

**Prepared in cooperation with the
South Dakota Department of Environment and Natural Resources**

Estimated Use of Water in South Dakota, 2000

Open-File Report 02-440

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By Franklin D. Amundson

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U.S. Department of the Interior

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ABSTRACT

During 2000, the total amount of water withdrawn from ground- and surface-water sources in South Dakota was about 528 Mgal/d (million gallons per day). Of this amount, about 222 Mgal/d, or 42 percent of the total, was from ground water. Surface-water withdrawals were about 306 Mgal/d, or 58 percent of the total.

Total withdrawals for six categories of offstream use in South Dakota during 2000 were compiled. The withdrawals include: 93.3 Mgal/d for public supply, 9.53 Mgal/d for self-supplied domestic, 5.12 Mgal/d for industrial, 372.7 Mgal/d for irrigation, 5.24 Mgal/d for thermoelectric power, and 42.0 Mgal/d for livestock.

Water use for hydroelectric power was the only instream use compiled in this report. About 57,794 Mgal/d was used by the hydroelectric powerplants to generate about 6,151 gigawatt-hours of electricity during 2000.

INTRODUCTION

Our Nation's social and economic development has depended on and will continue to depend on the availability of usable water. In 1950, the U.S. Geological Survey (USGS) began publishing water-use data on a national level every 5 years to assist in the wise management of our Nation's water resources.

In 1977, Congress authorized the National Water-Use Information Program. The program encourages the USGS and a State-level agency in each of the 50 states to cooperate in the collection and dissemination of water-use data. In South Dakota, the USGS and

the South Dakota Department of Environment and Natural Resources (SDDENR), Water Rights Program, are cooperators in this effort. Data contained in this report were collected and compiled through the cooperative program.

Purpose and Scope

This report presents six offstream use of freshwater withdrawal estimates and one instream use estimate for South Dakota by source and category during 2000. Withdrawal source is either ground water or surface water. The data are aggregated by county and aquifer or aquifer system. The USGS Office of Ground Water provided a list of aquifer or aquifer systems in South Dakota using information from Whitehead (1996). The 2000 water-use compilation has fewer categories with fewer data elements required for each category than previous compilations.

Terminology

In this report, the term "offstream use" represents all water diverted or withdrawn from a ground- or surface-water source and conveyed to a place of use. "Withdrawal" is water removed from the ground or diverted from a surface-water source for use. "Instream use" refers to water that is used but not withdrawn from a surface-water source.

Data-Collection Methods

Water-use data during 2000 were collected for the following categories: public supply, domestic, industrial, irrigation, thermoelectric power, livestock,

and hydroelectric power. SDDENR mailed out a one-page questionnaire to all permitted water users, except permitted irrigators, requesting total withdrawals and the source(s) of withdrawals. SDDENR sent the completed questionnaires to the USGS where they were compiled and entered into a Site-Specific Water-Use Data System (SWUDS). The permitted irrigators are required to report annually to the SDDENR the amount of water applied and acres irrigated. The reported irrigation data are compiled by the SDDENR and provided to the USGS. The USGS then inputs the data into SWUDS. Telephone followups were used, if needed, for additional information or clarification of data. All SWUDS data were then aggregated by water-use category, county, and aquifer and stored in the USGS Aggregated Water-Use Data System (AWUDS).

OFFSTREAM USE

Water-use information was compiled for six categories of offstream use during 2000. The six categories are public supply, domestic, industrial, irrigation, thermoelectric power, and livestock.

During 2000, total withdrawals from ground- and surface-water sources in South Dakota for the six categories of offstream use were about 528 Mgal/d (million gallons per day) (table 1). Total withdrawals by county are shown in figure 1, and total withdrawals by category of use are shown in figure 2. Of this total, about 222 Mgal/d, or 42 percent of the total, was withdrawn from ground water (table 1). Ground-water withdrawals by category of use are shown in figure 3. Surface-water withdrawals were about 306 Mgal/d, or 58 percent of the total withdrawals (table 1). Surface-water withdrawals by category of use are shown in figure 4.

Public Supply

In 2000, public supply refers to water withdrawn by public or private water suppliers and delivered to multiple users for domestic, industrial, and thermoelectric power uses. Public supply includes public and private water systems that furnish water to at least 25 people, or have a minimum of 15 service connections.

Public-supply facilities in South Dakota withdrew an estimated 93.3 Mgal/d during 2000 (table 2).

About 54.2 Mgal/d, or 58 percent, of these withdrawals was from ground water. Surface-water withdrawals were about 39.1 Mgal/d or about 42 percent. Total public-supply withdrawals averaged about 149.2 gal/d (gallons per day) for each person served.

The population served by public-supply systems has been increasing the last 10 years from about 550,000 during 1990 (Solley and others, 1993, p. 25) to about 602,000 during 1995 (Amundson, 1998) and about 625,000 during 2000. About 346,000 people were served by public-supply systems withdrawing from ground-water sources, while about 279,000 people were served by public-supply systems withdrawing from surface-water sources. The increase in population served by public-supply systems from 1990 to 2000 can be attributed to the continued increase in the number of rural customers and towns served by rural water systems and the migration of people to cities.

There are over 30 regional rural water systems operating in South Dakota, and some other regional systems are either under construction or being planned. Many of these regional rural water systems make withdrawals from one location and deliver the water over a large geographic area that may include several counties. Deliveries by public suppliers for domestic use was about 56.3 Mgal/d (table 3). Deliveries by public suppliers for other uses were not tracked for 2000.

Domestic

Domestic water use includes water for household purposes, such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, car washing, and watering lawns and gardens. Domestic water users obtain water from both public-supply and self-supplied facilities.

Domestic water use during 2000 was about 66 Mgal/d. Of this total, about 56.3 Mgal/d was delivered from public-supply systems serving about 625,000 people (table 3). Per capita domestic use was about 90 gal/d for public-supplied users. Self-supplied withdrawals were 9.53 Mgal/d, of which 9.52 Mgal/d was from ground water (table 4). The population served by self-supplied facilities during 2000 was about 129,000, and per capita use was about 74 gal/d.

