predevelopment levels, which, in turn, increase the rate that water moves through the system. If the water table were lowered substantially, the rate at which the ground water moves through the aquifer would start to slow. Subsequently, the residence time of the ground water would increase, and any contaminants in the aquifer would take longer to discharge from it.

Chemical Interaction of Surface Water and Ground Water

Ground-water samples were collected from July 1995 through September 1998 and analyzed to assess stratification of nitrate and general water-quality conditions in the aquifer. The chemistry of the ground water, especially concentrations of nitrate and uranium, varied in space and time and were used in the evaluation of surface-water/ground-water interaction. Some nitrate concentrations in ground-water samples exceeded 10 mg/L, and occasionally exceeded 20 mg/L, in shallow monitoring wells (screened less than 30 feet below the water table). Nitrate concentrations were generally less than 5 mg/L in water from the deeper wells. However, in areas within several hundred feet of major canals and laterals, nitrate concentrations in the ground water were diluted by infiltration of surface water containing nitrate concentrations less than 2 mg/L (fig. 3). Near the Interstate Canal, surface water appeared to displace ground water in the upper 30 feet of the aquifer. As a result, nitrate and uranium concentrations decreased in shallow ground water, but specific conductance and sulfate concentrations increased. Away from the canal this effect was present but less pronounced. In areas where surface water was applied through irrigation systems, nitrate concentrations generally increased over time because of the leaching and transport of nitrogen from fertilizer (Verstraeten and others, 2000).

GROUND-WATER SUSTAINABILITY

Ground-water sustainability in the Dutch Flats area is important to the local economy. In times of severe drought, water produced from irrigation wells can supplement surface-water irrigation systems. Overall, seepage of water from canals and laterals provides substantial artificial recharge to the aquifer and improves the ground-water quality through dilution of nitrate concentrations with surface water containing nitrate concentrations less than 2 mg/L. However, away from the canals, leaching of fertilizer from surface water and ground water applied to the fields transports nitrate from the land surface to the ground water. Generally, higher concentrations of nitrate are found in the shallow, younger water. In summary, seepage from canals in the Dutch Flats area helps to sustain ground-water quantity and quality.

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For further information contact:
U.S. Geological Survey
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Prepared in cooperation with the
NORTH PLATTE NATURAL RESOURCES DISTRICT

Surface-Water/Ground-Water Interaction and Implications for Ground-Water Sustainability in the Dutch Flats Area, Western Nebraska

—*Gregory V. Steele[1], Ingrid M. Verstraeten[1], and James C. Cannia[2]*

SIGNIFICANT FINDINGS

Surface water, and to a lesser extent ground water, are used extensively in western Nebraska for agricultural, domestic, and industrial supplies. In the Dutch Flats area, Nebraska, the surface water and ground water interact such that the ground water is sustained by seepage of surface water from irrigation canal systems. Seasonal infiltration of surface water from canal seepage raises ground-water levels about 10 feet above seasonal low water levels near the canals and locally dilutes nitrate concentrations in ground water near the canals and their laterals. However, away from the canals, ground-water-level rises are not as pronounced, and water applied for irrigation transports nitrogen from the land surface to the ground water. Direct seepage of water from canals and laterals recharges the ground water with water containing small nitrate concentrations, whereas recharge from water that is applied to the fields tends to recharge water at shallow depths with larger nitrate concentrations.

INTRODUCTION

Nitrate concentrations detected near or above the U.S. Environmental Protections Agency's Maximum Contaminant Level (MCL) of 10 mg/L (milligrams per liter) in ground water in the Dutch Flats area of the North Platte Natural Resources District (NPNRD) have become an important issue. However, nitrate concentrations measured in surface-

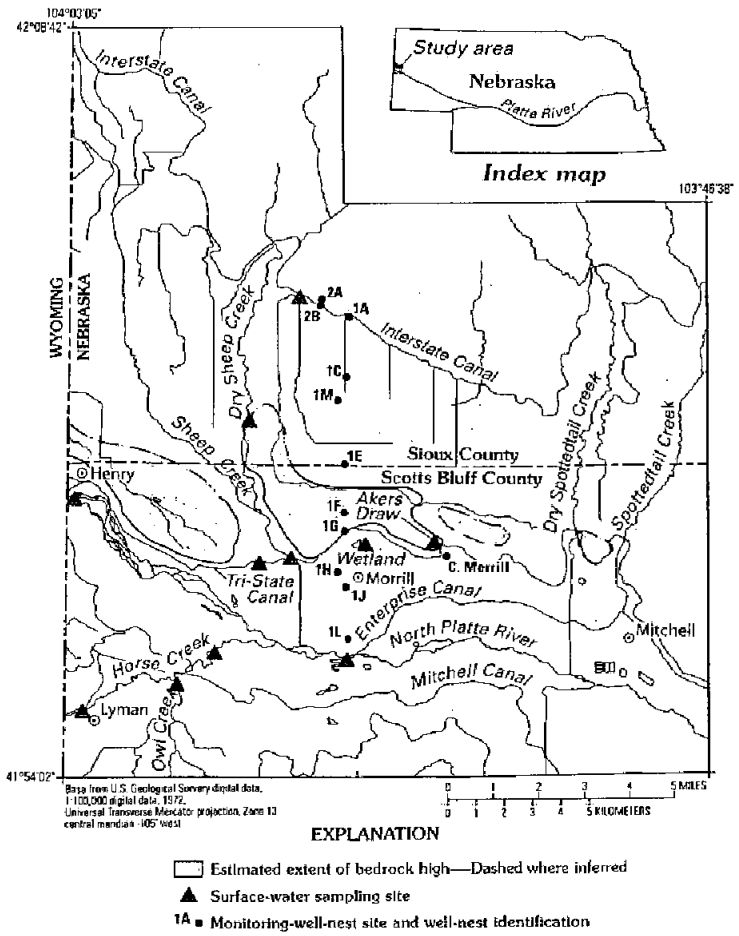

Figure 1. Location of study area, including rivers, canals, and selected monitoring wells, Dutch Flats area, western Nebraska.

[1] U.S. Geological Survey, Lincoln, Nebraska.
[2] North Platte Natural Resources District, Gering, Nebraska.

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water systems in the area have remained below the MCL. In 1995, the U.S. Geological Survey (USGS) and the NPNRD began a study to characterize the spatial distribution of selected water-quality constituents in surface and ground water and to evaluate the surface-water/ground-water interaction in the Dutch Flats area of western Nebraska (Verstraeten and others, 2001). This fact sheet briefly summarizes the effects of seepage from irrigation canals and the implication to ground-water sustainability.

Study Area

The study area is about 212 square miles (fig. 1) and primarily consists of a sand-and-gravel aquifer that generally is separated by a bedrock high that has been breached by tributaries of the North Platte River. The bedrock high (fig. 1) generally trends parallel to the North Platte River, lies just north of the Tri-State Canal, and imparts a topographic relief of as much as 100 feet. Although the bedrock high separates the aquifer into northern and southern parts, the aquifer remains hydraulically connected and contains similar hydrogeologic characteristics throughout. The saturated thickness of the aquifer varies locally from less than 10 feet near the edges to more than 200 feet. The northern part of the aquifer underlies the Dutch Flats geographic area, which is bounded on the north and south by the Interstate and Tri-State Canals, respectively, and on the east and west by Dry Spottedtail and Dry Sheep Creeks, respectively. The southern part of the aquifer underlies the North Platte River Valley.

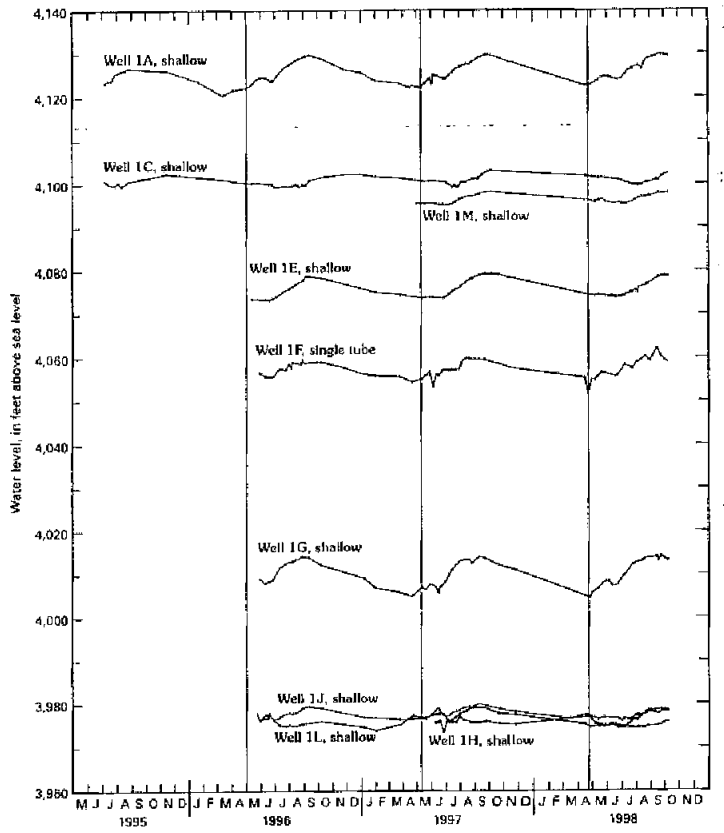


Figure 2. Altitude of water levels in selected shallow and single-tube monitoring wells in the Dutch Flats area, western Nebraska, July 1995 through September 1998.

