are received from the Army Corps of Engineer's Kansas City District Office. The Accumulated Totals date from 1951 through 2004. Cumulative totals are revised by the Corps of Engineers in some cases to reflect data not previously included in the reporting and may not match previous cumulative totals.

Construction Cost of storage dams was $208,954,130.
The reservoirs upstream of Harlan County Lake did not receive benefits for damages prevented from 1972 to 1993.

TABLE 6
WATER DIVERTED IN 2004
(Units - Acre-Feet)

Irrigation District and Canal	2004 Irrigation Operations From	To	10-Year Average Diversion (1994-2003)		2004 Diversion
Mirage Flats Irrigation District					
Mirage Flats Canal	7/11	9/2	13,212		8,553
Ainsworth Irrigation District					
Ainsworth Canal	5/6	9/23	72,466		84,275
Twin Loups Irrigation District					
Above Davis Creek	5/11	9/23	40,591	*	51,880
Below Davis Creek	5/11	9/22	37,599	*	43,729
Total Twin Loups Irrigation District			78,190		95,609
Frenchman Valley Irrigation District					
Culbertson Canal	3/17	9/7	9,178		8,674
H & RW Irrigation District					
Culbertson Extension Canal	Did not run.		8,985		0
Frenchman-Cambridge Irrigation District					
Meeker-Driftwood Canal	Did not run.		23,903		0
Red Willow Canal	Did not run.		6,218		0
Bartley Canal	Did not run.		7,182		0
Cambridge Canal	6/21	9/3	23,960		21,964
Total Frenchman-Cambridge Irrigation District			61,263		21,964
Almena Irrigation District					
Almena Canal	Did not run.		4,836		0
Bostwick Irrigation District in Nebraska					
Franklin Canal	Did not run.		30,006		0
Naponee Canal	Did not run.		2,704		0
Franklin Pump Canal	Did not run.		3,067		0
Superior Canal	5/24	9/16	13,627		5,800
Courtland Canal (Nebraska)	Did not run.		2,105		0
Total Bostwick Irrigation District in Nebraska			51,509		5,800
Kansas-Bostwick Irrigation District					
Courtland Canal above Lovewell	7/1	11/15	27,375		3,268
Courtland Canal below Lovewell	5/13	8/30	47,304		30,134
Total Kansas-Bostwick Irrigation District			74,679		33,402
Kirwin Irrigation District					
Kirwin Canal	7/20	8/20	21,521		7,937
Webster Irrigation District					
Osborne Canal	7/20	8/19	14,178		4,253
Glen Elder Irrigation District	5/25	9/21	5,749		6,991
TOTAL			415,766		277,458

* Average diversion is from 1995 through 2004 for Twin Loups and Glen Elder Irrigation Districts.

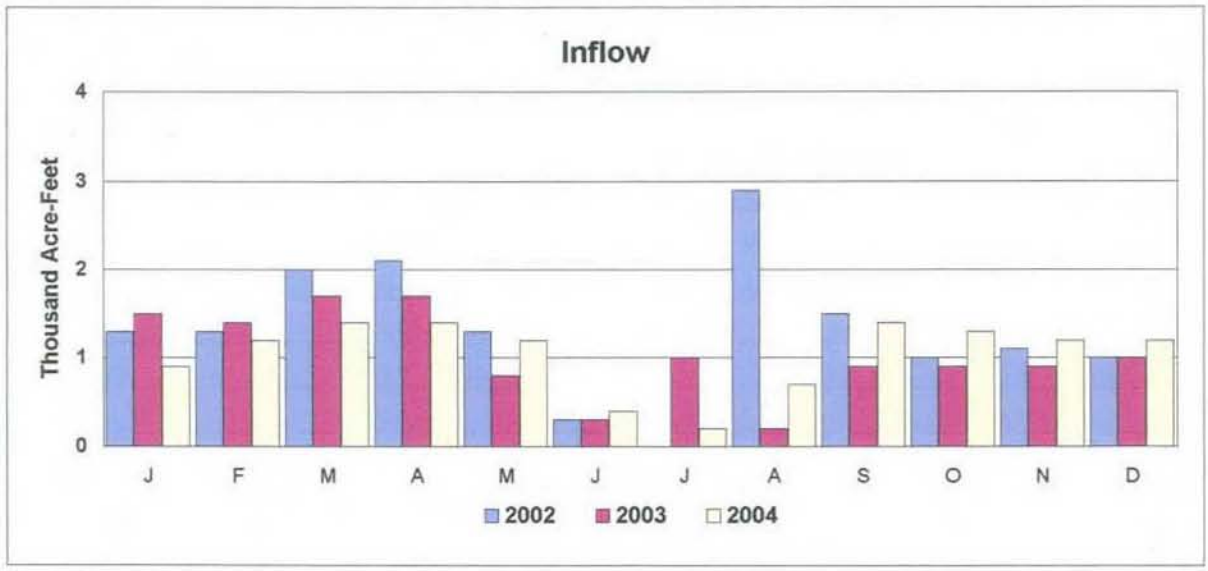
TABLE 7
NEBRASKA-KANSAS PROJECTS
Summary of Precipitation, Reservoir Storage and Inflows
CALENDAR YEAR 2004

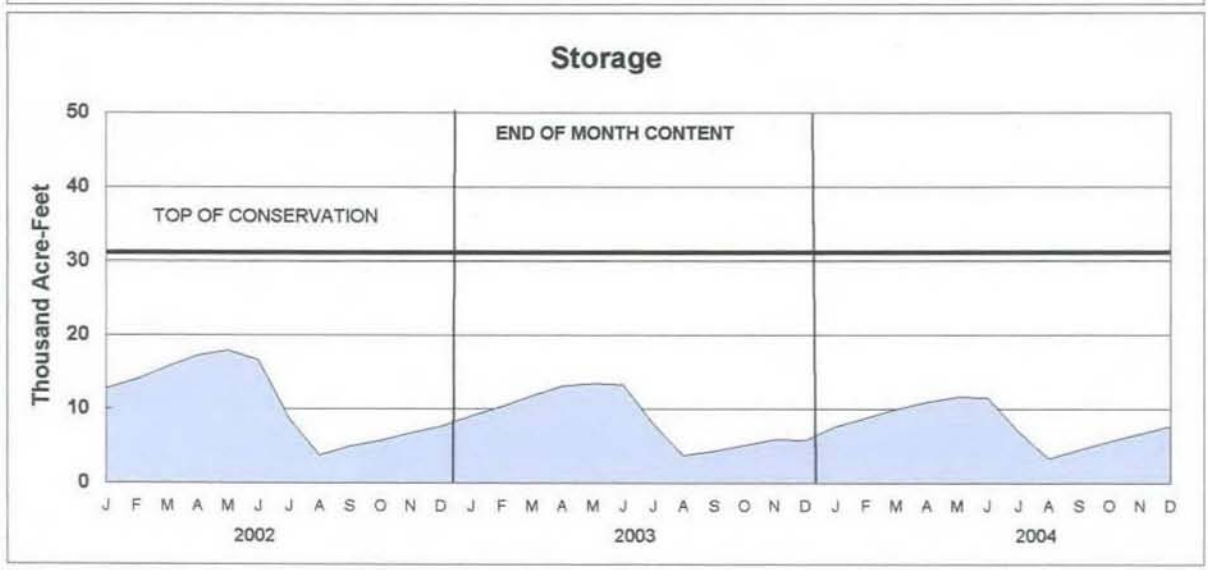
Reservoir	Total Precip. Inches	Percent Of Average %	Storage 12-31-03 AF	Storage 12-31-04 AF	Gain or Loss AF	Maximum Content AF	Storage Date	Minimum Content AF	Storage Date	Total Inflow AF
Box Butte	16.15	94	6,895	7,768	873	11,893	MAY 19	3,423	AUG 31	12,527
Merritt	24.21	120	68,831	69,110	279	74,781	JUN 21	29,330	SEP 15	180,572
Calamus	20.86	88	87,654	100,649	12,995	129,667	MAY 23	67,235	SEP 21	249,768
Davis Creek	20.58	87	10,111	9,345	-766	31,123	JUN 28	7,423	SEP 10	51,783
Bonny	15.60	90	16,726	13,754	-2,972	17,318	MAY 6	13,719	DEC 23	5,390
Enders	22.77	120	11,267	11,632	365	12,175	MAY 1	11,210	SEP 21	4,876
Swanson	28.43	142	26,599	30,489	3,890	32,168	JUL 26	26,577	JAN 2	12,714
Hugh Butler	21.70	110	15,587	18,387	2,800	18,571	AUG 2	15,607	JAN 1	9,632
Harry Strunk	24.66	120	21,540	21,177	-363	31,860	JUN 20	13,755	SEP 3	28,707
Keith Sebelius	23.11	93	9,172	8,247	-925	9,649	APR 15	8,107	NOV 8	3,704
Harlan County	22.83	100	113,346	107,050	-6,296	117,883	MAY 23	107,050	DEC 26	25,099
Lovewell	30.73	113	28,358	15,904	-12,454	42,173	JUL 10	12,512	NOV 15	30,821
Kirwin	21.51	92	24,575	14,414	-10,161	25,264	MAR 9	14,400	NOV 10	4,009
Webster	21.47	91	19,143	10,153	-8,990	19,437	MAR 5	10,113	OCT 6	4,033
Waconda	24.41	95	168,625	159,801	-8,824	179,256	JUL 31	159,504	DEC 25	49,217
Cedar Bluff	19.51	92	130,225	117,211	-13,014	130,282	MAR 1	117,211	DEC 27	10,496

EXHIBIT 1A

BOX BUTTE RESERVOIR

ACTUAL OPERATION





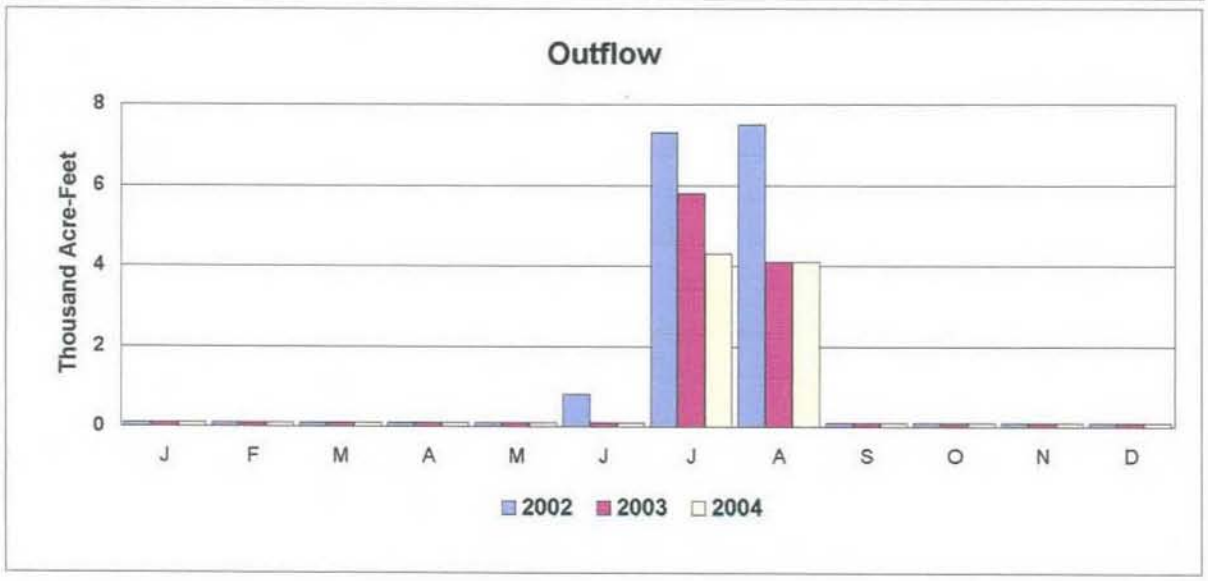
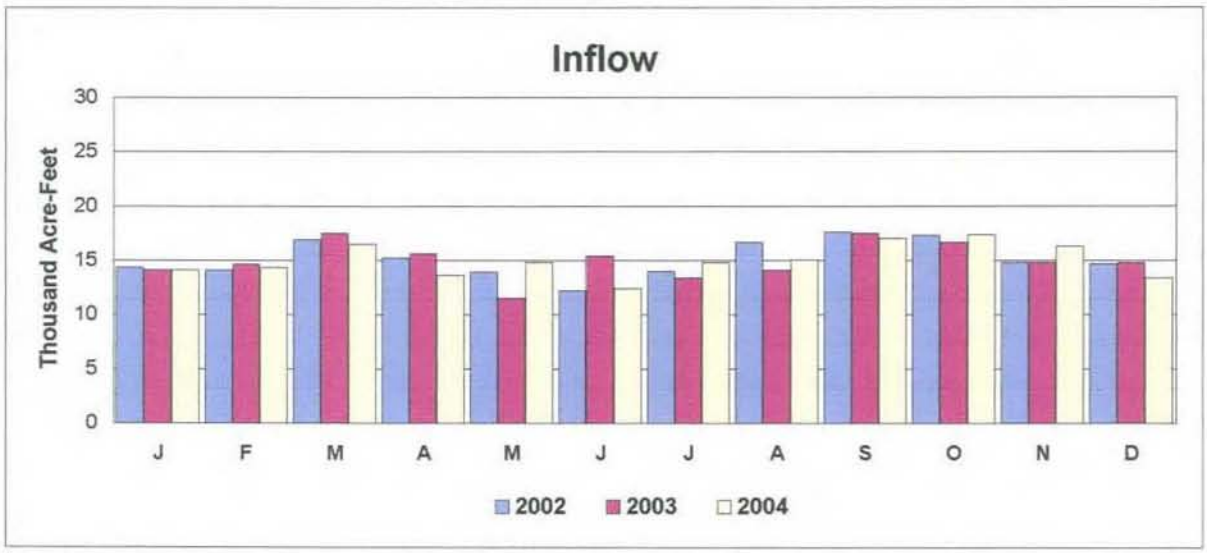
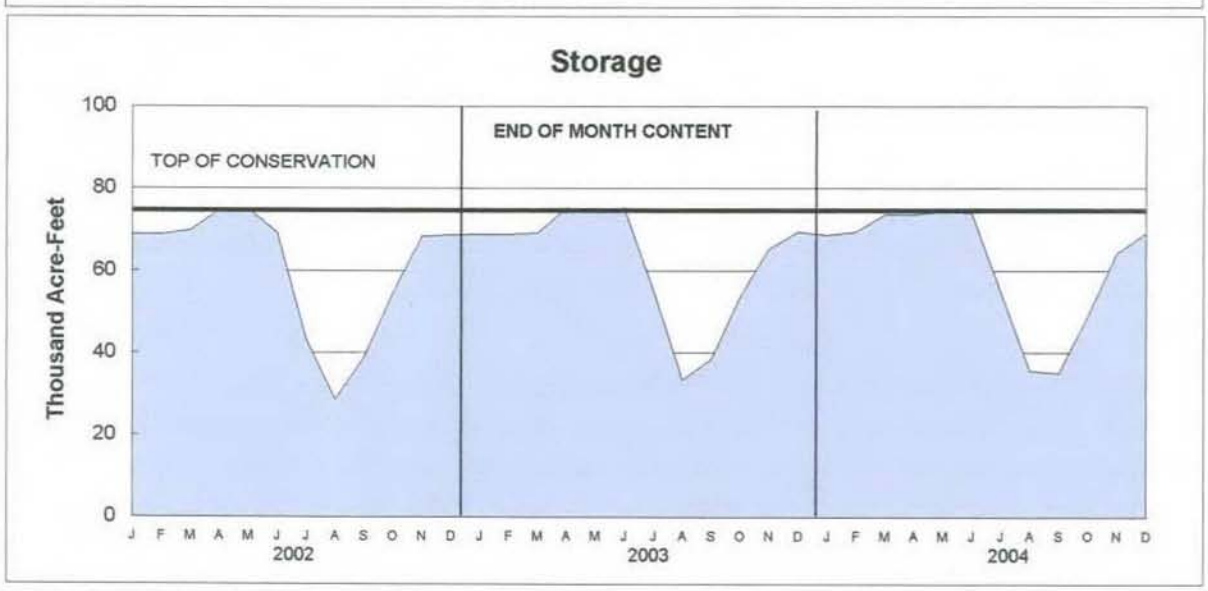


EXHIBIT 2A

MERRITT RESERVOIR
ACTUAL OPERATION





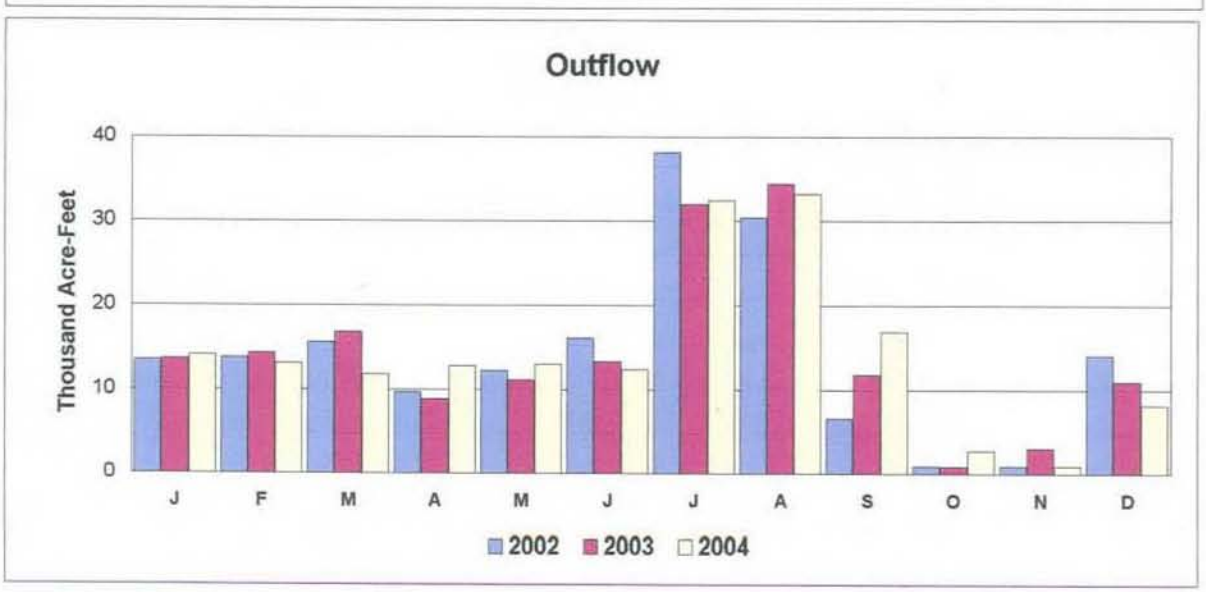
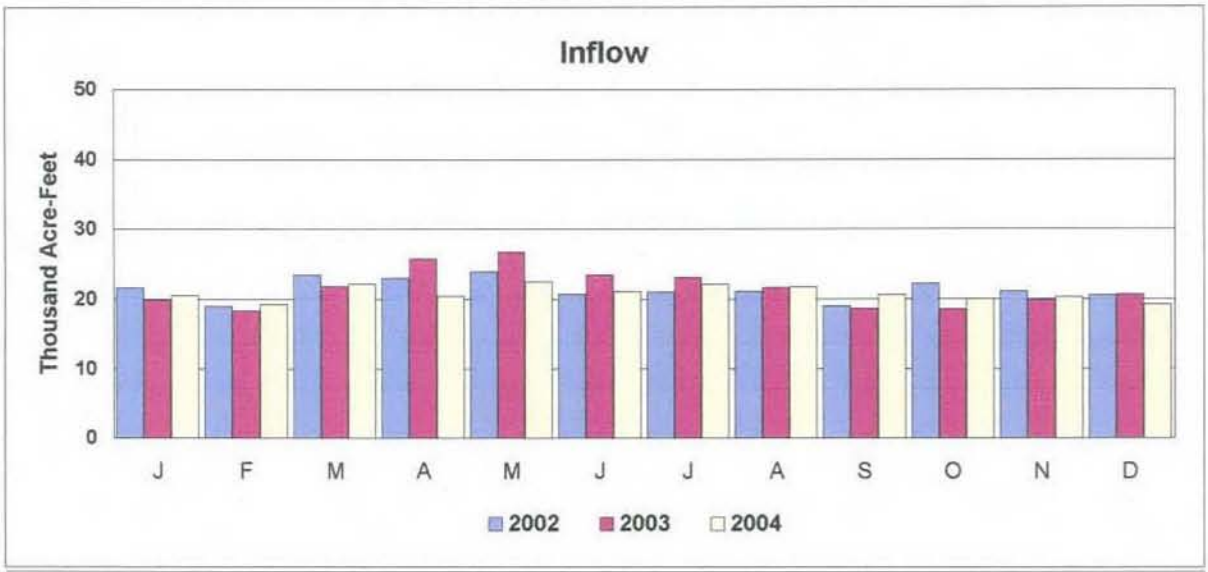
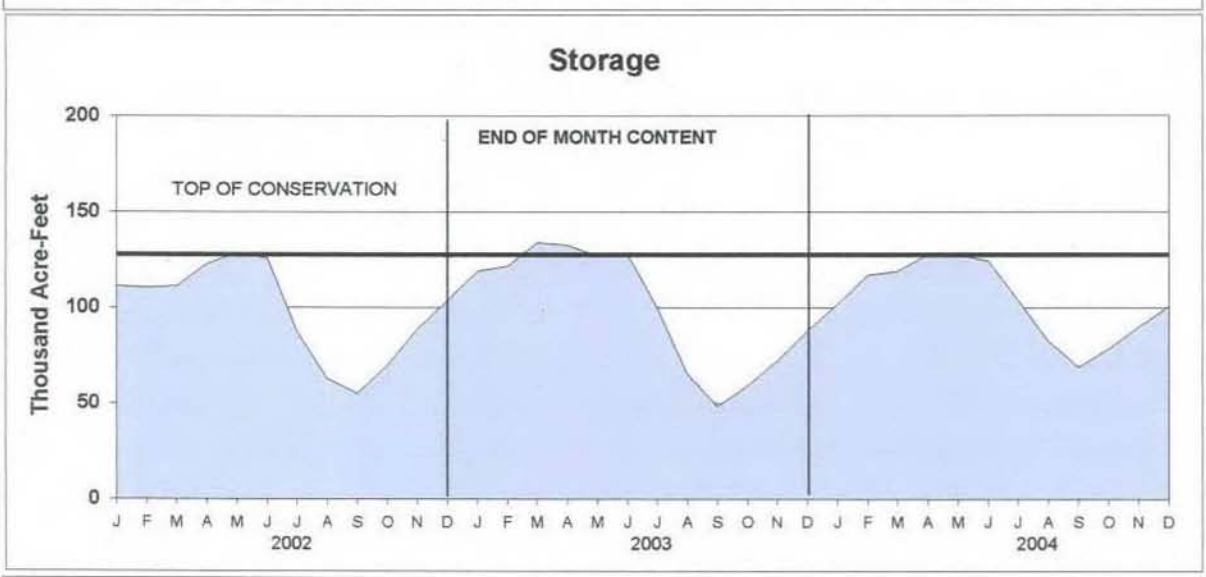


