

A decreasing water supply for Enders Reservoir is shown on the graphs depicting historic inflows and reservoir levels (see Appendix XX). The last time Enders Reservoir reached the top of conservation level (elevation 3112.30 feet) was in 1968. Flows in the Frenchman Creek exhibit less variability than in many of the other drainage basins within the Republican River Basin. Since the 1950's, the streamflow into Enders has been showing a progressive decline, and there is no indication that the decline is leveling off. The cause of the decline appears to be mainly the result of a high degree of well development in above Enders Reservoir.

Historic mean annual inflow for 1929-50	63,100 acre-feet
Historic mean annual inflow for 1980-93	23,600 acre-feet
Change in mean annual inflow	-39,500 acre-feet
Historic mean annual inflow for 1929-50	63,100 acre-feet
Historic mean annual inflow for 1994-2004	13,600 acre-feet
Change in mean annual inflow	-49,500 acre-feet

GW WELL INST TIMELINE & DIST,

Previous Investigations and Reports

Numerous investigations have been completed in the study area to address the depletions occurring in the upper Republican River Basin. A study entitled "Groundwater Geology and Pump Irrigation in Frenchman Creek Basin Above Palisade, Nebraska" (Water Supply Paper No. 1577) was published in 1963. At the request of Reclamation, the USGS included a study to determine the extent to which future pumping of ground water for irrigation might deplete streamflow in the Frenchman River and in Stinking Water Creek.

The Conservation and Survey Division, Institute of Agriculture and Natural Resources, University of Nebraska, Lincoln, in cooperation with the Southwest Nebraska Ground water Conservation District, prepared a report entitled "Groundwater Geology of Southwest Nebraska ground water Conservation District" (Nebraska Water Survey Paper Number 37) which was published in May 1974. The purpose of this report was to provide geohydrologic data that could be used as a base for assessing the impacts of future ground-water withdrawals in the district.

In January 1977 published the "Frenchman Unit Nebraska Appraisal Report" which evaluated the water supply problems facing the Frenchman Unit of the Frenchman-Cambridge Division, which includes the Frenchman Valley and H&RW Irrigation Districts. At that time the report concluded that, "The primary problem facing the Frenchman Unit is the continuous decline of the water supply from Enders Reservoir. The results of the 1977 appraisal study indicate that intensive private irrigation well development upstream has caused depletion of the base flow of the Frenchman River."

Reclamation published the "Resource Management Assessment Republican River Basin" for renewing the water service contracts of the irrigation districts in the Republican River Basin in July 1996. The report looked at surface water supply (historic and present) and ground water supply within the Basin. The report stated that "In general, inflows to all the reservoirs have been declining at a significant rate since pre-development. The cause of those declines appears to be a combination of reduce streamflow due to effects from surface water diversions, irrigation well pumpage, conservation practices, upstream reservoir development, and what appears to be a reduction in annual precipitation variability."

A complete list of the reports available for use in this study are shown in Appendix A.

Plan Formulation and Alternatives (FLOW DIAGRAM) Scope of Work

A multi-disciplinary planning team will be organized by Reclamation and the Study partners. This team will consist of experienced individuals representing major functional disciplines important to the study process, i.e. hydrology (surface and groundwater), engineering (water supply), economics, environmental, technical writing, etc. Some of the disciplines will only provide cursory input and review to assure the study