Agriculture is the primary land use in the study area. Application of nitrogen in commercial fertilizers has increased about 15-fold from 1950 to 1994. Detailed descriptions of the study area, including climate, land use, and hydrogeology, are reported by Verstraeten and others (2001).

Background Information

In the North Platte River Valley, surface water was used for irrigation as early as the 1870s. Since 1908, the Interstate Canal has received water diverted from the North Platte River about 50 miles upstream from the study area. The Interstate Canal supplies water for irrigation to western Nebraska including the Dutch Flats area (fig. 1). The Bureau of Reclamation (BOR) (1949 and 1957) and Babcock and Visher (1951) reported seepage estimates from the Interstate Canal, at or near the Dutch Flats area, at 3.8 cubic feet per second per mile or about 2,460,000 gallons per day per mile. As a result, the BOR (1957) reported that a part of the Dutch Flats area had become waterlogged from a combination of canal seepage and the application of surface water for irrigation.

Pre-canal water-level data are unavailable. However, if the estimated predevelopment water level in the northern part of the aquifer was approximately equal to or slightly higher than the current (2001) water level in the southern part of the aquifer, water levels in the northern part of the aquifer could have risen 120 to 140 feet above the estimated predevelopment water levels since diversions started in the Interstate Canal. Consequently, if not for the seepage from the Interstate Canal, ground water for irrigation in the northern part of the aquifer likely would be insufficient because the deeper ground-water levels would reduce substantially the volume of water available to large-capacity wells. The Interstate Canal replenishes water in the aquifer through infiltration of surface water applied to fields and seepage of water from the canal and its laterals.

SURFACE-WATER/GROUND-WATER INTERACTION

Water-level measurements made in nested monitoring wells (fig.1) from July 1995 through September 1998 indicate that seepage from the canals into the aquifer plays a substantial role in the sustainability

Surface-water gravity-feed irrigation in the Dutch Flats area.

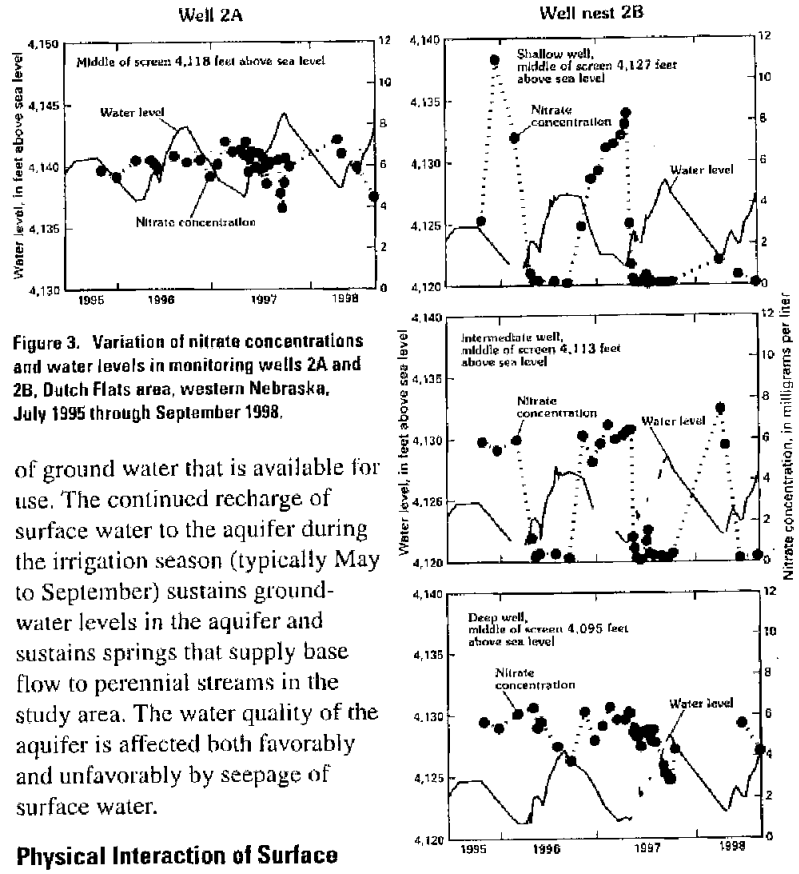


Figure 3. Variation of nitrate concentrations and water levels in monitoring wells 2A and 2B, Dutch Flats area, western Nebraska, July 1995 through September 1998.

of ground water that is available for use. The continued recharge of surface water to the aquifer during the irrigation season (typically May to September) sustains ground-water levels in the aquifer and sustains springs that supply base flow to perennial streams in the study area. The water quality of the aquifer is affected both favorably and unfavorably by seepage of surface water.

Physical Interaction of Surface Water and Ground Water

Water-level measurements made in the monitoring wells near the Interstate Canal show that ground-water levels started to rise about 3 weeks after the start of diversions into the Interstate Canal (fig. 2). The water-level rises continued throughout the irrigation season until diversions into the canal ceased. When diversions into the canals ceased, ground-water levels continued to rise in the monitoring wells closest to the Interstate Canal until about October. Ground-water levels then declined from about November until diversions started the following year.

Changes in ground-water levels near the canals were greater than those farther from the canals. Water levels in some monitoring wells within 1,000 feet of the canals rose about 10 feet during the irrigation season. However, water levels in monitoring wells more than 1,000 feet away from the canals typically did not rise more than 4 feet. Water-level rises in monitoring wells within 1,000 feet of the Interstate Canal were significantly greater during the summer than water-level rises in monitoring wells farther than 1,000 feet from the Interstate Canal (Verstraeten and others, 2001).

Seepage of surface water from the canals also affects the ground-water system by increasing water levels over the estimated predevelopment water levels. Rising water levels increase the hydraulic gradient of the water table above estimated

3.2.5 Development of Irrigation Return Flows

As the ground-water reservoir began to fill, it began to spill into low areas creating wetlands and perennially flowing streams. According to charts of return flows published by the Nebraska Board of Irrigation, Water, Power and Drainage, between the state line and Bridgeport, return flows to creeks were less than 25,000 acre-feet a year in 1911. During the fall of 1912, the U. S. Reclamation Service made a series of observations on the seepage from the North Platte Project. They found over 100 second feet had gathered in natural draws and was returning to the river (Price, 1914, p. 45). By 1913 the annual runoff attributed to seepage from the North Platte Project between the state line and Bridgeport was over 66,000 acre-feet (Weeks, 1916, p. 221; also see Figure 9). In 1915 an attempt was made to determine all the diversions and return flows for the month of July on the North Platte and Platte Rivers from Henry, Nebraska, on the North Platte River near the state line, to Elm Creek on the Platte River, just west of Kearney, Nebraska. The results showed that the principal gains from seepage were between Mitchell and Minatare and between Bridgeport and Lisco. The net reach gain between Henry, Nebraska, near the state line and Bridgeport was 9,750 acre-feet (Weeks, 1916, p. 219).

One of the first to notice these changes was R. H. Willis, who started work for the Nebraska Board of Irrigation in 1895 and was the Chief of the Board from 1919 until 1951. Working out of the Bridgeport office, Willis was in a good position to notice the impact of the newly built irrigation system. In publications starting in 1927 he described the development of the surface water returns on the North Platte River west of Bridgeport:

> The quantity of water returning to the North Platte River, after being diverted for irrigation, is amazing to those who have not observed the habits of this stream . . . The factors contributing to return flow in the North Platte River are storage of flood waters in the Pathfinder Reservoir, and the increased diversion beginning with the years 1910 and

> 1911. The impounding of water in the reservoir is a direct retard of the stream flow from the flood period to the irrigation period, and the diversions of the streamflow to large areas of land creates a large underground storage (Willis and Murphy, 1930) . . . In the year 1911, there was no perceptible return flow west of Bridgeport. Beginning with 1911, the return flow gradually increased until 1927. The major portion of the water flowing in the river after passing Mitchell is return flow used and re-used for irrigation. Since the construction of the reservoir, the mean flow for May and June has been approximately 50% less than the mean prior to that time. For July, the mean flow has been 30% less; for August, 95% more; for September, about 225% more and for October, 215% more than the mean flow prior to the beginning of storage in the Pathfinder Reservoir. This increased flow during the months cited is the result of the application of water to the irrigated area between Whalen and North Platte. . . The quantity of water returning in a comparatively short time is remarkable (Willis, 1930, p. 33-34)

Wenzel, Cady and Waite also documented this change in the water regime. They too concluded that most of ground water discharged by streams along the North Platte River in Scotts Bluff County in western Nebraska was return flow from irrigation. On the south side of the North Platte River just east of Scottsbluff they observed Gering Drain, which was constructed to prevent water logging of land in Cedar Valley. When first constructed, it flowed 218 acre-feet during the first three months of the year. However, from 1923 to 1938 its flow for the same months was never below 2,995 acre-feet. They also calculated the total gain from the state line to Minatare for the years 1931 to 1938. In this 30 mile stretch the average gain was 326,000 acre-feet; 195,000 acre-feet was from measured tributaries and the rest was from "invisible pick-up" or ground-water accretions. Because these return flows are often rediverted, they noted, some of the visible pickup was included in the computations more than once (Wenzel, et al. , 1946, p. 123).

