

Frenchman Valley Appraisal Study
Recreation Analysis

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The recreation analysis for this appraisal level assessment of the Frenchman Valley Study alternatives focuses exclusively on effects at Enders Reservoir. Recreation effects of the proposed alternatives at other regional reservoirs or river segments were considered insignificant and were not addressed in the analysis.

Affected Environment:

This section presents estimates of current recreation visitation and economic value at Enders Reservoir. Enders Reservoir generates both water based and land based recreational activity. The reservoir provides approximately 1,707 acres of surface area and 26 miles of shoreline at full pool.

Recreation facilities at Enders Reservoir include two boat ramps, two campgrounds (150+ tent sites, 32 recreational vehicle sites), eight picnic areas, and one designated swimming beach.

Table REC1 presents the most recent five years (2002-2006) of available recreation visitation data by month at Enders State Recreation Area as obtained from the Nebraska Game and Parks Commission (NGPC). Total recreation use across this period averaged approximately 43,000 visits annually and ranged from a low of 39,812 visits to a high of 46,760 visits. The majority of the visits, nearly 80 percent, occurred during the high use season from May to September.

To measure the economic value associated with this visitation, estimates of economic value per visit were applied to the visitation estimates. However, the visitation estimates first needed to be grouped by primary recreation activity because the economic values per visit vary by recreation activity. To provide an estimate of visitation by recreation activity, a recently published study by Holland and Gabelhouse (2006) was used. This 1999 study surveyed recreators at Enders Reservoir. Table REC2 presents the visitation percentages by primary recreation activity at Enders Reservoir across the entire year and for the high use recreation season (May-September) as obtained from the survey. While the data from the survey was for 1999 and not the 2002-2006 period, the assumption is that the visitation percentages by recreation activity typically do not change significantly from one year to the next within the same general time period. The recreation activities identified in the survey 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 accounting for 55.4% of the full year visitation and 63.2% of the high season use followed by fishing at 21.5% of the full year and 18.7% of the high season use.

Economic values per visit by activity were obtained from a meta analysis study conducted by Loomis (2005). This study determined economic value estimates by recreation activity from

hundreds of recreation economic benefit studies conducted from 1967 through 2003. These studies were separated by recreation activity and geographic region. Economic values were selected from the intermountain region (which includes Nebraska) for the recreation activities listed above. The values were then indexed to February 2008 dollars. The economic values per visit were determined to be highest for boating, fishing, and hunting, with the lowest values for swimming and camping.

Applying these values by recreation activity to the average current visitation estimates by recreation activity provides an estimate of average annual recreation economic value for the 2002 through 2006 period. Using the full year visitation and percentage by activity estimates, annual recreation economic value averaged nearly \$1.9 million. Focusing purely on the high recreation season visitation estimates and percentages, the annual recreation economic value averaged \$1.47 million. The top three activities in terms of economic value proved to be camping, fishing, and boating.

In addition to the visitation and economic value estimates, a simple recreation facility availability analysis was conducted for the years 2002-2006 to be consistent with the timeframe associated with the visitation and value estimates. While Chapter 5 – Potential Effects of the Alternatives will be focusing on differences between facility availability between the proposed alternatives, this same analysis for the 2002-2006 time period is intended to provide some historical perspective. Average and dry/wet (10%/90%) condition end of month (EOM) water levels were compared to high and low end usability thresholds for the two boat ramps and one swimming beach (see the recreation environmental consequences section for more detail on the methodology).

The boat ramps were evaluated from two perspectives, one where two feet were added to the bottom of each ramp to allow for launching and the other where the bottom of the ramp was simply used as the low end threshold. As shown in Table REC3, the boat ramps vary in terms of their availability based on the water condition and the assumptions regarding the low end usability threshold. When the two foot water level cushion is added to the bottom of the ramps, the Center Dam ramp is unavailable across the entire 2002-6 period. The new “low water” ramp is available from January or February through June during average and wet conditions. Considering the absolute low end of the ramps as the usability threshold improves availability, especially for the new low water ramp, which is available in all months except July through September under dry conditions. During the high use recreation season from May through September, Cow Beach boat ramp is available from May through July or August during average and wet conditions, but only May and June during dry conditions.

