

**CHAPTER 8. GROUND WATER QUANTITY**

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## CHAPTER 8 GROUND WATER QUANTITY

### **8.1 Historical Review Regarding the Nebraska Ground Water Management and Protection Act (GWMPA)**

Since its original enactment in 1975, the Ground Water Management and Protection Act, has been modified several times. The Nebraska State Legislature adopted the Ground Water Management Act (GWMA) in 1975, in response to growing concern over ground water depletion occurring in the state through the mining of aquifers. This Act provided a method to control and regulate ground water depletion (quantity), but did not address ground water quality issues.

The Nebraska Legislature revised the GWMA to incorporate ground water quality concerns in 1982. The title of the Act was changed to the Ground Water Management and Protection Act (GWMPA). The 1982 GWMPA did not provide specific authority to prevent ground water quality degradation. However, it did establish a basis that would ultimately authorize the NRDs to administer non-point source contamination regulations through the implementation of Ground Water Quality Management Areas (GWQMA). Legislation enacted in 1986 provided the NRDs with the authority to choose to establish ground water management areas after preparation of a District Ground Water Management Plan.

Legislative Bill 1106, enacted in 1984, mandated that each of the 23 NRDs develop a ground water management plan to inventory the ground water resources within each District, but contamination concerns were not a required component of the plan. Revisions included in the 1986 update of the Act further defined the role of the Natural Resources Districts and the means by which they could address non-point source ground water contamination.

The concept of Special Protection Area (SPA) was first introduced in the Legislature in 1983 in LB 426, which did not pass. A similar bill, LB 463, was introduced in 1985, which did not pass either. A compromise bill, LB 894, was adopted in 1986. LB 894 allowed the Nebraska Department of Environmental Quality (NDEQ) to administer regulations for ground water non-point source contamination. In addition, this legislation gave NDEQ the ability to engage in a non-point source contamination issue at the request of other entities than just NRDs.

Several pieces of legislation passed in the Nebraska Unicameral have affected the SPA program since its inception in 1986. LB 51, enacted in 1991, imposed that prior to July 1, 1993, each NRD shall amend its ground water management plan to identify to the extent possible: 1) levels and sources of ground water contamination within the area, 2) ground water quality goals, 3) long term solutions necessary to prevent the levels of ground water contaminants from becoming too high and to reduce high levels sufficiently to eliminate health hazards, and 4) practices recommended to stabilize, reduce, and prevent the occurrence, increase, or spread of ground water contamination.

LB 51 also gave the Director of Environmental Quality the authority to require an NRD which has established a Ground Water Quality Management Area to adopt an "action plan" for designated SPAs.

LB 21 was passed in the 1992 Nebraska Legislative Session and became effective July 15, 1993. The primary purpose of LB 21 was to allow a Natural Resources District with a Special Protection Area to increase its general tax levy by up to one-half cent per \$100 valuation. In such NRDs, the maximum levy will be five cents per \$100 valuation.

The 1993 legislative session resulted in the passage of LB 439 which allows reduction of irrigated acres in Water Management Areas. This bill was requested by the Central Platte NRD and authorizes NRDs with GWQMAs to adopt the type of acreage reduction program (equal percentage of acres reduced for all ground water irrigators) which Central Platte NRD uses for ground water quantity management. This bill also modified the definition of rotation to allow its use on a yearly basis. Previously, rotation could not be based on time periods longer than a month.

In 2004, the Nebraska Legislature passed LB 962, which went into effect July 15, 2004. This bill required the Department of Natural Resources to identify geographic areas where surface water and ground water are hydrologically connected and to designate river basin(s) that are fully appropriated and over appropriated. Once a basin has been designated fully appropriated, the NRD must work in conjunction with DNR to develop an Integrated Management Plan. The development of the IMP may take three to five years.

## **8.2 Methods of Formation for Ground Water Protection**

NRDs have the authority to establish Ground Water Management Areas, to address ground water quantity concerns. Prior to designating a management area, an NRD must have prepared a ground water management plan that includes a ground water reservoir life goal and which specifies how proposed controls will impact this goal.

Actions that may be used in a Ground Water Management Area include: 1) Permits required to construct water wells, 2) Adoption of authorized controls that have been identified in the NRDs Ground Water Management Plan, 3) determination of the total amount of ground water to be withdrawn, and 4) After a public hearing, an NRD Board of Directors may dissolve a management area based on ground water returning to acceptable levels and land use practices that no longer pose a contamination threat to ground water.

Before considering a Ground Water Management Area the District will evaluate all available alternatives. When determining whether to designate a Ground Water Management Area, the District will consider its financial and technical capabilities; public input and concerns, and seek to identify the needs for any additional studies to confirm the District's problem(s).

### **8.3 Districtwide Ground Water Management Area**

The Twin Platte Natural Resources District will establish the entire district as a Ground Water Quantity Management Area upon approval of revisions for the Ground Water Management Plan to take a proactive approach to protecting the ground water resources.