Table 1. Total population and water withdrawals by county in South Dakota, 2000

County	Population, in thousands	Water withdrawals, in million gallons per day			County	Population, in thousands	Water withdrawals, in million gallons per day		
		Source		Total			Source		Total
		Ground water	Surface water				Ground water	Surface water	
Aurora	3.06	0.30	0.28	0.58	Jackson	2.93	0.46	0.56	1.02
Beadle	17.02	9.83	2.65	12.48	Jerauld	2.30	1.29	.49	1.78
Bennett	3.57	8.57	.30	8.87	Jones	1.19	.20	.68	.88
Bon Homme	7.26	1.91	3.77	5.68	Kingsbury	5.82	2.98	.37	3.35
Brookings	28.22	14.32	.62	14.94	Lake	11.28	1.92	.36	2.28
Brown	35.46	1.34	3.66	5.00	Lawrence	21.80	4.53	3.93	8.46
Brule	5.36	.29	2.59	2.88	Lincoln	24.13	2.78	.46	3.24
Buffalo	2.03	.71	3.76	4.47	Lyman	3.90	.57	2.02	2.59
Butte	9.09	3.15	127.66	130.81	McCook	5.83	1.03	.42	1.45
Campbell	1.78	1.47	2.37	3.84	McPherson	2.90	1.01	.72	1.73
Charles Mix	9.35	3.65	10.80	14.45	Marshall	4.58	.82	.52	1.34
Clark	4.14	4.63	.67	5.30	Meade	24.25	2.66	3.78	6.44
Clay	13.54	6.88	.45	7.33	Mellette	2.08	.37	.68	1.05
Codington	25.90	6.92	.70	7.62	Miner	2.88	.22	.29	.51
Corson	4.18	.65	1.25	1.90	Minnehaha	148.28	7.66	13.22	20.88
Custer	7.28	.97	3.77	4.74	Moody	6.60	2.82	1.24	4.06
Davison	18.74	.68	3.62	4.30	Pennington	88.57	16.82	3.33	20.15
Day	6.27	.91	.27	1.18	Perkins	3.36	.68	.75	1.43
Deuel	4.50	1.24	.30	1.54	Potter	2.69	1.27	1.71	2.98
Dewey	5.97	.48	1.58	2.06	Roberts	10.02	2.95	.50	3.45
Douglas	3.46	1.66	.35	2.01	Sanborn	2.68	.43	.38	.81
Edmunds	4.37	.40	.45	.85	Shannon	12.47	1.02	.20	1.22
Fall River	7.45	1.32	36.52	37.84	Spink	7.45	15.13	1.90	17.03
Faulk	2.64	.27	.40	.67	Stanley	2.77	.53	.47	1.00
Grant	7.85	3.91	4.79	8.70	Sully	1.56	.81	10.79	11.60
Gregory	4.79	1.02	1.17	2.19	Todd	9.05	8.46	.96	9.42
Haakon	2.20	1.59	1.34	2.93	Tripp	6.43	3.21	2.45	5.66
Hamlin	5.54	4.15	.25	4.40	Turner	8.85	18.45	.51	18.96
Hand	3.74	1.36	.69	2.05	Union	12.58	21.56	.42	21.98
Hanson	3.14	.24	.53	.77	Walworth	5.97	.64	6.07	6.71
Harding	1.35	.48	.95	1.43	Yankton	21.65	5.45	7.51	12.96
Hughes	16.48	4.79	18.33	23.12	Ziebach	2.52	.22	.35	.57
Hutchinson	8.08	2.25	.92	3.17	Total	754.85	221.76	306.20	527.96
Hyde	1.67	.47	.40	.87					

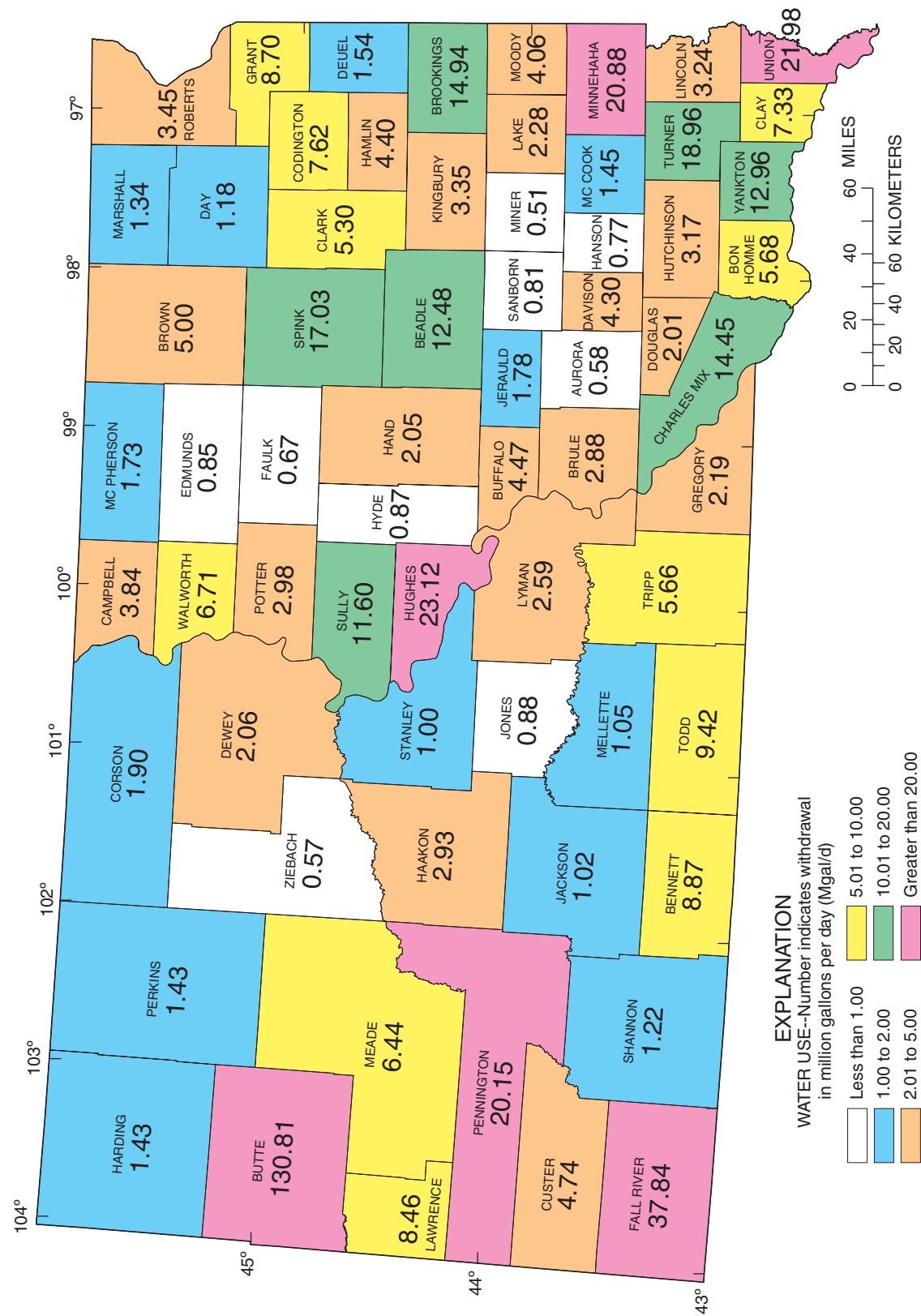


Figure 1. Total water withdrawals by county during 2000.