Table REC1: Average Annual and Monthly Visitation at Enders State Recreation Area (SRA)

Source: Nebraska Game & Parks Commission

Year	Location	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
2002	ENDERS SRA	1,663	1,417	1,575	1,785	6,475	8,750	8,750	4,550	1,925	1,050	1,225	1,575	40,740
2003	ENDERS SRA	1,487	1,400	1,522	1,803	7,000	9,275	9,800	5,250	1,750	1,120	1,050	1,487	42,944
2004	ENDERS SRA	1,400	1,050	1,312	1,750	6,650	8,750	6,300	4,200	5,250	1,400	1,050	700	39,812
2005	ENDERS SRA	1,050	1,225	1,330	1,330	5,250	9,100	9,800	8,750	5,600	1,050	1,225	1,050	46,760
2006	ENDERS SRA	875	700	700	1,225	5,075	8,750	9,450	8,750	5,775	1,137	1,225	1,050	44,712
	Monthly Average:	1,295	1,158	1,288	1,579	6,090	8,925	8,820	6,300	4,060	1,151	1,155	1,172	42,994
	Percent by Month:	3.01	2.69	3.00	3.67	14.16	20.76	20.51	14.65	9.44	2.68	2.69	2.73	
	High Season (May-Sept) Average:	34,195												
	High Season (May-Sept) Percent:	79.54												

Table REC2: Average Annual Recreation Visitation and Economic Value by Activity

Recreation Activities	Full Year Percent (1)	High Season (May-Sept) Percent (1)	Full Year Visitation	High Season (May-Sept) Visitation	(2004 \$) Economic Value per Visit (2)	(2008 \$) Economic Value per Visit (2)	(2008 \$) Full Year Value	(2008 \$) High Season (May-Sept) Value
Camping	55.39	63.22	23,814	21,618	34.72	38.39	914,201	829,896
Fishing	21.49	18.72	9,239	6,401	49.57	54.81	506,391	350,844
Boating	8.54	8.79	3,672	3,006	53.68	59.35	217,922	178,398
Swimming	5.22	6.19	2,244	2,117	29.54	32.66	73,301	69,134
Wildlife Observation	4.34	2.19	1,866	749	37.24	41.18	76,830	30,835
Hunting	3.88	0.29	1,668	99	48.55	53.68	89,547	5,323
Other (Walking)	1.14	0.6	490	205	38.53	42.60	20,880	8,741
	100.00	100.00	42,994	34,195			1,899,073	1,473,171

Data Sources: (1) Holland and Gabelhouse (2006), (2) Loomis (2005)

Table REC3: Recreation Facility Availability Years 2002-2006

Note: YES = Available, NO = Unavailable

EOM Water Levels	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg:	3086.7	3087.3	3087.7	3088.1	3088.2	3088.0	3086.2	3085.7	3085.3	3085.4	3085.7	3086.0
10%:	3086.3	3086.6	3086.8	3086.9	3086.7	3086.4	3085.0	3084.8	3084.7	3085.1	3085.3	3085.7
90%:	3087.3	3088.3	3089.1	3089.8	3090.0	3089.6	3087.0	3086.4	3085.8	3085.9	3086.1	3086.3

I. Boat Ramps: 2 feet added to bottom of ramps to allow for launching

Center Dam:	Low:	3091	High:	3118								
Average:	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
10%:	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
90%:	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
New Ramp:	Low:	3087	High:	3102								
Average:	NO	YES	YES	YES	YES	YES	NO	NO	NO	NO	NO	NO
10%:	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
90%:	YES	YES	YES	YES	YES	YES	NO	NO	NO	NO	NO	NO

II. Boat Ramps: 2 feet not added to bottom of ramps

Center Dam:	Low:	3089	High:	3118								
Average:	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
10%:	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
90%:	NO	NO	YES	YES	YES	YES	NO	NO	NO	NO	NO	NO
New Ramp:	Low:	3085	High:	3102								
Average:	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
10%:	YES	YES	YES	YES	YES	YES	NO	NO	NO	YES	YES	YES
90%:	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

III. Beaches:

Cow Beach:	Low:	3086	High:	3100								
Average:	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO	NO	YES
10%:	YES	YES	YES	YES	YES	YES	NO	NO	NO	NO	NO	NO
90%:	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	YES	YES

Environmental Consequences:

The focus of the recreation analysis is on a comparison of recreation facility availability at Enders Reservoir for each of the proposed “action” alternatives compared to the No Action Alternative.