In Wyoming, Rapp Visher and Littleton described the impact of irrigation on small tributaries below Whalen Dam. Prior to irrigation Rawhide Creek was the only perennial stream contributing water to the North Platte River between the mouth of the Laramie River and the state line (Rapp et al, 1957, p. 18). No perennial streams flowed into the North Platte River

below Torrington. However in the 1950's, three perennial drains, Cherry Creek, Katzer, and Arnold contributed around 40,000 acre-feet of irrigation return flow (Rapp et al., Littleton, 1957, p. 59-60).

Since 1913, the Nebraska Department of Water Resources, formerly the Bureau of Irrigation Water Power and Drainage, State of Nebraska Department of Roads, has measured the annual amount of the irrigation return flows on streams between the state line and Bridgeport. Figures 10 and 11 show the quantity and pattern of return flows in creeks for which there are continuous gaging records. By 1919 there were substantial return flows. These flow patterns have continued unabated to the present day with a seasonal pattern showing a rise of flow after the start of the irrigation season and a fall after the season closes. Additional inflows to the river coming from unmeasured tributaries and ground-water inflows, the "invisible pick-up," also exhibit this pattern. These flows would most likely cease if irrigation diversions were terminated and the water table were to continue to drop as described by Rapp et al., 1957, pp. 51-52).

Irrigation development also resulted in rising water tables that contributed flow to the Platte River in central Nebraska. Before development, according to a 1916 study of July reach gains, the river lost 43,800 acre-feet between North Platte, Nebraska and Elm Creek, just west of Kearney (Weeks, 1916, p. 220). In 1929 Willis stated:

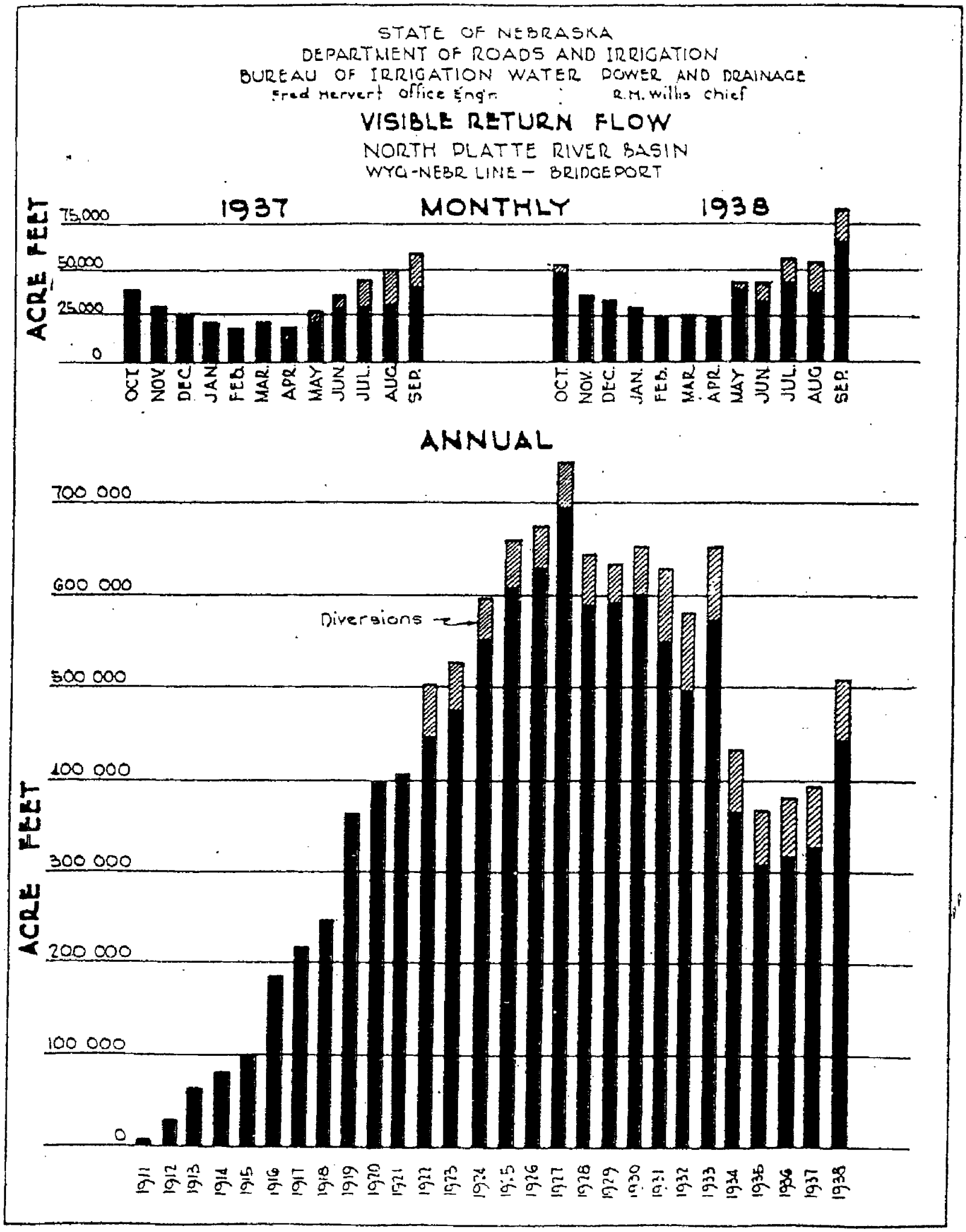
> There is a stream bed loss east of the confluence of the North and South Platte Rivers. When the flow east of North Platte is low, the bed loss is very noticeable. The water table during these dry periods drops below the river bed to the extent that no water flows on the surface. In the year 1910, the water table was about ten feet below the river bed at Kearney in the month of August. However, this condition seems to be improving. The water table has not dropped as low as in the former years. In a few more years the water table, which I believe is the surface of a large underground reservoir, will be stabilized at a higher elevation in July and August by the increasing return flow coming from irrigated areas in the upstream portion of the basin.

> In the recent period of water shortage it is less difficult to administer the distribution of the available water supply as far as Cozad. In other words, it seems that the water table has reached a stage of equilibrium at Cozad, beyond that point the water table is below the river bed (Willis, 1929, pp 27-28).

Lugn and Wenzel noted that direction of ground-water flow in 1931 was toward the river from Gothenburg to Lexington and more or less parallel to the river from Lexington to Grand Island (Lugn and Wenzel, 1938, pp.121-136, Plate 10). Goeke et al (1992, p. 30) reconstructed the configuration of the water table along the Platte River from Lake McConaughy to just west of Kearney for the year of 1935. They show that the ground-water flow in 1935 was toward the river from east of the future site of Lake McConaughy to North Platte, but somewhere around Cozad, the flow was parallel to the river (Goeke et al., 1992, p. 30). Where ground-water flows are parallel to the river, the direction of ground-water flow to and from the river is easily reversed. Thus, before Lake McConaughy and its associated irrigation and power systems were built, the river between North Platte and Kearney probably alternated between gaining and losing water to the ground-water reservoir. The shift would depend on the relative stage of the river and the elevation of the water table and, at least according to Lugn and Wenzel, on prevailing winds (Lugn and Wenzel, 1938, pp.105-136). After CNPPID's and NPPD's project caused the development of a ground-water mound, ground water between Gothenburg and Kearney, Nebraska tended to flow toward the Platte River. Within 30 years of the filling of Lake McConaughy this reach of the river was no longer a losing reach. (Goeke et al., 1992, p. 31). East of Kearney the river still tends to lose water to ground water (Conservation and Survey Division, 1986, p. 14).

