Rural Water Supplies in South Dakota: Jones County

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Rural Water Supplies in South Dakota

JONES County

January, 1940
Special Extension Circular
Number 47

Extension Service
South Dakota State College
Brookings, S. D.
RURAL WATER SUPPLIES IN
SOUTHERN DAKOTA
JONES COUNTY

BY
WALTER V. SEARIGHT
AND
ELMER E. MCLEEN

THIS BOOK DOES NOT CIRCULATE

PREPARED BY THE WORK PROJECTS ADMINISTRATION AS A REPORT ON THE WELL SURVEY CONDUCTED AS WORK PROJECTS ADMINISTRATION OFFICIAL PROJECT 665-74-3-126; SPONSORED BY THE EXTENSION SERVICE AND THE EXPERIMENT STATION SOUTH DAKOTA STATE COLLEGE, IN COOPERATION WITH THE STATE GEOLOGICAL SURVEY.

JANUARY 1940
FOREWORD

This study was first proposed as a project of the Mineral Resources Committee of the State Planning Board under the direction of the State Geological survey and undertaken as a Work Projects Administration project sponsored by the State Planning Board, and was continued under the Planning Board until that body was abolished July 1, 1939 by the State Legislature. At that time sponsorship was transferred to the South Dakota Agricultural Experiment Station and the State College Extension Service, South Dakota State College. Field work was begun October 1, 1938 and was practically completed by February 15, 1939. Workers were assigned in the several counties under the supervision and direction of the County Agricultural Agents and Field Supervisors who were employed by the Work Projects Administration. Questionnaires were mailed out from the offices of the County Agents and were checked and tabulated in these offices. The material was then forwarded to the central office for final tabulation and analysis under the direction of Elmer E. Meleen and Walter V. Searight.

Particular credit should be given to the individual County Agricultural Agents in the various counties of the state who arranged the contacts with the individuals from whom these data were collected, furnished a large portion of the necessary supplies for field work, and directed the workers engaged in collecting field data. Without this assistance in gathering basic data, this study could not have been conducted. The value of the report is therefore in direct proportion to the accuracy and adequacy of those basic data.
INTRODUCTION

PURPOSE

This report on rural water supplies of South Dakota has been prepared to present data recently made available on the types and the sources of water supply, exclusive of stream, lake and dam waters. The information presented is of importance to evaluate present supplies. It should also prove useful as a basis for further development of supplies where they are needed or become necessary. Further, it is hoped that the facts presented may prove of value in any program of water conservation.

SOURCES OF INFORMATION

Questionnaires were sent to all, or essentially all of the farmers of the state, asking for complete data on farm wells and supplementary supplies, with the exception of the supplies above noted. A most gratifying number returned questionnaires, actually 60.1% average for the entire state. The coverage is probably more than 60.1% since it is likely that many unanswered inquiries were those to farmers who were without wells, the type of supply emphasized in the questionnaires. The data thus obtained were supplemented with information contained in the files of the State Geological Survey, the office of the State Engineer, and reports of the United States Geological Survey. This supplementary information, together with that contained in questionnaires was used in making the well location maps included in this report.

PROCEDURE

All data from the questionnaires were tabulated and analyzed statistically by counties, which were made the areal units of study. Within the county,

Acknowledgments - The authors wish especially to acknowledge and commend the conscientious assistance of Mr. E. L. Woodburn, Supervisor, for careful and painstaking supervision of statistical work. The authors also desire to express appreciation for the constant interest and support of this project by Mr. Bob Butts, Director of Research and Records Projects, South Dakota Work Projects Administration.
supplies were allocated as to kind on county maps. Since shallow waters are the most important source of rural supply in South Dakota, wells 200 feet deep and less were plotted on county maps from which maps indicating depths of wells by 50 foot intervals were made. Springs shown on the well location map, and cisterns were also tabulated as important supplementary supplies although the latter do not appear on maps or in the tables in this report.

PRESENTATION OF DATA

For convenience and utility, this report has been divided into sections, each covering one county, and each county section bound separately. Each county report contains the following material wherever possible.

1. Well Location Map: This map shows the location of all wells and springs within the county, as far as information is now available. These have been plotted in such a manner that artesian and shallow wells can be differentiated readily by the reader. Artesian wells, where they occur, are divided into flowing and pumped. Artesian wells showing decreased flow and those reported as controlled are also indicated by symbols. Shallow wells are differentiated as adequate and inadequate, and dry holes as of 1938 are located. Wells from other sources of information other than questionnaires collected by this survey are shown in blue.

2. Shallow Well Map: This map shows, as accurately as possible, in 50 foot intervals, the depths at which shallow supplies are commonly obtained. Where shallow wells are abundant, as indicated by the well location map, the map is as accurate as the information on which it is based, but where such wells are sparsely distributed errors are likely to occur. In many places reports of shallow wells are absent, in which case the area has been left blank.