EXHIBIT 3A

CALAMUS RESERVOIR
ACTUAL OPERATION





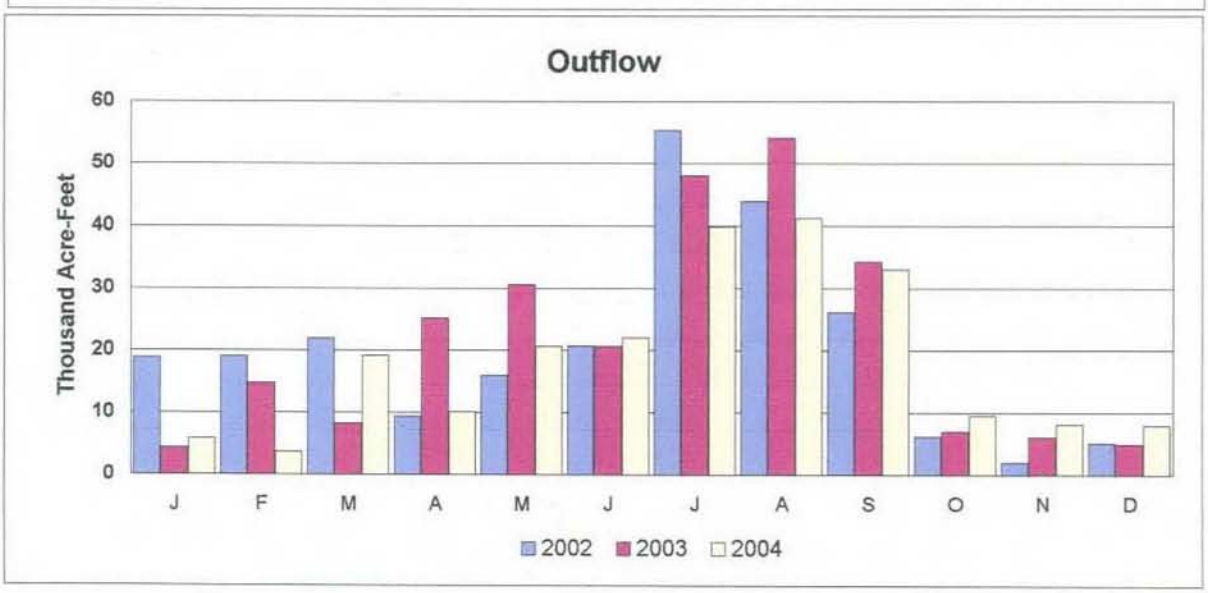
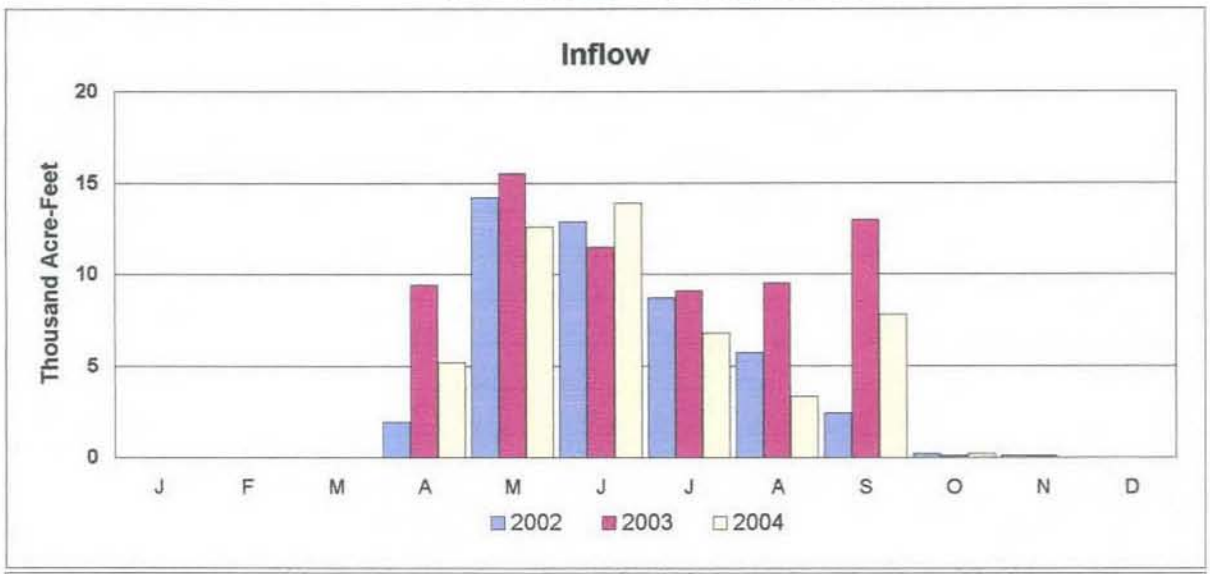
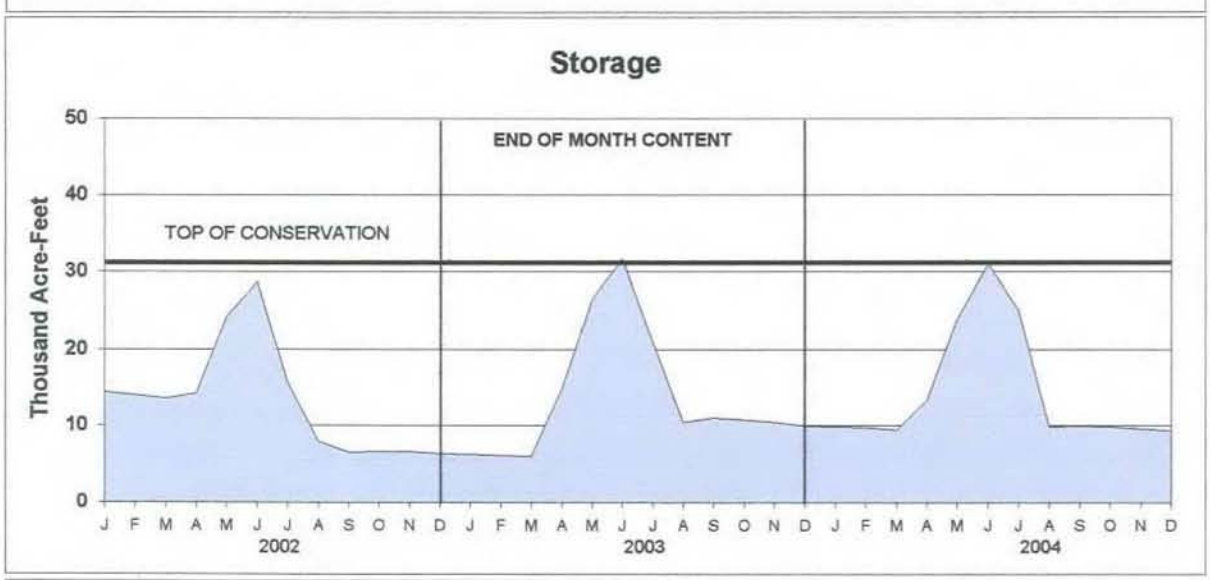


EXHIBIT 4A

DAVIS CREEK RESERVOIR

ACTUAL OPERATION





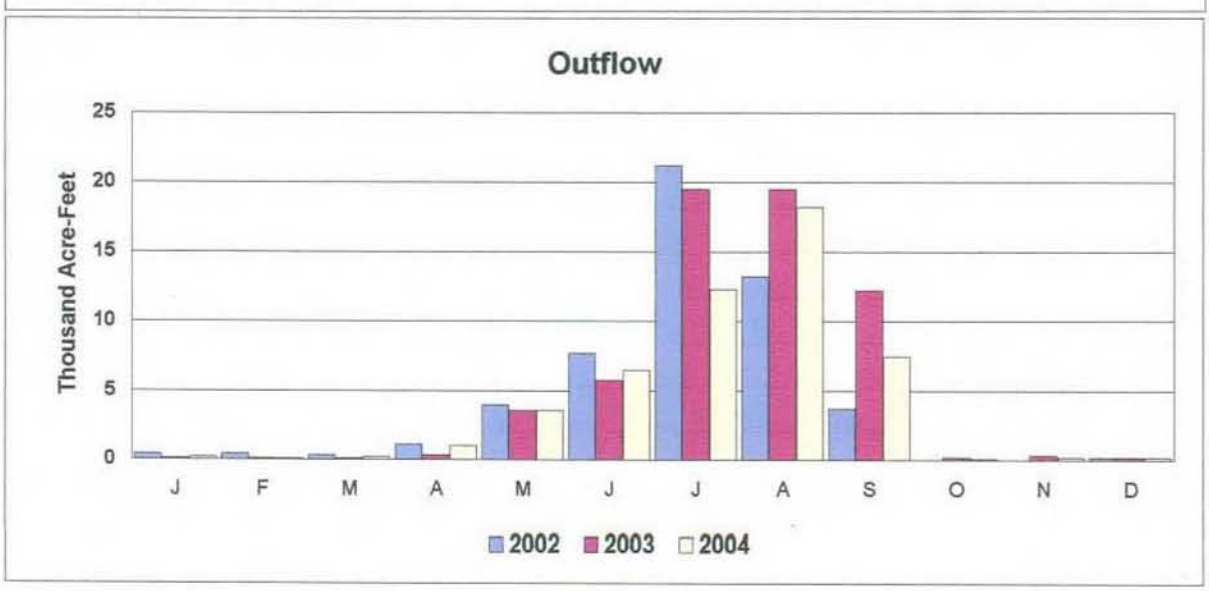
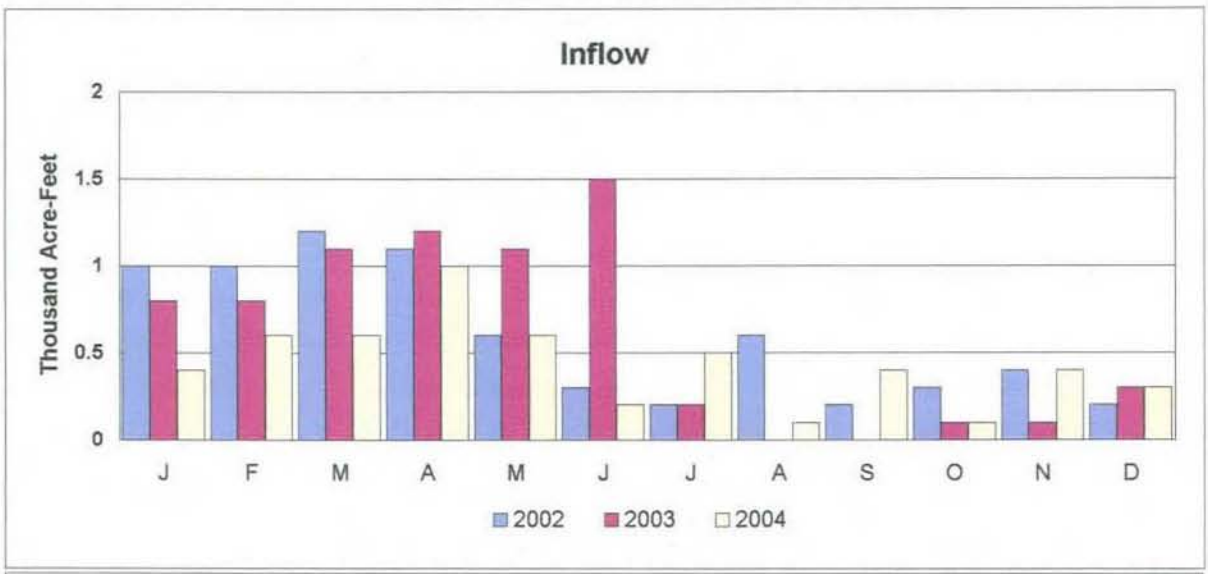
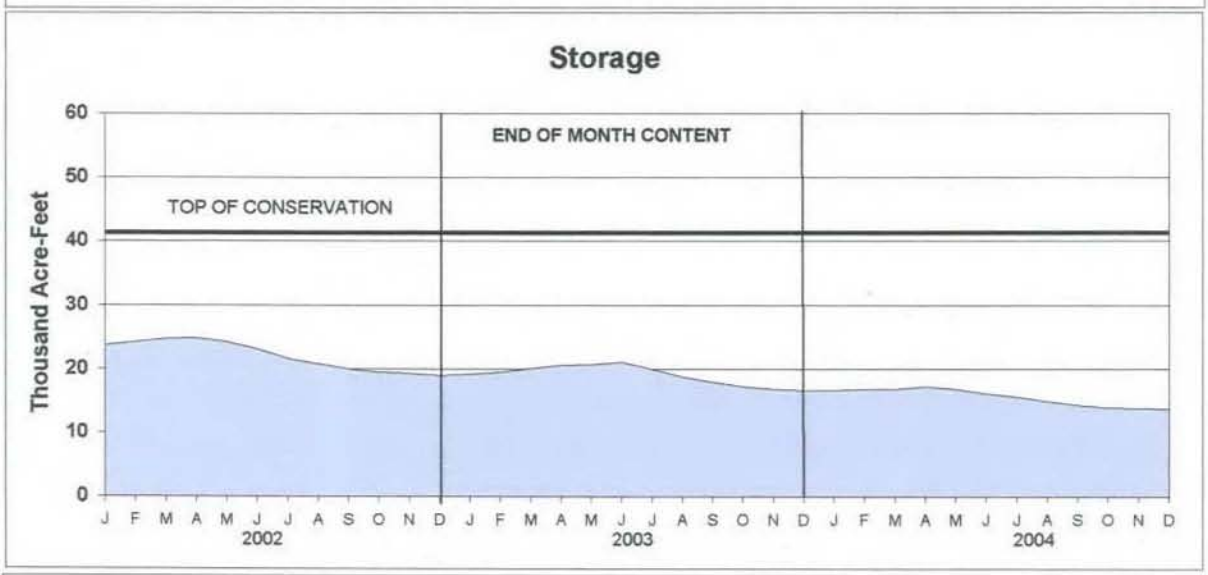


EXHIBIT 5A

BONNY RESERVOIR
ACTUAL OPERATION





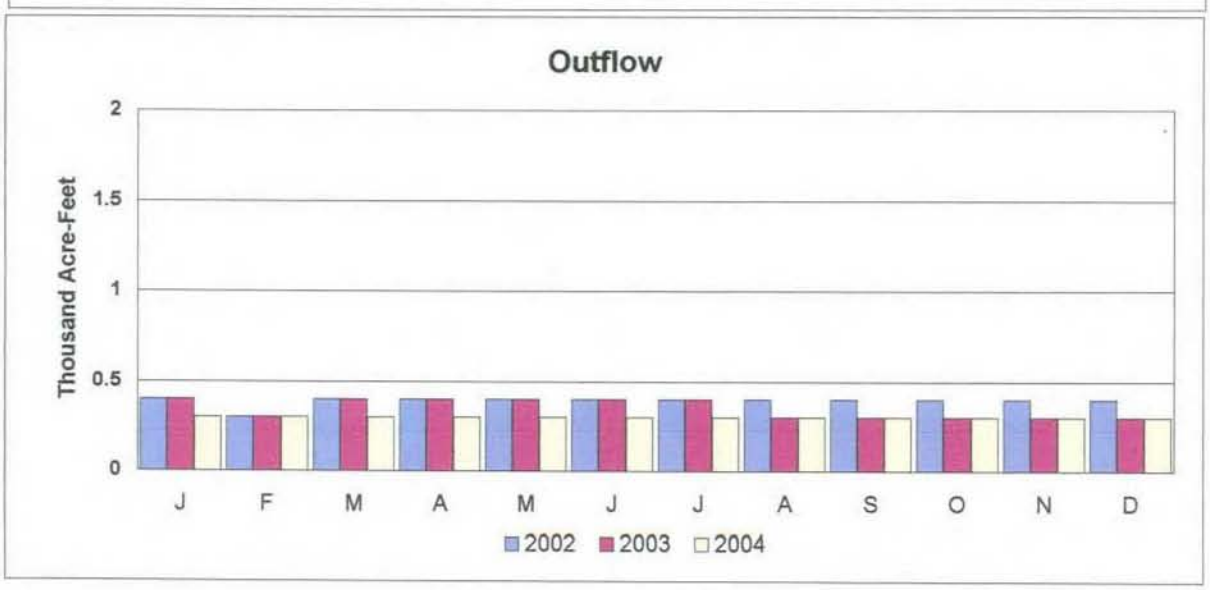
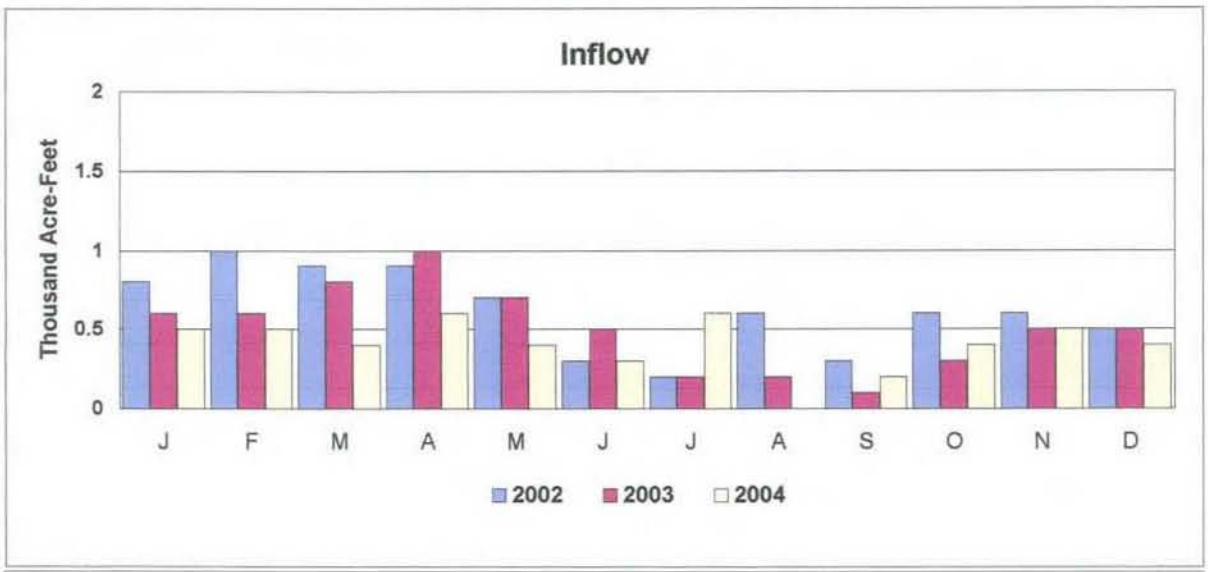
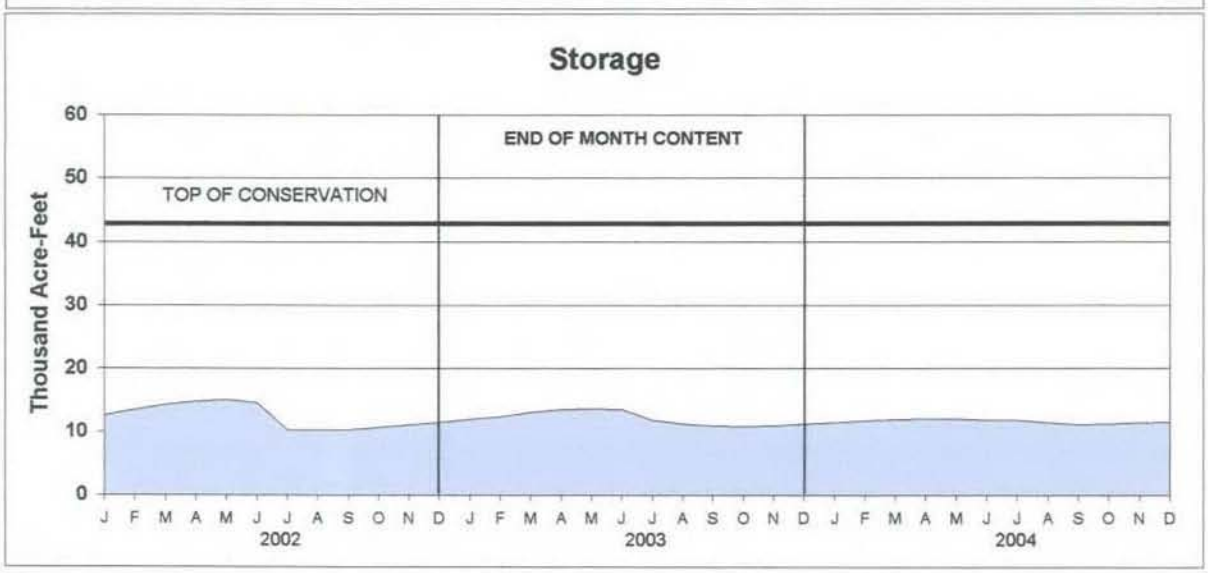