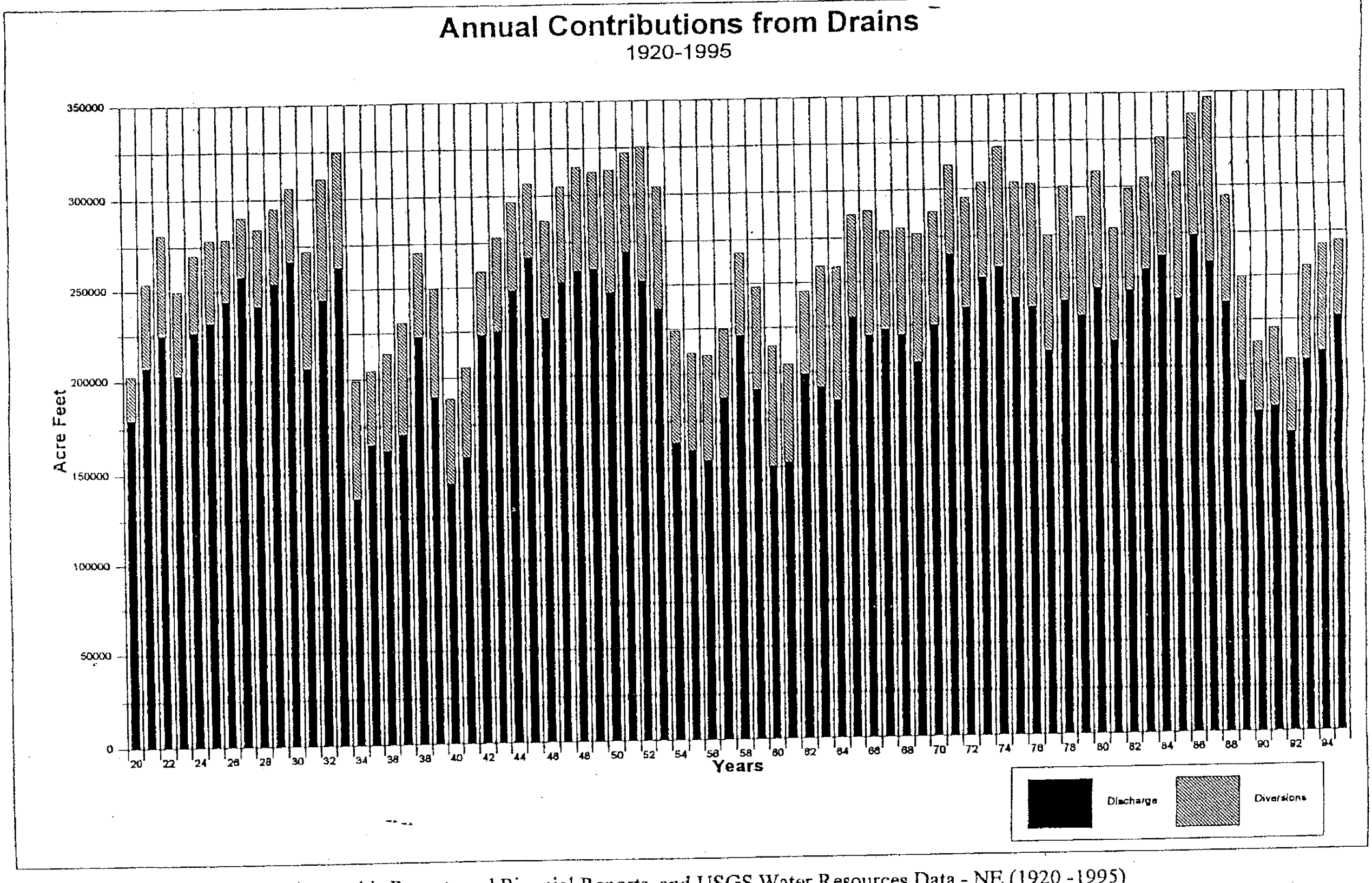
Figure 9 . Visible Return Flow

DEPARTMENT OF ROADS AND IRRIGATION



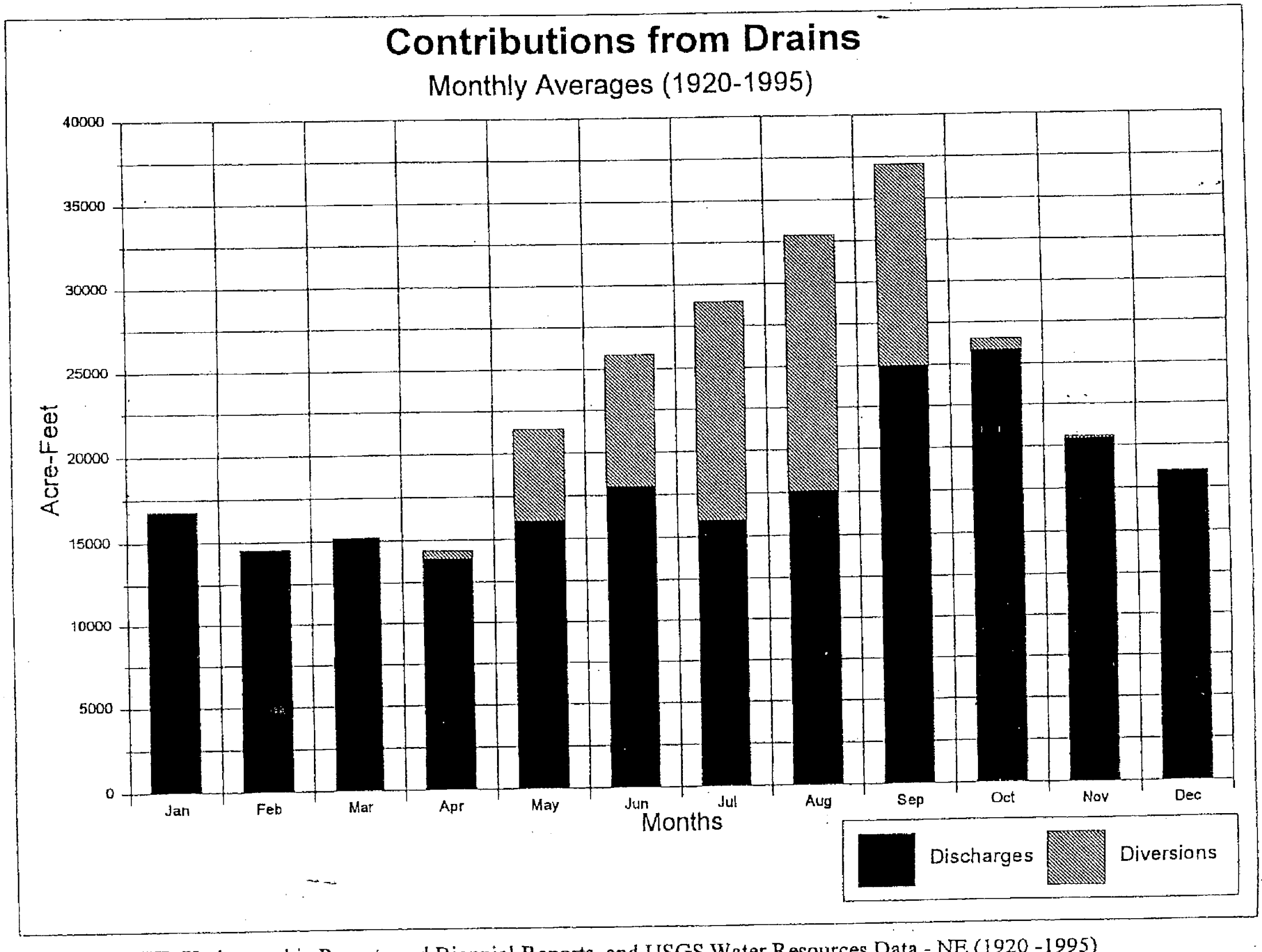
Reprinted from Tilley, A. C. 1938. Twenty-Second Biennial Report of the Department of Roads and Irrigation to Honorable R. L. Cochran Governor of the State of Nebraska 1937-1938. Lincoln, NE.