Upon establishment of a Districtwide Ground Water Quantity Management Area:

- ◇ Permits will be required for all new wells with the capacity to pump greater than 50 gallons per minute.
- ◇ A maximum allowed irrigated acres will be determined for all new well permits issued. The maximum allowed irrigated acres will be determined based on that the total irrigated acres will not exceed 25% of the land area within a one mile radius of a new well which lies within the Twin Platte Natural Resources District. (Example: There are 2010 acres within a one mile radius circle and the total irrigated acres within that circle will not exceed 502.5 acres – 25% of the land area) The new well must be located within the area of the acres irrigated from the new well.

### **8.4 Twin Platte NRD Ground Water Quantity Management Program**

The **Goal** of the Twin Platte NRD's Ground Water Quantity Management Program is to maintain or improve the quantity of ground water consistent with the goals and objectives of the District as provided in Chapter 6. The District envisions their goal being accomplished first through voluntary and mandatory educational programs and implementation of agricultural and conservation techniques such as the use of Quantity Best Management Practices (BMPs).

The District's Ground Water Quantity Management Program will establish a Ground Water Quantity Management subarea within a Major Land Resources Area or portion thereof where ground water quantity is or could become a problem.

Currently, the District recognizes that the major threat to depletion of ground water is related to irrigation. The District began a ground water level monitoring program for ground water table levels in 1976 and continues to monitor 116 sites annually. The District initiated a ground water model study titled "Hydrology of Parts of the Twin Platte and Middle Republican Natural Resources Districts, Southeastern Nebraska" which was published in April, 1992 and on file in the Twin Platte Natural Resources District office and initiated a ground water model study titled "Simulation of Ground Water Movement in the High Plains Aquifer, Southern Sandhills Area, West Central Nebraska" which is expected to be completed late in 1995 to establish base-line water quantity conditions in the District and to access future conditions. The District's data collection efforts and ground water modeling studies are described in Chapter 5. Depending on the scope and trends in the ground water, the District will proceed with addressing those problems within a Major Land Resource Area or portion thereof when the spring ground water table levels trends show a three year average decrease of 10.0 feet or greater from



**Phase I: Initiation**

A Ground Water Quantity Management Subarea will be established throughout a Major Land Resource Area or within a portion of the Major Land Resource Area when the Phase I triggering mechanism in section 8.4.1 is met.

**Phase I: Controls**

- 1) The TPNRD will coordinate a mandatory multifaceted educational program for ground water users. The program will emphasize ground water use management through information, education and site demonstrations.
- 2) The TPNRD may initiate a moratorium on the issuance of additional well construction permits. A moratorium may be in place for no more than 3 years without subsequent renewal by the Board of Director's.
- 3) The TPNRD may establish a minimum spacing distance between new wells more stringent than statutory requirements.
- 4) The TPNRD may establish a smaller number of maximum allowed irrigated acres within a one mile radius of a new well and/or increase the radius around a new well.

A list of recommended quantity best management practices are summarized in Table 8-1 (Located at end of Chapter 8). These practices will be incorporated into the general education program.

Table 8-2 (Located at end of Chapter 8) outlines assistance programs that can be developed by the NRD to support landowners in addressing ground water declines in a given area(s).

**Phase II: Initiation**

When the Phase II triggering mechanism in Section 8.4.1 is met for an established Ground Water Management Subarea, Phase II controls will be implemented.

**Phase II: Controls**

- 1) All requirements in Phase I will be continued.
- 2) The TPNRD may initiate a moratorium on the issuance of additional well construction permits. A moratorium may be in place for no more than 3 years without subsequent renewal by the Board of Director's.
- 3) The TPNRD will also adopt **one** or more of the controls listed below:

- ◇ Implementation of an allocation schedule and allocating the total amount of ground water that may be withdrawn. Allocation for purposes of irrigation means the allotment of a specified total number of acre-inches of irrigation water per irrigated acre over any reasonable period of time. Flow meters or other approved water measuring devices will be required to measure the amount of ground water applied to each irrigated field and reports, on forms developed by the District, will be required to be submitted to the District.
- ◇ Require District approval of transfers of ground water off of the land where the water is withdrawn and/or transfers of ground water allocations.
- ◇ Adoption of a rotation system for use of ground water.
- ◇ Adoption of a system for reducing irrigated acres.
- ◇ Establishment of a minimum spacing distance between new wells more stringent than statutory requirements.
- ◇ Establishment of a smaller number of maximum allowed irrigated acres within the area around a new well and/or increases the radius around a new well.

### **Phase III. Initiation**

When the Phase III triggering mechanism in Section 8.4.1 is met for an established Ground Water Management Subarea, Phase III controls will be implemented.