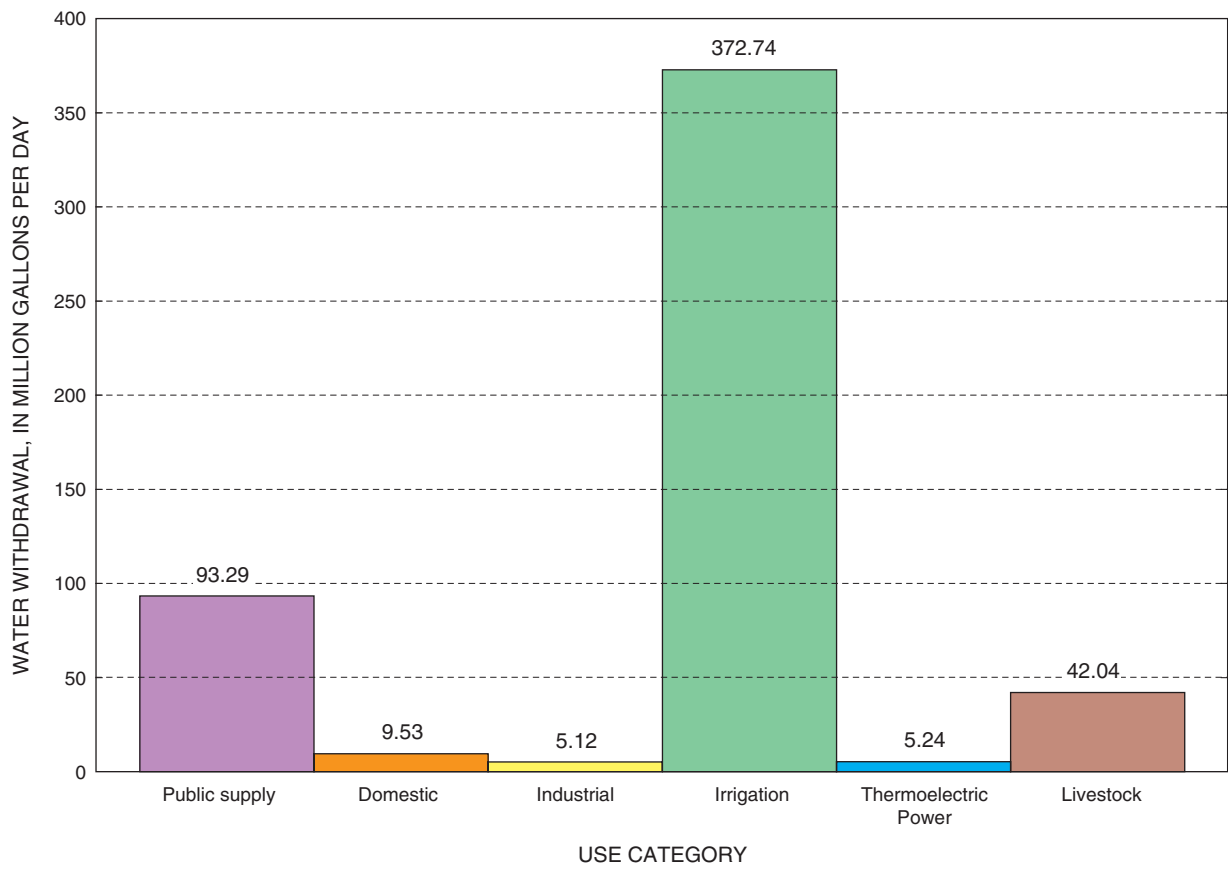


Figure 2. Total water withdrawals from ground water and surface water in South Dakota by category during 2000.

