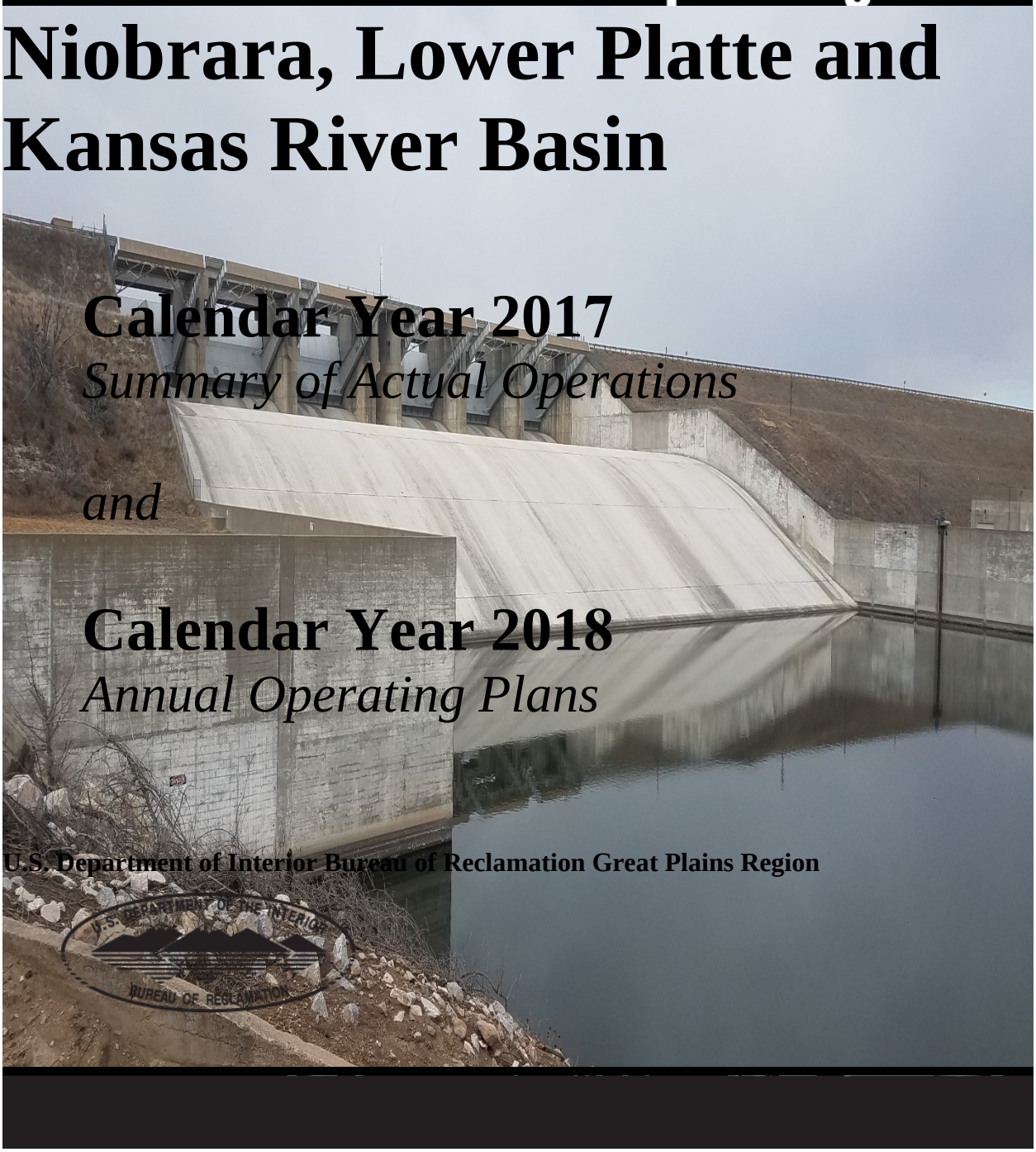
RECLAMATION

Managing Water in the West

Annual Operating Plans

Niobrara, Lower Platte and Kansas River Basin



Calendar Year 2017

Summary of Actual Operations

and

Calendar Year 2018

Annual Operating Plans

U.S. Department of Interior Bureau of Reclamation Great Plains Region

Table of Contents

SYNOPSIS

General

This year is the sixty-fifth consecutive year that an Annual Operating Plan (AOP) has been prepared for the Federally-owned dams and reservoirs in the Niobrara, Lower Platte, and Kansas River Basins. The AOP 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 270,078 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 or the Corps of Engineers (COE). 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 located at McCook, Nebraska 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 have 60 Hydromet stations that can be accessed. The Nebraska-Kansas Area Office (NKAO) has installed and maintains 41 of these Hydromet stations. These stations can be found on the Internet at https://www.usbr.gov/gp/hydromet/stationcodes.html.

2017 Summary Climatic Conditions

Precipitation at the project dams during 2017 ranged from 72 percent of normal at Lovewell Dam to 143 percent of normal at Bonny Dam. Annual precipitation was above normal for 10 of the 16 project dams.

Temperatures in January were below normal, while temperatures in February were much above normal throughout the project area. Precipitation in January was well above normal for most of the projects. February precipitation was well below normal throughout the project area. March temperature and precipitation was well above normal at most of the dams with twelve of the project dams above 111 percent of the average precipitation.

Temperatures in April were above normal while in May they were below normal. Precipitation during April was below normal with only five project dams above normal. May precipitation was well above normal at most of the project dams. Fourteen of the project dams received four or more inches and seven of the project dams received over seven inches of precipitation.

Temperatures in August were below normal, while temperatures in June and July were well above normal throughout the project area. Total precipitation for June and July was well below normal. August precipitation was above normal for nine of the project dams.

Precipitation recorded in September ranged from 62 percent to 355 percent of normal. October precipitation ranged from 41 percent to 353 percent of normal. November precipitation was almost non-existent with only one project dam over 50 percent of normal. In December, precipitation was significantly below average for the project dams in the Kansas River Basins. Temperatures in the fall and winter were above normal.

Storage Reservoirs

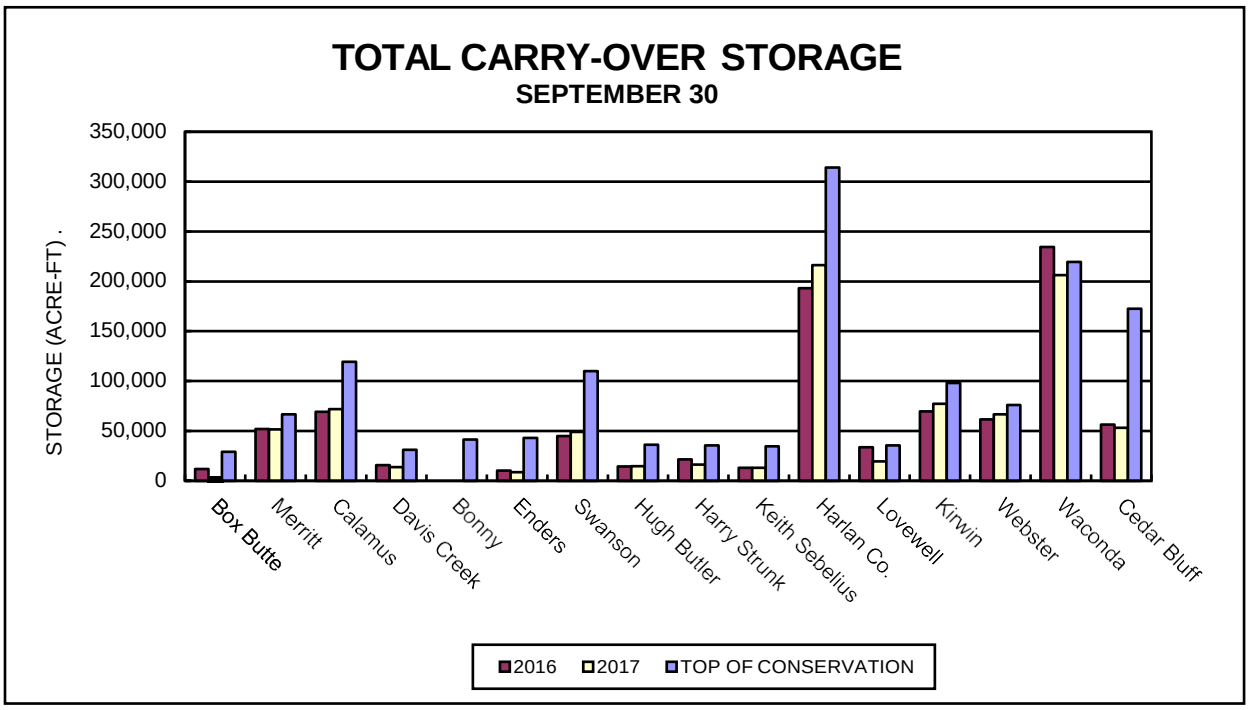
Conservation Operations: The 2017 inflow was below the dry year forecast for Hugh Butler Lake. Inflows at Box Butte Reservoir, Swanson Lake, Harry Strunk Lake, Harlan County Lake, Kirwin Reservoir, Webster Reservoir and Waconda Lake were between the normal year and wet year forecasts. The inflow for Merritt Reservoir was above the wet year forecast. The remaining reservoirs had inflows between the dry year and normal year forecasts.

Eight of the sixteen reservoirs had below average carryover storage from 2016. Box Butte and Enders Reservoirs, along with Swanson, Hugh Butler, Keith Sebelius, and Harlan County Lakes did not have sufficient storage to provide water users with a full water supply. Webster Reservoir, Lovewell Reservoir, Harry Strunk Lake and Waconda Lake used some flood pool storage during the year. Irrigation demands greatly reduced the storage in several project reservoirs throughout the summer. Reservoir storage was below average at eleven of the sixteen reservoirs at the end of the 2017.

On September 20, 2011 the State of Colorado ordered that Bonny Reservoir be drained for Republican River Compact compliance. All of the water in Bonny Reservoir was evacuated by the end of May 2012 and no storage has been recorded since. The State of Colorado order remains in effect and inflows continue to be bypassed.

On December 31, 2016 the State of Nebraska, Department of Natural Resources (NDNR) determined a “Compact Call Year” (Compact Call) to be in effect on the Republican River Basin for the fifth consecutive year. The Compact Call resulted in the NDNR issuing closing notices on all natural flow in the basin until such time that the NDNR determines that yearly administration is no longer needed to ensure Republican River Compact compliance. NDNR notified Reclamation that it was not requiring curtailment of storage water rights held by Reclamation in the Republican River Basin but a future notice could be provided to Reclamation to ensure Nebraska's Compact obligations would be accomplished. No natural flow was bypassed through Enders Reservoir, Swanson Lake, Hugh Butler Lake, Harry Strunk Lake and Harlan County Lake as a result of the Compact Call. NDNR determined that 2018 would also be a “Compact Call Year”.

The following graph shows a comparison of 2016 and 2017 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 30, 2017.



Flood Control Operations: Lovewell Reservoir, Webster Reservoir, Waconda Lake, and Harry Strunk Lake used flood pool storage in 2017. Flood releases from Lovewell Reservoir totaled 12,500 acre-feet (AF) from early May through the end of May. Flood releases from Webster Reservoir totaled 10,700 AF from mid-May through mid-June. Waconda Lake totaled 97,900 AF from early May through the end of June. Harry Strunk Lake had 6,900 AF evacuated from the flood pool from early March through late-April.

Glen Elder Dam recorded 4.7 inches of rain from May 16 through May 22, 2017 with localized heavier amounts reported in the basin. Runoff from the mid-May rains increased the reservoir level of Waconda Lake to a peak elevation of 1458.68 feet on May 30, 2017. This level is 3.1 feet above the top of conservation with 41,000 AF stored in the flood pool. River releases from Glen Elder Dam were staged up to 1,500 cfs by the end of the month to evacuate the flood storage.

The 2017 flood damages prevented by the operation of Reclamation's Nebraska-Kansas Projects facilities was $1,356,400 as determined by the COE. An additional benefit of $427,400 was credited to Harlan County Lake. The accumulative total of flood control benefits for the years 1951 through 2017 by facilities in this report total $2,201,945,500 (see Table 5). Box Butte, Merritt, Calamus, and Davis Creek Reservoirs do not have a designated flood pool and have not accrued any flood benefits to date.

A summary of precipitation, reservoir storage and inflows at the facilities of the Nebraska-Kansas Projects during 2017 can be found in Table 7.

Water Service

There was 362,139 AF of water diverted to irrigate approximately 204,794 acres of project lands in the 12 irrigation districts (see tables 3 and 6). The project water supply was either inadequate or limited for 149,257 acres of the total project lands. This includes lands in Mirage Flats, Frenchman Valley, H&RW, Frenchman-Cambridge, Almena, Bostwick in Nebraska, and Kansas Bostwick Irrigation Districts. The project water supplies for the other units mentioned in this report were adequate in 2017.

The water requirements of three municipalities, one rural water district, and two fish hatchery facilities were met in 2017. Storage releases and natural flows are used in meeting these demands.

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. NKAO is available for meetings, if requested, with Nebraska, Colorado, and Kansas state management agencies to discuss the AOP. Information is solicited from the agencies to enhance fishery resources within the flexibility allowed while still meeting contractual obligations with the various irrigation districts.

Reservoir operations were favorable for recreation and fish and wildlife uses in 2017 at those project reservoirs with full or nearly full conservation pools prior to the irrigation season. The higher water levels experienced early in the year submerged existing shoreline vegetation. Normal irrigation demands and the lack of precipitation during the summer greatly reduced the pool levels at several reservoirs allowing for late summer shoreline revegetation. The draining of Bonny Reservoir and the State administration of storage rights in southwest Nebraska reservoirs in previous years diminished recreation benefits at these facilities.

2018 Outlook

Three forecast conditions have been developed for each of the reservoirs in the Niobrara, Lower Platte, and Kansas River Basins conforming to established operating criteria under various reservoir inflow conditions. These operation studies are included in Table 4, sheets 1 through 16. The municipal and rural water district water supply requirements will be met under all three inflow forecast conditions for all units.

Under reasonable minimum inflow forecast conditions, irrigation districts receiving storage water from the following lakes and reservoirs are expected to receive less than a full supply: Box Butte, Enders, Swanson, Hugh Butler, Harry Strunk, Keith Sebelius, Harlan County, and Lovewell. The irrigation districts affected are Mirage Flats; Frenchman Valley and H&RW; Frenchman-Cambridge; Almena; Bostwick in Nebraska; and Kansas Bostwick; respectively. If 2018 is a dry year, 149,257 of the total 270,078 acres with service available to be irrigated (55 percent) will have an inadequate water supply.

Under most probable inflow conditions, it is expected that Mirage Flats, Frenchman Valley, H&RW, and Almena Irrigation Districts would experience irrigation demand shortages from Box Butte Reservoir, Enders Reservoir, and Keith Sebelius Lake. Most irrigators in these districts plan to use water from private wells to supplement the project water supply.

Under reasonable maximum inflow conditions, it is expected that Mirage Flats, Frenchman Valley, and H&RW Irrigation Districts would experience irrigation demand shortages from Box Butte and Enders Reservoir.

Under reasonable minimum inflow conditions, the conservation pools at Merritt, Calamus, Davis Creek, Webster, and Lovewell Reservoirs, and Harry Strunk Lake are expected to fill during 2018.

Even with the low reservoir levels and inadequate water supplies for some project lands, the recommendations of various state agencies will be considered. As in the past, irrigation and reclamation districts will advise state agencies regarding aquatic weed control and canal operations. Reclamation will continue to operate the reservoirs and other facilities under its jurisdiction in the best interests of all project functions and for the optimum public benefit.

Water is not expected to be stored in Bonny Reservoir during 2018 as the State of Colorado's order to bypass all inflows remains in effect. Bonny Reservoir was drained in 2012 by order of the State of Colorado to assist in meeting Republican River Compact compliance.

2017 Headlines

- NRD balks at paying 131K N-CORPE bill.
- NRD putting in real-time rain data equipment.
- Water issues in Nebraska pale in comparison to California.
- Kansas and Nebraska water officials outline aspects of long-term agreement.
- Frenchman River Channel fills up as water is released from Enders Reservoir.
- Managing the aquifer means finding a balance.
- Engineer gives thumbs up to Platte Republican diversion project.
- Medicine Creek, Republican flood of 1947 remembered.
- Compact compliance now being measured over a five-year period.
- Lovewell Lake cabin owners consider purchase agreement.
- Platte link to NCORPE under construction; Republican pumping for compact compliance less in 2017.
- Republican Basin augmentation project- property tax issue could go to high court.
- Landowners gather to discuss NCORPE water, land.
- Analysis shows acceleration of aquifer drop.
- NDNR: 2018 another call year in Republican River Basin.

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 2017 and serves as a guideline for the 2018 operations. This report also

describes the responsibilities of Reclamation, COE, 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 COE. In addition to irrigation and flood control, these reservoirs provide recreation, fish and wildlife, and municipal water supply 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 COE operates and maintains Harlan County Dam and Lake. The State of Colorado provides operational guidelines for Bonny Reservoir. Operational guidelines for Cedar Bluff Reservoir are provided by the State of Kansas. Reclamation operates and maintains eleven 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 COE 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 2000 sediment survey 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. As provided by the lease agreement between Reclamation and the states, the states are responsible for administering the water surface activities and the federal lands around the reservoirs. The Service administer 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.

Water Supply

For forecasting purposes, values of annual inflows that will be 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.

Inflow records from 1998 through 2017 were used for the analysis of reservoirs in the Niobrara, Lower Platte and Kansas River Basins.

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.

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 sixteen storage facilities now in operation are listed below.

Constructed by Reclamation

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.

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

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 Superior-Courtland Diversion Dam and the Courtland Canal between the head gates and the Nebraska-Kansas state line to Kansas Bostwick Irrigation District.

The contracted irrigation season for Mirage Flats Irrigation District is April through September. The contracted irrigation season for Frenchman-Cambridge Irrigation District is April 15 through October 15 or such additional period from April 1 to April 15 of each year as may be agreed upon between the District and Reclamation. The contracted irrigation season for Frenchman Valley and H&RW Irrigation Districts is from May 1 through October 15 or such additional period from April 1 through May 1 of each year as determined between the District and Reclamation. The

contracted irrigation season for Twin Loups Reclamation District and Almena, Bostwick in Nebraska and Kansas Bostwick Irrigation Districts is May 1 through September 30 or such additional period from April 1 through November 15 of each year as determined between the District and Reclamation. For Ainsworth, Kirwin and Webster Irrigation Districts, the contracted irrigation season is from May 1 through September 30.

Municipal Water

Three municipalities in Kansas (Norton, Russell, and Beloit) and one rural water district in Kansas (Mitchell County Rural Water District No. 2) have executed water service contracts or repayment contracts for full or supplemental water supplies.

Fish and Wildlife

The Calamus Fish Hatchery is located below Virginia Smith Dam and Calamus Reservoir. The hatchery is operated and maintained by the Nebraska Game and Parks Commission (Commission). 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.

The state of Kansas operates and maintains the fish hatchery facility below Cedar Bluff Reservoir.

State of Colorado Division of Wildlife

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

State of Kansas Department of Wildlife, Parks and Tourism (KDWPT)

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, Kansas (Russell) existing water storage right and contract with the United States remained unchanged.

Power Interference Considerations

A Power Interference Agreement exists between Reclamation, the Loup River Public Power District and the Twin Loups Reclamation District. Subordination Agreements also exist between Reclamation, the Ainsworth Irrigation District, the Nebraska Public Power District, the Mirage Flats Irrigation District and the Nebraska Public Power District. Provisions of these agreements will be incorporated into the 2018 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 operational 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 can 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 stating that Nebraska had violated the Republican River Compact by using more than its share of the Republican River water supply. The three original parties to the Compact; Kansas, Nebraska and Colorado, became parties to the case. Because the major water development structures in the Republican River Basin were constructed by Reclamation and the COE, the United States was allowed to participate as *amicus curiae.* After seventeen months of negotiations, the Final Settlement Stipulation (Stipulation) was signed by each respective governor and attorney general and was filed with the Special Master December 16, 2002. The United States Supreme Court approved the Stipulation and dismissed the case on May 19, 2003.

The Stipulation 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 table land wells in the accounting, and accounting for all reservoirs 15 AF and larger within the river basin.

The Stipulation also required that Colorado, Kansas and Nebraska, in cooperation with the United States, form a Conservation Committee to 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 Colorado, Kansas and Nebraska, 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; advanced monitoring equipment for terraces and additional reservoirs was installed by UNL in 2006 with data collection and model development continuing through 2009. .The Conservation Committee presented a Summary Report of Preliminary Findings for the study at the 2011 Republican River Compact annual meeting held in Burlington, Colorado on August 31, 2011. The Republican River Compact Administration (RRCA) reviewed the report and determined a formal study report was needed. The final report was released in June 2014.

After more than two years of negotiations, the RRCA approved two resolutions on August 24, 2016 establishing long-term agreements between Kansas, Colorado and Nebraska related to Colorado's and Nebraska's compliance activities in the Republican River basin.

Water-Short Year Administration will be in effect in those years in which the projected or actual irrigation supply is less than 119,000 AF of storage available for use from Harlan County Lake as determined by Reclamation. It was determined that Water Short Year Administration would be in effect in 2017.

Republican River Basin Study

In early 2016, the Republican River Basin Study (Basin Study) was completed. The Basin Study represented an extensive collaborative effort among the states of Colorado, Kansas, and Nebraska to identify adaptation strategies that address current and future water management challenges in the basin.

The Basin Study found that climate change may have a pronounced impact on future supplies and demands across the basin. The modeling tools developed under the study were used to evaluate alternatives to improve the supply reliability at the Frenchman-Cambridge Irrigation District in Nebraska, as well as the Bostwick Irrigation Districts in Nebraska and Kansas.

Nebraska focused on augmenting the supply of Swanson Lake and creating new surface water storage on Thompson Creek, a tributary of the Republican River. Kansas evaluated alternatives that increase the storage volume at Lovewell Reservoir.

The newly developed ground and surface water modeling tools will help inform future water management decisions that help build resiliency against future climate change, while also maintaining compliance with the Republican River Compact.

The Basin Study is a part of Reclamation’s WaterSMART Program. The report is available online at www.usbr.gov/watersmart/bsp.

Emergency Management

The NKAO continues to coordinate with local jurisdictions that could potentially be impacted by flooding from large operational releases and or dam failure. A Tabletop Exercise of the Emergency Action Plan (EAP) was held for Bonny Dam, and Functional Exercises were held for Norton, Medicine Creek, Red Willow, and Trenton Dams in 2017. Tabletop Exercises will be held for Virginia Smith, Davis Creek, Cedar Bluff, and Enders Dams in 2018. Communications Directories for all of the EAPs are reviewed annually.

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. NKAO will have one satellite phone that can be used in an emergency. Management and dam operators have been trained on the use of these phones.

Public Safety Reviews

The Annual Safety Training for field personnel was held in McCook, Nebraska in the spring of 2017. This training provided personnel the opportunity to update their training in Confined Space, First Aid, CPR, Fire Extinguisher Operation, OSHA Construction, Hearing Conservation, Hanta Virus Protection, Materials Handling, Biological Hazards, Active Shooter, Security, and Respirator Training and Fit Testing.

The ongoing safety reviews of project facilities continue to identify potential safety hazards to the public and operating personnel. NKAO combines elements of the Annual Safety Inspections of the major facilities with the Dam Safety Facility Reviews when possible, and conducts follow up inspections when deficiencies are not on-the-spot correctible. This format provides for enhanced communication and coordination between both the Area Safety Specialist and Staff, and teams of Dam Safety Specialists.

NKAO continues to involve Great Plains Region Safety and Occupational Health in Billings, Montana when maintenance and operational items, such as replacing AED batteries and pads, and reprogramming CPR protocol, is required.

Attention continues with regards to issues concerning contractor safety, defensive driving, National Fire Protection Association 70E Electrical Safety/Arc Flash, construction equipment safety, lock out/tag out, personal protective equipment, welding, cutting, coating safety procedures, confined space, pesticide and herbicide use, fall protection/slips, trips, and falls, working alone, near-miss accident reporting, and completing job hazard analyses, with emphasis from managers, supervisors, employees, and the NKAO Safety Committee. Guidance contained in the Reclamation Safety and Occupational Health Plan is incorporated. Employees were provided safety and health training and given information related to these and several other issues throughout the year.

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 2008 to 2017, the project water supply averaged 11,297 AF, which is about 0.97 AF per irrigable acre. Many irrigators supplement their water supply with private wells.

The Mirage Flats Irrigation District cooperates with the 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 (2,026 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 increase the minimum reservoir level by one additional foot to elevation 3979.00 feet (2,392 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 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.

2017 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 in the Mirage Flats Irrigation District totaled 19.68 inches, which is 115 percent of normal. The 2017 total inflow of 18,618 AF was between the normal year and wet year forecasts.

The reservoir level began 2017 at elevation 3996.39 feet (10.6 feet below the top of conservation). The pool level gradually increased during the late winter and early spring peaking at elevation 4002.87 feet on May 23, 2017. Irrigation releases began on May 24, 2017 and ended on October 25, 2017. Diversions of 23,085 AF to the Mirage Flats Canal provided irrigation water for approximately 10,548 acres, 90 percent of the service available acreage. The farm deliveries from the project water supply totaled 10,413 AF (0.99 acre-foot per irrigated acre), which is a delivery efficiency of 45 percent. Total reservoir storage was 2,230 AF at the end of the irrigation season. Privately owned irrigation wells supplemented the project water supply. The reservoir level at the end of the year was 3984.80 feet (22.2 feet below the top of conservation).

Higher reservoir levels experienced in 2011, not experienced since June 1959, resulted in increased toe drain seepage and observed wet areas below the dam. Engineers with Reclamation's Technical Service Center (TSC) out of Denver, Colorado followed up with a special inspection that summer.

Irrigation releases decreased the reservoir level throughout the summer, seepage returned to near normal levels, and observed wet areas dried up. Three Safety of Dams recommendations were completed in 2012 as a result of this event including performing an Issue Evaluation on changed seepage conditions at higher reservoir levels, stockpiling of filter sand and drain gravel at the dam, and daily monitoring of instrumentation when the reservoir level exceeds 4004.00 feet. A Corrective Action/Value Planning Study was initiated and Appraisal Level Design Alternatives and Costs were completed in 2013.

The preferred design alternative, to replace the toe drains, was selected in 2015 and documented in the Corrective Action Study transmitted in early 2016. In 2016, contract specifications were completed and the Mirage Flats Irrigation District repayment contract was signed. In 2017 the contract for dam modifications was awarded to Paul Reed Construction out of Gering, Nebraska for 3.6 million dollars. The contractor mobilized in the fall of 2017. An Internal Alert remains in effect at the dam.

The district continues to implement water conservation measures as outlined in their Water Management Plan and their Long Range Plan. Assistance to project irrigators provided by the district include delivery system improvements that provide on-farm efficiency improvements, such as relocation of turnouts, burying pipe for better access, and on-farm efficiency incentives.

2018 Outlook

The project water supply is expected to be inadequate in 2018 as it has been since the early 1960's. In the spring, the district will inform their water users of the amount of water that will be available from storage in Box Butte Reservoir. It is anticipated that district irrigators will continue to use their privately-owned irrigation wells as a supplemental supply.

The district's future water conservation plans include the automation of Dunlap Diversion Dam and the outlet works gate at Box Butte Dam. The district is also researching opportunities to provide groundwater recharge benefits in the project area.

Construction work to address reservoir seepage conditions began in the fall of 2017 and will be completed in 2018. Reservoir storage will be restricted to a maximum pool level of 3985.0 feet during the toe drain replacement.

Ainsworth Unit, Sandhills Division in Nebraska General

Within the Ainsworth Irrigation District, there are approximately 35,000 acres with available service. The project water supply is provided by Snake River flows and Merritt Reservoir storage. The reservoir is filled to elevation 2944.0 feet each fall after the irrigation season. This level is approximately 2 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 is then 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 with the level maintained until irrigation releases begin to draw on the pool around mid-May. Seepage, pickup and toe drain flow normally result in flows of up to 15 cubic feet per second (cfs) below Merritt Dam.

A Memorandum of Agreement (MOA) was executed between Reclamation, the Commission and Ainsworth Irrigation District for Snake River releases below Merritt Dam. The purpose of this MOA is to establish the protocol that will be used to make future releases of water from Merritt Dam to the lower Snake River. The development of the MOA was an environmental commitment outlined in the Ainsworth Irrigation District Final Environmental Assessment for the conversion of a Long-Term Water Service Contract to a Repayment Contract (December 2006). Release criteria will be based on the best available scientific data to determine when local conditions warrant releases to the Snake River. When it becomes necessary to release water from Merritt Reservoir, Reclamation will direct the Ainsworth Irrigation District to make the necessary releases to the river. Changes to the river will be staged to allow fish and other aquatic organisms time to acclimate to the changing environment.

2017 Summary

Precipitation, as recorded near Merritt Dam, totaled 21.36 inches, which was 101 percent of normal. The total yearly inflow of 209,434 AF was above the wet year forecast and was the greatest annual total since dam construction. The reservoir level at the beginning of the year was at elevation 2944.30 feet. The reservoir level was maintained at approximately two feet below the top of conservation (2944.0 feet) throughout the spring. Beginning the irrigation season at a lower than normal level was requested by the Commission to accommodate construction of a new boat ramp and break water facility following the season. The lower reservoir level at the end of the season would also benefit Reclamation in allowing more time for grouting the underdrain system of the outlet works stilling basin. The water supply was more than adequate to meet the project's irrigation requirement. There were 73,067 AF diverted from Merritt Reservoir into Ainsworth Canal, with 35,362 AF delivered to the farm head gates (delivery efficiency of 48 percent). There were 34,626 acres of land irrigated in 2017. The reservoir elevation at the end of 2017 was 2944.00 feet.

The district provided a total of 319 AF of irrigation water from holding ponds located within the district's service area.

During the 2011 annual site inspection at Merritt Dam, a large seep located near the outlet works stilling basin wing wall was observed to be transporting a sand material. After discussions with personnel in the Great Plains Regional Office and TSC, it was determined that the seep was an ongoing issue. An Issue Evaluation to address the transportation of sand observed was initiated in 2012 and was completed in 2015. A Risk Analysis was also conducted.

A Corrective Action Study was started and completed in July 2017 with a recommendation to modify the structure. In late September 2017 the Great Plains Regional Drill crew, TSC, and NKAO were onsite completing preparatory activities for grouting the underdrain system and potential voids beneath the structure.

2018 Outlook

During the winter months, the reservoir will be regulated to maintain elevation 2944.0 feet (2.0 feet below the top of conservation capacity). In order to alleviate erosive action to the lands around the reservoir and to maximize all benefits associated with the reservoir, releases from Merritt Reservoir will be regulated to fill the conservation capacity during the early spring. This filling generally takes place during April. If weather conditions or irrigation demands dictate, it may be necessary to begin filling the reservoir prior to this time. This reservoir level will be maintained until irrigation releases begin dropping the pool level. Following the irrigation season the reservoir will begin to refill to elevation 2944.0 feet. A release of 50 cfs will be made to the Snake River beginning around the second week of October and will continue until the reservoir reaches the desired winter elevation. The water supply is expected to be adequate in 2018 for the irrigation of 35,000 acres.

In 2018, the grouting project will be completed and risk reduction documentation will be prepared. In accordance with the Ainsworth Irrigation District's water conservation plan, improved water measurement opportunities were identified as one of the main objectives of the district. The district has worked with Reclamation to install some new ramp flumes to improve delivery system operations. The district continues to evaluate measurement and automation opportunities on a number of laterals and turnouts.

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 55,449 acres of project lands. Operation of the North Loup Division also provides a sustained groundwater supply for an additional 17,000 acres. Principal features 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 3 to 4 feet below the top of conservation capacity during the winter months to avoid ice damage to the soil cement on the upstream face of the dam. After the ice clears in the spring, the reservoir is filled to conservation capacity. The North Loup Division project operation is restricted to zero water diversions from the Calamus and North Loup Rivers during the months of July, August, and September whenever sufficient water is available in the storage reservoirs to deliver full water demands. 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 level is typically maintained at an average elevation of 2048.0 feet from the end of the irrigation season through the winter months. Off season seepage and evaporation has historically resulted in a reservoir drawdown of 2.5 to 3.0 feet requiring an end of September reservoir level of 2050.0 feet or less. 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 will generally reach full content by the end of June. A 160-acre recreation area adjoining the reservoir continues to be managed by the Lower Loup Natural Resources District. The area includes a boat ramp, a handicapped accessible fishing pier, a day-use area, a primitive camping area, shelter and a hiking path. Public lands adjoining Kent Diversion Dam are managed by the Commission and are also open to day-use fishing with handicapped accessibility provided.

2017 Summary

Precipitation at Virginia Smith Dam was 35.00 inches which is 143 percent of normal for the year and the third highest on record (since 1982.) The inflow totaled 262,858 AF which was between the dry year and normal year forecasts. The reservoir level at the first of the year was elevation 2240.16 feet (3.8 feet below the top of conservation). The conservation pool filled on March 30, 2017. The water supply was more than adequate for the district's needs. There were 108,662 AF of water released into Mirdan Canal and 6,153 AF diverted through Kent Canal from the North

Loup River. A total of 47,835 AF was diverted for district use above Davis Creek Reservoir. The farm head gate delivery was 27,423 AF which is a delivery efficiency of 57 percent. Land irrigated in 2017 totaled 34,110 acres above Davis Creek Reservoir. The Calamus Fish Hatchery used bypassed natural flows and storage from the reservoir totaling 1,660 AF. Calamus Reservoir inflows were bypassed during July, August, and September as required. The dam recorded 6.68 inches of precipitation during October, the greatest ever recorded at the site for the month. The elevation at the end of the year was 2239.46 feet.

The precipitation total of 23.05 inches near Davis Creek Dam was 91 percent of normal. Inflow to Davis Creek Reservoir totaled 55,143 AF during 2017. The reservoir elevation at the first of the year was 2057.19 feet, 18.8 feet below the top of conservation. Beginning in mid-April, Davis Creek Reservoir was filled to a peak elevation of 2076.49 feet on June 21, 2017 using diversions from Calamus Reservoir and the North Loup River. A release of 45,764 AF was made from Davis Creek Dam into Fullerton Canal, with 19,968 AF delivered to the farm head gates which is a 44 percent delivery efficiency. There were 21,016 acres irrigated below Davis Creek Reservoir. Following the irrigation season, the reservoir level was maintained and wintered approximately 8 feet higher than normal. The higher wintering level is part of a three year study to determine if an increase in over wintering water levels has an effect on groundwater levels near North Loup, Nebraska. The district has requested the increase in over wintering level, because they are experiencing an increase in maintenance issues associated with the inlet supply canal and outlet distribution system. The reservoir elevation at the end of 2017 was 2054.69 feet, 21.3 feet below the top of conservation.

2018 Outlook

Filling of Calamus Reservoir will continue through late winter and early spring. The reservoir will be allowed to fill to an elevation of 2244.0 feet (top of conservation capacity) in late March or April. This reservoir level will be maintained in order to minimize shoreline erosion until demands begin to draw on the reservoir. Bypassing of inflows will be made during July, August and September under all inflow forecast conditions. In the fall the reservoir will be filled to an elevation of approximately 2240.0 feet, if possible.

Water will be available for all irrigable acres with service from the Mirdan, Geranium and Scotia Canals and Lateral Systems. It is estimated that approximately 34,000 acres will be irrigated from these canals. Water supplies will be sufficient to meet the full dry year requirements.

Filling of Davis Creek Reservoir will take place this spring with flows diverted from the North Loup River at Kent Division Dam and transported through Kent and Mirdan Canals. Storage water can also be transferred from Calamus Reservoir into Davis Creek Reservoir during the summer months via Mirdan Canal. Water will be sufficient to irrigate an estimated 21,000 acres from Elba and Fullerton Canals under all inflow forecast conditions. The reservoir level will be wintered at an approximate elevation of 2056.0 feet (8 feet higher than the normal winter level).

The fish hatchery demand for 2018 is expected to be similar to that of the last few years with approximately 5,000 AF required for the hatchery. The district plans to expand their remote monitoring capabilities by installing equipment at additional wasteways and key canal

measurement sites throughout their delivery system. In addition to further remote monitoring capabilities, the district will continue to expand the radio control network. Additionally, the district intends to further integrate an alarm and monitoring system into their existing infrastructure to reduce the risk of operational failure.

CHAPTER III - REPUBLICAN RIVER BASIN

Armel Unit, Upper Republican Division in Colorado

Normal reservoir operations for Bonny Reservoir have historically been for recreation and fish and wildlife support, although water has been 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 can utilize Bonny Reservoir storage water for 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 historic operation pattern of Bonny Reservoir enhanced the spring fish spawn and provided excellent fishing opportunities during the summer and hunting conditions each fall. In September of 2011, the State of Colorado ordered all storage water evacuated from Bonny Reservoir for Republican River Compact compliance. As a result, the reservoir fishery was decimated and future operations are unlikely to provide fishing opportunities unless water is returned to the reservoir.

2017 Summary

The annual precipitation total of 25.11 inches at Bonny Dam was 143 percent of average and third highest total on record (since 1950). Bonny Dam recorded 7.61 inches of precipitation during the month of May, the second greatest ever recorded for the month. The annual computed inflow of 4,580 AF to Bonny Reservoir was between the dry year and normal year forecasts. Bonny Reservoir remains drained, and inflows continue to be bypassed for the purpose of compact compliance.

As directed by the Colorado State Water Commissioner, water was bypassed through Bonny Dam into Hale Ditch beginning April 7, 2017 and continuing through July 12, 2017. A total of 1,057 AF of water was diverted into Hale Ditch. During the remainder of the year water was bypassed through the reservoir into the South Fork Republican River as ordered by the Colorado State Engineer for compact compliance.

2018 Outlook

The State of Colorado's order to release all of the storage in Bonny Reservoir for Republican River Compact compliance remains in effect. If the order continues throughout 2018, water will not be available in the reservoir for irrigation or fishery purposes. Water allowed to be stored in Bonny Reservoir during 2018 would be available to Hale Ditch and other private irrigators under short-term water service contracts executed with the state.

Frenchman Unit, Frenchman-Cambridge Division in Nebraska General

The Culbertson Canal and the Culbertson Extension Canal systems serve 9,292 acres in the Frenchman Valley Irrigation District and 11,915 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 and clears this section of Frenchman Creek prior to irrigation releases 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 normally deplete the conservation storage by late summer, thereby limiting the fishing and recreational usage. Due to extremely low storage levels, irrigation releases have not been made from Enders Reservoir since 2003.

Annual reservoir inflows have steadily declined from around 61,000 AF when Enders Dam was constructed to only 5,000 AF in recent years. Extensive groundwater pumping from upstream well development along with various conservation practices have resulted in the depletion of inflows. The conservation pool has not filled since 1968.

2017 Summary

The annual precipitation total of 17.10 inches at Enders Dam was 89 percent of normal. The 2017 inflow into Enders Reservoir of 4,652 AF was between the dry year and normal year forecasts. The reservoir level began the year at a level of 27.9 feet (3084.41 feet) below the top of conservation. This was the third lowest level ever recorded on the first of January since initial filling. The reservoir level increased during the spring to a peak elevation of 3085.33 feet on April 3, 2017.

On January 18, 2017 the Frenchman Valley and H&RW Irrigation Districts entered into an agreement with the Middle Republican Natural Resources District (MRNRD) to release 2,000 AF of storage water from Enders Reservoir to be used by downstream irrigation districts. The purchased water was released beginning on April 5, 2017 and ended on April 12, 2017 decreasing the pool level to 3082.40 feet. Evaporation decreased the reservoir level from June through late-October reaching elevation 3081.53 feet on October 30, 2017. Due to the extremely low water supply available, no water was released from Enders Reservoir during the irrigation season. The end of the year reservoir level was 30.5 feet (3081.83 feet) below the top of conservation. This was the lowest end of year level recorded since initial filling.

The Frenchman Valley Irrigation District also cooperated with the MRNRD by forgoing diversions of the natural flow from Frenchman Creek in 2017. The H&RW Irrigation District did not divert water into Culbertson Extension Canal in 2017. This was the fifteenth consecutive year that the district did not deliver water.

2018 Outlook

The fall and early winter inflows into Enders Reservoir were near the dry year forecast. If dry year conditions prevail, the project water supply is expected to experience a shortage of about 78,100 AF. Normal year conditions are expected to be inadequate by 61,300 AF and wet year conditions by 29,200 AF to irrigate the 9,292 acres in the Frenchman Valley Irrigation District and 11,915 acres in the H&RW Irrigation District.

The Frenchman Valley Irrigation District has expressed an interest in replacement of additional open ditch laterals with buried pipe. Future piping projects are somewhat limited due to the water supply shortage. The district is also investigating remote monitoring opportunities to improve the delivery system operations. The Frenchman Valley Irrigation District and the H&RW Irrigation District are investigating possible alternatives for the most efficient use of the declining water supply in the basin.

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

General

Service is provided for Frenchman-Cambridge Irrigation District by Meeker-Driftwood Canal to 16,691 acres; Red Willow Canal to 4,643 acres; Bartley Canal to 6,130 acres; and Cambridge Canal to 18,205 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 ditch laterals that were economically feasible with buried pipe which has significantly increased both system and on-farm efficiencies.

2017 Summary

The annual precipitation total of 26.27 inches at Trenton Dam was 131 percent of normal. The inflow of 33,514 AF to Swanson Lake was between the normal year and wet year forecasts. The May precipitation of 7.89 inches was the highest on record for the month (since 1954.) The lake level began the year at elevation 2735.63 feet (16.4 feet below the top of conservation) and gradually increased throughout the late winter and spring. The peak elevation on June 9, 2017 was 2742.22 feet (9.8 feet below the top of conservation). The reservoir level decreased throughout the irrigation season and reached an elevation of 2736.24 feet on September 22, 2017. The district diverted 16,692 AF from June 22, 2017 through September 5, 2017 and delivered 5,024 AF to the farms, which is a delivery efficiency of 30 percent. At the end of the year, the reservoir level was 14.7 feet below the top of conservation at 2737.34 feet. The COE determined that Swanson Lake prevented $73,000 in flood damages in 2017.

In late February 2013, the Upper Republican Natural Resources District (URNRD) began operating the Rock Creek Augmentation Project. The augmentation water is pumped from the ground and diverted into Rock Creek. The water flows from Rock Creek into the North Fork of the Republican River at Parks, Nebraska. From there the water travels approximately 35 miles to

Swanson Lake. The URNRD pumped water into Rock Creek from January through April of 2017 for compact compliance.

The Republican River Water Conservation District (RRWCD) built and completed the Colorado Compliance Pipeline in April 2014. The augmentation water is pumped from the ground and flows approximately 8 to 15 miles south to the North Fork of the Republican River just above the Colorado-Nebraska state line. The water then travels approximately 55 miles to Swanson Lake. The RRWCD pumped water from January through March of 2017 and again from October through December for compact compliance.

The annual precipitation total at Red Willow Dam was 18.92 inches (96 percent of normal). The annual inflow of 6,802 AF into Hugh Butler Lake was below the dry year forecast and was the second lowest ever recorded. The reservoir level at the first of the year was 2564.94 feet, 16.9 feet below the top of conservation. Late winter and spring inflows gradually increased the lake level but evaporation slowed reservoir gains and the lake level peaked at 2567.36 feet on May 29, 2017. A total of 863 AF was released from Hugh Butler Lake beginning on July 24, 2017 and ending on August 11, 2017 for diversion into Bartley Canal. Due to the low water supply available, there were no diversions into Red Willow Canal for the eighth consecutive year. Late summer evaporation exceeded inflows, decreasing the lake level to 2564.51 feet on September 22, 2017. The end of year elevation was 2565.94 feet, 15.9 feet below the top of conservation.

The annual precipitation total of 18.66 inches at Medicine Creek Dam was 89 percent of normal. The inflow of 40,838 AF was between the normal year and wet year forecasts. The reservoir level at the beginning of 2017 was 3.1 feet below the top of conservation at 2363.00 feet. The reservoir level was maintained near 0.5 foot below top of conservation from late-January through late-February with inflows passed through the outlet works. The reservoir filled to top of conservation on March 1, 2017 and began spilling over the uncontrolled spillway notch. The reservoir level peaked at elevation 2367.70 feet on March 30, 2017. Additional releases were started from the river outlet works on April 14, 2017 decreasing the pool level to elevation 2364.70 feet just prior to irrigation releases beginning on June 5, 2017. Irrigation releases continued through September 7, 2017 reducing the reservoir level to 2351.46 feet. The district diverted 25,406 AF into Cambridge Canal and delivered 9,152 AF to 12,683 acres of district lands which is a delivery efficiency of 36 percent. Late fall and early winter inflows increased the level of Harry Strunk Lake to elevation 2359.09 feet at the end of the year (7.0 feet below the top of conservation).

The Nebraska Cooperative Republican Platte Enhancement Project (N-CORPE) is an interlocal agency formed by the URNRD, the MRNRD, the Lower Republican Natural Resources District (LRNRD), and the Twin Platte Natural Resources District. N-CORPE has constructed an augmentation project that pumps groundwater from Lincoln County into Medicine Creek. The delivery system consists of a 42-inch diameter pipe approximately 6 miles long. The pumped water enters at the source of Medicine Creek and travels approximately 57 stream miles to Harry Strunk Lake. The capacity of the project is approximately 87 cfs (63,000 AF annually). The augmentation project was in operation from January through March.

2018 Outlook

Forecasts show that carry-over storage, streamflow gains, plus reasonable minimum inflows for the three lakes supplying the Frenchman-Cambridge Irrigation District will be inadequate to meet the full dry year irrigation requirement by 31,700 AF. The water supply will be adequate under normal year and wet year conditions.

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 (Norton) provides for a maximum annual use of 1,600 AF from Keith Sebelius Lake.

In 2017, the Almena Irrigation District and the Norton County Community Foundation, Inc. entered into an MOA to maintain a minimum pool elevation in Keith Sebelius Lake through December 31, 2027. The MOA was approved by the irrigators within the district and provided that no water would be released for irrigation below elevation 2288.5 feet.

2017 Summary

The annual precipitation at Norton Dam totaled 26.57 inches, which is 107 percent of normal. The total inflow of 7,073 AF was between the dry year and normal year forecasts. The reservoir was 13.0 feet below the top of conservation pool at the first of the year (2291.25 feet). Norton Dam recorded 9.54 inches of precipitation during the month of May, the second greatest ever recorded for the month. The reservoir level increased to an elevation of 2293.34 feet on June 7, 2017. Irrigation releases began July 10, 2017 and continued until July 15, 2017 dropping the reservoir elevation to 2292.20 feet. The district diverted 771 AF into Almena Canal and delivered 288 AF to 2,500 acres of district lands which is a delivery efficiency of 37 percent. The reservoir level decreased during the summer and fall reaching elevation 2291.15 feet on September 22, 2017. Keith Sebelius Lake ended the year at elevation 2291.54 feet (12.8 feet below the top of conservation). Norton used 369 AF of municipal water during 2017.

2018 Outlook

If 2018 is a dry year without significant runoff producing storms above Keith Sebelius Lake, it is anticipated that the water supply may be inadequate by as much as 14,300 AF. If normal inflow into the lake and normal rainfall over the irrigated area occur, a shortage of 9,800 AF may be experienced. The water supply will be adequate under wet year conditions. Requirements for Norton will be met in full in 2018.

The district continues to plan projects to replace open ditch laterals with buried pipe that will reduce seepage losses, lessen maintenance requirements, and provide improvements in on-farm efficiencies. However, due to uncertainty of the district's water supply in the past and the temporary agreements with the State to forgo irrigation releases, the district may delay some identified delivery system improvement projects.

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 22,455 acres in the Bostwick Irrigation District in Nebraska, and 13,378 acres in the Kansas Bostwick Irrigation District No. 2 (KBID) above Lovewell Reservoir. This storage and natural flows, together with White Rock Creek flows and Lovewell Reservoir storage, furnish a water supply for 29,122 acres below Lovewell Reservoir in the KBID.

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 KBID.

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.

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

The KDWPT has requested that the KBID 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.

Harlan County Dam is currently operating under an Interim Operating Plan (IOP) initiated in 2003. The IOP resulted from a “Dam Safety Assurance Study” that evaluated the adequacy of the dam as required by COE dam safety regulations. There were three primary findings from this study: Tainter gate bearings may experience significant bearing friction when operated under increasing water load; concerns of spillway stability due to water pressure in the foundation of the dam; spillway was found to be hydrologically deficient when modern hydrologic criteria were applied to the dam. The IOP has resulted in a decrease of flood protection capability.

The “Lovewell Reservoir Regulation Manual” was revised in 2010 to allow for a two foot raise in the conservation pool for water storage during drought years. Storing additional water during drought periods increases the project’s irrigation beneficial purpose without adversely affecting the ability to protect for the project design storm. A calculation of available water supply will be made at the end of March to determine if additional water can be stored in Lovewell Reservoir.

Bostwick Division - Harlan County Lake Operations 2017 Summary

The annual precipitation at Harlan County Dam totaled 26.60 inches, which is 115 percent of normal. The 2017 inflow of 118,889 AF was between the normal year and wet year forecasts. Harlan County Lake began 2017 approximately 10.2 feet below the top of conservation pool, at 1935.58 feet. The lake level gradually filled to a peak elevation of 1941.86 feet on June 6, 2017. Irrigation releases began on June 12, 2017 and continued through September 14, 2017. The lake level on September 14, 2017 was 1937.69 feet. Irrigation releases from Harlan County Lake totaled 52,764 AF in 2017. The level of Harlan County Lake on December 31, 2017 was at 1938.39 feet (7.3 feet below the top of conservation).

KBID entered into an Excess Capacity Contract (Warren Act Authority) with Reclamation for the use of compact compliance water stored in Harlan County Lake during 2014. The amendment to the contract between KBID and Reclamation in December 2016 provided for 15,000 AF of water to be carried over into 2017. No water was released under this contract during the 2017 irrigation season. Losses due to evaporation resulted in 12,989 AF remaining in this pool to be carried over into 2018.

After more than two years of negotiations among the States, the RRCA approved two resolutions on August 24, 2016 establishing long-term agreements among Kansas, Colorado and Nebraska related to Colorado's and Nebraska's compliance activities in the Republican River basin. In response to this resolution, KBID requested the state of Kansas to request the state of Nebraska that 20,000 AF be accrued to Harlan County Lake through augmentation activities prior to June 1, 2017. On December 13, 2016 Bostwick Irrigation District in Nebraska and KBID amended their original MOA dated October 4, 2000 to allow for the first 20,000 AF of inflow in 2017 be stored for exclusive use by KBID.

Harlan County Lake prevented $427,400 of downstream flood damages during 2017 according to the COE. There was 28,120 AF delivered to Lovewell Reservoir via Courtland Canal during 2017. This was approximately 51 percent of the total Lovewell Reservoir inflow.

Bostwick Division - Nebraska 2017 Summary

Irrigation diversions were made into Franklin, Naponee, Franklin Pump, Superior, and Courtland Canals in Nebraska in 2017. The district diverted 26,850 AF of water and delivered 9,745 AF to the farm head gates (36 percent delivery efficiency).

The district continues to explore opportunities for replacing sections of open ditch lateral with buried pipe. These pipe projects provide delivery system improvements by eliminating seepage losses, eliminating operational wasteways, improving water measurement and accounting by using water meters, and providing on-farm benefits by allowing land owners the opportunity to convert to sprinkler irrigation.