Figure 10 Annual Contributions from Drains 1920 - 1995

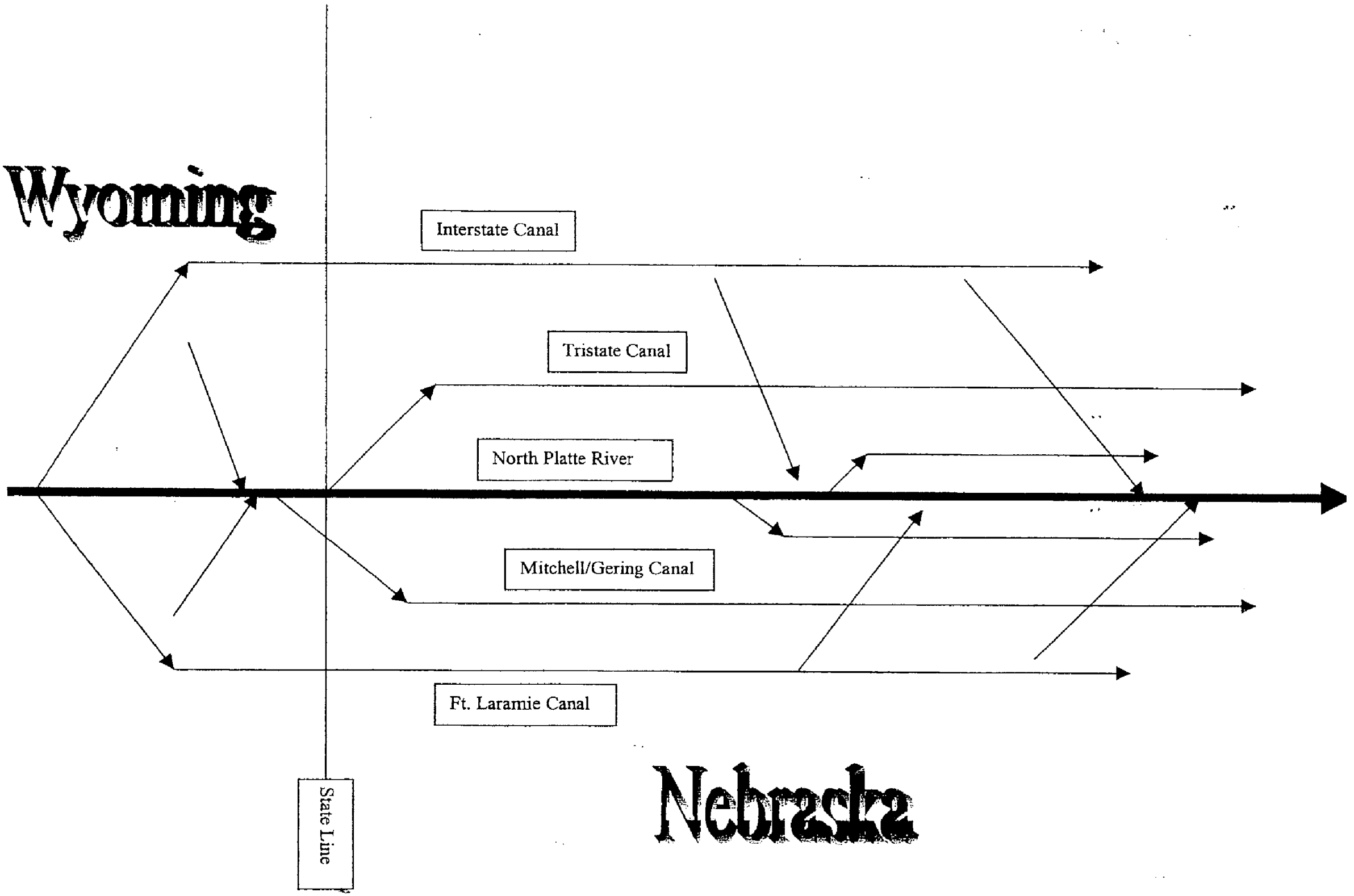


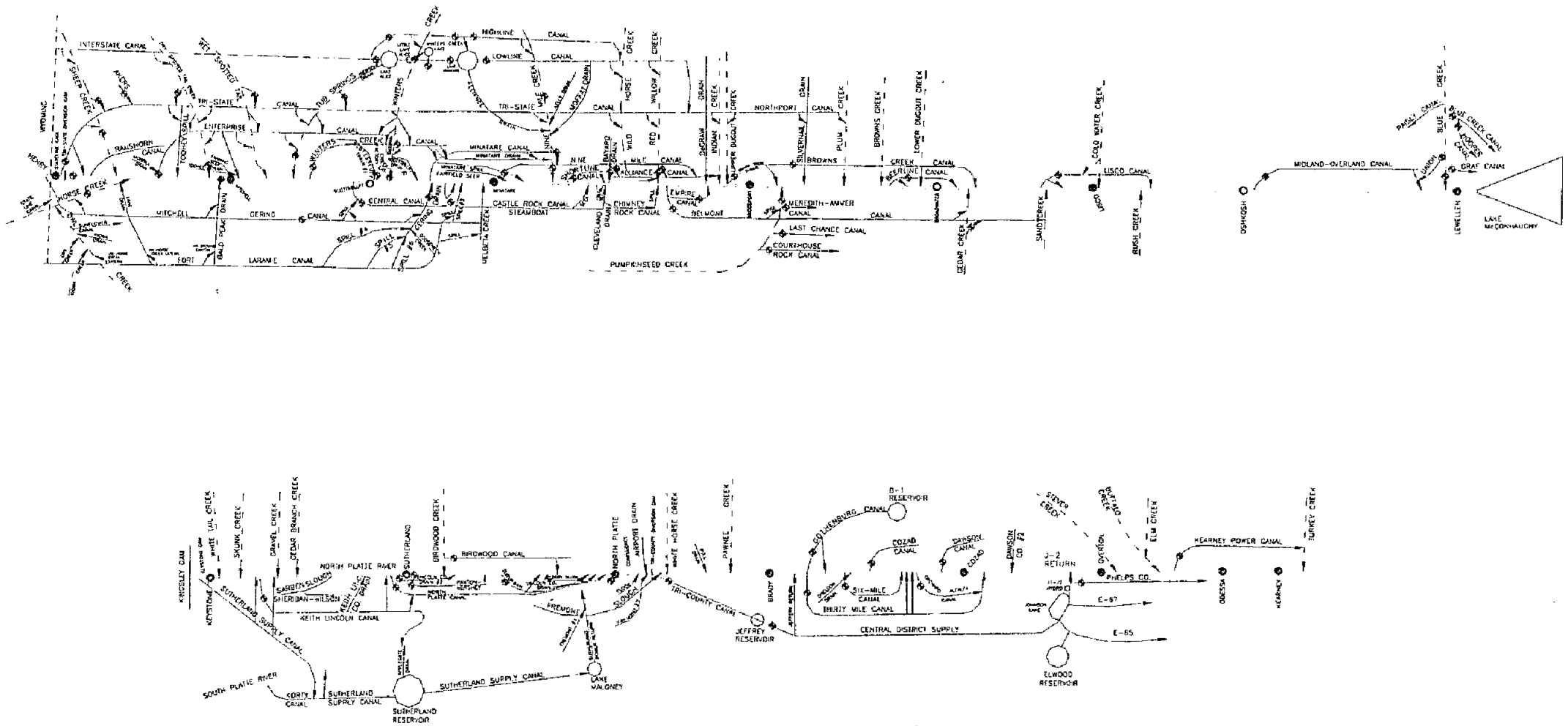
Sources of data: NE DWR Hydrographic Reports and Biennial Reports, and USGS Water Resources Data - NE (1920 -1995)

Figure. 11 Contributions from Drains Monthly Averages 1920 - 1995



Sources of data: NE DWR Hydrographic Reports and Biennial Reports, and USGS Water Resources Data - NE (1920 -1995)

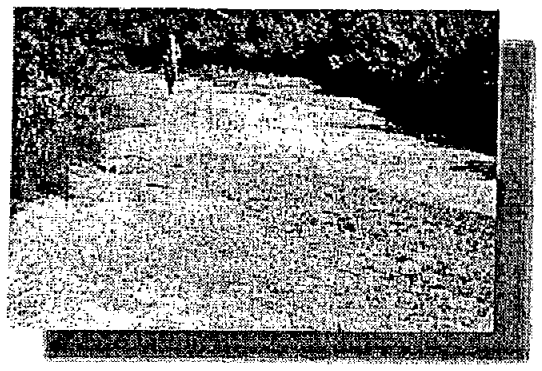

Wyoming
Interstate Canal
Tristate Canal
North Platte River
Mitchell/Gering Canal
Ft. Laramie Canal
State Line
Nebraska



NOTE:
- ALL CANALS HAVE A GAGING STATION
- RAMSHORN CANAL WAS CANCELLED

NOT TO SCALE

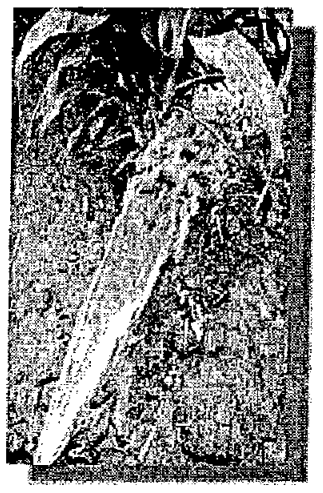
LEGEND
- GAGING STATION
- CITIES
- CITIES/GAGING STATION
- RESERVOIR
- CANAL
- CREEK
- DRAIN



of water may be less than the permitted amount based upon the capacity of the diversion facility, the annual acreage report, or the amount of water available. The **second type** of notice is a closing order. This denies the permit holder the right to divert for reasons such as insufficient water, failure to file an acreage report, or irrigation of lands not under the permit. The **third type** of notice is an opening order that may be issued when water supplies increase or when needed permits or modifications to permits have been granted.

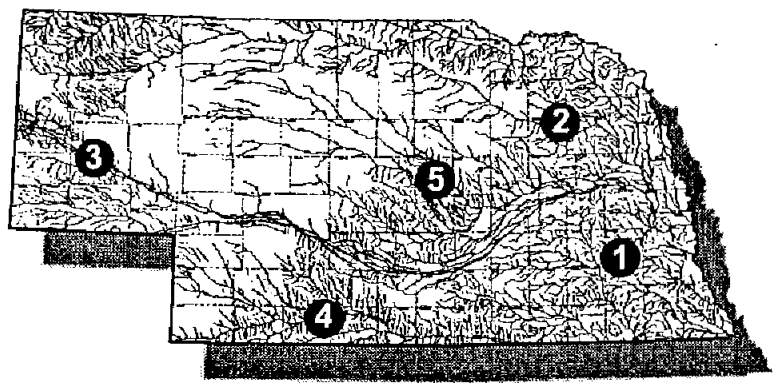
Meters

The DNR can require any appropriator to install a measuring device on any diversion facility when needed for proper water distribution. Most canals have measuring devices and in several areas pumps are required to have meters.



ILLEGAL DIVERSIONS

Under Nebraska law, anyone who uses, or allows to be used, surface water for any purpose, without authority from the DNR shall, if convicted, be guilty of a Class II misdemeanor. Each day that water is allowed to run without authority from the DNR constitutes a separate offense. The penalty for a Class II misdemeanor is a maximum of six months imprisonment or one thousand dollars fine, or both.



Department of Natural Resources Office Locations

① **Lincoln Office** *(Main)*
301 Centennial Mall South, Fourth Floor
Lincoln, NE 68509
(402) 471-2363

② **Norfolk Office**
601 East Benjamin Ave., Suite 101
Norfolk, NE 68701
(402) 370-3377

③ **Bridgeport Office**
729 Main Street
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(308) 262-1930

④ **Cambridge Office**
622 Patterson
Cambridge, NE 69022
(308) 697-3730

⑤ **Ord Office**
North Highway 11
Ord, NE 68862
(308) 728-3325

Permit holders who have questions regarding their permits are encouraged to contact DNR personnel at one of the above locations.