EXHIBIT 6A

ENDERS RESERVOIR

ACTUAL OPERATION





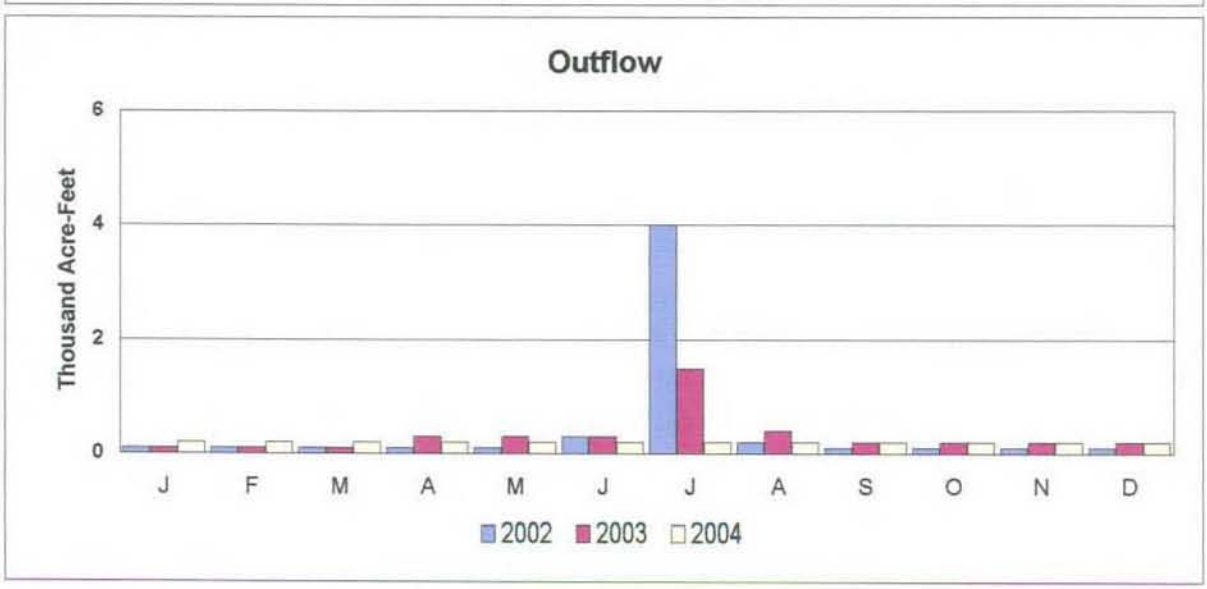
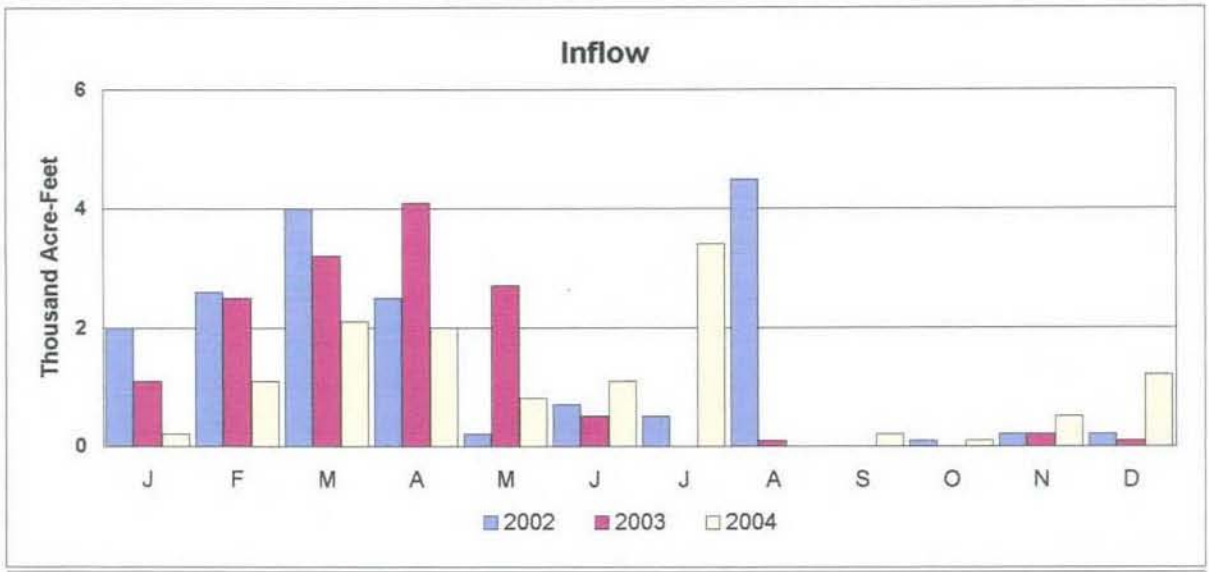
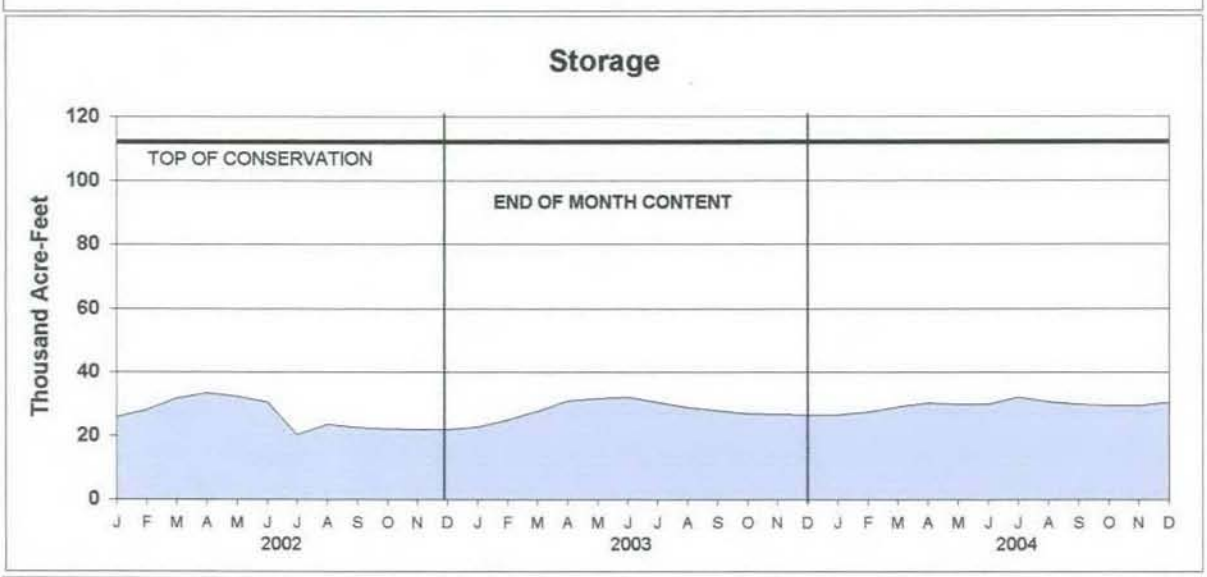


EXHIBIT 7A

SWANSON LAKE
ACTUAL OPERATION





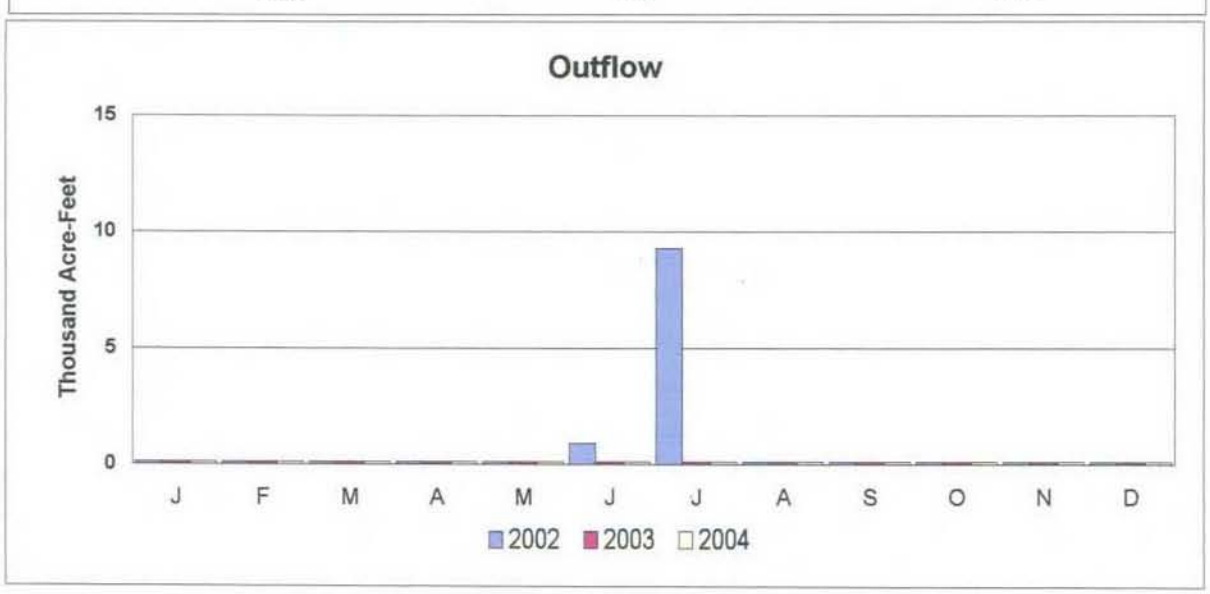
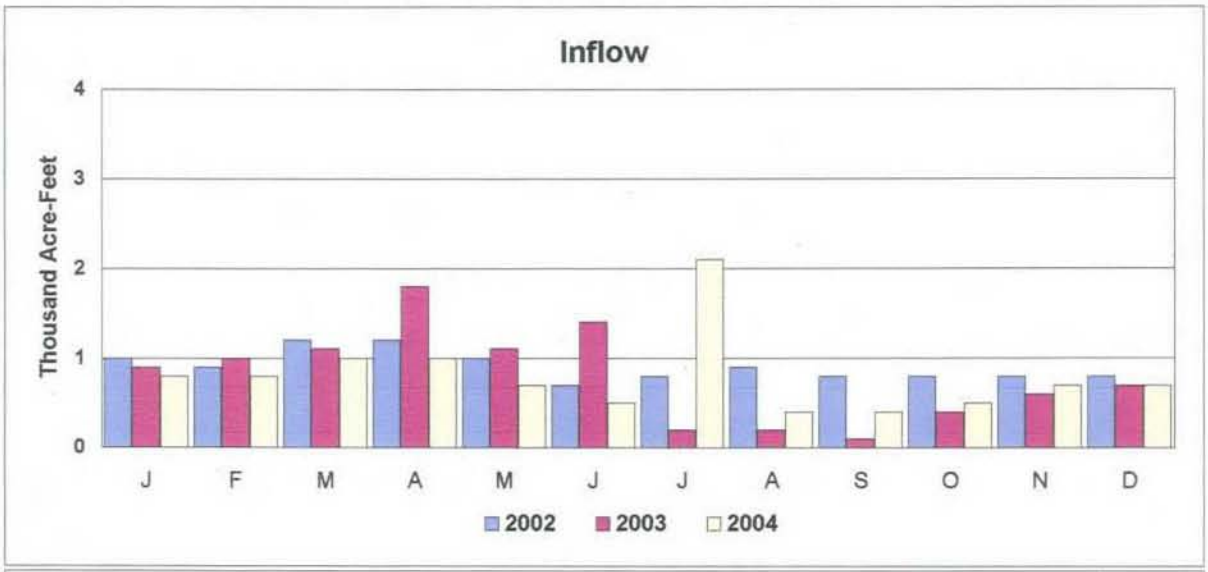
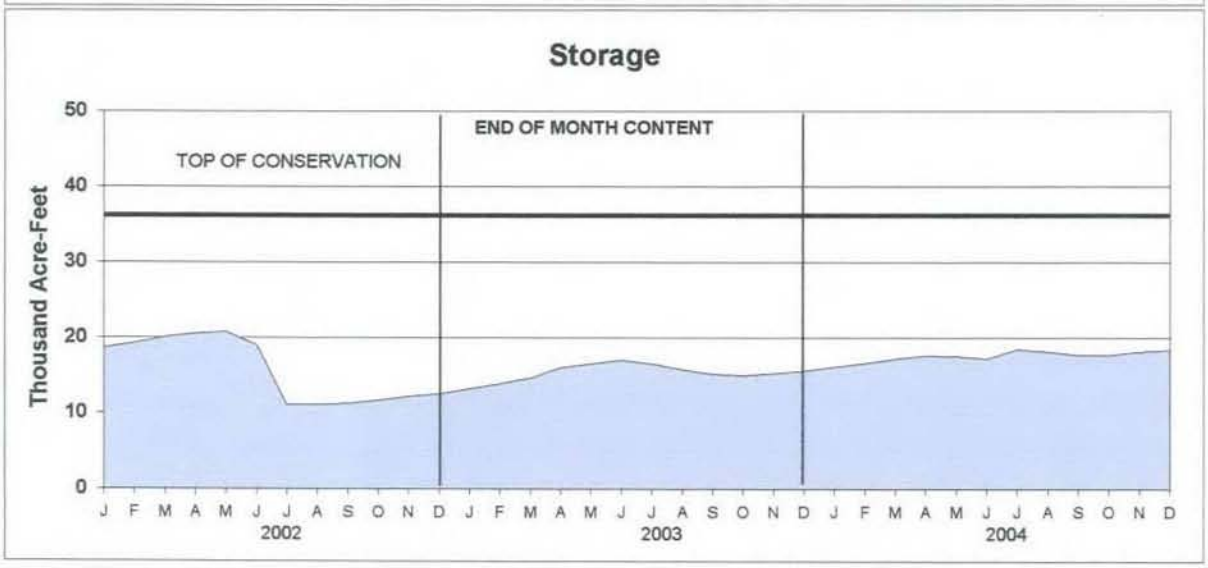


EXHIBIT 8A

HUGH BUTLER LAKE

ACTUAL OPERATION





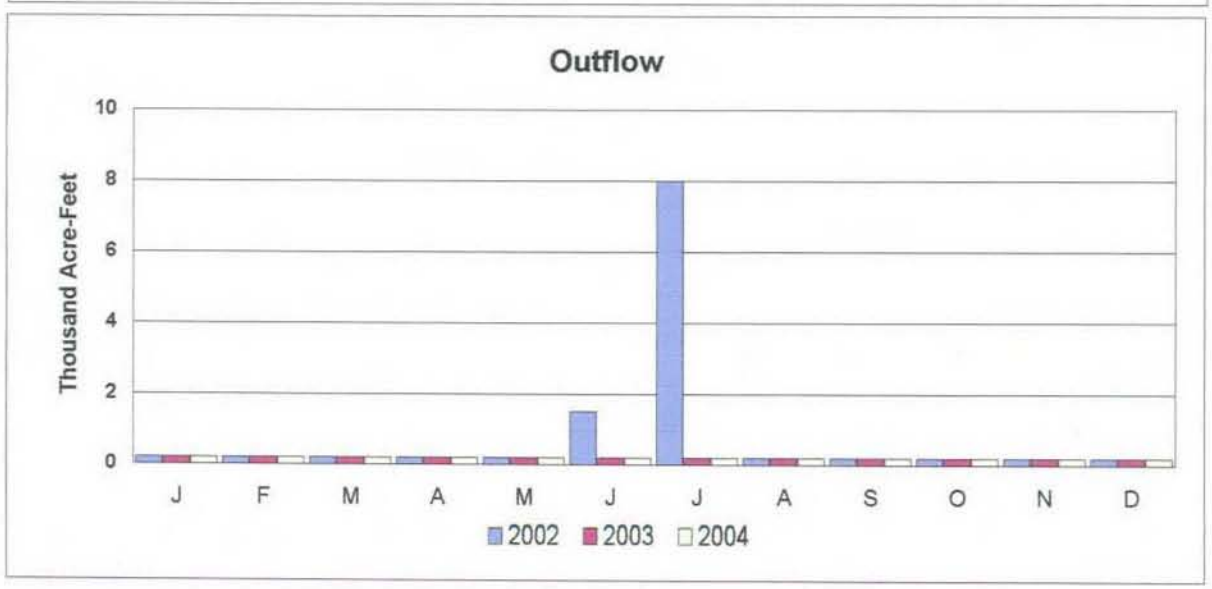
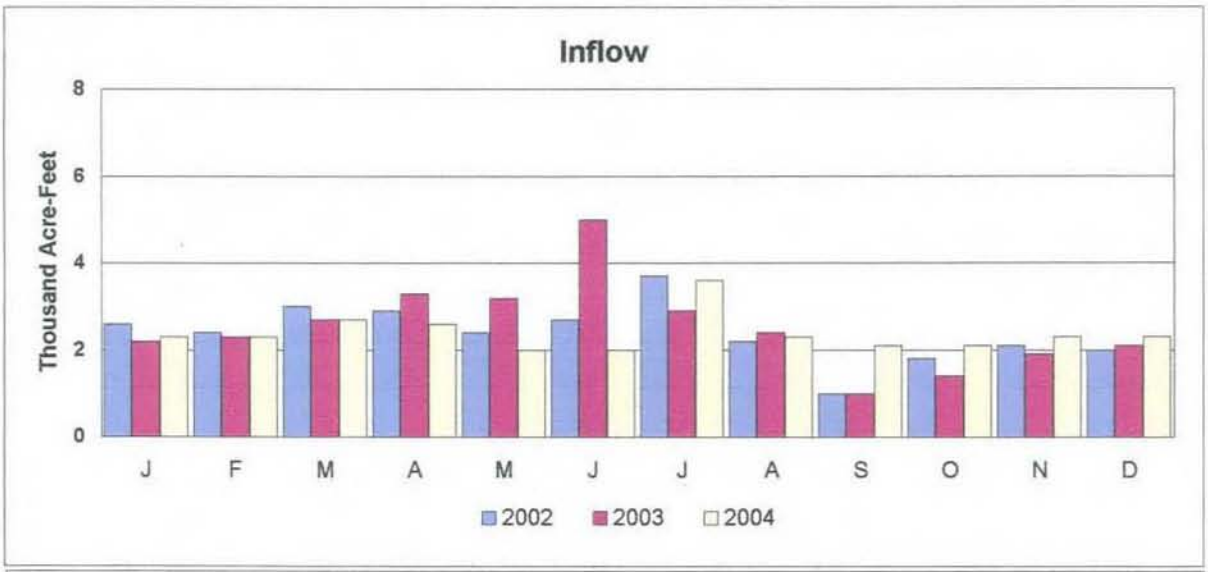
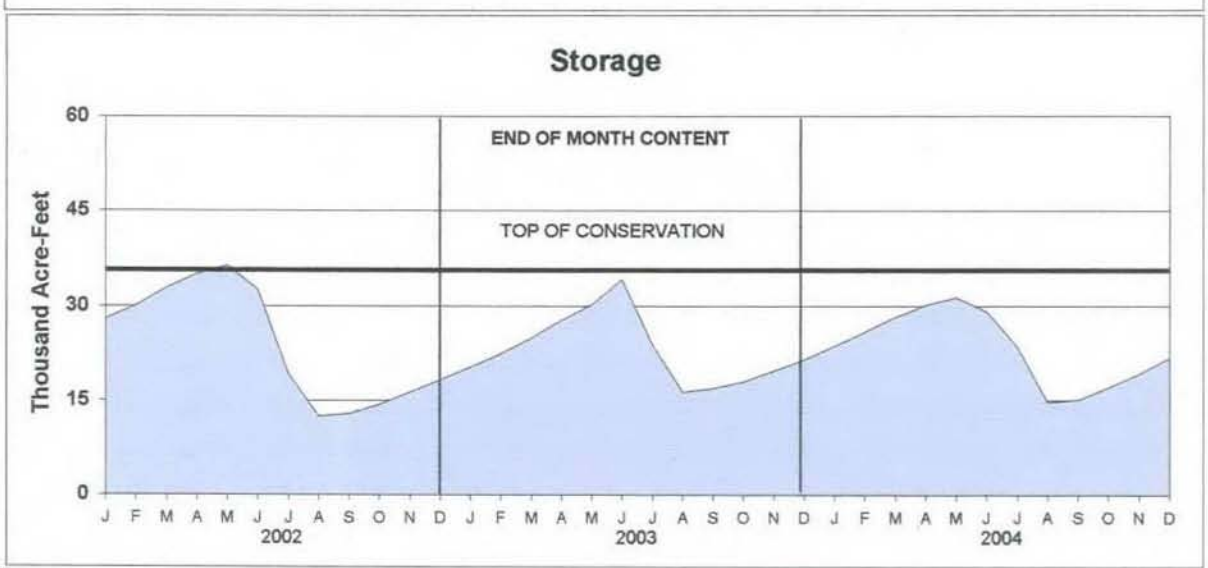