Methodology:

The availability of three primary water based recreation facilities found at Enders Reservoir were compared across the alternatives: 1) Center Dam boat ramp, 2) New “Low Water” boat ramp, and 3) Cow beach. The most current usability thresholds for the boat ramps were obtained from NGPC. The Center Dam ramp has a low end threshold of 3089 (bottom of the ramp) and a high end threshold of 3118 (top of the ramp). The New “Low Water” ramp has a low end threshold of 3085 and a high end threshold of 3102. To prevent boat trailers from running off the ends of the ramps, an assumption was made that the ramps would be closed when reservoir water levels dropped within two feet of the end of each ramp. This implies that the low end threshold for the Center Dam ramp increases to 3091 and the New “Low Water” ramp to 3087. While this reflects a “best guess” estimate of facility availability, the analysis was also run using the full length of the ramps from top to bottom. In addition, the Park Manager at Enders estimated Cow Beach to be most usable between elevations 3086 and 3100.

End of Month (EOM) water levels at Enders Reservoir were projected by Reclamation hydrologists for each alternative from 2008 through 2046. From this data, water level estimates were developed for average, dry (10th percentile), median (50% percentile), and wet (90th percentile) conditions by month and alternative.

Finally, the EOM water level estimates by alternative and hydrologic condition were compared to the high and low end usability thresholds by recreation facility to estimate future facility availability by month and alternative. The facility availability for each of the proposed action alternatives was then compared to the facility availability for the No Action Alternative to estimate the change in facility availability for the action alternatives (changes in availability are shown in bold in the tables). Note that the facility availability for each alternative is a rough estimate since it is based on EOM water levels. Obviously water levels can vary across the days in each month and even across the hours in each day, but water levels often tend to trend up or down within a month based on irrigation demands.

Facility Availability Results:

Recreation facility availability is presented for each of the alternatives. For the proposed action alternatives, emphasis is placed on the change in facility availability as compared to the No Action Alternative.

No Action Alternative: As shown in Table REC4 (displayed at the end of this section), the boat ramps vary in terms of their availability based on both the water condition and the assumptions regarding the low end usability threshold. When the two foot water

cushion is added to the bottom of the ramps, the Center Dam ramp shows up as unavailable across all water conditions. The new “low water” ramp only shows up as available during wet conditions, albeit for all months. Using the absolute low end of the ramps as the threshold improves availability. The Center Dam ramp becomes available in wet conditions, but only for January through June. The new low water ramp shows availability in all months during average and wet conditions, but no availability during dry conditions. During the high use recreation season from May through September, Cow Beach shows availability only in May and June during average conditions. The beach shows up as unavailable during dry conditions and available during wet conditions.

Flow Through Alternative: As presented in Table REC5, none of the facilities show up as available under any of the water conditions with the Flow Through Alternative. Compared to the No Action Alternative, this represents a reduction in facility availability as follows –

- Center Dam Ramp: Reduction in availability from January to June under wet conditions (without 2’ cushion)
- New “Low Water” Ramp: Reduction in availability across all months under wet conditions (with 2’ cushion), and in all months under average and wet conditions (without 2’ cushion).
- Cow Beach: Reduction in availability during high use season for May and June during average conditions and May through September during wet conditions.

This alternative would be expected to result in a loss in recreation visitation and economic value as compared to the No Action Alternative.

Groundwater Recharge Alternative: As presented in Table REC6, none of the facilities show up as available under any of the water conditions with the Groundwater Recharge Alternative. Compared to the No Action Alternative, the reduction in facility availability mirrors that of the Flow Through Alternative.

This alternative would be expected to result in a loss in recreation visitation and economic value as compared to the No Action Alternative similar to the Flow Through Alternative.

Recreation Alternative without Deliveries: As presented in Table REC7, all of the facilities show up as available under each of the water conditions with the Recreation Alternative without Deliveries, except for the Center Dam ramp under dry conditions (with the 2’ cushion).