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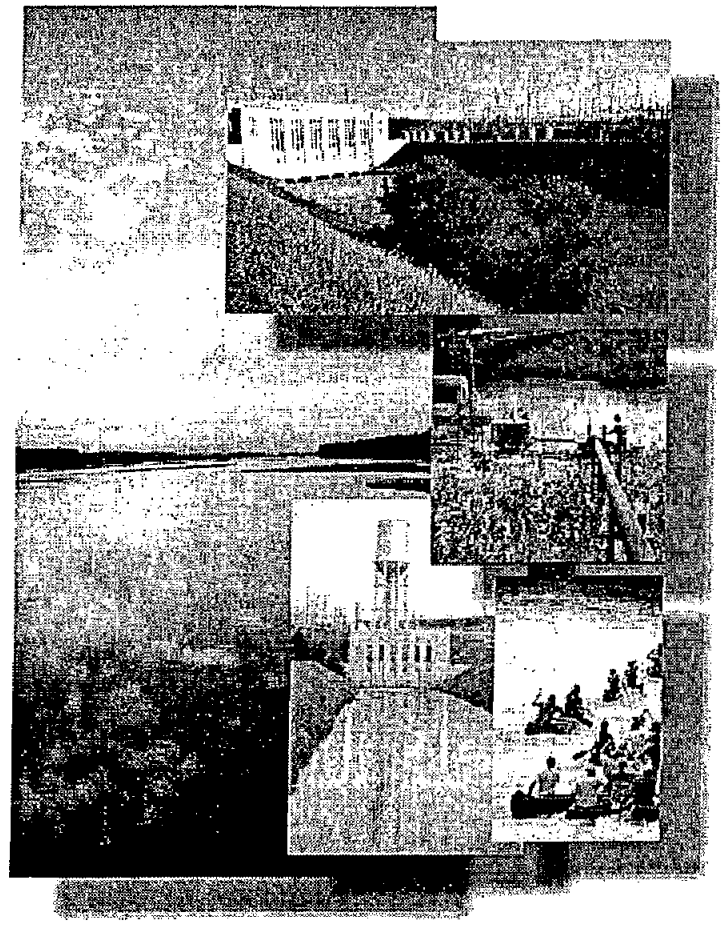
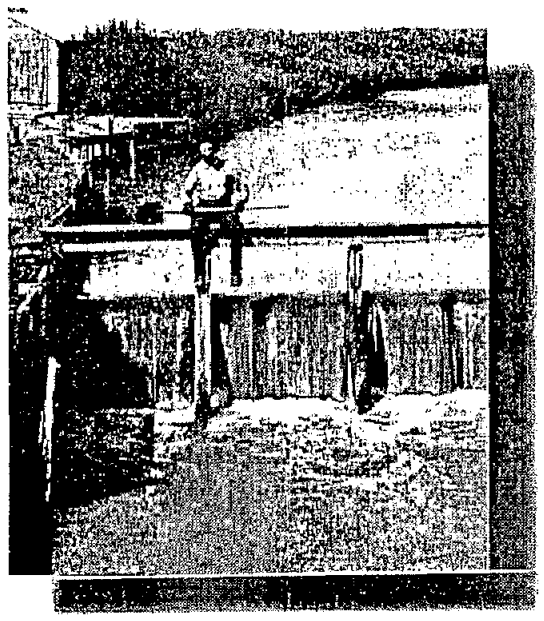
SURFACE WATER ADMINISTRATION for Natural Flow Permits



State of Nebraska
Department of Natural Resources

Surface Water Resources



Since 1895, Nebraska has had an administrative system overseeing the orderly use of the State's surface water resources. The **Nebraska Department of Natural Resources** (DNR) is the State agency authorized by Nebraska statutes to regulate surface waters. **All diversions of surface water for irrigation, hydropower, industrial use, municipal use, domestic use, storage and other uses require a State permit**. Recently, authority of the DNR was broadened to include instream uses for recreation; fish and wildlife; induced ground water recharge for public water suppliers; and diversions by ground water irrigation wells located within 50 feet of the bank of the channel. Each permit has certain limitations and conditions associated with it. **This publication is limited to discussion of natural flow permits granted to divert water from Nebraska's streams.**

PERMITS

Priority Dates

Every permit has a priority date usually based on the date the application for a permit was filed with the DNR. There are some statutory exceptions. Water distribution in Nebraska is based on "first in time is first in right." Priority dates set the value of the right, the older *(senior)* the priority date, the better the right. During times of shortage, newer *(junior)* water rights are denied water to satisfy the needs of older water rights.

Point of Diversion

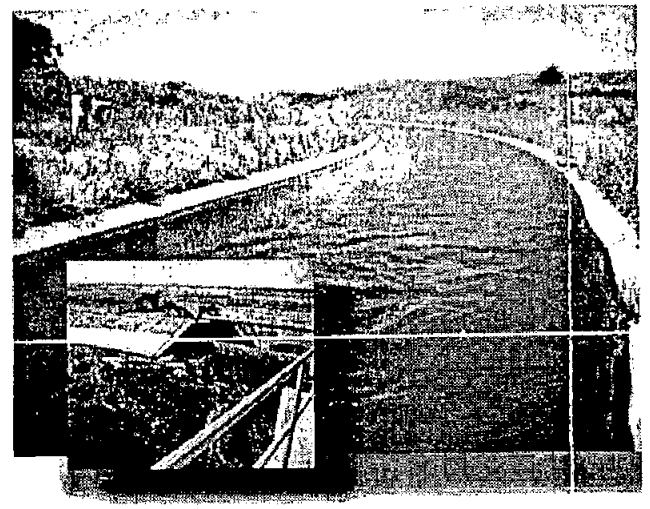
The point of diversion may be a pump location or a headgate. In either case, there is a described location given in the permit where water may be diverted from a stream. Some permits may have several approved diversion points. To change the point of diversion to somewhere other than the location specified in the permit, the permit holder must file a petition with the DNR to relocate. Approval must be received prior to relocation. Relocations may occur within the same 40-acre government subdivision without approval from the DNR as long as impairment does not occur to other appropriators. Any relocation that harms other appropriators cannot be approved.

Amount of Water

Permits are limited as to the amount of water that may be withdrawn, stored, or used. For permits to withdraw water from streams, both the diversion rate and the total annual volume that can be diverted are usually defined.

By law, the rate of diversion for irrigation cannot exceed one-seventieth of a cubic foot per second (cfs) per acre. (This is also stated as one cfs per 70 acres.) To convert cfs to gallons per minute (gpm), multiply by 448.8. Someone with a permit to irrigate 70 acres usually receives the right to divert one cfs or 449 gpm. Someone irrigating 35 acres usually receives a permit for 0.50 cfs or 224 gpm. However, within the last 100 years, different standards were established by law and some permits were granted instantaneous rates of less than one-to-seventy. A recently enacted law allows irrigation districts and companies to seek modification of existing permits in order to achieve a greater rate of diversion than one-to-seventy. Unless that modification has been approved, no acre of land may receive more than one-seventieth of a cfs under a single natural flow permit or combination of natural flow permits.

Permits are also conditioned by law as to the maximum amount of water that can be withdrawn on an annual basis. Most irrigation permits are held to a three acre-feet per acre limitation.



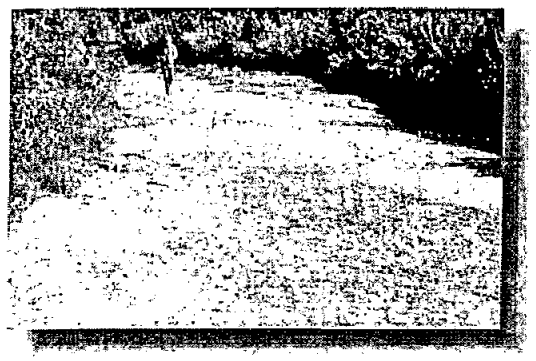
The amount of water diverted for both the instantaneous rate and the annual volume is measured at the point of diversion from the stream, not at the location of use.

Location of Use

The location of use is usually described within the permit and, in most cases, a map is filed as part of the permit. The map indicates the exact location of use approved by the permit. For irrigation permits, increase in the number of acres or a change in their location requires approval from the DNR. Water rights are a property right that attach to the land and cannot be moved without formal action of the DNR.

Other Conditions

Some permits are conditioned as to the time of year use can occur and under what situations diversions can occur. Permits describe the type of use to be made under the permit. Failure to use water as allowed under the permit for more than three consecutive years causes the permit to be subject to cancellation. There are excusable reasons for nonuse described in the law. Each permit is unique and must be read to determine exact rights associated with each.



The only excuse for non-use that can exceed the 10-year period is if a landowner of any tract of land uses all of the available water supply but on only part of the land under the appropriation because of an inadequate water supply.

After the individual presents his or her testimony, DNR staff will likely question the witness. The hearing is concluded when all parties are satisfied that all the facts have been presented and recorded.

Testimony presented honestly and fairly is the best evidence landowners or appropriators can present to DNR during the adjudication process.

Some basic suggestions on preparation for a water appropriation hearing are:

- Review the copy of the field investigation report provided by DNR prior to the hearing;

- If, in the case of an irrigation appropriation, the field report does not show all the lands that have been irrigated within the last three years, mark an aerial photograph to show all the lands that have been irrigated and bring this to the hearing;

- You should be prepared to testify to the following:
  1. When each field was last irrigated.
  2. What crops have been grown on the field since it was last irrigated, or what has occurred on the field.
  3. Why the field has not been irrigated since the last time it was irrigated.
  4. What equipment do you have available to irrigate.

- If the water appropriation was not used because of an acreage reserve program or some legal action, bring copies of the documents showing proof;

After the hearing, the transcripts (including exhibits) are reviewed by DNR. A decision is made on the evidence presented and the Director of DNR issues a order to leave the appropriation in effect, modify the appropriation, or cancel the appropriation. The order is sent to all parties appearing at the hearing and the appropriator.