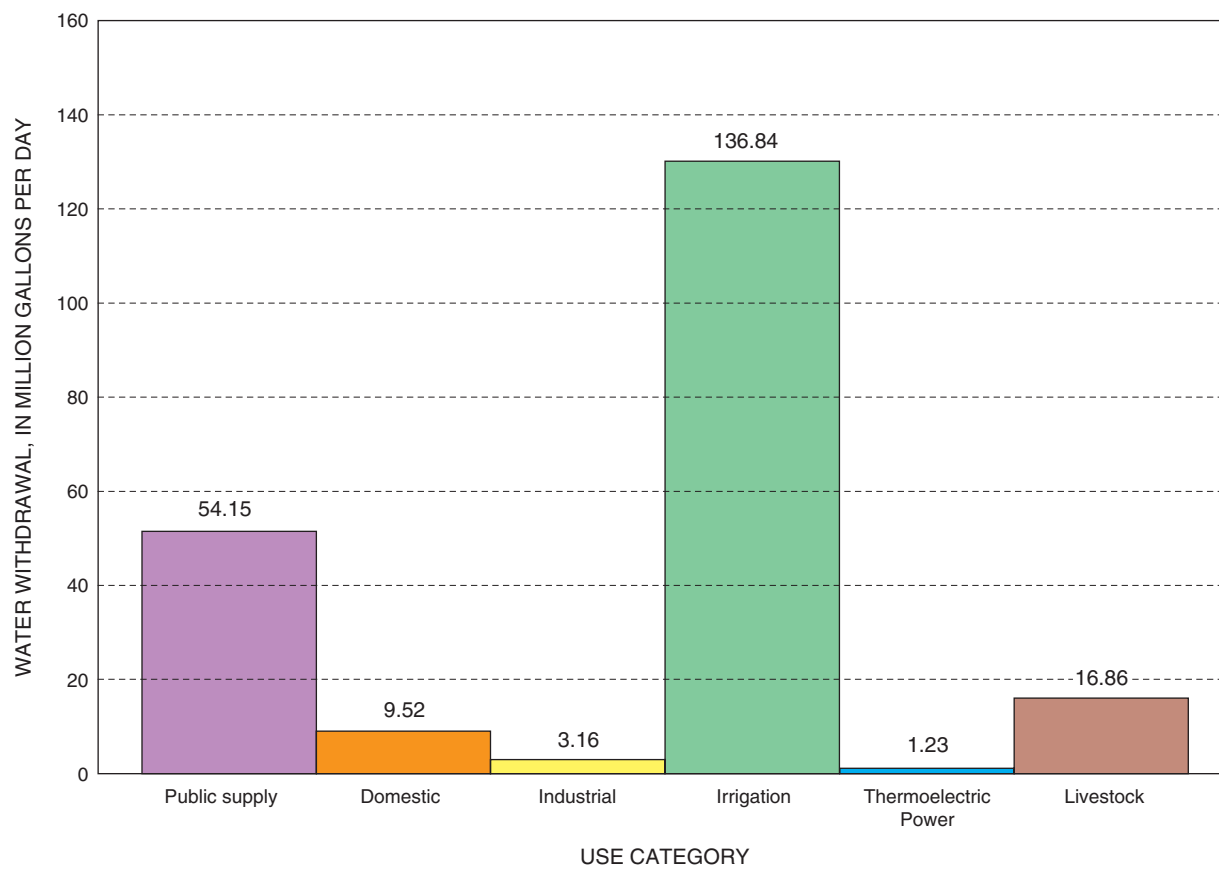


Figure 3. Ground-water withdrawals in South Dakota by category during 2000.

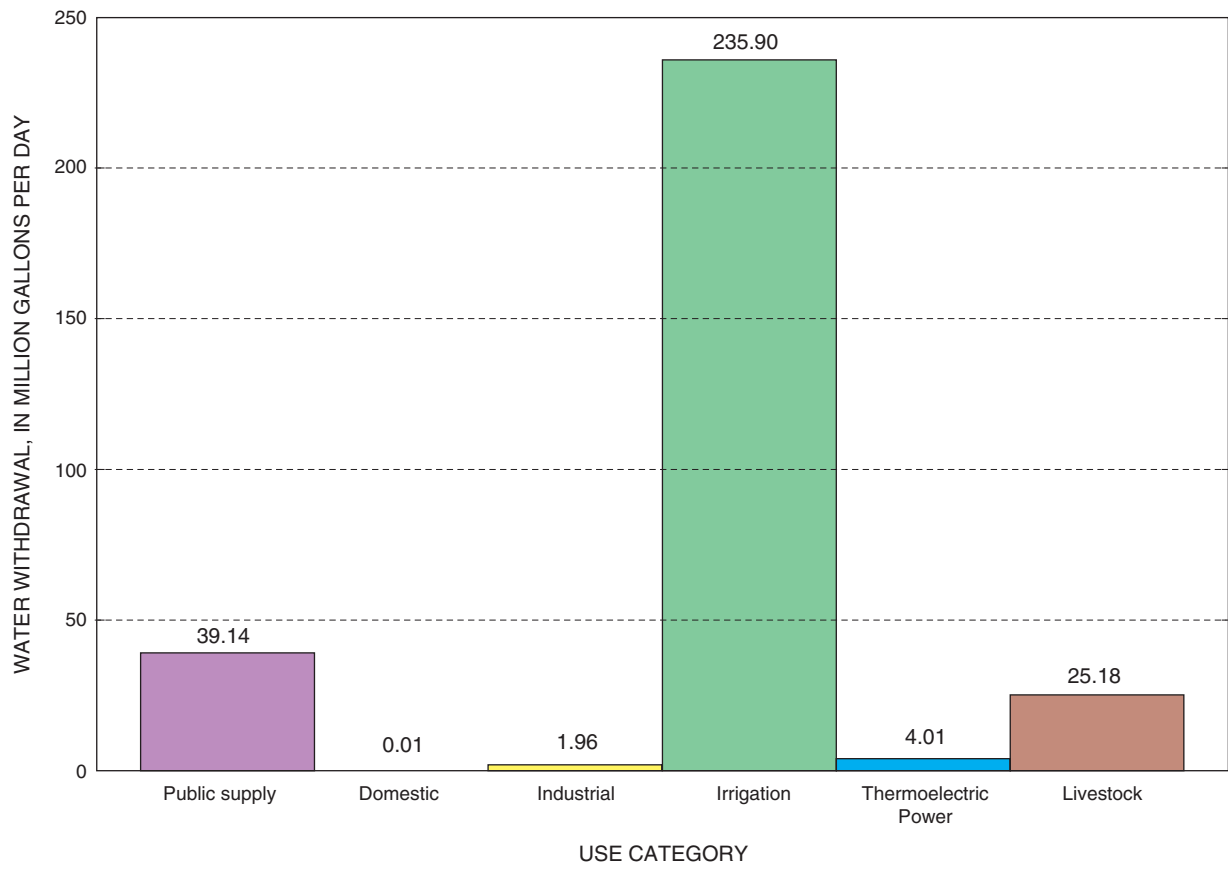


Figure 4. Surface-water withdrawals in South Dakota by category during 2000.

Table 2. Estimated population and public-supply withdrawals by county in South Dakota, 2000