3. Table of Pumped Wells, from 0 to 200 feet (inclusive) in depth: This table shows minimum, maximum, and average depths of wells within the county, as reported in the questionnaires. Tabulations are by townships. The general character of the water, hard, medium, and soft, as reported by farm-
ers, and the number of wells suitable or unsuitable for drinking are shown in this table. Further, the adequacy of supply, as indicated on the questionnaires, and use for irrigation are shown here.

4. Table of Wells greater in depth than 200 feet: Minimum, maximum, and average depths are indicated. Character, reported as hard, medium or soft is tabulated. Adequacy and use for irrigation are shown as in the preceding table.

5. Table of flowing wells: Minimum, maximum, and average depths are shown together with general character and use for irrigation. The volume of flow as reported, and the number of flowing wells reported as equipped with control valves is also included in this table.

SUMMARY OF STATE SUPPLIES

In the entire state, a total of 43,479 wells were reported in response to questionnaires, returned by 60.1% of the recipients. If those who did not respond have a number of wells in proportion to those who reported, there are approximately 80,000 wells in South Dakota. There are possibly many less than this number since several counties with large numbers of wells returned over 75% of the questionnaires and since many farmers without wells did not reply because they were not requested to do so in the formal questionnaire. Of the wells reported, 16.2% are artesian, including both pumped and flowing wells. Shallow wells are 83.8% of the wells reported. Wells from shallow sources are thus obviously by far the most important means for obtaining water in rural South Dakota.

Important supplementary supplies are cisterns and springs. Roughly, there is more than one cistern to each 40 wells. Many springs are reported, however, in counties with very few wells, so that in some localities they are of considerable importance.
Jones county is in the south central part of South Dakota. It is bounded on the north by Stanley county, on the east by Lyman county, on the south by Mellette county, and on the west by Jackson and Haakon counties.

Jones county is mainly an agricultural area with 418,665 acres (66.6 per cent) of the total 628,480 acres in farms divided into 507 farm units of approximately 825 acres each. More than 30 per cent of the acreage in farms is under cultivation. Wheat, hay, barley, corn, sorghum forage, and oats are the important field crops, being produced in the order named. Livestock is also important; horses and mules, cattle, sheep and lambs are valued highest.6

Farm units devoted to livestock require generally distributed sources of water supply. The supplies required are not great, but adequate and constant supplies of suitable water at low cost are necessary to operate farms of these sizes and organization profitably. The well location map of Jones county indicates that, in general, such supplies are available and are widely distributed.

On the well location map of Jones county, the single deep flowing well and one deep pumped well reported are shown in black as artesian wells. All other wells are shown in red and are called shallow wells regardless of depth.

6South Dakota Agricultural Statistics, Annual Report, 1937
On all other maps and in the tables and text of this report, the term shallow wells is applied to all wells of 200 feet or less in depth, and those more than 200 feet deep are treated as deep wells.

Questionnaires were sent to 382 farmers and land owners of Jones county, of whom 235 responded with information on 262 wells and 173 cisterns. This represented a 61.5 per cent coverage.

DEPTH AND DISTRIBUTION

Rural water supplies of Jones county are obtained from shallow pumped, deep pumped, and deep flowing wells.

Shallow wells: Approximately 99 per cent (99.2) of all wells reported in Jones county were shallow pumped wells. No shallow flowing wells were reported and none are known to occur. Of 260 shallow pumped wells reported, 95.8 per cent were between 0 and 50 feet in depth, and 4.2 per cent from 50 to 100 feet deep. No wells were reported within 100 and 200 foot depth interval. Thus, all the shallow supplies of Jones county were obtained from wells less than 100 feet deep. The percentage of shallow wells decreases notably with depth in Jones county. Whenever possible, the shallower supplies are used because of the increased cost of construction of deeper wells and the lack of supplies at intermediate depths.

In the extreme southern part of the county, shallow pumped wells do not exceed 25 feet in depth (T.4S. - R.28E., 29E., and 30E.). Only eleven shallow pumped wells were reported greater than 50 feet in depth in the county. The shallow well map on page 8 shows the depths at which shallow supplies were obtained in Jones county.

Thirty of the thirty-two townships in the county reported all wells shallow. Following is a tabulation of these townships with the location and number of wells reported:
Deep wells: Only 0.8 per cent of the rural water supplies of Jones county was reported to be obtained from deep wells (pumped and flowing.) One deep well was reported from T.2N., R.31E. with a depth of 1600 feet (see table 2). One deep flowing well was reported in T.1N., R.29E., but no depth was given (see ‘table 3).

CHARACTER OF WELL WATER

In order to determine the character of water from wells of the county, users were asked to indicate whether they considered supplies hard, moderately hard, or soft. Although chemical analyses are not commonly available to farmers, usage of the water is a fairly satisfactory criterion of quality until adequate laboratory analyses are available.