Bostwick Division - Kansas 2017 Summary

The 2017 precipitation at Lovewell Dam totaled 20.01 inches, which was 72 percent of normal. The total annual inflow recorded at Lovewell Reservoir was 55,402 AF. Approximately 27,300 AF of the inflow was from White Rock Creek which was between the normal year and wet year forecasts. The reservoir elevation at the beginning of 2017 was 1582.51 feet (0.1 foot below the top of conservation). The reservoir pool gradually increased reaching a target level of 2.0 feet above top of conservation at the end of April. River releases were started on May 1, 2017 to maintain the pool level. Lovewell Dam recorded 3.55 inches of rain from May 16, 2017 through May 21, 2017. Runoff from the rain events increased the reservoir level 1.8 feet to a peak elevation of 1586.45 feet on May 22, 2017. This level was 1.9 feet above the target elevation with 6,000 AF of additional storage. The river release was increased to 700 cfs on May 22, 2017 and staged off by the end of the month when the pool level reached the desired target level. Approximately 12,500 AF was released to the river.

Canal releases from Lovewell Reservoir began on May 1, 2017 with irrigation releases beginning in earnest on June 5, 2017. Irrigation releases continued through September 15, 2017. The reservoir elevation at the end of the irrigation season was at 1575.42 feet. Republican River flow was diverted via Courtland Canal into Lovewell Reservoir after the irrigation season until early December. The pool level at the end of the year was 1581.15 feet (1.5 foot below top of conservation). Lovewell Reservoir prevented $92,200 of downstream flood damages during 2017 according to the COE.

KBID diverted a total of 62,094 AF to serve 12,267 acres above Lovewell Dam and 27,393 acres below Lovewell Dam. District farm delivery totaled 34,526 AF for an efficiency of 56 percent.

The district continues to explore opportunities for replacing sections of open ditch lateral with buried pipe. These pipe projects provide delivery system improvements by eliminating seepage losses, eliminating operational wasteways, improving water measurement and accounting by using water meters, and providing on-farm benefits by allowing land owners the opportunity to convert to sprinkler irrigation.

Bostwick Division 2018 Outlook

The storage in Harlan County Lake and Lovewell Reservoir and flows of the Republican River and White Rock Creek are expected to be inadequate in meeting the full dry year irrigation requirement for the Bostwick lands. The water supply will be adequate under both normal year and wet year conditions.

Both districts will continue to investigate remote monitoring site installation that will provide system operations improvements. Bostwick Irrigation District in Nebraska is collaborating with the LRNRD on a project to improve the efficiency of Franklin Canal. Cost of automating the canal will be shared by the district, LRNRD, and a grant from the Water Sustainability Fund. In return, LRNRD will receive a portion of the water savings realized from the project to be applied toward any needed addition to streamflows to the Republican River to address the potential for non- compliance.

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, fish spawning, and preservation of waterfowl species.

The (Service) has completed the Kirwin National Wildlife Refuge Comprehensive Conservation Plan (CCP). The 1997 National Refuge System Improvement Act required the Service to develop a CCP for each of its refuges. The Kirwin Refuge CCP will guide the refuge management activities through 2025.

2017 Summary

The annual precipitation total of 25.39 inches at Kirwin Dam was 107 percent of normal. The inflow of 51,139 AF was between the normal year and wet year forecasts. The reservoir level was 4.5 feet below the top of conservation pool at the first of the year (elevation 1724.77 feet). The reservoir level slowly increased to elevation 1728.63 feet on June 16, 2017. Irrigation releases began on June 19, 2017 and continued through August 31, 2017 decreasing the reservoir level to 1725.07 feet.

A series of precipitation events at the end of September and beginning of October caused inflow to improve and the reservoir to gain almost 2.7 feet in three weeks. Storage in Kirwin Reservoir increased around 12,400 AF with a peak average daily inflow of 1,710 cfs on the North Fork of the Solomon River and 926 cfs on Bow Creek on October 3, 2017. No flood release was required as storage remained within the active conservation pool.

The reservoir level, likely due to the September/October run-off event, increased throughout the fall and early winter to a maximum elevation of 1728.25 feet (1.0 foot below the top of conservation). The COE determined that Kirwin Reservoir prevented $61,500 in flood damages in 2017. A total of 17,546 AF was released into Kirwin Canal to irrigate 8,936 acres of project lands during 2017. Farm delivery efficiency was 49 percent with 8,592 AF delivered to farms.

2018 Outlook

Carry-over storage and the forecasted inflows in the North Fork of the Solomon River are expected to be adequate to irrigate all district lands under all forecasted conditions.

The district continues to explore opportunities for replacing sections of open ditch lateral with buried pipe. The district is also assisting landowners with on-farm improvements such as the installation of sprinklers, assisting with burying lines to pivots and through the relocation of turnouts. Future conservation projects include the possibility of installing remote monitoring equipment at the wasteways and at the Kirwin North/South Canal split. These projects may be delayed due to the availability of cost-share funding.

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.

2017 Summary

In 2017, the precipitation at Webster Dam was 101 percent of normal (23.88 inches). The inflow of 49,021 AF was between the normal year and wet year forecasts. The reservoir level was 2.3 feet below the top of conservation pool at the first of the year (elevation 1890.17 feet). The reservoir level increased in the winter and spring to a peak elevation of 1894.98 feet on May 22, 2017 (2.5 feet above the top of conservation). Flood releases were made from mid-May through mid-June amounting to 10,700 AF. Irrigation releases began June 20, 2017 and continued until August 30, 2017 decreasing the reservoir level to 1890.25 feet. The pool level decreased in the late summer to an elevation of 1889.80 feet on September 22, 2017 (2.6 feet below the top of conservation).

A series of precipitation events at the end of September and beginning of October caused inflow to improve and the reservoir to gain approximately 2.0 feet in three weeks. Storage in Webster Reservoir increased to 7,200 AF with a peak average daily inflow of 1,600 cfs on the South Fork of the Solomon River on October 3, 2017. No flood release was required as storage remained within the active conservation pool.

The reservoir level, likely due to the September/October run-off event, increased throughout the fall and early winter to a maximum elevation of 1893.00 feet (0.5 foot above the top of conservation) at the end of the year. The COE determined that Webster Reservoir prevented $71,100 in flood damages. A total of 11,525 AF was diverted into Osborne Canal to irrigate 5,028 acres of project lands during 2017. Farm delivery efficiency was 49 percent with 5,669 AF delivered to farms.

2018 Outlook

The carry-over storage and the flows in the South Fork Solomon River are expected to be adequate to irrigate all district lands under all forecasted conditions.

The district continued to explore opportunities to cost share with Reclamation and district irrigators for the replacement of open ditch laterals with buried pipe. The district will continue to seek outside funding for water conservation improvement projects. Future conservation projects include the possibility of installing remote monitoring equipment at the wasteways and at the beginning of the second and third sections of Osborne Canal. These projects may be delayed due to the availability of cost-share funding.

Glen Elder Unit, Solomon Division in Kansas General

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

Renewal of the long term water service contract with Beloit was completed in 2008. The new repayment contract became effective on January 1, 2009. The repayment contract with Beloit, provides for the annual use of up to 2,000 AF from Waconda Lake storage. Water is measured at the Glen Elder Dam river outlet works. 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.

The long term water service contract with the Glen Elder Irrigation District was to expire in June 2017. Renewal of the long term water service contract is currently underway and is expected to be completed this spring. 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.

When compatible with flood control operations, the operating criteria for Waconda Lake provides for a stable or rising pool level during the fish spawning period each spring. When possible, Waconda Lake is 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 is normally regulated at 1 to 2 feet below the top of conservation capacity during the winter months. Maintaining the lake at this level reduces shoreline erosion, provides a buffer for spring runoff and lessens ice damage to the upstream face of Glen Elder Dam. Releases from Waconda Lake are regulated each year to maintain a constant water surface level while the lake is ice-covered.

2017 Summary

The annual precipitation total of 20.51 inches at Glen Elder Dam was 80 percent of normal. The inflow of 200,092 AF was between the normal year and wet year forecasts. The lake level at the beginning of the year was 0.2 foot below the top of conservation at 1455.40 feet. Releases continued to be made during January and February decreasing the lake level to 1454.60 feet (1.0 foot below the top of conservation). The level of Waconda Lake was allowed to slowly increase during the spring, filling the conservation pool on May 1, 2017.

Glen Elder Dam recorded 4.7 inches of rain from May 16, 2017 through May 22, 2017 with localized heavier amounts reported in the basin. Runoff from these rainfall events during May increased the reservoir level of Waconda Lake to a peak elevation of 1458.68 feet on May 30, 2017. This level is 3.1 feet above the top of conservation with 41,000 AF stored in the flood pool. River releases from Glen Elder Dam were staged up to 1,500 cfs and the flood pool was evacuated by late-June. The reservoir released 97,900 AF from May and June. Irrigation

releases began on June 28, 2017 and continued through September 12, 2017 decreasing the reservoir level to 1454.60 feet. Waconda Lake ended the year 0.5 foot (elevation 1455.09 feet) below the top of conservation, and prevented $381,700 of downstream flood damages during 2017 according to the COE.

A total of 154,728 AF of water was released from Glen Elder Dam in 2017. Storage releases of 3,368 AF combined with natural flow releases of 6,466 AF for the irrigation of 5,752 acres in the Glen Elder Irrigation District. The district delivered 4,705 AF to the farms resulting in a delivery efficiency of 48 percent. No storage releases were made for Beloit, but 2,358 AF was bypassed for water quality as directed by the State Water Commissioner. Releases to the Mitchell County Rural Water District No. 2 totaled 764 AF.

2018 Outlook

The municipal requirement of Beloit and the requirements of the Mitchell County Rural Water District No. 2 will be met in full with releases as required from Waconda Lake. It is expected that the Kansas Water Commissioner will request that inflows be passed through the lake for water right administration. The storage in Waconda Lake and flows in the North and South Forks of the Solomon River will furnish a full water supply to the Glen Elder Irrigation District. The reservoir will be regulated to maintain a constant level during the winter months when the reservoir is ice- covered to minimize ice damage. Under normal year conditions, the lake is expected to be maintained between one and two feet below the top of the conservation pool during the winter.

The Glen Elder Irrigation District continues to encourage their producers to advance water ordering times to improve on water releases, making more efficient use of the district's water supply. Some district pumping sites present problems due to river conditions at the sites. In order to minimize required reservoir releases, the district is investigating potential improvements to those water pumping sites.

Cedar Bluff Unit, Smoky Hill Division in Kansas

General

Cedar Bluff Reservoir storage furnishes a maximum of 2,000 AF each year for Russell 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. Reformulation of the Cedar Bluff Unit in October of 1992 resulted in the dissolution of the Cedar Bluff Irrigation District with the Kansas Water Office (KWO) and Kansas Department of Wildlife and Parks acquiring the use and control of portions of the reservoir conservation capacity. A "designated operating pool" was established for Cedar Bluff Reservoir and includes the following sub allocation pools: Russell's existing water storage right which remained unchanged (2,700 AF); an artificial recharge pool under control of the KWO (5,110 AF); and a fish, wildlife and recreation pool under control of the KDWPT (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 KDWPT and the KWO. A Contract Administration Memorandum between Reclamation, the state of Kansas and Russell was signed in November/December of 2003, establishing an accounting procedure for water storage in Cedar Bluff Reservoir. In January, 2006 an MOU was signed by the state of Kansas agencies, KWO, and Kansas Department of Wildlife and Parks. The KDWPT will be responsible for the joint pool releases and for the water rights.

2017 Summary

The annual precipitation total at Cedar Bluff Dam was 23.68 inches which is 113 percent of normal. The 2017 inflow of 9,338 AF was between the dry year and normal year forecasts. The reservoir level at the beginning of the year was 2118.81 feet (25.2 feet below top of conservation). May precipitation at Cedar Bluff Dam totaled 7.33 inches and was the third greatest ever recorded for the month (since 1950.) The level of Cedar Bluff Reservoir slowly increased to elevation 2120.05 feet on June 7, 2017. Water was not released from the reservoir for Russell or the KWO in 2017. Evaporation and seepage losses exceeded inflows throughout the remainder of the year and the reservoir level gradually decreased to elevation 2117.68 feet on December 31, 2017 (26.3 feet below the top of conservation). The COE determined that the reservoir prevented $630,800 in flood damages. The state of Kansas operates and maintains the fish hatchery facility located below Cedar Bluff Dam. There were no releases to the facility in 2017.

2018 Outlook

Storage in Cedar Bluff Reservoir on December 31, 2017 was within the joint use pool. The KDWPT is expected to use very little if any water in the operations of the fish hatchery facility. If conditions are dry, Russell and KWO may request a release to the river for recharge in 2018.

TABLE 1

RESERVOIR DATA - NIOBRARA, LOWER PLATTE AND KANSAS RIVER BASINS

		CAPACITY ALLOCATIONS*			
			LIVE CONSERVATION		
RESERVOIR		DEAD	Inactive	Active	FLOOD CONTROL
Box Butte	- Elevation Ft.	3969.0	3979.0	4007.0	---
	Total Acre-feet	188	2,392	29,161	---
	Net Acre-feet	188	2,204	26,769	---
Merritt	- 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	35	20,150	119,469	---
	Net Acre-feet	35	20,115	99,319	---
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	0	0	36,508	165,328
	Net Acre-feet	0	0	36,508	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	- Elevation Ft.	2710.0	2720.0	2752.0	2773.0
Lake	Total Acre-feet	1,027	10,329	110,175	244,362
	Net Acre-feet	1,027	9,302	99,846	134,187
Hugh Butler	- Elevation Ft.	2552.0	2558.0	2581.8	2604.9
Lake	Total Acre-feet	5,185	8,921	36,224	85,070
	Net Acre-feet	5,185	3,736	27,303	48,846
Harry Strunk	- Elevation Ft.	2335.0	2343.0	2366.1	2386.2
Lake	Total Acre-feet	3,408	7,897	34,647	87,361
	Net Acre-feet	3,408	4,489	26,750	52,714
Keith Sebelius	- Elevation Ft.	2275.0	2280.4	2304.3	2331.4
Lake	Total Acre-feet	1,636	3,993	34,510	133,740
	Net Acre-feet	1,636	2,357	30,517	99,230
Harlan County	- Elevation Ft.	1885.0	1927.0	1945.73	1973.5
Lake***	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	1,659	11,644	35,666	86,131
	Net Acre-feet	1,659	9,985	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	- Elevation Ft.	1407.8	1428.0	1455.6	1488.3
Lake	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.)		32,379	264,764	1,457,448	3,815,125 **
Total Net Acre-feet		32,379	232,385	1,192,684	2,357,677

* Includes space for sediment storage.

** Includes total active storage for Box Butte, Merritt, Calamus, and Davis Creek Reservoirs.

*** Bottom of irrigation pool for Harlan County Lake is 1932.5 feet, 164,111 AF.

TABLE 2
SUMMARY OF 2017 OPERATIONS

MIRAGE FLATS PROJECT

	BOX BUTTE RESERVOIR					MIRAGE FLATS CANAL	
Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content	Diversions To Canal (AF)	Delivered To Farms (AF)
Jan.	1,002	56	99	0.74	15,636	0	0
Feb.	1,979	60	131	0.43	17,424	0	0
Mar.	2,589	67	246	1.36	19,700	0	0
Apr.	2,349	60	421	2.51	21,568	0	0
May	2,855	908	522	4.33	22,993	787	123
June	944	4,235	637	1.65	19,065	4,137	745
July	488	5,760	626	3.13	13,167	5,355	3,002
Aug.	509	6,379	411	2.79	6,886	6,199	3,299
Sep.	823	4,013	202	1.03	3,494	3,805	1,937
Oct.	1,850	2,305	117	0.80	2,922	2,802	1,307
Nov.	1,744	36	68	0.46	4,562	0	0
Dec.	1,486	803	45	0.45	5,200	0	0
TOTAL	18,618	24,682	3,525	19.68		23,085	10,413

NOTE: Acres irrigated 2017: Mirage Flats Canal - 10,548 acres.

SANDHILLS DIVISION
AINSWORTH UNIT

	MERRITT RESERVOIR					AINSWORTH CANAL	
Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content	Release To Canal (AF)	Delivered To Farms (AF)
Jan.	15,563	15,868	238	0.98	61,370	0	0
Feb.	20,100	18,149	304	1.36	63,017	0	0
Mar.	19,305	20,529	423	0.73	61,370	0	0
Apr.	17,283	16,860	693	1.96	61,100	0	0
May	19,881	17,435	1,083	4.21	62,463	2,499	0
June	15,267	18,347	1,163	0.53	58,220	14,035	5,011
July	17,403	31,131	1,185	1.59	43,307	30,942	20,137
Aug.	18,605	13,736	745	4.66	47,431	13,849	3,874
Sep.	17,281	12,476	613	2.14	51,623	11,742	6,340
Oct.	17,505	7,319	709	2.25	61,100	0	0
Nov.	15,987	14,995	451	0.30	61,641	0	0
Dec.	15,254	15,481	314	0.65	61,100	0	0
TOTAL	2019,434	202,326	7,921	21.36		73,067	35,362

NOTE: Acres irrigated 2017: Ainsworth Canal - 34,626 acres.

TABLE 2
SUMMARY OF OPERATIONS

NORTH LOUP DIVISION

	CALAMUS RESERVOIR						ABOVE DAVIS CREEK MIRDAN CANAL		
Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip (Inches)	End of Month Content	Release to Calamus Fish Hatch. (AF)	Release To Canal (AF)	Canal Use (AF)	Delivered To Farms (AF)
Jan.	19,808	17,941	436	0.89	102,634	0	0	0	0
Feb.	18,483	14,186	554	0.34	106,377	0	0	0	0
Mar.	21,347	6,959	1,042	2.17	119,723	4	0	0	0
Apr.	20,717	19,813	1,765	3.46	118,862	488	6,133	0	0
May	26,378	24,829	2,255	5.43	118,156	75	21,878	2,078	142
June	20,282	20,166	3,054	2.69	115,218	279	18,536	9,140	4,644
July	22,032	47,182	3,532	3.04	86,536	240	34,207	19,965	13,261
Aug	25,758	32,647	2,271	5.76	77,376	294	16,604	10,370	5,205
Sep.	21,301	25,679	1,171	4.21	71,827	203	11,304	6,282	4,171
Oct.	27,624	4,720	1,115	6.68	93,616	77	0	0	0
Nov.	19,923	14,755	661	0.02	98,123	0	0	0	0
Dec.	19,205	18,816	389	0.31	98,123	0	0	0	0
TOTAL	262,858	247,693	18,245	35.00		1,660	108,662	47,835	27,423

NOTE: Acres irrigated 2017: Mirdan Canal - 34,110 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 Month Content	Release To Canal (AF)	Delivered To Farms (AF)
Jan.	238	456	64	0.91	14,018	0	0
Feb.	188	395	79	0.40	13,732	0	0
Mar.	205	413	137	1.39	13,387	0	0
Apr.	4,018	425	239	2.43	16,741	0	0
May	15,743	3,305	342	3.65	28,837	2,138	50
June	12,223	8,912	589	0.82	31,559	7,438	2,001
July	11,429	17,304	540	2.33	25,144	16,253	11,084
Aug.	6,149	15,079	330	4.56	15,884	13,722	4,126
Sep.	4,339	6,381	213	2.62	13,629	6,169	2,707
Oct.	309	447	180	3.47	13,311	44	0
Nov.	190	381	96	0.13	13,024	0	0
Dec.	112	371	55	0.34	12,710	0	0
TOTAL	55,143	53,869	2,864	23.05		45,764	19,968

NOTE: Acres irrigated 2017: Fullerton Canal - 21,016 acres

TABLE 2
SUMMARY OF 2017 OPERATIONS

UPPER REPUBLICAN DIVISION ARMEL UNIT

	BONNY RESERVOIR					HALE DITCH
Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content	Outflow (AF)
Jan.	165	165	0	0.84	0	0
Feb.	333	333	0	0.04	0	0
Mar.	530	530	0	3.66	0	0
Apr.	557	557	0	1.43	0	224
May	592	592	0	7.61	0	435
June	1,478	1,478	0	3.19	0	351
July	226	226	0	3.19	0	47
Aug.	123	123	0	2.56	0	0
Sep.	119	119	0	2.01	0	0
Oct.	123	123	0	0.45	0	0
Nov.	149	149	0	0.11	0	0
Dec.	185	185	0	0.02	0	0
TOTAL	4,580	4,850	0	25.11		1,057

FRENCHMAN-CAMBRIDGE DIVISION
FRENCHMAN UNIT

	ENDERS RESERVOIR					CULBERTSON CANAL		CULBERTSON EXT.CANAL	
Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip (Inches)	End of Month Content	Diversions To Canal (AF)	Delivered To Farms (AF)	Diversions To Canal (AF)	Delivered To Farms (AF)
Jan.	489	185	50	0.99	10,518	0	0	0	0
Feb.	397	167	63	0.20	10,685	0	0	0	0
Mar.	471	185	103	1.61	10,868	0	0	0	0
Apr.	646	2,142	203	2.09	9,169	0	0	0	0
May	819	185	279	3.55	9,524	0	0	0	0
June	251	179	344	0.37	9,252	0	0	0	0
July	164	185	377	1.41	8,854	0	0	0	0
Aug.	330	185	287	3.42	8,712	0	0	0	0
Sep.	148	179	178	2.61	8,503	0	0	0	0
Oct.	234	185	140	0.58	8,412	0	0	0	0
Nov.	388	179	99	0.15	8,522	0	0	0	0
Dec.	315	185	57	0.12	8,595	0	0	0	0
TOTAL	4,652	4,141	2,180	17.10		0	0	0	0

NOTE: Acres irrigated 2017: Culbertson Canal - 0 acres; Culbertson Extension Canal - 0 acres.

TABLE 2
SUMMARY OF 2017 OPERATIONS

FRENCHMAN-CAMBRIDGE DIVISION (Continued)
MEEKER-DRIFTWOOD UNIT

	SWANSON LAKE					MEEKER-DRIFTWOOD	
Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content	Release To Canal (AF)	Delivered To Farms (AF)
Jan.	4,284	61	229	0.70	49,966	0	0
Feb.	5,071	56	303	0.03	54,678	0	0
Mar.	5,971	61	498	2.07	60,090	0	0
Apr.	4,930	60	999	1.12	63,961	0	0
May	5,394	61	1,317	7.89	67,977	0	0
June	933	1,513	1,906	1.20	65,491	1,783	397
July	690	9,453	1,784	1.88	54,944	9,316	2,887
Aug.	1,459	4,727	1,488	3.91	50,188	4,704	1,554
Sep.	755	1,107	757	5.54	49,079	889	186
Oct.	27	61	752	1.50	48,293	0	0
Nov.	2,038	60	528	0.29	49,743	0	0
Dec.	1,962	61	302	0.14	51,342	0	0
TOTAL	33,514	17,281	10,863	26.27		16,692	5,024

NOTE: Acres irrigated 2017: Meeker-Driftwood Canal - 7,040 acres

FRENCHMAN-CAMBRIDGE DIVISION (Continued)
RED WILLOW UNIT

	HUGH BUTLER LAKE					RED WILLOW CANAL		BARTLEY CANAL	
Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content	Diversions To Canal (AF)	Delivered To Farms (AF)	Diversions To Canal (AF)	Delivered To Farms (AF)
Jan.	622	123	62	0.70	15,106	0	0	0	0
Feb.	617	111	83	0.26	15,529	0	0	0	0
Mar.	668	123	135	2.04	15,939	0	0	0	0
Apr.	667	119	310	0.40	16,177	0	0	408	0
May	1,334	123	351	5.38	17,037	0	0	1,601	0
June	60	119	622	0.64	16,356	0	0	2,203	424
July	43	454	705	1.08	15,240	0	0	1,794	920
Aug.	464	583	395	3.21	14,726	0	0	1,926	1,028
Sep.	700	119	506	2.97	14,801	0	0	204	53
Oct.	606	123	197	1.79	15,087	0	0	0	0
Nov.	542	119	155	0.27	15,355	0	0	0	0
Dec.	479	123	85	0.18	15,626	0	0	0	0
TOTAL	6,802	2,239	3,606	18.92		0	0	8,136	2,425

NOTE: Acres irrigated 2017: Red Willow Canal - 0 acres; Bartley Canal - 3,474 acres.

TABLE 2
SUMMARY OF 2017 OPERATIONS

FRENCHMAN-CAMBRIDGE DIVISION (Continued)
CAMBRIDGE UNIT

	HARRY STRUNK LAKE					CAMBRIDGE CANAL	
Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content	Diversions To Canal (AF)	Delivered To Farms (AF)
Jan.	5,551	1,133	109	0.67	33,702	0	0
Feb.	4,751	3,751	147	0.14	34,555	0	0
Mar.	5,328	1,958	256	1.27	37,669	0	0
Apr.	3,748	8,390	591	0.19	32,436	298	0
May	4,343	3,830	701	4.68	32,248	3,551	0
June	2,060	5,560	710	0.68	28,038	6,465	1,475
July	2,348	8,456	817	2.72	21,113	7,225	3,019
Aug.	2,413	6,331	487	4.20	16,708	6,154	3,874
Sep.	1,999	2,057	377	2.36	16,273	1,713	784
Oct.	3,256	62	233	1.08	19,234	0	0
Nov.	2,599	60	190	0.26	21,583	0	0
Dec.	2,442	62	108	0.41	23,855	0	0
TOTAL	40,838	41,650	4,726	18.66		25,406	9,152

NOTE: Acres irrigated 2017: Cambridge Canal - 12,683 acres

KANASKA DIVISION
ALMENA UNIT

	KEITH SEBELIUS LAKE						ALMENA CANAL	
Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content	Release to City of Norton (AF)	Diversions To Canal (AF)	Delivered To Farms (AF)
Jan.	542	50	81	0.99	13,450	19	0	0
Feb.	326	45	102	0.04	13,629	17	0	0
Mar.	541	51	171	2.24	13,948	21	0	0
Apr.	603	53	384	1.03	14,114	23	0	0
May	2,111	56	600	9.54	15,569	25	0	0
June	511	82	818	0.80	15,180	53	0	0
July	686	1,168	901	3.97	13,797	52	771	288
Aug.	406	75	618	2.79	13,510	44	0	0
Sep.	256	76	592	3.55	13,098	46	0	0
Oct.	509	59	357	1.51	13,191	28	0	0
Nov.	312	51	191	0.02	13,261	21	0	0
Dec.	270	50	102	0.09	13,379	20	0	0
TOTAL	7,073	1,816	4,917	26.57		369	771	288

NOTE: Acres irrigated 2017: Almena Canal - 2,500 acres.

TABLE 2
SUMMARY OF 2017 OPERATIONS

BOSTWICK DIVISION
FRANKLIN UNIT

	HARLAN COUNTY LAKE Data from Corps of Engineers					FRANKLIN CANAL		NAPONEE CANAL	
Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content	Release To Canal (AF)	Delivered To Farms (AF)	Release To Canal (AF)	Delivered To Farms (AF)
Jan.	7,140	0	615	1.11	200,728	0	0	0	0
Feb.	10,840	0	657	0.02	210,911	0	0	0	0
Mar.	9,501	0	1,044	1.49	219,368	0	0	0	0
Apr.	16,899	0	2,709	4.16	233,558	0	0	0	0
May	32,390	0	3,363	7.01	262,585	0	0	0	0
June	5,544	8,061	4,309	1.95	255,759	896	0	101	12
July	13,329	22,269	5,450	4.09	241,369	8,162	2,440	390	129
Aug.	5,643	16,874	5,335	2.15	224,803	6,058	2,788	392	105
Sep.	2,579	5,560	5,490	1.92	216,332	2,018	1,016	71	41
Oct.	5,518	0	3,566	2.53	218,284	0	0	0	0
Nov.	5,236	0	2,498	0.07	221,022	0	0	0	0
Dec.	4,270	0	1,045	0.10	224,247	0	0	0	0
TOTAL	118,889	52,764	36,081	26.60		17,134	6,244	954	287

NOTE: Acres irrigated 2017: Franklin Canal - 10,328 acres; Naponee Canal - 453 acres.

BOSTWICK DIVISION (Continued)
SUPERIOR-COURTLAND UNIT

	FRANKLIN PUMP CANAL		SUPERIOR CANAL			COURTLAND CANAL - ABOVE LOVEWELL NEBRASKA USE		KANSAS USE	
Month	Diverted To Canal (AF)	Delivered To Farms (AF)	Diverted To Canal (AF)	Delivered To Farms (AF)	Total Diversion (AF)	Total (AF)	Delivered To Farms (AF)	Diversion To Canal (AF)	Delivered To Farms (AF)
Jan.	0	0	0	0	0	0	0	0	0
Feb.	0	0	0	0	0	0	0	0	0
Mar.	0	0	0	0	0	0	0	0	0
Apr.	0	0	0	0	0	0	0	0	0
May	0	0	0	0	4,565	0	0	395	0
June	0	0	1,724	252	8,552	54	44	6,508	1,230
July	425	216	2,776	950	13,813	205	183	7,600	3,773
Aug.	303	200	2,435	986	13,633	182	156	7,389	3,472
Sep.	70	46	558	152	6,725	30	29	2,202	1,055
Oct.	0	0	0	0	9,289	0	0	0	0
Nov.	0	0	0	0	5,860	0	0	0	0
Dec.	0	0	0	0	0	0	0	0	0
TOTAL	798	462	7,493	2,340	62,437	471	412	24,094	9,530

NOTE: Acres irrigated 2017:
Franklin Pump Canal - 1,231 acres; Superior Canal - 6,166 acres.
Courtland Canal-Nebraska use - 1,243 acres.
Courtland Canal-Kansas use - 12,267 acres.

TABLE 2
SUMMARY OF 2017 OPERATIONS

BOSTWICK DIVISION (Continued)
COURTLAND UNIT

	LOVEWELL RESERVOIR							COURTLAND (Below)	
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)	Release To Canal (AF)	Delivered To Farms (AF)
Jan.	3,456	0	3,456	12	176	1.18	38,666	0	0
Feb.	1,199	0	1,199	11	241	0.18	39,613	0	0
Mar.	1,387	0	1,387	12	413	1.43	40,575	0	0
Apr.	2,439	0	2,439	12	862	1.87	42,140	0	0
May	13,472	844	14,316	13,674	1,265	4.67	41,517	1,648	0
June	2,532	1,209	3,741	6,992	1,545	2.08	36,721	7,056	3,642
July	1,576	4,468	6,044	12,685	1,618	2.43	28,462	12,865	9,897
Aug.	1,302	4,367	5,669	11,265	996	2.53	21,870	11,300	7,996
Sep.	406	3,677	4,083	5,480	827	1.84	19,646	5,131	3,461
Oct.	0	8,378	7,748	12	579	1.50	26,803	0	0
Nov.	0	5,065	4,880	12	399	0.10	31,272	0	0
Dec.	328	112	440	12	206	0.20	31,494	0	0
TOTAL	27,282	28,120	55,402	50,179	9,127	20.01		38,000	24,996

NOTE: Acres irrigated 2017: Courtland Canal below Lovewell - 27,393 acres.

SOLOMON DIVISION
KIRWIN UNIT

	KIRWIN RESERVOIR					KIRWIN CANAL	
Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content	Release To Canal (AF)	Delivered To Farms (AF)
Jan.	4,270	0	282	1.64	81,017	0	0
Feb.	2,353	0	402	0.07	82,968	0	0
Mar.	2,439	0	644	1.63	84,763	0	0
Apr.	3,722	0	1,339	2.24	87,146	0	0
May	8,989	0	2,185	8.21	93,950	0	0
June	4,289	2,495	2,925	1.88	92,819	2,671	687
July	3,486	8,107	3,203	2.29	84,995	8,100	3,782
Aug.	2,253	6,918	1,985	2.40	78,345	6,775	4,123
Sep.	1,129	20	2,075	2.05	77,379	0	0
Oct.	14,069	0	1,252	2.61	90,196	0	0
Nov.	2,514	0	771	0.14	91,939	0	0
Dec.	1,626	0	402	0.23	93,163	0	0
TOTAL	51,139	17,540	17,465	25.39		17,546	8,592

NOTE: Acres irrigated 2017: Kirwin Canal – 8,936 acres.

TABLE 2
SUMMARY OF 2017 OPERATIONS

SOLOMON DIVISION (Continued)
WEBSTER UNIT

	WEBSTER RESERVOIR					OSBORNE CANAL	
Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content	Diversions To Canal (AF)	Delivered To Farms (AF)
Jan.	4,176	0	250	1.52	71,790	0	0
Feb.	2,781	0	321	0.00	74,250	0	0
Mar.	2,873	0	551	1.69	76,572	0	0
Apr.	4,884	0	1,087	1.99	80,369	0	0
May	12,131	6,107	1,638	6.44	84,755	0	0
June	5,522	6,918	2,289	2.99	81,070	2,537	489
July	2,550	6,544	2,417	2.59	74,659	5,264	2,781
Aug.	612	5,405	1,721	1.50	68,145	3,724	2,399
Sep.	258	0	1,655	2.61	66,748	0	0
Oct.	9,068	0	784	2.36	75,032	0	0
Nov	2,381	0	614	0.04	76,799	0	0
Dec.	1,785	0	338	0.15	78,246	0	0
TOTAL	49,021	24,974	13,665	23.88		11,525	5,669

NOTE: Acres irrigated 2017: Osborne Canal - 5,028 acres.

SOLOMON DIVISION (Continued)
GLEN ELDER UNIT

	WACONDA LAKE					OUTFLOW TO RIVER				
						City of Beloit		Irrig.District	Other	Release To
Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content	Storage Release (AF)	Quality Bypass (AF)	Storage Release (AF)	Controlled Releases (AF)	Mitchell Co. RWD No. 2 (AF)
Jan.	17,365	21,580	762	1.86	211,931	0	0	0	21,521	59
Feb.	6,772	11,175	986	0.00	206,542	0	0	0	11,122	53
Mar.	6,568	3,549	1,681	1.38	207,880	0	0	0	3,483	66
Apr.	12,702	1,544	3,755	1.61	215,283	0	0	0	1,488	56
May	88,607	39,509	5,117	7.65	259,264	0	0	0	39,456	53
June	24,286	59,006	7,636	1.33	216,908	0	0	0	58,932	74
July	10,202	6,108	9,194	1.41	211,808	0	0	2,438	3,580	90
Aug.	7,176	2,755	6,515	2.04	209,714	0	47	629	2,007	72
Sep.	4,504	1,275	6,764	1.97	206,179	0	429	301	482	63
Oct.	13,146	796	3,869	1.11	214,660	0	738	0	0	58
Nov.	4,990	775	1,967	0.05	216,908	0	714	0	0	61
Dec.	3,774	6,656	981	0.10	213,045	0	430	0	6,167	59
TOTAL	200,092	154,728	49,227	20.51	0	0	2,358	3,368	148,238	764

NOTE: Acres irrigated 2017: Glen Elder District - 5,752 acres.

TABLE 2
SUMMARY OF 2017 OPERATIONS

SMOKY HILL DIVISION
ELLIS UNIT

	CEDAR BLUFF RESERVOIR					Release to:		
Month	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	End of Month Content	City of Russell (AF)	Fish Hatchery (AF)	Kansas Water Office (AF)
Jan.	404	0	231	1.34	54,458	0	0	0
Feb.	26	0	286	0.10	54,198	0	0	0
Mar.	341	0	456	1.97	54,083	0	0	0
Apr.	1,843	0	1,092	2.58	54,834	0	0	0
May	4,049	0	1,419	7.33	57,464	0	0	0
June	1,767	0	1,737	3.08	57,494	0	0	0
July	145	0	1,928	1.42	55,711	0	0	0
Aug.	1	0	1,658	0.56	54,054	0	0	0
Sep.	701	0	1,642	4.04	53,113	0	0	0
Oct.	0	0	1,013	1.23	52,100	0	0	0
Nov.	60	0	479	0.03	51,681	0	0	0
Dec.	1	0	581	0.00	51,101	0	0	0
TOTAL	9,338	0	12,522	23.68		0	0	0

TABLE 3

ACRES IRRIGATED IN 2017 AND ESTIMATES FOR 2018

Irrigation District and Canal	Acres With Service Available	Acres Irrigated in 2017	Estimated Acres to be Irrigated in 2018
Mirage Flats Irrigation District			
Mirage Flats Canal	11,662	10,548	10,000
Ainsworth Irrigation District			
Ainsworth Canal	35,000	34,626	34,500
Twin Loups Irrigation District			
Above Davis Creek	34,453	34,110	34,000
Below Davis Creek	20,996	21,016	21,000
Total Twin Loups Irrigation District	55,449	55,126	55,000
Frenchman Valley Irrigation District			
Culbertson Canal	9,292	0	500
H & RW Irrigation District			
Culbertson Extension Canal	11,915	0	0
Frenchman-Cambridge Irrigation District			
Meeker-Driftwood Canal	16,691	7,040	7,000
Red Willow Canal	4,643	0	0
Bartley Canal	6,130	3,474	3,500
Cambridge Canal	18,205	12,683	13,000
Total Frenchman-Cambridge Irrigation District	45,669	23,197	23,500
Almena Irrigation District			
Almena Canal	5,764	2,500	2,500
Bostwick Irrigation District in Nebraska			
Franklin Canal	11,031	10,328	10,500
Naponee Canal	1,607	453	500
Franklin Pump Canal	2,026	1,231	1,500
Superior Canal	6,056	6,166	6,000
Courtland Canal (Nebraska)	1,735	1,243	1,500
Total Bostwick Irrigation Dist. in Nebraska	22,455	19,421	20,000
Kansas-Bostwick Irrigation District			
Courtland Canal above Lovewell	13,378	12,267	12,500
Courtland Canal below Lovewell	29,122	27,393	28,000
Total Kansas-Bostwick Irrigation District	42,500	39,660	40,500
Kirwin Irrigation District			
Kirwin Canal	11,465	8,936	9,000
Webster Irrigation District			
Osborne Canal	8,537	5,028	6,000
Glen Elder Irrigation District	10,370	5,752	6,000
TOTAL PROJECT USES	270,078	204,794	207,500
Non-Project Uses			
Hale Ditch	700	200	
	200		
TOTAL PROJECT AND NON-PROJECT	270,778	204,994	207,700

TABLE 4

BOX BUTTE RESERVOIR OPERATION ESTIMATES - 2018

	INFLOW		EVAPORATION		RELEASE REQUIRMENT		RESERVOIR SPILL	REQUIREMENT SHORTAGE	END OF MONTH ELEV	CONT	RESERVOIR CHANGE
	MEAN	1000		1000	MEAN	1000	1000	1000		1000	1000
MONTH	CFS	AF	INCHES	AF	CFS	AF	AF	AF	FT	AF	AF
REASONABLE MINIMUM INFLOW CONDITIONS											
JAN	15	0.9	1.6	0.1	2	0.1	0.6	0.0	3985.0	5.3	0.1
FEB	20	1.1	1.9	0.1	2	0.1	0.9	0.0	3985.0	5.3	0.0
MAR	24	1.5	3.8	0.1	2	0.1	1.3	0.0	3985.0	5.3	0.0
APR	22	1.3	5.3	0.2	2	0.1	1.0	0.0	3985.0	5.3	0.0
MAY	16	1.0	6.6	0.2	2	0.1	0.7	0.0	3985.0	5.3	0.0
JUN	10	0.6	8.8	0.3	89	5.3	0.0	2.1	3979.0	2.4	-2.9
JUL	6	0.4	10.1	0.2	226	13.9	0.0	13.7	3979.0	2.4	0.0
AUG	11	0.7	8.8	0.2	213	13.1	0.0	12.6	3979.0	2.4	0.0
SEP	12	0.7	6.6	0.1	40	2.4	0.0	1.8	3979.0	2.4	0.0
OCT	15	0.9	5.0	0.1	2	0.1	0.0	0.0	3980.9	3.1	0.7
NOV	18	1.1	2.5	0.1	2	0.1	0.0	0.0	3982.5	4.0	0.9
DEC	15	0.9	1.9	0.1	2	0.1	0.0	0.0	3983.9	4.7	0.7
TOTAL		11.1	62.9	1.8		35.5	4.5	30.2			-0.5
MOST PROBABLE INFLOW CONDITIONS											
JAN	19	1.2	1.5	0.1	2	0.1	0.9	0.0	3985.0	5.3	0.1
FEB	25	1.4	1.7	0.1	2	0.1	1.2	0.0	3985.0	5.3	0.0
MAR	34	2.1	3.5	0.1	2	0.1	1.9	0.0	3985.0	5.3	0.0
APR	29	1.7	5.0	0.2	2	0.1	1.4	0.0	3985.0	5.3	0.0
MAY	23	1.4	6.1	0.2	2	0.1	1.1	0.0	3985.0	5.3	0.0
JUN	13	0.8	8.2	0.3	70	4.2	0.0	0.8	3979.0	2.4	-2.9
JUL	10	0.6	9.3	0.2	209	12.9	0.0	12.5	3979.0	2.4	0.0
AUG	15	0.9	8.2	0.2	164	10.1	0.0	9.4	3979.0	2.4	0.0
SEP	17	1.0	6.1	0.1	29	1.7	0.0	0.8	3979.0	2.4	0.0
OCT	19	1.2	4.7	0.1	2	0.1	0.0	0.0	3981.3	3.4	1.0
NOV	25	1.5	2.3	0.1	2	0.1	0.0	0.0	3983.9	4.7	1.3
DEC	19	1.2	1.7	0.1	2	0.1	0.4	0.0	3985.0	5.3	0.6
TOTAL		15.0	58.3	1.8		29.7	6.9	23.5			0.1
REASONABLE MAXIMUM INFLOW CONDITIONS											
JAN	26	1.6	1.3	0.0	2	0.1	1.4	0.0	3985.0	5.3	0.1
FEB	34	1.9	1.6	0.1	2	0.1	1.7	0.0	3985.0	5.3	0.0
MAR	44	2.7	3.2	0.1	2	0.1	2.5	0.0	3985.0	5.3	0.0
APR	37	2.2	4.6	0.2	2	0.1	1.9	0.0	3985.0	5.3	0.0
MAY	29	1.8	5.6	0.2	2	0.1	1.5	0.0	3985.0	5.3	0.0
JUN	17	1.0	7.5	0.3	47	2.8	0.0	0.0	3981.0	3.2	-2.1
JUL	11	0.7	8.6	0.2	135	8.3	0.0	7.0	3979.0	2.4	-0.8
AUG	19	1.2	7.5	0.2	104	6.4	0.0	5.4	3979.0	2.4	0.0
SEP	20	1.2	5.6	0.1	18	1.1	0.0	0.0	3979.0	2.4	0.0
OCT	26	1.6	4.3	0.1	2	0.1	0.0	0.0	3982.1	3.8	1.4
NOV	32	1.9	2.1	0.1	2	0.1	0.2	0.0	3985.0	5.3	1.5
DEC	26	1.6	1.6	0.1	2	0.1	1.4	0.0	3985.0	5.3	0.0
TOTAL		19.4	53.5	1.7		19.4	10.6	12.4			0.1

TABLE 4

MERRITT RESERVOIR OPERATION ESTIMATES - 2018

					RELEASE REQUIRMENT				RESERVOIR	REQUIREMENT	END OF	MONTH	RESERVOIR
	INFLOW		EVAPORATION		CANAL	RIVER	TOTAL		SPILL	SHORTAGE	ELEV	CONT	CHANGE
	MEAN	1000		1000	1000	1000	MEAN	1000	1000	1000		1000	1000
MONTH	CFS	AF	INCHES	AF	AF	AF	CFS	AF	AF	AF	FT	AF	AF
REASONABLE MINIMUM INFLOW CONDITIONS													
JAN	227	14.0	1.9	0.3	0.0	1.0	16	1.0	12.7	0.0	2944.0	61.1	0.0
FEB	248	13.8	2.6	0.4	0.0	1.0	18	1.0	12.4	0.0	2944.0	61.1	0.0
MAR	255	15.7	3.2	0.5	0.0	1.0	16	1.0	11.4	0.0	2945.0	63.9	2.8
APR	262	15.6	5.1	0.8	0.0	1.0	17	1.0	11.0	0.0	2946.0	66.7	2.8
MAY	253	15.6	6.4	1.1	3.4	1.0	71	4.4	10.1	0.0	2946.0	66.7	0.0
JUN	240	14.3	8.4	1.4	7.6	1.0	144	8.6	4.3	0.0	2946.0	66.7	0.0
JUL	242	14.9	9.7	1.6	33.4	1.0	558	34.4	0.0	0.0	2937.1	45.6	-21.1
AUG	247	15.2	8.4	1.0	31.0	1.0	519	32.0	0.0	0.0	2926.2	27.8	-17.8
SEP	243	14.5	7.1	0.5	8.5	1.0	159	9.5	0.0	0.0	2929.4	32.3	4.5
OCT	247	15.2	6.4	0.5	0.0	2.5	41	2.5	0.0	0.0	2936.6	44.5	12.2
NOV	240	14.3	3.2	0.4	0.0	4.0	67	4.0	0.0	0.0	2941.3	54.4	9.9
DEC	224	13.8	1.9	0.3	0.0	1.0	16	1.0	5.8	0.0	2944.0	61.1	6.7
TOTAL		176.9	64.3	8.8	83.9	16.5		100.4	67.7	0.0			0.0
MOST PROBABLE INFLOW CONDITIONS													
JAN	239	14.7	1.7	0.3	0.0	1.0	16	1.0	13.4	0.0	2944.0	61.1	0.0
FEB	261	14.5	2.3	0.4	0.0	1.0	18	1.0	13.1	0.0	2944.0	61.1	0.0
MAR	269	16.6	2.8	0.4	0.0	1.0	16	1.0	12.4	0.0	2945.0	63.9	2.8
APR	275	16.4	4.5	0.7	0.0	1.0	17	1.0	11.9	0.0	2946.0	66.7	2.8
MAY	266	16.4	5.7	1.0	2.9	1.0	63	3.9	11.5	0.0	2946.0	66.7	0.0
JUN	253	15.1	7.4	1.3	6.5	1.0	126	7.5	6.3	0.0	2946.0	66.7	0.0
JUL	255	15.7	8.5	1.4	28.5	1.0	479	29.5	0.0	0.0	2940.0	51.5	-15.2
AUG	260	16.0	7.4	0.9	26.6	1.0	448	27.6	0.0	0.0	2933.6	39.0	-12.5
SEP	257	15.3	6.2	0.6	7.3	1.0	139	8.3	0.0	0.0	2937.0	45.4	6.4
OCT	260	16.0	5.7	0.7	0.0	2.5	41	2.5	0.0	0.0	2942.8	58.2	12.8
NOV	253	15.1	2.8	0.4	0.0	4.0	67	4.0	7.8	0.0	2944.0	61.1	2.9
DEC	235	14.5	1.7	0.3	0.0	1.0	16	1.0	13.2	0.0	2944.0	61.1	0.0
TOTAL		186.3	56.7	8.4	71.8	16.5		88.3	89.6	0.0			0.0
REASONABLE MAXIMUM INFLOW CONDITIONS													
JAN	258	15.9	1.5	0.2	0.0	1.0	16	1.0	14.7	0.0	2944.0	61.1	0.0
FEB	282	15.7	2.0	0.3	0.0	1.0	18	1.0	14.4	0.0	2944.0	61.1	0.0
MAR	291	17.9	2.5	0.4	0.0	1.0	16	1.0	13.7	0.0	2945.0	63.9	2.8
APR	297	17.7	4.0	0.7	0.0	1.0	17	1.0	13.2	0.0	2946.0	66.7	2.8
MAY	287	17.7	5.0	0.8	2.4	1.0	55	3.4	13.5	0.0	2946.0	66.7	0.0
JUN	273	16.3	6.5	1.1	5.3	1.0	106	6.3	8.9	0.0	2946.0	66.7	0.0
JUL	274	16.9	7.5	1.3	23.3	1.0	394	24.3	0.0	0.0	2942.8	58.0	-8.7
AUG	281	17.3	6.5	1.0	21.8	1.0	370	22.8	0.0	0.0	2940.0	51.5	-6.5
SEP	277	16.5	5.5	0.7	5.9	1.0	116	6.9	0.0	0.0	2943.7	60.4	8.9
OCT	281	17.3	5.0	0.8	0.0	2.5	41	2.5	13.3	0.0	2944.0	61.1	0.7
NOV	273	16.3	2.5	0.4	0.0	4.0	67	4.0	11.9	0.0	2944.0	61.1	0.0
DEC	255	15.7	1.5	0.2	0.0	1.0	16	1.0	14.5	0.0	2944.0	61.1	0.0
TOTAL		201.2	50.0	7.9	58.7	16.5		75.2	118.1	0.0			0.0

TABLE 4

CALAMUS RESERVOIR OPERATION ESTIMATES - 2018

					RELEASE REQUIRMENT				RESERVOIR	REQUIREMENT	END OF MONTH		RESERVOIR
	INFLOW		EVAPORATION		CANAL	RIVER	TOTAL		SPILL	SHORTAGE	ELEV	CONT	CHANGE
	MEAN	1000		1000	1000	1000	MEAN	1000	1000	1000		1000	1000
MONTH	CFS	AF	INCHES	AF	AF	AF	CFS	AF	AF	AF	FT	AF	AF
REASONABLE MINIMUM INFLOW CONDITIONS													
JAN	297	18.3	1.9	0.5	0.5	3.1	58	3.6	11.8	0.0	2240.0	100.5	2.4
FEB	316	17.6	2.3	0.6	0.5	2.8	59	3.3	13.7	0.0	2240.0	100.5	0.0
MAR	352	21.7	4.2	1.1	0.5	3.1	58	3.6	7.8	0.0	2242.0	109.7	9.2
APR	364	21.7	6.7	1.9	0.5	3.0	59	3.5	6.5	0.0	2244.0	119.5	9.8
MAY	404	24.9	7.0	2.1	2.7	3.1	94	5.8	17.0	0.0	2244.0	119.5	0.0
JUN	369	22.0	8.4	2.5	5.6	3.0	144	8.6	10.9	0.0	2244.0	119.5	0.0
JUL	344	21.2	9.6	2.8	37.8	21.2	957	59.0	0.0	0.0	2234.7	78.9	-40.6
AUG	325	20.0	9.6	2.2	30.3	20.0	816	50.3	0.0	0.0	2224.9	46.4	-32.5
SEP	307	18.3	7.4	1.2	9.9	18.3	473	28.2	0.0	0.0	2220.6	35.3	-11.1
OCT	305	18.8	5.7	0.8	0.5	3.1	58	3.6	0.0	0.0	2226.1	49.7	14.4
NOV	332	19.8	3.0	0.5	0.5	3.0	59	3.5	0.0	0.0	2231.1	65.5	15.8
DEC	321	19.8	1.8	0.4	0.5	3.1	58	3.6	0.0	0.0	2235.4	81.3	15.8
TOTAL		244.1	67.6	16.6	89.8	86.8		176.6	67.7	0.0			-16.8
MOST PROBABLE INFLOW CONDITIONS													
JAN	325	20.0	1.7	0.4	0.5	3.1	58	3.6	13.6	0.0	2240.0	100.5	2.4
FEB	345	19.2	2.0	0.5	0.5	2.8	54	3.3	15.4	0.0	2240.0	100.5	0.0
MAR	385	23.7	3.7	1.0	0.5	3.1	58	3.6	9.9	0.0	2242.0	109.7	9.2
APR	398	23.7	5.9	1.6	0.5	3.0	57	3.5	8.8	0.0	2244.0	119.5	9.8
MAY	442	27.2	6.1	1.8	2.3	3.1	88	5.4	20.0	0.0	2244.0	119.5	0.0
JUN	403	24.0	7.4	2.2	4.7	3.0	125	7.7	14.1	0.0	2244.0	119.5	0.0
JUL	377	23.2	8.5	2.5	30.2	23.2	867	53.4	0.0	0.0	2236.7	86.8	-32.7
AUG	356	21.9	8.5	2.0	23.8	21.9	742	45.7	0.0	0.0	2229.7	61.0	-25.8
SEP	335	20.0	6.6	1.3	5.7	20.0	417	25.7	0.0	0.0	2227.5	54.0	-7.0
OCT	333	20.5	5.0	0.9	0.5	3.1	58	3.6	0.0	0.0	2232.3	70.0	16.0
NOV	362	21.6	2.7	0.6	0.5	3.0	57	3.5	0.0	0.0	2236.9	87.5	17.5
DEC	351	21.6	1.5	0.4	0.5	3.1	58	3.6	4.6	0.0	2240.0	100.5	13.0
TOTAL		266.6	59.6	15.2	70.2	92.4		162.6	86.4	0.0			2.4
REASONABLE MAXIMUM INFLOW CONDITIONS													
JAN	375	23.1	1.5	0.4	0.5	3.1	58	3.6	16.7	0.0	2240.0	100.5	2.4
FEB	397	22.1	1.8	0.5	0.5	2.8	59	3.3	18.3	0.0	2240.0	100.5	0.0
MAR	445	27.4	3.3	0.9	0.5	3.1	58	3.6	13.7	0.0	2242.0	109.7	9.2
APR	460	27.4	5.2	1.4	0.5	3.0	59	3.5	12.7	0.0	2244.0	119.5	9.8
MAY	510	31.4	5.5	1.6	1.9	3.1	81	5.0	24.8	0.0	2244.0	119.5	0.0
JUN	465	27.7	6.6	2.0	3.8	3.0	114	6.8	18.9	0.0	2244.0	119.5	0.0
JUL	433	26.7	7.5	2.2	22.0	26.7	791	48.7	0.0	0.0	2238.8	95.3	-24.2
AUG	409	25.2	7.5	1.9	17.5	25.2	693	42.7	0.0	0.0	2233.9	75.9	-19.4
SEP	387	23.1	5.8	1.3	4.1	23.1	456	27.2	0.0	0.0	2232.5	70.5	-5.4
OCT	385	23.7	4.4	0.9	0.5	3.1	58	3.6	0.0	0.0	2237.4	89.7	19.2
NOV	418	24.9	2.4	0.6	0.5	3.0	59	3.5	10.0	0.0	2240.0	100.5	10.8
DEC	404	24.9	1.4	0.4	0.5	3.1	58	3.6	20.9	0.0	2240.0	100.5	0.0
TOTAL		307.6	52.9	14.1	52.8	102.3		155.1	136.0	0.0			2.4