County	Population served, in thousands			Water withdrawals ¹ , in million gallons per day		
	Source		Total	Source		Total
	Ground water	Surface water		Ground water	Surface water	
Aurora	0.60	2.46	3.06	0.07	0.00	0.07
Beadle	2.14	11.00	13.14	.73	1.27	2.00
Bennett	1.11	.00	1.11	.24	.00	.24
Bon Homme	2.13	5.13	7.26	.18	.20	.38
Brookings	26.35	.00	26.35	5.38	.00	5.38
Brown	1.11	34.16	35.27	.03	2.89	2.92
Brule	.00	5.36	5.36	.00	1.09	1.09
Buffalo	.00	1.72	1.72	.00	.00	.00
Butte	6.65	.00	6.65	1.37	.00	1.37
Campbell	.58	1.20	1.78	.10	.00	.10
Charles Mix	.82	8.53	9.35	.09	2.54	2.63
Clark	3.89	.00	3.89	.97	.00	.97
Clay	13.34	.20	13.54	1.88	.00	1.88
Codington	24.20	.00	24.20	3.71	.00	3.71
Corson	1.18	.00	1.18	.17	.00	.17
Custer	2.68	.00	2.68	.45	.00	.45
Davison	.48	16.85	17.33	.04	3.01	3.05
Day	1.37	4.90	6.27	.09	.00	.09
Deuel	4.50	.00	4.50	.19	.00	.19
Dewey	.68	2.29	2.97	.11	.93	1.04
Douglas	.00	3.46	3.46	.00	.00	.00
Edmunds	.00	4.37	4.37	.00	.00	.00
Fall River	5.14	.00	5.14	.80	.00	.80
Faulk	.11	2.53	2.64	.01	.00	.01
Grant	3.46	3.64	7.10	.07	.49	.56
Gregory	4.79	.00	4.79	.54	.00	.54
Haakon	1.06	.90	1.96	.75	.00	.75
Hamlin	4.01	.00	4.01	.37	.00	.37
Hand	.02	2.58	2.60	.01	.00	.01
Hanson	.10	3.04	3.14	.00	.00	.00
Harding	.44	.00	.44	.06	.00	.06
Hughes	13.88	1.12	15.00	3.11	1.21	4.32
Hutchinson	3.34	1.32	4.66	.09	.00	.09
Hyde	.85	.22	1.07	.00	.00	.00
Jackson	.85	.31	1.16	.06	.00	.06
Jerauld	.32	1.04	1.36	.13	.14	.27
Jones	.09	.61	.70	.01	.12	.13

Table 2. Estimated population and public-supply withdrawals by county in South Dakota, 2000–Continued

County	Population served, in thousands			Water withdrawals ¹ , in million gallons per day		
	Source		Total	Source		Total
	Ground water	Surface water		Ground water	Surface water	
Kingsbury	5.82	0.00	5.82	1.50	0.00	1.50
Lake	11.28	.00	11.28	.90	.00	.90
Lawrence	8.61	5.40	14.01	1.75	1.65	3.40
Lincoln	24.13	.00	24.13	1.99	.00	1.99
Lyman	1.49	.68	2.17	.13	.23	.36
McCook	3.86	1.97	5.83	.79	.00	.79
McPherson	1.16	1.56	2.72	.03	.00	.03
Marshall	4.07	.14	4.21	.47	.02	.49
Meade	6.44	.82	7.26	.61	.00	.61
Mellette	.60	.57	1.17	.04	.00	.04
Miner	2.85	.03	2.88	.02	.00	.02
Minnehaha	33.16	106.79	139.95	4.12	12.26	16.38
Moody	6.60	.00	6.60	1.25	.00	1.25
Pennington	67.68	.30	67.98	13.35	.00	13.35
Perkins	1.77	.00	1.77	.18	.00	.18
Potter	1.34	1.35	2.69	.19	.00	.19
Roberts	5.77	.00	5.77	.48	.00	.48
Sanborn	.97	.12	1.09	.07	.00	.07
Shannon	.09	.00	.09	.01	.00	.01
Spink	.43	7.02	7.45	.09	.00	.09
Stanley	1.99	.00	1.99	.31	.00	.31
Sully	.08	.94	1.02	.01	.00	.01
Todd	1.58	.10	1.68	.11	.00	.11
Tripp	6.43	.00	6.43	1.67	.00	1.67
Turner	5.27	3.58	8.85	1.13	.00	1.13
Union	9.81	.00	9.81	1.12	.00	1.12
Walworth	.24	5.73	5.97	.02	4.94	4.96
Yankton	.42	21.23	21.65	.00	6.15	6.15
Ziebach	.00	1.96	1.96	.00	.00	.00
Total	346.21	279.23	625.44	54.15	39.14	93.29

¹May include withdrawals by rural water systems that make deliveries to other counties.

Table 3. Estimated public-supply domestic water deliveries by county in South Dakota, 2000

County	Public-supplied population, in thousands	Public-supply deliveries, in million gallons per day	Per capita use, in gallons per day	County	Public-supplied population, in thousands	Public-supply deliveries, in million gallons per day	Per capita use, in gallons per day
Aurora	3.06	0.28	91.50	Jackson	1.16	0.06	51.72
Beadle	13.14	.80	60.88	Jerauld	1.36	.22	161.76
Bennett	1.11	.15	135.14	Jones	.70	.13	185.71
Bon Homme	7.26	.89	122.59	Kingsbury	5.82	.64	109.97
Brookings	26.35	2.08	78.94	Lake	11.28	1.22	108.16
Brown	35.27	2.70	76.55	Lawrence	14.01	2.22	158.46
Brule	5.36	.61	113.81	Lincoln	24.13	1.60	66.31
Buffalo	1.72	.02	11.63	Lyman	2.17	.41	188.94
Butte	6.65	.90	135.34	McCook	5.83	.46	78.90
Campbell	1.78	.32	179.78	McPherson	2.72	.15	55.15
Charles Mix	9.35	1.57	167.91	Marshall	4.21	.32	76.01
Clark	3.89	.25	64.27	Meade	7.26	.74	101.93
Clay	13.54	1.11	81.98	Mellette	1.17	.08	68.38
Codington	24.20	2.19	90.50	Miner	2.88	.23	79.86
Corson	1.18	.13	110.17	Minnehaha	139.95	8.32	59.45
Custer	2.68	.27	100.75	Moody	6.60	.60	90.91
Davison	17.33	2.01	115.98	Pennington	67.98	7.11	104.59
Day	6.27	.62	98.88	Perkins	1.77	.12	67.80
Deuel	4.50	.49	108.89	Potter	2.69	.24	89.22
Dewey	2.97	.50	168.35	Roberts	5.77	.44	76.26
Douglas	3.46	.62	179.19	Sanborn	1.09	.07	64.22
Edmunds	4.37	.40	91.53	Shannon	.09	.01	111.11
Fall River	5.14	.73	142.02	Spink	7.45	.60	80.54
Faulk	2.64	.28	106.06	Stanley	1.99	.11	55.28
Grant	7.10	.55	77.46	Sully	1.02	.12	117.65
Gregory	4.79	.62	129.44	Todd	1.68	.14	83.33
Haakon	1.96	.53	270.41	Tripp	6.43	.85	132.19
Hamlin	4.01	.50	124.69	Turner	8.85	.82	92.66
Hand	2.60	.23	88.46	Union	9.81	.87	88.69
Hanson	3.14	.38	121.02	Walworth	5.97	.58	97.15
Harding	.44	.06	136.36	Yankton	21.65	1.40	64.67
Hughes	15.00	1.90	126.67	Ziebach	1.96	.14	71.43
Hutchinson	4.66	.43	92.27				
Hyde	1.07	.16	149.53	Total	625.44	56.30	¹ 90.02

¹Average computed by dividing total deliveries by total population.