EXHIBIT 9A

HARRY STRUNK LAKE

ACTUAL OPERATION





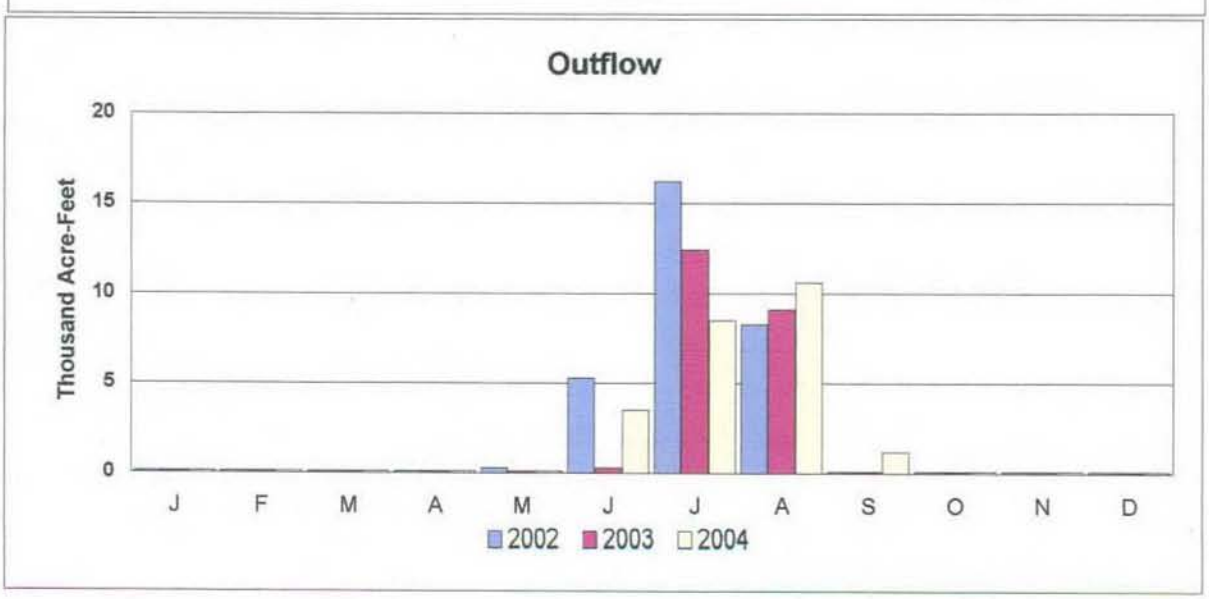
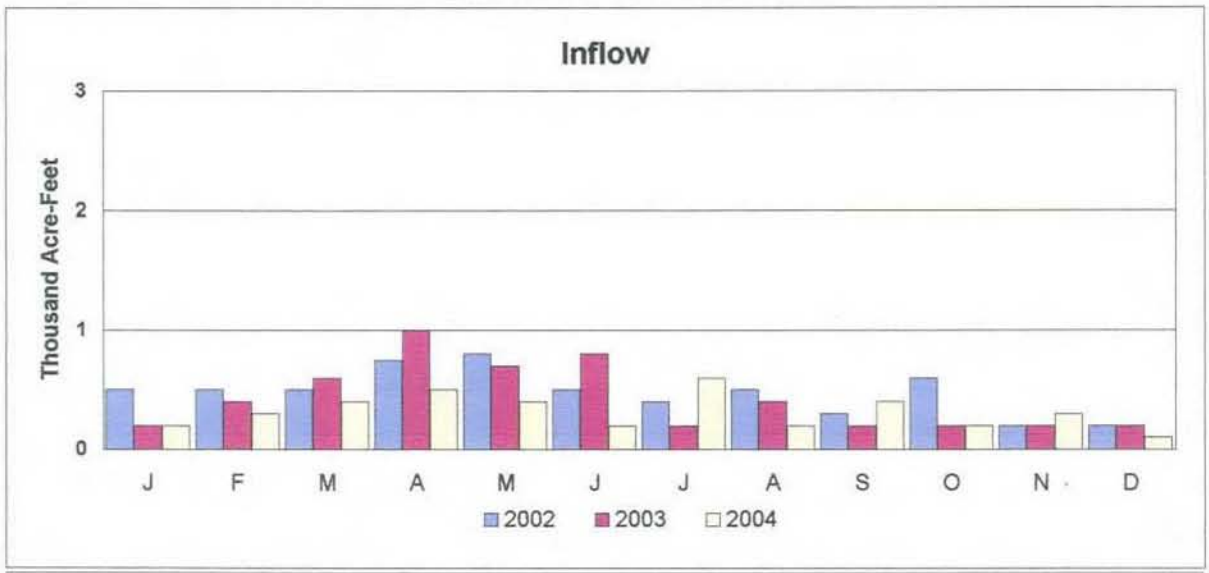
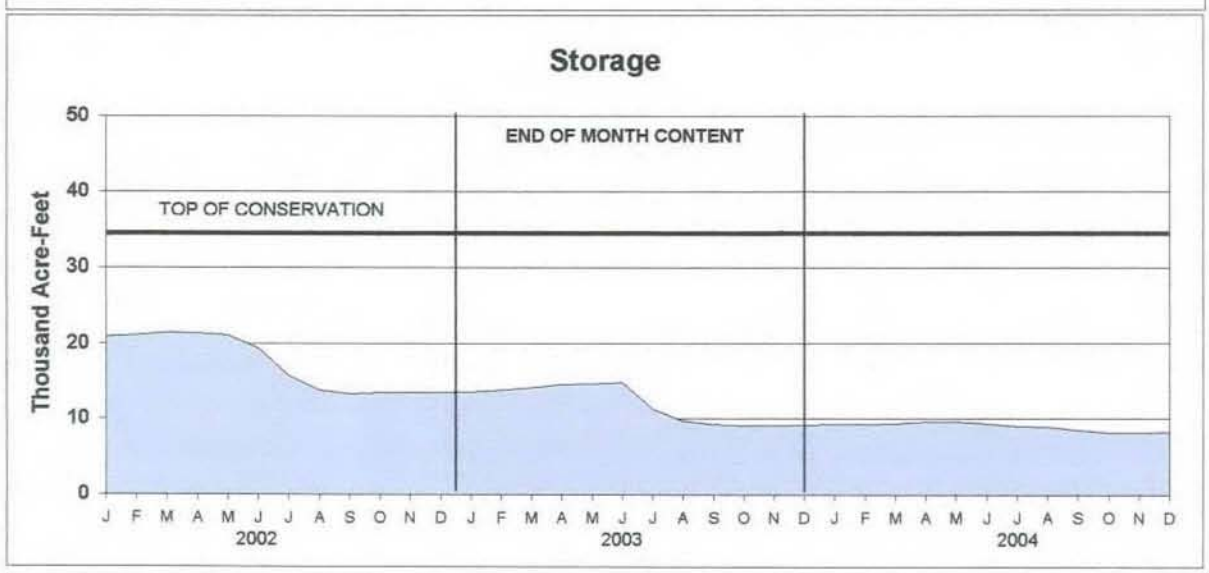


EXHIBIT 10A

KEITH SEBELIUS LAKE

ACTUAL OPERATION





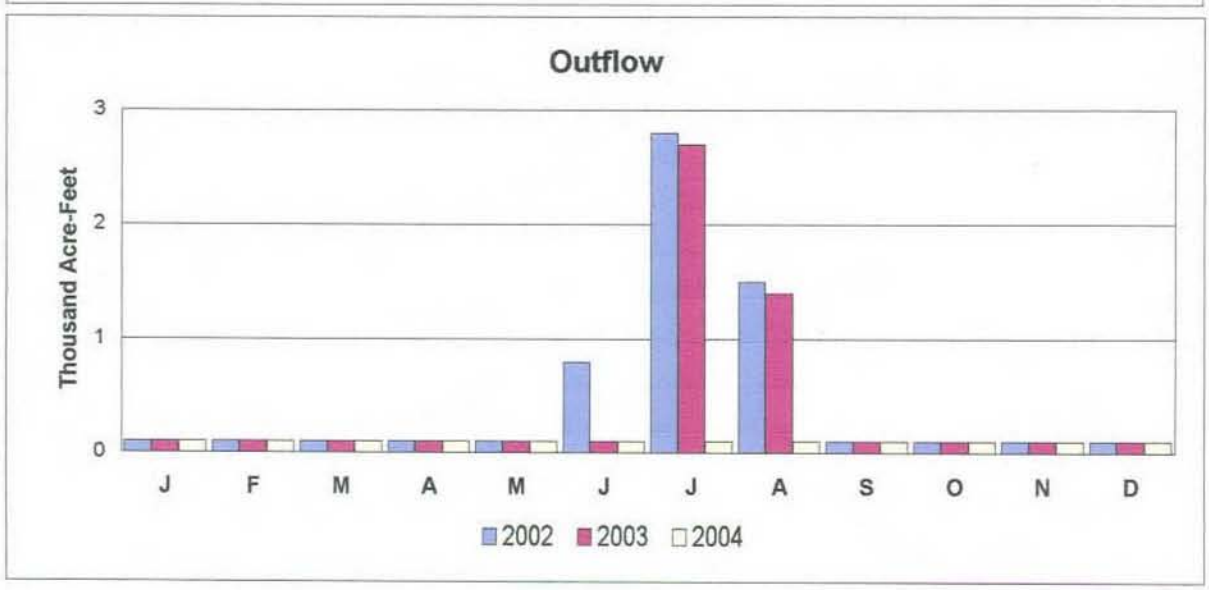
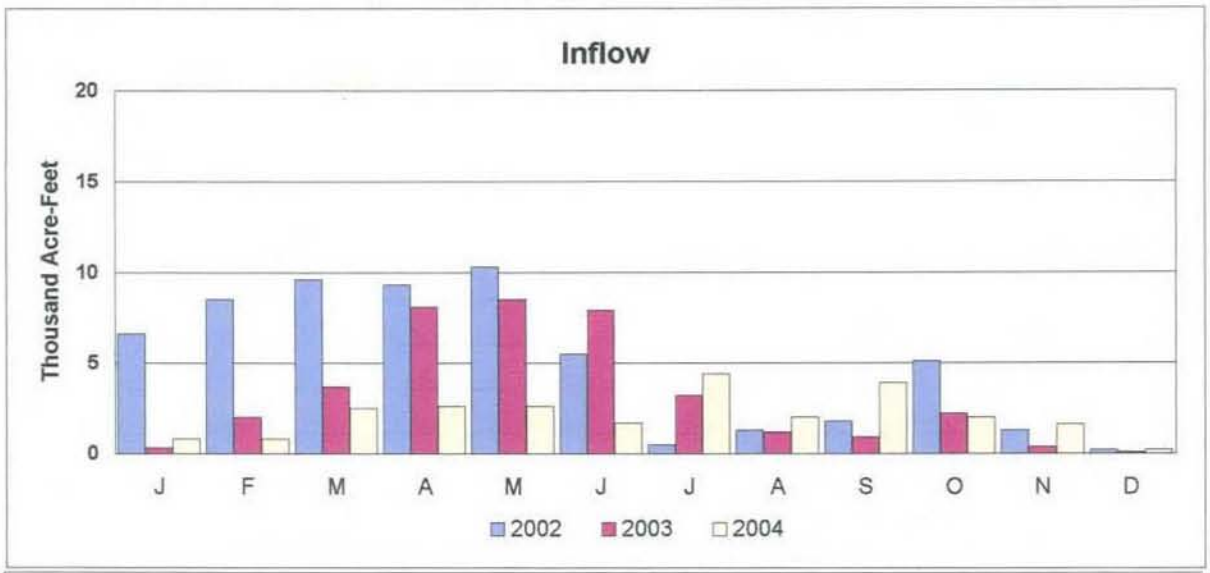
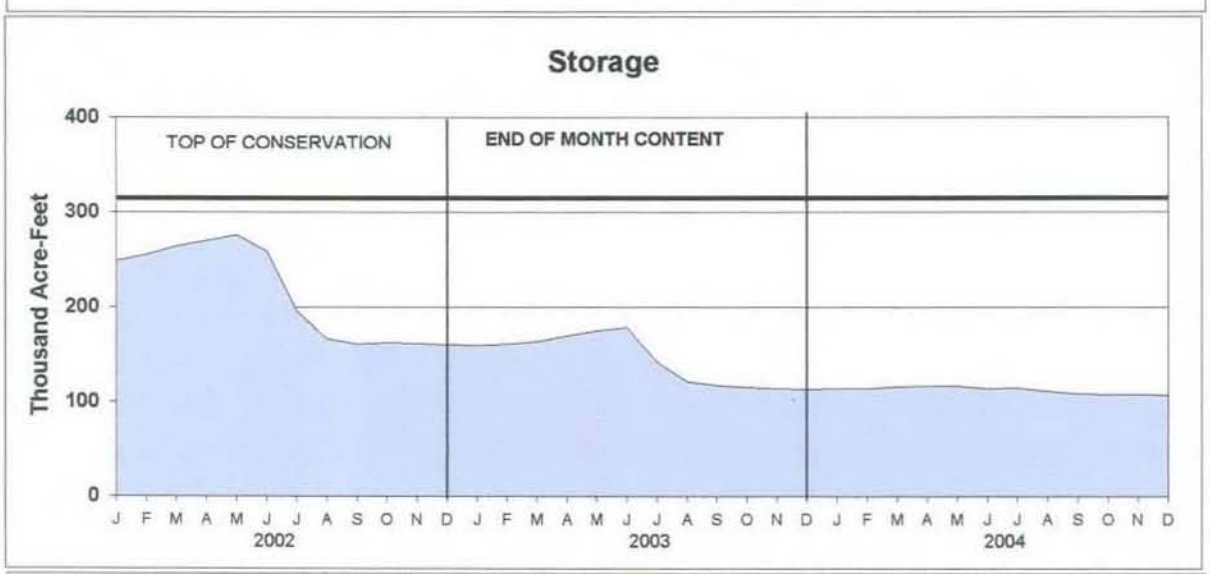


EXHIBIT 11A

HARLAN COUNTY LAKE

ACTUAL OPERATION





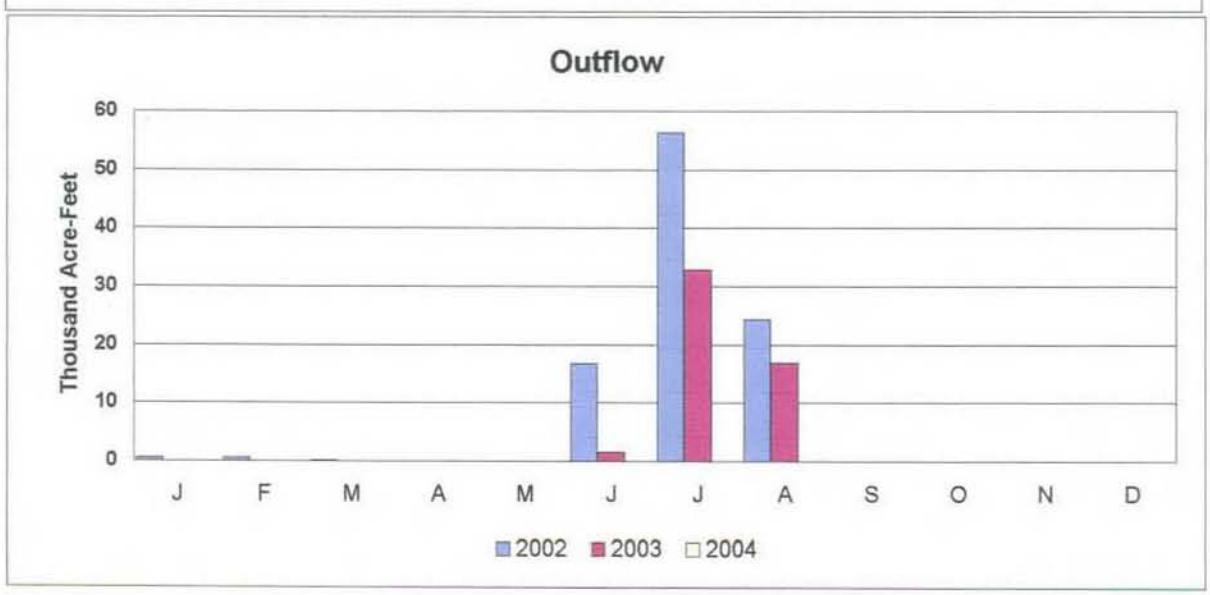
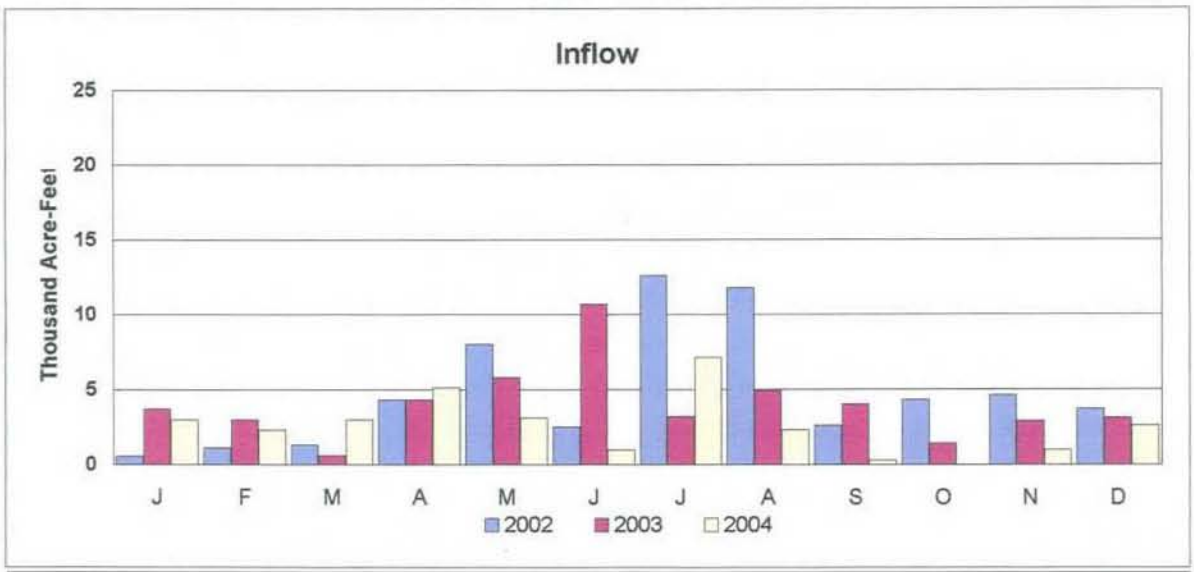
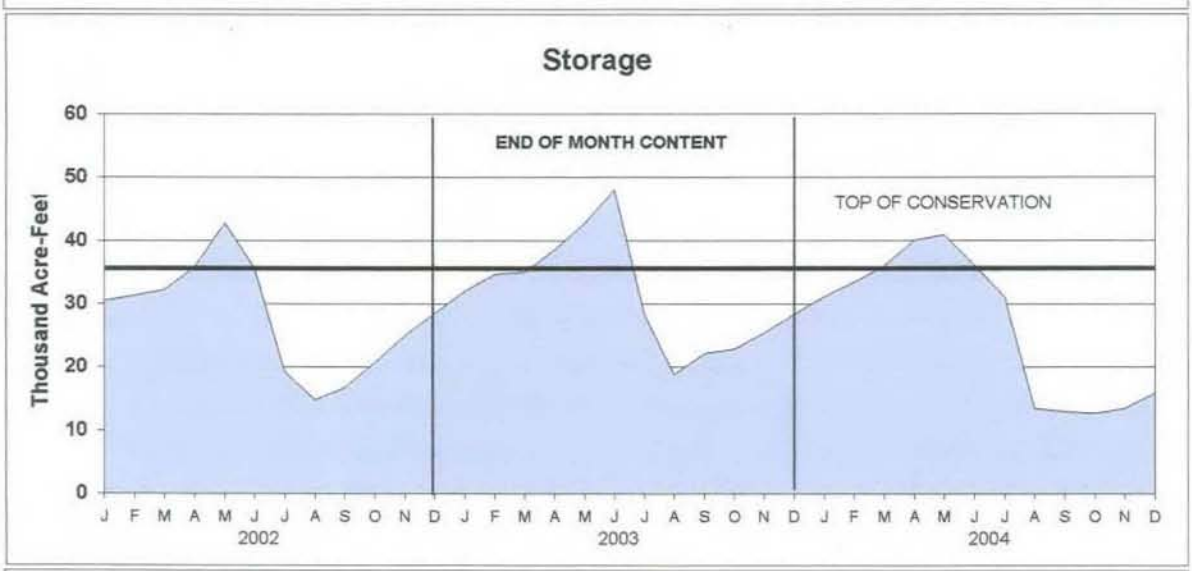