TABLE 4

DAVIS CREEK RESERVOIR OPERATION ESTIMATES - 2018

	INFLOW		EVAPORATION		RELEASE REQUIRMENT		RESERVOIR SPILL	REQUIREMENT SHORTAGE	END OF MONTH ELEV	MONTH CONT	RESERVOIR CHANGE
	MEAN	1000		1000	MEAN	1000	1000	1000		1000	1000
MONTH	CFS	AF	INCHES	AF	CFS	AF	AF	AF	FT	AF	AF
REASONABLE MINIMUM INFLOW CONDITIONS											
JAN	0	0.0	1.9	0.1	6	0.4	0.0	0.0	2053.8	12.2	-0.5
FEB	0	0.0	2.3	0.1	7	0.4	0.0	0.0	2053.0	11.7	-0.5
MAR	0	0.0	4.1	0.1	6	0.4	0.0	0.0	2052.1	11.2	-0.5
APR	96	5.7	6.6	0.2	7	0.4	0.0	0.0	2060.1	16.3	5.1
MAY	239	14.7	7.0	0.3	57	3.5	0.0	0.0	2072.3	27.2	10.9
JUN	203	12.1	8.5	0.5	127	7.6	0.0	0.0	2076.0	31.2	4.0
JUL	239	14.7	9.0	0.6	297	18.3	0.0	0.0	2072.1	27.0	-4.2
AUG	161	9.9	7.0	0.4	273	16.8	0.0	0.0	2064.4	19.7	-7.3
SEP	60	3.6	6.1	0.3	133	7.9	0.0	0.0	2058.3	15.1	-4.6
OCT	0	0.0	5.5	0.2	6	0.4	0.0	0.0	2057.4	14.5	-0.6
NOV	0	0.0	2.9	0.1	7	0.4	0.0	0.0	2056.7	14.0	-0.5
DEC	0	0.0	1.7	0.1	6	0.4	0.0	0.0	2055.9	13.5	-0.5
TOTAL		60.7	62.6	3.0		56.9	0.0	0.0			0.8
MOST PROBABLE INFLOW CONDITIONS											
JAN	0	0.0	1.7	0.1	6	0.4	0.0	0.0	2053.8	12.2	-0.5
FEB	0	0.0	2.2	0.1	7	0.4	0.0	0.0	2052.9	11.7	-0.5
MAR	0	0.0	3.8	0.1	6	0.4	0.0	0.0	2052.1	11.2	-0.5
APR	50	3.0	6.1	0.2	6	0.4	0.0	0.0	2056.1	13.6	2.4
MAY	239	14.7	6.5	0.2	42	2.6	0.0	0.0	2070.7	25.5	11.9
JUN	206	12.3	7.9	0.5	99	6.1	0.0	0.0	2076.0	31.2	5.7
JUL	179	11.0	8.4	0.6	231	14.2	0.0	0.0	2072.5	27.4	-3.8
AUG	112	6.9	6.5	0.4	211	13.0	0.0	0.0	2065.8	20.9	-6.5
SEP	10	0.6	5.7	0.3	99	6.1	0.0	0.0	2058.3	15.1	-5.8
OCT	0	0.0	5.1	0.2	6	0.4	0.0	0.0	2057.4	14.5	-0.6
NOV	0	0.0	2.7	0.1	6	0.4	0.0	0.0	2056.7	14.0	-0.5
DEC	0	0.0	1.6	0.1	6	0.4	0.0	0.0	2055.9	13.5	-0.5
TOTAL		48.5	58.2	2.9		44.8	0.0	0.0			0.8
REASONABLE MAXIMUM INFLOW CONDITIONS											
JAN	0	0.0	1.7	0.1	6	0.4	0.0	0.0	2053.8	12.2	-0.5
FEB	0	0.0	2.0	0.1	7	0.4	0.0	0.0	2052.9	11.7	-0.5
MAR	0	0.0	3.6	0.1	6	0.4	0.0	0.0	2052.1	11.2	-0.5
APR	15	0.9	5.8	0.2	7	0.4	0.0	0.0	2052.6	11.5	0.3
MAY	239	14.7	6.2	0.2	32	2.0	0.0	0.0	2069.1	24.0	12.5
JUN	205	12.2	7.4	0.4	77	4.6	0.0	0.0	2076.0	31.2	7.2
JUL	114	7.0	7.9	0.5	172	10.6	0.0	0.0	2072.2	27.1	-4.1
AUG	67	4.1	6.2	0.4	156	9.6	0.0	0.0	2066.1	21.2	-5.9
SEP	0	0.0	5.4	0.3	97	5.8	0.0	0.0	2058.3	15.1	-6.1
OCT	0	0.0	4.8	0.2	6	0.4	0.0	0.0	2057.4	14.5	-0.6
NOV	0	0.0	2.5	0.1	7	0.4	0.0	0.0	2056.7	14.0	-0.5
DEC	0	0.0	1.5	0.1	6	0.4	0.0	0.0	2055.9	13.5	-0.5
TOTAL		38.9	55.0	2.7		35.4	0.0	0.0			0.8

TABLE 4

BONNY RESERVOIR OPERATION ESTIMATES - 2018

					RELEASE REQUIRMENT				RESERVOIR	REQUIREMENT	END OF MONTH		RESERVOIR
	INFLOW		EVAPORATION		CANAL	RIVER	TOTAL		SPILL	SHORTAGE	ELEV	CONT	CHANGE
	MEAN	1000		1000	1000	1000	MEAN	1000	1000	1000		1000	1000
MONTH	CFS	AF	INCHES	AF	AF	AF	CFS	AF	AF	AF	FT	AF	AF
REASONABLE MINIMUM INFLOW CONDITIONS													
JAN	5	0.3	2.3	0.0	0.0	0.1	2	0.1	0.2	0.0	3638.0	0.0	0.0
FEB	5	0.3	3.1	0.0	0.0	0.1	2	0.1	0.2	0.0	3638.0	0.0	0.0
MAR	5	0.3	3.9	0.0	0.0	0.1	2	0.1	0.2	0.0	3638.0	0.0	0.0
APR	7	0.4	6.2	0.0	0.1	0.1	3	0.2	0.2	0.0	3638.0	0.0	0.0
MAY	6	0.4	7.7	0.0	0.4	0.1	8	0.5	0.0	0.1	3638.0	0.0	0.0
JUN	7	0.4	10.0	0.0	0.5	0.1	10	0.6	0.0	0.2	3638.0	0.0	0.0
JUL	3	0.2	11.6	0.0	0.8	0.1	15	0.9	0.0	0.7	3638.0	0.0	0.0
AUG	2	0.1	10.0	0.0	0.6	0.1	11	0.7	0.0	0.6	3638.0	0.0	0.0
SEP	2	0.1	8.5	0.0	0.5	0.1	10	0.6	0.0	0.5	3638.0	0.0	0.0
OCT	3	0.2	7.7	0.0	0.5	0.1	10	0.6	0.0	0.4	3638.0	0.0	0.0
NOV	5	0.3	3.9	0.0	0.0	0.1	2	0.1	0.2	0.0	3638.0	0.0	0.0
DEC	5	0.3	2.3	0.0	0.0	0.1	2	0.1	0.2	0.0	3638.0	0.0	0.0
TOTAL		3.3	77.2	0.0	3.4	1.2		4.6	1.2	2.5			0.0
MOST PROBABLE INFLOW CONDITIONS													
JAN	11	0.7	2.1	0.0	0.0	0.1	2	0.1	0.6	0.0	3638.0	0.0	0.0
FEB	12	0.7	2.7	0.0	0.0	0.1	2	0.1	0.6	0.0	3638.0	0.0	0.0
MAR	13	0.8	3.4	0.0	0.0	0.1	2	0.1	0.7	0.0	3638.0	0.0	0.0
APR	15	0.9	5.5	0.0	0.1	0.1	3	0.2	0.7	0.0	3638.0	0.0	0.0
MAY	16	1.0	6.9	0.0	0.3	0.1	6	0.4	0.6	0.0	3638.0	0.0	0.0
JUN	15	0.9	8.9	0.0	0.3	0.1	7	0.4	0.5	0.0	3638.0	0.0	0.0
JUL	8	0.5	10.3	0.0	0.5	0.1	10	0.6	0.0	0.1	3638.0	0.0	0.0
AUG	5	0.3	8.9	0.0	0.4	0.1	8	0.5	0.0	0.2	3638.0	0.0	0.0
SEP	3	0.2	7.5	0.0	0.3	0.1	7	0.4	0.0	0.2	3638.0	0.0	0.0
OCT	6	0.4	6.9	0.0	0.3	0.1	6	0.4	0.0	0.0	3638.0	0.0	0.0
NOV	10	0.6	3.4	0.0	0.0	0.1	2	0.1	0.5	0.0	3638.0	0.0	0.0
DEC	10	0.6	2.1	0.0	0.0	0.1	2	0.1	0.5	0.0	3638.0	0.0	0.0
TOTAL		7.6	68.6	0.0	2.2	1.2		3.4	4.7	0.5			0.0
REASONABLE MAXIMUM INFLOW CONDITIONS													
JAN	21	1.3	1.8	0.0	0.0	0.1	2	0.1	1.2	0.0	3638.0	0.0	0.0
FEB	23	1.3	2.4	0.0	0.0	0.1	2	0.1	1.2	0.0	3638.0	0.0	0.0
MAR	24	1.5	3.1	0.0	0.0	0.1	2	0.1	1.4	0.0	3638.0	0.0	0.0
APR	29	1.7	4.9	0.0	0.0	0.1	2	0.1	1.6	0.0	3638.0	0.0	0.0
MAY	31	1.9	6.1	0.0	0.1	0.1	3	0.2	1.7	0.0	3638.0	0.0	0.0
JUN	29	1.7	7.9	0.0	0.1	0.1	3	0.2	1.5	0.0	3638.0	0.0	0.0
JUL	15	0.9	9.2	0.0	0.1	0.1	3	0.2	0.7	0.0	3638.0	0.0	0.0
AUG	10	0.6	7.9	0.0	0.1	0.1	3	0.2	0.4	0.0	3638.0	0.0	0.0
SEP	7	0.4	6.7	0.0	0.1	0.1	3	0.2	0.2	0.0	3638.0	0.0	0.0
OCT	11	0.7	6.1	0.0	0.0	0.1	2	0.1	0.6	0.0	3638.0	0.0	0.0
NOV	18	1.1	3.1	0.0	0.0	0.1	2	0.1	1.0	0.0	3638.0	0.0	0.0
DEC	19	1.2	1.8	0.0	0.0	0.1	2	0.1	1.1	0.0	3638.0	0.0	0.0
TOTAL		14.3	61.0	0.0	0.5	1.2		1.7	12.6	0.0			0.0

TABLE 4

ENDERS RESERVOIR OPERATION ESTIMATES - 2018

	INFLOW		EVAPORATION		RELEASE REQUIRMENT		RESERVOIR SPILL	REQUIREMENT SHORTAGE	END OF MONTH ELEV	CONT	RESERVOIR CHANGE
	MEAN	1000		1000	MEAN	1000	1000	1000		1000	1000
MONTH	CFS	AF	INCHES	AF	CFS	AF	AF	AF	FT	AF	AF
REASONABLE MINIMUM INFLOW CONDITIONS											
JAN	6	0.4	1.4	0.1	3	0.2	0.0	0.0	3082.0	8.8	0.2
FEB	5	0.3	1.6	0.1	4	0.2	0.0	0.0	3082.0	8.8	0.0
MAR	5	0.3	2.7	0.1	3	0.2	0.0	0.0	3082.0	8.8	0.0
APR	5	0.3	5.8	0.2	3	0.2	0.0	0.0	3081.9	8.7	-0.1
MAY	6	0.4	7.4	0.3	3	0.2	0.0	0.0	3081.7	8.6	-0.1
JUN	5	0.3	9.4	0.3	176	10.5	0.0	10.3	3081.4	8.4	-0.2
JUL	6	0.4	10.3	0.4	532	32.8	0.0	32.6	3081.0	8.2	-0.2
AUG	6	0.4	8.7	0.3	505	31.1	0.0	30.9	3080.9	8.1	-0.1
SEP	5	0.3	6.4	0.2	75	4.5	0.0	4.3	3080.7	8.0	-0.1
OCT	5	0.3	4.1	0.1	3	0.2	0.0	0.0	3080.7	8.0	0.0
NOV	5	0.3	3.0	0.1	3	0.2	0.0	0.0	3080.7	8.0	0.0
DEC	5	0.3	1.7	0.1	3	0.2	0.0	0.0	3080.7	8.0	0.0
TOTAL		4.0	62.5	2.3		80.5	0.0	78.1			-0.6
MOST PROBABLE INFLOW CONDITIONS											
JAN	10	0.6	1.3	0.0	3	0.2	0.0	0.0	3082.5	9.0	0.4
FEB	9	0.5	1.4	0.1	3	0.2	0.0	0.0	3082.7	9.2	0.2
MAR	8	0.5	2.5	0.1	3	0.2	0.0	0.0	3083.1	9.4	0.2
APR	8	0.5	5.4	0.2	3	0.2	0.0	0.0	3083.2	9.5	0.1
MAY	10	0.6	6.8	0.3	3	0.2	0.0	0.0	3083.4	9.6	0.1
JUN	8	0.5	8.7	0.3	114	7.0	0.0	6.1	3082.4	8.9	-0.7
JUL	10	0.6	9.5	0.3	487	30.0	0.0	29.7	3082.4	8.9	0.0
AUG	10	0.6	8.0	0.3	388	23.9	0.0	23.6	3082.4	8.9	0.0
SEP	8	0.5	6.0	0.2	36	2.2	0.0	1.9	3082.4	8.9	0.0
OCT	8	0.5	3.8	0.1	3	0.2	0.0	0.0	3082.6	9.1	0.2
NOV	8	0.5	2.8	0.1	3	0.2	0.0	0.0	3082.9	9.3	0.2
DEC	8	0.5	1.6	0.1	3	0.2	0.0	0.0	3083.2	9.5	0.2
TOTAL		6.4	57.8	2.1		64.7	0.0	61.3			0.9
REASONABLE MAXIMUM INFLOW CONDITIONS											
JAN	18	1.1	1.2	0.0	3	0.2	0.0	0.0	3083.2	9.5	0.9
FEB	18	1.0	1.3	0.0	4	0.2	0.0	0.0	3084.4	10.3	0.8
MAR	16	1.0	2.3	0.1	3	0.2	0.0	0.0	3085.4	11.0	0.7
APR	17	1.0	4.9	0.2	3	0.2	0.0	0.0	3086.2	11.6	0.6
MAY	18	1.1	6.2	0.3	3	0.2	0.0	0.0	3087.1	12.2	0.6
JUN	17	1.0	7.9	0.3	40	2.4	0.0	0.0	3084.7	10.5	-1.7
JUL	19	1.2	8.7	0.4	297	18.3	0.0	15.9	3082.4	8.9	-1.6
AUG	18	1.1	7.3	0.3	229	14.1	0.0	13.3	3082.4	8.9	0.0
SEP	17	1.0	5.4	0.2	3	0.2	0.0	0.0	3083.2	9.5	0.6
OCT	16	1.0	3.5	0.1	3	0.2	0.0	0.0	3084.3	10.2	0.7
NOV	17	1.0	2.5	0.1	3	0.2	0.0	0.0	3085.3	10.9	0.7
DEC	16	1.0	1.4	0.1	3	0.2	0.0	0.0	3086.2	11.6	0.7
TOTAL		12.5	52.6	2.1		36.6	0.0	29.2			3.0

TABLE 4

SWANSON LAKE OPERATION ESTIMATES - 2018

					RELEASE REQUIRMENT				RESERVOIR	REQUIREMENT	END OF MONTH		RESERVOIR
	INFLOW		EVAPORATION		CANAL	RIVER	TOTAL		SPILL	SHORTAGE	ELEV	CONT	CHANGE
	MEAN	1000		1000	1000	1000	MEAN	1000	1000	1000		1000	1000
MONTH	CFS	AF	INCHES	AF	AF	AF	CFS	AF	AF	AF	FT	AF	AF
REASONABLE MINIMUM INFLOW CONDITIONS													
JAN	19	1.2	1.5	0.3	0.0	0.1	2	0.1	0.0	0.0	2737.5	52.1	0.8
FEB	31	1.7	1.6	0.3	0.0	0.1	2	0.1	0.0	0.0	2737.9	53.4	1.3
MAR	34	2.1	2.9	0.6	0.0	0.1	2	0.1	0.0	0.0	2738.3	54.8	1.4
APR	39	2.3	6.4	1.2	0.0	0.1	2	0.1	0.0	0.0	2738.6	55.8	1.0
MAY	34	2.1	7.5	1.5	0.1	0.1	3	0.2	0.0	0.0	2738.8	56.2	0.4
JUN	27	1.6	9.7	1.9	4.4	0.9	89	5.3	0.0	0.0	2737.1	50.6	-5.6
JUL	15	0.9	9.7	1.8	16.3	6.9	377	23.2	0.0	0.0	2728.4	26.5	-24.1
AUG	8	0.5	9.7	1.3	13.6	6.3	323	19.9	0.0	13.2	2725.0	19.0	-7.5
SEP	3	0.2	7.5	0.9	2.0	2.1	69	4.1	0.0	4.0	2724.6	18.2	-0.8
OCT	6	0.4	4.6	0.5	0.0	0.1	2	0.1	0.0	0.0	2724.5	18.0	-0.2
NOV	15	0.9	3.2	0.4	0.0	0.1	2	0.1	0.0	0.0	2724.7	18.4	0.4
DEC	16	1.0	1.7	0.2	0.0	0.1	2	0.1	0.0	0.0	2725.0	19.1	0.7
TOTAL		14.9	66.0	10.9	36.4	17.0		53.4	0.0	17.2			-32.2
MOST PROBABLE INFLOW CONDITIONS													
JAN	36	2.2	1.3	0.2	0.0	0.1	2	0.1	0.0	0.0	2737.9	53.2	1.9
FEB	54	3.0	1.4	0.3	0.0	0.1	2	0.1	0.0	0.0	2738.6	55.8	2.6
MAR	62	3.8	2.7	0.5	0.0	0.1	2	0.1	0.0	0.0	2739.6	59.0	3.2
APR	67	4.0	5.8	1.2	0.0	0.1	2	0.1	0.0	0.0	2740.4	61.7	2.7
MAY	60	3.7	6.9	1.4	0.1	0.1	3	0.2	0.0	0.0	2740.9	63.8	2.1
JUN	49	2.9	8.9	1.9	3.8	0.1	63	3.9	0.0	0.0	2740.1	60.9	-2.9
JUL	26	1.6	8.9	1.8	14.2	4.2	299	18.4	0.0	0.0	2734.4	42.3	-18.6
AUG	15	0.9	8.9	1.5	11.7	4.1	256	15.8	0.0	0.0	2728.2	25.9	-16.4
SEP	7	0.4	6.9	0.9	1.7	0.1	29	1.8	0.0	0.0	2727.1	23.6	-2.3
OCT	10	0.6	4.2	0.5	0.0	0.1	2	0.1	0.0	0.0	2727.1	23.6	0.0
NOV	25	1.5	2.9	0.4	0.0	0.1	2	0.1	0.0	0.0	2727.6	24.6	1.0
DEC	28	1.7	1.6	0.2	0.0	0.1	2	0.1	0.0	0.0	2728.2	26.0	1.4
TOTAL		26.3	60.4	10.8	31.5	9.3		40.8	0.0	0.0			-25.3
REASONABLE MAXIMUM INFLOW CONDITIONS													
JAN	58	3.6	1.2	0.2	0.0	0.1	2	0.1	0.0	0.0	2738.3	54.6	3.3
FEB	90	5.0	1.3	0.3	0.0	0.1	2	0.1	0.0	0.0	2739.6	59.2	4.6
MAR	101	6.2	2.4	0.5	0.0	0.1	2	0.1	0.0	0.0	2741.2	64.8	5.6
APR	111	6.6	5.3	1.1	0.0	0.1	2	0.1	0.0	0.0	2742.7	70.2	5.4
MAY	99	6.1	6.3	1.4	0.1	0.1	3	0.2	0.0	0.0	2743.8	74.7	4.5
JUN	79	4.7	8.1	1.8	3.1	0.1	54	3.2	0.0	0.0	2743.8	74.4	-0.3
JUL	42	2.6	8.1	1.8	11.6	1.2	208	12.8	0.0	0.0	2740.6	62.4	-12.0
AUG	23	1.4	8.1	1.7	9.6	1.7	183	11.3	0.0	0.0	2737.1	50.8	-11.6
SEP	12	0.7	6.3	1.2	1.4	0.1	25	1.5	0.0	0.0	2736.5	48.8	-2.0
OCT	16	1.0	3.9	0.7	0.0	0.1	2	0.1	0.0	0.0	2736.6	49.0	0.2
NOV	42	2.5	2.6	0.5	0.0	0.1	2	0.1	0.0	0.0	2737.2	50.9	1.9
DEC	47	2.9	1.4	0.3	0.0	0.1	2	0.1	0.0	0.0	2737.9	53.4	2.5
TOTAL		43.3	55.0	11.5	25.8	3.9		29.7	0.0	0.0			2.1

TABLE 4

HUGH BUTLER LAKE OPERATION ESTIMATES - 2018

MONTH	INFLOW MEAN CFS	INFLOW 1000 AF	EVAPORATION INCHES	EVAPORATION 1000 AF	RELEASE REQUIRMENT MEAN CFS	RELEASE REQUIRMENT 1000 AF	RESERVOIR SPILL 1000 AF	REQUIREMENT SHORTAGE 1000 AF	END OF MONTH ELEV FT	END OF MONTH CONT 1000 AF	RESERVOIR CHANGE 1000 AF
REASONABLE MINIMUM INFLOW CONDITIONS											
JAN	8	0.5	1.3	0.1	3	0.2	0.0	0.0	2566.1	15.8	0.2
FEB	11	0.6	1.4	0.1	4	0.2	0.0	0.0	2566.4	16.1	0.3
MAR	13	0.8	2.6	0.2	3	0.2	0.0	0.0	2566.8	16.5	0.4
APR	13	0.8	7.2	0.4	3	0.2	0.0	0.0	2567.0	16.7	0.2
MAY	13	0.8	8.4	0.5	3	0.2	0.0	0.0	2567.1	16.8	0.1
JUN	13	0.8	10.3	0.6	29	1.7	0.0	0.0	2565.6	15.3	-1.5
JUL	11	0.7	11.5	0.6	73	4.5	0.0	0.3	2560.9	11.2	-4.1
AUG	11	0.7	10.2	0.5	62	3.8	0.0	3.6	2560.9	11.2	0.0
SEP	7	0.4	7.9	0.4	15	0.9	0.0	0.7	2560.7	11.0	-0.2
OCT	8	0.5	5.0	0.2	3	0.2	0.0	0.0	2560.8	11.1	0.1
NOV	8	0.5	3.0	0.1	3	0.2	0.0	0.0	2561.1	11.3	0.2
DEC	8	0.5	1.5	0.1	3	0.2	0.0	0.0	2561.3	11.5	0.2
TOTAL		7.6	70.3	3.8		12.5	0.0	4.6			-4.1
MOST PROBABLE INFLOW CONDITIONS											
JAN	13	0.8	1.1	0.1	3	0.2	0.0	0.0	2566.4	16.1	0.5
FEB	16	0.9	1.3	0.1	4	0.2	0.0	0.0	2567.0	16.7	0.6
MAR	19	1.2	2.3	0.1	3	0.2	0.0	0.0	2567.8	17.6	0.9
APR	20	1.2	6.4	0.4	3	0.2	0.0	0.0	2568.4	18.2	0.6
MAY	19	1.2	7.5	0.5	3	0.2	0.0	0.0	2568.9	18.7	0.5
JUN	20	1.2	9.2	0.6	23	1.4	0.0	0.0	2568.1	17.9	-0.8
JUL	16	1.0	10.2	0.6	62	3.8	0.0	0.0	2564.7	14.5	-3.4
AUG	16	1.0	9.1	0.5	52	3.2	0.0	0.0	2561.7	11.8	-2.7
SEP	10	0.6	7.0	0.3	13	0.8	0.0	0.0	2561.1	11.3	-0.5
OCT	11	0.7	4.4	0.2	3	0.2	0.0	0.0	2561.4	11.6	0.3
NOV	13	0.8	2.7	0.1	3	0.2	0.0	0.0	2562.0	12.1	0.5
DEC	13	0.8	1.4	0.1	3	0.2	0.0	0.0	2562.6	12.6	0.5
TOTAL		11.4	62.6	3.6		10.8	0.0	0.0			-3.0
REASONABLE MAXIMUM INFLOW CONDITIONS											
JAN	19	1.2	1.0	0.1	3	0.2	0.0	0.0	2566.8	16.5	0.9
FEB	25	1.4	1.1	0.1	4	0.2	0.0	0.0	2567.8	17.6	1.1
MAR	31	1.9	2.1	0.1	3	0.2	0.0	0.0	2569.3	19.2	1.6
APR	30	1.8	5.9	0.4	3	0.2	0.0	0.0	2570.4	20.4	1.2
MAY	31	1.9	6.9	0.5	3	0.2	0.0	0.0	2571.4	21.6	1.2
JUN	32	1.9	8.4	0.6	18	1.1	0.0	0.0	2571.6	21.8	0.2
JUL	24	1.5	9.4	0.7	45	2.8	0.0	0.0	2569.9	19.8	-2.0
AUG	26	1.6	8.3	0.5	39	2.4	0.0	0.0	2568.7	18.5	-1.3
SEP	17	1.0	6.4	0.4	8	0.5	0.0	0.0	2568.8	18.6	0.1
OCT	18	1.1	4.1	0.3	3	0.2	0.0	0.0	2569.3	19.2	0.6
NOV	20	1.2	2.5	0.2	3	0.2	0.0	0.0	2570.0	20.0	0.8
DEC	19	1.2	1.3	0.1	3	0.2	0.0	0.0	2570.8	20.9	0.9
TOTAL		17.7	57.4	4.0		8.4	0.0	0.0			5.3

TABLE 4

HARRY STRUNK LAKE OPERATION ESTIMATES - 2018

	INFLOW		EVAPORATION		RELEASE REQUIREMENT		RESERVOIR SPILL	REQUIREMENT SHORTAGE	END OF MONTH		RESERVOIR CHANGE
	MEAN	1000		1000	MEAN	1000	1000	1000		1000	1000
MONTH	CFS	AF	INCHES	AF	CFS	AF	AF	AF	ELEV FT	CONT AF	AF
REASONABLE MINIMUM INFLOW CONDITIONS											
JAN	34	2.1	1.3	0.1	2	0.1	0.0	0.0	2360.5	25.8	1.9
FEB	43	2.4	1.4	0.1	2	0.1	0.0	0.0	2362.0	28.0	2.2
MAR	45	2.8	2.6	0.2	2	0.1	0.0	0.0	2363.6	30.5	2.5
APR	45	2.7	7.0	0.7	2	0.1	0.0	0.0	2364.8	32.4	1.9
MAY	49	3.0	8.2	0.8	2	0.1	0.0	0.0	2366.0	34.5	2.1
JUN	50	3.0	10.2	1.1	89	5.3	0.0	0.0	2364.0	31.1	-3.4
JUL	45	2.8	11.2	1.1	318	19.6	0.0	0.0	2349.6	13.2	-17.9
AUG	37	2.3	9.9	0.5	268	16.5	0.0	9.4	2343.0	7.9	-5.3
SEP	23	1.4	7.7	0.3	27	1.6	0.0	0.5	2343.0	7.9	0.0
OCT	29	1.8	5.0	0.2	2	0.1	0.0	0.0	2345.1	9.4	1.5
NOV	34	2.0	3.0	0.1	2	0.1	0.0	0.0	2347.3	11.2	1.8
DEC	31	1.9	1.6	0.1	2	0.1	0.0	0.0	2349.2	12.9	1.7
TOTAL		28.2	69.1	5.3		43.8	0.0	9.9			-11.0
MOST PROBABLE INFLOW CONDITIONS											
JAN	47	2.9	1.2	0.1	2	0.1	0.0	0.0	2361.0	26.6	2.7
FEB	61	3.4	1.2	0.1	2	0.1	0.0	0.0	2363.2	29.8	3.2
MAR	63	3.9	2.3	0.2	2	0.1	0.0	0.0	2365.4	33.4	3.6
APR	64	3.8	6.3	0.7	2	0.1	1.8	0.0	2366.1	34.6	1.2
MAY	68	4.2	7.3	0.8	2	0.1	3.3	0.0	2366.1	34.6	0.0
JUN	70	4.2	9.1	1.0	74	4.4	0.0	0.0	2365.4	33.4	-1.2
JUL	65	4.0	10.1	1.0	265	16.3	0.0	0.0	2356.1	20.1	-13.3
AUG	52	3.2	8.9	0.6	222	13.7	0.0	0.0	2344.5	9.0	-11.1
SEP	34	2.0	7.0	0.3	20	1.2	0.0	0.0	2345.2	9.5	0.5
OCT	42	2.6	4.5	0.2	2	0.1	0.0	0.0	2348.0	11.8	2.3
NOV	47	2.8	2.7	0.1	2	0.1	0.0	0.0	2350.8	14.4	2.6
DEC	44	2.7	1.4	0.1	2	0.1	0.0	0.0	2353.2	16.9	2.5
TOTAL		39.7	62.0	5.2		36.4	5.1	0.0			-7.0
REASONABLE MAXIMUM INFLOW CONDITIONS											
JAN	75	4.6	1.1	0.1	2	0.1	0.0	0.0	2362.2	28.3	4.4
FEB	93	5.2	1.1	0.1	2	0.1	0.0	0.0	2365.3	33.3	5.0
MAR	99	6.1	2.1	0.2	2	0.1	4.5	0.0	2366.1	34.6	1.3
APR	97	5.8	5.7	0.6	2	0.1	5.1	0.0	2366.1	34.6	0.0
MAY	106	6.5	6.6	0.7	2	0.1	5.7	0.0	2366.1	34.6	0.0
JUN	109	6.5	8.2	0.9	47	2.8	2.8	0.0	2366.1	34.6	0.0
JUL	101	6.2	9.0	1.0	182	11.2	0.0	0.0	2362.4	28.6	-6.0
AUG	80	4.9	8.0	0.7	154	9.5	0.0	0.0	2358.6	23.3	-5.3
SEP	52	3.1	6.2	0.5	2	0.1	0.0	0.0	2360.5	25.8	2.5
OCT	65	4.0	4.1	0.3	2	0.1	0.0	0.0	2363.0	29.4	3.6
NOV	72	4.3	2.4	0.2	2	0.1	0.0	0.0	2365.4	33.4	4.0
DEC	68	4.2	1.3	0.1	2	0.1	2.8	0.0	2366.1	34.6	1.2
TOTAL		61.4	55.8	5.4		24.4	20.9	0.0			10.7

TABLE 4

KEITH SEBELIUS LAKE OPERATION ESTIMATES - 2018

MONTH	INFLOW MEAN CFS	INFLOW 1000 AF	EVAPORATION INCHES	EVAPORATION 1000 AF	RELEASE REQUIRMENT MEAN CFS	RELEASE REQUIRMENT 1000 AF	RESERVOIR SPILL 1000 AF	REQUIREMENT SHORTAGE 1000 AF	END OF MONTH ELEV FT	END OF MONTH CONT 1000 AF	RESERVOIR CHANGE 1000 AF
REASONABLE MINIMUM INFLOW CONDITIONS											
JAN	2	0.1	1.5	0.1	2	0.1	0.0	0.0	2291.4	13.3	-0.1
FEB	4	0.2	1.9	0.1	2	0.1	0.0	0.0	2291.4	13.3	0.0
MAR	6	0.4	3.0	0.2	2	0.1	0.0	0.0	2291.5	13.4	0.1
APR	7	0.4	7.9	0.5	2	0.1	0.0	0.0	2291.4	13.2	-0.2
MAY	10	0.6	8.7	0.6	6	0.4	0.0	0.0	2291.0	12.8	-0.4
JUN	12	0.7	11.0	0.7	57	3.4	0.0	0.0	2287.7	9.4	-3.4
JUL	10	0.6	12.3	0.6	146	9.0	0.0	4.4	2281.7	4.8	-4.6
AUG	8	0.5	11.0	0.4	138	8.5	0.0	8.4	2281.7	4.8	0.0
SEP	3	0.2	8.7	0.3	27	1.6	0.0	1.5	2281.4	4.6	-0.2
OCT	2	0.1	6.0	0.2	2	0.1	0.0	0.0	2281.0	4.4	-0.2
NOV	2	0.1	3.3	0.1	2	0.1	0.0	0.0	2280.9	4.3	-0.1
DEC	2	0.1	1.7	0.1	2	0.1	0.0	0.0	2280.7	4.2	-0.1
TOTAL		4.0	77.0	3.9		23.6	0.0	14.3			-9.2
MOST PROBABLE INFLOW CONDITIONS											
JAN	3	0.2	1.4	0.1	2	0.1	0.0	0.0	2291.5	13.4	0.0
FEB	5	0.3	1.6	0.1	2	0.1	0.0	0.0	2291.6	13.5	0.1
MAR	10	0.6	2.6	0.2	2	0.1	0.0	0.0	2291.8	13.8	0.3
APR	10	0.6	6.9	0.5	2	0.1	0.0	0.0	2291.8	13.8	0.0
MAY	16	1.0	7.7	0.5	3	0.2	0.0	0.0	2292.1	14.1	0.3
JUN	22	1.3	9.7	0.7	45	2.8	0.0	0.0	2290.2	11.9	-2.2
JUL	15	0.9	10.9	0.7	138	8.5	0.0	2.1	2283.0	5.7	-6.2
AUG	13	0.8	9.7	0.4	112	6.9	0.0	6.5	2283.0	5.7	0.0
SEP	7	0.4	7.7	0.3	21	1.3	0.0	1.2	2283.0	5.7	0.0
OCT	3	0.2	5.3	0.2	2	0.1	0.0	0.0	2282.9	5.6	-0.1
NOV	3	0.2	2.9	0.1	2	0.1	0.0	0.0	2282.9	5.6	0.0
DEC	3	0.2	1.5	0.1	2	0.1	0.0	0.0	2282.9	5.6	0.0
TOTAL		6.7	67.9	3.9		20.4	0.0	9.8			-7.8
REASONABLE MAXIMUM INFLOW CONDITIONS											
JAN	6	0.4	1.2	0.1	2	0.1	0.0	0.0	2291.7	13.6	0.2
FEB	11	0.6	1.5	0.1	2	0.1	0.0	0.0	2292.0	14.0	0.4
MAR	18	1.1	2.4	0.2	2	0.1	0.0	0.0	2292.7	14.8	0.8
APR	18	1.1	6.2	0.5	2	0.1	0.0	0.0	2293.0	15.3	0.5
MAY	28	1.7	6.9	0.5	3	0.2	0.0	0.0	2293.8	16.3	1.0
JUN	37	2.2	8.7	0.7	27	1.6	0.0	0.0	2293.7	16.2	-0.1
JUL	26	1.6	9.7	0.8	71	4.4	0.0	0.0	2290.9	12.6	-3.6
AUG	24	1.5	8.7	0.6	68	4.2	0.0	0.0	2287.6	9.3	-3.3
SEP	12	0.7	6.9	0.4	15	0.9	0.0	0.0	2286.9	8.7	-0.6
OCT	5	0.3	4.7	0.2	2	0.1	0.0	0.0	2286.9	8.7	0.0
NOV	7	0.4	2.6	0.1	2	0.1	0.0	0.0	2287.1	8.9	0.2
DEC	6	0.4	1.3	0.1	2	0.1	0.0	0.0	2287.3	9.1	0.2
TOTAL		12.0	60.8	4.3		12.0	0.0	0.0			-4.3

TABLE 4

HARLAN COUNTY LAKE OPERATION ESTIMATES - 2018

MONTH	INFLOW MEAN CFS	INFLOW 1000 AF	EVAPORATION INCHES	EVAPORATION 1000 AF	RELEASE REQUIRMENT MEAN CFS	RELEASE REQUIRMENT 1000 AF	RESERVOIR SPILL 1000 AF	REQUIREMENT SHORTAGE 1000 AF	END OF MONTH ELEV FT	END OF MONTH CONT 1000 AF	RESERVOIR CHANGE 1000 AF
REASONABLE MINIMUM INFLOW CONDITIONS											
JAN	39	2.4	1.4	1.3	0	0.0	0.0	0.0	1938.4	225.3	1.1
FEB	61	3.4	1.6	1.5	0	0.0	0.0	0.0	1938.6	227.2	1.9
MAR	83	5.1	2.8	2.6	0	0.0	0.0	0.0	1938.8	229.7	2.5
APR	70	4.2	6.5	6.1	0	0.0	0.0	0.0	1938.7	227.8	-1.9
MAY	89	5.5	8.0	7.5	0	0.0	0.0	0.0	1938.5	225.8	-2.0
JUN	75	4.5	9.6	8.9	198	11.8	0.0	0.0	1937.0	209.6	-16.2
JUL	76	4.7	10.7	9.5	870	53.6	0.0	0.0	1931.0	151.2	-58.4
AUG	60	3.7	9.4	6.9	730	45.0	0.0	22.9	1928.0	125.9	-25.3
SEP	30	1.8	7.5	4.8	54	3.2	0.0	3.2	1927.6	122.9	-3.0
OCT	28	1.7	5.1	3.2	0	0.0	0.0	0.0	1927.4	121.4	-1.5
NOV	37	2.2	3.2	2.0	0	0.0	0.0	0.0	1927.5	121.6	0.2
DEC	37	2.3	2.0	1.3	0	0.0	0.0	0.0	1927.5	122.6	1.0
TOTAL		41.5	67.8	55.6		113.6	0.0	26.1			-101.6
MOST PROBABLE INFLOW CONDITIONS											
JAN	101	6.2	1.2	1.1	0	0.0	0.0	0.0	1938.8	229.3	5.1
FEB	156	8.7	1.4	1.3	0	0.0	0.0	0.0	1939.4	236.7	7.4
MAR	211	13.0	2.4	2.3	0	0.0	0.0	0.0	1940.4	247.4	10.7
APR	181	10.8	5.7	5.6	0	0.0	0.0	0.0	1940.8	252.6	5.2
MAY	229	14.1	7.0	7.0	0	0.0	0.0	0.0	1941.4	259.7	7.1
JUN	191	11.4	8.4	8.5	64	3.8	0.0	0.0	1941.3	258.8	-0.9
JUL	193	11.9	9.4	9.5	636	39.2	0.0	0.0	1938.2	222.0	-36.8
AUG	156	9.6	8.2	7.5	544	33.5	0.0	0.0	1935.2	190.6	-31.4
SEP	77	4.6	6.5	5.5	34	2.0	0.0	0.0	1934.9	187.7	-2.9
OCT	73	4.5	4.4	3.7	0	0.0	0.0	0.0	1935.0	188.5	0.8
NOV	96	5.7	2.8	2.4	0	0.0	0.0	0.0	1935.3	191.8	3.3
DEC	94	5.8	1.8	1.5	0	0.0	0.0	0.0	1935.8	196.1	4.3
TOTAL		106.3	59.2	55.9		78.5	0.0	0.0			-28.1
REASONABLE MAXIMUM INFLOW CONDITIONS											
JAN	206	12.7	1.1	1.0	0	0.0	0.0	0.0	1939.4	235.9	11.7
FEB	323	18.0	1.3	1.2	0	0.0	0.0	0.0	1940.8	252.7	16.8
MAR	433	26.7	2.1	2.1	0	0.0	0.0	0.0	1942.8	277.3	24.6
APR	374	22.3	5.0	5.2	0	0.0	0.0	0.0	1944.2	294.4	17.1
MAY	472	29.1	6.2	6.6	0	0.0	2.8	0.0	1945.7	314.1	19.7
JUN	393	23.4	7.4	8.2	37	2.2	13.0	0.0	1945.7	314.1	0.0
JUL	398	24.5	8.2	9.1	143	8.8	6.6	0.0	1945.7	314.1	0.0
AUG	320	19.7	7.3	8.1	136	8.4	3.2	0.0	1945.7	314.1	0.0
SEP	158	9.4	5.7	6.3	20	1.2	1.9	0.0	1945.7	314.1	0.0
OCT	149	9.2	3.9	4.3	0	0.0	4.9	0.0	1945.7	314.1	0.0
NOV	198	11.8	2.5	2.8	0	0.0	9.0	0.0	1945.7	314.1	0.0
DEC	195	12.0	1.6	1.8	0	0.0	10.2	0.0	1945.7	314.1	0.0
TOTAL		218.8	52.3	56.7		20.6	51.6	0.0			89.9

TABLE 4

LOVEWELL RESERVOIR OPERATION ESTIMATES - 2018

MONTH	WHITE ROCK CREEK INFLOW 1000 AF	COURTLAND CANAL INFLOW 1000 AF	TOTAL INFLOW MEAN CFS	TOTAL INFLOW 1000 AF	EVAPORATION INCHES	EVAPORATION 1000 AF	RELEASE REQUIRMENT MEAN CFS	RELEASE REQUIRMENT 1000 AF	RESERVOIR SPILL 1000 AF	REQUIREMENT SHORTAGE 1000 AF	END OF MONTH ELEV FT	END OF MONTH CONT 1000 AF	RESERVOIR CHANGE 1000 AF
REASONABLE MINIMUM INFLOW CONDITIONS													
JAN	0.4	0.1	8	0.5	1.2	0.3	0	0.0	0.0	0.0	1581.2	31.7	0.2
FEB	0.6	2.5	56	3.1	1.5	0.3	0	0.0	0.0	0.0	1582.2	34.5	2.8
MAR	1.3	3.3	75	4.6	2.6	0.6	0	0.0	0.0	0.0	1583.5	38.5	4.0
APR	1.2	2.3	59	3.5	5.4	1.4	0	0.0	0.0	0.0	1584.1	40.6	2.1
MAY	1.5	2.5	65	4.0	6.8	1.8	15	0.9	0.0	0.0	1584.6	41.9	1.3
JUN	1.7	0.0	29	1.7	8.9	2.4	168	10.0	0.0	0.0	1581.0	31.2	-10.7
JUL	1.1	9.8	177	10.9	9.6	2.2	505	31.1	0.0	2.9	1571.7	11.7	-19.5
AUG	0.1	9.8	161	9.9	7.9	1.0	347	21.4	0.0	12.5	1571.7	11.7	0.0
SEP	0.9	0.0	15	0.9	6.0	0.7	47	2.8	0.0	2.6	1571.7	11.7	0.0
OCT	0.6	1.9	41	2.5	4.1	0.5	0	0.0	0.0	0.0	1573.0	13.7	2.0
NOV	0.5	2.5	50	3.0	3.0	0.4	0	0.0	0.0	0.0	1574.5	16.3	2.6
DEC	0.3	2.6	47	2.9	1.5	0.2	0	0.0	0.0	0.0	1575.9	19.0	2.7
TOTAL	10.2	37.3		47.5	58.5	11.8		66.2	0.0	18.0			-12.5
MOST PROBABLE INFLOW CONDITIONS													
JAN	0.8	0.0	13	0.8	1.0	0.2	0	0.0	0.0	0.0	1581.4	32.1	0.6
FEB	1.3	0.0	23	1.3	1.3	0.3	0	0.0	0.0	0.0	1581.7	33.1	1.0
MAR	2.9	0.0	47	2.9	2.3	0.5	0	0.0	0.0	0.0	1582.5	35.5	2.4
APR	2.6	0.0	44	2.6	4.6	1.1	0	0.0	0.0	0.0	1583.0	37.0	1.5
MAY	3.3	3.9	117	7.2	5.9	1.5	13	0.8	0.0	0.0	1584.6	41.9	4.9
JUN	3.6	0.0	60	3.6	7.7	2.1	133	7.9	0.0	0.0	1582.5	35.5	-6.4
JUL	2.4	10.0	201	12.4	8.3	2.1	404	24.9	0.0	0.0	1576.8	20.9	-14.6
AUG	0.2	10.0	165	10.2	6.8	1.2	278	17.1	0.0	0.0	1572.4	12.8	-8.1
SEP	1.9	0.0	32	1.9	5.1	0.7	37	2.2	0.0	0.0	1571.7	11.8	-1.0
OCT	1.3	4.7	97	6.0	3.5	0.4	0	0.0	0.0	0.0	1575.0	17.4	5.6
NOV	1.1	4.1	87	5.2	2.6	0.4	0	0.0	0.0	0.0	1577.4	22.2	4.8
DEC	0.8	4.6	88	5.4	1.3	0.2	0	0.0	0.0	0.0	1579.5	27.4	5.2
TOTAL	22.2	37.3		59.5	50.4	10.7		52.9	0.0	0.0			-4.1
REASONABLE MAXIMUM INFLOW CONDITIONS													
JAN	2.1	0.0	34	2.1	0.9	0.2	0	0.0	0.0	0.0	1581.8	33.4	1.9
FEB	3.2	0.0	58	3.2	1.1	0.3	0	0.0	0.6	0.0	1582.6	35.7	2.3
MAR	7.2	0.0	117	7.2	1.9	0.5	0	0.0	6.7	0.0	1582.6	35.7	0.0
APR	6.6	0.0	111	6.6	4.0	1.0	0	0.0	5.6	0.0	1582.6	35.7	0.0
MAY	8.2	0.0	133	8.2	5.1	1.3	8	0.5	6.4	0.0	1582.6	35.7	0.0
JUN	9.0	0.0	151	9.0	6.6	1.6	87	5.2	2.2	0.0	1582.6	35.7	0.0
JUL	6.1	0.0	99	6.1	7.1	1.8	265	16.3	0.0	0.0	1578.0	23.7	-12.0
AUG	0.6	0.0	10	0.6	5.8	1.1	179	11.0	0.0	0.0	1572.0	12.2	-11.5
SEP	4.8	0.0	81	4.8	4.4	0.6	23	1.4	0.0	0.0	1573.7	15.0	2.8
OCT	3.2	4.7	128	7.9	3.0	0.4	0	0.0	0.0	0.0	1577.5	22.5	7.5
NOV	2.8	3.4	104	6.2	2.3	0.4	0	0.0	0.0	0.0	1580.0	28.3	5.8
DEC	1.9	0.0	31	1.9	1.1	0.2	0	0.0	0.0	0.0	1580.6	30.0	1.7
TOTAL	55.7	8.1		63.8	43.3	9.4		34.4	21.5	0.0			-1.5

TABLE 4

KIRWIN RESERVOIR OPERATION ESTIMATES - 2018

	INFLOW		EVAPORATION		RELEASE REQUIREMENT		RESERVOIR SPILL	REQUIREMENT SHORTAGE	END OF MONTH		RESERVOIR CHANGE
	MEAN	1000		1000	MEAN	1000	1000	1000		1000	1000
MONTH	CFS	AF	INCHES	AF	CFS	AF	AF	AF	ELEV FT	CONT AF	AF
REASONABLE MINIMUM INFLOW CONDITIONS											
JAN	5	0.3	1.3	0.4	0	0.0	0.0	0.0	1728.2	93.1	-0.1
FEB	7	0.4	1.6	0.5	0	0.0	0.0	0.0	1728.2	93.0	-0.1
MAR	13	0.8	2.8	0.8	0	0.0	0.0	0.0	1728.2	93.0	0.0
APR	13	0.8	6.4	1.8	0	0.0	0.0	0.0	1728.0	92.0	-1.0
MAY	21	1.3	7.9	2.2	8	0.5	0.0	0.0	1727.7	90.6	-1.4
JUN	18	1.1	9.6	2.7	87	5.2	0.0	0.0	1726.2	83.8	-6.8
JUL	16	1.0	10.9	2.9	193	11.9	0.0	0.0	1723.1	70.0	-13.8
AUG	11	0.7	9.6	2.3	179	11.0	0.0	0.0	1719.8	57.4	-12.6
SEP	7	0.4	7.4	1.6	8	0.5	0.0	0.0	1719.3	55.7	-1.7
OCT	3	0.2	5.1	1.1	0	0.0	0.0	0.0	1719.1	54.8	-0.9
NOV	5	0.3	3.0	0.6	0	0.0	0.0	0.0	1719.0	54.5	-0.3
DEC	5	0.3	1.6	0.3	0	0.0	0.0	0.0	1719.0	54.5	0.0
TOTAL		7.6	67.2	17.2		29.1	0.0	0.0			-38.7
MOST PROBABLE INFLOW CONDITIONS											
JAN	16	1.0	1.1	0.3	0	0.0	0.0	0.0	1728.3	93.9	0.7
FEB	25	1.4	1.4	0.4	0	0.0	0.0	0.0	1728.6	94.9	1.0
MAR	41	2.5	2.5	0.7	0	0.0	0.0	0.0	1728.9	96.7	1.8
APR	45	2.7	5.7	1.7	0	0.0	0.0	0.0	1729.1	97.7	1.0
MAY	71	4.4	7.1	2.1	6	0.4	1.4	0.0	1729.3	98.2	0.5
JUN	59	3.5	8.6	2.5	71	4.4	0.0	0.0	1728.5	94.8	-3.4
JUL	55	3.4	9.8	2.8	193	11.9	0.0	0.0	1726.2	83.5	-11.3
AUG	39	2.4	8.6	2.3	149	9.2	0.0	0.0	1724.2	74.4	-9.1
SEP	20	1.2	6.6	1.6	8	0.5	0.0	0.0	1723.9	73.5	-0.9
OCT	13	0.8	4.6	1.1	0	0.0	0.0	0.0	1723.8	73.2	-0.3
NOV	18	1.1	2.7	0.7	0	0.0	0.0	0.0	1723.9	73.6	0.4
DEC	15	0.9	1.4	0.3	0	0.0	0.0	0.0	1724.1	74.2	0.6
TOTAL		25.3	60.1	16.5		26.4	1.4	0.0			-19.0
REASONABLE MAXIMUM INFLOW CONDITIONS											
JAN	47	2.9	1.0	0.3	0	0.0	0.0	0.0	1728.7	95.8	2.6
FEB	77	4.3	1.3	0.4	0	0.0	1.5	0.0	1729.3	98.2	2.4
MAR	125	7.7	2.3	0.7	0	0.0	7.0	0.0	1729.3	98.2	0.0
APR	139	8.3	5.1	1.5	0	0.0	6.8	0.0	1729.3	98.2	0.0
MAY	219	13.5	6.3	1.9	5	0.3	11.3	0.0	1729.3	98.2	0.0
JUN	181	10.8	7.7	2.3	59	3.5	5.0	0.0	1729.3	98.2	0.0
JUL	170	10.5	8.8	2.6	167	10.3	0.0	0.0	1728.7	95.8	-2.4
AUG	120	7.4	7.7	2.2	119	7.3	0.0	0.0	1728.3	93.7	-2.1
SEP	62	3.7	5.9	1.7	7	0.4	0.0	0.0	1728.6	95.3	1.6
OCT	41	2.5	4.1	1.2	0	0.0	0.0	0.0	1728.9	96.6	1.3
NOV	55	3.3	2.4	0.7	0	0.0	1.0	0.0	1729.3	98.2	1.6
DEC	42	2.6	1.3	0.4	0	0.0	2.2	0.0	1729.3	98.2	0.0
TOTAL		77.5	53.9	15.9		21.8	34.8	0.0			5.0