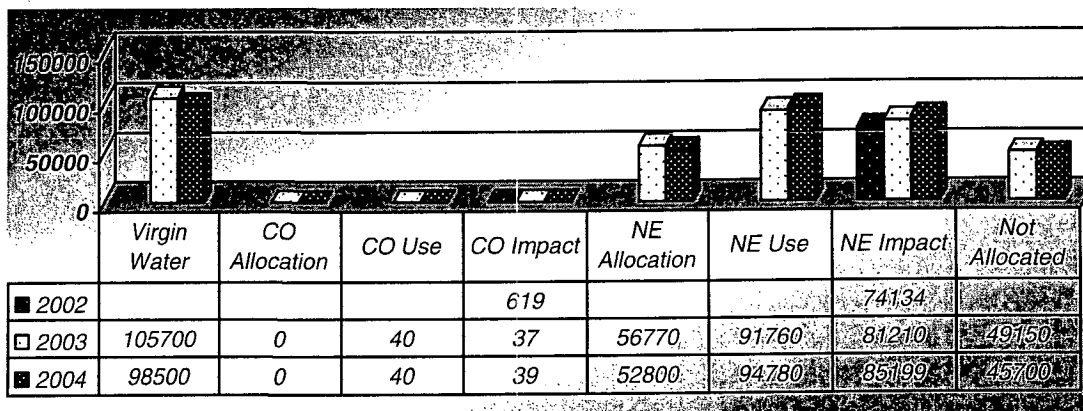
CREP (Republican/Platte River Valleys – NE): Reduce irrigated acres in Platte and Republican Valleys by 125000AF. Permanently retire 8% of irrigated cropland. Conserve 100000AF of water within reservoirs. Increase flow in rivers by 50000AF.

Water use per irrigated acre:
 2004 – 14.85 acre inches
 2005 – 8.78 acre inches

EQIP (Nationwide): Reduction of 15.3 million irrigated acres(1996).

Permanent retirement:
 MRNRD - ~1200acres (2005)
 Republican – 2640acres
 Permanent plus Temporary(4yr) retirement?:
 URNRD – 527.9 (ground water)
 MRNRD – 2781.12 (2524.02 ground water, 257.10 surface water)

RRCA (<http://www.republicanrivercompact.org/>):
 Allocates water to the states(CO, KS, NE) per the legal framework of RRCA.



methodology, procedure, and results are reasonable and to raise concerns, if there are any.

[DEVELOP SCENARIOS FOR THIS SECTION]

Phase I Modeling (inflows to Enders):

1. Establish historical baseline, pre settlement – calibrate to present day, define zone budgets?

Establish baseline **BASELINE** – there was some discussion about the baseline alternative or the future without alternative. The study will need to estimate this future without condition, which would be the best estimate of what will happen in the Frenchman Creek area if nothing is done. There was a discussion that the future without should extend out to 40 years. This future without will be the alternative that all of the other alternatives are compared to, specifically to determine if there is a federal interest to proceed to a Feasibility Study.

2. run future scenarios with restrictions from IMP's, new restrictions from the Republican River Water Conservation District in Colorado, arbitrary reductions, EQIP, CREP, variable recharge, etc...

MILESTONE – define preferred scenarios to analyze in Phase II, **CHOOSE "FUTURE WITHOUT" condition:**

Future without Condition – Continue operations as is

- WRD – Based on Current Allocations vs
- NRD – No "new" restrictions on groundwater pumping
- NRD – no additional controls or regulations
- NRD – no third party impacts from "new" restrictions
- Reclamation – meet authorized purpose of the project ?
- Reclamation, Neb DNR, FV-HRW – solvency of the Districts ?
can the Districts continue with as is operations?
- Reclamation – existing contracts with the Irrigation Districts ?
can the Districts continue with as is operations?
- Reclamation – storage and storage use rights are considerably higher than what is available
- FV-HRW – reliability of the reservoir supply and natural flow supply

Phase II Modeling (Surface water distribution from Enders):

1. No change (no releases)
2. Incremental release to supply FVID and H&RWID with... 3in... 6in... 9in... 12in... 15in...
Irrigation Alternatives
Frenchman Valley ID Only
Frenchman Valley ID and H & RW ID

3. **MILESTONE** – identify/choose scenarios to analyze in Phase III Modeling

*Range of scenarios
IF Future without
Done - Reclamation
Does it. Could
Say state does not
Require future without
but if Reclamation wants
they will choose and
write that section*

*most current annual allocations
no releases Assume some pumping
but no increase in irrig acres?*

Phase III Modeling (water supply impact to FVID and H&RWID)

1. Future water supply at the Frenchman River Gauge at Culbertson. Without diversions into Culbertson Canal and without releases from Enders.
2. Future water supply at the Culbertson Diversion Dam (near Palisade) (without any releases from Enders)
- 3.
- 4.

