

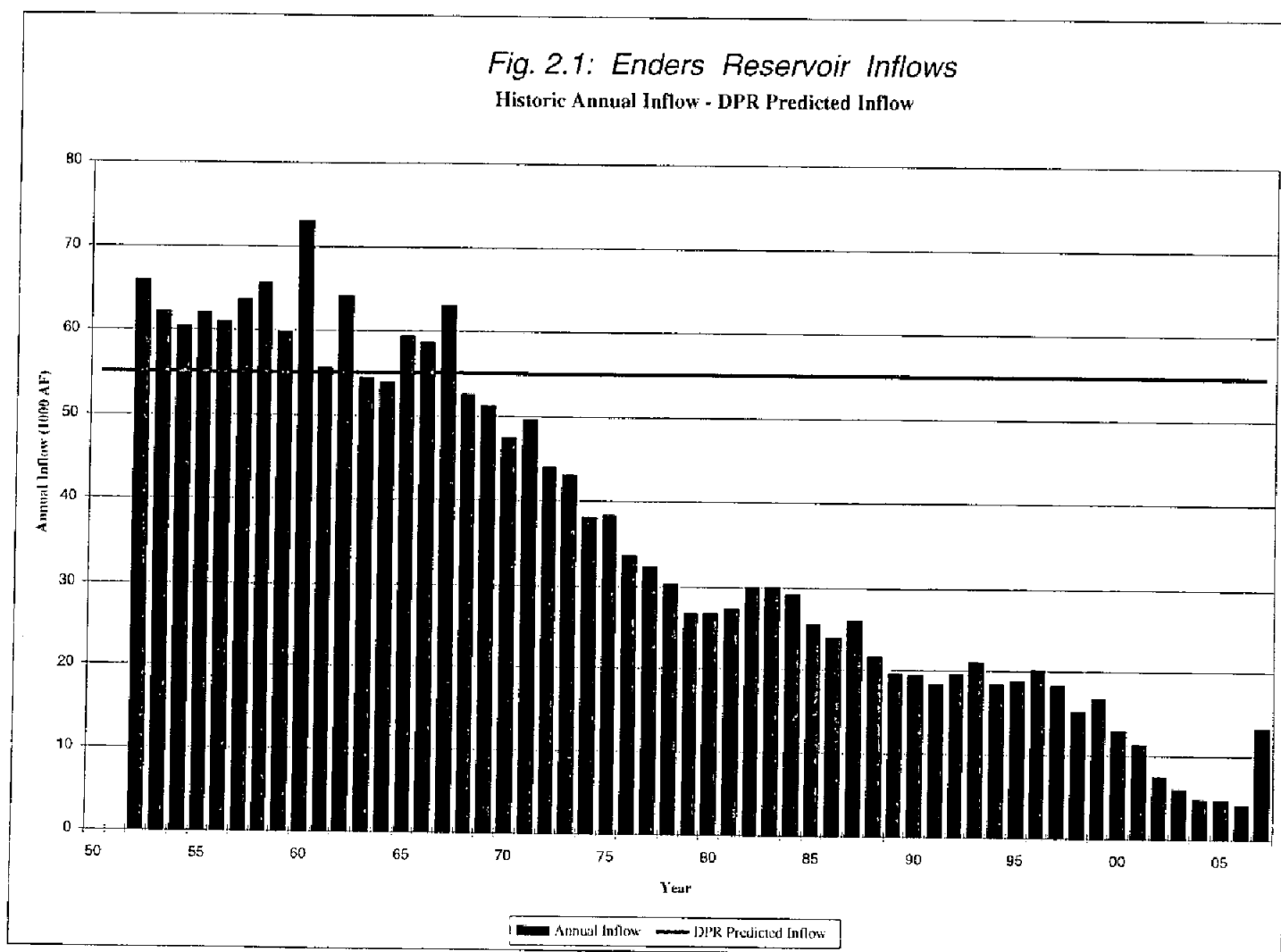
Chapter 2: Problems and Needs

Chapter 2 defines the problems and needs of the Unit area, both present and future. It also lists planning objectives and constraints.