EXHIBIT 12A

LOVEWELL RESERVOIR

ACTUAL OPERATION





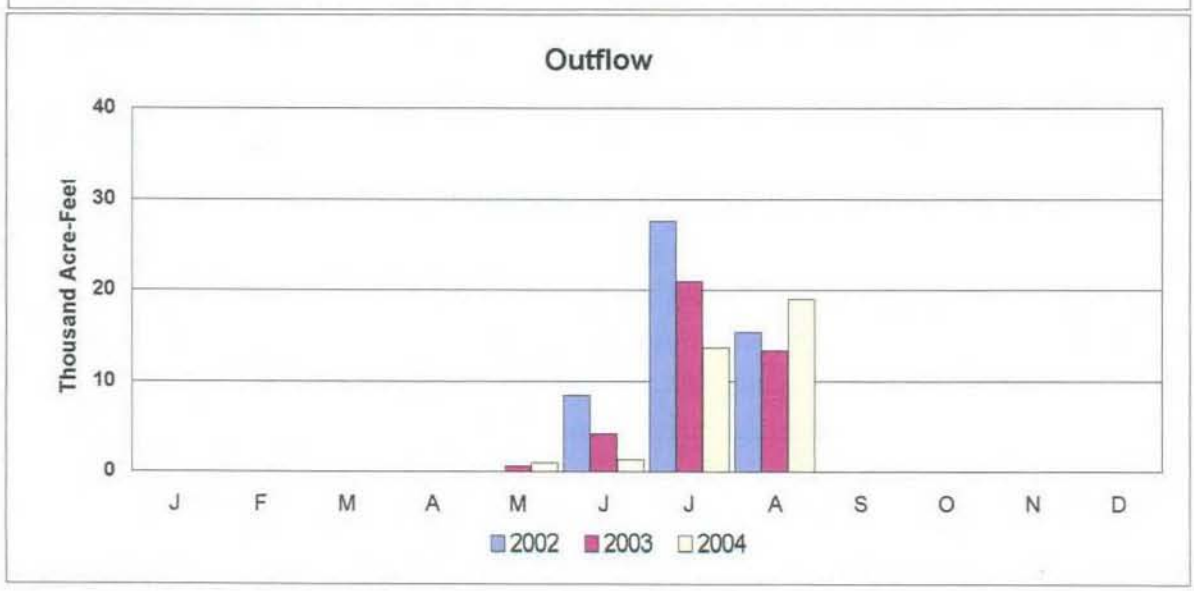
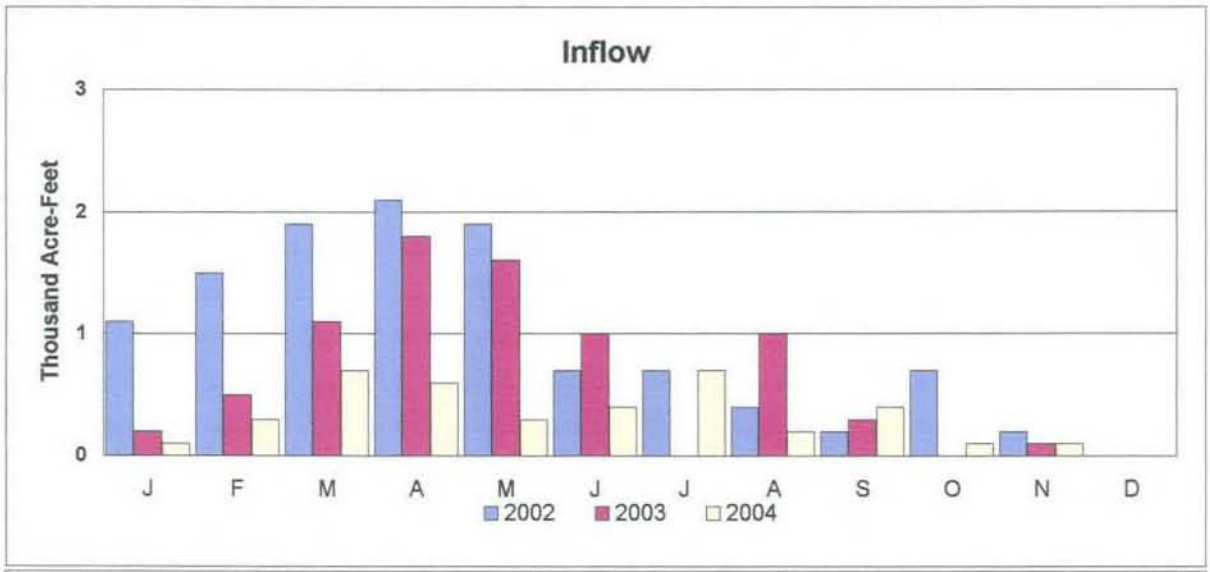
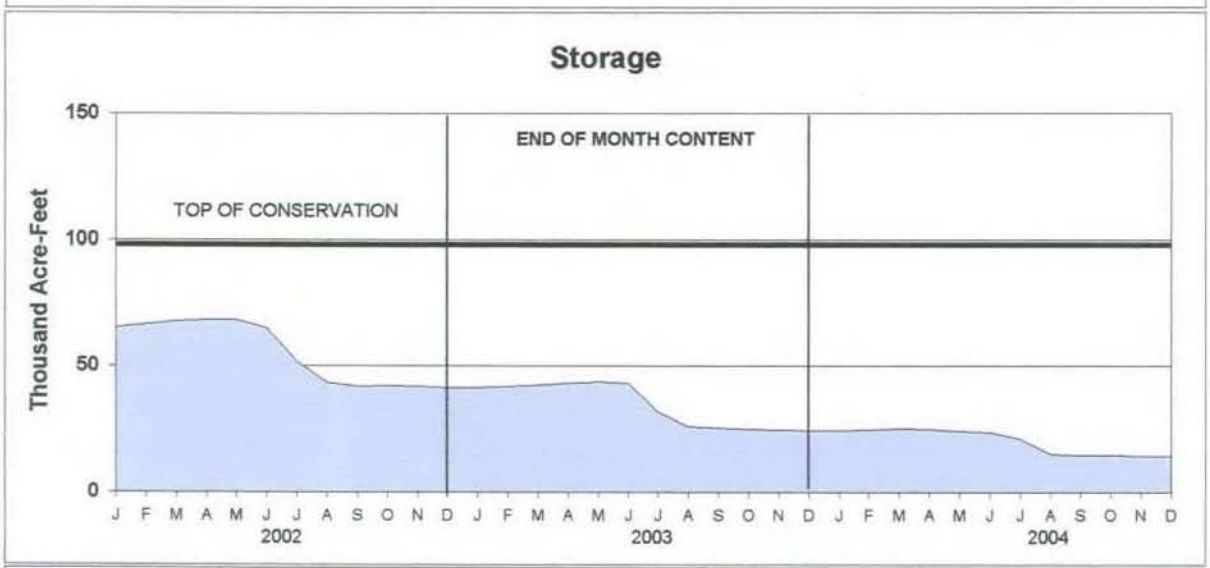


EXHIBIT 13A

KIRWIN RESERVOIR

ACTUAL OPERATION





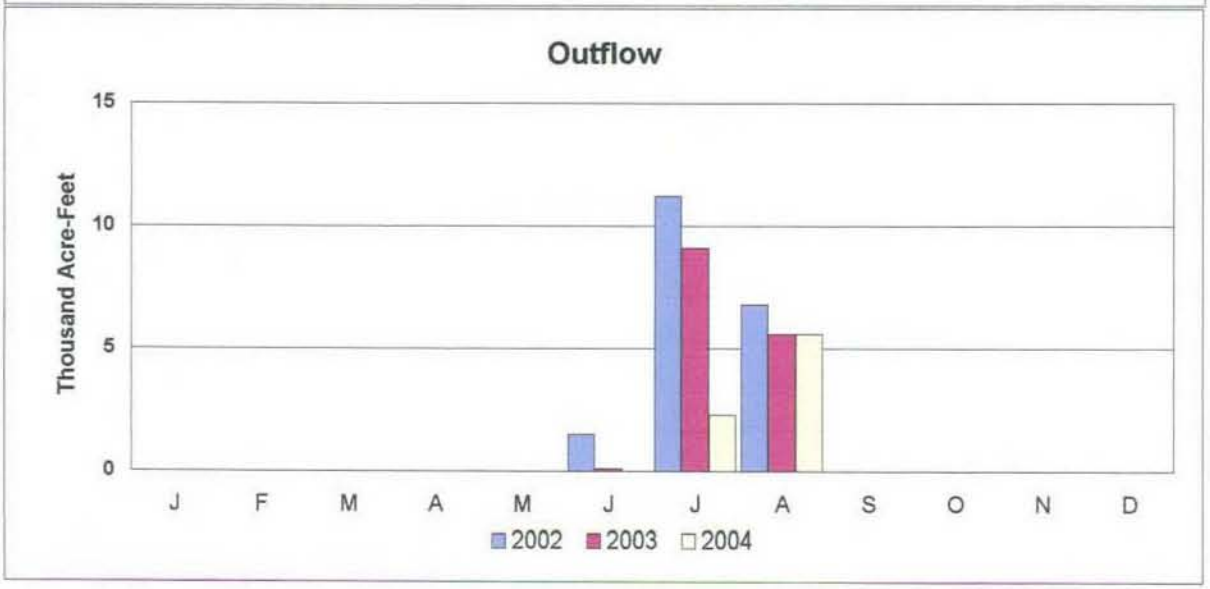
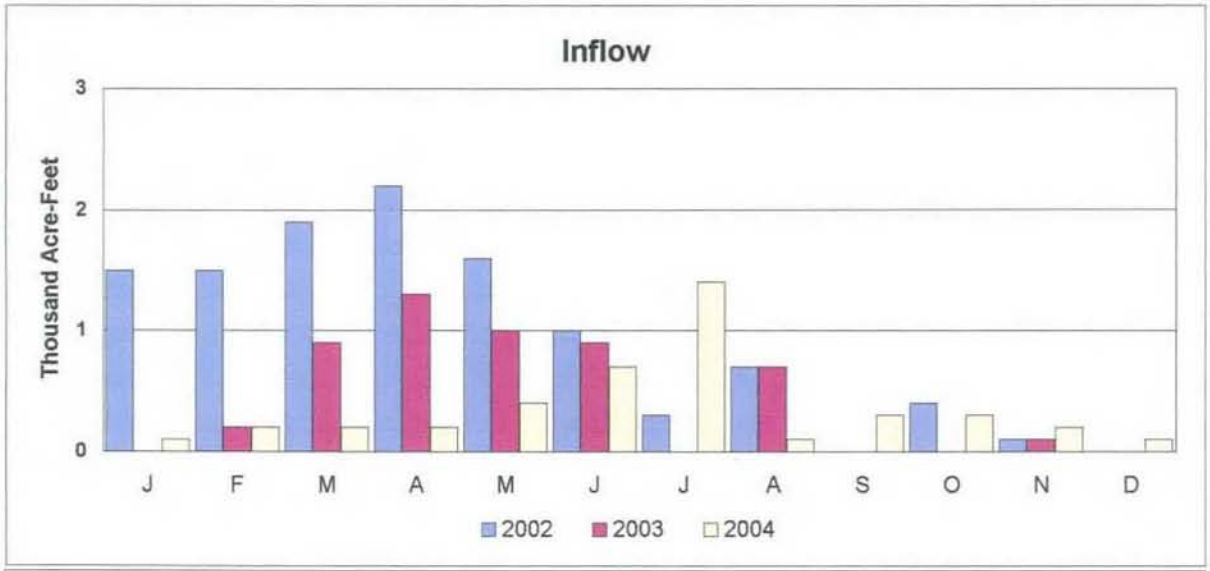
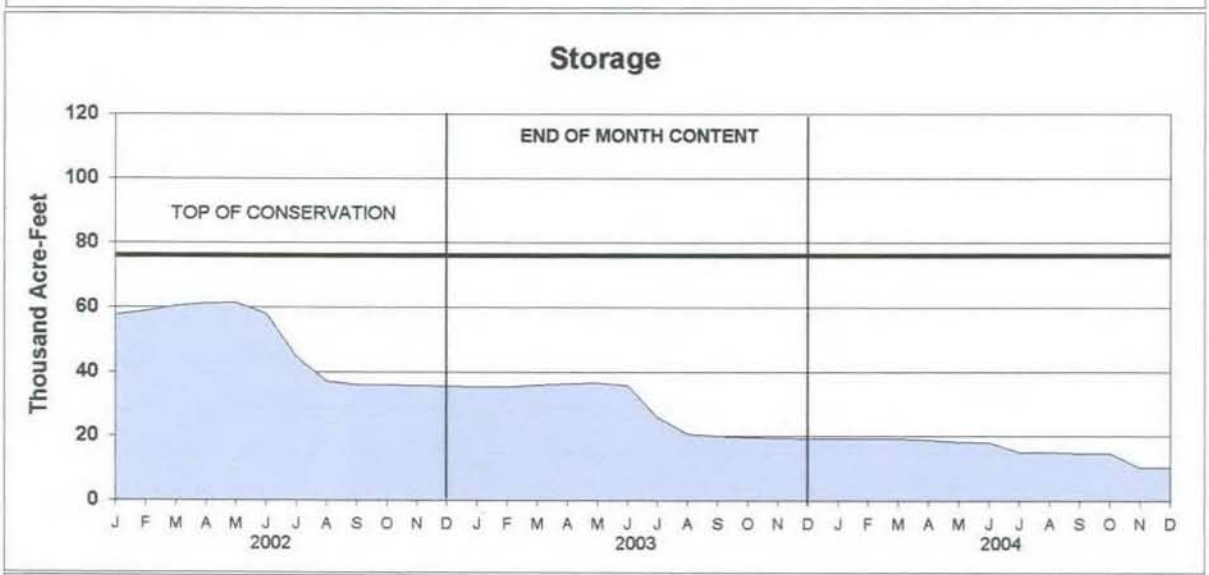


EXHIBIT 14A

WEBSTER RESERVOIR

ACTUAL OPERATION





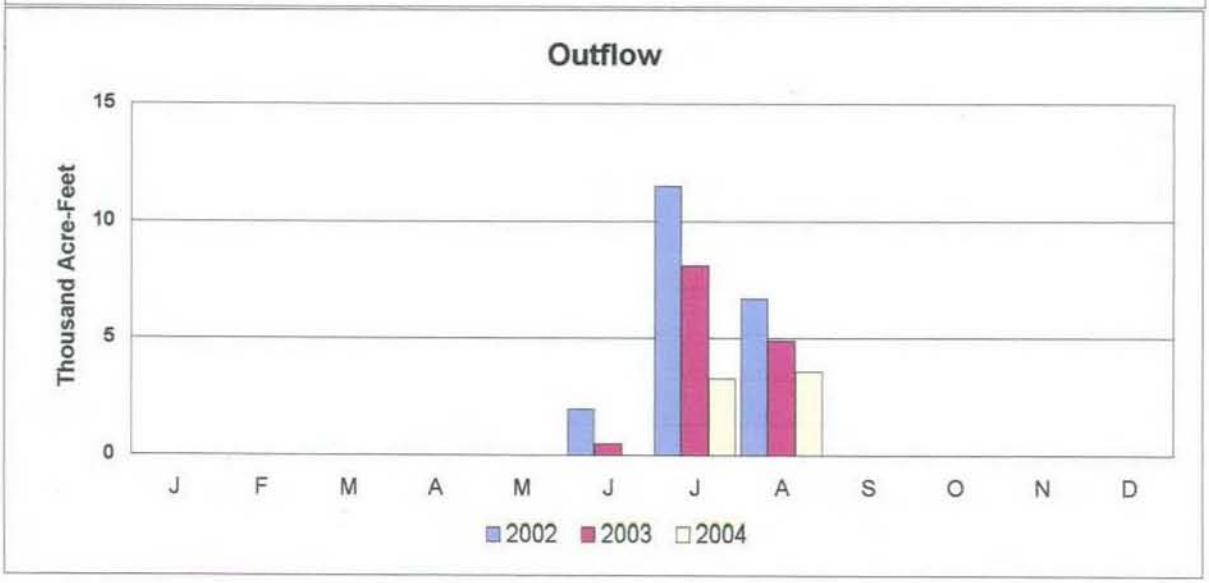
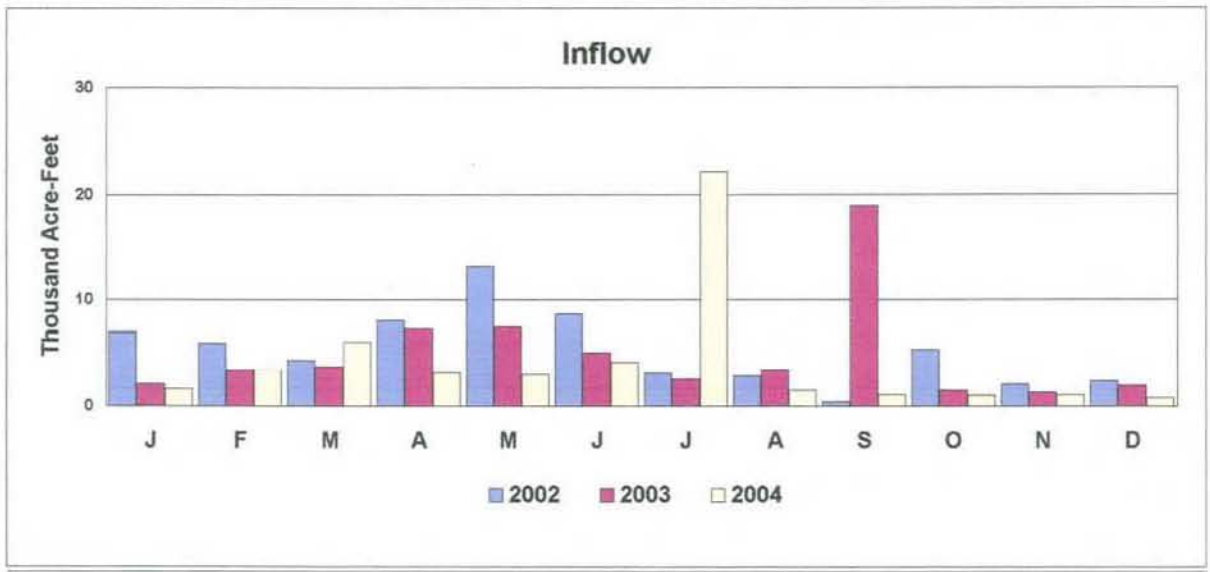
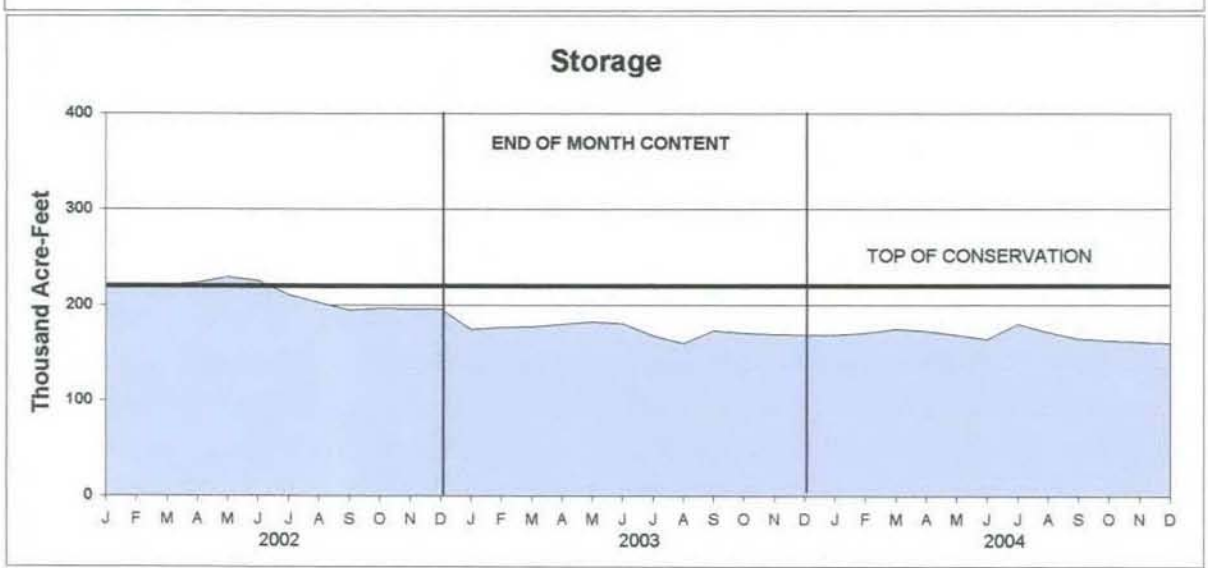