Since most of the water supplies of Jones county were obtained from shallow wells, water in the county was reported predominately hard. Of all the shallow wells reported, 77.2 per cent produced hard water, 17.4 per cent moderately hard, and only 5.4 per cent soft. Thus, 94.6 per cent of the shallow pumped wells reported from the county produced hard or moderately hard water. There were only seven townships which reported soft wells in the county, and there were only 14 in number. Of these soft water wells, thirteen were in the southern part of the county and only one in the northern part. The northern
SHALLOW WELLS
(0-200 FT)

DEPTHS AT WHICH SUPPLIES ARE COMMONLY OBTAINED

☐ 0-50 FT. ☐ 50-100 FT.

MILES

0 2 4 6

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half of the county reported all wells hard or moderately hard, with the excep-
tion of one soft water well in T.1N., R.26E. Most soft water wells were re-
ported in T.3S., R.27, 28,29 and 30E., in which 9 were listed.

Water from a large percentage of shallow pumped wells in Jones county was
reported to be unsuitable for drinking. There were 159 (61.2 per cent) of the
shallow pumped wells reported unsuitable for drinking. The greatest number of
unsuitable wells was reported from the southern part of the county with the
exception of T.4S., R.28, 29, and 32E., in which only one well was reported
unsuitable.

The deep flowing well was reported unsuitable for drinking purposes, but
the deep pumped well was considered suitable.

Adequacy of Well Waters:

Approximately one third (36.9 per cent) of the shallow wells reported in
Jones county were inadequate for present needs. Needs vary, however, and
changes in land use, modification of farm management, or dry cycles, in this
and surrounding land areas affect both the source and demand for supplies.

Of the 260 shallow wells reported in the county, 96 were inadequate for
present needs. Both deep wells were reported adequate. Most of the inadequate
wells were in the southern half of the county.

Irrigation:

Nine shallow pumped wells were used for irrigation. Six wells were in
use to irrigate 1 3/4 acres in plots ranging from 1/4 to one acre in size.

Supplementary Water Supplies

No springs were reported from Jones county.

Cisterns are an important source of supplementary supplies in the county.
There were 173 cisterns (approximately one cistern to every 1 1/2 wells) re-
ported, most of which were in the southern half of the county. Farmers with shallow wells reported 173 cisterns, of which 159 were used for drinking only. One hundred and seven were supplied by rain and 122 were supplied by hauling water from other sources. In general, 144 cisterns were used for laundry purposes in hard water areas. Cisterns were also used for drinking and cooking where well waters and other supplies were inadequate or unsuitable.
<table>
<thead>
<tr>
<th>LOCATION</th>
<th>Number of Wells</th>
<th>DEPTH OF WELLS</th>
<th>CHARACTER OF WATER</th>
<th>ADEQUACY OF SUPPLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-7</td>
<td>5</td>
<td>15</td>
<td>30</td>
<td>22</td>
</tr>
<tr>
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<td>3</td>
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<td>4</td>
<td>12</td>
<td>24</td>
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<td>31</td>
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<tr>
<td>2</td>
<td>9</td>
<td>20</td>
<td>45</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>25</td>
<td>55</td>
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<td>31</td>
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<tr>
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<td>9</td>
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<td>45</td>
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<td>4</td>
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<td>1</td>
<td>7</td>
<td>20</td>
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<tr>
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<td>7</td>
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<td>4</td>
<td>20</td>
<td>25</td>
<td>22</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>26</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>260</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
### Table 2. DATA OF PUMPED WELLS OVER 200 FEET IN DEPTH

<table>
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<tr>
<th>LOCATION</th>
<th>Number of Wells</th>
<th>DEPTH OF WELLS</th>
<th>CHARACTER OF WATER</th>
<th>ADEQUACY OF SUPPLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-N 31</td>
<td>1</td>
<td>1800</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Character of Water**
- **Hard**
- **Med.**
- **Soft**
- **Corroded Casing**
- **Unsuitable for Drinking**
- **Adequate**
- **Inadequate**
- **Number used for Irrigation**
- **Approximate Irrigated Acres**

**Adequacy of Supply**
- **Approximate Irrigated Acres**

**NOTE:** No Pumped Wells over 200 feet in depth reported from the following townships and Ranges: T.2N., R. 26, 27, 28, 29, 30E; T.1N., R. 26, 27, 28, 29, 30, 31E; T.1S., R. 26, 27, 28, 29, 30, 31E; T.3S., R. 27, 28, 29, 30, 31E; T.4S., R. 26, 29, 30, 31, 32E;