Problems

Declining Water Supply in the Basin

Fig. 2.1 shows annual inflows from Frenchman Creek into Enders Reservoir. The red line in the figure represents reservoir inflows predicted in Reclamation's DPR. The inflows were about 66,000 AF in 1952, a year after the dam closed. Inflows reached their highest point at 74,000 AF in 1961. Inflows routinely averaged above those predicted in Reclamation's *Definite Plan Report* (DPR) until the late 1960s, before steadily declining to around 28,000 AF in 1979, where they leveled off until 1984. From that date, inflows declined to just below 20,000 AF in



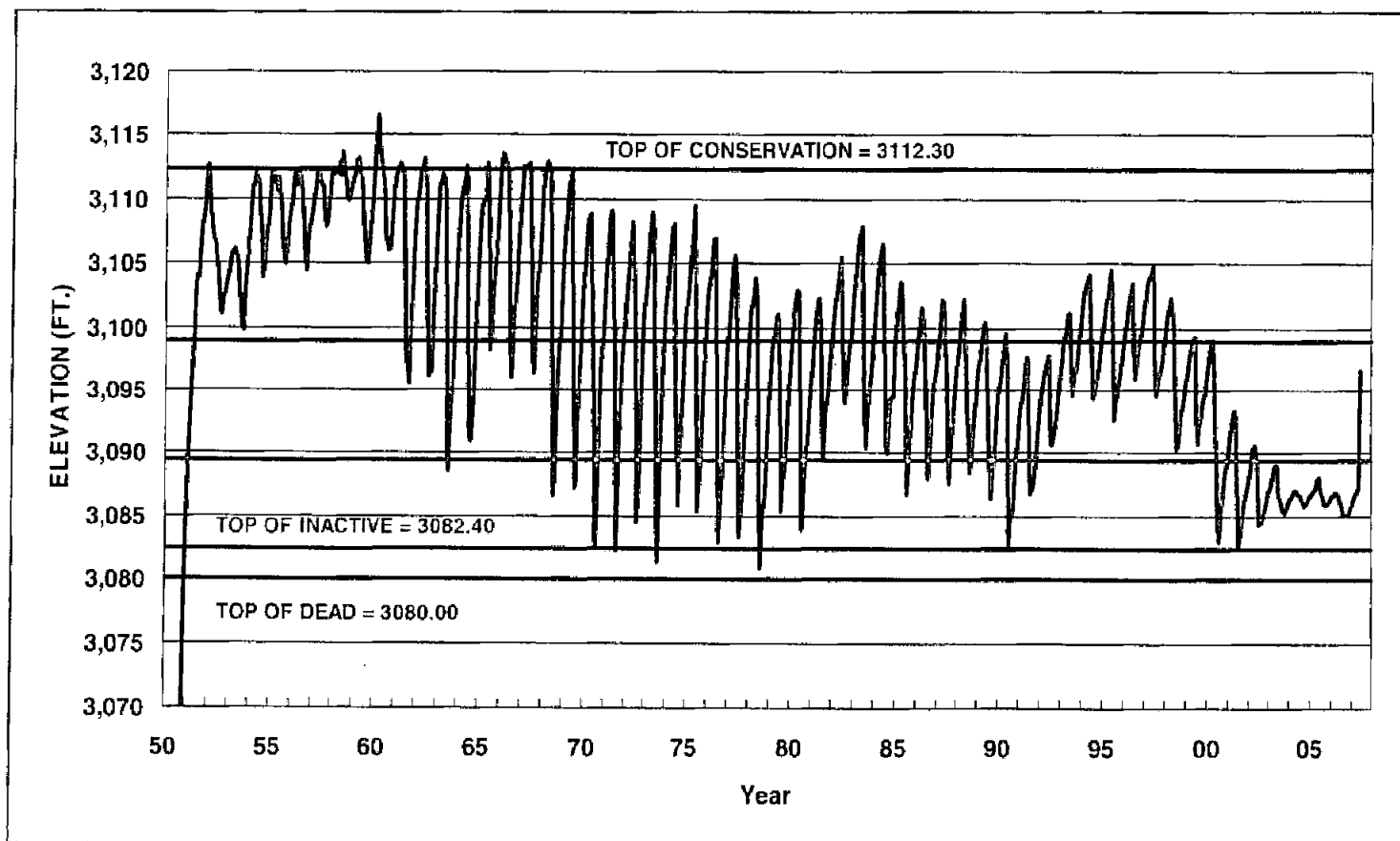
Inflows routinely averaged above those predicted in Reclamation's *Definite Plan Report* (DPR) until the late 1960s, before steadily declining to around 28,000 AF in 1979, where they leveled off until 1984. From that date, inflows declined to just below 20,000 AF in