EXHIBIT 15A

WACONDA LAKE
ACTUAL OPERATION





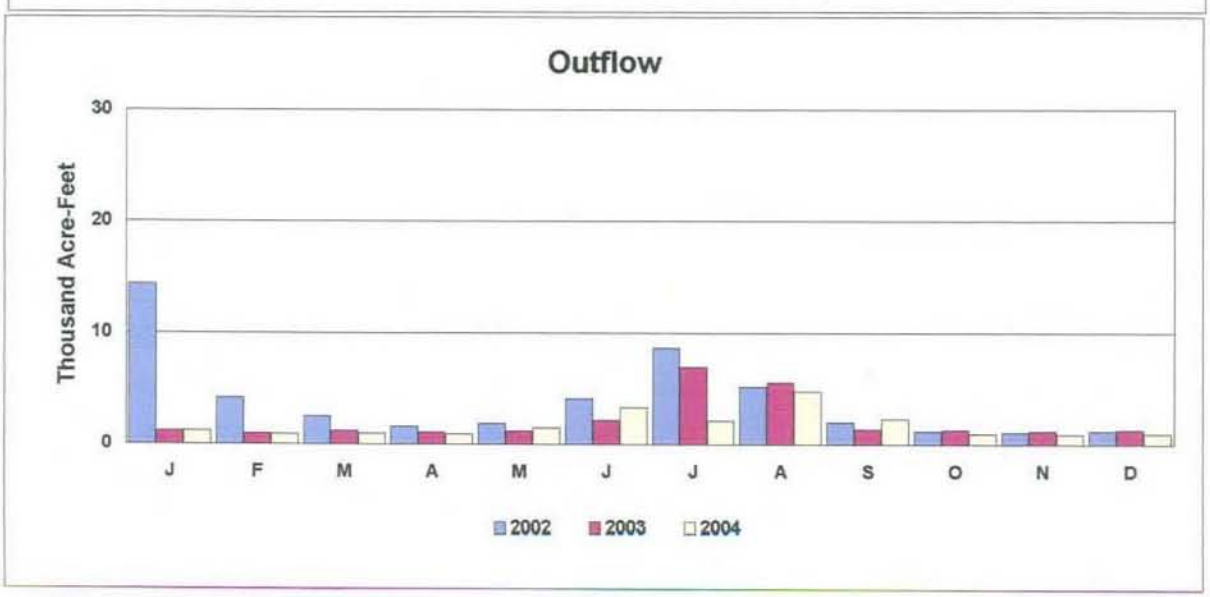
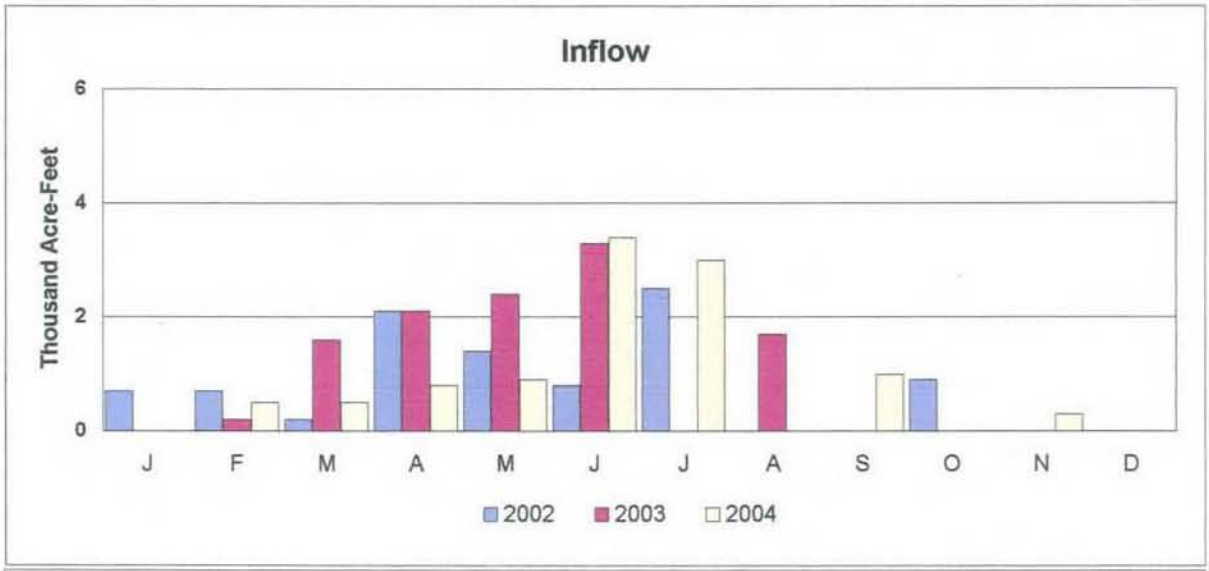
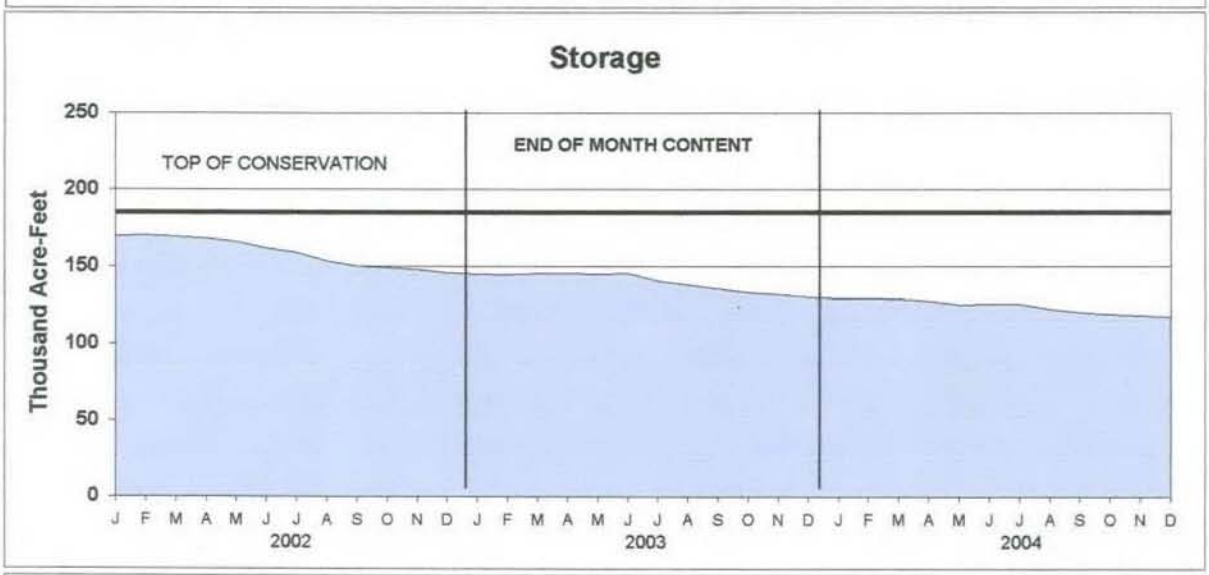


EXHIBIT 16A

CEDAR BLUFF RESERVOIR

ACTUAL OPERATION





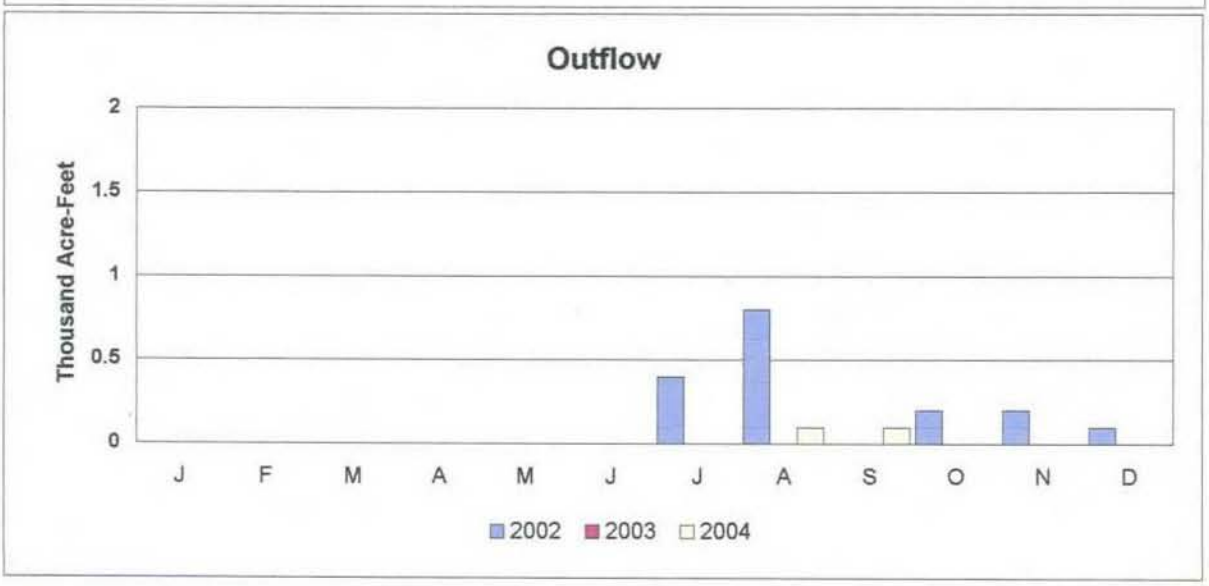
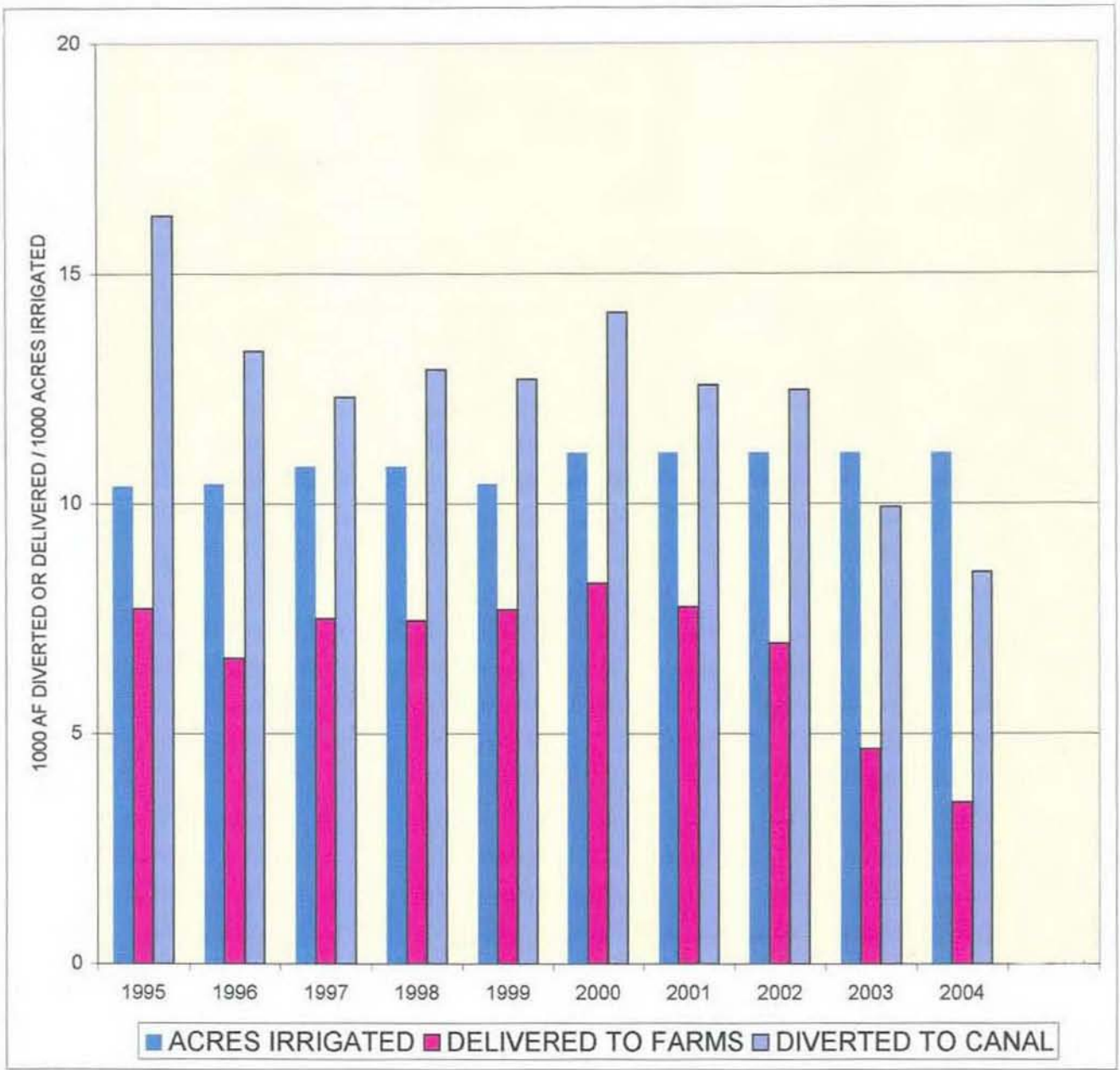


EXHIBIT 17

MIRAGE FLATS IRRIGATION DISTRICT

CANAL DIV., FARM DEL., AND ACRES IRRIG.

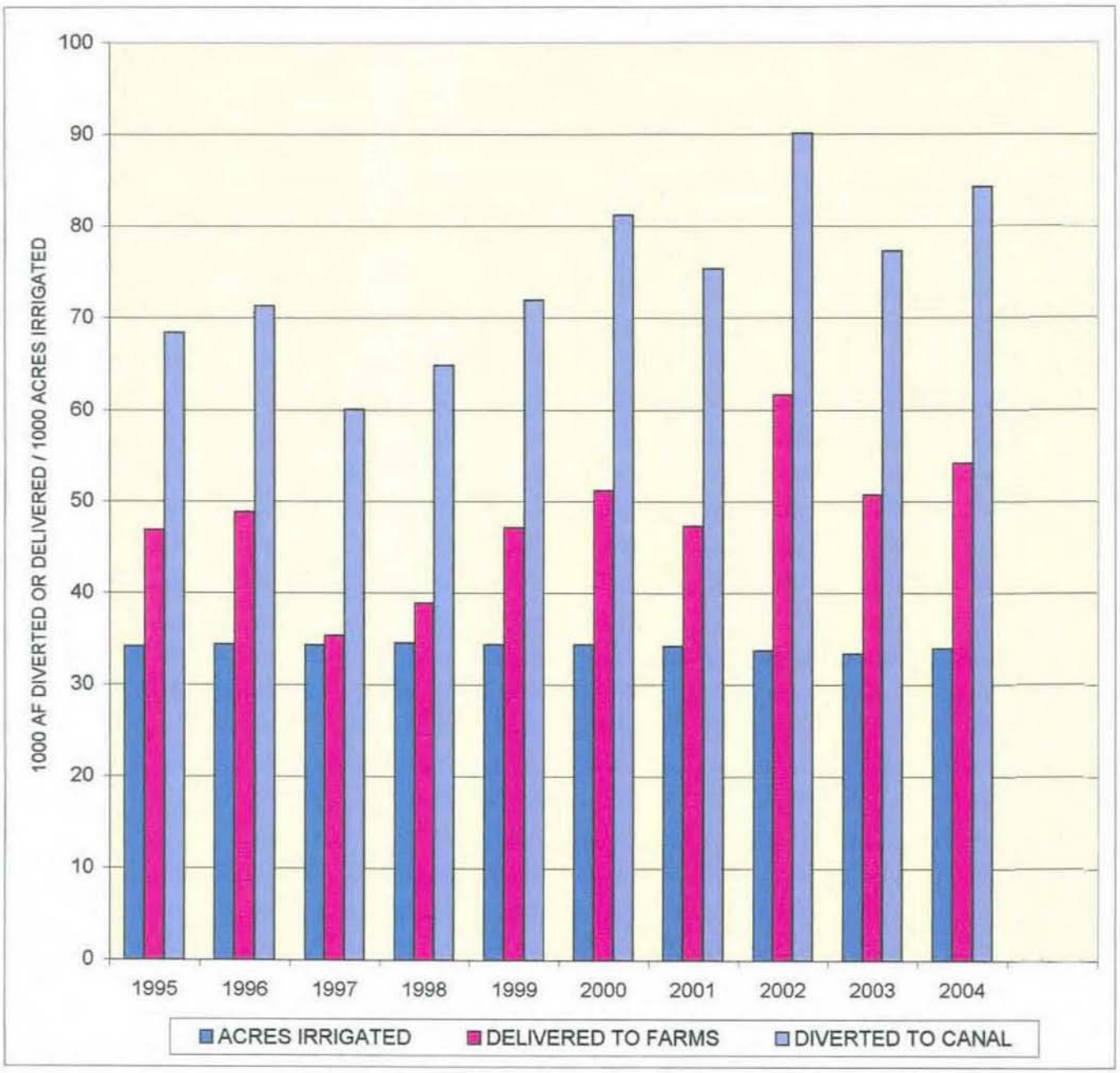


	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
DIVERTED af/acre	1.57	1.28	1.14	1.20	1.22	1.28	1.13	1.12	0.90	0.77
DELIVERED af/acre	0.74	0.64	0.70	0.69	0.74	0.75	0.70	0.63	0.42	0.32
EFFICIENCY	48%	50%	61%	58%	61%	58%	62%	56%	47%	41%

EXHIBIT 18

AINSWORTH IRRIGATION DISTRICT

CANAL DIV., FARM DEL., AND ACRES IRRIG.