Study Schedules and Milestones

EXCEL SPREADSHEET [INSERT]

Assumptions and Constraints

Assumptions and Constraints – The POS will list the assumptions and constraints, i.e. the assumptions made for the future without condition, the Republican River Compact, the Republican River Lawsuit Settlement, the NRD Integrated Management Plans, specific sections of Nebraska water law, etc.

Future without Condition – Continue operations as is

40 Year contract on Ender's

NRD – No "new" restrictions on groundwater pumping

NRD – no additional controls or regulations

NRD – no third party impacts from "new" restrictions

Reclamation – meet authorized purpose of the project ?

Reclamation, Neb DNR, FV-HRW – solvency of the Districts ?

can the Districts continue with as is operations?

Reclamation – existing contracts with the Irrigation Districts ?

can the Districts continue with as is operations?

Reclamation – storage and storage use rights are considerably higher than what is available

FV-HRW – reliability of the reservoir supply and natural flow supply

Reclamation – 40 year contract on Ender's

Input on planning objectives and constraints will be solicited from the study partners and others. Planning objectives, for which alternatives will be developed to address the problems include:

- Consider all reasonable solutions
- Obtain input from the study partners
- Provide for an acceptable allowance for shortages for the Districts
- Economic feasibility
- Financial feasibility (ability to repay construction costs and annual OM&R)
- Acceptable environmental impacts

Planning constraints, for which alternatives will be developed to address the problems include:

- Conform to the Final Settlement Stipulation and Proposed Consent Judgment
 - Conform to the Republican River Compact
- Conform to the State and NRD regulations

Study Costs and Cost Sharing Agreement



Item
Schedule/Due Date
Responsibility
Cost

DR
DRAFT

APPENDIX A

List of Previous Investigations and Reports

- Bentall, R. & Hamer, T., 1980, Stream-Aquifer Relationships in Nebraska: UNL Conservation and Survey Division and Nebraska Department of Water Resources, 102 pages, 171 illustrations.
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APPENDIX B

Natural Flow Water Rights

Frenchman River – Natural Flow Water Rights

Frenchman Valley Irrigation District 05/16/1890 9160.4 ac	D-24R	130.86 cfs
H & RW Irrigation District 04/03/1946 1415.0 ac	A-3869AR	16.64 cfs
H & RW Irrigation District 04/16/1954 9576.0 ac	A-6214R	136.80 cfs
H & RW Irrigation District 03/04/1959 157.0 ac	A-9697R	2.24 cfs
Frenchman Valley Irrigation District 03/17/1960 132.0 ac	A-9802R	1.89 cfs
H & RW Irrigation District 04/03/1946 683.0 ac	A-13016R	9.76 cfs
H & RW Irrigation District 06/04/1976 60.0 ac	A-14249R	.86 cfs
H & RW Irrigation District 07/10/1980 24.0 ac	A-15678R	.34 cfs
Riverside Irrigation Company, Inc. 12/19/1893 51.1 ac	D-10AR	.73 cfs
Riverside Irrigation Company, Inc. 07/28/1894 291.0 ac	D-18	4.16 cfs
Riverside Irrigation Company, Inc. 07/03/1922 190.0 ac	A-1674	2.71 cfs
Riverside Irrigation Company, Inc. 07/31/1941 140.0 ac	A-3477R	2.00 cfs

Frenchman River – Storage Water Right

Bureau of Reclamation 05/01/1946	A-3899	44,079 AF
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Storage Use Water Rights

Enders, Strunk, Harlan County, and Swanson Reservoirs
Bureau of Reclamation A-6225HR
04/16/1954
Covers flow rights A-3869AR