1989, where they stayed until about 1997. From 1997, inflows continued the downward trend, reaching a historic low of 4,284 AF in 2006. Storms in June 2007 resulted in higher inflows to the reservoir, providing uncharacteristic annual inflows of 13,258 acre-feet. The downward trend is expected to otherwise continue.

Water Demands Exceed Supply

Water demands exceed available water supplies (both current and predicted) in the Frenchman Basin. Declining inflows to Enders Reservoir presents an unfavorable future outlook for project landowners. Fig. 2.2 shows historic end-of-month (EOM) elevations for the reservoir. As shown, inflows were sufficient to consistently fill the reservoir every year until the late 1960's. The last time the reservoir reached TOC (elevation 3112.3 feet, contents 42,910 AF) was in 1968. During the 1970's, inflows to the reservoir and available natural flows began to drop to a point where water deliveries to both districts were reduced. The districts began to conserve storage in Enders for future-year deliveries in the 1980's and 1990's, shown in Fig. 2.2 by the decrease in the annual fluctuation in elevation. Since 2000, inflows to the reservoir had declined to the point where there is not enough water to justify irrigation releases to both FVID and H&RWID. The last time H&RWID took storage water was 2001; the last time FVID took storage water was 2003.

Fig. 2.2: Reservoir End-of-Month Elevations



Studies indicate a direct connection between intensive groundwater pumping in the basin and declining streamflows in Frenchman Creek. A 1963 study by the U.S. Geological Survey looked at geology and irrigation patterns in the basin above the town of Palisade (see map at front). The study analyzed the extent to which future pumping of groundwater might deplete streamflows in Frenchman and Stinking Water creeks (Cardwell and Jenkins ____). A 1974 report provided similar geo-hydrologic data to the Southwest Nebraska Groundwater Conservation District as a basis to assess effects of future groundwater withdrawals in their district (Leonard and Huntoon____).

Reclamation (1977) evaluated the water supply as:

The primary problem facing the Frenchman Unit is the continuing decline of the water supply from Enders Reservoir. The results of this appraisal study indicate that intensive private irrigation well development upstream has caused depletion of the base flow of the Frenchman River (p. I-1).

This report concluded that intensive groundwater development above Enders depleted streamflows at a faster rate than anticipated when the Unit was constructed, and that—unless Nebraska protected surface water rights from depletions caused by groundwater development—the depletion of surface water would continue.

The report made several recommendations:

It is recommended that the State of Nebraska and the Frenchman Valley and H & RW Irrigation Districts pursue the following plans of action:

- 1. Provide measures to protect developed surface water rights from ground water development in the Frenchman River watershed*
- 2. Continue close cooperation with interested local, state, and Federal agencies for the assessment of the basin's hydrologic conditions and develop plans leading to stabilization of the Frenchman Unit's water supply, and*
- 3. Investigate the potential for a program pursuant to the Rehabilitation and Betterment Act for ground-water development within or adjacent to the irrigation districts (p. VI-2).*

During renewal of FVID's water service contract in 1996, Reclamation looked at historic and future surface and groundwater supplies in the basin. The report concluded that streamflows in the Republican River Basin had declined due to irrigation, groundwater pumping, and conservation practices:

The drilling of wells and the use of groundwater has had an adverse effect on the available flow in the rivers above the reservoirs. Because of the development,

inflows to Reclamation reservoirs have steadily decreased, diminishing the ability to capture non-irrigation stream flows at all reservoirs within the system.

Water supplies in the tributaries and at stream flow locations upstream of the reservoirs have also shown a decline over the years. This trend can be associated with increases in diversion due to irrigation, groundwater pumping, conservation practices, and stock ponds developed in the basin. Soil and water conservation practices (residue management, terracing, and farm ponds) contribute the largest depletions to the basin water supply. During the past 3 decades, soil and water conservation practices have increased dramatically. . . . Overall, increased water usage has led to a decline in the available water supply in the Republican River and its tributary streams (p.14).