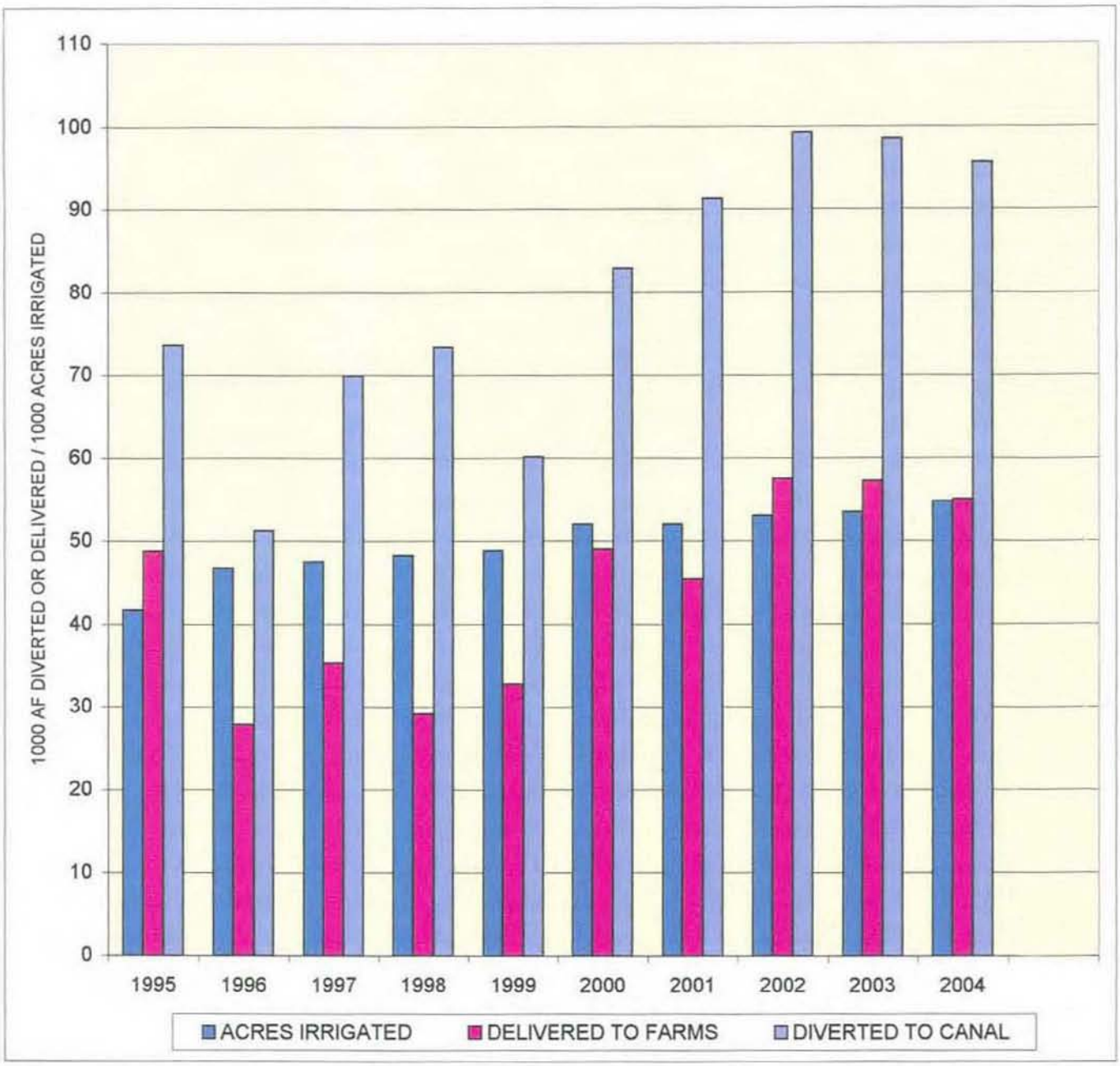


	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
DIVERTED af/acre	2.00	2.07	1.75	1.87	2.09	2.36	2.20	2.67	2.31	2.48
DELIVERED af/acre	1.37	1.42	1.03	1.13	1.37	1.49	1.38	1.83	1.52	1.59
EFFICIENCY	68%	68%	59%	60%	66%	63%	63%	68%	66%	64%

EXHIBIT 19

TWIN LOUPS IRRIGATION DISTRICT

CANAL DIV., FARM DEL., AND ACRES IRRIG.

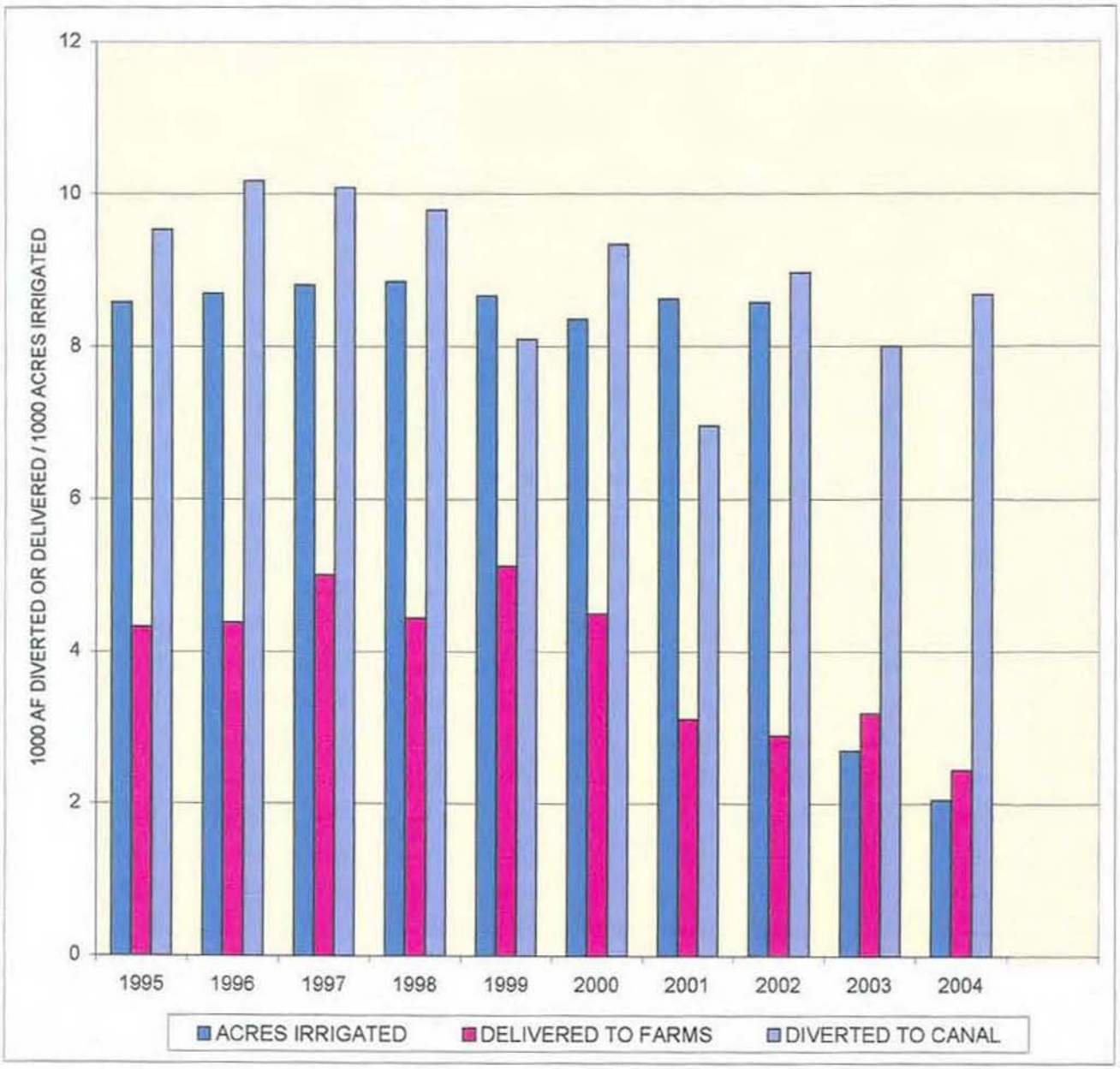


	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
DIVERTED af/acre	1.76	1.10	1.47	1.52	1.23	1.60	1.76	1.87	1.84	1.75
DELIVERED af/acre	1.17	0.60	0.74	0.60	0.67	0.94	0.88	1.09	1.07	1.00
EFFICIENCY	66%	54%	51%	40%	55%	59%	50%	58%	58%	58%

EXHIBIT 20

FRENCHMAN VALLEY IRRIGATION DISTRICT

CANAL DIV., FARM DEL., AND ACRES IRRIG.

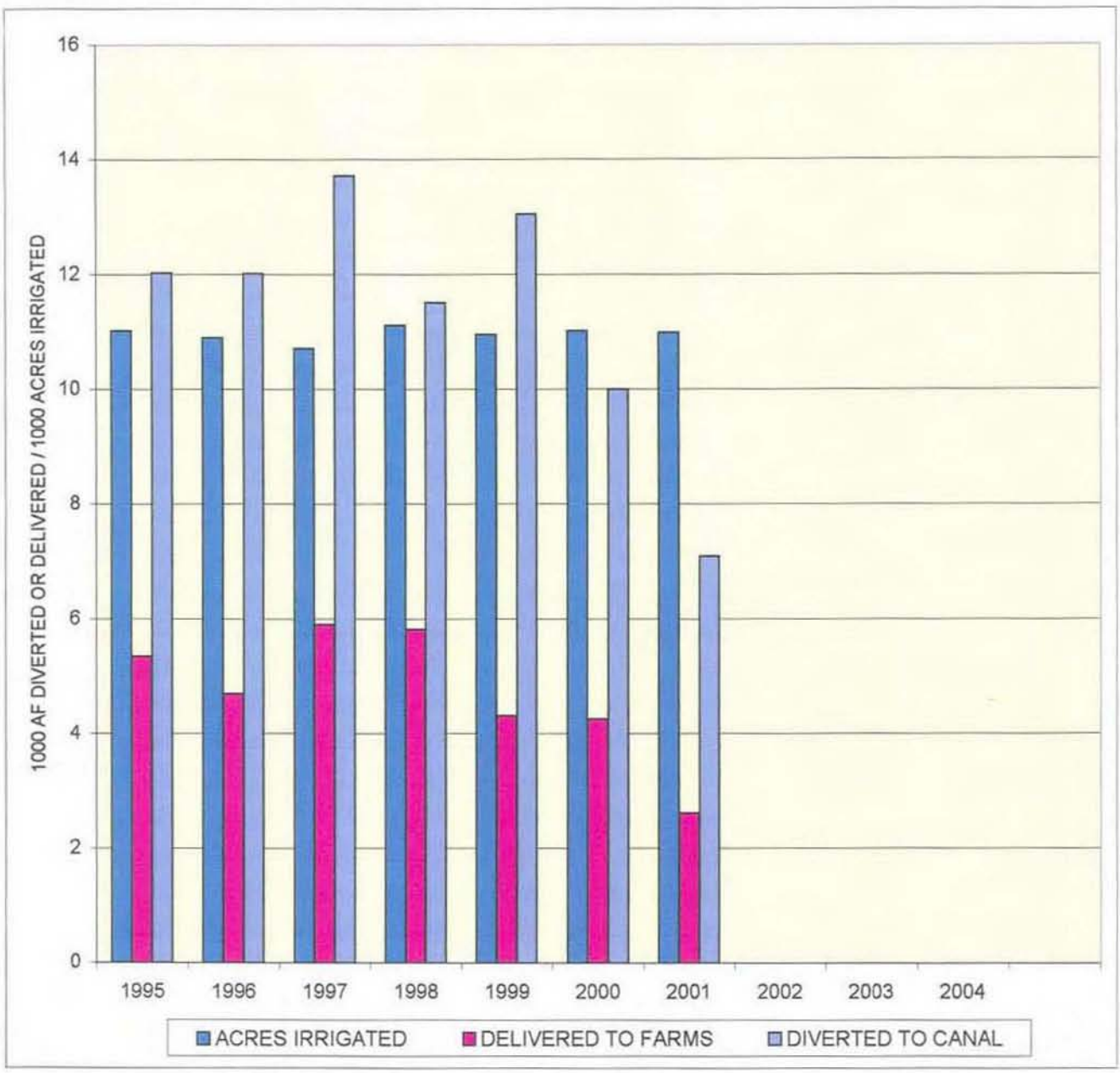


	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
DIVERTED af/acre	1.11	1.17	1.14	1.11	0.93	1.12	0.81	1.05	2.97	4.24
DELIVERED af/acre	0.50	0.50	0.57	0.50	0.59	0.54	0.36	0.34	1.18	1.19
EFFICIENCY	45%	43%	50%	45%	63%	48%	45%	32%	40%	28%

EXHIBIT 21

H AND RW IRRIGATION DISTRICT

CANAL DIV., FARM DEL., AND ACRES IRRIG.

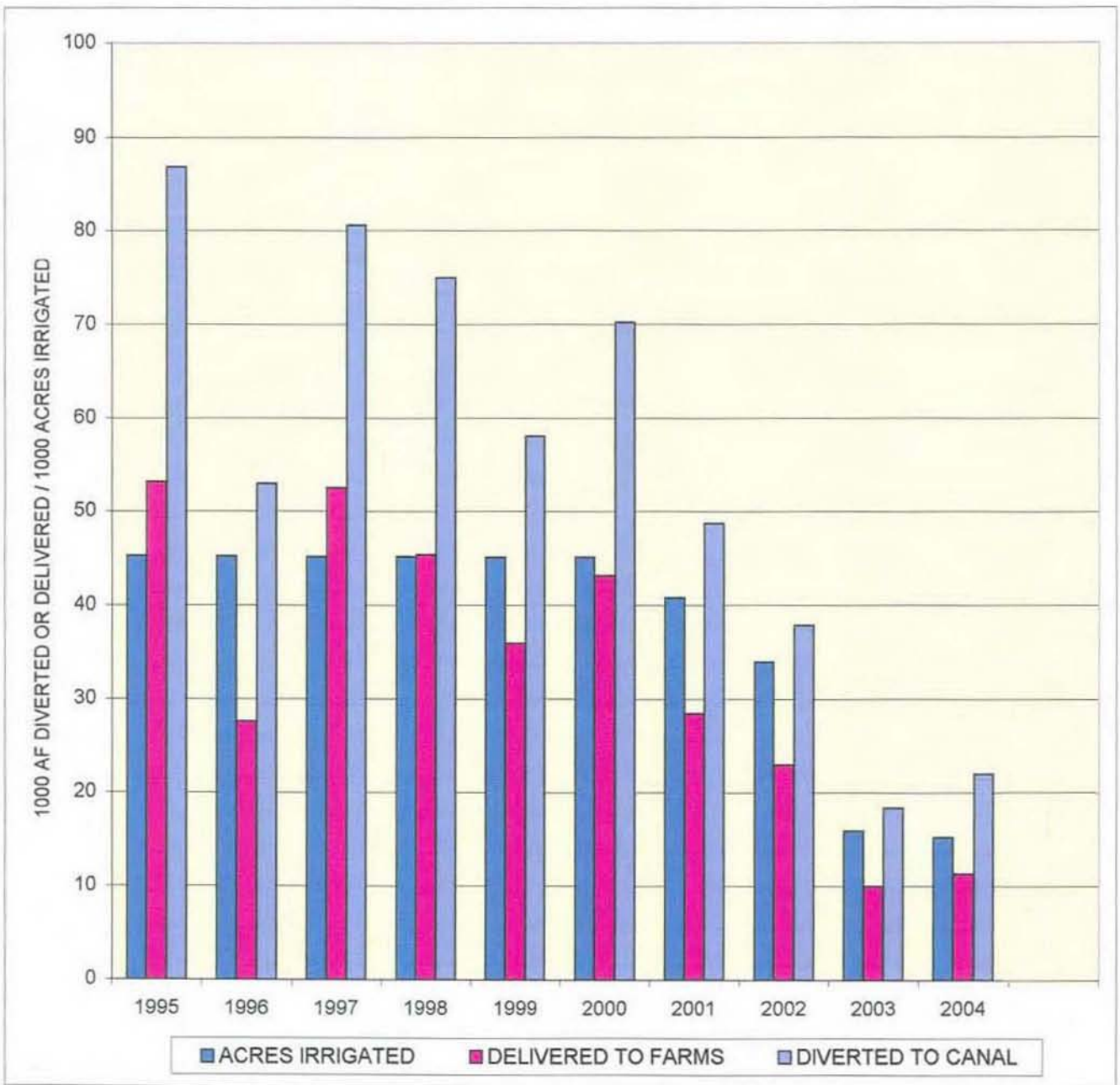


	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
DIVERTED af/acre	1.09	1.10	1.28	1.03	1.19	0.91	0.65	0.00	0.00	0.00
DELIVERED af/acre	0.48	0.43	0.55	0.52	0.39	0.39	0.24	0.00	0.00	0.00
EFFICIENCY	44%	39%	43%	51%	33%	43%	37%	0%	0%	0%

EXHIBIT 22

FRENCHMAN-CAMBRIDGE IRRIGATION DISTRICT

CANAL DIV., FARM DEL., AND ACRES IRRIG.

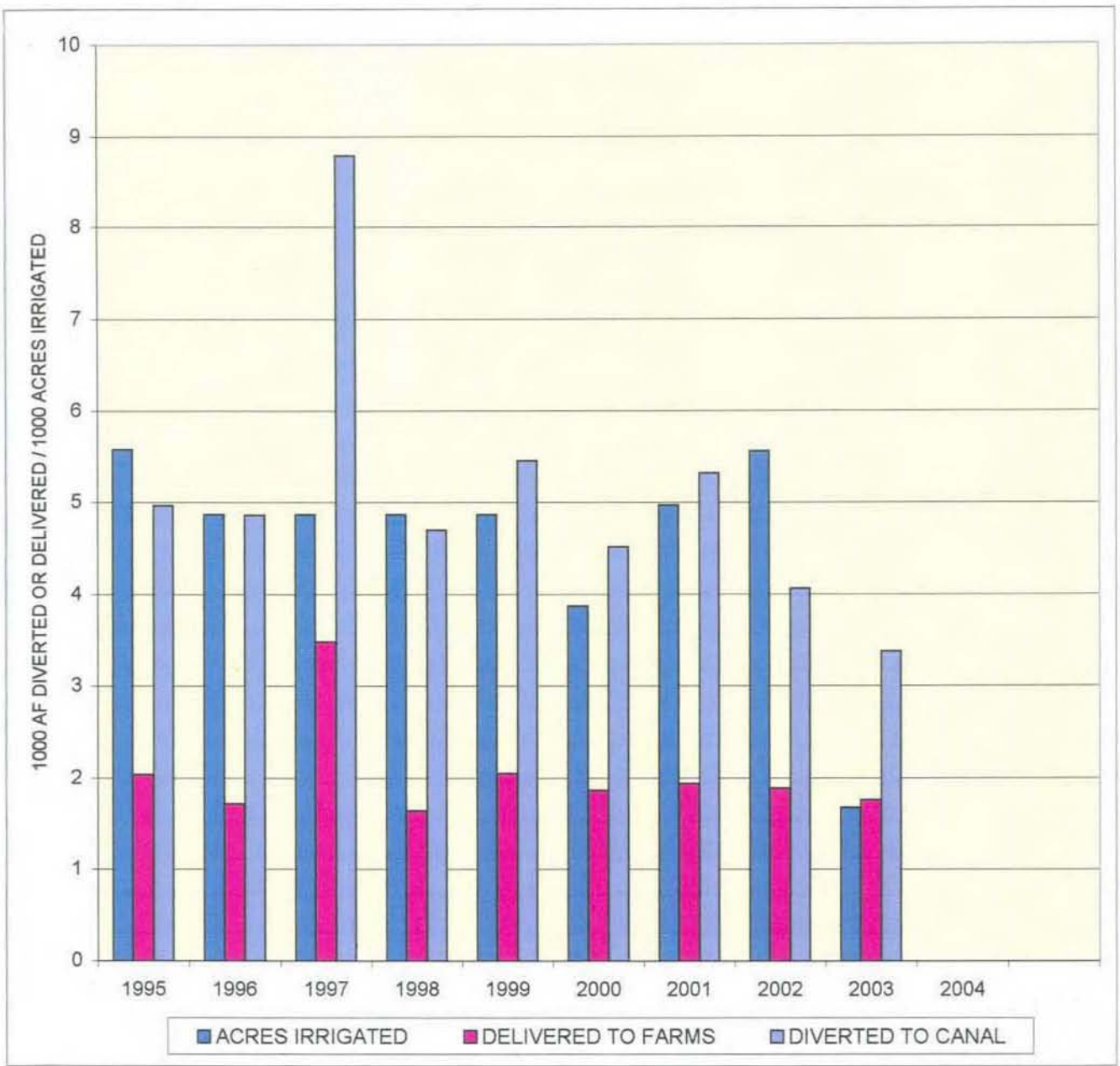


	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
DIVERTED af/acre	1.92	1.17	1.79	1.66	1.29	1.56	1.19	1.12	1.15	1.45
DELIVERED af/acre	1.17	0.61	1.16	1.00	0.80	0.96	0.70	0.67	0.63	0.74
EFFICIENCY	61%	52%	65%	60%	62%	61%	58%	61%	55%	52%

EXHIBIT 23

ALMENA IRRIGATION DISTRICT

CANAL DIV., FARM DEL., AND ACRES IRRIG.