Table 4. Estimated self-supplied domestic water withdrawals by county in South Dakota, 2000

County	Self-supplied population, in thousands	Self-supplied water withdrawals, in million gallons per day			Per capita use, in gallons per day	County	Self-supplied population, in thousands	Self-supplied water withdrawals, in million gallons per day			Per capita use, in gallons per day
		Source						Source			
		Ground water	Surface water	Total				Ground water	Surface water	Total	
Beadle	3.88	0.27	0.00	0.27	69.59	Jackson	1.77	0.13	0.00	0.13	73.45
Bennett	2.46	.17	.00	.17	69.11	Jerauld	.94	.07	.00	.07	74.47
Brookings	1.87	.17	.00	.17	90.91	Jones	.49	.03	.00	.03	61.22
Brown	.19	.02	.00	.02	105.26	Lawrence	7.79	.57	.01	.58	74.45
Buffalo	.31	.02	.00	.02	64.52	Lyman	1.73	.12	.00	.12	69.36
Butte	2.44	.18	.00	.18	73.77	McPherson	.18	.02	.00	.02	111.11
Clark	.25	.02	.00	.02	80.00	Marshall	.37	.03	.00	.03	81.08
Codington	1.70	.14	.00	.14	82.35	Meade	16.99	1.30	.00	1.30	76.52
Corson	3.00	.21	.00	.21	70.00	Mellette	.91	.06	.00	.06	65.93
Custer	4.60	.33	.00	.33	71.74	Minnehaha	8.33	.62	.00	.62	74.43
Davison	1.41	.10	.00	.10	70.92	Pennington	20.59	1.55	.00	1.55	75.28
Dewey	3.00	.21	.00	.21	70.00	Perkins	1.59	.11	.00	.11	69.18
Fall River	2.31	.17	.00	.17	73.59	Roberts	4.25	.31	.00	.31	72.94
Grant	.75	.05	.00	.05	66.67	Sanborn	1.59	.12	.00	.12	75.47
Haakon	.24	.02	.00	.02	83.33	Shannon	12.38	0.87	0.00	0.87	70.27
Hamlin	1.53	.11	.00	.11	71.90	Stanley	.78	.06	.00	.06	76.92
Hand	1.14	.08	.00	.08	70.18	Sully	.54	.04	.00	.04	74.07
Harding	.91	.07	.00	.07	76.92	Todd	7.37	.52	.00	.52	70.56
Hughes	1.48	.12	.00	.12	81.08	Union	2.77	.19	.00	.19	68.59
Hutchinson	3.42	.26	.00	.26	76.02	Ziebach	.56	.04	.00	.04	71.43
Hyde	.60	.04	.00	.04	66.67	Total	129.41	9.52	.01	9.53	73.64

Industrial

Industrial water use includes water used to manufacture products. Industrial water use during 2000 for self supply was about 5.12 Mgal/d (table 5). Of this total, about 3.16 Mgal/d was from ground water and about 1.96 Mgal/d was from surface water. Public-supply deliveries to industrial users were not tracked for 2000.

Irrigation

Irrigation water use includes all water artificially applied to farms, orchards, and horticulture crops.

Because irrigation is the largest offstream use of water in South Dakota, the quantity of water used by the holder of an irrigation permit must be reported annually to the SDDENR. The irrigation data provided in this report are based on the 2000 SDDENR irrigation questionnaires.

Irrigation withdrawals during 2000 totaled about 372.7 Mgal/d (table 6). Of the total withdrawals for irrigation, about 136.8 Mgal/d was from ground-water sources and about 235.9 Mgal/d was from surface-water sources. An estimated 354,320 acres was irrigated during 2000—276,000 acres by sprinkler application and 78,320 acres by surface (or flood) application.

Table 5. Estimated self-supplied industrial water withdrawals by county in South Dakota, 2000

Self-supplied water withdrawals, in million gallons per day				Self-supplied water withdrawals, in million gallons per day			
County	Source		Total	County	Source		Total
	Ground water	Surface water			Ground water	Surface water	
Aurora	0.00	0.00	0.00	Jackson	0.00	0.00	0.00
Beadle	.02	.00	.02	Jerauld	.00	.00	.00
Bennett	.00	.00	.00	Jones	.00	.00	.00
Bon Homme	.00	.00	.00	Kingsbury	.00	.00	.00
Brookings	.05	.00	.05	Lake	.01	.00	.01
Brown	.01	.00	.01	Lawrence	.25	1.82	2.07
Brule	.00	.00	.00	Lincoln	.00	.00	.00
Buffalo	.00	.00	.00	Lyman	.00	.00	.00
Butte	.00	.00	.00	McCook	.00	.00	.00
Campbell	.00	.00	.00	McPherson	.00	.00	.00
Charles Mix	.00	.00	.00	Marshall	.00	.00	.00
Clark	.07	.00	.07	Meade	.18	.00	.18
Clay	.00	.00	.00	Mellette	.00	.00	.00
Codington	.01	.00	.01	Miner	.00	.00	.00
Corson	.00	.00	.00	Minnehaha	1.41	.01	1.42
Custer	.00	.00	.00	Moody	.00	.00	.00
Davison	.00	.00	.00	Pennington	1.00	.09	1.09
Day	.00	.00	.00	Perkins	.00	.00	.00
Deuel	.01	.00	.01	Potter	.00	.00	.00
Dewey	.00	.00	.00	Roberts	.00	.00	.00
Douglas	.00	.00	.00	Sanborn	.00	.00	.00
Edmunds	.00	.00	.00	Shannon	.00	.00	.00
Fall River	.00	.00	.00	Spink	.00	.00	.00
Faulk	.00	.00	.00	Stanley	.00	.00	.00
Grant	.01	.00	.01	Sully	.01	.00	.01
Gregory	.00	.00	.00	Todd	.00	.00	.00
Haakon	.00	.00	.00	Tripp	.00	.00	.00
Hamlin	.00	.00	.00	Turner	.00	.00	.00
Hand	.00	.00	.00	Union	.07	.00	.07
Hanson	.00	.00	.00	Walworth	.00	.00	.00
Harding	.05	.04	.09	Yankton	.00	.00	.00
Hughes	.00	.00	.00	Ziebach	.00	.00	.00
Hutchinson	.00	.00	.00	Total	3.16	1.96	5.12
Hyde	.00	.00	.00				