TABLE 4

WEBSTER RESERVOIR OPERATION ESTIMATES - 2018

MONTH	INFLOW MEAN CFS	INFLOW 1000 AF	EVAPORATION INCHES	EVAPORATION 1000 AF	RELEASE REQUIRMENT MEAN CFS	RELEASE REQUIRMENT 1000 AF	RESERVOIR SPILL 1000 AF	REQUIREMENT SHORTAGE 1000 AF	END OF MONTH ELEV FT	END OF MONTH CONT 1000 AF	RESERVOIR CHANGE 1000 AF
REASONABLE MINIMUM INFLOW CONDITIONS											
JAN	3	0.2	1.3	0.3	0	0.0	1.9	0.0	1892.4	76.2	-2.0
FEB	4	0.2	1.6	0.4	0	0.0	0.0	0.0	1892.3	76.0	-0.2
MAR	6	0.4	2.9	0.6	0	0.0	0.0	0.0	1892.3	75.8	-0.2
APR	10	0.6	6.5	1.4	0	0.0	0.0	0.0	1892.1	75.0	-0.8
MAY	15	0.9	8.2	1.8	16	1.0	0.0	0.0	1891.6	73.1	-1.9
JUN	10	0.6	10.4	2.2	107	6.4	0.0	0.0	1889.3	65.1	-8.0
JUL	10	0.6	11.4	2.3	253	15.6	0.0	0.0	1883.8	47.8	-17.3
AUG	6	0.4	10.6	1.8	227	14.0	0.0	0.0	1877.8	32.4	-15.4
SEP	3	0.2	7.8	1.0	10	0.6	0.0	0.0	1877.1	31.0	-1.4
OCT	2	0.1	5.1	0.7	0	0.0	0.0	0.0	1876.9	30.4	-0.6
NOV	3	0.2	3.2	0.4	0	0.0	0.0	0.0	1876.8	30.2	-0.2
DEC	2	0.1	1.7	0.2	0	0.0	0.0	0.0	1876.7	30.1	-0.1
TOTAL		4.5	70.7	13.1		37.6	1.9	0.0			-48.1
MOST PROBABLE INFLOW CONDITIONS											
JAN	11	0.7	1.1	0.2	0	0.0	2.5	0.0	1892.4	76.2	-2.0
FEB	16	0.9	1.4	0.3	0	0.0	0.6	0.0	1892.4	76.2	0.0
MAR	24	1.5	2.6	0.6	0	0.0	0.9	0.0	1892.4	76.2	0.0
APR	35	2.1	5.8	1.3	0	0.0	0.8	0.0	1892.4	76.2	0.0
MAY	54	3.3	7.4	1.6	13	0.8	0.9	0.0	1892.4	76.2	0.0
JUN	39	2.3	9.3	2.0	71	4.4	0.0	0.0	1891.3	72.1	-4.1
JUL	36	2.2	10.3	2.2	208	12.8	0.0	0.0	1887.6	59.3	-12.8
AUG	21	1.3	9.5	1.8	161	9.9	0.0	0.0	1884.2	48.9	-10.4
SEP	13	0.8	7.0	1.2	5	0.3	0.0	0.0	1884.0	48.2	-0.7
OCT	6	0.4	4.6	0.8	0	0.0	0.0	0.0	1883.8	47.8	-0.4
NOV	10	0.6	2.9	0.5	0	0.0	0.0	0.0	1883.8	47.9	0.1
DEC	10	0.6	1.5	0.2	0	0.0	0.0	0.0	1884.0	48.3	0.4
TOTAL		16.7	63.4	12.7		28.2	5.7	0.0			-29.9
REASONABLE MAXIMUM INFLOW CONDITIONS											
JAN	39	2.4	1.0	0.2	0	0.0	4.2	0.0	1892.4	76.2	-2.0
FEB	58	3.2	1.3	0.3	0	0.0	2.9	0.0	1892.4	76.2	0.0
MAR	89	5.5	2.4	0.5	0	0.0	5.0	0.0	1892.4	76.2	0.0
APR	129	7.7	5.3	1.2	0	0.0	6.5	0.0	1892.4	76.2	0.0
MAY	193	11.9	6.7	1.5	6	0.4	10.0	0.0	1892.4	76.2	0.0
JUN	139	8.3	8.5	1.9	42	2.5	3.9	0.0	1892.4	76.2	0.0
JUL	131	8.1	9.3	2.0	125	7.7	0.0	0.0	1892.0	74.6	-1.6
AUG	78	4.8	8.6	1.9	101	6.2	0.0	0.0	1891.1	71.3	-3.3
SEP	47	2.8	6.3	1.3	2	0.1	0.0	0.0	1891.5	72.7	1.4
OCT	26	1.6	4.2	0.9	0	0.0	0.0	0.0	1891.7	73.4	0.7
NOV	35	2.1	2.6	0.6	0	0.0	0.0	0.0	1892.1	74.9	1.5
DEC	32	2.0	1.4	0.3	0	0.0	0.4	0.0	1892.4	76.2	1.3
TOTAL		60.4	57.6	12.6		16.9	32.9	0.0			-2.0

TABLE 4

WACONDA LAKE OPERATION ESTIMATES - 2018

MONTH	INFLOW MEAN CFS	INFLOW 1000 AF	EVAPORATION INCHES	EVAPORATION 1000 AF	RELEASE REQUIRMENT MEAN CFS	RELEASE REQUIRMENT 1000 AF	RESERVOIR SPILL 1000 AF	REQUIREMENT SHORTAGE 1000 AF	END OF MONTH ELEV FT	END OF MONTH CONT 1000 AF	RESERVOIR CHANGE 1000 AF
REASONABLE MINIMUM INFLOW CONDITIONS											
JAN	29	1.8	1.2	0.9	19	1.2	5.6	0.0	1454.6	207.1	-5.9
FEB	43	2.4	1.4	1.0	20	1.1	0.3	0.0	1454.6	207.1	0.0
MAR	83	5.1	2.7	1.9	18	1.1	0.0	0.0	1454.7	209.2	2.1
APR	86	5.1	6.8	4.8	17	1.0	0.0	0.0	1454.7	208.5	-0.7
MAY	99	6.1	8.4	6.0	18	1.1	0.0	0.0	1454.6	207.5	-1.0
JUN	86	5.1	10.4	7.4	45	2.7	0.0	0.0	1454.2	202.5	-5.0
JUL	138	8.5	12.3	8.6	156	9.6	0.0	0.0	1453.3	192.8	-9.7
AUG	50	3.1	10.6	7.1	125	7.7	0.0	0.0	1452.3	181.1	-11.7
SEP	39	2.3	8.5	5.4	35	2.1	0.0	0.0	1451.8	175.9	-5.2
OCT	29	1.8	5.5	3.4	21	1.3	0.0	0.0	1451.6	173.0	-2.9
NOV	34	2.0	2.9	1.8	27	1.6	0.0	0.0	1451.4	171.6	-1.4
DEC	28	1.7	1.4	0.9	24	1.5	0.0	0.0	1451.4	170.9	-0.7
TOTAL		45.0	72.1	49.2		32.0	5.9	0.0			-42.1
MOST PROBABLE INFLOW CONDITIONS											
JAN	78	4.8	1.0	0.7	10	0.6	9.4	0.0	1454.6	207.1	-5.9
FEB	117	6.5	1.3	0.9	10	0.6	5.0	0.0	1454.6	207.1	0.0
MAR	222	13.7	2.4	1.7	10	0.6	8.9	0.0	1454.8	209.6	2.5
APR	231	13.8	6.1	4.4	8	0.5	0.0	0.0	1455.5	218.5	8.9
MAY	268	16.5	7.5	5.5	10	0.6	9.5	0.0	1455.6	219.4	0.9
JUN	228	13.6	9.4	6.9	32	2.0	4.7	0.0	1455.6	219.4	0.0
JUL	370	22.8	11.1	8.2	112	6.9	7.7	0.0	1455.6	219.4	0.0
AUG	136	8.4	9.5	7.0	89	5.5	0.0	0.0	1455.2	215.3	-4.1
SEP	104	6.2	7.6	5.5	21	1.3	0.0	0.0	1455.2	214.7	-0.6
OCT	81	5.0	4.9	3.6	10	0.6	0.0	0.0	1455.2	215.5	0.8
NOV	92	5.5	2.6	1.9	15	0.9	0.0	0.0	1455.5	218.2	2.7
DEC	73	4.5	1.3	1.0	13	0.8	13.8	0.0	1454.6	207.1	-11.1
TOTAL		121.3	64.7	47.3		20.9	59.0	0.0			-5.9
REASONABLE MAXIMUM INFLOW CONDITIONS											
JAN	232	14.3	0.9	0.6	3	0.2	19.4	0.0	1454.6	207.1	-5.9
FEB	347	19.3	1.2	0.9	4	0.2	18.2	0.0	1454.6	207.1	0.0
MAR	656	40.4	2.2	1.6	5	0.3	36.0	0.0	1454.8	209.6	2.5
APR	684	40.8	5.6	4.0	5	0.3	26.7	0.0	1455.6	219.4	9.8
MAY	789	48.6	6.9	5.1	5	0.3	43.2	0.0	1455.6	219.4	0.0
JUN	671	40.0	8.6	6.3	22	1.3	32.4	0.0	1455.6	219.4	0.0
JUL	1091	67.2	10.1	7.4	70	4.3	55.5	0.0	1455.6	219.4	0.0
AUG	401	24.7	8.7	6.4	57	3.5	14.8	0.0	1455.6	219.4	0.0
SEP	305	18.2	7.0	5.1	12	0.7	12.4	0.0	1455.6	219.4	0.0
OCT	239	14.7	4.5	3.3	6	0.4	11.0	0.0	1455.6	219.4	0.0
NOV	270	16.1	2.4	1.8	5	0.3	14.0	0.0	1455.6	219.4	0.0
DEC	214	13.2	1.2	0.9	5	0.3	24.3	0.0	1454.6	207.1	-12.3
TOTAL		357.5	59.3	43.4		12.1	307.9	0.0			-5.9

TABLE 4

CEDAR BLUFF RESERVOIR OPERATION ESTIMATES - 2018

	INFLOW		EVAPORATION		RELEASE REQUIREMENT		RESERVOIR SPILL	REQUIREMENT SHORTAGE	END OF MONTH ELEV	CONT	RESERVOIR CHANGE
	MEAN	1000		1000	MEAN	1000	1000	1000		1000	1000
MONTH	CFS	AF	INCHES	AF	CFS	AF	AF	AF	FT	AF	AF
REASONABLE MINIMUM INFLOW CONDITIONS											
JAN	3	0.2	1.6	0.3	0	0.0	0.0	0.0	2117.7	51.0	-0.1
FEB	4	0.2	1.7	0.3	0	0.0	0.0	0.0	2117.6	50.9	-0.1
MAR	6	0.4	3.1	0.5	0	0.0	0.0	0.0	2117.5	50.8	-0.1
APR	10	0.6	7.7	1.2	0	0.0	0.0	0.0	2117.3	50.2	-0.6
MAY	15	0.9	9.2	1.5	3	0.2	0.0	0.0	2117.0	49.4	-0.8
JUN	15	0.9	11.4	1.8	3	0.2	0.0	0.0	2116.6	48.3	-1.1
JUL	19	1.2	13.7	2.1	11	0.7	0.0	0.0	2116.0	46.7	-1.6
AUG	15	0.9	11.7	1.7	11	0.7	0.0	0.0	2115.4	45.2	-1.5
SEP	5	0.3	10.1	1.5	3	0.2	0.0	0.0	2114.8	43.8	-1.4
OCT	2	0.1	7.1	1.0	0	0.0	0.0	0.0	2114.5	42.9	-0.9
NOV	3	0.2	3.3	0.5	0	0.0	0.0	0.0	2114.3	42.6	-0.3
DEC	2	0.1	1.9	0.3	0	0.0	0.0	0.0	2114.3	42.4	-0.2
TOTAL		6.0	82.5	12.7		2.0	0.0	0.0			-8.7
MOST PROBABLE INFLOW CONDITIONS											
JAN	5	0.3	1.4	0.2	0	0.0	0.0	0.0	2117.7	51.2	0.1
FEB	7	0.4	1.6	0.3	0	0.0	0.0	0.0	2117.8	51.3	0.1
MAR	13	0.8	2.7	0.4	0	0.0	0.0	0.0	2117.8	51.7	0.4
APR	22	1.3	7.0	1.1	0	0.0	0.0	0.0	2117.9	51.9	0.2
MAY	31	1.9	8.3	1.3	2	0.1	0.0	0.0	2118.1	52.4	0.5
JUN	32	1.9	10.3	1.7	2	0.1	0.0	0.0	2118.2	52.5	0.1
JUL	42	2.6	12.3	2.0	10	0.6	0.0	0.0	2118.2	52.5	0.0
AUG	29	1.8	10.5	1.7	6	0.4	0.0	0.0	2118.0	52.2	-0.3
SEP	12	0.7	9.1	1.5	2	0.1	0.0	0.0	2117.8	51.3	-0.9
OCT	5	0.3	6.4	1.0	0	0.0	0.0	0.0	2117.4	50.6	-0.7
NOV	7	0.4	3.0	0.5	0	0.0	0.0	0.0	2117.4	50.5	-0.1
DEC	5	0.3	1.7	0.3	0	0.0	0.0	0.0	2117.4	50.5	0.0
TOTAL		12.7	74.3	12.0		1.3	0.0	0.0			-0.6
REASONABLE MAXIMUM INFLOW CONDITIONS											
JAN	15	0.9	1.3	0.2	0	0.0	0.0	0.0	2117.9	51.8	0.7
FEB	20	1.1	1.4	0.2	0	0.0	0.0	0.0	2118.2	52.7	0.9
MAR	36	2.2	2.5	0.4	0	0.0	0.0	0.0	2118.9	54.5	1.8
APR	59	3.5	6.2	1.0	0	0.0	0.0	0.0	2119.7	57.0	2.5
MAY	84	5.2	7.4	1.3	3	0.2	0.0	0.0	2120.9	60.7	3.7
JUN	91	5.4	9.2	1.7	3	0.2	0.0	0.0	2122.0	64.2	3.5
JUL	115	7.1	11.0	2.1	3	0.2	0.0	0.0	2123.4	69.0	4.8
AUG	81	5.0	9.4	1.9	0	0.0	0.0	0.0	2124.3	72.1	3.1
SEP	34	2.0	8.1	1.6	0	0.0	0.0	0.0	2124.5	72.5	0.4
OCT	13	0.8	5.7	1.2	0	0.0	0.0	0.0	2124.3	72.1	-0.4
NOV	18	1.1	2.7	0.5	0	0.0	0.0	0.0	2124.5	72.7	0.6
DEC	13	0.8	1.5	0.3	0	0.0	0.0	0.0	2124.7	73.2	0.5
TOTAL		35.1	66.4	12.4		0.6	0.0	0.0			22.1

TABLE 5

FLOOD DAMAGES PREVENTED BY NEBRASKA-KANSAS PROJECTS RESERVOIRS

RESERVOIR	DURING FY 2017	PRIOR TO 2017	ACCUMULATED TOTAL
BONNY	$800	$2,868,900	$2,869,700
ENDERS	$8,200	$3,605,100	$3,613,300
SWANSON	$73,000	$44,179,600	$44,252,600
HUGH BUTLER	$13,300	$6,410,700	$6,424,000
HARRY STRUNK	$6,800	$19,037,300	$19,044,100
KEITH SEBELIUS	$17,000	$4,164,600	$4,181,600
HARLAN COUNTY	$427,400	$240,404,900	$240,832,300
LOVEWELL	$92,200	$158,630,800	$158,723,000
KIRWIN	$61,500	$104,163,700	$104,225,200
WEBSTER	$71,100	$122,030,900	$122,102,000
WACONDA	$381,700	$1,355,804,100	$1,356,185,800
CEDAR BLUFF	$630,800	$138,870,100	$139,500,900
TOTAL	$1,783,800	$2,200,170,700	$2,201,954,500

Estimates of damages prevented are received from the Army Corps of Engineer's Kansas City District Office. The Accumulated Totals date from 1951 through 2017. 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 2017 AND THE
ESTIMATED DIVERSION FOR 2018
(Units - Acre-Feet)

Irrigation District and Canal	2017 Irrigation Operations From	To	10-Year Average Diversion (2007-2016)	2017 Diversion	Estimated Diversion in 2018
Mirage Flats Irrigation District					
Mirage Flats Canal	5/24	10/25	9,685	23,085	6,000
Ainsworth Irrigation District					
Ainsworth Canal	5/14	9/20	70,449	73,067	75,000
Twin Loups Irrigation District					
Above Davis Creek	4/19	9/18	44,548	47,835	46,000
Below Davis Creek	5/15	10/02	42,533	45,764	44,000
Total Twin Loups Irrigation District			87,081	93,599	90,000
Frenchman Valley Irrigation District					
Culbertson Canal	Did not run.		5,107	0	9,000
H & RW Irrigation District					
Culbertson Extension Canal	Did not run.		0	0	0
Frenchman-Cambridge Irrigation District					
Meeker-Driftwood Canal	6/22	9/05	14,729	16,692	19,000
Red Willow Canal	Did not run.		926	0	0
Bartley Canal	4/19	9/06	5,494	8,136	9,000
Cambridge Canal	4/24	9/08	20,841	25,406	28,000
Total Frenchman-Cambridge Irrigation District			41,990	50,234	56,000
Almena Irrigation District					
Almena Canal	7/12	7/17	1,731	771	2,500
Bostwick Irrigation District in Nebraska					
Franklin Canal	6/26	9/13	15,220	17,134	18,000
Naponee Canal	6/20	9/09	791	954	1,000
Franklin Pump Canal	7/06	9/08	818	798	1,000
Superior Canal	6/16	9/13	5,435	7,493	7,000
Courtland Canal (Nebraska)	6/19	9/13	414	471	1,000
Total Bostwick Irrigation District in Nebraska			22,678	26,850	28,000
Kansas-Bostwick Irrigation District					
Courtland Canal above Lovewell	5/01	9/15	19,169	24,094	22,000
Courtland Canal below Lovewell	5/01	9/15	35,771	38,000	36,000
Total Kansas-Bostwick Irrigation District			54,940	62,094	58,000
Kirwin Irrigation District					
Kirwin Canal	6/19	8/31	14,722	17,546	18,000
Webster Irrigation District					
Osborne Canal	6/14	8/31	5,802	11,525	13,000
Glen Elder Irrigation District	6/28	9/12	3,569	3,368	5,000
TOTAL			317,754	362,139	360,500

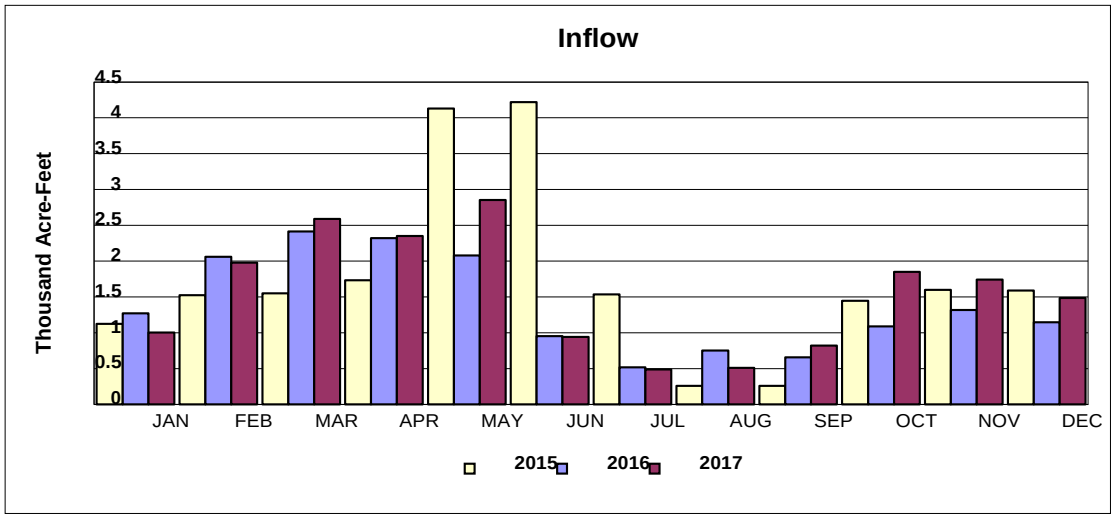
TABLE 7

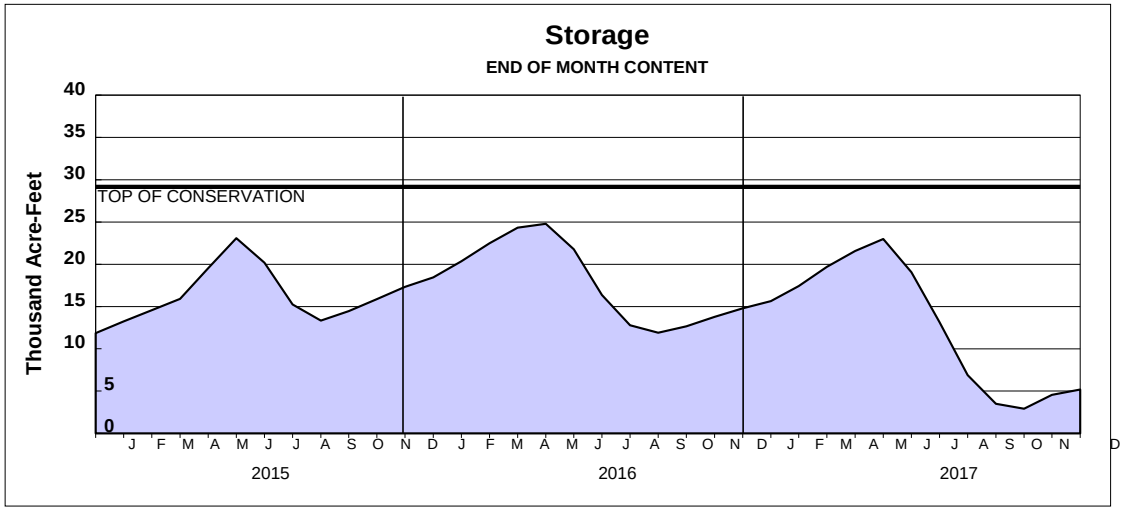
NEBRASKA-KANSAS PROJECTS
Summary of Precipitation, Reservoir Storage and Inflows
CALENDAR YEAR 2017

Reservoir	Total Precip. Inches	Percent Of Average %	Storage 12-31-16 AF	Storage 12-31-17 AF	Gain or Loss AF	Maximum Content AF	Storage Date	Minimum Content AF	Storage Date	Total Inflow AF	Percent Of Most Probable %
Box Butte	19.68	115	14,789	5,200	-9,589	22,979	MAY 23	2,230	OCT 23	18,618	124
Merritt	21.36	101	61,913	61,100	-813	64,170	FEB 24	41,996	JUL 26	209,434	112
Calamus	35.00	143	101,203	98,123	-3,080	120,690	APR 3	69,028	SEP 17	262,858	99
Davis Creek	23.05	91	14,300	12,710	-1,590	31,720	JUN 21	12,698	DEC 31	55,143	117
Bonny	25.11	143	0	0	0	0	N/A	0	N/A	4,580	60
Enders	17.10	89	10,264	8,595	-1,669	10,903	APR 3	8,412	SEP 22	4,652	73
Swanson	26.27	131	45,972	51,342	5,370	68,314	JUN 9	46,094	JAN 1	33,514	127
Hugh Butler	18.92	96	14,669	15,626	957	17,047	MAY 29	14,267	SEP 22	6,802	60
Harry Strunk	18.66	89	29,393	23,855	-5,538	37,689	MAR 30	15,005	SEP 8	40,838	103
Keith Sebelius	26.57	107	13,039	13,379	340	15,622	JUN 7	12,924	SEP 22	7,073	106
Harlan County	26.60	115	194,203	224,247	30,044	264,901	JUN 6	194,305	JAN 1	118,889	112
Lovewell	20.01	72	35,398	31,494	-3,904	48,288	MAY 22	18,001	SEP 15	55,402	93
Kirwin	25.39	107	77,029	93,163	16,134	95,040	JUN 16	77,029	SEP 21	51,139	202
Webster	23.88	101	67,864	78,246	10,382	86,046	MAY 22	66,574	SEP 22	49,021	294
Waconda	20.51	80	216,908	213,045	-3,863	260,260	MAY 30	204,607	MAR 10	200,092	165
Cedar Bluff	23.68	113	54,285	51,101	-3,184	57,947	JUN 7	51,101	DEC 28	9,338	74

EXHIBIT 1A

BOX BUTTE RESERVOIR
ACTUAL OPERATION





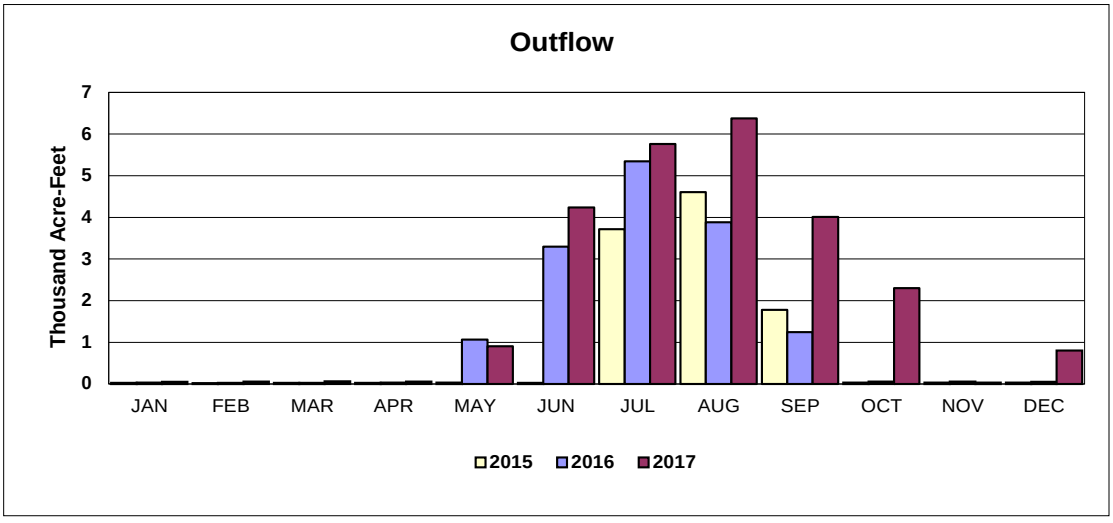
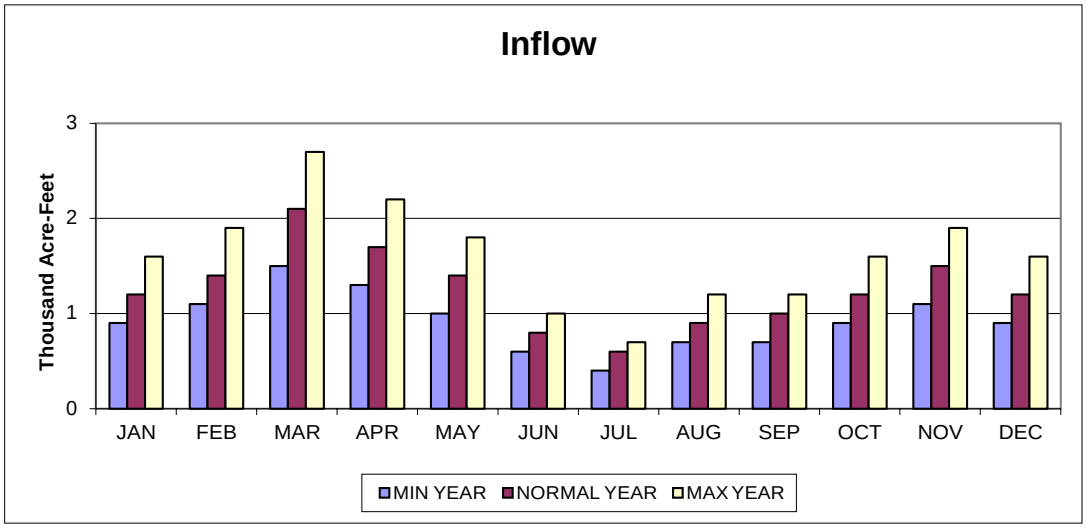
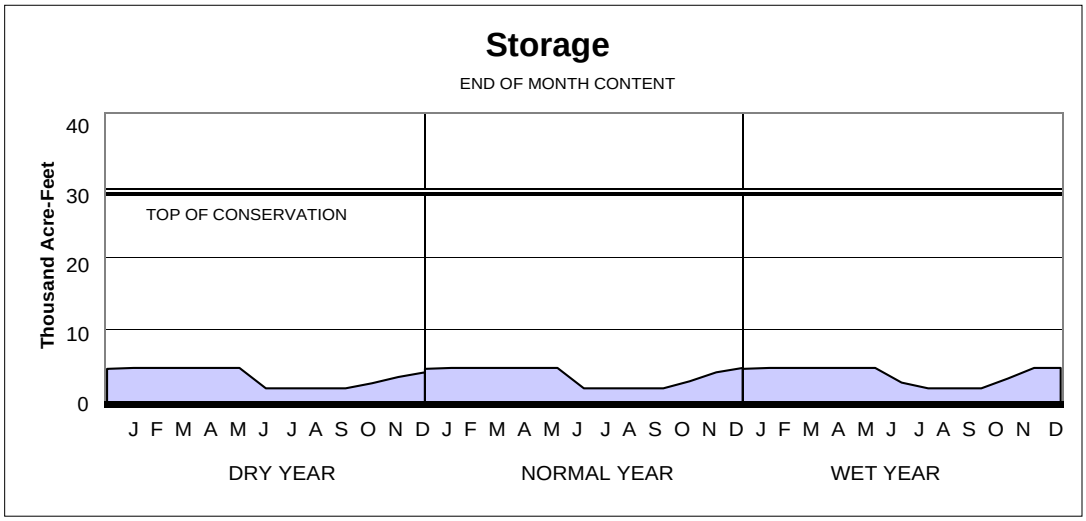


EXHIBIT 1B

BOX BUTTE RESERVOIR

2018 OPERATION PLAN





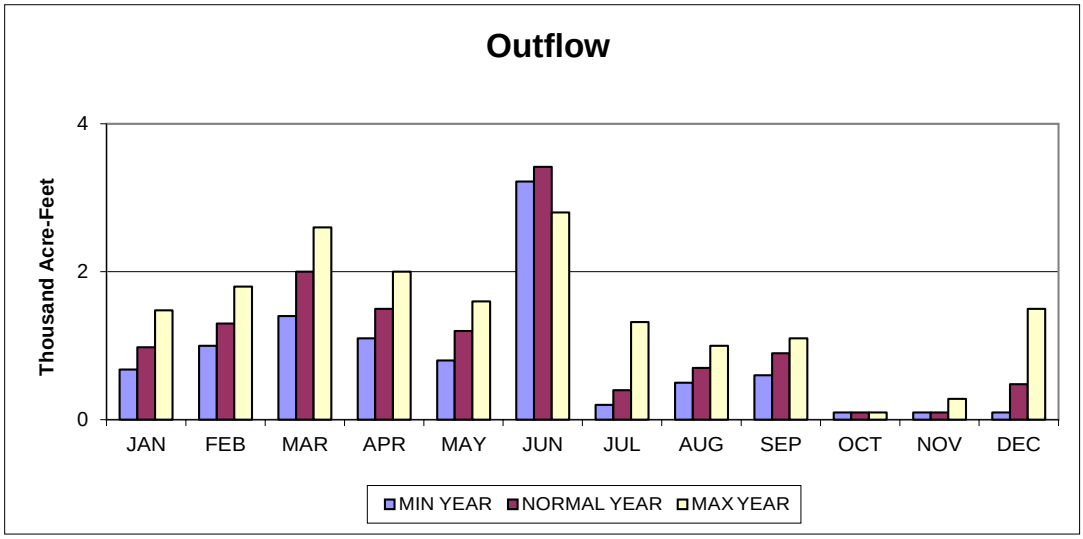
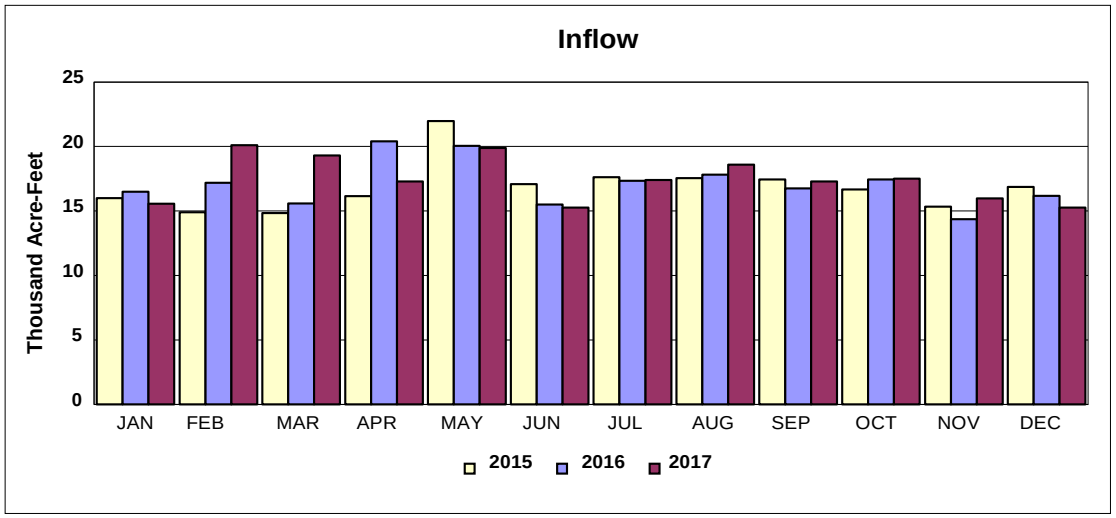
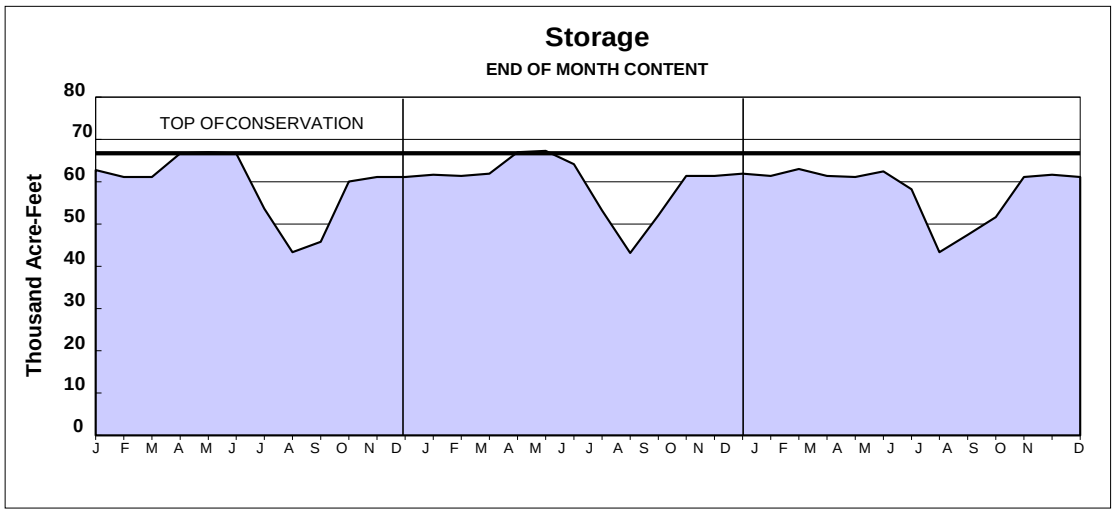


EXHIBIT 2A

MERRITT RESERVOIR
ACTUAL OPERATION





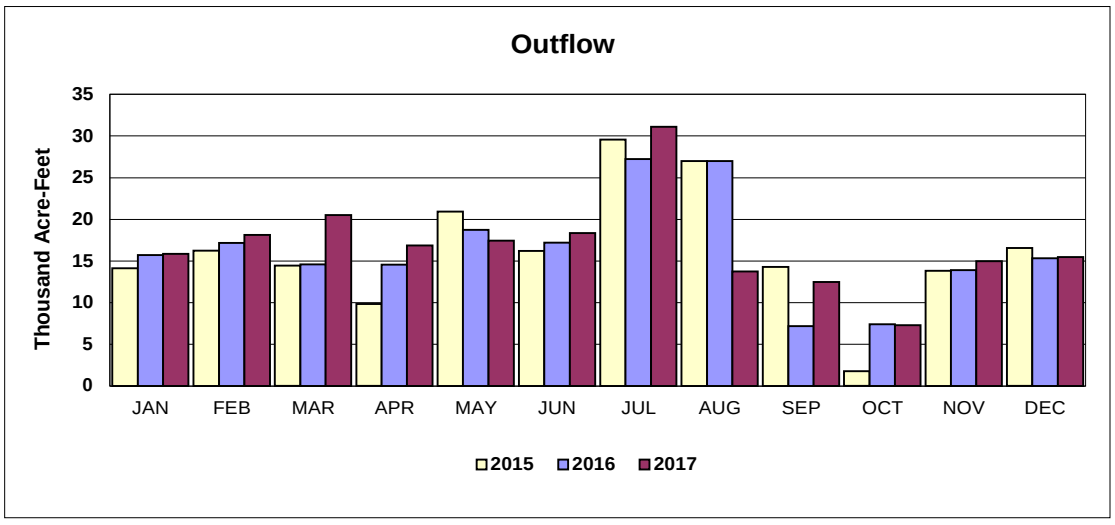
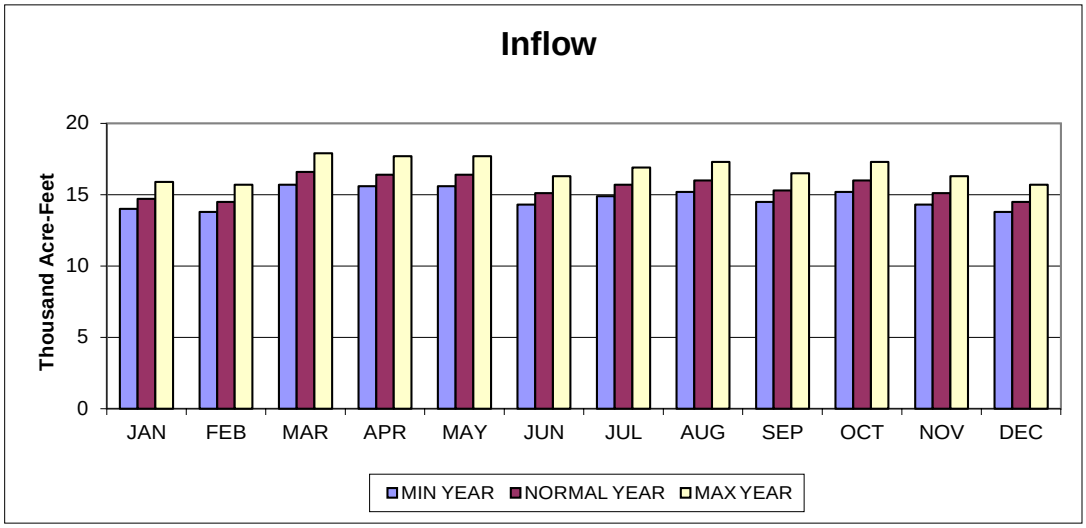
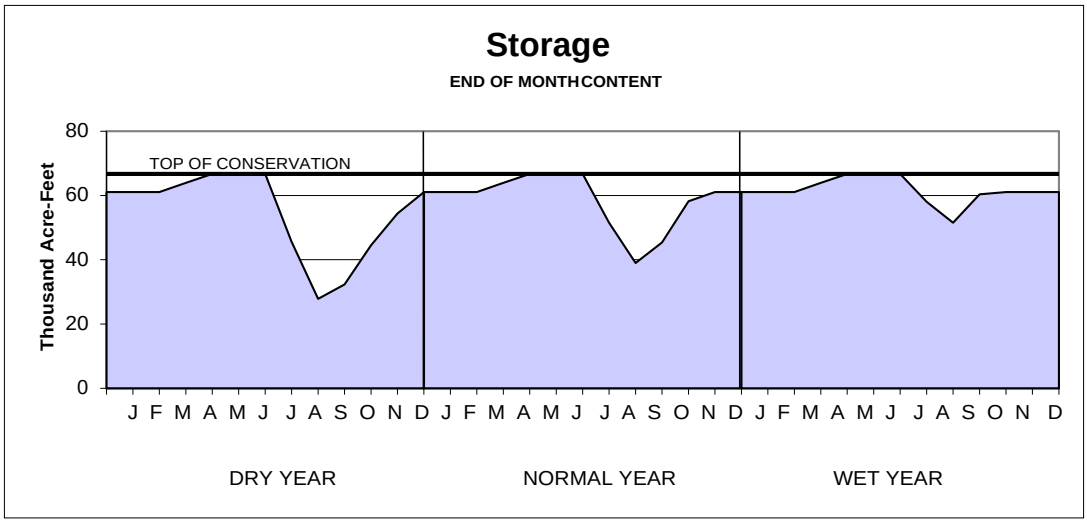


EXHIBIT 2B

MERRITT RESERVOIR
2018 OPERATION PLAN





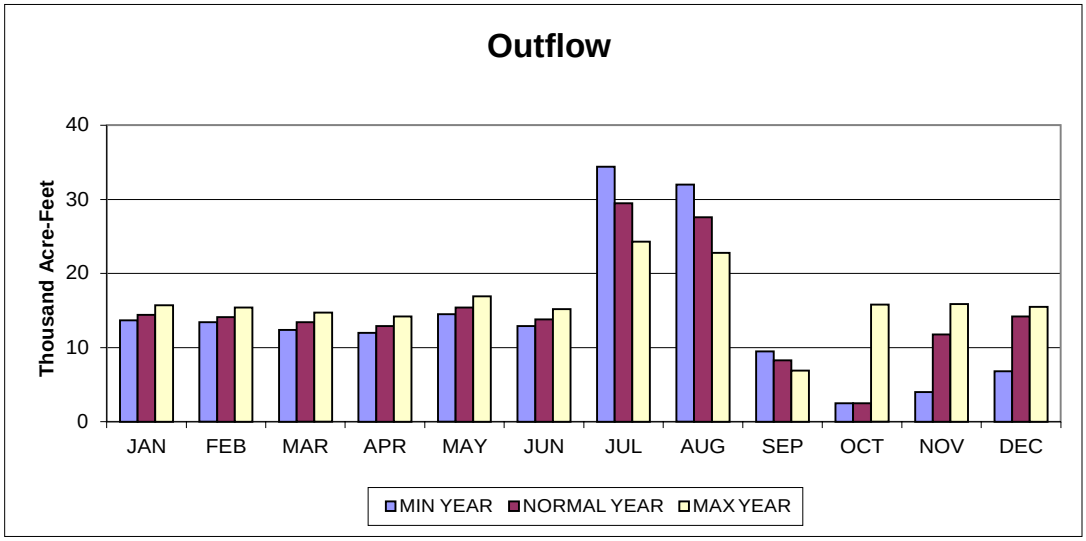
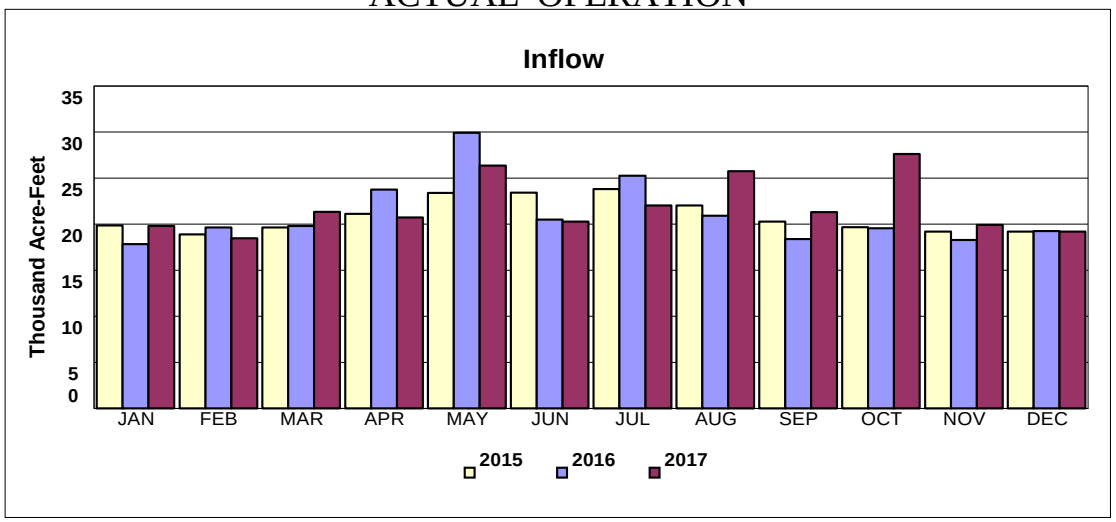
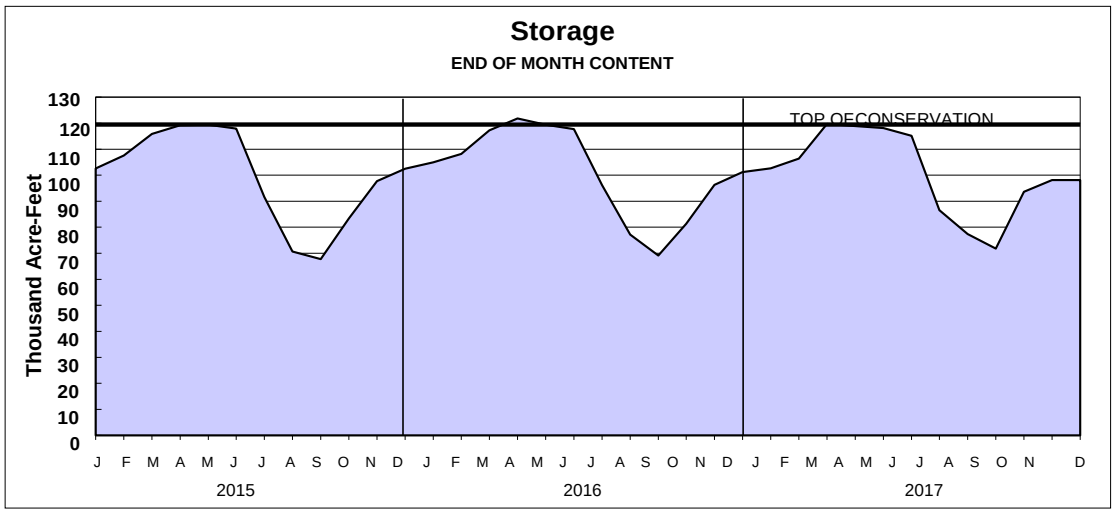


