Summary

The Bureau of Reclamation's Frenchman Unit (Unit) in south-central Nebraska lacks the water supply to meet all authorized purposes. Enders Reservoir supplies project water to the Frenchman Valley Irrigation District (FVID) and the Hitchcock and Red Willow Irrigation District (H&RWID). Enders and the surrounding land provide fishing, flat-water recreation, hunting, and camping.

Reclamation studies in 1977 and 1997 showed that surface water inflows into the reservoir had dropped drastically due to intensive drilling of irrigation wells upstream in Frenchman Creek, and to soil and water conservation practices in the area. FVID and H&RWID have not received a full water supply since the early 1970's. The last time Enders Reservoir reached the top of conservation (TOC) pool at elevation 3112.3 feet was in 1968.

By existing Nebraska water right law, all inflows into Enders Reservoir, and natural flows to Frenchman Creek below the dam, belong to the Unit. These water rights are needed to meet irrigation obligations to the FVID and H&RWID.

Purpose and Scope

The purpose of this study is to determine whether the alternative plans analyzed in this report have sufficient potential to justify further Federal involvement, including a detailed feasibility report on the Unit.

Background

The Unit is one of four in Reclamation's Frenchman-Cambridge Division. It is located on Frenchman Creek, a tributary to the Republican River near the Kansas border. The study area encompasses Chase, Dundy, Hays, Hitchcock, Perkins, and Red Willow counties.

Water stored in Enders Reservoir—along with flows from the Frenchman and Stinking Water Creeks—supplies the Culbertson Canal and the Culbertson Extension Canal Systems (see map at front of the report).

In a 1998 lawsuit, Kansas charged Colorado and Nebraska had violated the Republican River Compact which divides the river's water supply among the three states. The states negotiated a settlement, called the *Final Settlement Stipulation* (FSS), approved by the Supreme Court in May 2003. The FSS mandated an accounting of stream depletions caused by groundwater pumping.

Under the water terms in the FSS, Nebraska exceeded its allocation from 2003-2006. To try to comply, Nebraska enacted legislation in 2004 by which the Nebraska Department of Natural Resources (DNR), the Upper Republican Natural Resource District, and the Middle Republican Natural Resource District (NRD's) developed integrated surface water/groundwater management plans. These *Integrated Water Management Plans* (IMP's) include limiting groundwater depletions by the NRD's. The IMP's predict that target stream flows could be met with a 20 percent reduction in groundwater pumping in the Republican River Basin from average pumping from 1998-2002.

The DNR and/or NRD's have tried to improve streamflows though other means as well: buying or leasing surface water from willing irrigation districts or taxing property in the basin to pay for surface water. Neither of these methods has resulted in reduced groundwater pumping in the basin.

Alternatives

Three alternative plans were developed by Reclamation with input from the study partners to meet planning objectives and avoid constraints.

- Flow-through Alternative
- Recreation Alternative, and
- Groundwater Recharge Alternative.

These alternatives were compared to the *Future-Without Project Condition*, which represents no change in present conditions of the Unit. Table S.1 describes the salient characteristics of the alternatives; summarizes irrigation, flat-water recreation, fish and wildlife, and flood benefits of each; and concludes whether or not the alternatives would meet the three planning objectives.

Conclusions

Nebraska's current IMP's project that reductions in groundwater pumping to meet the will result in only a small increase in streamflows in the basin. The surface water supply of the Unit will not return to levels necessary to sustain all project irrigation requirements.

Table S.1: Summary of the Alternatives

	Future-Without Project Condition	Flow-through Alternative	Recreation Alternative	Groundwater Recharge Alternative
Description	No change from present conditions in the Unit.	Would pass inflows through the reservoir.	Would establish a target minimum pool at Enders 7 feet higher to benefit recreation.	Would operate the Unit to recharge groundwater to benefit irrigation
Reservoir Minimum Pool	Same	Decrease	Increase	No change/ decrease
Elevation (ft)	3082.4	3080.0	3089.4	3082.4/3089.4
Surface Area (ac)	627	567	825	627/825
Content (AF)	8,948	7,516	14,426	8,948/14,426
Water Supply (in/ac)	3.5 from reservoir every 5th year for both districts; 3.5 yearly from natural flows for FVID.	4 for FVID yearly from natural flows or 1.75 yearly from natural flows for FVID and H&RWID.	1.5 from reservoir every 5th year for both districts; 3.5 yearly from natural flows for FVID.	3 from reservoir every 5th year for both districts; 3.5 yearly from natural flows for FVID.
Irrigation Benefits	Authorized project acres continue to be irrigated by reservoir storage when available and natural flows.	Inflows would pass through reservoir for diversion by both FVID and H&RWID; yearly evaporation losses would drop by 219 AF.	Initial storage loss of 525 AF for irrigation; following this, minor drop in yearly irrigation water supply due to increased evaporation losses of 722 AF.	FVID and H&RWID would irrigate from groundwater recharged by Unit canals and laterals.

	Future-Without-the-Project Condition	Flow through Alternative	Recreation Alternative	Groundwater Recharge Alternative
Flat-water Recreation Benefits	Continue to provide an average of 43,000 visitor-days of flat-water recreation and fishing on the reservoir and hunting on public lands surrounding.	Would result in loss in visitation for flat-water recreation and fishing, with consequent losses in economic value.	Recreation without storage deliveries—would result in largest gain in visitation and therefore economic value; Recreation with storage deliveries—gain in recreation visitation and economic value, but less than recreation without storage deliveries.	Would result in loss in visitation for flat-water recreation and fishing, with losses in economic value.
Fish and Wildlife Benefits	Continue to provide fishing and hunting on public lands around the reservoir.	Would result in decrease in fish benefits due to loss of reservoir surface area and crowding; moderate increase in wildlife benefits due to exposed lands in upper end of reservoir from lower elevations; no effects on T&E species.	Would result in increase in fish benefits due to additional reservoir storage; slight increase in wildlife benefits; no effects on T&E species.	Would result in significant decrease in fish benefits due to loss of reservoir surface area and crowding; greater increase in wildlife benefits in the upper end of the reservoir from lower elevations; no effects on T&E species.

	Future-Without-the-Project Condition	Flow through Alternative	Recreation Alternative	Groundwater Recharge Alternative
Flood Benefits	Continue to store flood flows to elevation 3127.0 feet.	Would result in no change—flood flows in excess of channel capacity would be stored for later release; might be considered an increase in flood protection as more flood storage would be available.	Would result in minimal change since reservoir has not filled in more than 40 years; flood storage would continue at elevation 3127.0 feet.	Would result in no change—reservoir would continue to store flood flows to elevation 3127.0 feet.
Would maintain the viability of FVID and H&RWID?	Yes –FVID continues to utilize natural flows available, H&RWID contract repayment is based on available irrigation storage.	Yes—might not be much difference in district operations because of non-use of storage due to reduced supply.	Yes—with reduced irrigation supply from storage; payment for increased storage would serve as financial incentive for project landowners.	Yes—might be able to add more beneficiaries to the project (lands benefitting from recharge not currently in either district) which would increase repayment pool.
Would maintain recreation at the reservoir?	Yes.	Yes—but at a significantly lower level.	Yes—but at a reduced level.	No—recreation benefits would basically be eliminated.
Would protect the Federal investment?	Yes.	Might be question for repayment—who pays?	Yes—might change who pays for benefits.	Might change areas of benefits—could add and/or eliminate some beneficiaries.

	Future-Without-the-Project Condition	Flow through Alternative	Recreation Alternative	Groundwater Recharge Alternative
Would result in changes to cultural resources or ITA's?	No.	No.	No.	No.