### **Phase III. Controls**

- 1) All requirements in Phases I & II will be continued.
- 2) The TPNRD may initiate a moratorium on the issuance of additional well construction permits. A moratorium may be in place for no more than 3 years without subsequent renewal by the Board of Director's.
- 3) One or more of the control(s) established in Phase II will be revised to:
  - A) Adopt more restrictive requirements for District transfer permits.
  - B) Reduce the allocation of the total permissible amount of ground water that may be withdrawn.
  - C) Adopt a more restrictive rotation system for use of ground water.
  - D) Adopt a system to further reduce irrigated acres.
  - E) Establish a greater minimum spacing distance between new wells.

- F) Establish a smaller maximum number of allowed irrigated acres within the area around a new well and/or increase the radius around a new well.

and/or

One or more of the following controls will be established to the extent not previously established:

- A) Require District approval of transfers of ground water off of the land where the water is withdrawn and/or transfers of ground water allocations.
- B) Implementation of an allocation schedule and allocating the total amount of ground water that may be withdrawn. Allocation for purposes of irrigation, means the allotment of a specified total number of acre-inches of irrigation water per irrigated acre per year or an average number of acre-inches of irrigation water per irrigated acre over any reasonable period of time.
- C) Adoption of a rotation system for use of ground water.
- D) Adoption of a system for reducing irrigated acres.
- E) Establishment of a minimum spacing distance between new wells more stringent than statutory requirements.
- F) Establishment of a smaller number of maximum allowed irrigated acres within the area around a new well and/or increase the radius around a new well.

#### **8.5 Other District Actions to be Considered for Implementation to Protect Water Quantity:**

The NRD will work with cities/villages to improve water use efficiency and establish water use conservation guidelines.

#### **8.6 Implementation Time Frame for Establishing a Management Area**

The main reason for establishing a Management Area is to prevent or reduce declines of water quantity.

Whenever ground water quantity is threatened, meaningful data is necessary to make informed decisions. Studies may be done to define the source, extent, mechanisms and effects to identify the extent of a subarea.

Data collected within an area, consecutively over a three year period, will provide the District with an opportunity to observe the seasonal effects of sampling activities and potential trends. The average levels based on this information will be used to determine the management phase (either I, II, or III) to address declines of ground water within a given area.

The District Board of Directors reserves the option to proceed immediately in implementing Ground Water Quantity Management subareas.

### **8.7 Identifying and Establishing Boundaries**

The boundaries of a Ground Water Quantity Management subarea will be the Major Land Resource Area or a portion of a Major Land Resource Area, based on geologic and hydrologic characteristics, within the Twin Platte Natural Resources District as identified by the USDA Natural Resources Conservation Service.

### **8.8 Enhance District's Ground Water Monitoring System**

It will be important to maintain a reliable ground water level monitoring system. Future decisions will be based on data from the monitoring system. The District's ground water monitoring program is located in Chapter 5. The data collected through the monitoring program will be accessible to landowners and operators within the monitoring network.

**Table 8-1**  
**Recommended Quantity Best Management Practices**

The following are recommended as quantity best management practices and will be incorporated into the general education program and certified training workshops. Detailed descriptions are not given for each practice. Descriptions used by the UN-L Cooperative Extension, Natural Resources Conservation Service and/or other recognized authorities will be used to define the practices.

1. Irrigation Water Management
  - a. Flow meters
  - b. Irrigation scheduling
  - c. Surge valves
  - d. Buried pipe lines
  - e. Reuse pits, return lines
  - f. Measurement of field moisture conditions with moisture blocks, tensiometers, soil probes, etc.
  - g. Determine crop water use using modified atmometers
  - h. Measurement of uniformity of water application by sprinklers
  - i. Development of an irrigation water management plan on each farm

**Table 8-2**  
**Potential TPNRD Assistance Programs**

Technology Transfer: As development of agricultural and landscape technology becomes available which will benefit land use decisions, the NRD will communicate information to rural and urban landowners.

The NRD will hold public meetings to provide an open forum to discuss new technologies or programs. Exhibits, rural and urban demonstration projects, newsletters, and reports by agencies/organizations will be used. Local news media will be used to keep the public informed of activities.

Development of Ground Water Advisory Committees: The District will develop advisory committees for the purposes of becoming familiar with NRD regulatory authorities pertaining to ground water management and protection; to promote public understanding of ground water concerns; to advise the Twin Platte NRD Board of Directors on policy making to ensure that all viewpoints are considered, and to communicate on-going District

programs and projects.

Cost-share Assistance: The District maintains the option to develop incentive programs to encourage the use of quantity best management practices. Outlined below are possible items for which cost-share funding could be available through the District. Similar cost share arrangements may be available through state and federal programs.

- 1) Flow Meters
- 2) Moisture Meters and Blocks, Tensiometers, and Soil Probes
- 3) Surge Systems
- 4) Irrigation Scheduling Services
- 5) Modified Atmometers
- 6) LEPA Systems
- 7) Well Abandonment Program
- 8) Independent Ag. Consultant

Additional Monitoring Activities: An intensive ground water level monitoring program and network throughout the District is important in order to determine any changes in the condition of the ground water. This program has been explained in greater detail in Chapter 5 of the District's Ground Water Management Plan.

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