EXHIBIT 3A

CALAMUS RESERVOIR

ACTUAL OPERATION





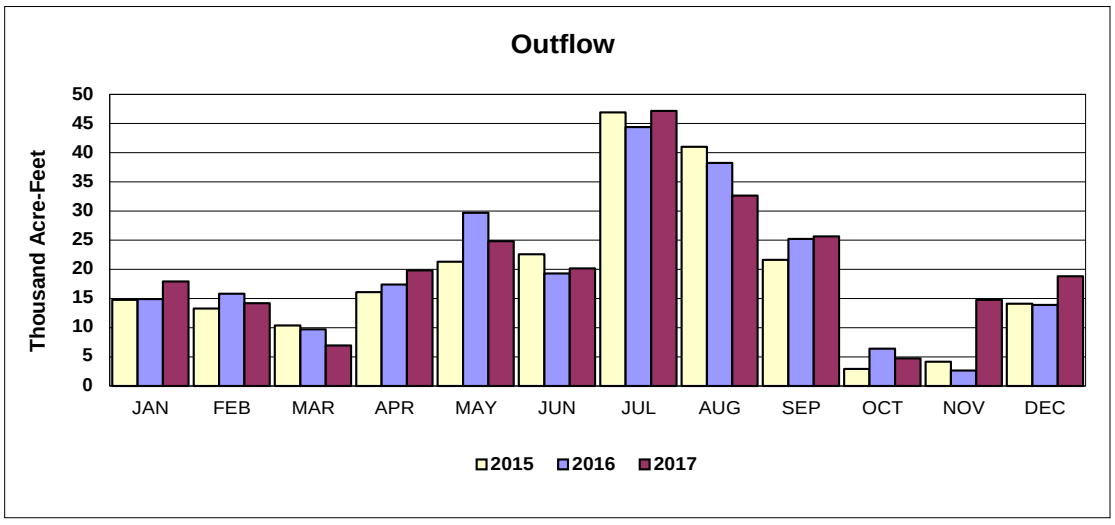
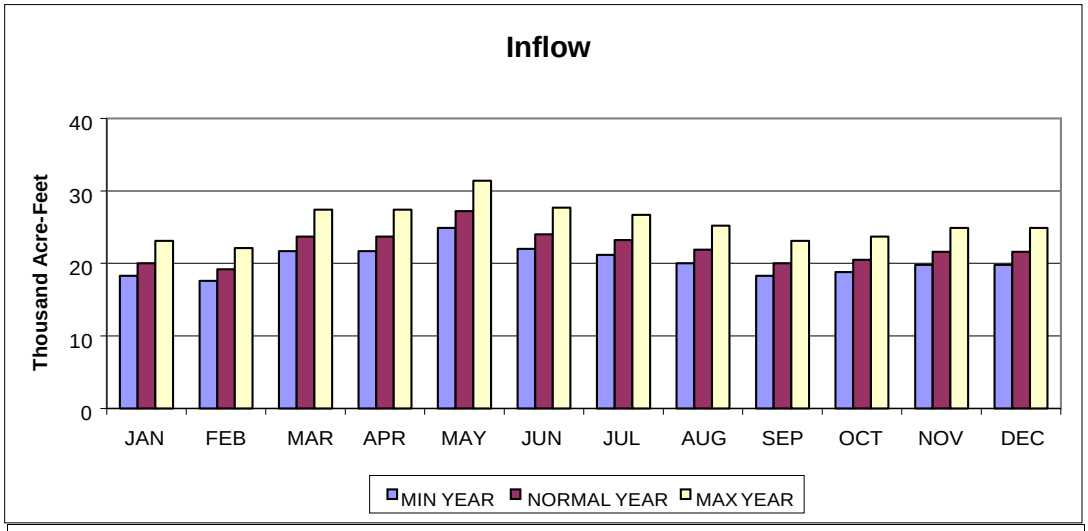
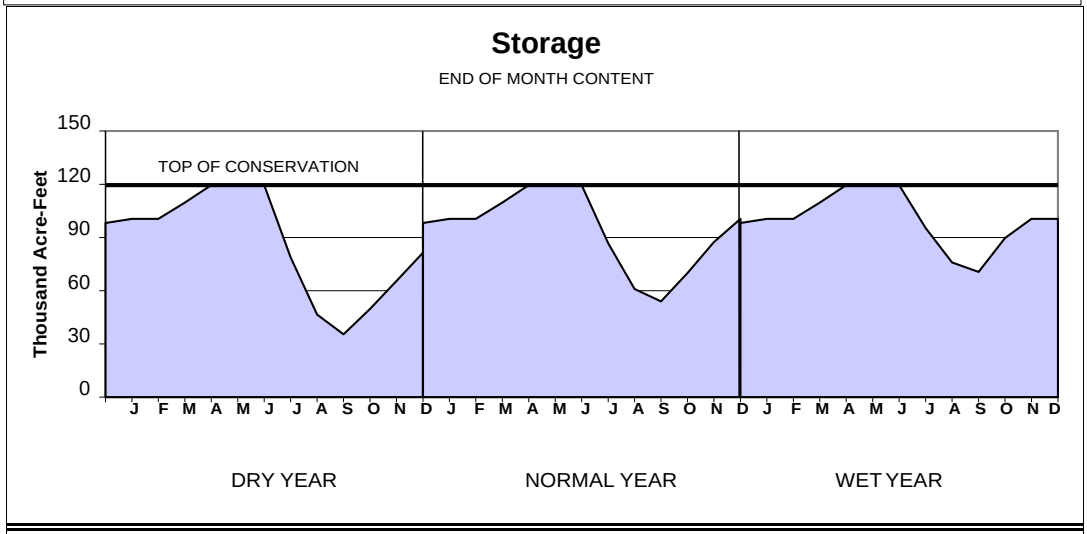


EXHIBIT 3B

CALAMUS RESERVOIR

2018 OPERATION PLAN





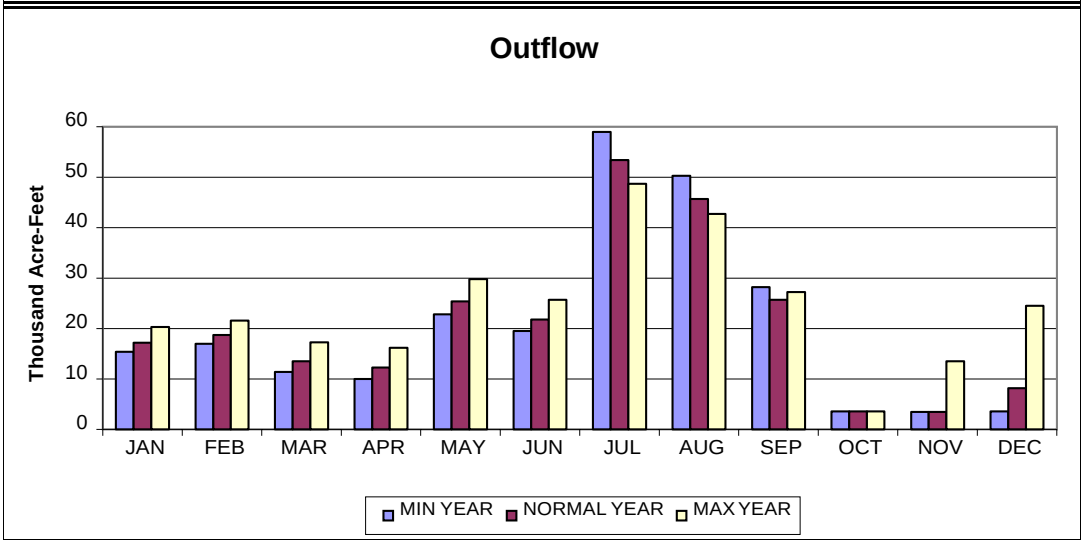
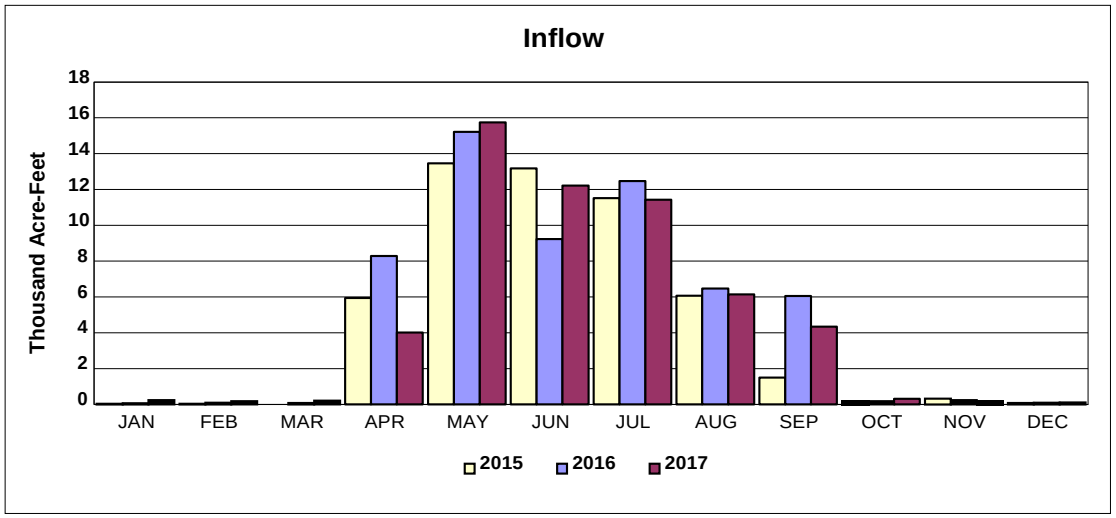
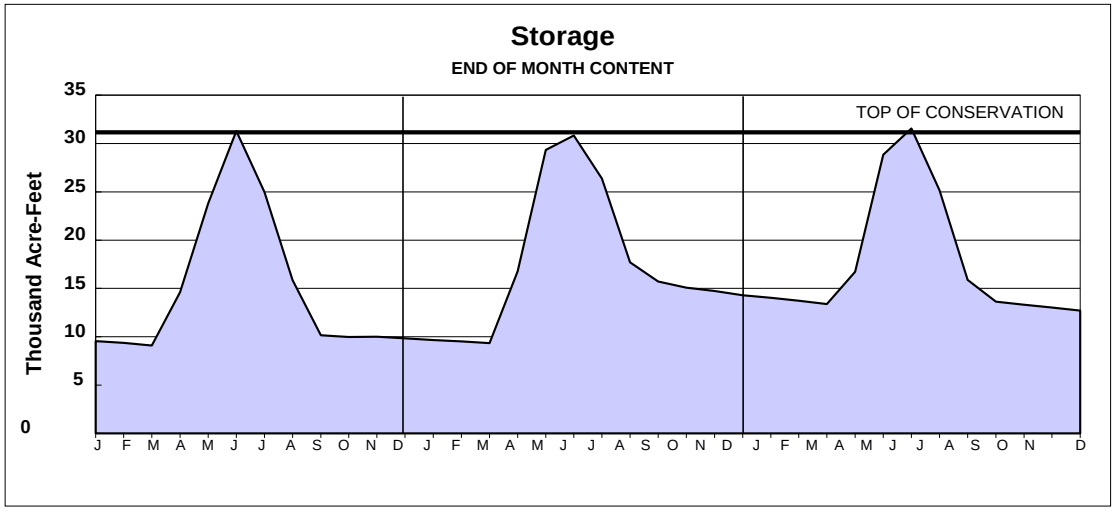


EXHIBIT 4A

DAVIS CREEK RESERVOIR

ACTUAL OPERATION





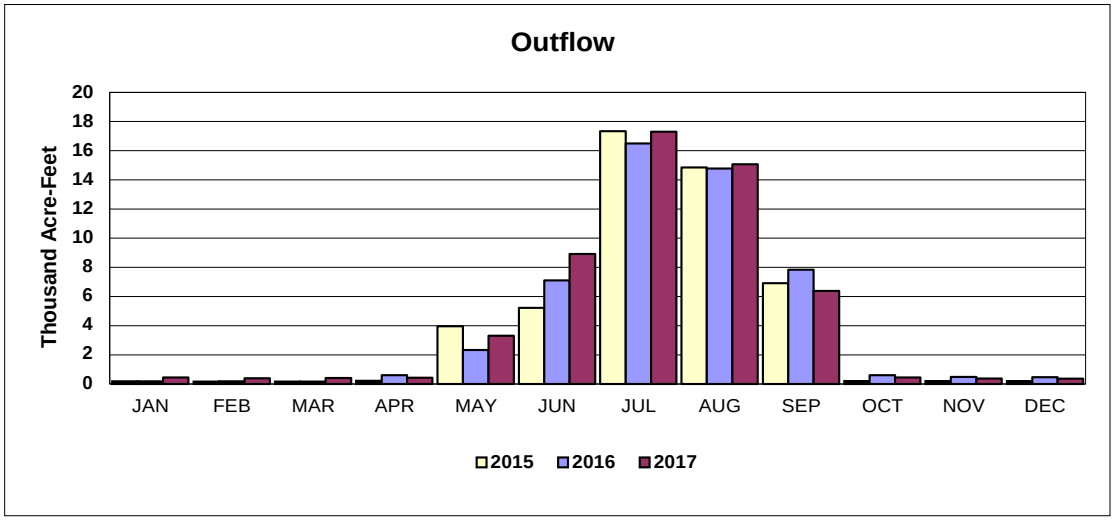
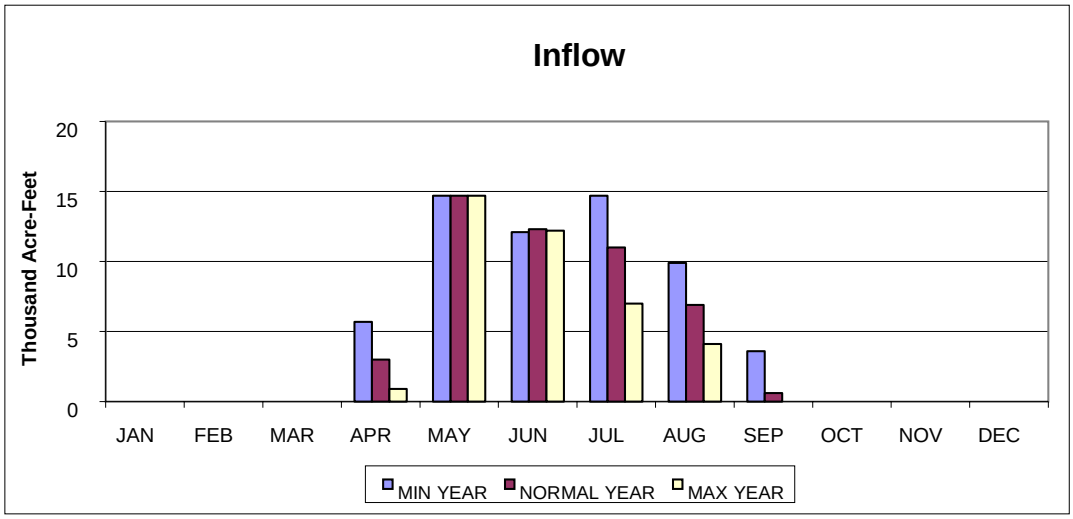
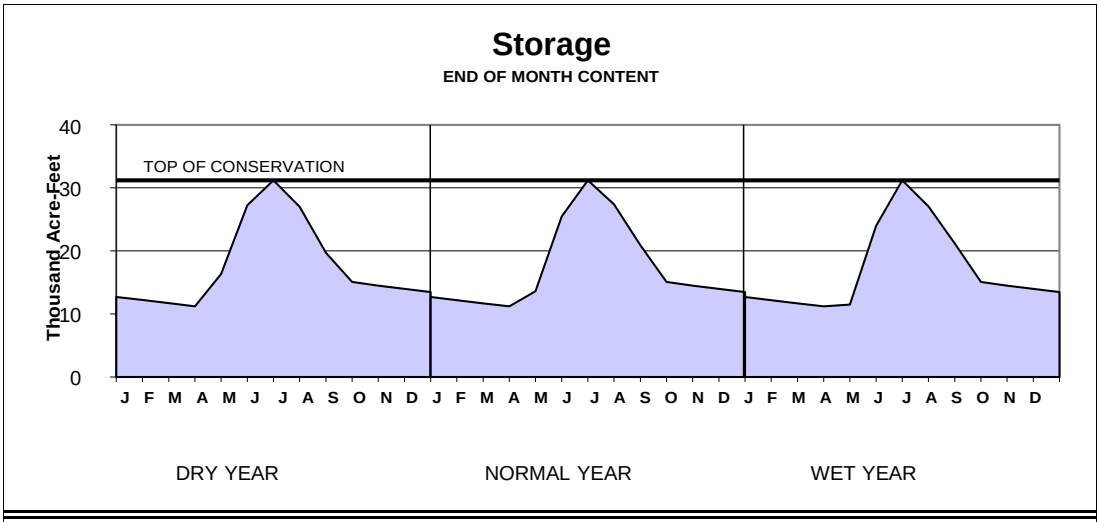


EXHIBIT 4B

DAVIS CREEK RESERVOIR

2018 OPERATION PLAN





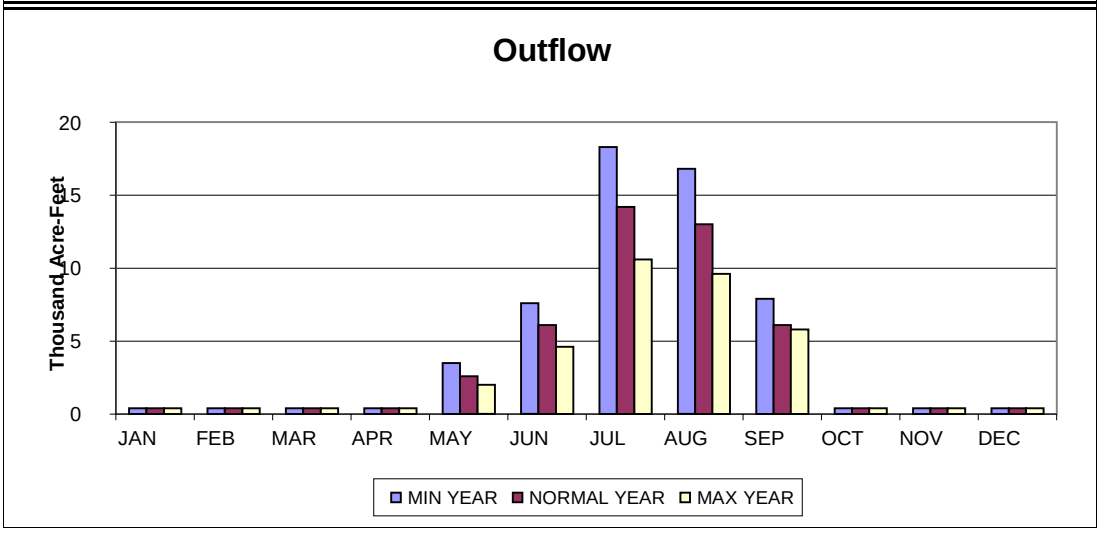
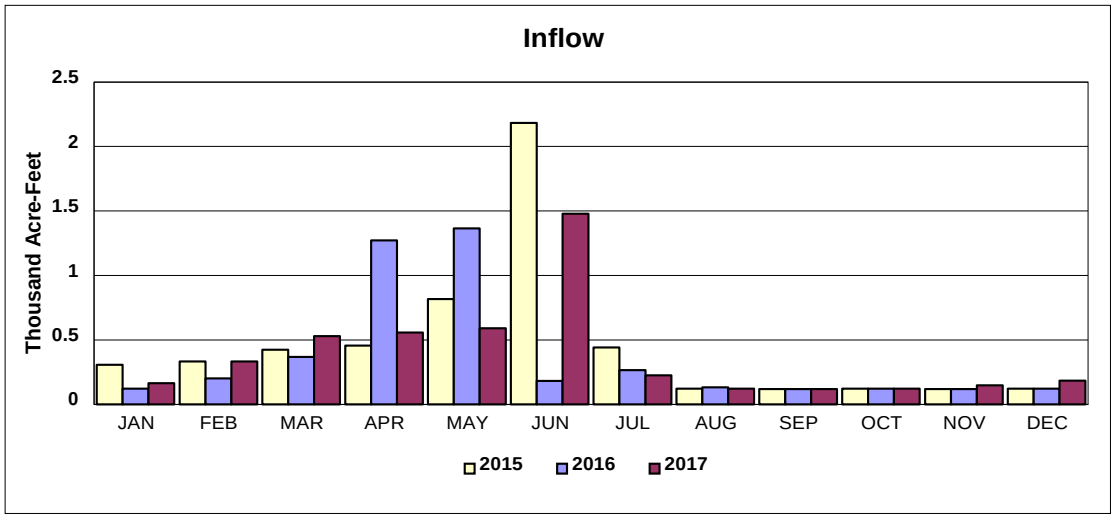
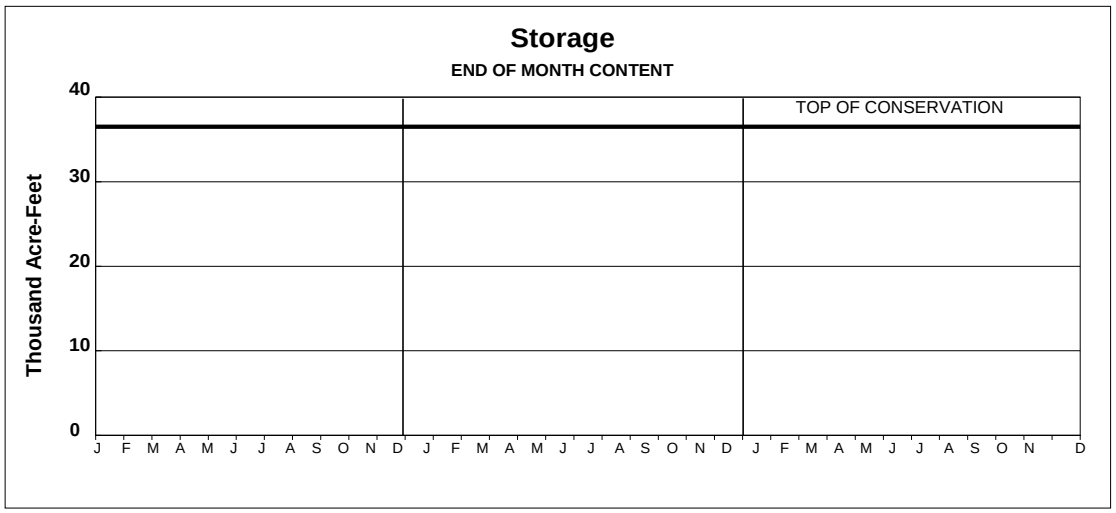


EXHIBIT 5A

BONNY RESERVOIR
ACTUAL OPERATION





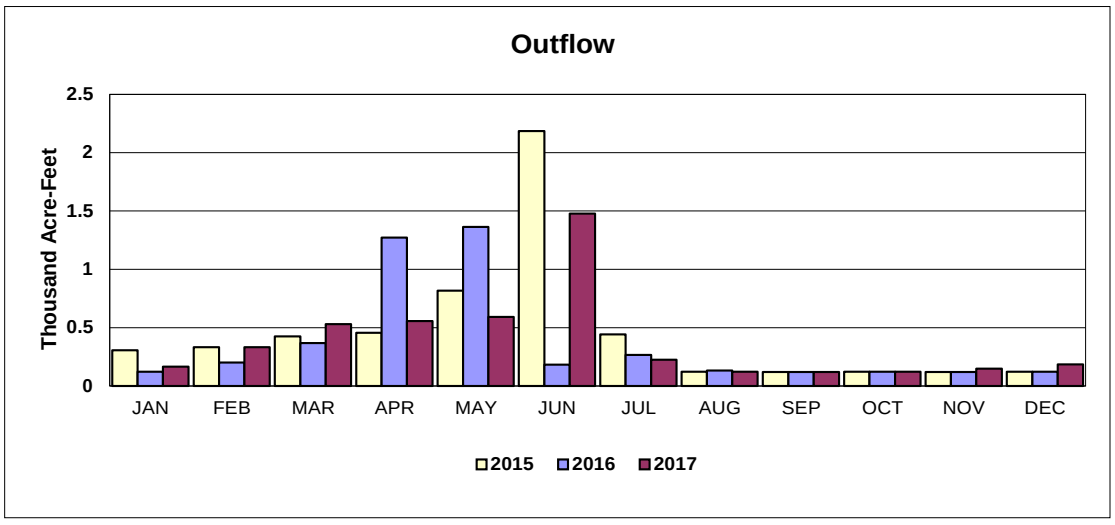
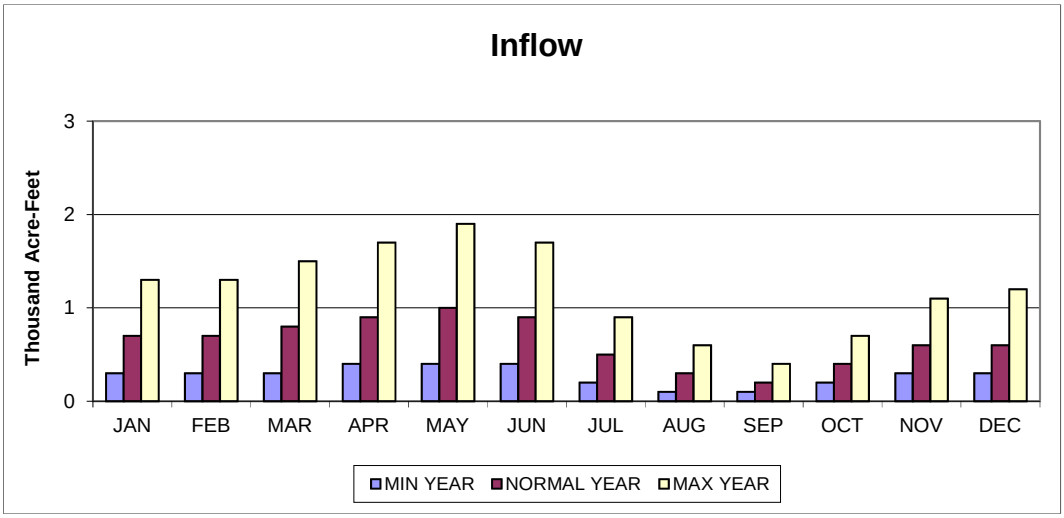
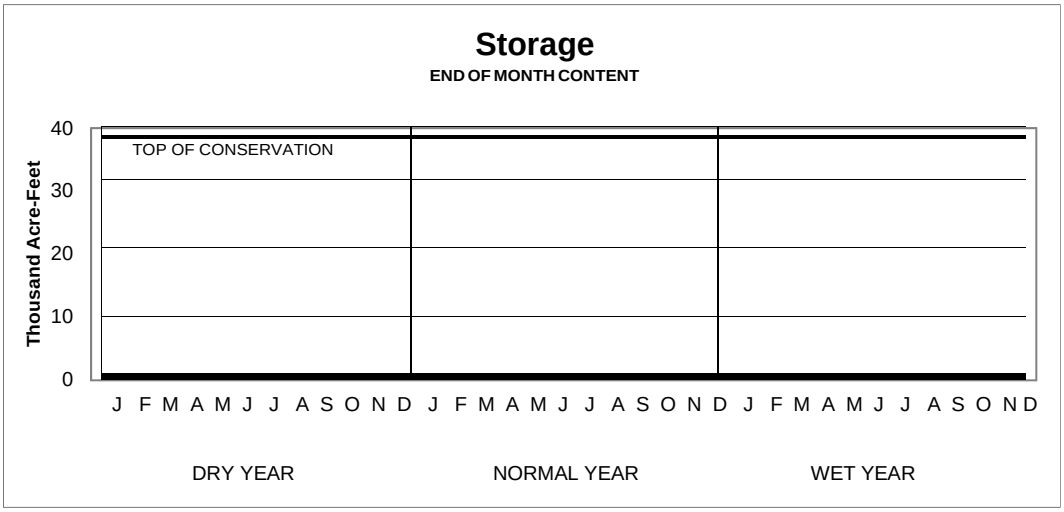
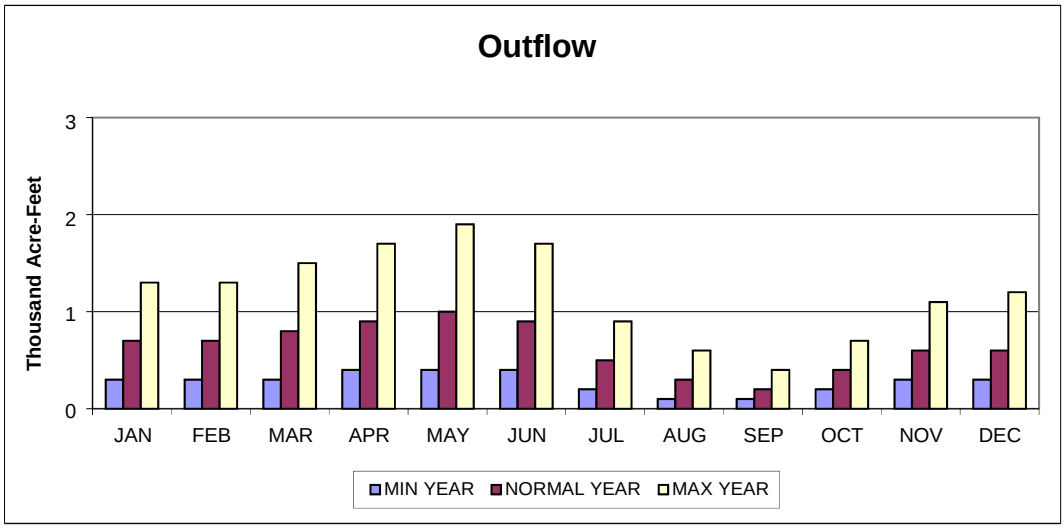


EXHIBIT 5B

BONNY RESERVOIR
2018 OPERATION PLAN

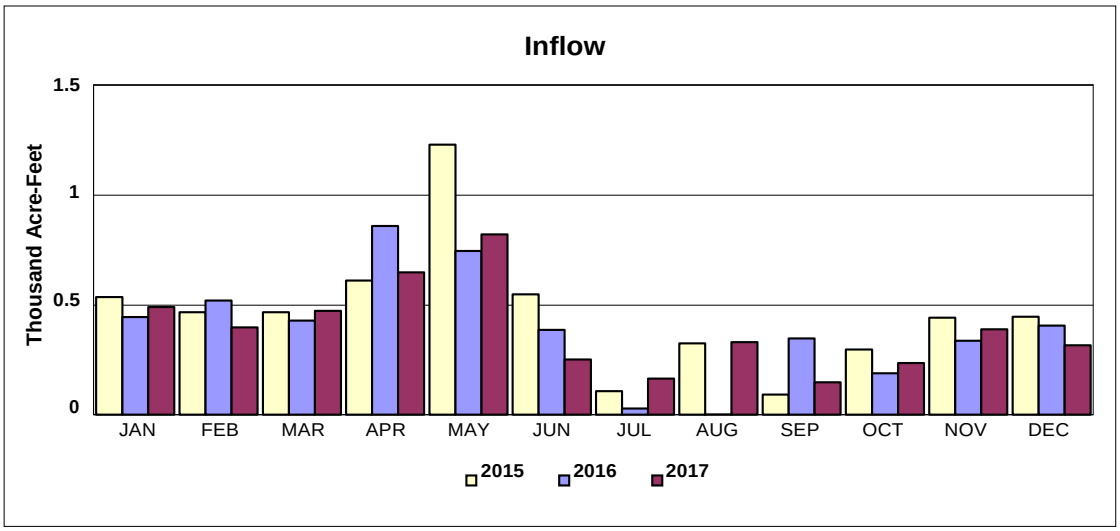


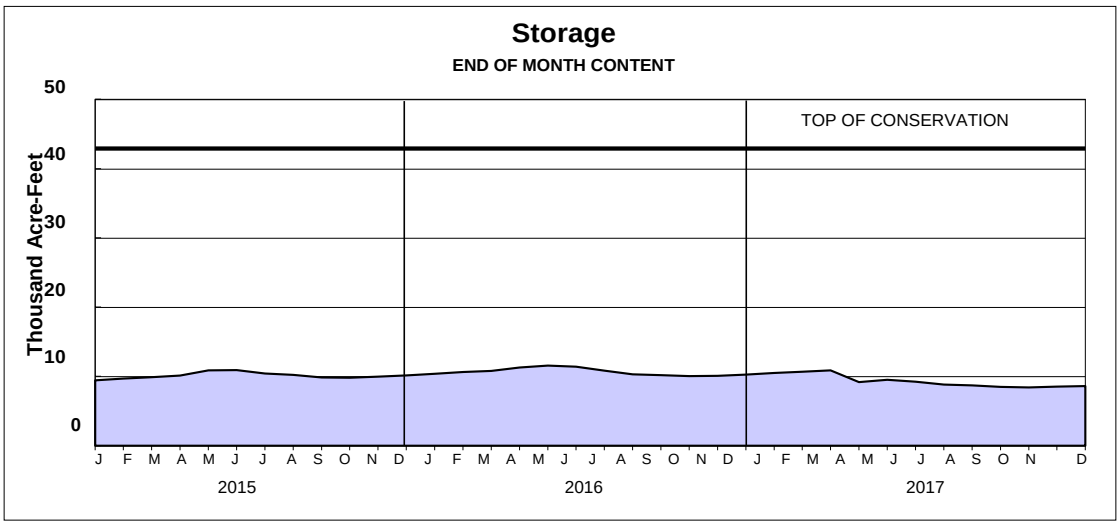




ENDERS RESERVOIR

ACTUAL OPERATION





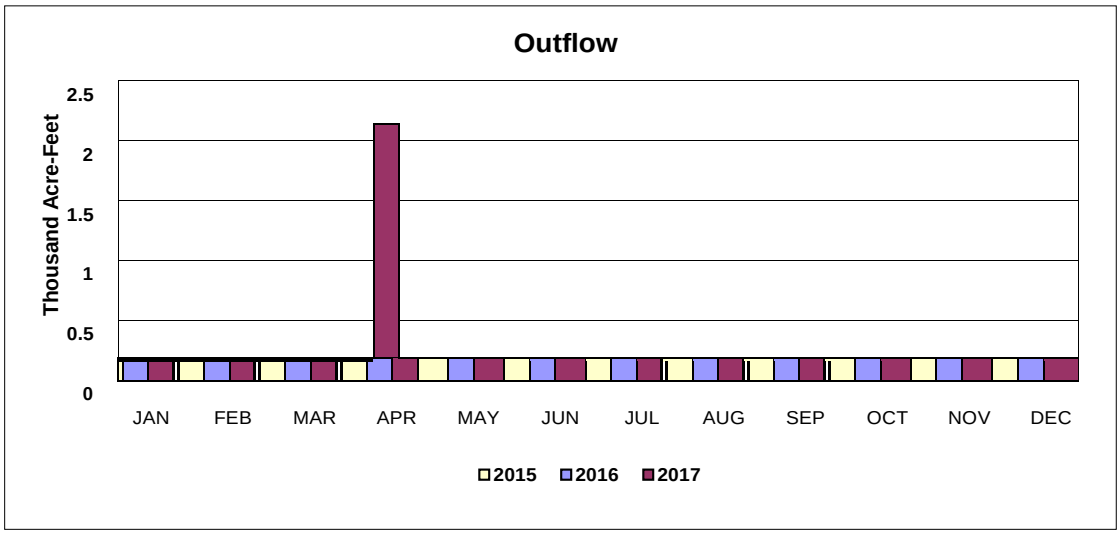
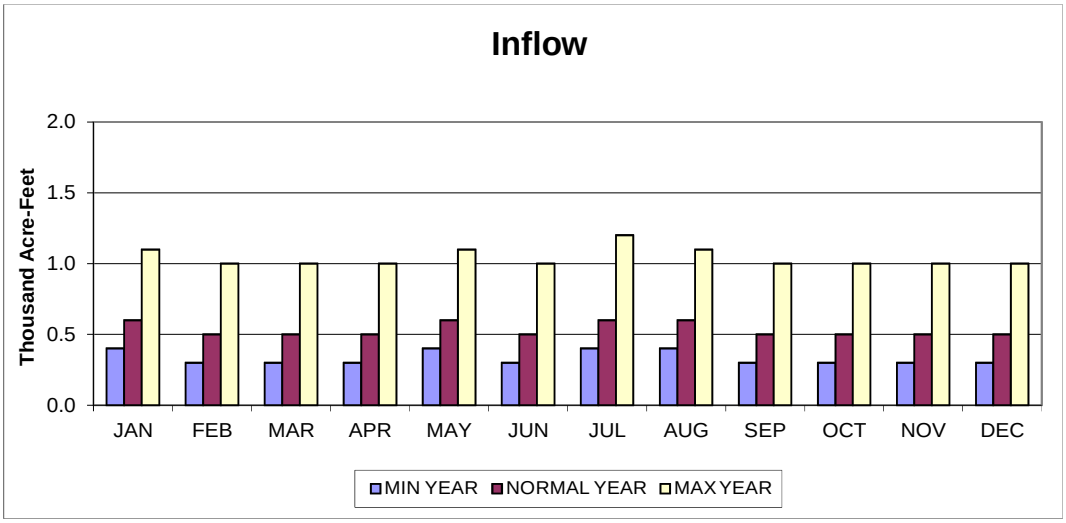
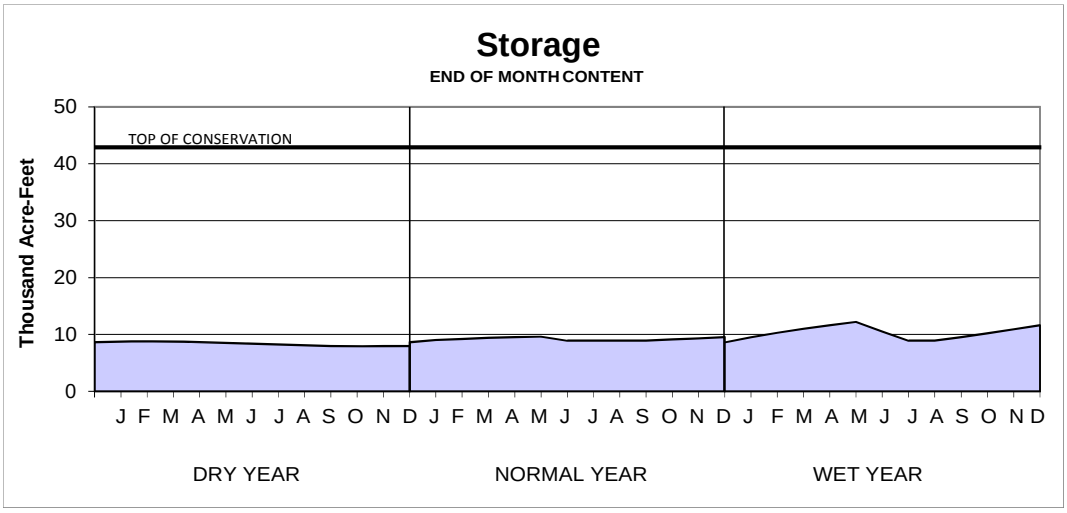


EXHIBIT 6B

ENDERS RESERVOIR
2018 OPERATION PLAN





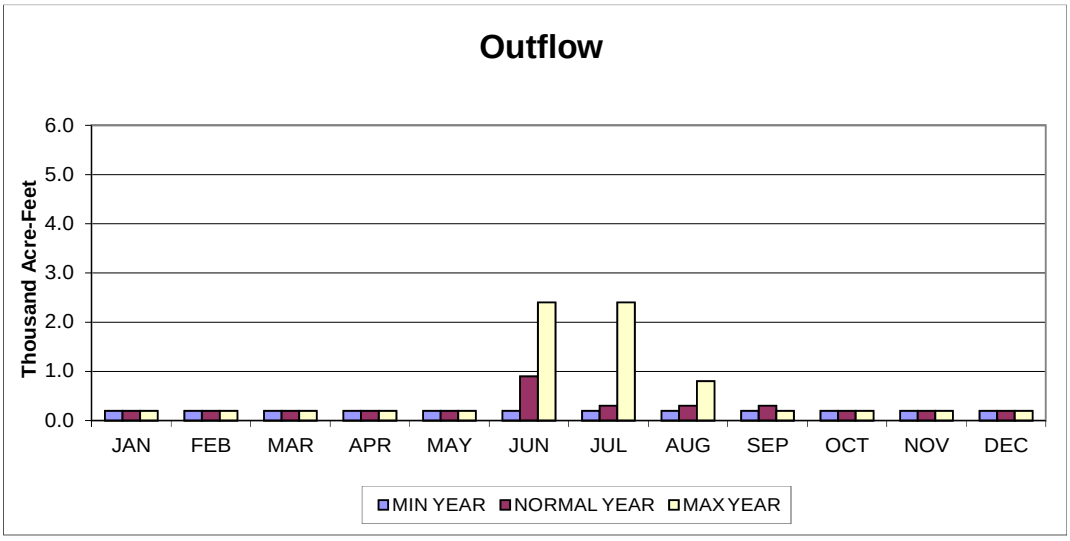
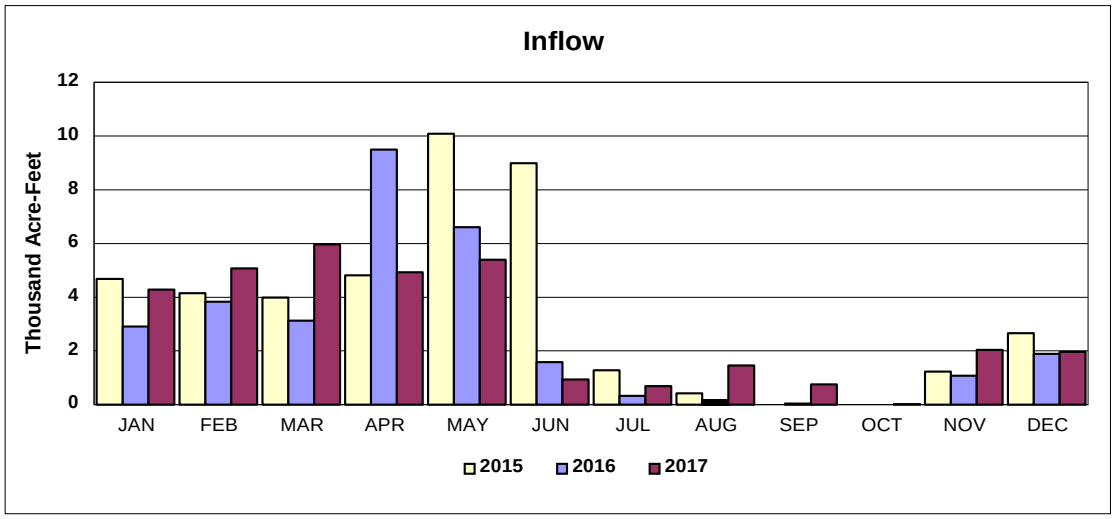
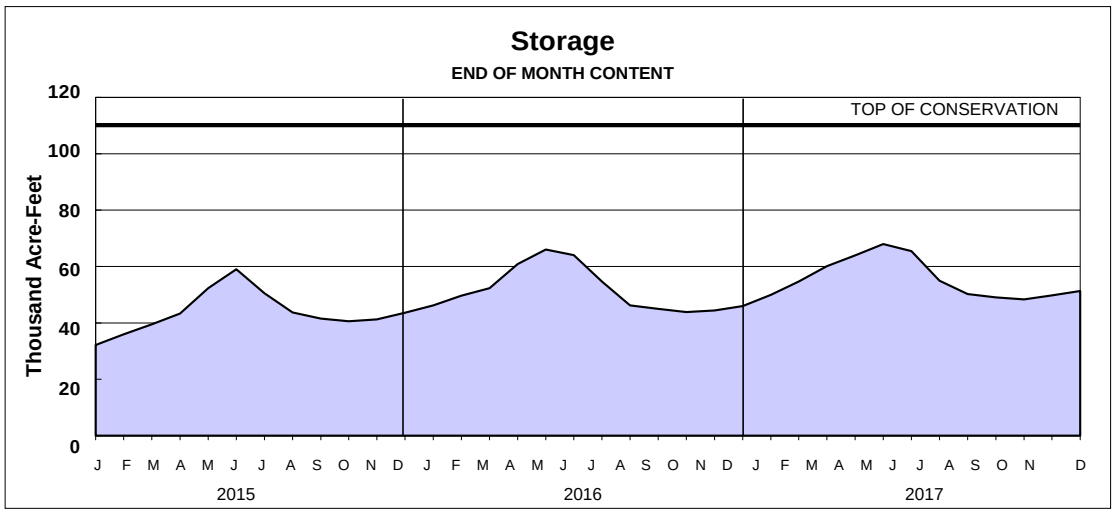
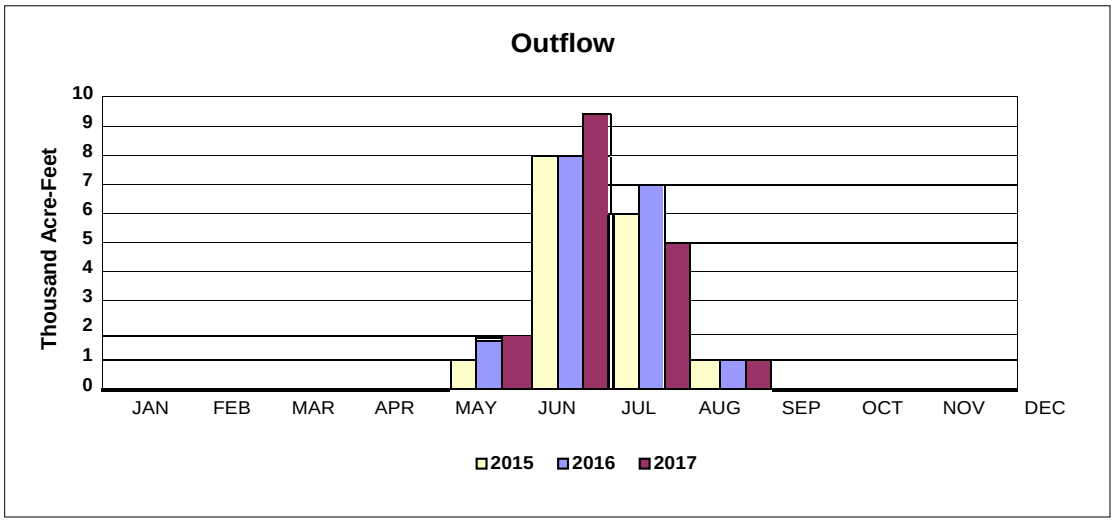


EXHIBIT 7A

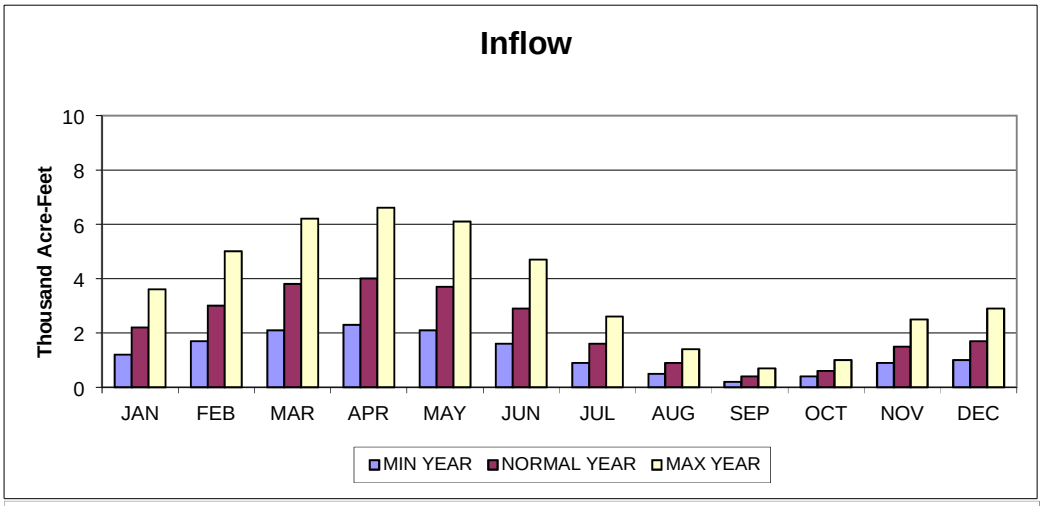
SWANSON LAKE
ACTUAL OPERATION

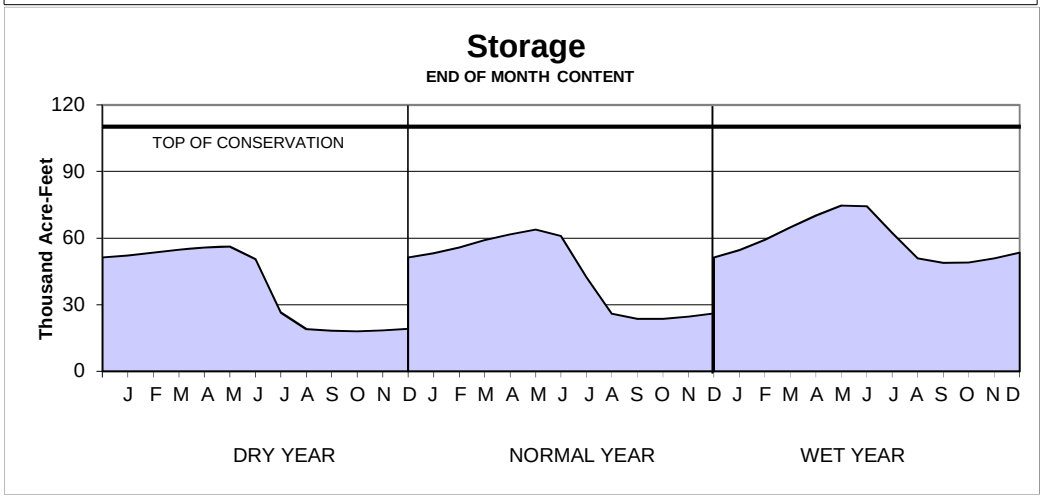






SWANSON LAKE
2018 OPERATION PLAN





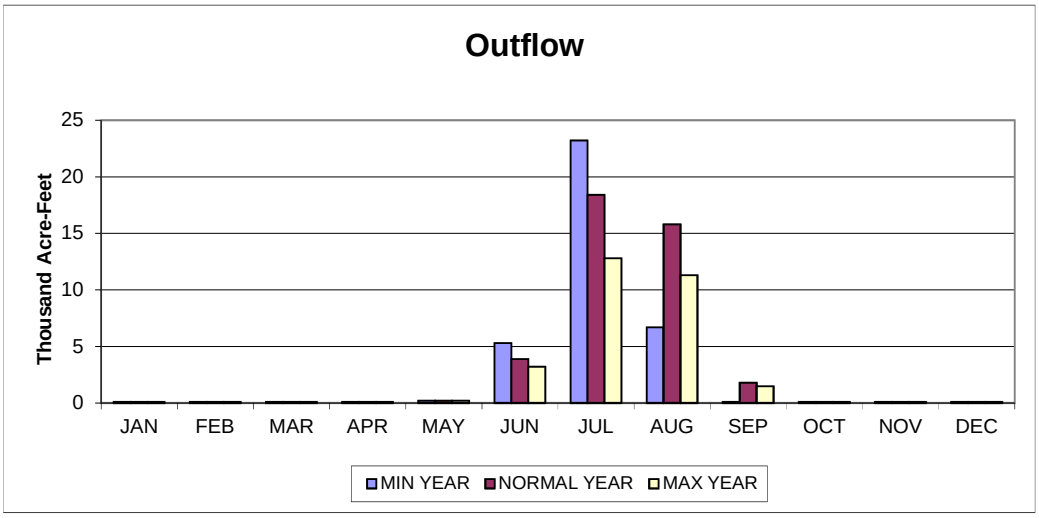
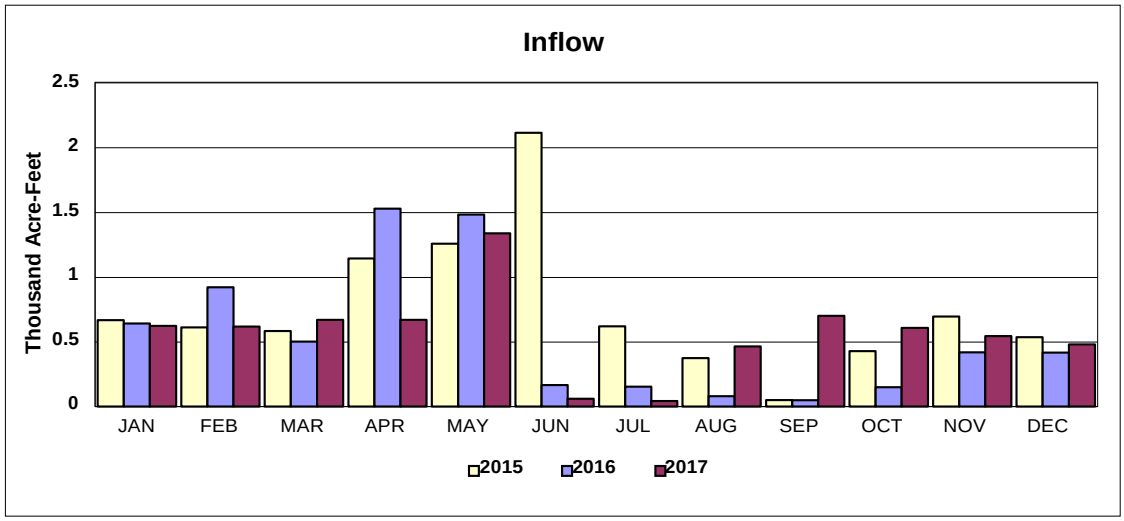
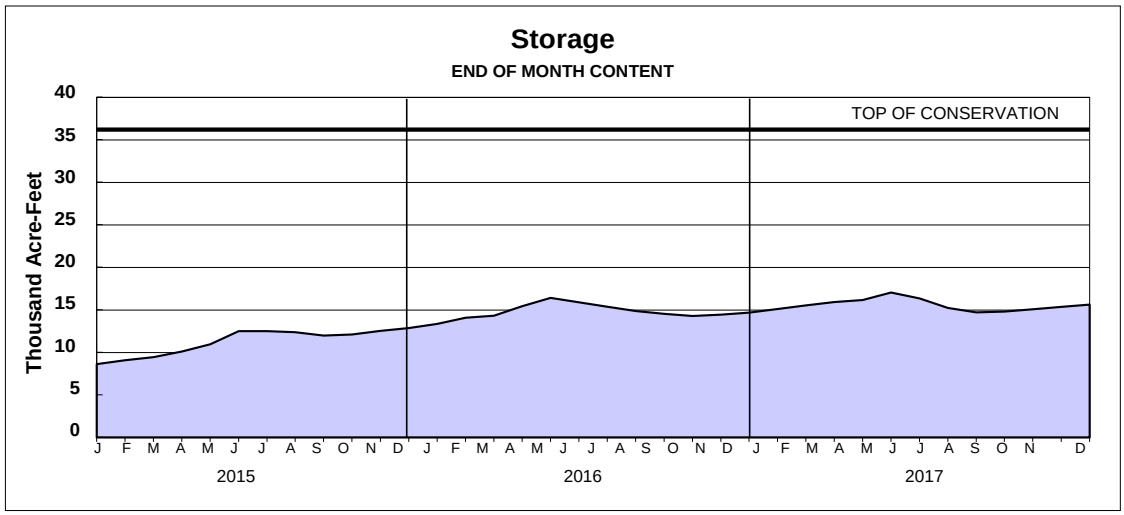