Anyone **dissatisfied with the decision or order** has two avenues of recourse. A document requesting a rehearing may be filed in the Lincoln office of the DNR within 15 days from the receipt of the order. That filing must contain sufficient reasons for DNR to grant such a request. The second avenue is to file an appeal with the Court of Appeals within 30 days of the issuance of the order; a request for rehearing, if filed does not delay the time for filing an appeal.

Permit holders who have additional questions regarding their water appropriation permit are encouraged to contact Department of Natural Resources personnel at the Lincoln office.

Nebraska
Department of Natural Resources
301 Centennial Mall South, Fourth Floor
P.O. Box 94676
Lincoln, NE 68509
Phone (402) 471-2363
Fax (402) 471-2900

DNR's Homepage address:
http://www.dnr.state.ne.us

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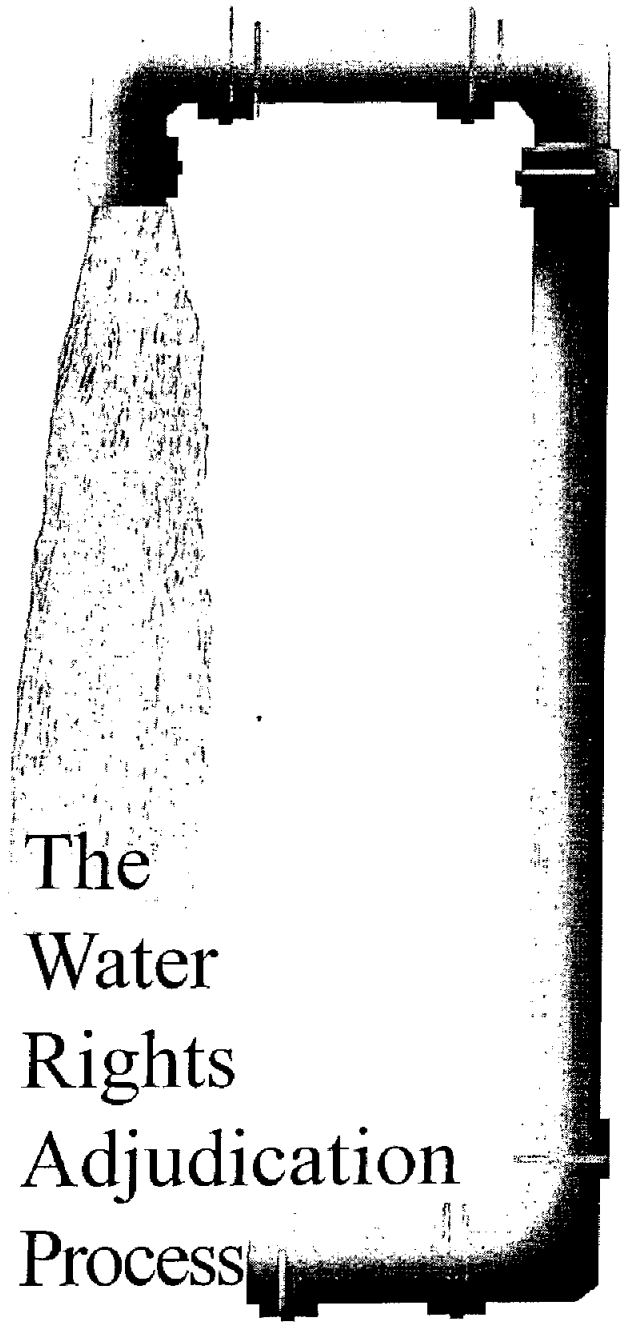

The Water Rights Adjudication Process

Published by the
Nebraska Department of Natural Resources

Water Rights ADJUDICATION

Nebraska state law requires the **Nebraska Department of Natural Resources** (DNR) to, **"as often as necessary," examine water appropriations to determine whether a water right is being utilized and is a valid appropriation, or whether the appropriation is subject to cancellation.** This process to examine water appropriations is called an **adjudication process**. The process is ongoing and DNR continues investigations as required, needed or as requested by other water users.

The investigation begins with DNR doing a records search to determine what is permitted under the existing appropriation, by examining orders, court decisions, legal descriptions and maps describing the location and water appropriation. The next step is generally **a DNR field investigation** that includes inspecting the land and irrigation facilities with the landowner/tenant to determine if and how water has been used under the subject appropriation. Other sources of information can include irrigation district records, county tax records, Natural Resources Conservation Service (NRCS) records, DNR diversion stream flow records and precipitation records.

Following the field investigation, DNR staff write a ***"Report of Field Investigation"***, which generally includes an aerial photograph marked to show the location of lands irrigated **within the last three years**. Once a field investigation report is completed, it's reviewed and a decision is made on whether a hearing on the appropriation is warranted.

Nebraska statues Section 46-229.02 states: *If it shall appear that any water appropriation has not been used for some beneficial or useful purpose or having been so used at one time has ceased to be used for such purpose for more than three consecutive years, the department shall appoint a place and time of hearing....* If only a portion of the water right is not used, a hearing is still required.

If a hearing is found necessary a **notice** is sent to all persons shown in DNR's records as being an owner of the appropriation. A title search is conducted at the county register of deeds office to determine landowners under the appropriation. Notices are mailed registered or certified, approximately six weeks before the scheduled hearing to all persons who were found to have an interest in the appropriation. The notice describes the appropriation and gives the time and place of the hearing. Notices are also published in the county newspaper if there are out-of-state landowners, or if the property lies within a municipality.

Adjudication hearings are comparable to a court hearing with a DNR employee acting as the hearing officer, presiding over the hearing. A hired court reporter swears in the witnesses and records their testimony. Another DNR employee acting as the hearing examiner will introduce exhibits and may or may not ask questions of the witness. The exhibits introduced by DNR include documents describing the water appropriation, notices, and the "Report of Field Investigation". Once the report is received into record, it is the burden of the landowner, tenant, canal operator or other interested person to refute any incorrect information or to provide excusable reasons. By law, the DNR Report of the Field Investigation is *prima facie* evidence. This means the report is considered in the judgment of the law to be sufficient to establish the facts contained unless rebutted or contradicted. **The law does expressly grant certain excusable reasons for non-use. All excusable reasons for non-use except one are valid for a period of not more than 10 years.**

Excusable reasons are:

a. The land subject to the appropriation was placed under an acreage reserve or production quota program or otherwise withdrawn from use as required for participation in any federal or state program;
b. Federal, state, or local laws, rules, or regulations temporarily prevented or restricted such use;
c. The available water supply was inadequate to enable the owner to use water for a beneficial or useful purpose;
d. Use of the water was unnecessary because of climate conditions;
e. Circumstances were such that a prudent person, following the dictates of good husbandry, would not have been expected to use the water;
f. The works, diversions, or other facilities essential to use of the water were destroyed by a cause not within the control of the owner of the appropriation and good faith efforts to repair or replace the works, diversion, or facilities have been and are being made;
g. The owner of the appropriation was in active involuntary service in the armed forces of the United States or was in active voluntary service during a time of crisis; or
h. Legal proceedings prevented or restricted use of water.

Administration-

Natural resources districts (NRDs) also use the ground water well registration information in their decision-making process concerning the need for ground water management areas when declines and shortages of ground water occur in their area. Additional state and federal agencies may also use this information regarding their studies dealing with both water quality and quantity issues. Certain state compacts or agreements concerning the administration of surface water between Nebraska and its neighboring states require information on water wells and ground water use that can also be obtained from the recorded ground water well registration information. If you have a need for this type of information and can't find the needed information online, please contact the Water Administration Division of the Nebraska Department of Natural Resources.

The electronic address for searching for well registration information is:
http://dnrserver26.dnr.state.ne.us/wells/wellsindex.asp

Nebraska
Department of Natural Resources
301 Centennial Mall South
P.O. Box 94676
Lincoln, Nebraska 68509-4676
Phone 402-471-2363
Fax 402-471-2900

Well Registration Updates

Written notice must be provided to DNR for change of ownership, correction of registration information, modifications of a registered well, and for abandonment of all wells.
DNR collects registration fees based on the use and pumping rate of wells. The fees received for well registrations are divided between the DNR and Health and Human Services. DNR's portion of the registration fee is used for cost-share programs for decommissioning water wells and is available through Nebraska's NRDs. HHSS's portion is used in administering and carrying out the purposes of the Water Well Standards and Contractor's Licensing Act.
Forms for reporting all the above updates are available at:
http://www nrc.state.ne.us/docs/wellforms.html
and DNR's Field Offices located at:

Norfolk Field Office
601 East Benjamin Ave., Suite 101
Norfolk, Nebraska 68701
Phone: 402-370 3377
Fax: 402-371-0653

Ord Field Office
North Highway 11
P.O. Box 251
Ord, Nebraska 68862
Phone: 308-728-3325
Fax: 308-728-9969

Bridgeport Field Office
729 Main Street
P.O. Box 787
Bridgeport, Nebraska 69336-0787
Phone: 308-262-1930
Fax: 308-262-1939

Cambridge Field Office
622 Patterson
P.O. Box 426
Cambridge, Nebraska 69022
Phone: 308-697-3730
Fax: 308-697-3200

Lincoln Field Office
301 Centennial Mall South
P.O. Box 94676
Lincoln, Nebraska 68509-4676
Phone: 402-471-2363
Fax: 402-471-2900