Table 6. Estimated irrigation withdrawals and acreage irrigated by county in South Dakota, 2000

County	Water withdrawals, in million gallons per day			Irrigated land, in thousand acres		
	Source		Total	Application method		Total
	Ground water	Surface water		Sprinkler	Surface	
Aurora	0.01	0.00	0.01	0.03	0.00	0.03
Beadle	8.15	.39	8.54	14.01	.54	14.55
Bennett	7.96	.00	7.96	6.19	.93	7.12
Bon Homme	1.45	3.16	4.61	6.08	.38	6.46
Brookings	8.39	.12	8.51	15.73	1.25	16.98
Brown	.86	.13	.99	3.26	.11	3.37
Brule	.00	1.02	1.02	1.42	.15	1.57
Buffalo	.59	3.61	4.20	3.32	.50	3.82
Butte	1.30	127.21	128.51	11.53	47.97	59.50
Campbell	1.22	2.14	3.36	2.89	.28	3.17
Charles Mix	3.05	7.49	10.54	11.80	1.00	12.80
Clark	3.28	.24	3.52	6.17	.16	6.33
Clay	4.92	.33	5.25	10.52	.35	10.87
Codington	2.82	.34	3.16	5.11	.42	5.53
Corson	.00	.85	.85	1.41	.09	1.50
Custer	.05	3.56	3.61	1.07	.62	1.69
Davison	.37	.36	.73	1.10	.01	1.11
Day	.64	.00	.64	1.35	.02	1.37
Deuel	.84	.00	.84	1.77	.03	1.80
Dewey	.00	.27	.27	.20	.04	.24
Douglas	1.43	.00	1.43	1.48	.07	1.55
Edmunds	.00	.00	.00	.00	.00	.00
Fall River	.08	36.12	36.20	4.67	8.39	13.06
Faulk	.00	.01	.01	.02	.00	.02
Grant	3.59	.05	3.64	4.90	.20	5.10
Gregory	.17	.71	.88	.95	.07	1.02
Haakon	.00	.85	.85	.51	.21	.72
Hamlin	3.51	.00	3.51	6.38	.41	6.79
Hand	.88	.10	.98	1.18	.04	1.22
Hanson	.08	.28	.36	.80	.00	.80
Harding	.00	.46	.46	.39	.19	.58
Hughes	1.29	16.86	18.15	13.05	.99	14.04
Hutchinson	1.48	.28	1.76	3.11	.05	3.16
Hyde	.16	.00	.16	.27	.00	.27
Jackson	.00	.16	.16	.20	.20	.40
Jerauld	.86	.00	.86	1.39	.07	1.46
Jones	.00	.31	.31	.39	.30	.69

Table 6. Estimated irrigation withdrawals and acreage irrigated by county in South Dakota, 2000–Continued

County	Water withdrawals, in million gallons per day			Irrigated land, in thousand acres		
	Source		Total	Application method		Total
	Ground water	Surface water		Sprinkler	Surface	
Kingsbury	1.23	0.00	1.23	1.49	0.03	1.52
Lake	.81	.06	.87	1.55	.06	1.61
Lawrence	1.88	.33	2.21	.85	.83	1.68
Lincoln	.59	.16	.75	1.14	.04	1.18
Lyman	.05	1.38	1.43	1.49	.13	1.62
McCook	.00	.06	.06	.03	.00	.03
McPherson	.64	.24	.88	.99	.03	1.02
Marshall	.01	.03	.04	.66	.02	.68
Meade	.06	3.02	3.08	1.33	1.11	2.44
Mellette	.07	.37	.44	.38	.24	.62
Miner	.00	.00	.00	.00	.00	.00
Minnehaha	1.14	.42	1.56	2.00	.11	2.11
Moody	1.30	1.04	2.34	3.12	.22	3.34
Pennington	.19	2.85	3.04	1.89	1.81	3.70
Perkins	.00	.23	.23	.20	.05	.25
Potter	.89	1.42	2.31	2.64	.20	2.84
Roberts	1.90	.11	2.01	2.91	.09	3.00
Sanborn	.00	.02	.02	.02	.00	.02
Shannon	.00	.00	.00	.00	.00	.00
Spink	14.66	1.34	16.00	22.43	.51	22.94
Stanley	.00	.26	.26	.03	.00	.03
Sully	.64	10.62	11.26	14.42	2.96	17.38
Todd	7.58	.58	8.16	9.72	1.09	10.81
Tripp	1.05	1.72	2.77	2.75	.44	3.19
Turner	17.01	.05	17.06	18.63	.52	19.15
Union	20.00	.15	20.15	30.75	1.35	32.10
Walworth	.46	.89	1.35	1.52	.13	1.65
Yankton	5.25	1.06	6.31	8.38	.30	8.68
Ziebach	.00	.08	.08	.03	.01	.04
Total	136.84	235.90	372.74	276.00	78.32	354.32

Thermoelectric Power

Thermoelectric power water use includes water used in the production of electric power generated with fossil-fuel, geothermal, or nuclear energy. Total water withdrawn by thermoelectric use during 2000 was about 5.24 Mgal/d, with about 1.23 Mgal/d from ground water and about 4.01 Mgal/d from surface water (table 7). Total water withdrawn for thermoelectric power generation by powerplants using fossil fuel was 4.47 Mgal/d, with 0.46 Mgal/d from ground water and 4.01 Mgal/d from surface water (table 8). The withdrawal of geothermal water totaled 0.77 Mgal/d during 2000 (table 9). The majority of the water was from wells that are used for heating and are completed in the Madison aquifer. South Dakota does not have any operating nuclear powerplants.