EXHIBIT 8A

HUGH BUTLER LAKE

ACTUAL OPERATION





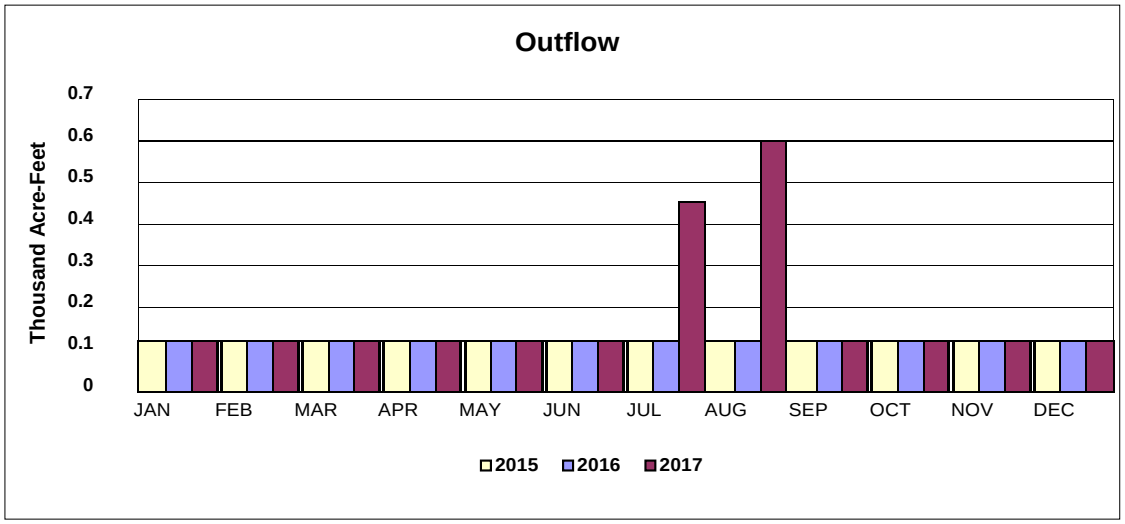
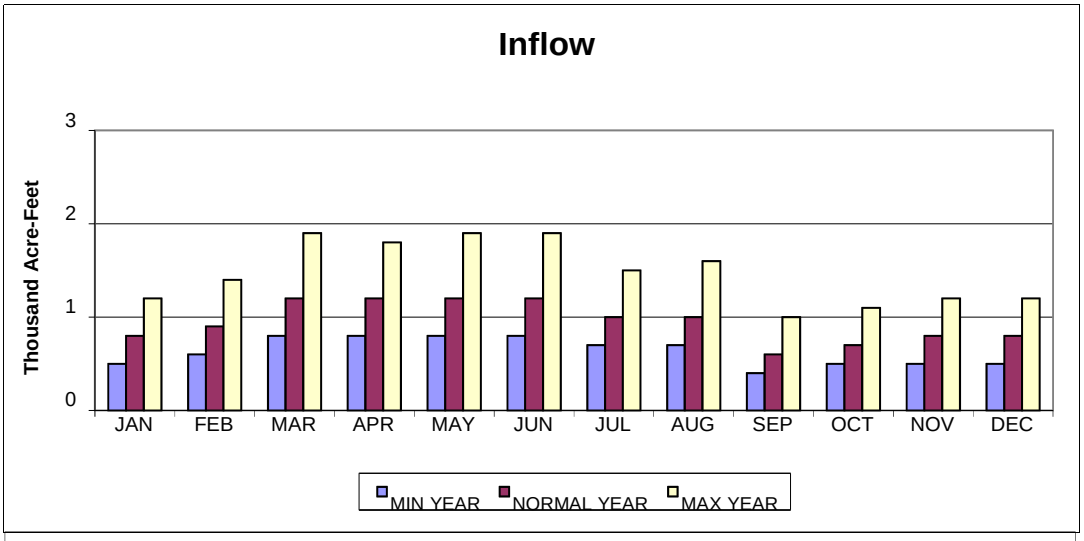
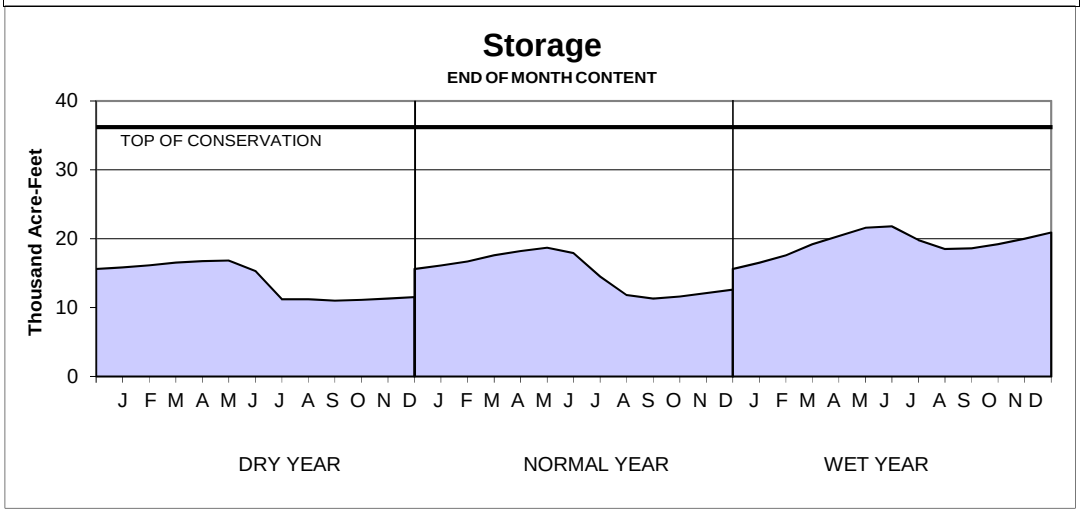


EXHIBIT 8B

HUGH BUTLER LAKE
2018 OPERATION PLAN





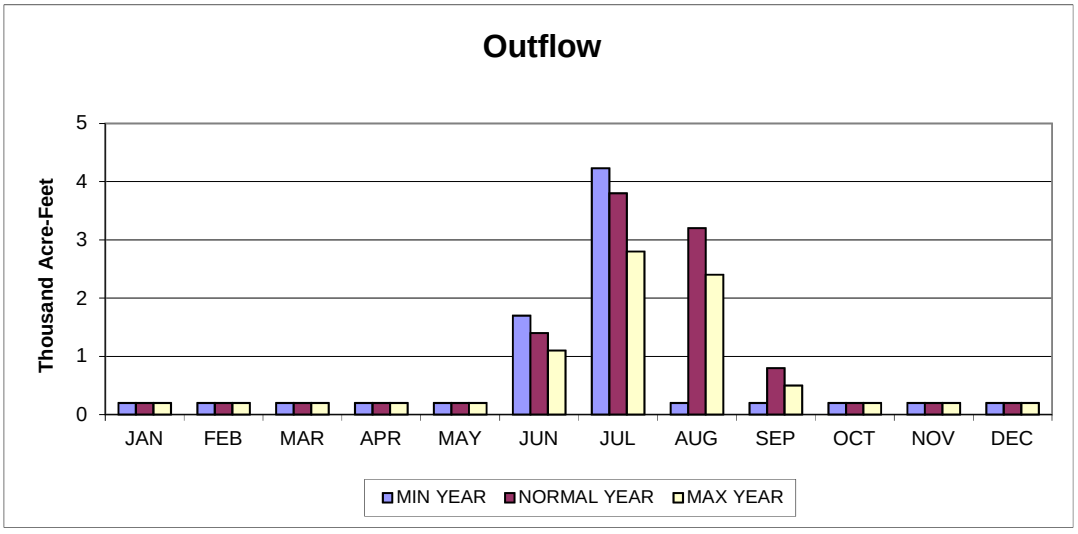
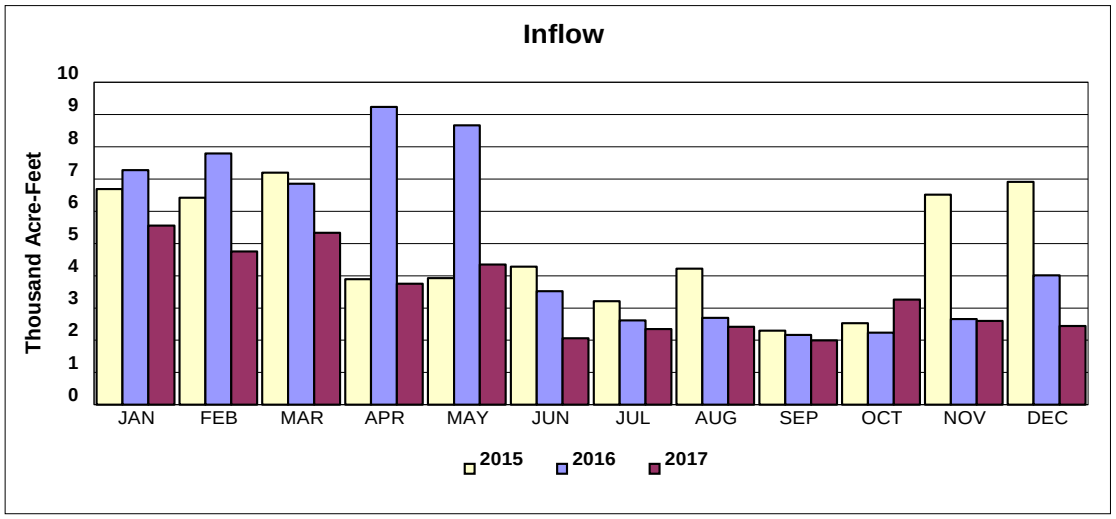
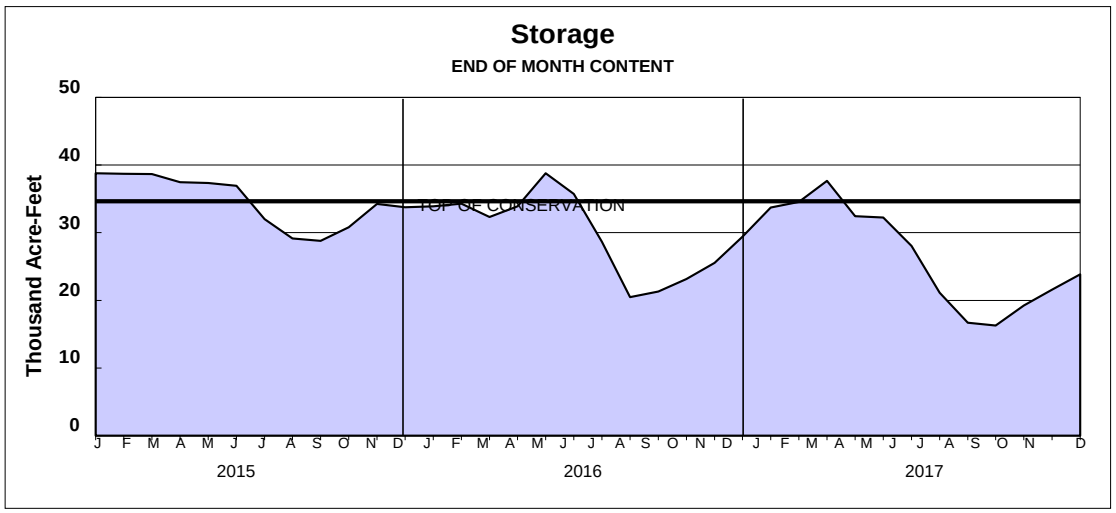


EXHIBIT 9A

HARRY STRUNK LAKE

ACTUAL OPERATION





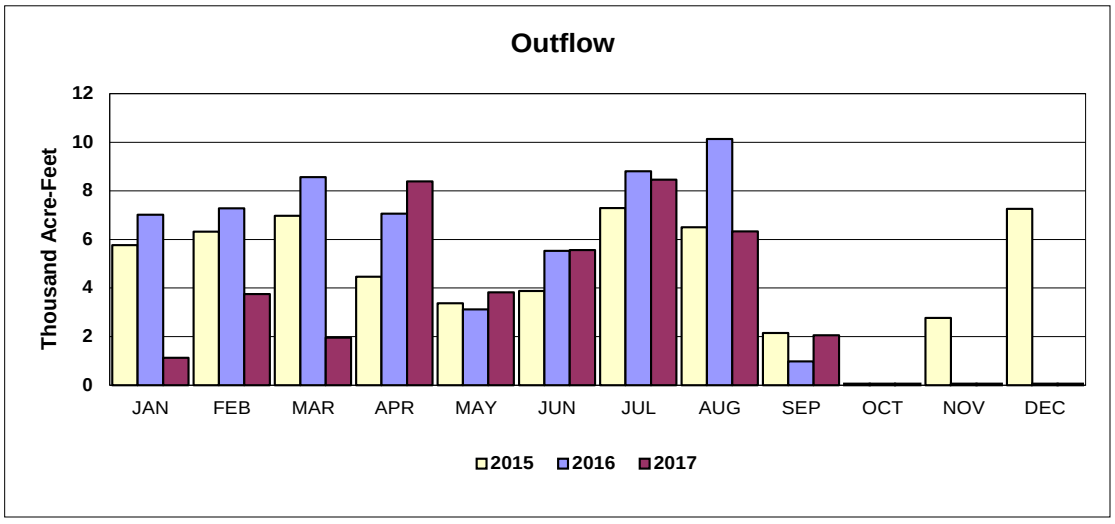
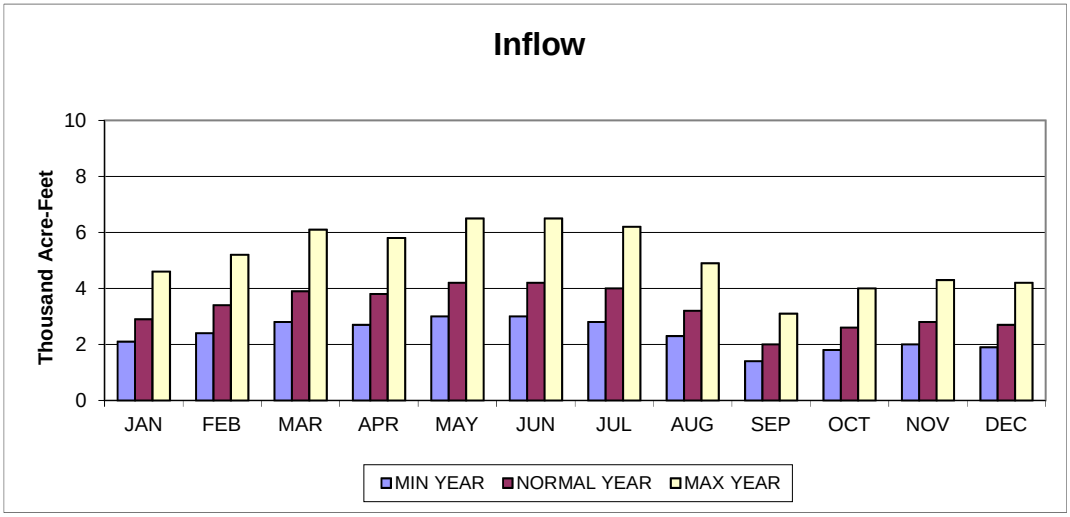
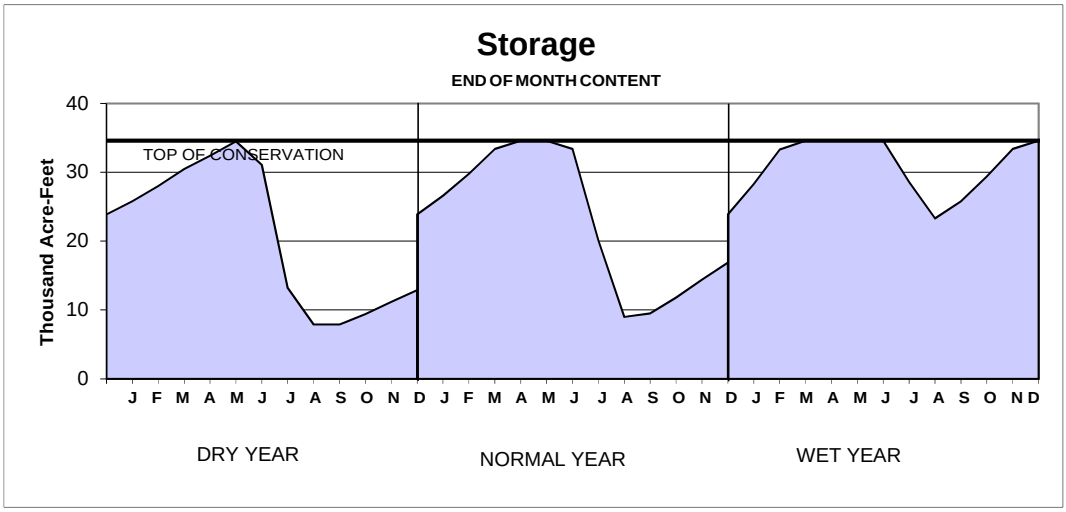


EXHIBIT 9B

HARRY STRUNK LAKE
2018 OPERATION PLAN





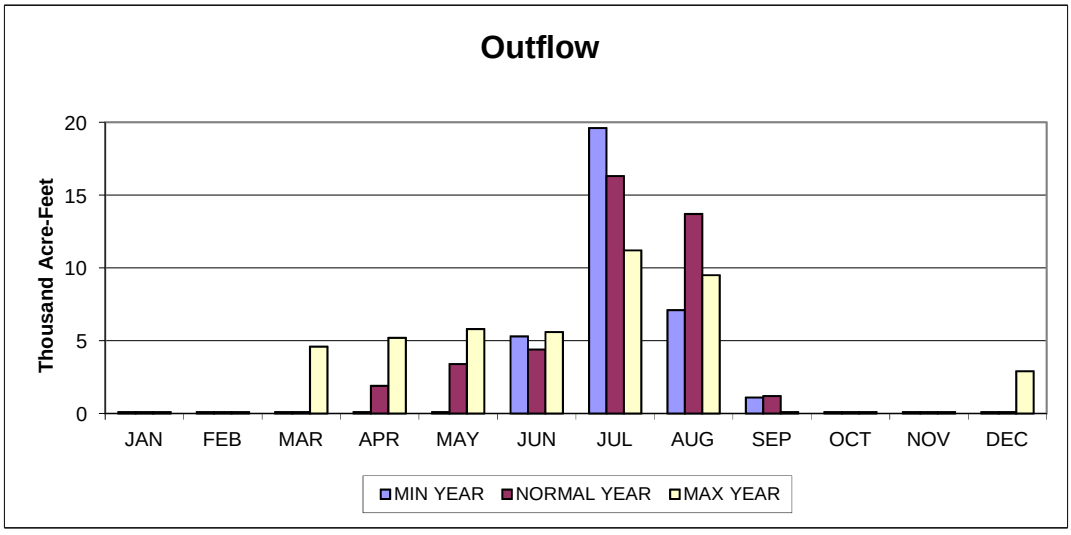
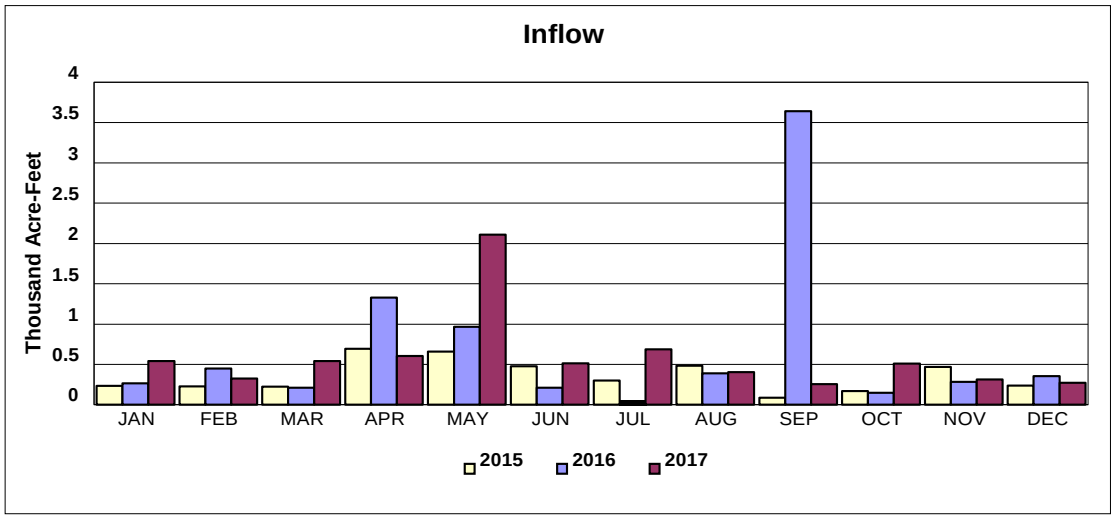
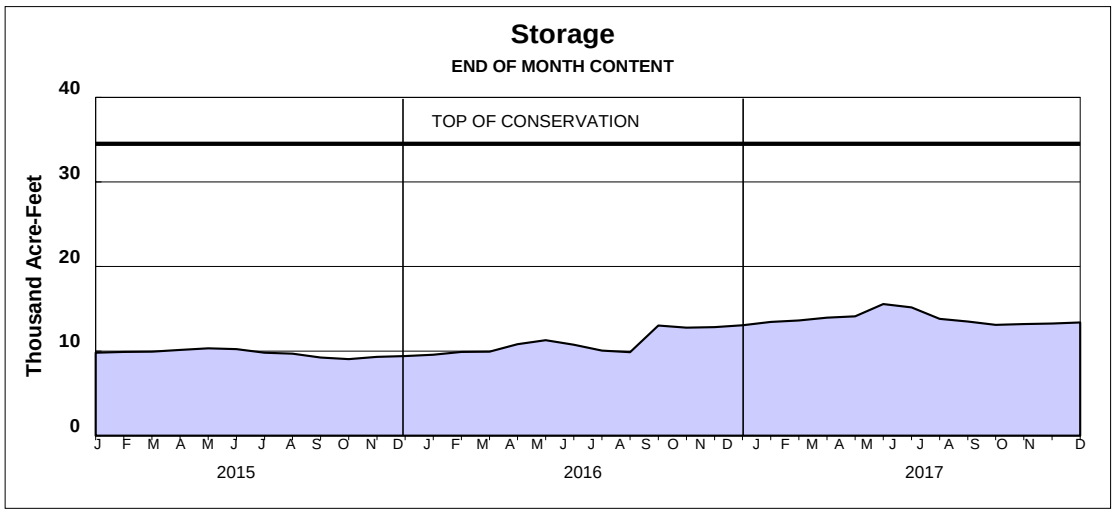


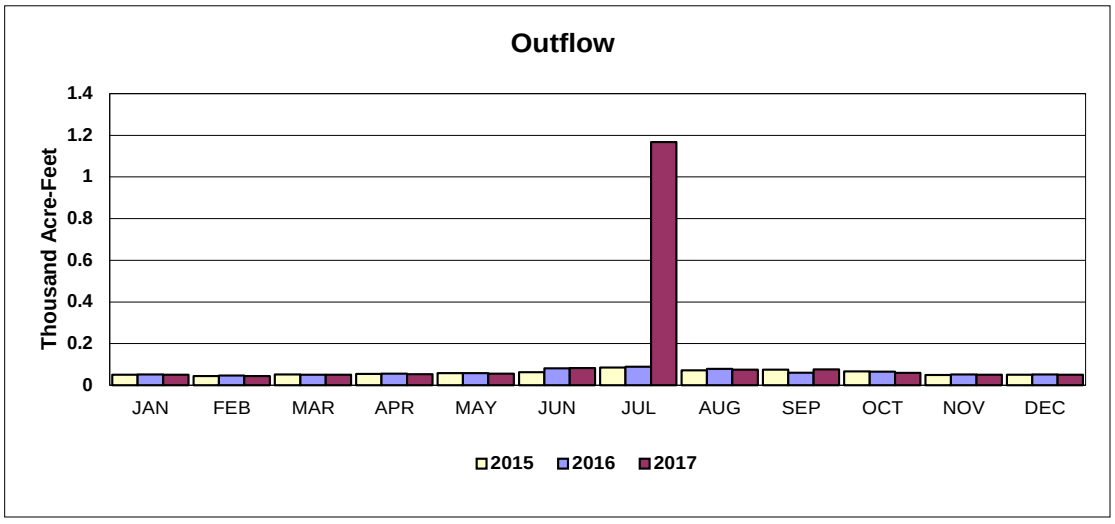
EXHIBIT 10A

KEITH SEBELIUS LAKE

ACTUAL OPERATION

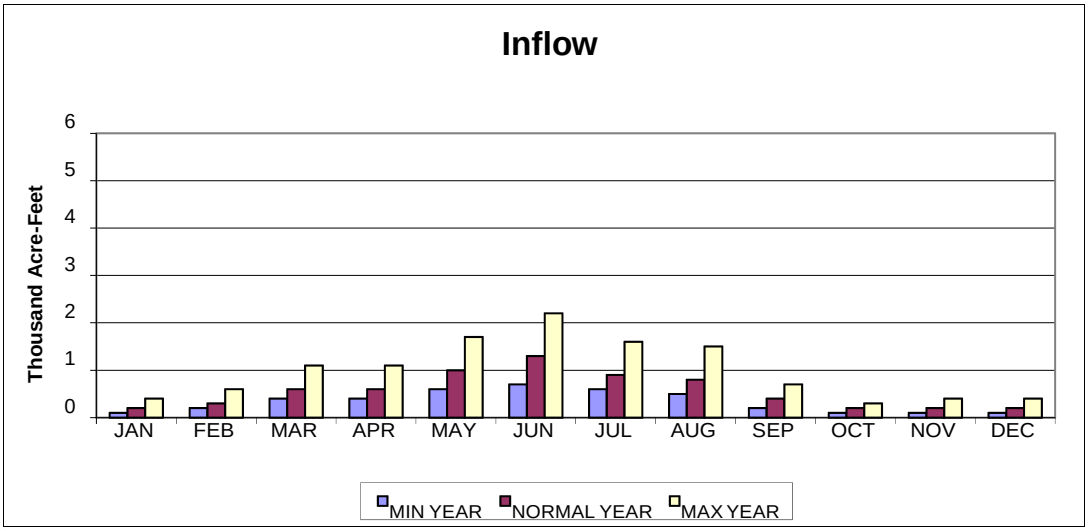


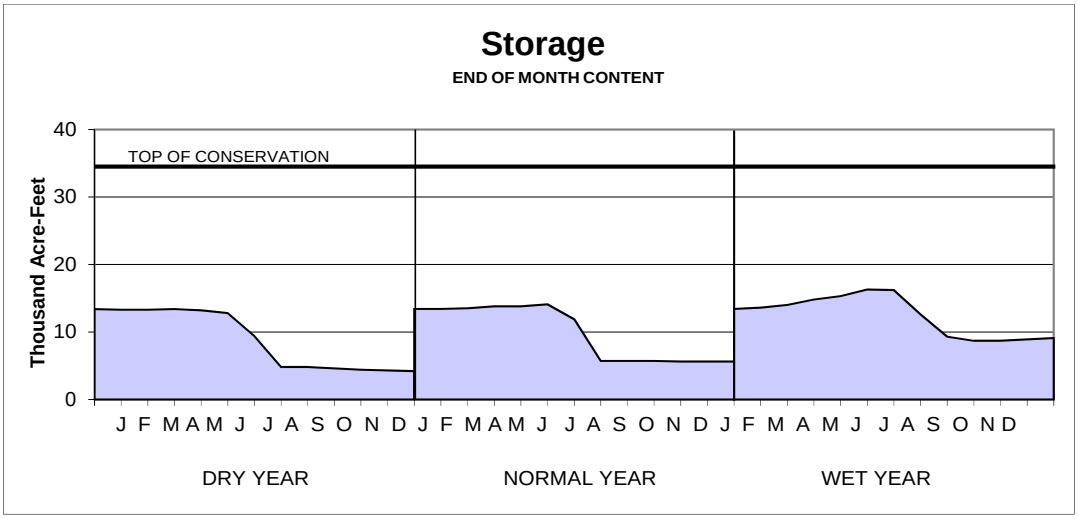




KEITH SEBELIUS LAKE

2018 OPERATION PLAN





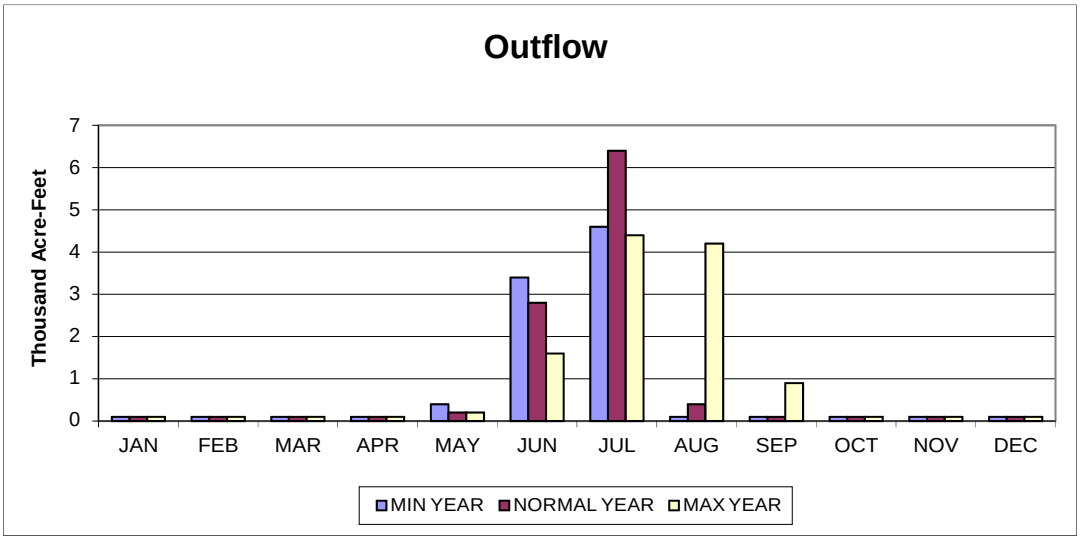
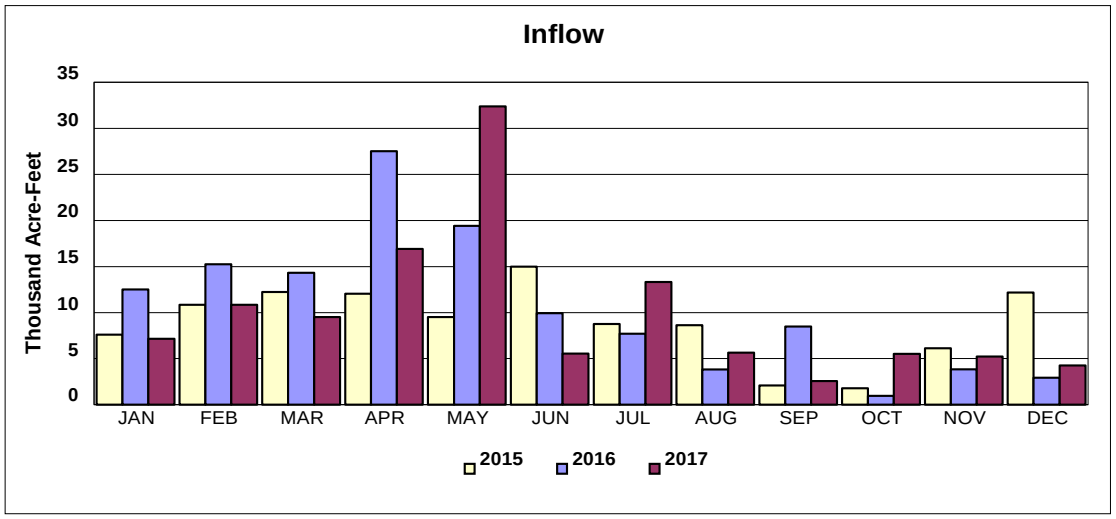
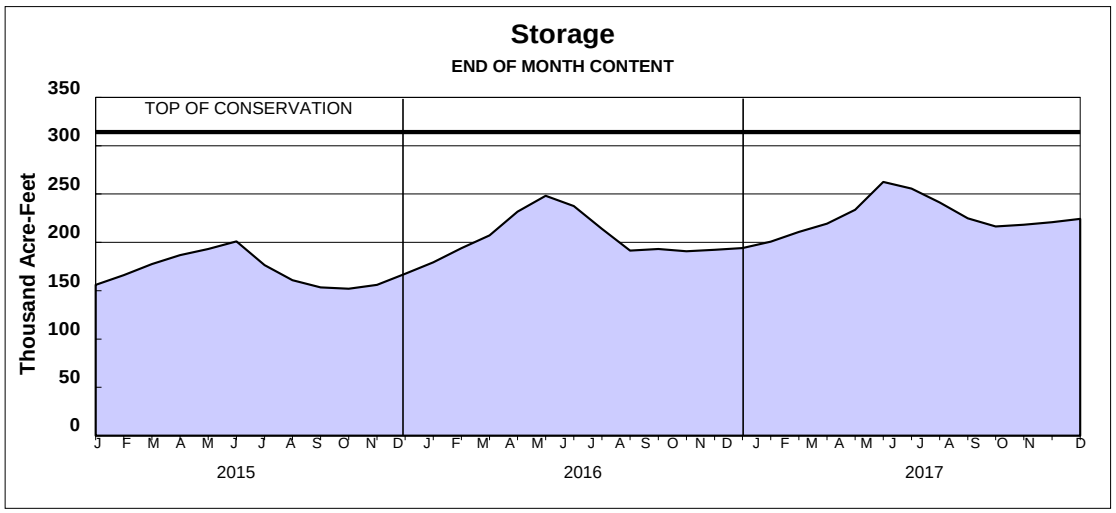


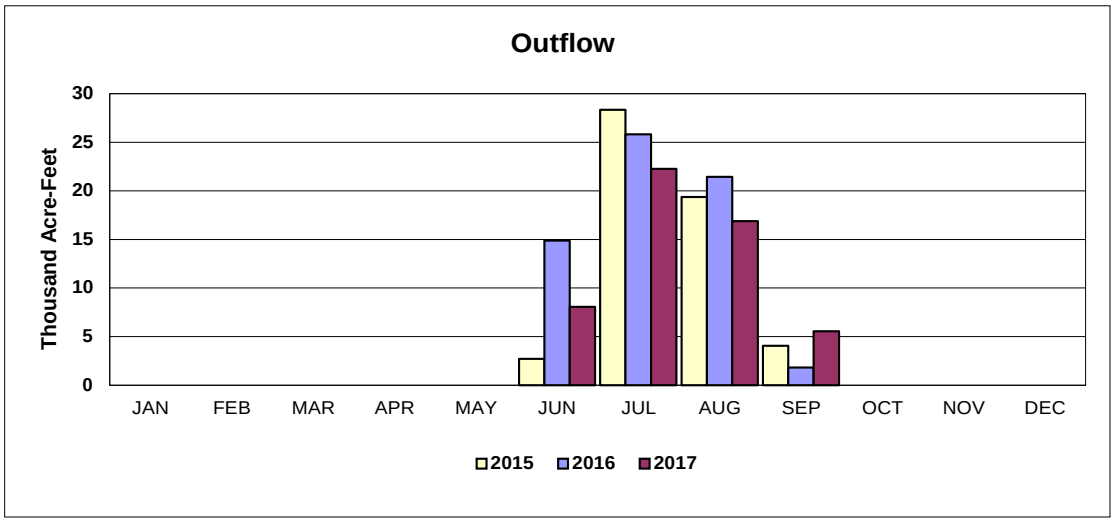
EXHIBIT 11A

HARLAN COUNTY LAKE

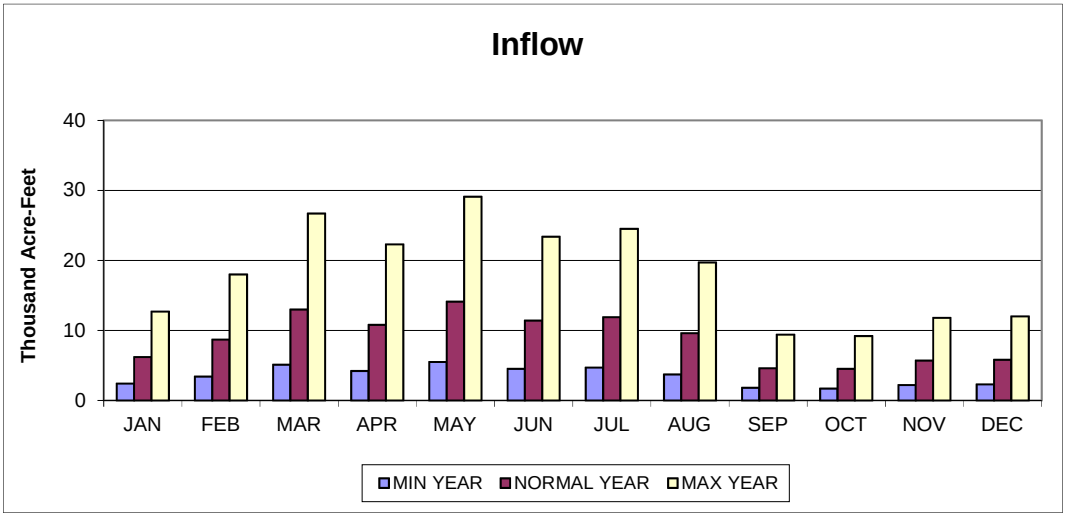
ACTUAL OPERATION

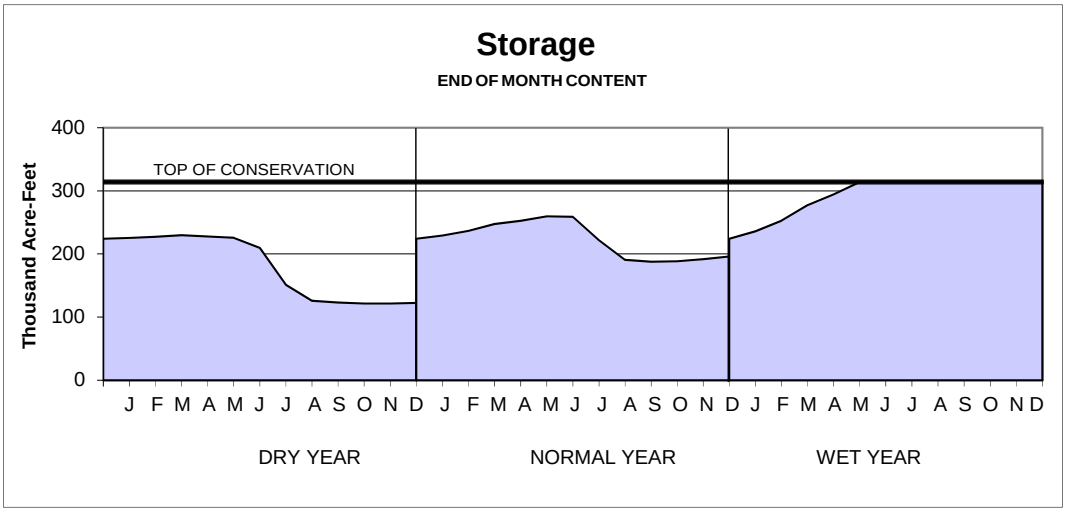






HARLAN COUNTY LAKE
2018 OPERATION PLAN





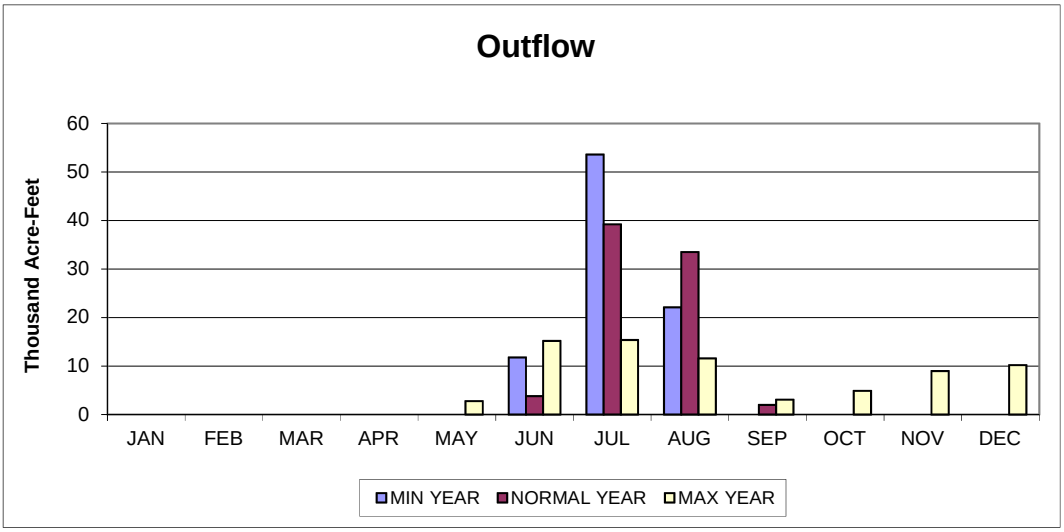
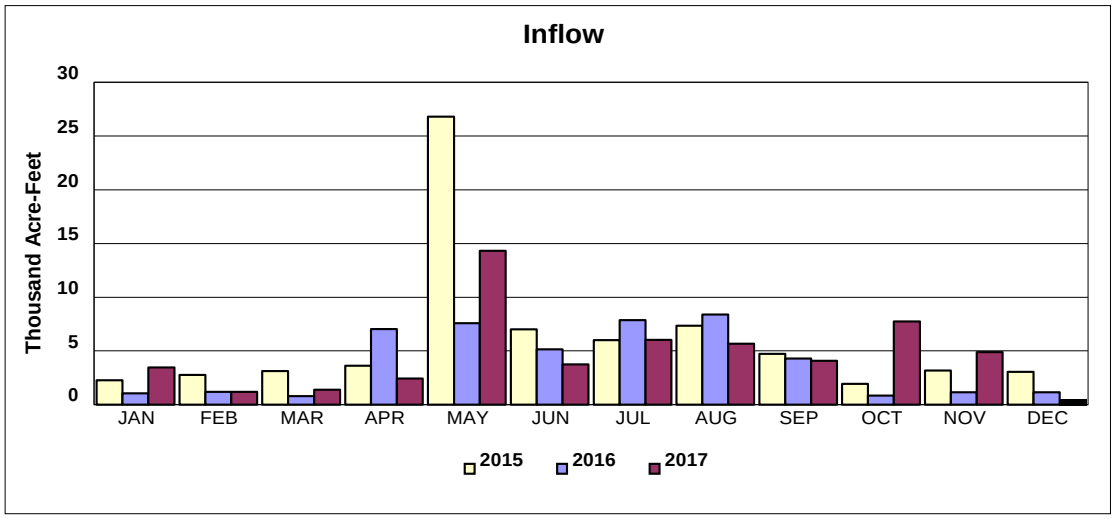
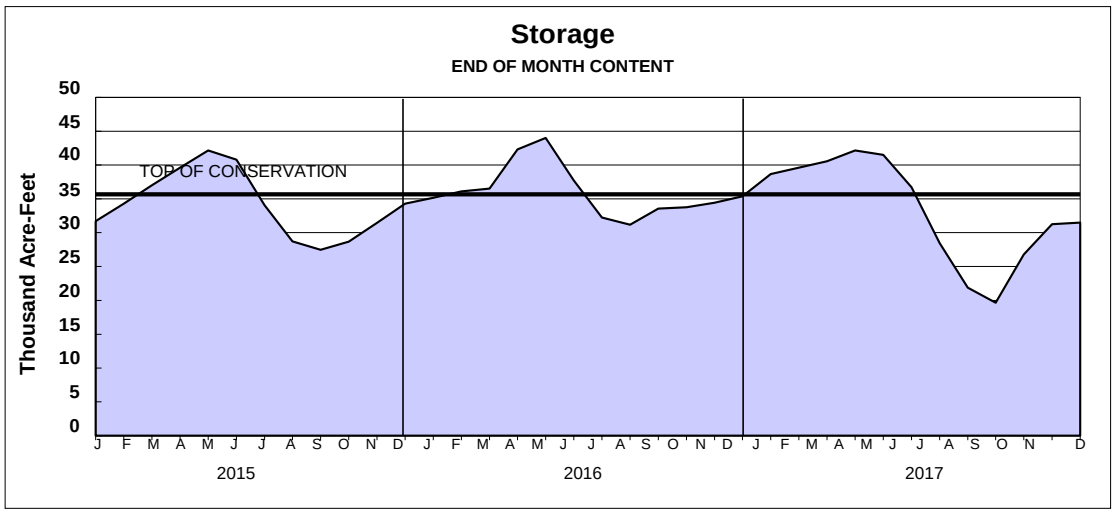


EXHIBIT 12A

LOVEWELL RESERVOIR

ACTUAL OPERATION





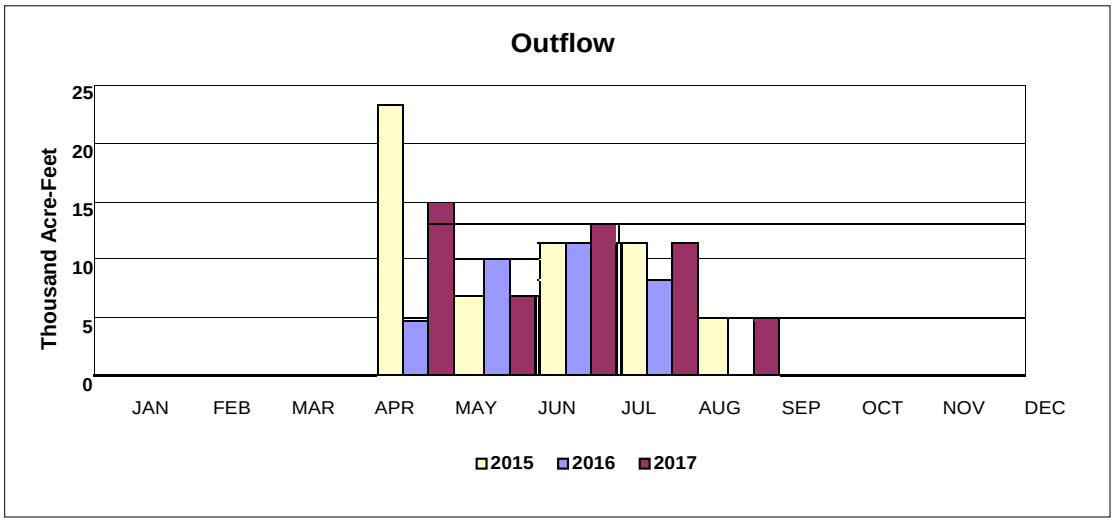
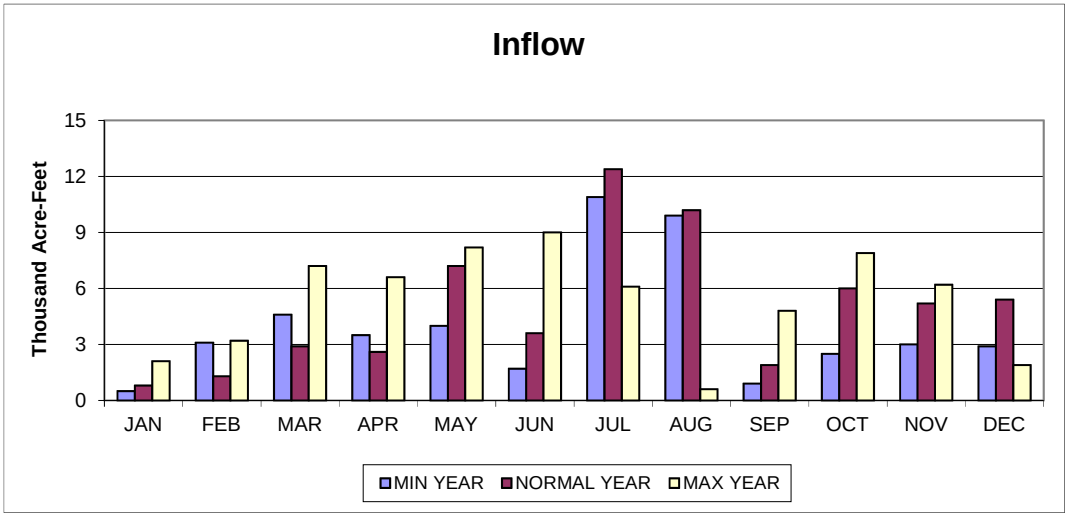
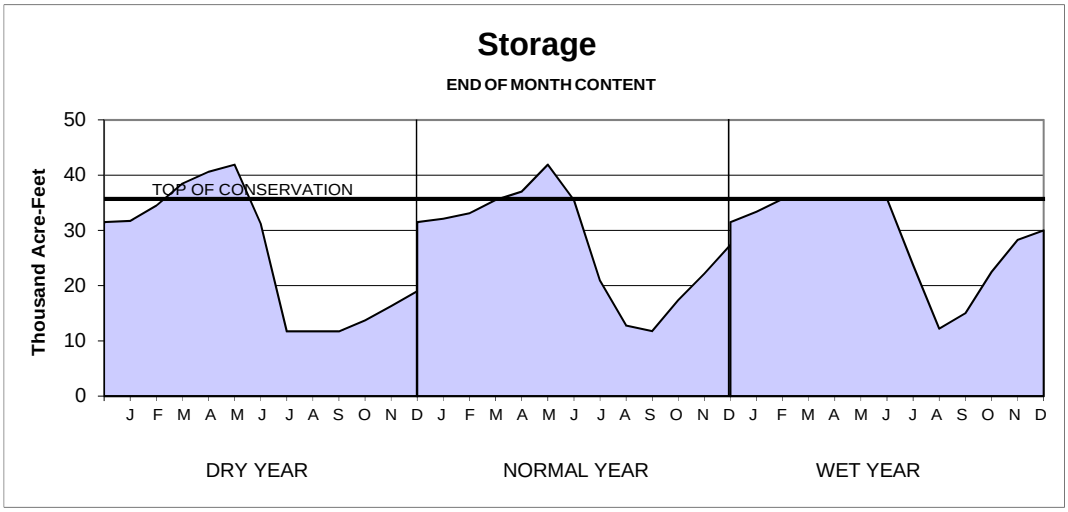