Bureau of Reclamation A-6225HR
04/16/1954
Covers flow rights A-6214R

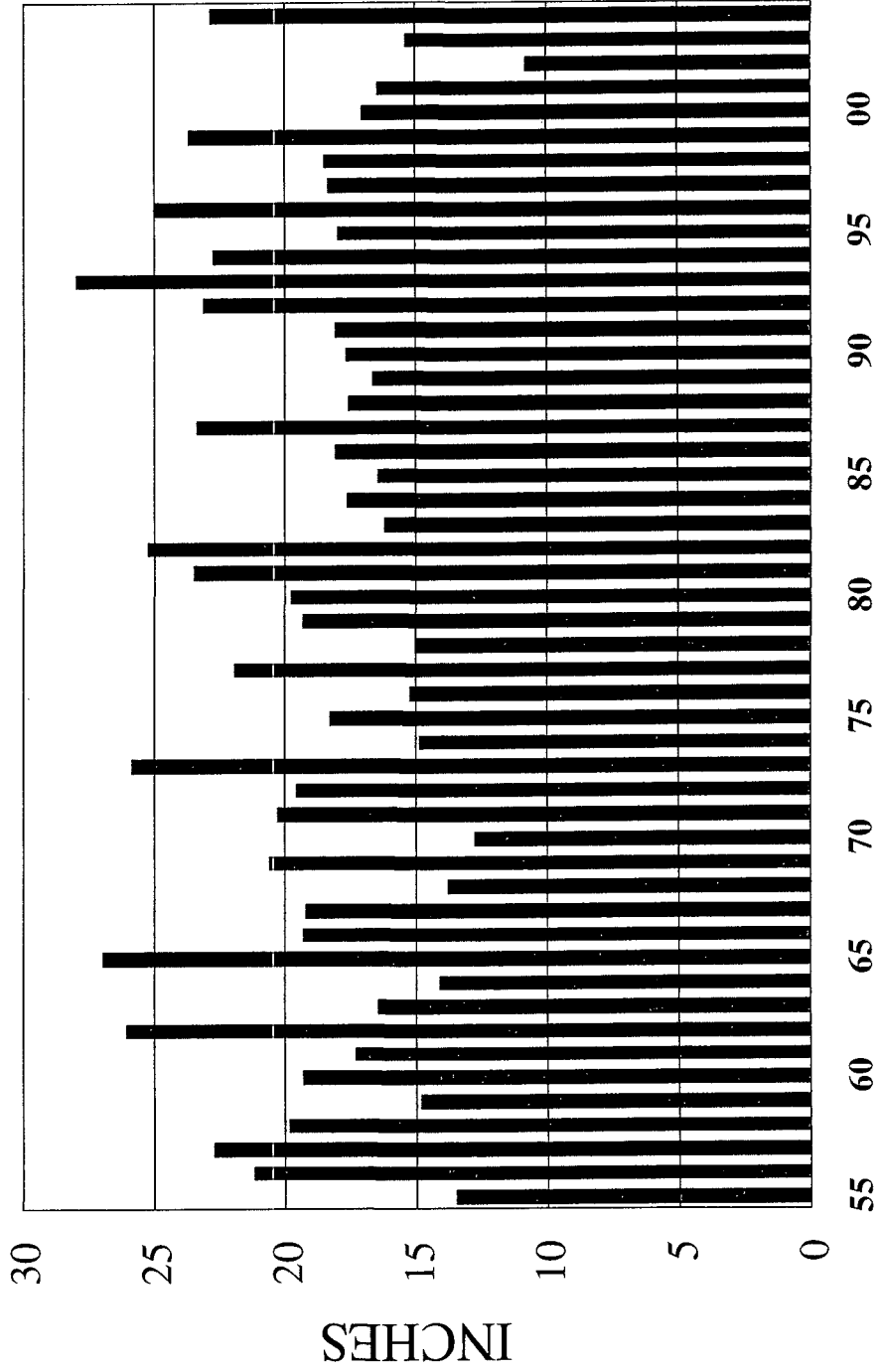
Enders, Strunk, Harlan County, Swanson, and Hugh Butler Lake Reservoirs
Bureau of Reclamation A-9782
12/16/1959
Covers flow rights D-24-30, A-6214, A-9697, A-9802
Bureau of Reclamation A-15839
04/18/1981
Covers flow rights A-13016R, A-14249R, A-15678R