### Table 3. DATA OF FLOWING WELLS

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>Number of Wells</th>
<th>DEPTH OF WELLS</th>
<th>CHARACTER OF WATER</th>
<th>ADEQUACY OF SUPPLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-N 29</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Character of Water**
- **Hard**
- **Med.**
- **Soft**
- **Corroded Casing**
- **Unsuitable for Drinking**
- **Adequate**
- **Inadequate**
- **Number used for Irrigation**
- **Approximate Irrigated Acres**

**Adequacy of Supply**
- **Approximate Irrigated Acres**
- **Ave. Gallon Per Min.**
- **Number Controlled**

**NOTE:** No Flowing Wells were reported from the following townships and ranges: T.2N., R. 26, 27, 28, 29, 30, 31E; T.1N., R. 26, 27, 28, 29, 30, 31E; T.1S., R. 26, 27, 28, 29, 30, 31; T.2S., R. 26, 27, 28, 29, 30, 31; T.3S., R. 27, 28, 29, 30, 31; T.4S., R. 26, 29, 30, 31, 32;
JONES COUNTY WELL NOTES

The following are pertinent remarks quoted from questionnaires returned by farmers and are included opinions of the water situation as expressed by the individual farmers and must be so applied.

T.2N., R.30E.
Sec. 35
35 feet:
"We have dug seven wells on our homestead and only one well had enough water for 60 head of stock. This well is now caved in and covered up, was 65 ft. deep. Also dug one 105 ft. which was dry. Others were from 40 to 80 ft. with very little water in them, but not enough to bother with. I cased four of these wells but closed them after a time. I struck rock in several wells. In one well we went down 30 feet, struck rock and went down to remove rock but gas was so bad we had to abandon the well and cover it up."

T.1N., R.27E.
Sec. 26
16 feet:
"The first two years after moving here we spent much time prospecting for water and after digging eight or ten holes we found water which contained Glauber salt and was fit only for stock."

T.1N., R.29E.
Sec. 6
"I do not know the age or depth of these artesian wells. Some people are able to drink this water after they become accustomed to it. I think the well is holding its own at the present time although it has decreased considerably since it was drilled."

T.1N., R.29E.
Sec. 21
20 feet:
"Present well is some distance from buildings. A much more convenient well could be obtained a few rods from house at a depth of 20 to 25 ft. Would have to be curred at once because of sand, and bored into shale below sand to form reservoir, otherwise water will seep away through sand."

T.1N., R.29E.
Sec. 34
35 feet:
"Difficulties were experienced in digging wells because of a vein of quicksand which ran in before curb was lowered."

T.1S., R.26E.
Sec. 19
10 feet:
"I have tried to dig several wells on my place but failed to get a well that would give very much water. The well I have now gives just enough to water about 15 or 16 head of stock. The water is quite strong with alkali."

T.1S., R.20E.
Sec. 11
45 feet:
"In drought seasons it is hard to get a well with a sufficient capacity. Most all water is found in hard shale and sometimes it is extremely difficult to bore or dig them."
T.1S., R.25E.
Sec. 35
32 feet:
"The water in wells of this part of South Dakota is not fit for use and is used only when dam is dry. Most of the drinking water is hauled from south of White River from wells. Well No. 3 on questionnaire is drilled 50 ft. deep but always was dry so we have water piped from the dam and can fill it any time there is water in the dam. We have dug and drilled many wells in Sec. 26 but they were either poor or dry."

T.2S., R.26E.
Sec. 2
20 feet:
"Wells are not obtainable everywhere only in valleys and draws. I have tested several places and found only dry holes and other places considerable water was found. But all surface wells run according to the drought seasons."

T.2S., R.26E.
Sec. 20
"Plenty of water (hard) is available at the building site at about 17 ft. and nearer the river reasonably soft water is obtained at about 12 ft. Down to water bearing gravel the soil is a fine silt, and upon entering the gravel and sand below, the well caves in so badly that all attempts by five different well men have failed to get a sufficient reservoir. A sandpoint is used in most of our wells which gets plenty of water but not a large flow, but well can be pumped continually. The two cisterns furnish all water necessary for domestic use."

T.2S., R.26E.
Sec. 17
40 feet:
"Bored several dry holes on this and adjoining quarter, one as deep as 90 ft., others furnished a small amount of poor and extremely hard water."

T.2S., R.26E.
Sec. 17
30 feet:
"There have been several difficulties in digging wells on the place. First rocks or extremely hard blue shale has stopped well drilling machine at 4 different times and secondly, I have not money to continue prospecting for a good well."

T.2S., R.26E.
Sec. 17
20 feet:
"Hard blue shale and rock make it difficult to go very deep here."

T.33., R.2CE.
Sec. 26
30 feet:
"My trouble most generally is running into hard pan which is so hard that I can neither dig or pick it with a pick, so I have to give up the job of going deeper."

T.38., R.3CE.
Sec. 12
35 feet:
"I had considerable trouble finding water but when I did find this well it was the only one that held out."
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