EXHIBIT 12B

LOVEWELL RESERVOIR
2018 OPERATION PLAN





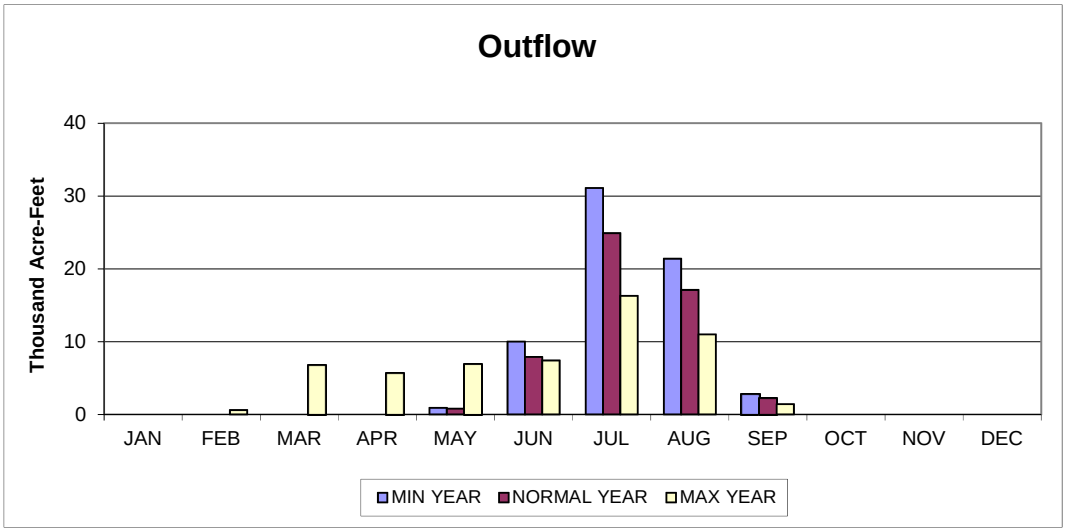
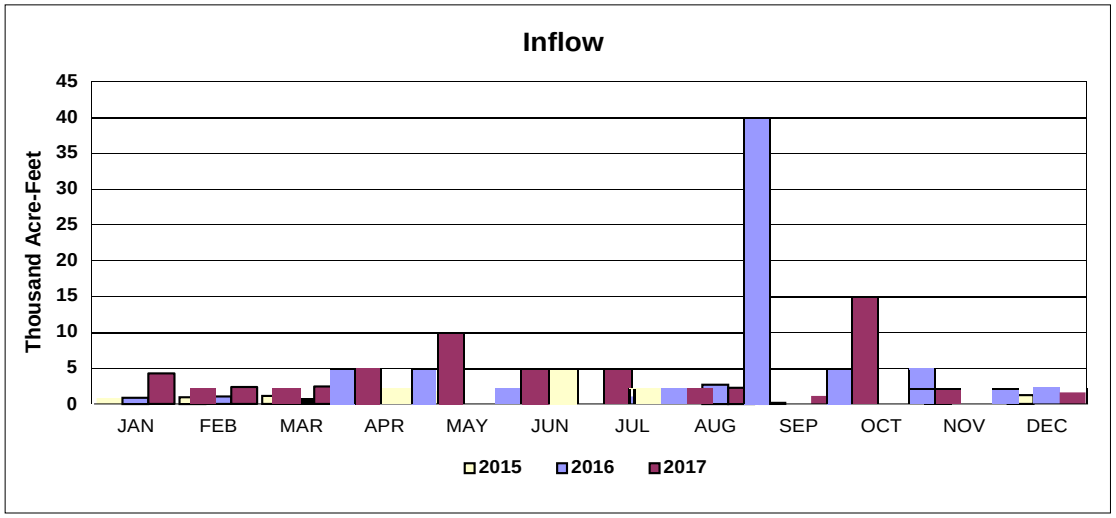
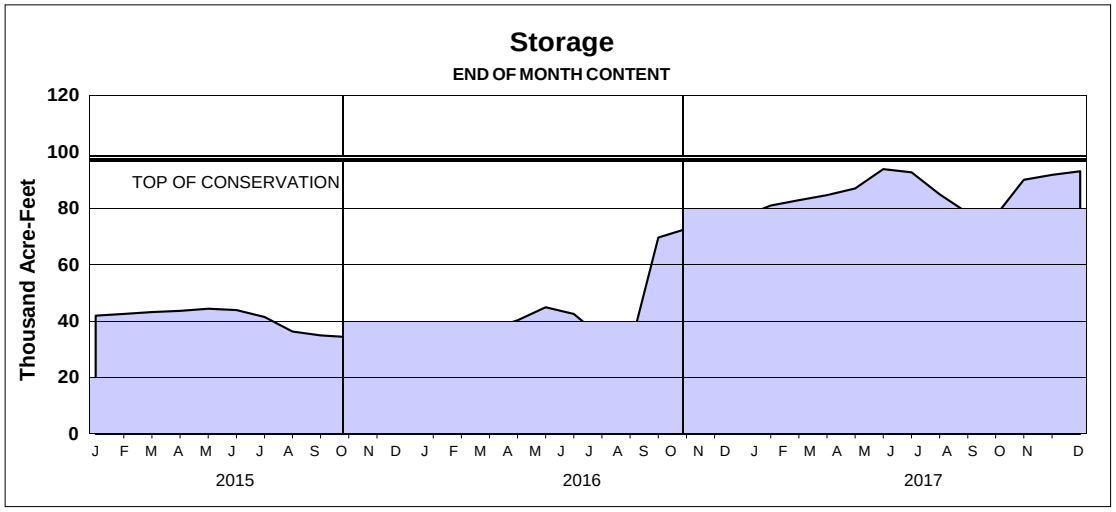


EXHIBIT 13A

KIRWIN RESERVOIR

ACTUAL OPERATION





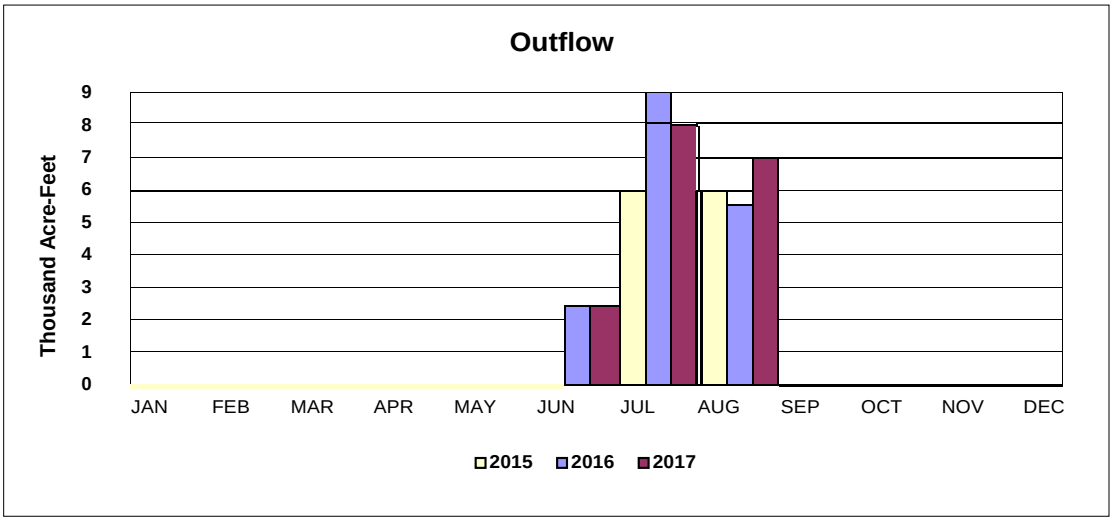
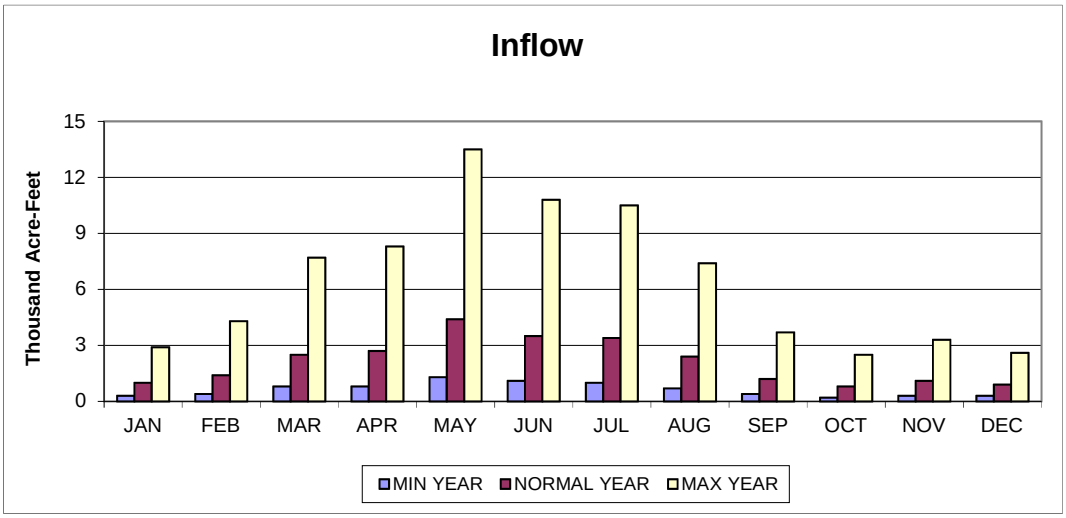
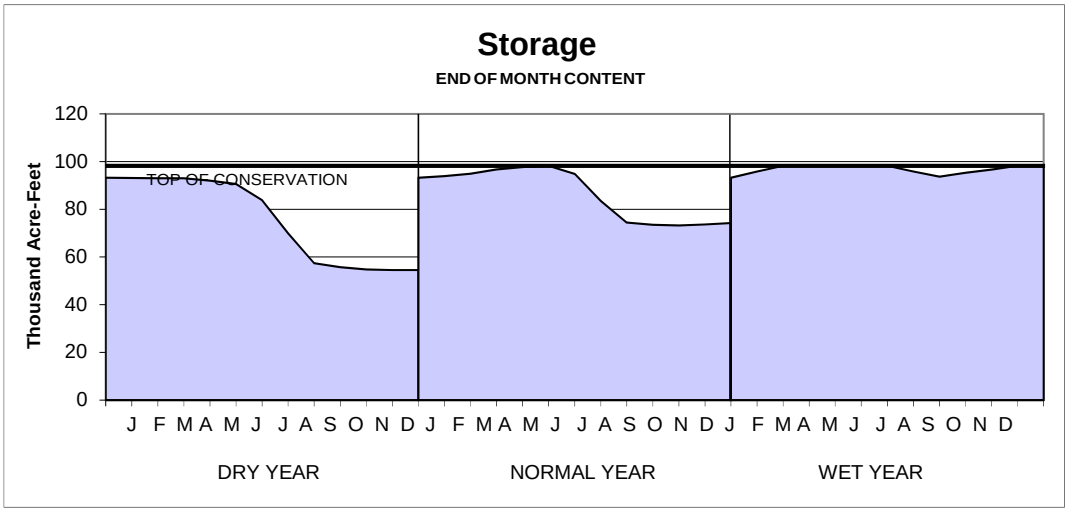


EXHIBIT 13B

KIRWIN RESERVOIR
2018 OPERATION PLAN





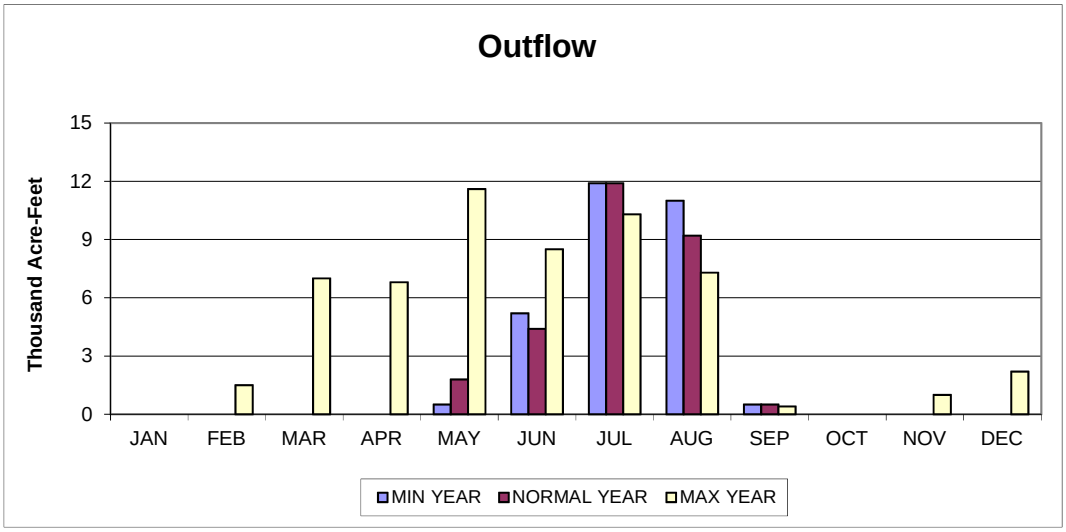
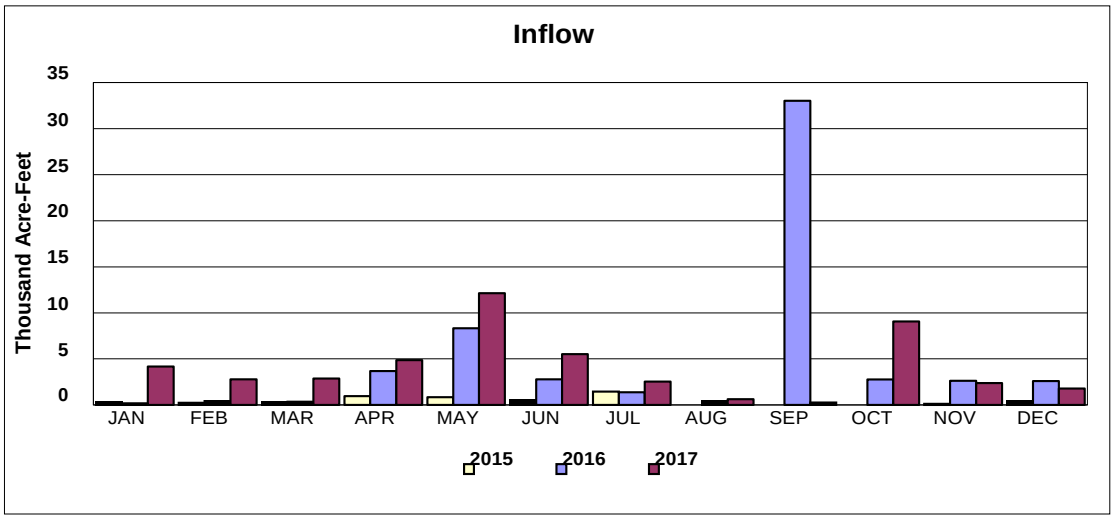
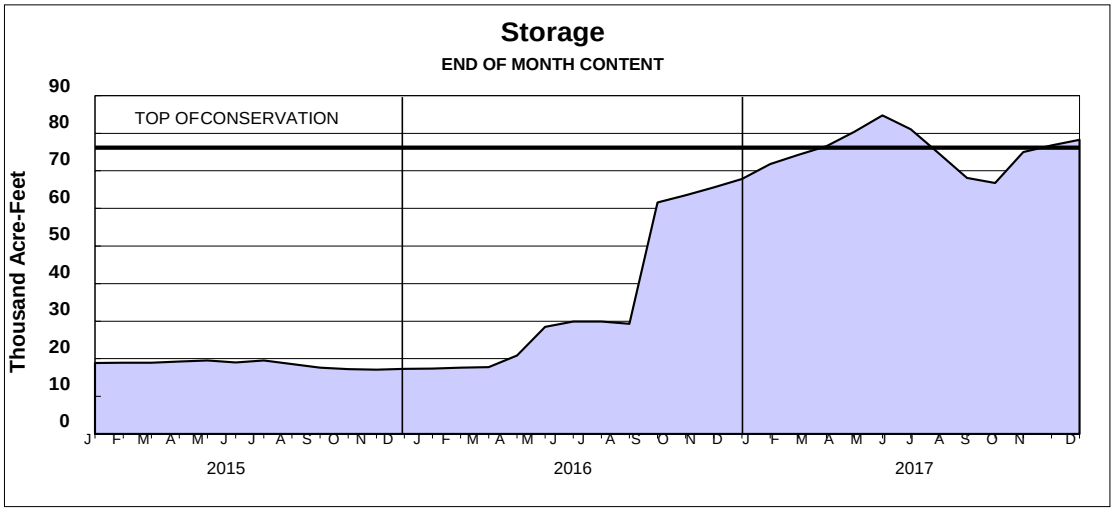


EXHIBIT 14A

WEBSTER RESERVOIR

ACTUAL OPERATION





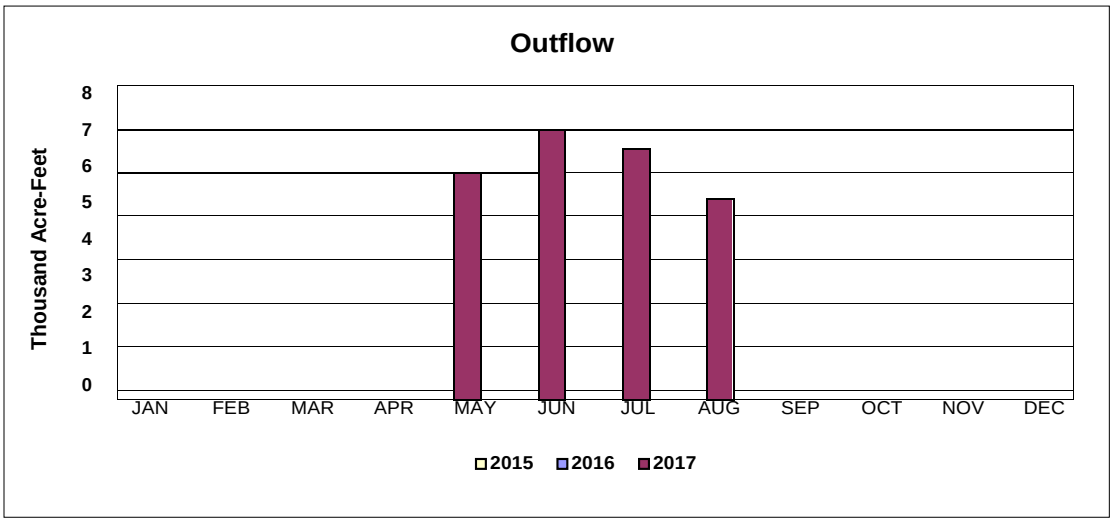
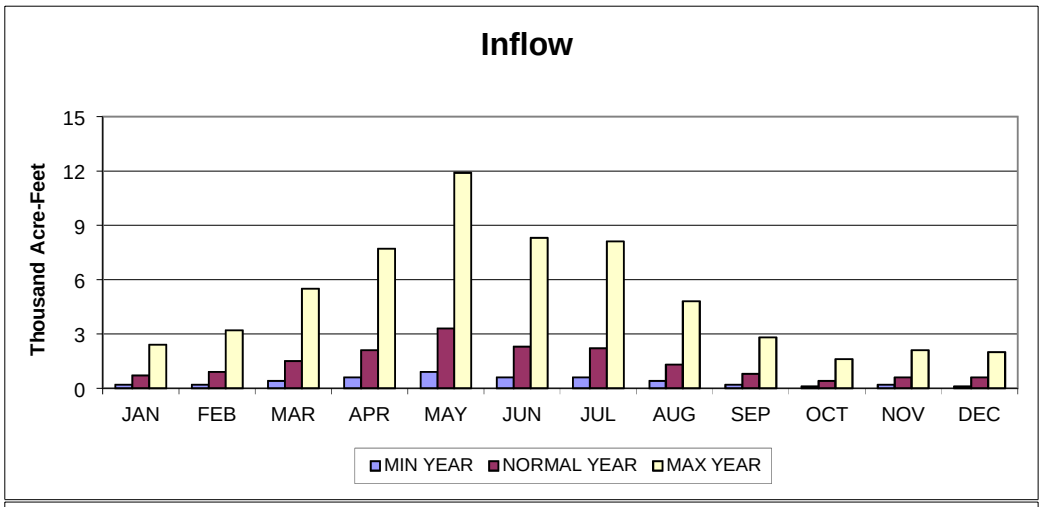
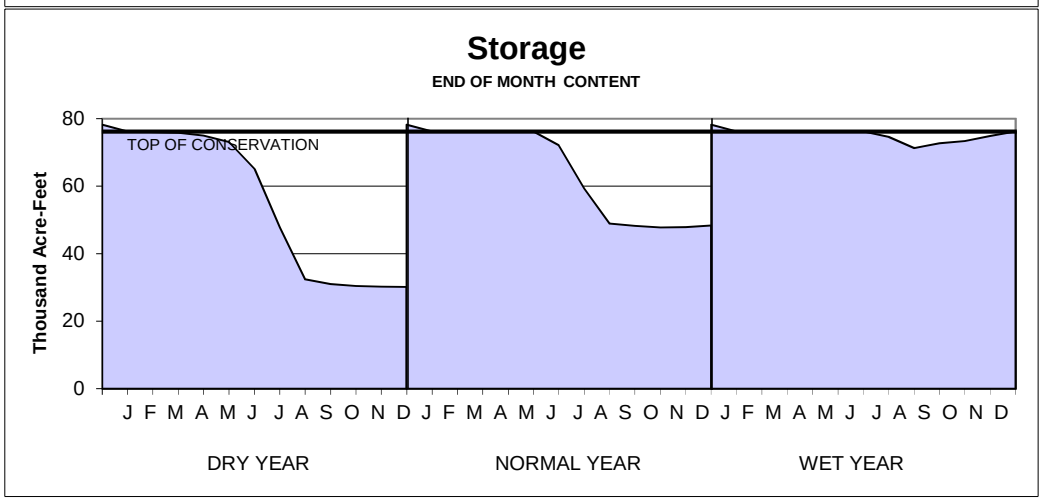


EXHIBIT 14B

WEBSTER RESERVOIR
2018 OPERATION PLAN





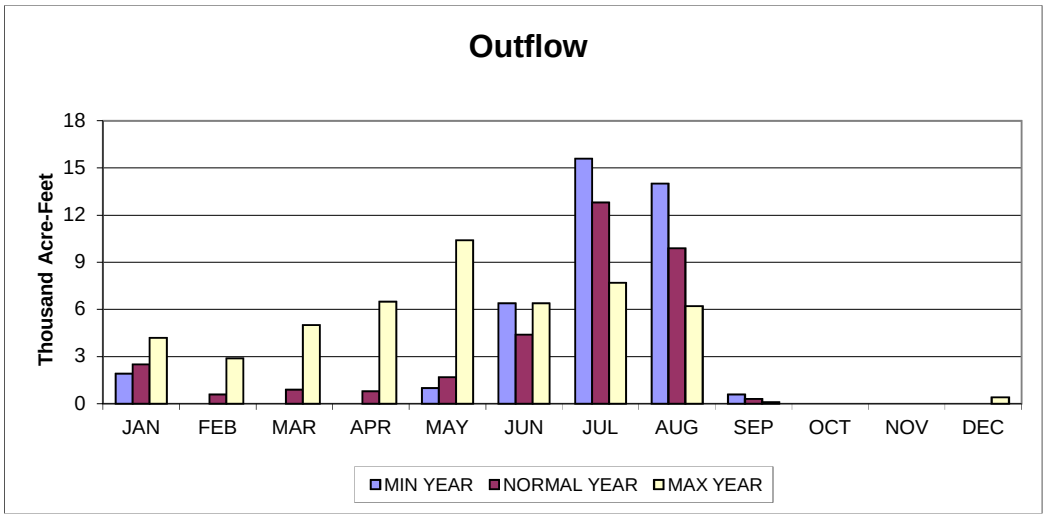
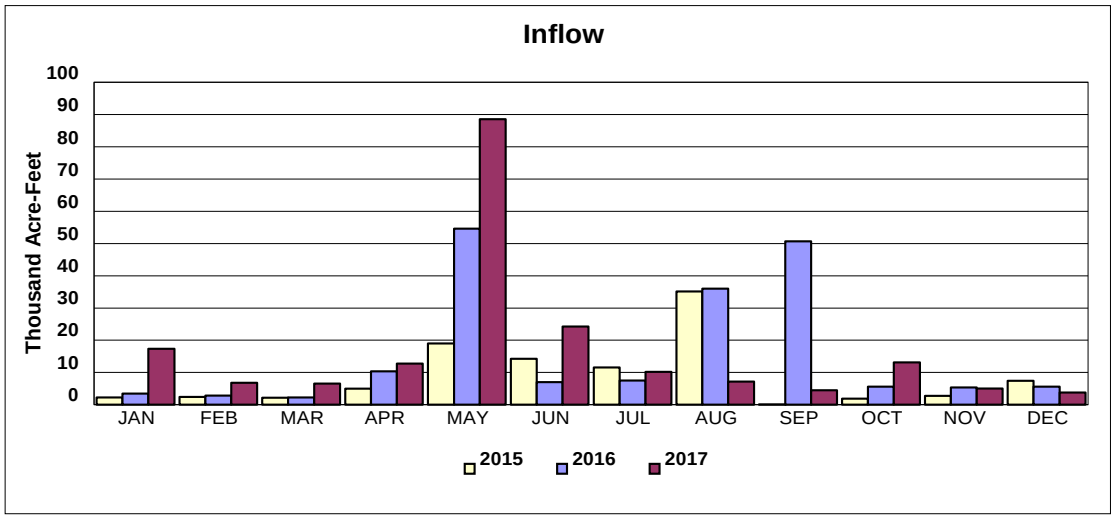
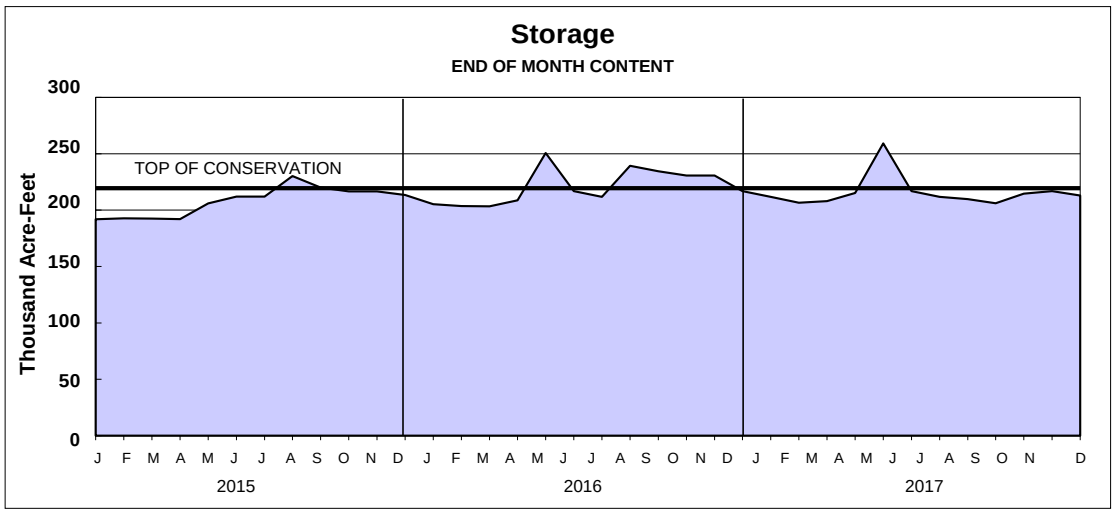


EXHIBIT 15A

WACONDA LAKE

ACTUAL OPERATION





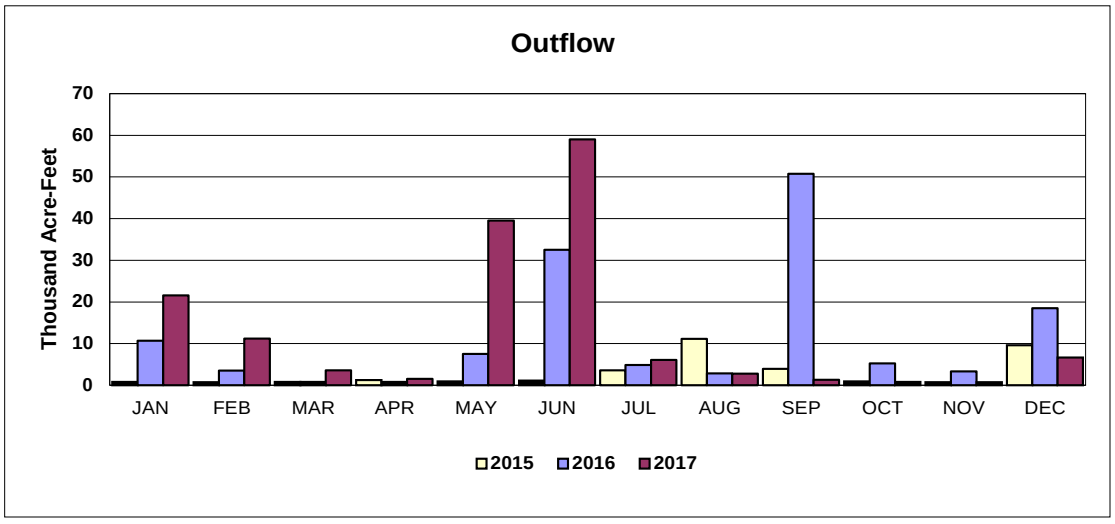
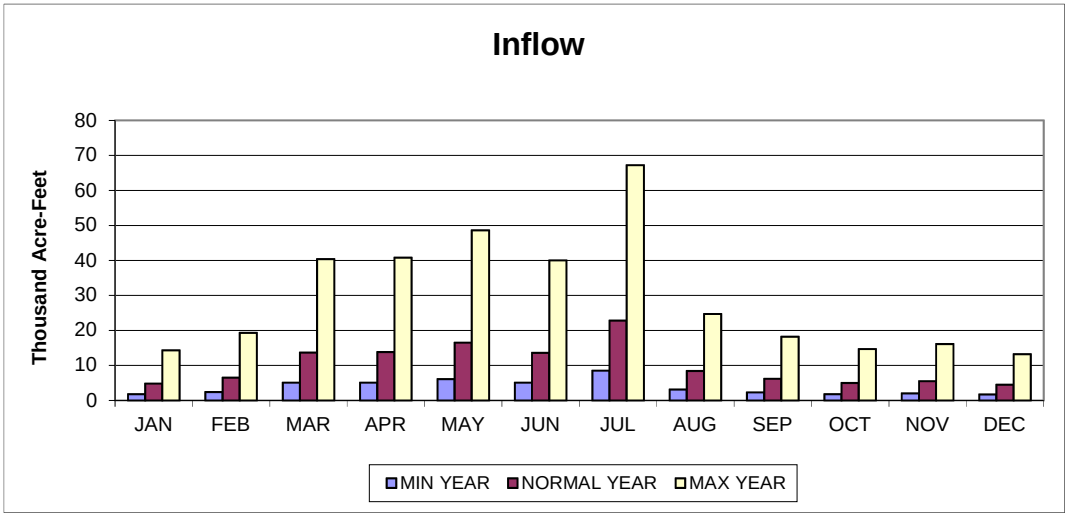
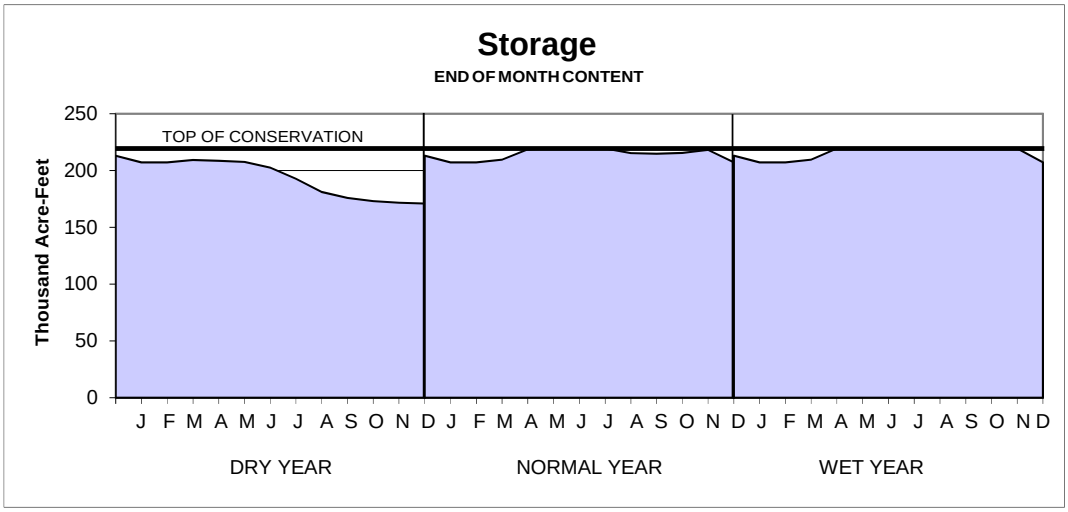


EXHIBIT 15B

WACONDA LAKE
2018 OPERATION PLAN





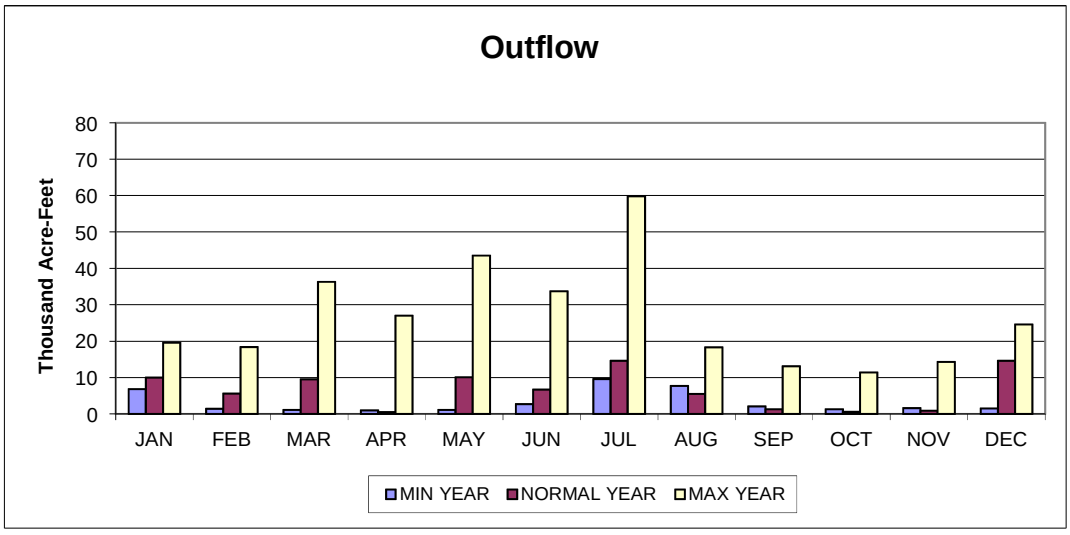
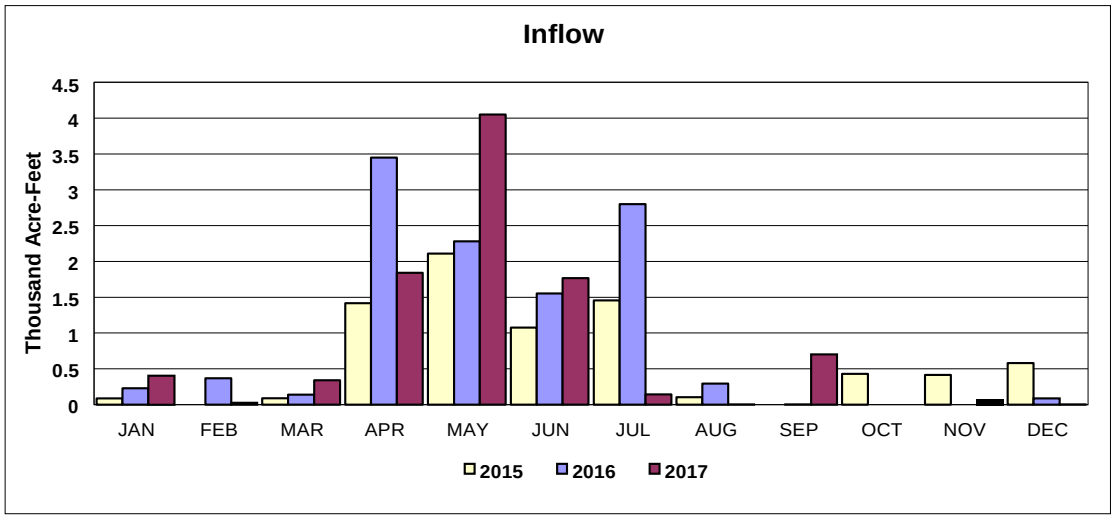
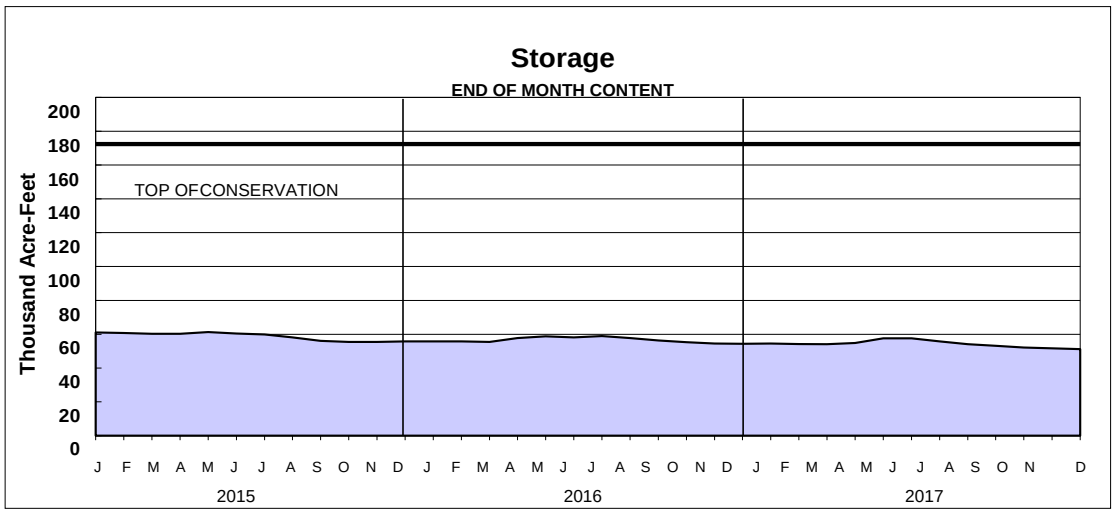


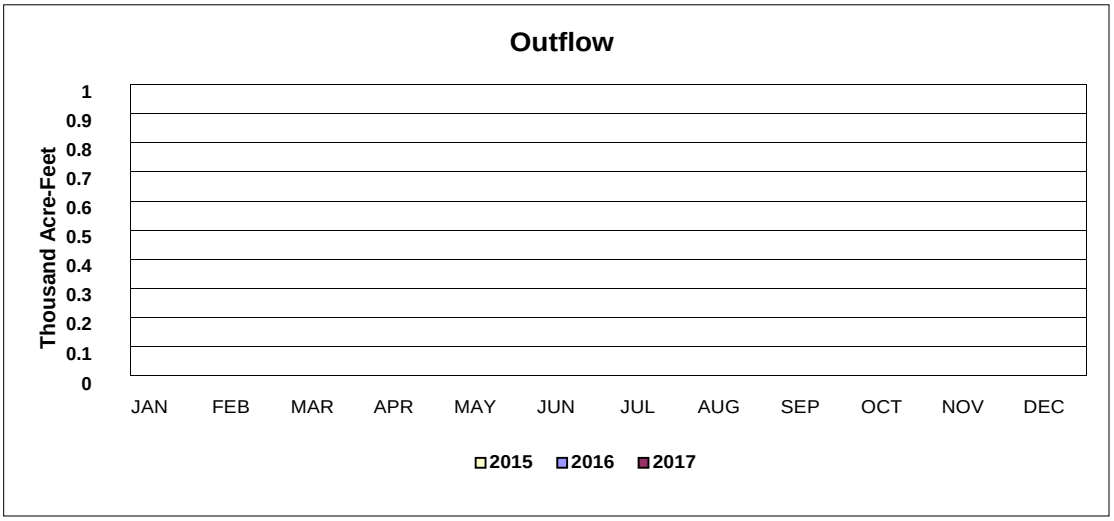
EXHIBIT 16A

CEDAR BLUFF RESERVOIR

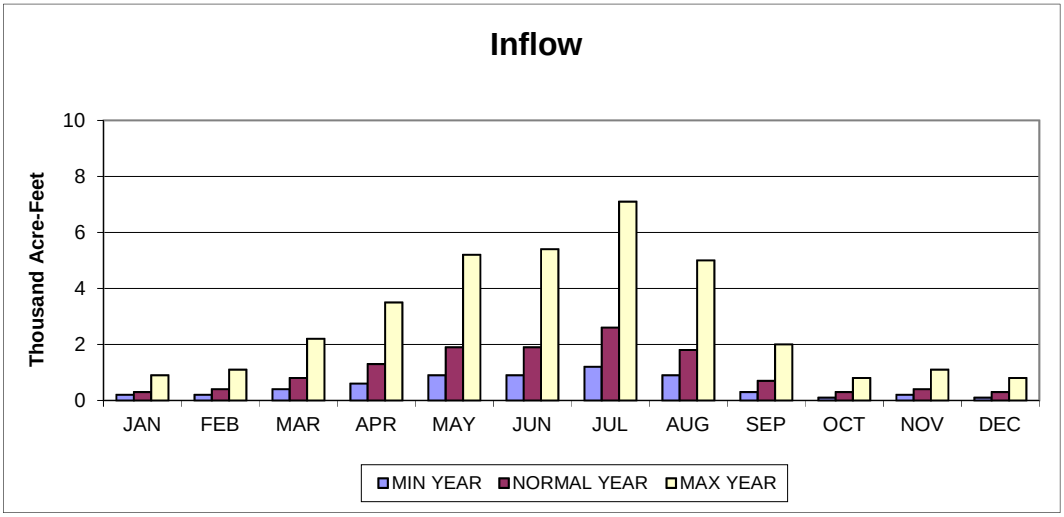
ACTUAL OPERATION

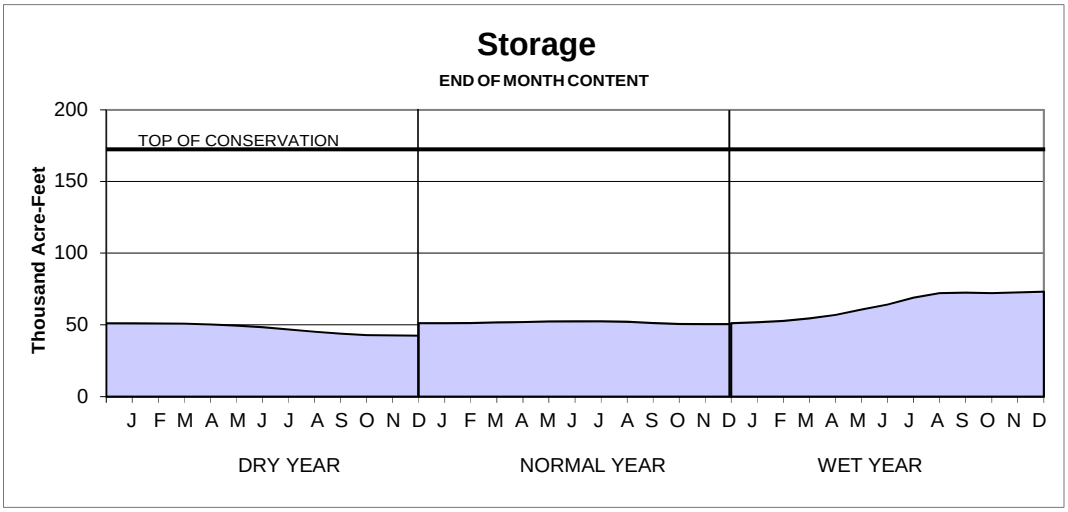






CEDAR BLUFF RESERVOIR
2018 OPERATION PLAN





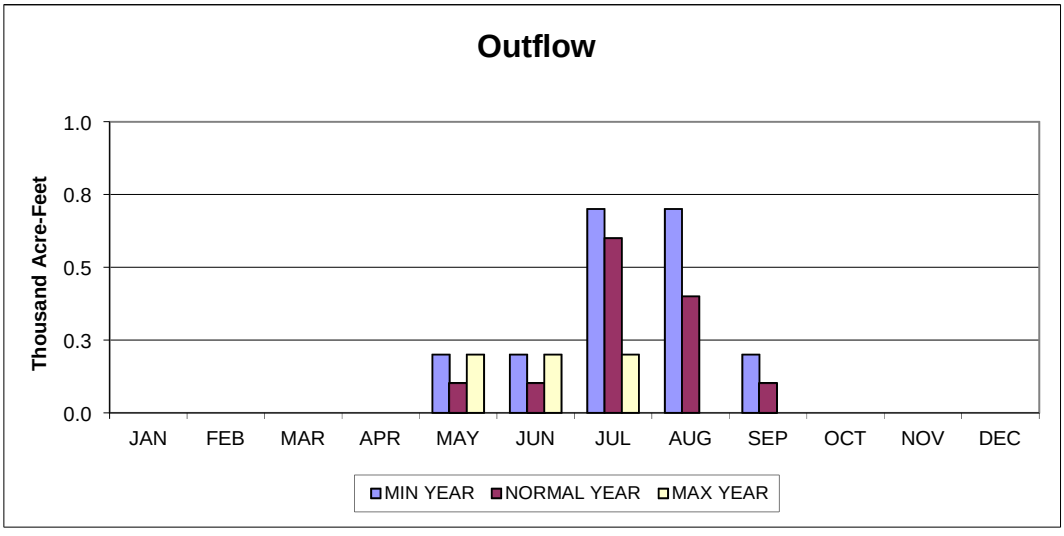
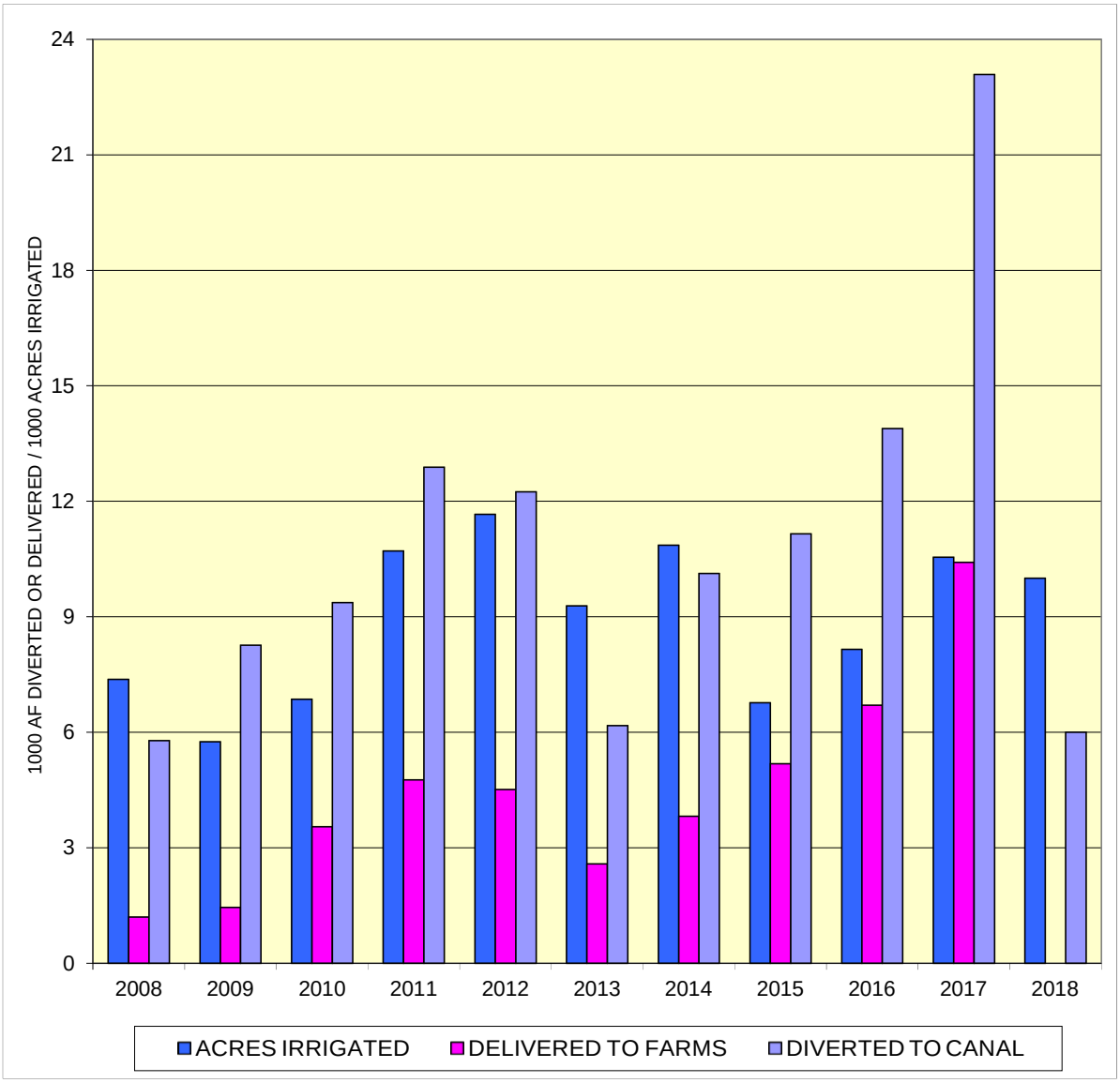