Compared to the No Action Alternative, this represents an increase in facility availability as follows -

- Center Dam Ramp: Increase in availability in all months during average and wet conditions and under dry conditions during March and April (with 2' cushion). Without the 2' cushion, the increase in availability occurs in all months during average and dry conditions and from July through December during wet conditions.
- New "Low Water" Ramp: Increase in availability occurs across all months under average and dry conditions (with 2' cushion), and in all months under dry conditions (without 2' cushion).
- Cow Beach: Increase in availability during high use season for July through September during average conditions and May through September during dry conditions.

This alternative would be expected to result in the largest gain in recreation visitation and economic value as compared to the No Action Alternative of all the proposed action alternatives.

Recreation Alternative with Deliveries: As shown in Table REC8, the Center Dam ramp is generally unavailable (except from January through May during wet conditions) with the 2' cushion and generally available (except in August and September during dry conditions) without the 2' cushion. The New "Low Water" ramp and Cow Beach show up as available across all water conditions.

Compared to the No Action Alternative, this represents an increase in facility availability as follows -

- Center Dam Ramp: Increase in availability from January to May under wet conditions with the 2' cushion. Without the 2' cushion, the increase in availability occurs in all months during average and dry conditions (except for August and September in dry conditions), and from July through December during wet conditions.
- New "Low Water" Ramp: Increase in availability occurs across all months under average and dry conditions (with 2' cushion), and in all months under dry conditions (without 2' cushion).
- Cow Beach: Increase in availability during high use season for July through September during average conditions and May through September during dry conditions.

This alternative would be expected to result in a gain in recreation visitation and economic value as compared to the No Action Alternative, but perhaps somewhat less than the Recreation Alternative without Deliveries.

Table REC4: Recreation Facility Availability - No Action Alternative

Note: YES = Available, NO = Unavailable

EOM Water Levels	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg:	3086.5	3086.7	3086.9	3086.9	3086.8	3086.4	3085.5	3085.1	3085.3	3085.5	3085.7	3086
10%:	3083.9	3084.1	3084.3	3084.4	3084.2	3084	3083.7	3082.4	3082.7	3082.9	3083.2	3083.6
90%:	3089.7	3089.9	3090.1	3090.2	3090.1	3089.1	3088.1	3088.1	3088.3	3088.5	3088.7	3088.9

I. Boat Ramps: 2 feet added to bottom of ramps to allow for launching

Center Dam:	Low:	3091	High:	3118								
Average:	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
10%:	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
90%:	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
New Ramp:	Low:	3087	High:	3102								
Average:	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
10%:	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
90%:	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

II. Boat Ramps: 2 feet not added to bottom of ramps

Center Dam:	Low:	3089	High:	3118								
Average:	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
10%:	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
90%:	YES	YES	YES	YES	YES	YES	NO	NO	NO	NO	NO	NO
New Ramp:	Low:	3085	High:	3102								
Average:	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
10%:	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
90%:	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

III. Beaches:

Cow Beach:	Low:	3086	High:	3100								
Average:	YES	YES	YES	YES	YES	YES	NO	NO	NO	NO	NO	YES
10%:	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
90%:	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table REC5: Recreation Facility Availability - Flow Through Alternative

Note: YES = Available, NO = Unavailable

EOM Water Levels	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg:	3080	3080	3080	3080	3080	3080	3080	3080	3080	3080	3080	3080
10%:	3080	3080	3080	3080	3080	3080	3080	3080	3080	3080	3080	3080
90%:	3080	3080	3080	3080	3080	3080	3080	3080	3080	3080	3080	3080

I. Boat Ramps: 2 feet added to bottom of ramps to allow for launching

Center Dam:	Low:	3091	High:	3118								
Average:	NO											
10%:	NO											
90%:	NO											
New Ramp:	Low:	3087	High:	3102								
Average:	NO											
10%:	NO											
90%:	NO											

II. Boat Ramps: 2 feet not added to bottom of ramps

Center Dam:	Low:	3089	High:	3118								
Average:	NO											
10%:	NO											
90%:	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
New Ramp:	Low:	3085	High:	3102								
Average:	NO											
10%:	NO											
90%:	NO											

III. Beaches:

Cow Beach:	Low:	3086	High:	3100								
Average:	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
10%:	NO											
90%:	NO											

Note: **Bolded cells** reflect changes from the No Action Alternative.