Total Natural Flow Rights

Frenchman Valley Irrigation District	132.75 cfs	9,292.4
acres		
H & RW Irrigation District	164.40 cfs	11,915
acres		
Riverside Irrigation Company	9.60 cfs	
672.1 acres		

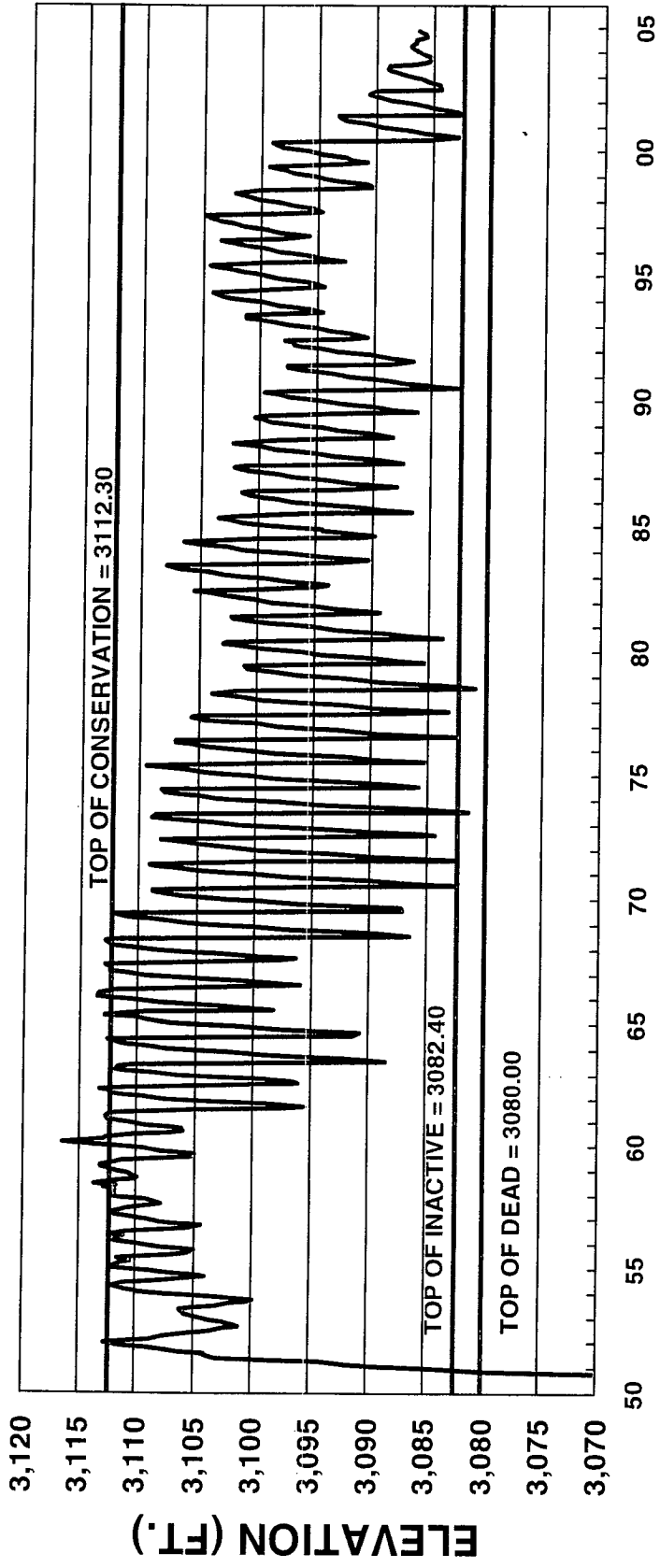