EXHIBIT 17

MIRAGE FLATS IRRIGATION DISTRICT

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



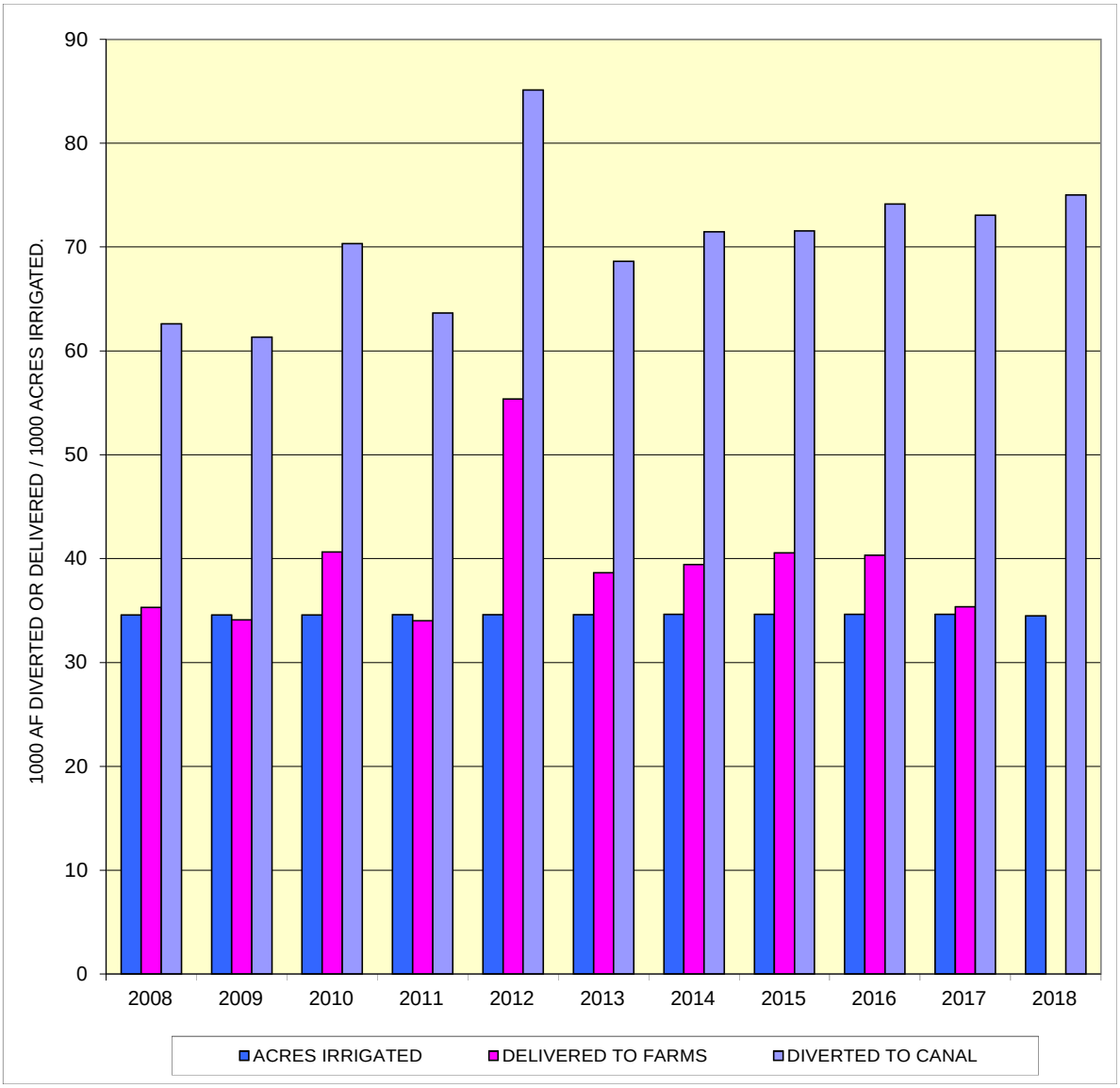
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
DIVERTED af/acre	0.78	1.44	1.37	1.20	1.05	0.66	0.93	1.65	1.70	2.19
DELIVERED af/acre	0.16	0.25	0.52	0.44	0.39	0.28	0.35	0.77	0.82	0.99
EFFICIENCY	21%	18%	38%	37%	37%	42%	38%	46%	48%	45%

FORECASTED SHORTAGES (2018) DRY
YEAR 30,200 AF
NORMAL YEAR 23,500 AF
WET YEAR 12,400 AF

EXHIBIT 18

AINSWORTH IRRIGATION DISTRICT

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



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
DIVERTED af/acre	1.81	1.77	2.03	1.84	2.46	1.98	2.06	2.07	2.14	2.11
DELIVERED af/acre	1.02	0.99	1.18	0.98	1.60	1.12	1.14	1.17	1.16	1.02
EFFICIENCY	56%	56%	58%	53%	65%	56%	55%	57%	54%	48%

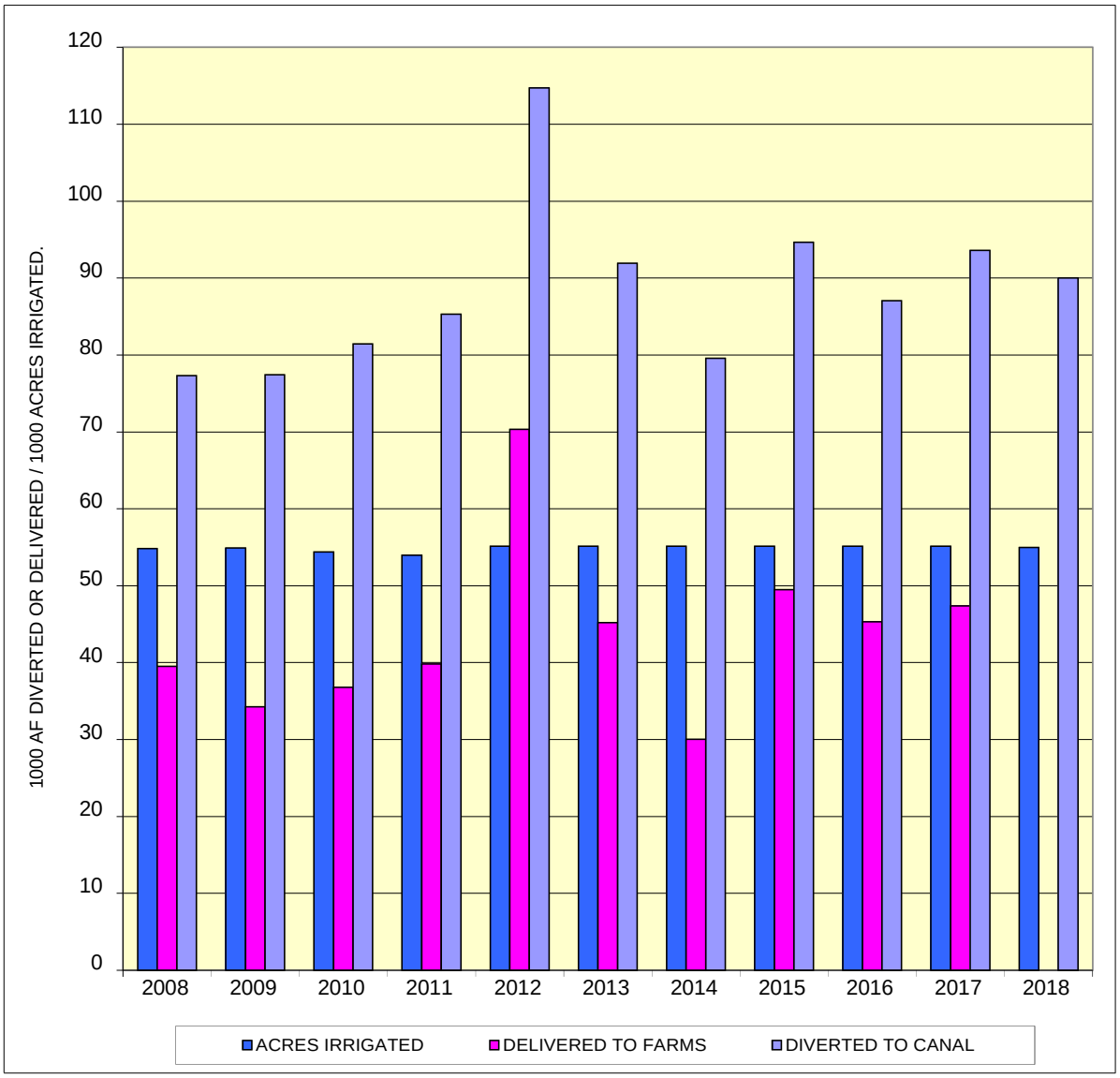
FORECASTED SHORTAGES (2018)

DRY YEAR	0 AF
NORMAL YEAR	0 AF
WET YEAR	0 AF

EXHIBIT 19

TWIN LOUPS IRRIGATION DISTRICT

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



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
DIVERTED af/acre	1.41	1.41	1.50	1.58	2.08	1.67	1.44	1.72	1.58	1.70
DELIVERED af/acre	0.72	0.62	0.68	0.74	1.28	0.82	0.54	0.90	0.82	0.86
EFFICIENCY	51%	44%	45%	47%	61%	49%	38%	52%	52%	51%

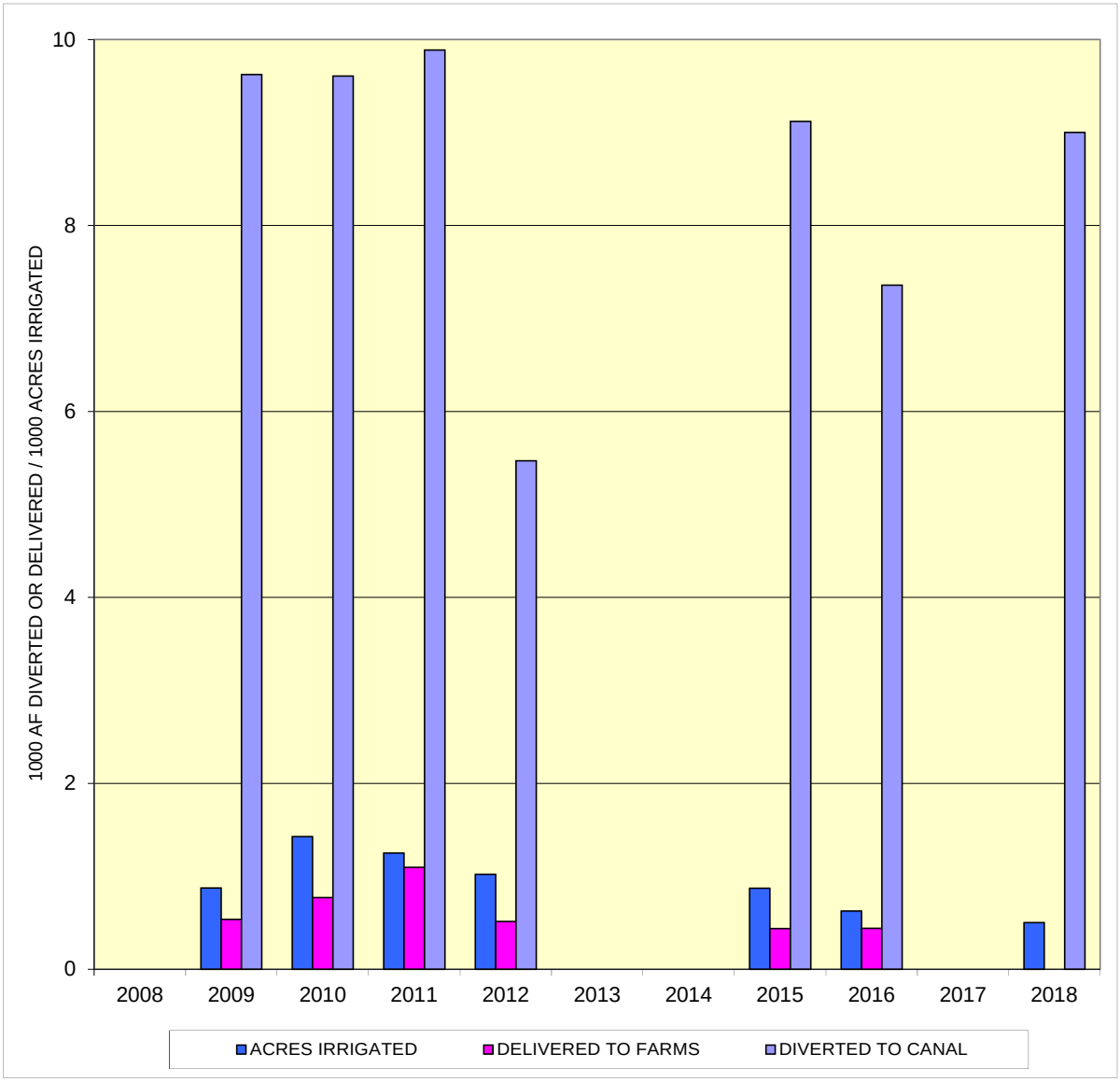
FORECASTED SHORTAGES (2018)

DRY YEAR	0 AF
NORMAL YEAR	0 AF
WET YEAR	0 AF

EXHIBIT 20

FRENCHMAN VALLEY IRRIGATION DISTRICT

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



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
DIVERTED af/acre	0.00	11.01	6.74	7.91	5.36	0.00	0.00	10.47	11.78	0.00
DELIVERED af/acre	0.00	0.61	0.54	0.88	0.50	0.00	0.00	0.50	0.70	0.00
EFFICIENCY	0%	6%	8%	11%	9%	0%	0%	5%	6%	0%

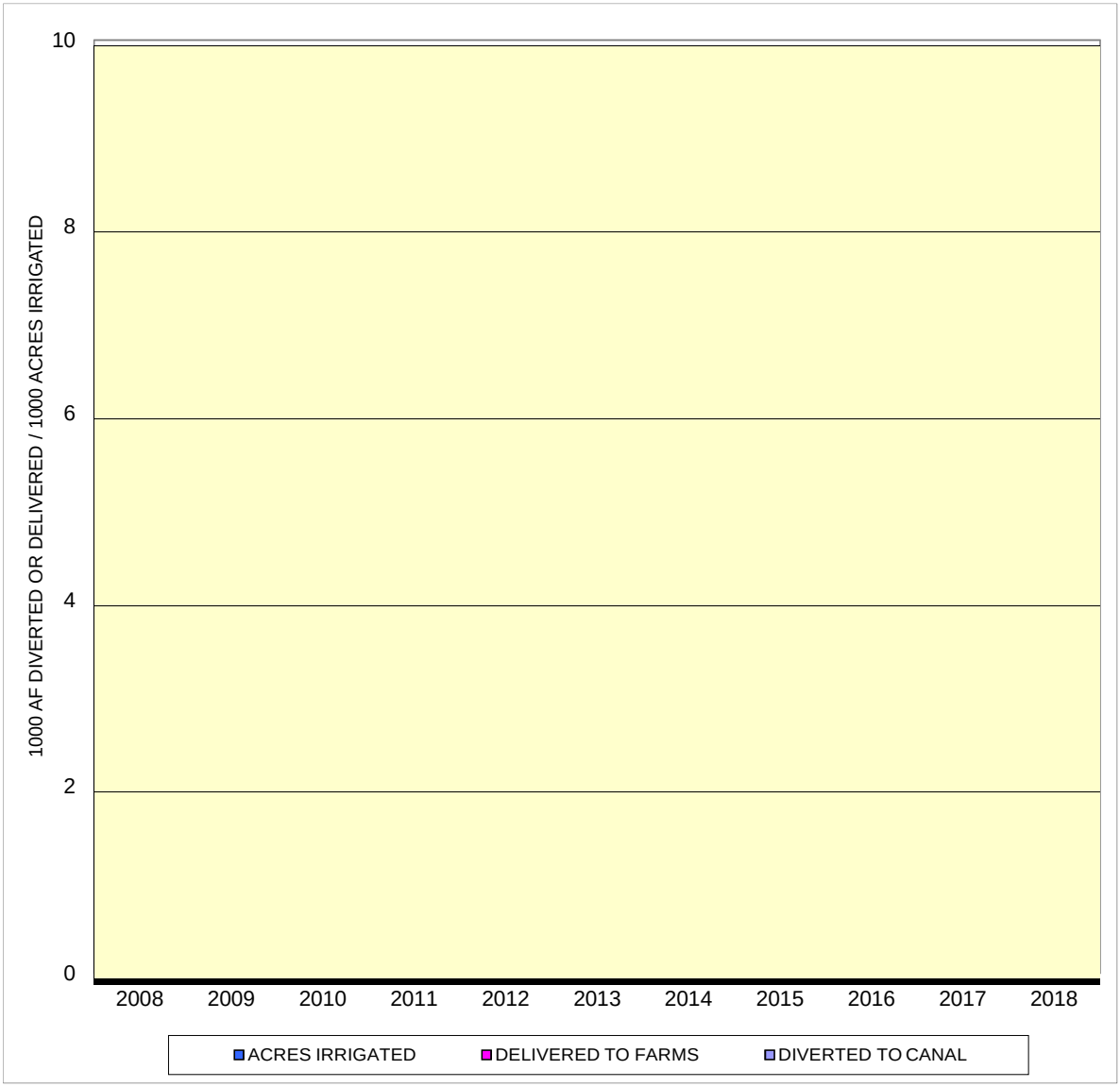
FORECASTED SHORTAGES (2018)

DRY YEAR	34,200 AF
NORMAL YEAR	26,900 AF
WET YEAR	12,800 AF

EXHIBIT 21

H & RW IRRIGATION DISTRICT

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



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
DIVERTED af/acre	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DELIVERED af/acre	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EFFICIENCY	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

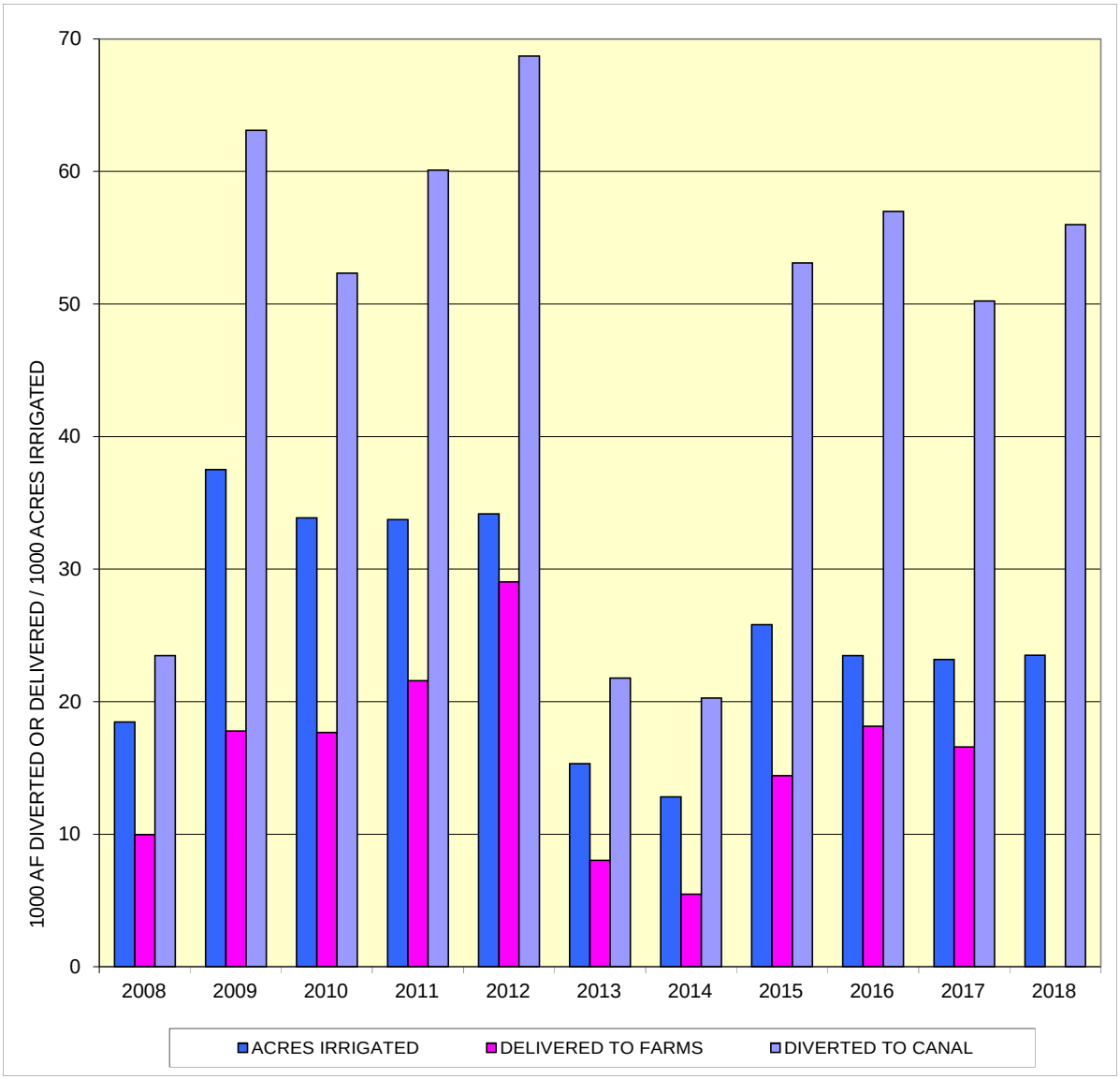
FORECASTED SHORTAGES (2018)

DRY YEAR	43,900 AF
NORMAL YEAR	34,400 AF
WET YEAR	16,400 AF

EXHIBIT 22

FRENCHMAN-CAMBRIDGE IRRIGATION DISTRICT

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



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
DIVERTED af/acre	1.27	1.68	1.55	1.78	2.01	1.42	1.58	2.06	2.43	2.17
DELIVERED af/acre	0.54	0.47	0.52	0.64	0.85	0.52	0.43	0.56	0.77	0.72
EFFICIENCY	42%	28%	34%	36%	42%	37%	27%	27%	32%	33%

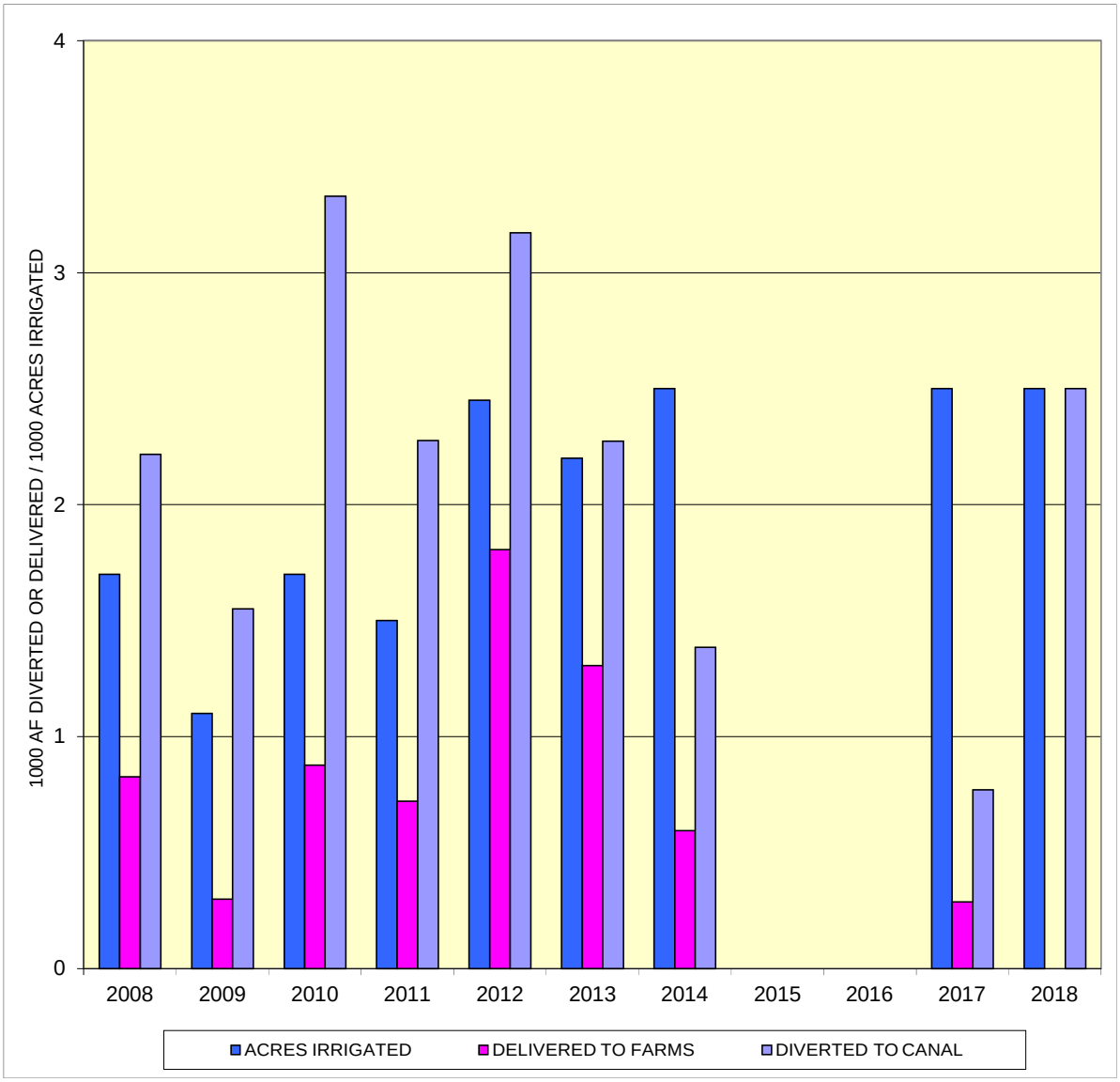
FORECASTED SHORTAGES (2018)

DRY YEAR	31,700 AF
NORMAL YEAR	0 AF
WET YEAR	0 AF

EXHIBIT 23

ALMENA IRRIGATION DISTRICT

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



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
DIVERTED af/acre	1.30	1.41	1.96	1.52	1.29	1.03	0.55	0.00	0.00	0.31
DELIVERED af/acre	0.49	0.27	0.52	0.48	0.74	0.59	0.24	0.00	0.00	0.12
EFFICIENCY	37%	19%	26%	32%	57%	57%	43%	0%	0%	37%

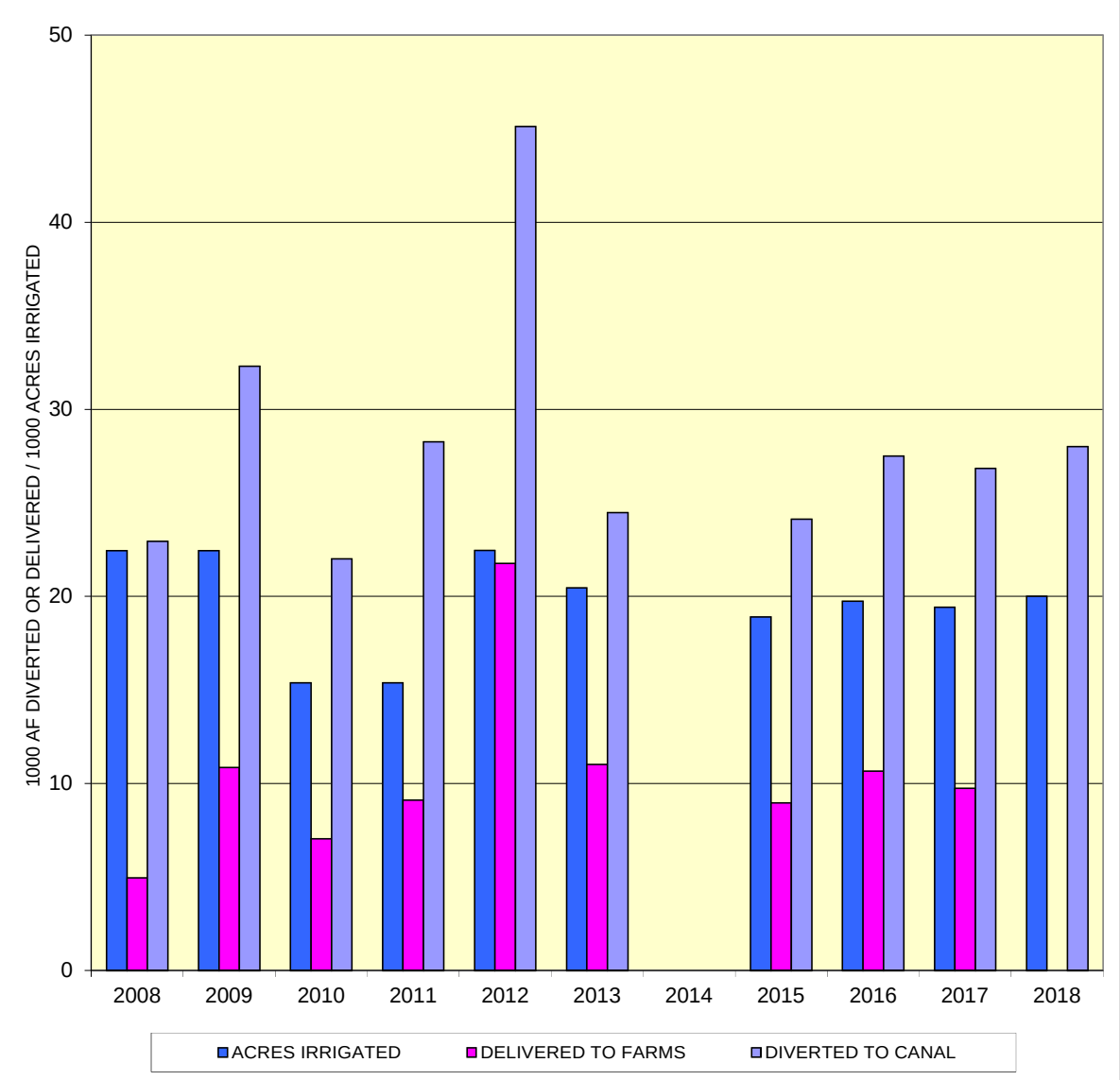
FORECASTED SHORTAGES (2018)

DRY YEAR	14,300 AF
NORMAL YEAR	9,800 AF
WET YEAR	0 AF

EXHIBIT 24

BOSTWICK IRRIGATION DISTRICT IN NEBRASKA

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



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
DIVERTED af/acre	1.02	1.44	1.43	1.84	2.01	1.20	0.00	1.28	1.39	1.38
DELIVERED af/acre	0.22	0.48	0.46	0.59	0.97	0.54	0.00	0.47	0.54	0.50
EFFICIENCY	22%	34%	32%	32%	48%	45%	0%	37%	39%	36%

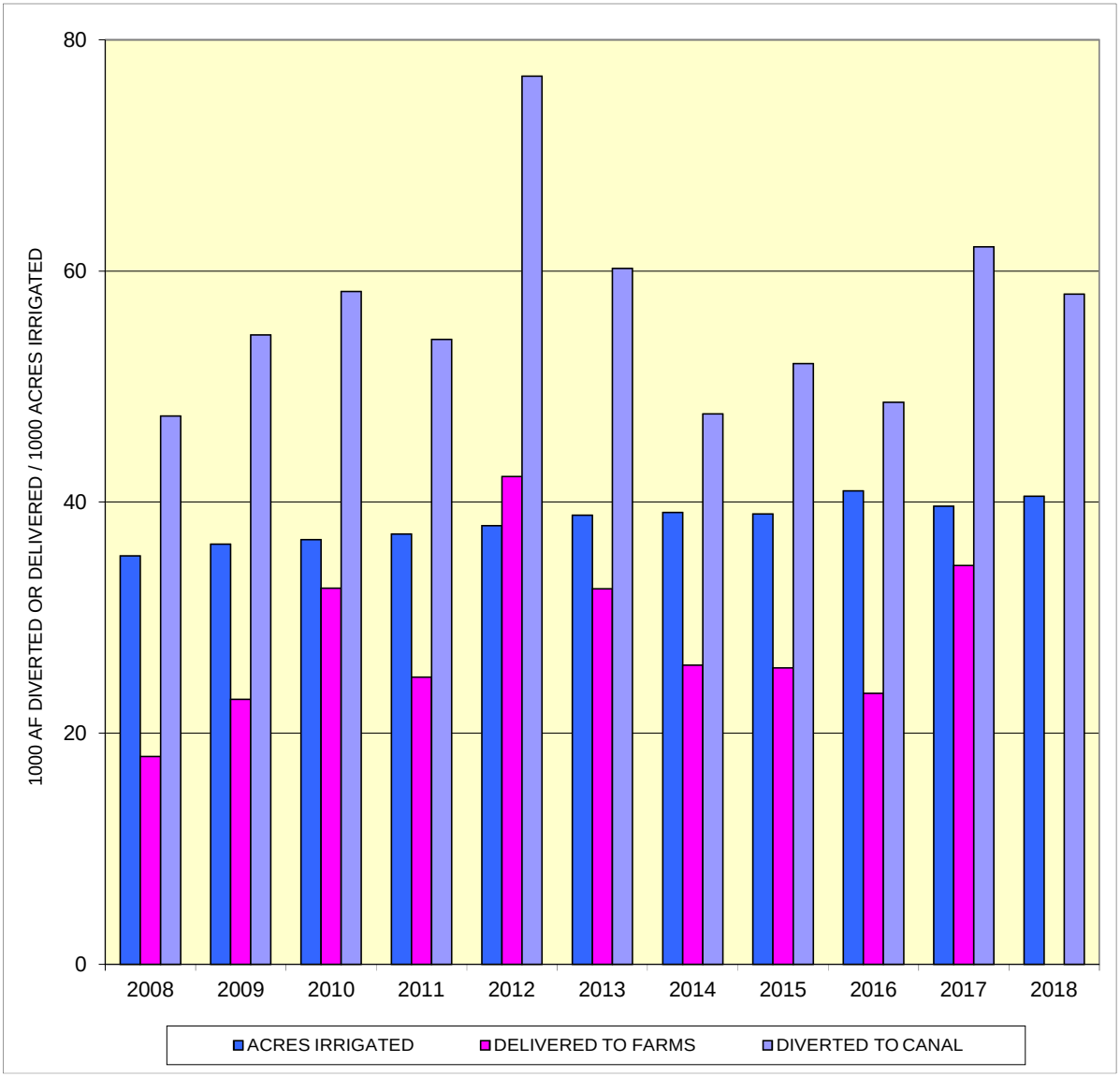
FORECASTED SHORTAGES (2018)

DRY YEAR	15,200 AF
NORMAL YEAR	0 AF
WET YEAR	0 AF

EXHIBIT 25

KANSAS BOSTWICK IRRIGATION DISTRICT

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



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
DIVERTED af/acre	1.34	1.50	1.58	1.45	2.02	1.55	1.22	1.33	1.19	1.57
DELIVERED af/acre	0.51	0.63	0.89	0.67	1.11	0.84	0.66	0.66	0.57	0.87
EFFICIENCY	38%	42%	56%	46%	55%	54%	54%	49%	48%	56%

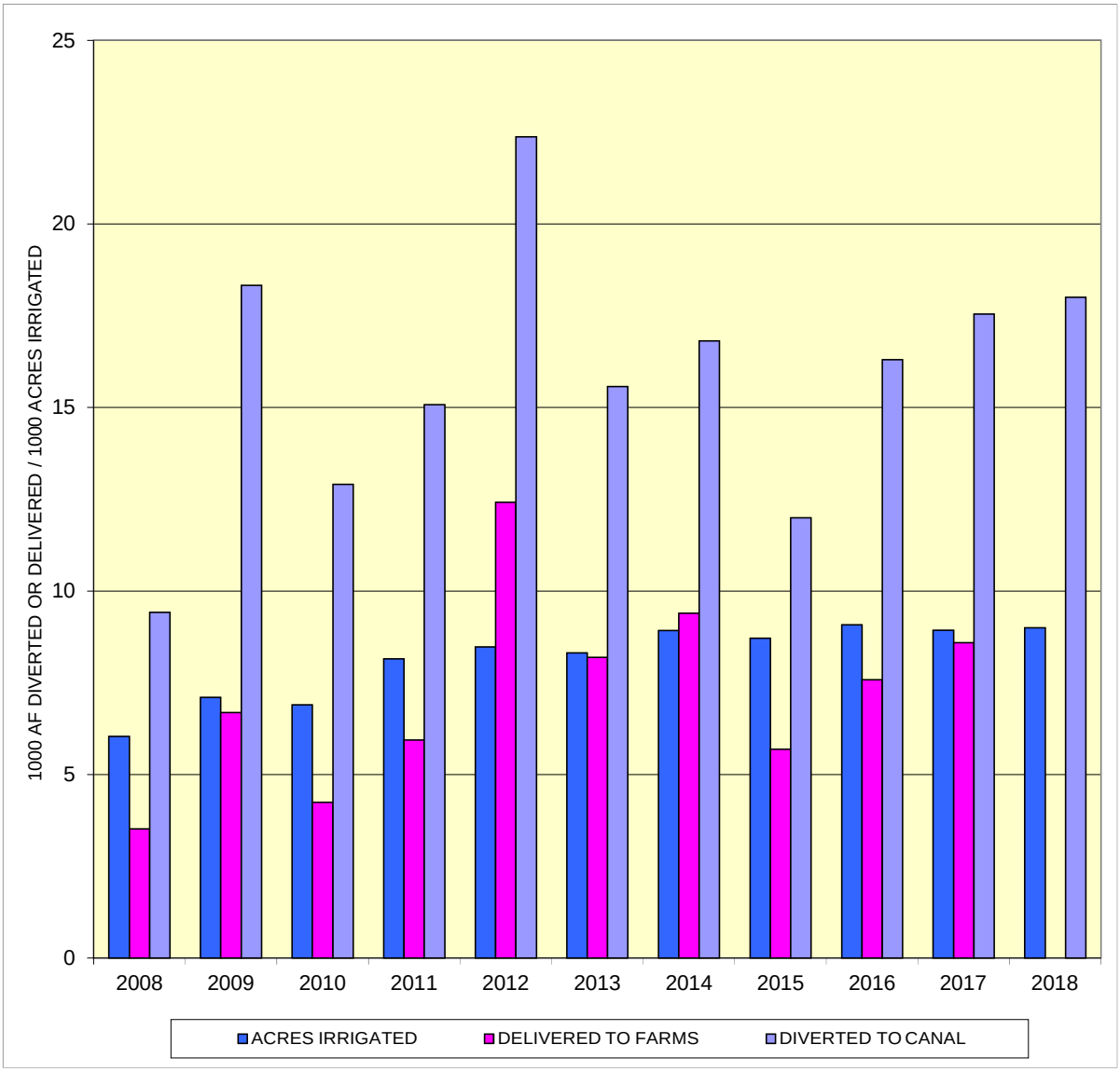
FORECASTED SHORTAGES (2018)

DRY YEAR	28,900 AF
NORMAL YEAR	0 AF
WET YEAR	0 AF

EXHIBIT 26

KIRWIN IRRIGATION DISTRICT

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



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
DIVERTED af/acre	1.56	2.58	1.87	1.85	2.64	1.87	1.88	1.38	1.80	1.96
DELIVERED af/acre	0.58	0.94	0.61	0.73	1.46	0.99	1.05	0.65	0.84	0.96
EFFICIENCY	37%	36%	33%	39%	55%	53%	56%	47%	47%	49%

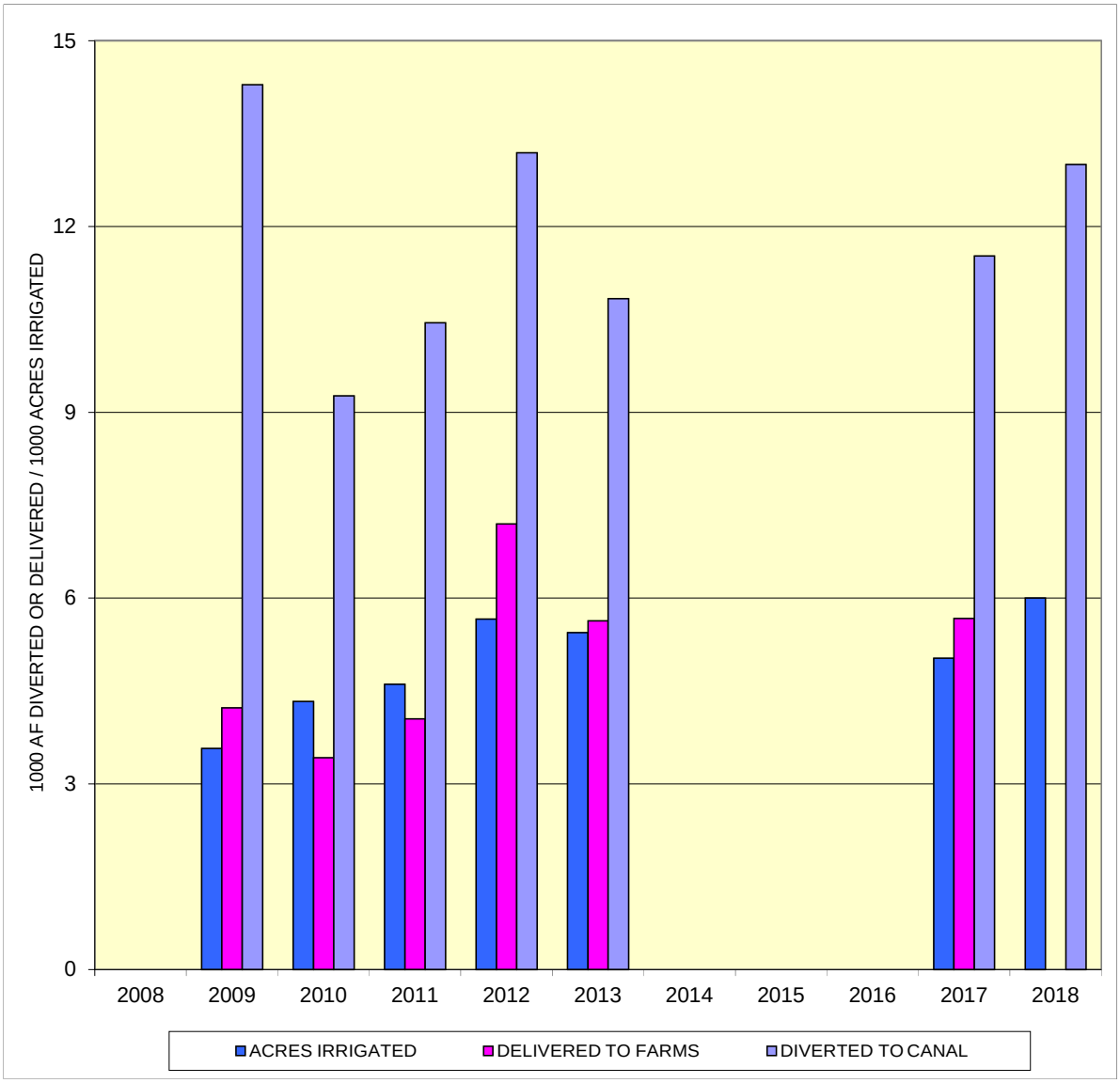
FORECASTED SHORTAGES (2018)

DRY YEAR	0 AF
NORMAL YEAR	0 AF
WET YEAR	0 AF

EXHIBIT 27

WEBSTER IRRIGATION DISTRICT

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



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
DIVERTED af/acre	0.00	4.00	2.14	2.27	2.33	1.99	0.00	0.00	0.00	2.29
DELIVERED af/acre	0.00	1.18	0.79	0.88	1.27	1.04	0.00	0.00	0.00	1.13
EFFICIENCY	0%	30%	37%	39%	55%	52%	0%	0%	0%	49%

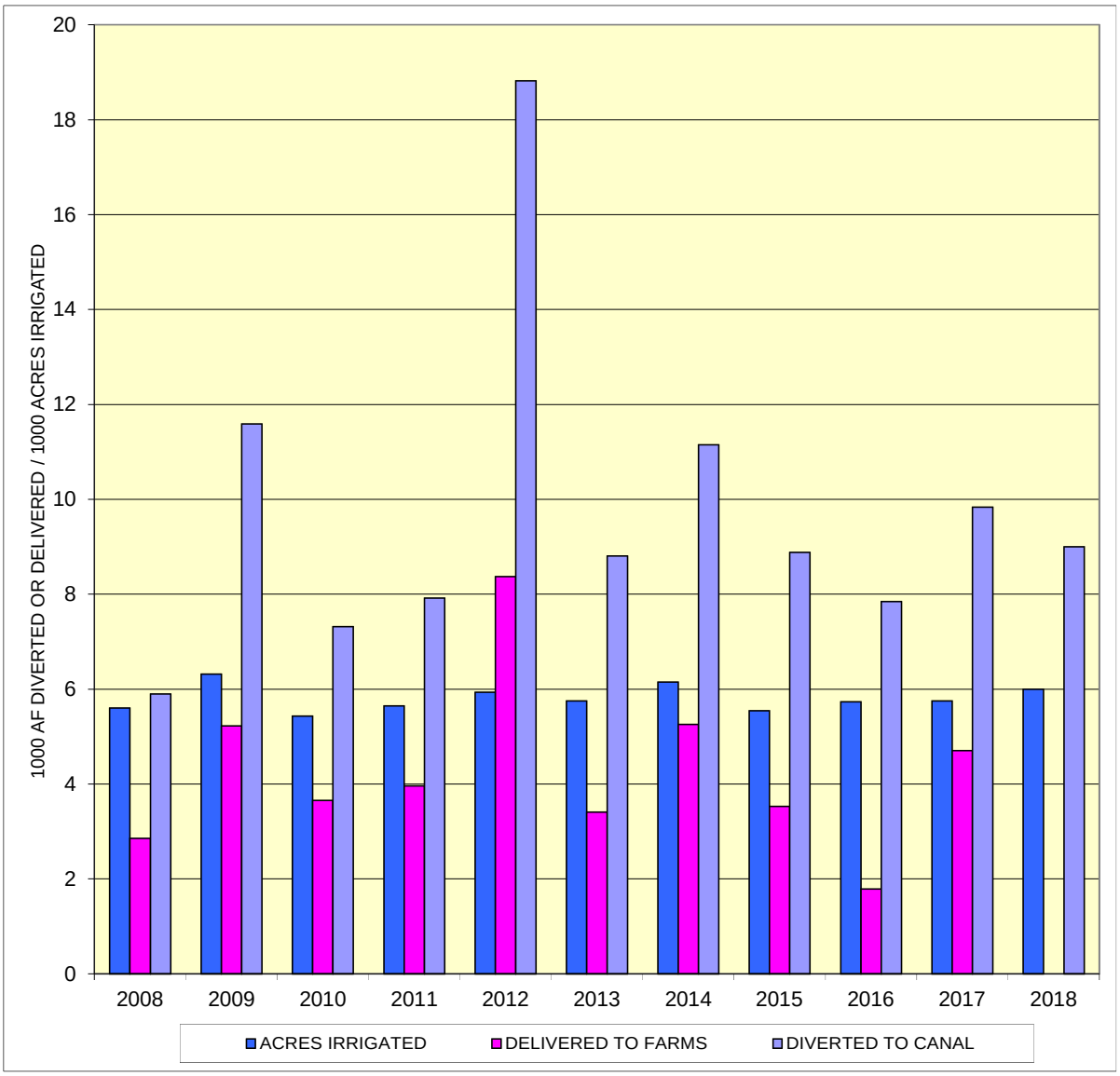
FORECASTED SHORTAGES (2018)

DRY YEAR	0 AF
NORMAL YEAR	0 AF
WET YEAR	0 AF

EXHIBIT 28

GLEN ELDER IRRIGATION DISTRICT

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



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
DIVERTED af/acre	1.05	1.83	1.35	1.40	3.17	1.53	1.81	1.60	1.37	1.71
DELIVERED af/acre	0.51	0.83	0.67	0.70	1.41	0.59	0.86	0.64	0.31	0.82
EFFICIENCY	48%	45%	50%	50%	44%	39%	47%	40%	23%	48%

FORECASTED SHORTAGES (2018)

DRY YEAR	0 AF
NORMAL YEAR	0 AF
WET YEAR	0 AF

Nebraska - Kansas Area Office

BOX BUTTE DAM
Box Butte Reservoir
Capacity Allocation
Conser. 28,973 a.f.
Dead 188 a.f.
Total 29,161 a.f.

MERRITT DAM
Merritt Reservoir
Capacity Allocation
Conser. 65,952 a.f.
Dead 774 a.f.
Total 66,726 a.f.

VIRGINIA SMITH DAM
Calamus Reservoir
Capacity Allocation
Conser. 119,434 a.f.
Dead 35 a.f.
Total 119,469 a.f.

DAVIS CREEK DAM
Davis Creek Reservoir
Capacity Allocation
Conser. 31,082 a.f.
Dead 76 a.f.
Total 31,158 a.f.

ENDERS DAM
Enders Reservoir
Capacity Allocation
Flood 30,048 a.f.
Conser. 35,394 a.f.
Dead 7,516 a.f.
Total 72,958 a.f.

RED WILLOW DAM
Hugh Butler Lake
Capacity Allocation
Flood 48,846 a.f.
Conser. 31,039 a.f.
Dead 5,185 a.f.
Total 85,070 a.f.

MEDICINE CREEK DAM
Harry Strunk Lake
Capacity Allocation
Flood 52,714 a.f.
Conser. 31,239 a.f.
Dead 3,408 a.f.
Total 87,361 a.f.

HARLAN COUNTY DAM
Harlan County Lake
U.S.A.C.E.
Capacity Allocation
Flood 500,000 a.f.
Conser. 314,111 a.f.
Dead 0 a.f.
Total 814,111 a.f.

TRENTON DAM
Swanson Lake
Capacity Allocation
Flood 134,187 a.f.
Conser. 109,148 a.f.
Dead 1,027 a.f.
Total 244,362 a.f.

NORTON DAM
Keith Sebelius Lake
Capacity Allocation
Flood 99,230 a.f.
Conser. 32,874 a.f.
Dead 1,636 a.f.
Total 133,740 a.f.

KIRWIN DAM
Kirwin Reservoir
Capacity Allocation
Flood 215,136 a.f.
Conser. 93,185 a.f.
Dead 4,969 a.f.
Total 313,290 a.f.

LOVEWELL DAM
Lovewell Reservoir
Capacity Allocation
Flood 50,465 a.f.
Conser. 34,007 a.f.
Dead 1,659 a.f.
Total 86,131 a.f.

BONNY DAM
Bonny Reservoir
Capacity Allocation
Flood 128,820 a.f.
Conser. 36,508 a.f.
Dead 0 a.f.
Total 165,328 a.f.

WEBSTER DAM
Webster Reservoir
Capacity Allocation
Flood 183,353 a.f.
Conser. 74,901 a.f.
Dead 1,256 a.f.
Total 259,910 a.f.

GLEN ELDER DAM
Waconda Lake
Capacity Allocation
Flood 722,988 a.f.
Conser. 219,172 a.f.
Dead 248 a.f.
Total 942,408 a.f.

CEDAR BLUFF DAM
Cedar Bluff Reservoir
Capacity Allocation
Flood 191,890 a.f.
Conser. 168,050 a.f.
Dead 4,402 a.f.
Total 364,342 a.f.

MIRAGE FLATS PROJECT
SAND HILLS DIVISION
NORTH LOUP DIVISION
FRENCHMAN-CAMBRIDGE DIVISION
BOSTWICK DIVISION (NE)
BOSTWICK DIVISION (KS)
KANASKA DIVISION
UPPER REPUBLICAN DIVISION
SOLOMON DIVISION
SMOKY HILL DIVISION

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

GREAT PLAINS REGION
NKAO

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

MIRAGE FLATS AND MISSOURI RIVER BASIN PROJECTS
NIOBRARA, LOWER PLATTE, AND KANSAS RIVER BASINS
IRRIGATION AND FLOOD CONTROL FACILITIES

MCCOOK, NEBRASKA
MAP BASED OFF OF:
RECLAMATION DRAWING
NO. 60-705-1 REV. 10
MAY 2016

Legend

- State Boundaries
- Irrigation District Boundaries
- Diversion Dams
- City Boundaries
- Water Bodies
- Nebraska - Kansas Area Office
- Counties
- Interstates
- Highways
- Railroads
- Rivers & Streams
- Canals
- Laterals

N W E S

0 5 10 20 30 40 Miles
0 5 10 20 30 40 Kilometers

Projection: Transverse Mercator
North American Datum 1983
Universal Transverse Mercator Zone 14 North

MAP CREATED, COMPILED, AND EDITED BY: USBR GP NKAO GIS

SOURCE DATA
U. S. Department of Interior - Bureau of Reclamation
U. S. Department of Interior - Geological Survey
U. S. Department of Commerce - Census Bureau
U. S. Department of Transportation - Federal Highway Administration
U. S. Department of Transportation - Federal Railroad Administration
Esri, HERE, DeLorme, © OpenStreetMap contributors, and the GIS user community