Needs

Irrigation

The Unit is authorized to provide a supplemental water supply for FVID and H&RWID from storage in Enders Reservoir and natural flows of Frenchman and Stinking Water Creeks below the reservoir. Flows are diverted from Frenchman Creek into the Culberson Canal at the Culbertson Diversion Dam near Palisade, Nebraska (see map at front). Normal operations of the Unit expect that reservoir levels gradually rise in the spring towards TOC (Figs.1.2 and 2.2). Irrigation releases from Enders Reservoir normally deplete conservation storage by late summer.

Because of declining inflows into the reservoir, the Unit has not operated as planned since the reservoir last filled in 1968. As the water supply declined, project operations have changed, both districts taking less water from storage in order to save it for the future. Reservoir storage continued to decline: in 2001 there was insufficient water available to justify releases for both districts. Also in 2001, H&RWID did not deliver water for the first time. Storage levels have dropped to a point where FVID elected not to use available storage in 2004. FVID irrigated 2,048 acres by diverting available natural flows below the reservoir.

Continued declining streamflows, both above and below Enders Reservoir, have resulted in reduced deliveries to project lands. As surface water supplies dropped, the irrigation districts delivered less water to fewer acres. With limited water supplies, most project irrigators have installed groundwater wells in order to make up for the shortfall from surface water supplies. An estimated 90 percent of project lands use groundwater to offset the shortage of surface water.

The decline in average water deliveries to FVID and H&RWID is shown in Table 2.1. Deliveries declined 70 percent from 1970-2000 for FVID, 69 percent for H&RWID.

Table 2.1: Irrigation Water Deliveries

| | Frenchman Valley District | Hitchcock and Red Willow District |
|-----------|---|---|
| | On-Farm Deliveries 5-Year Average (in/ac) | On-Farm Deliveries 5-Year Average (in/ac) |
| 1966-1970 | 22.0 | 17.1 |
| 1971-1975 | 18.9 | 15.0 |
| 1976-1980 | 13.1 | 9.4 |
| 1981-1985 | 9.8 | 8.6 |
| 1986-1990 | 8.6 | 6.5 |
| 1991-1995 | 5.7 | 5.1 |
| 1996-2000 | 6.5 | 5.3 |

Recreation and Fish and Wildlife

To provide an estimate of visitation by recreation activity, a recently published report by the NGPC was used (Holland and Gabelhouse 2006). Total recreation use averaged approximately 43,000 visits annually and ranged from a low of 39,812 visits to a high of 46,760 visits. Most visits—nearly 80 percent—occurred during the high use season from May to September. The recreation activities identified from highest to lowest visitation levels were camping, fishing, boating, swimming, wildlife observation, hunting, and other (primarily walking/hiking). Camping was by far the most popular recreational activity followed by fishing.

Declining inflows lead to lower reservoir levels resulting in decreased recreation, fish and wildlife benefits at Enders Reservoir. If recreation benefits continue to diminish, the NGPC may have difficulty in justifying future investments in recreation facilities.

Other Needs

One of the identified benefits of the Frenchman-Cambridge Division with a full water supply included maintaining water quality. Reduced streamflows and a lessened water supply from the Unit have caused adverse effects on municipal wells.

Groundwater withdrawals from the area exceed recharge, resulting in groundwater level declines (see Appendix C). The Unit operations provide recharge benefits through canal and lateral seepage, system waste, and on-farm deep percolation. As the Unit's water supply declined, recharge benefits also declined. If the Unit does not deliver water, groundwater levels in the project area would decline at a faster rate.

Planning Objectives/Constraints

Alternative plans were developed to meet planning objectives, while avoiding constraints.

Planning objectives are:

- Maintain the viability of the FVID and H&RWID
- Maintain recreation at Enders Reservoir by establishing a minimum pool
- Protect the Federal investment in the Unit.

Constraints are:

- The volume of water available according to location and timing
- The Compact and FSS, including meeting sub-basin allocations
- Nebraska water laws and regulations
- The IMP's for the Upper and Middle Republican NRD's
- The RRWCD in Colorado
- The Flood Control Act of December 22, 1944 as amended, which authorized the Unit of the Frenchman-Cambridge Division.