DRY

ENDERS DAM YEARLY PRECIPITATION



1955 THROUGH 2004

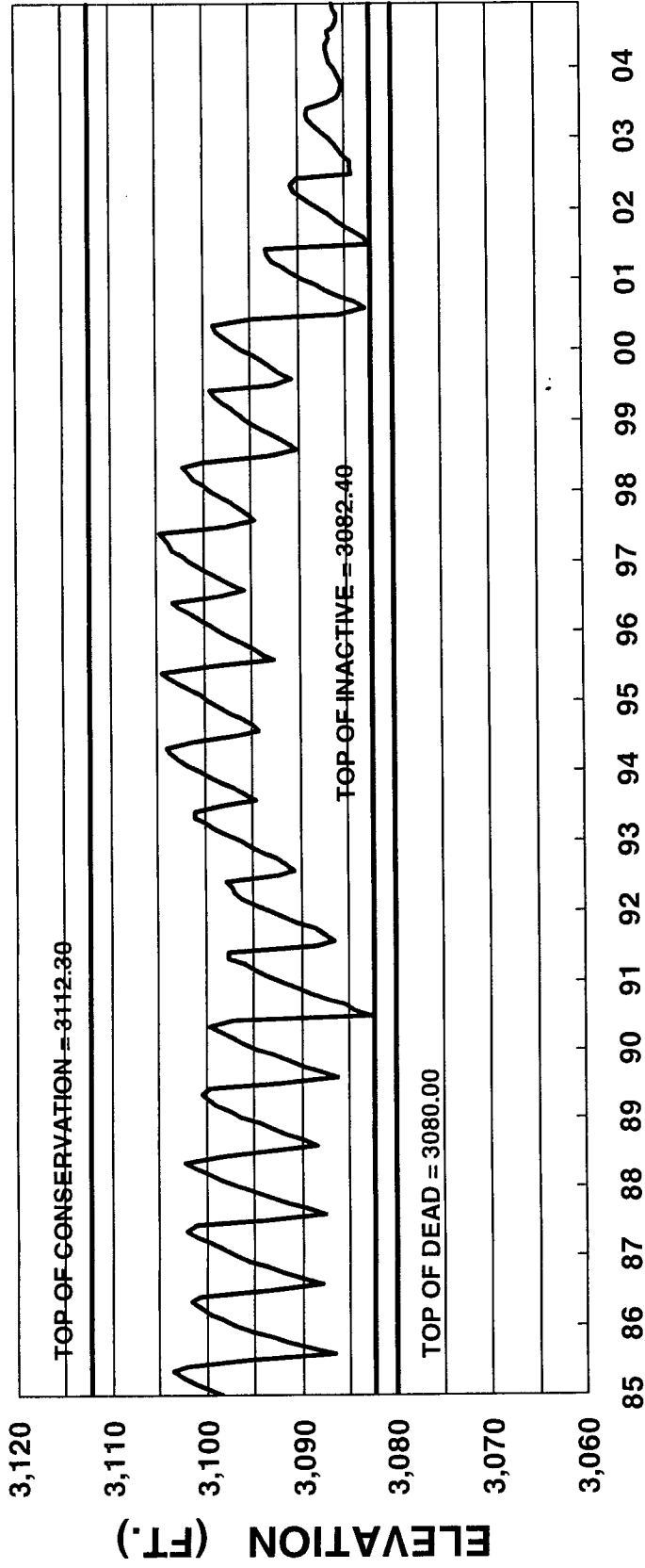
**ENDERS RESERVOIR
END OF MONTH ELEVATION**



OCT 1950 THROUGH DEC 2004

ENDERS RESERVOIR

20 YEAR EOM LEVELS



JAN 1985 - DEC 2004