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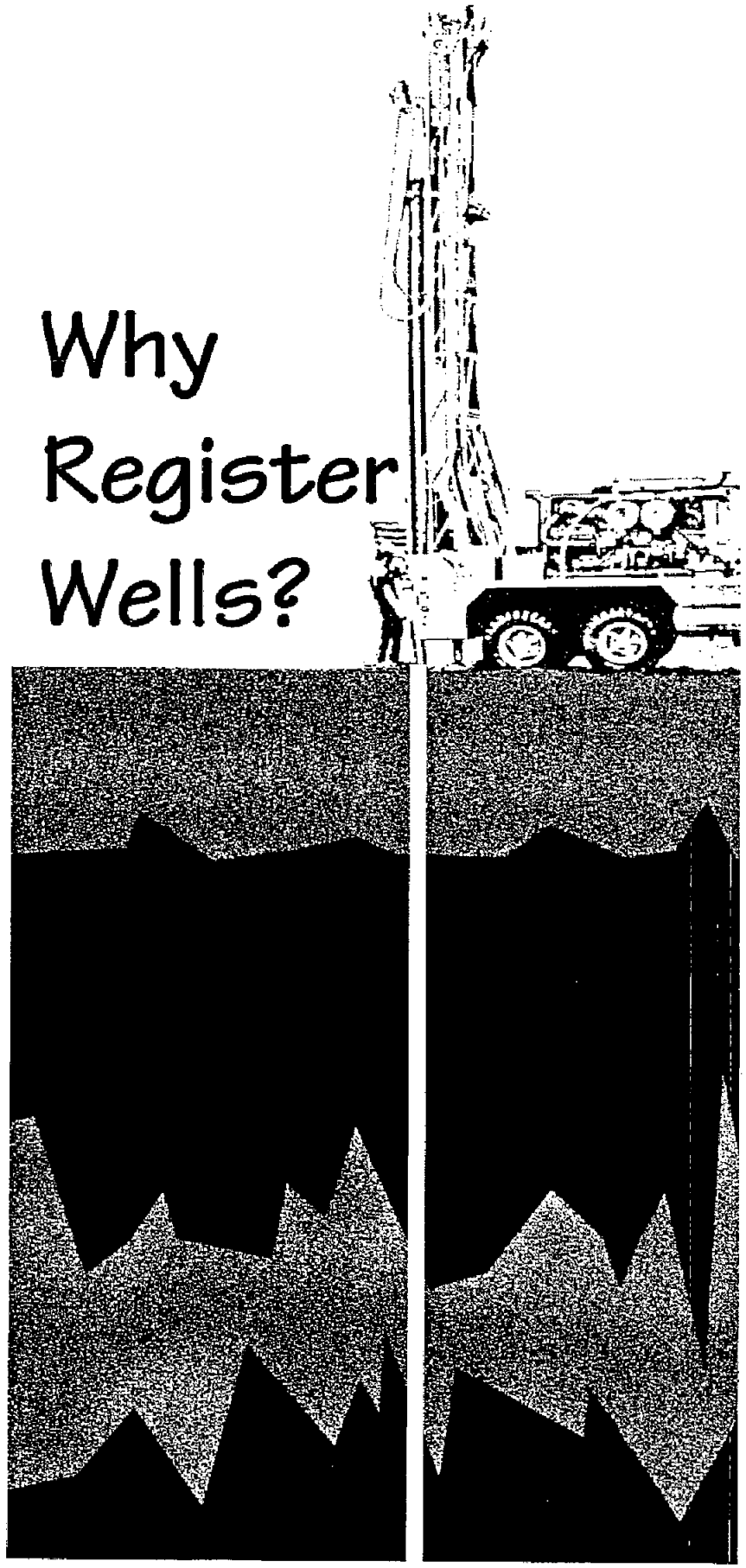
January 2002

Why Register Wells?



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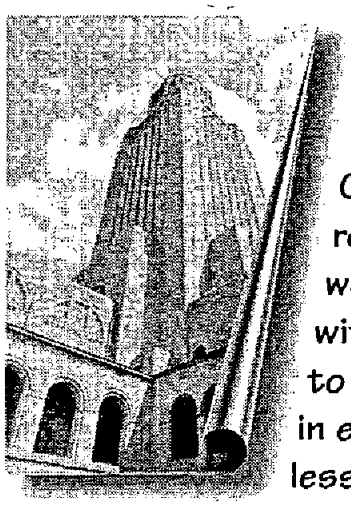
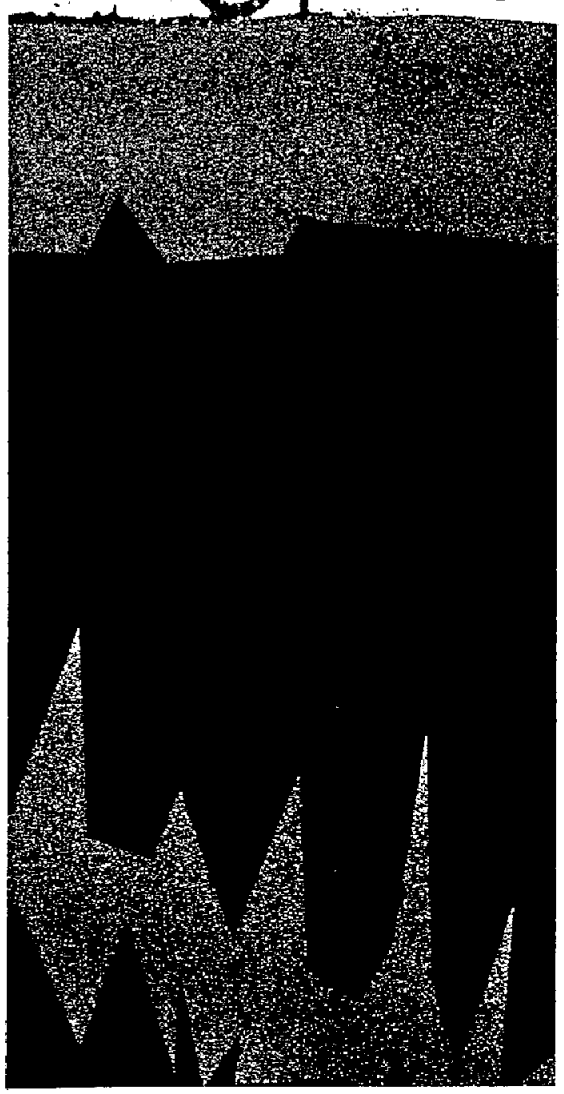


Statutory

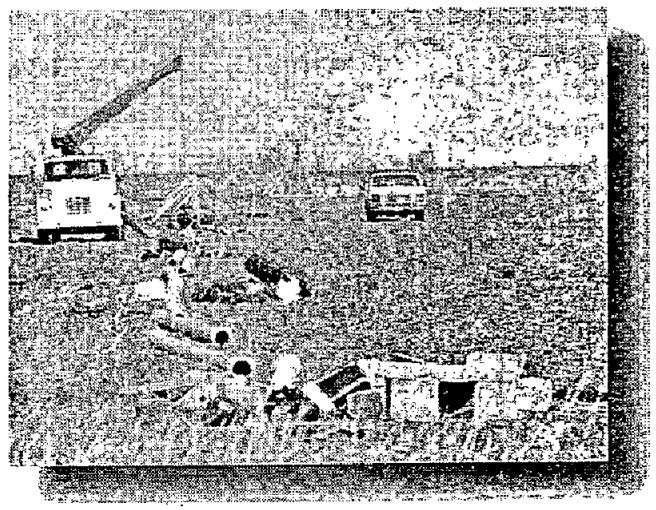
Current Nebraska law requires that all water wells must be registered with the State. Exceptions to the law include test holes in existence for ten days or less, dewatering wells with intended use of ninety days or less, domestic or livestock wells completed prior to September 9, 1993. Water well contractors are now responsible for filing the well registration for newly constructed water wells with the Nebraska Department of Natural Resources (DNR) within 60 days of well completion. Well owners are responsible for registering existing wells which have not been previously registered. Forms are available at DNR's offices or website. Failure to register a water well is a Class IV misdemeanor.



Personal Benefits

Spacing Protection-

New irrigation wells must be drilled at least 600 feet from any existing registered irrigation well under separate ownership. Industrial and certain public water supply wells must be drilled at least 1000 feet from any registered existing irrigation well. Even stricter spacing requirements may apply within groundwater management areas.



Public Record-

Water well information, well drillers logs, and registrations are updated daily, recorded and retained at DNR and may be accessed by anyone wishing the information. Well drillers logs contain not only water well location information but also include depth and thickness of identified deposits drilled. Therefore, if you need information concerning the construction of your properly registered water well and cannot locate the information in your records, that information, if registered, is available to you through DNR. The information can be obtained online at http://dnrserver26.dnr.state.ne.us/wells/wellsindex.asp .

Public Benefits

Research-

Much of the information concerning the state's underground layers of materials and deposits has been obtained from the information recorded during drilling and the water well registration process. This recorded information may be used by water well contractors when trying to locate water and/or other water wells in nearby areas. The recorded well information is also often used by the Department of Health and Human Services (HHSS) and the Department of Environmental Quality in their programs and work. This wealth of useful information is available to anyone.

Nebraska had over 120,000 active registered wells as of January 1, 2002