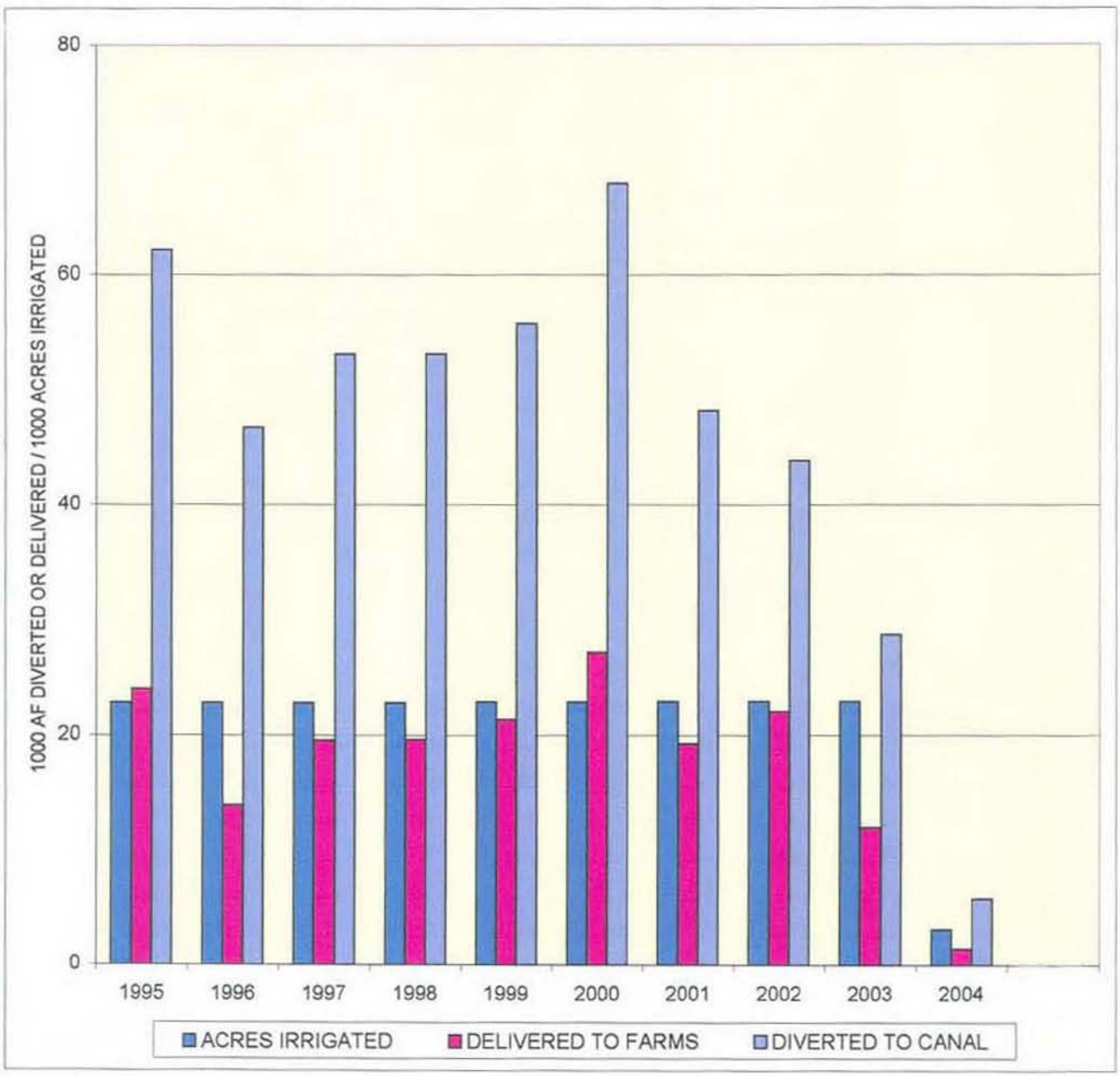


	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
DIVERTED af/acre	0.89	1.00	1.81	0.97	1.12	1.17	1.07	0.73	2.02	0.00
DELIVERED af/acre	0.37	0.35	0.72	0.34	0.42	0.48	0.39	0.34	1.05	0.00
EFFICIENCY	41%	35%	40%	35%	38%	41%	36%	46%	52%	0%

EXHIBIT 24

BOSTWICK IRRIGATION DISTRICT - NEBRASKA

CANAL DIV., FARM DEL., AND ACRES IRRIG.

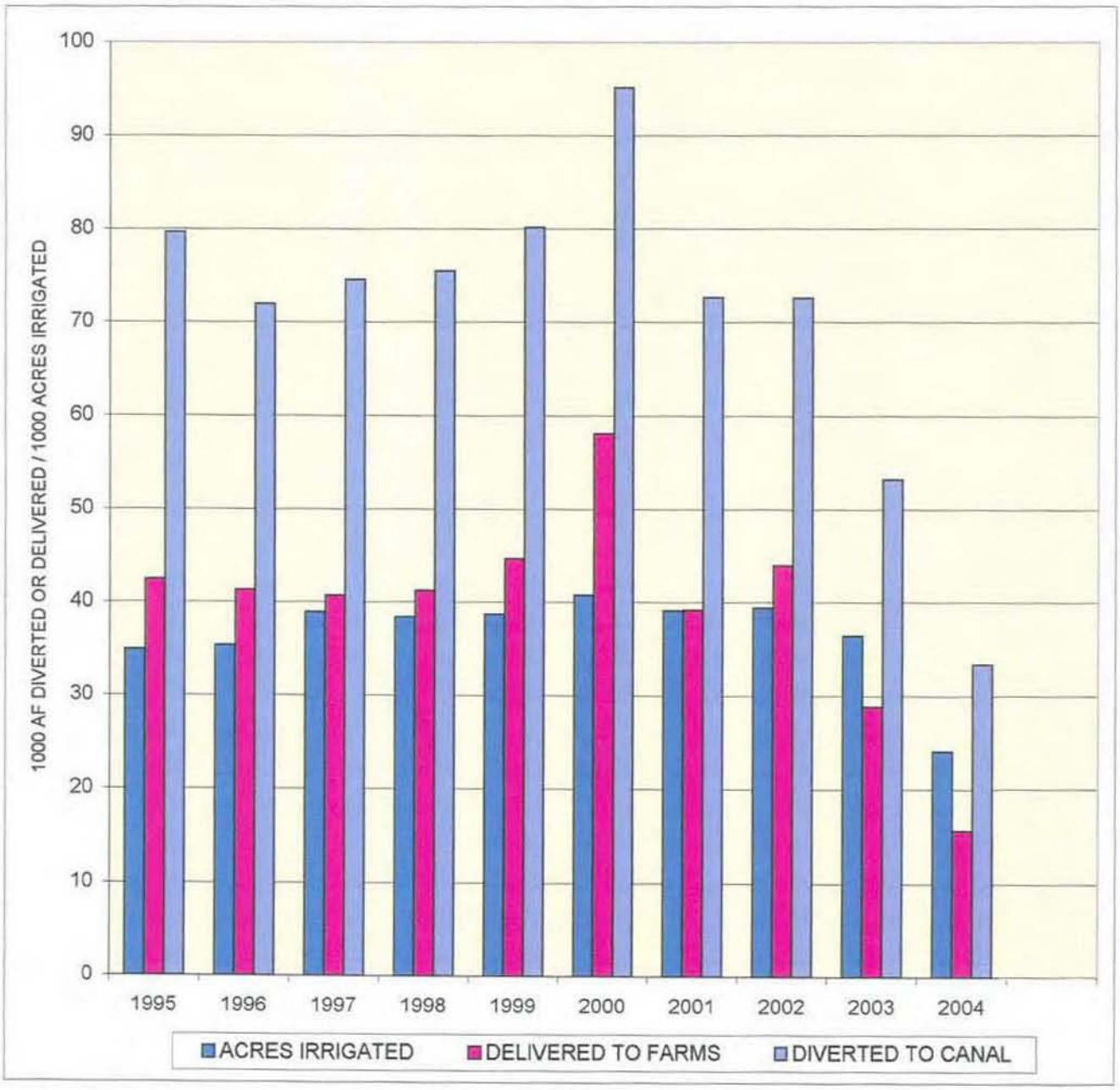


	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
DIVERTED af/acre	2.73	2.05	2.33	2.33	2.44	2.97	2.10	1.91	1.25	1.85
DELIVERED af/acre	1.05	0.61	0.86	0.86	0.93	1.19	0.84	0.96	0.52	0.47
EFFICIENCY	39%	30%	37%	37%	38%	40%	40%	50%	42%	25%

EXHIBIT 25

KANSAS-BOSTWICK IRRIGATION DISTRICT

CANAL DIV., FARM DEL., AND ACRES IRRIG.

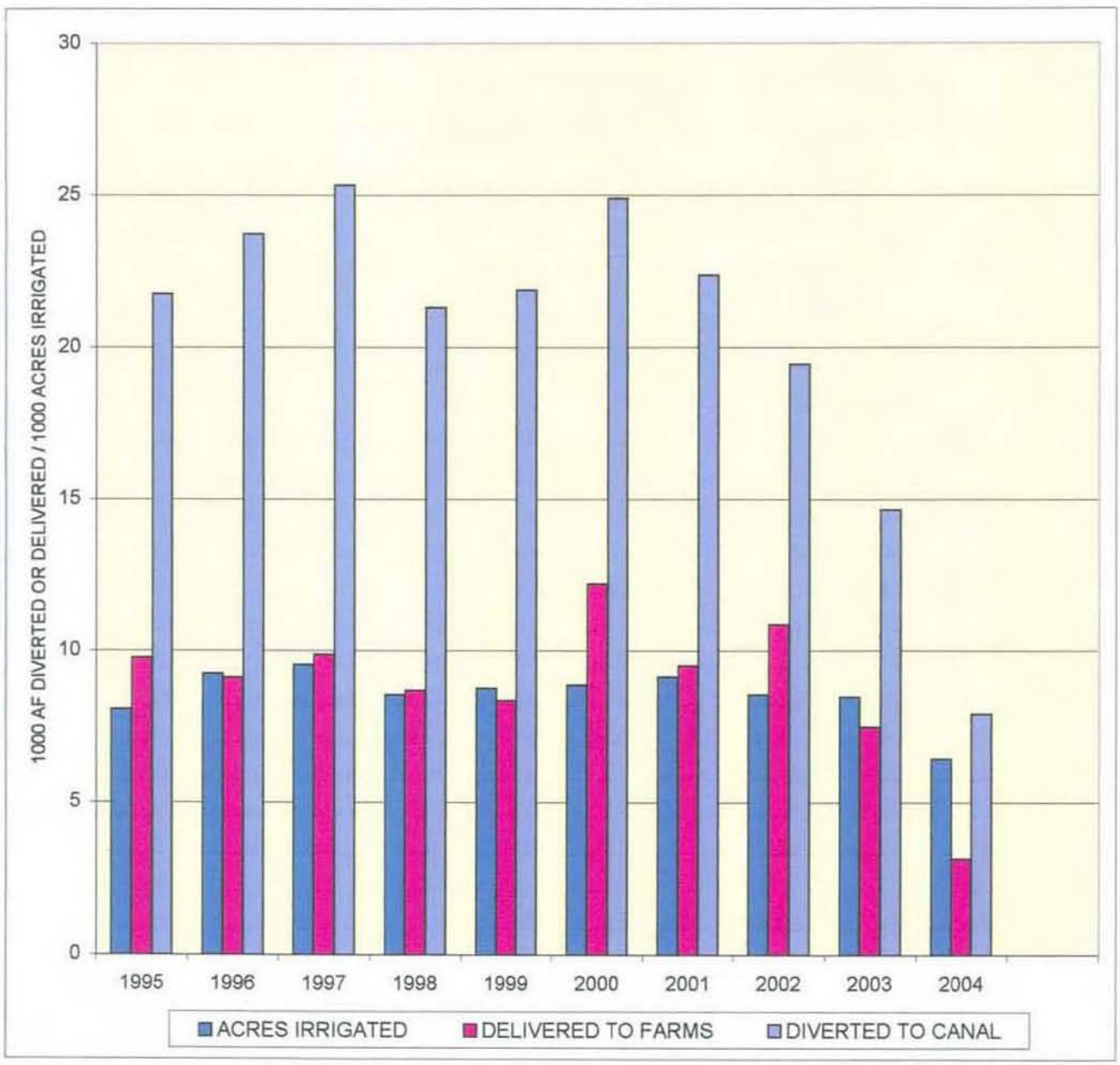


	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
DIVERTED af/acre	2.28	2.03	1.91	1.96	2.07	2.33	1.86	1.84	1.46	1.38
DELIVERED af/acre	1.22	1.16	1.04	1.07	1.15	1.42	1.00	1.11	0.79	0.65
EFFICIENCY	53%	57%	55%	55%	56%	61%	54%	61%	54%	47%

EXHIBIT 26

KIRWIN IRRIGATION DISTRICT

CANAL DIV., FARM DEL., AND ACRES IRRIG.

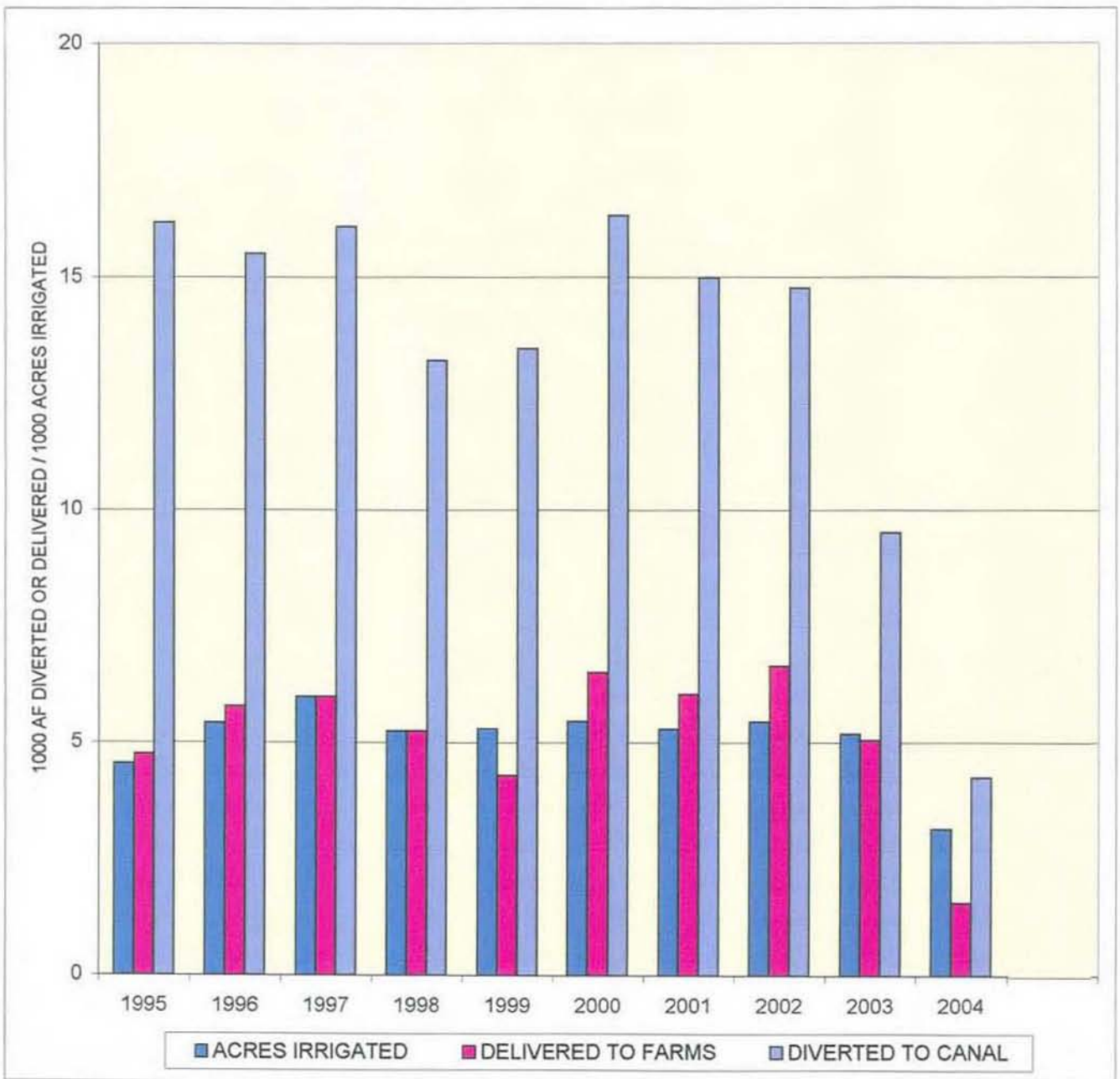


	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
DIVERTED af/acre	2.69	2.56	2.65	2.48	2.49	2.80	2.44	2.27	1.73	1.23
DELIVERED af/acre	1.21	0.99	1.04	1.01	0.95	1.37	1.04	1.27	0.88	0.49
EFFICIENCY	45%	39%	39%	41%	38%	49%	43%	56%	51%	40%

EXHIBIT 27

WEBSTER IRRIGATION DISTRICT

CANAL DIV., FARM DEL., AND ACRES IRRIG.

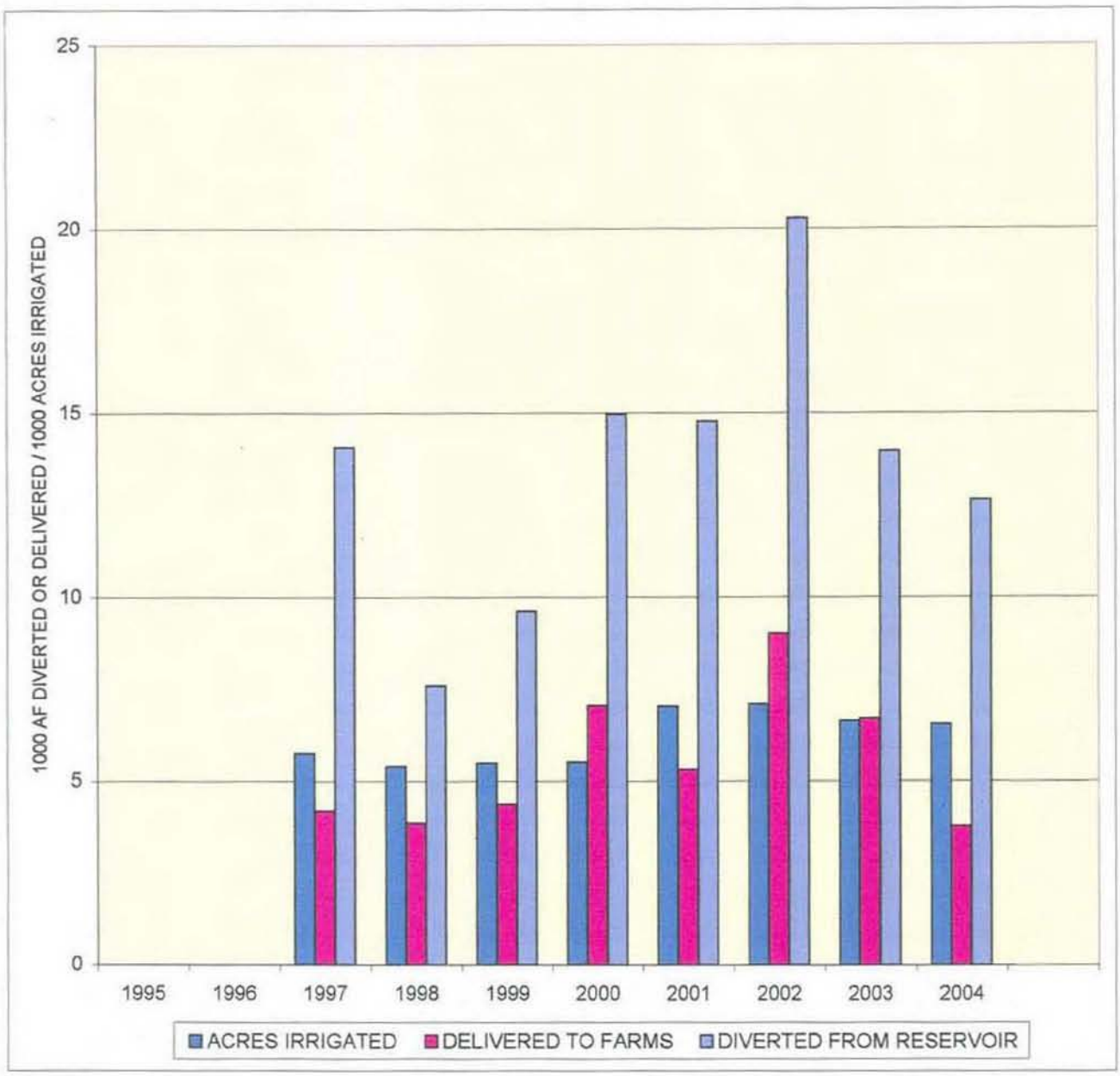


	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
DIVERTED af/acre	3.55	2.86	2.68	2.52	2.54	2.98	2.83	2.71	1.83	1.35
DELIVERED af/acre	1.04	1.07	1.00	1.00	0.81	1.19	1.14	1.22	0.97	0.50
EFFICIENCY	29%	37%	37%	40%	32%	40%	40%	45%	53%	37%

EXHIBIT 28

GLEN ELDER IRRIGATION DISTRICT

CANAL DIV., FARM DEL., AND ACRES IRRIG.



	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
DIVERTED af/acre	0.00	0.00	2.45	1.41	1.76	2.72	2.10	2.86	2.10	1.93
DELIVERED af/acre	0.00	0.00	0.73	0.71	0.80	1.28	0.75	1.27	1.01	0.58
EFFICIENCY	0%	0%	30%	51%	45%	47%	36%	44%	48%	30%