Livestock

Livestock water use is that used in the production of meat, poultry, eggs, milk, and wool. It does not include rural-domestic water use, irrigation water use, or other farm needs such as lawn and garden watering. The South Dakota Agricultural Statistics Service U.S. Census of Agriculture livestock data for 1997 were used to estimate the livestock water use during 2000. Total livestock water use during 2000 was about 42.0 Mgal/d (table 10). Of this total, about 16.9 Mgal/d was from ground water and about 25.2 Mgal/d was from surface water. Total livestock water use was distributed among 3,723,271 cattle, 1,396,326 hogs, 416,570 sheep, 51,775 horses, and 2,347,423 poultry (South Dakota Agricultural Statistics Service, 1997a, 1997b, 1997c, 1997d, 1997e).

Table 7. Estimated total thermoelectric power water use by county in South Dakota, 2000

County	Self-supplied water withdrawals, in million gallons per day		
	Source		Total
	Ground water	Surface water	
Edmunds	0.11	0.00	0.11
Grant	.00	3.96	3.96
Haakon	.49	.00	.49
Hughes	.10	.00	.10
Minnehaha	.05	.05	.10
Pennington	.46	.00	.46
Stanley	.02	.00	.02
Total	1.23	4.01	5.24

Table 8. Estimated fossil fuel thermoelectric power water use by county in South Dakota, 2000

County	Self-supplied water withdrawals, in million gallons per day		
	Source		Total
	Ground water	Surface water	
Grant	0.00	3.96	3.96
Minnehaha	.00	.05	.05
Pennington	.46	.00	.46
Total	.46	4.01	4.47

Table 9. Estimated geothermal thermoelectric power water use by county in South Dakota, 2000

County	Self-supplied water withdrawals, in million gallons per day		
	Source		Total
	Ground water	Surface water	
Edmunds	0.11	0.00	0.11
Haakon	.49	.00	.49
Hughes	.10	.00	.10
Minnehaha	.05	.00	.05
Stanley	.02	.00	.02
Total	.77	.00	.77

Table 10. Estimated livestock water use by county in South Dakota, 2000

County	Water withdrawals, in million gallons per day			County	Water withdrawals, in million gallons per day		
	Source		Total		Source		Total
	Ground water	Surface water			Ground water	Surface water	
Aurora	0.22	0.28	0.50	Jackson	0.27	0.40	0.67
Beadle	.66	.99	1.65	Jerauld	.23	.35	.58
Bennett	.20	.30	.50	Jones	.16	.25	.41
Bon Homme	.28	.41	.69	Kingsbury	.25	.37	.62
Brookings	.33	.50	.83	Lake	.20	.30	.50
Brown	.42	.64	1.06	Lawrence	.08	.12	.20
Brule	.29	.48	.77	Lincoln	.20	.30	.50
Buffalo	.10	.15	.25	Lyman	.27	.41	.68
Butte	.30	.45	.75	McCook	.24	.36	.60
Campbell	.15	.23	.38	McPherson	.32	.48	.80
Charles Mix	.51	.77	1.28	Marshall	.31	.47	.78
Clark	.29	.43	.72	Meade	.51	.76	1.27
Clay	.08	.12	.20	Mellette	.20	.31	.51
Codington	.24	.36	.60	Miner	.20	.29	.49
Corson	.27	.40	.67	Minnehaha	.32	.48	.80
Custer	.14	.21	.35	Moody	.27	.20	.47
Davison	.17	.25	.42	Pennington	.27	.39	.66
Day	.18	.27	.45	Perkins	.39	.52	.91
Deuel	.20	.30	.50	Potter	.19	.29	.48
Dewey	.16	.38	.54	Roberts	.26	.39	.65
Douglas	.23	.35	.58	Sanborn	.24	.36	.60
Edmunds	.29	.45	.74	Shannon	.14	.20	.34
Fall River	.27	.40	.67	Spink	.38	.56	.94
Faulk	.26	.39	.65	Stanley	.14	.21	.35
Grant	.19	.29	.48	Sully	.11	.17	.28
Gregory	.31	.46	.77	Todd	.25	.38	.63
Haakon	.33	.49	.82	Tripp	.49	.73	1.22
Hamlin	.16	.25	.41	Turner	.31	.46	.77
Hand	.39	.59	.98	Union	.18	.27	.45
Hanson	.16	.25	.41	Walworth	.16	.24	.40
Harding	.30	.45	.75	Yankton	.20	.30	.50
Hughes	.17	.26	.43	Ziebach	.18	.27	.45
Hutchinson	.42	.64	1.06	Total	16.86	25.18	42.04
Hyde	.27	.40	.67				

INSTREAM USE

The only instream use reported for South Dakota is for hydroelectric power generation. Instream use occurred in four counties in South Dakota during 2000.

Water used for hydroelectric power generation refers to the water used in the generation of electricity at plants where turbine generators are driven by falling water. Water use for hydroelectric power generation is substantial in South Dakota because of the four hydroelectric powerplants operated by the U.S. Army Corps of Engineers on the Missouri River in South Dakota. During 2000, about 57,794 Mgal/d was used by the hydroelectric powerplants to generate about 6,151 gigawatt-hours of electricity (table 11).

Table 11. Estimated hydroelectric power water use by county in South Dakota, 2000

County	Instream water use		Power generated, in gigawatt-hours
	Million gallons per day	Thousand acre-feet per year	
Buffalo	15,886	17,795.00	1,047.2
Charles Mix	16,124	18,061.00	1,901.79
Hughes	16,861	18,887.00	2,786.85
Yankton ¹	8,923	9,995.00	415.06
Total	57,794	64,738.00	6,150.9

¹Values presented reflect exactly one-half of the water-use and power-generation data for Gavins Point Dam. The other one-half is reported by Nebraska.

SUMMARY

Total water withdrawals for South Dakota during 2000 were about 528 Mgal/d. Ground-water withdrawals accounted for about 42 percent of the total withdrawals, or about 222 Mgal/d. Surface-water withdrawals accounted for about 58 percent of the total withdrawals, or about 306 Mgal/d.

Total withdrawals for six categories of off-stream use in South Dakota during 2000 were compiled. The withdrawals were as follows: public supply, 93.3 Mgal/d; self-supplied domestic, 9.53 Mgal/d; industrial, 5.12 Mgal/d; irrigation, 372.7 Mgal/d; thermoelectric power, 5.24 Mgal/d; and livestock, 42.0 Mgal/d.

Water use for hydroelectric power was the only instream use compiled in this report. About 57,794 Mgal/d was used by the hydroelectric powerplants to generate 6,151 gigawatt-hours of electricity during 2000.

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