Table REC6: Recreation Facility Availability - Groundwater Recharge Alternative

Note: YES = Available, NO = Unavailable

EOM Water Levels	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg:	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4
10%:	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4
90%:	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4	3082.4

I. Boat Ramps: 2 feet added to bottom of ramps to allow for launching

Center Dam:	Low:	3091	High:	3118								
Average:	NO											
10%:	NO											
90%:	NO											
New Ramp:	Low:	3087	High:	3102								
Average:	NO											
10%:	NO											
90%:	NO											

II. Boat Ramps: 2 feet not added to bottom of ramps

Center Dam:	Low:	3089	High:	3118								
Average:	NO											
10%:	NO											
90%:	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
New Ramp:	Low:	3085	High:	3102								
Average:	NO											
10%:	NO											
90%:	NO											

III. Beaches:

Cow Beach:	Low:	3086	High:	3100								
Average:	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
10%:	NO											
90%:	NO											

Note: **Bolded cells** reflect changes from the No Action Alternative.

Table REC7: Recreation Facility Availability – Recreation Alternative Without Deliveries Note: YES = Available, NO = Unavailable

EOM Water Levels	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg:	3093.1	3093.2	3093.3	3093.3	3093.1	3092.9	3092.7	3092.5	3092.4	3092.5	3092.7	3092.8
10%:	3090.8	3090.9	3091.1	3091.1	3090.9	3090.6	3090.3	3090.1	3090.0	3090.1	3090.3	3090.5
90%:	3095.0	3095.1	3095.3	3095.2	3095.1	3094.9	3094.7	3094.6	3094.5	3094.5	3094.7	3094.9

I. Boat Ramps: 2 feet added to bottom of ramps to allow for launching

Center Dam:	Low:	3091	High:	3118								
Average:	YES											
10%:	NO	NO	YES	YES	NO							
90%:	YES											
New Ramp:	Low:	3087	High:	3102								
Average:	YES											
10%:	YES											
90%:	YES											

II. Boat Ramps: 2 feet not added to bottom of ramps

Center Dam:	Low:	3089	High:	3118								
Average:	YES											
10%:	YES											
90%:	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
New Ramp:	Low:	3085	High:	3102								
Average:	YES											
10%:	YES											
90%:	YES											

III. Beaches:

Cow Beach:	Low:	3086	High:	3100								
Average:	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
10%:	YES											
90%:	YES											

Note: **Bolded cells** reflect changes from the No Action Alternative.

Table REC8: Recreation Facility Availability – Recreation Alternative With Deliveries

Note: YES = Available, NO = Unavailable

EOM Water Levels	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg:	3090.3	3090.5	3090.6	3090.6	3090.4	3089.8	3089.6	3089.4	3089.4	3089.6	3089.8	3090.0
10%:	3089.6	3089.8	3089.9	3089.9	3089.7	3089.3	3089.2	3089.0	3088.9	3089.1	3089.3	3089.4
90%:	3091.3	3091.4	3091.6	3091.6	3091.5	3090.7	3090.4	3090.3	3090.2	3090.4	3090.6	3090.8

I. Boat Ramps: 2 feet added to bottom of ramps to allow for launching

Center Dam:	Low:	3091	High:	3118								
Average:	NO											
10%:	NO											
90%:	YES	YES	YES	YES	YES	NO						
New Ramp:	Low:	3087	High:	3102								
Average:	YES											
10%:	YES											
90%:	YES											

II. Boat Ramps: 2 feet not added to bottom of ramps

Center Dam:	Low:	3089	High:	3118								
Average:	YES											
10%:	YES	NO	NO	YES	YES	YES						
90%:	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
New Ramp:	Low:	3085	High:	3102								
Average:	YES											
10%:	YES											
90%:	YES											

III. Beaches:

Cow Beach:	Low:	3086	High:	3100								
Average:	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
10%:	YES											
90%:	YES											

Note: **Bolded cells** reflect changes from the No Action Alternative.

References

Holland, R. and Z. Gabelhouse. 2006. Characterization of Outdoor Recreationists Using Four Bureau of Reclamation Reservoirs, Park Facilities, and Associated Wildlife Lands in the Republican River Basin. Report submitted to: U. S. Department of Interior, Bureau of Reclamation, Grand Island, NE.

Loomis, J. 2005. Updated Outdoor Recreation Use Values on National Forests and Other Public Lands. General Technical Report PNW-GTR-658. Portland, OR: U. S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 26 p.