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# Departmental Functions of the Conservation and Survey Division


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**Departmental Functions**  
of  
**The Conservation and**  
**Survey Division**



*By*

G. E. CONDRA

*and*

E. C. REED

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Conservation & Survey Division  
113 Nebraska Hall  
The University of Nebraska - Lincoln

**BULLETIN 33**  
**OF THE**  
**CONSERVATION AND SURVEY DIVISION**  
**UNIVERSITY OF NEBRASKA**

LINCOLN, NEBRASKA

NOVEMBER, 1952

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R. G. GUSTAVSON, *Chancellor*

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### CONSERVATION AND SURVEY DIVISION

G. E. CONDRA, *Dean and State Geologist*

E. C. REED, *Associate Director and Associate State Geologist*

AS DEFINED by law, the mission of the Conservation and Survey Division of the University is to survey and describe the geology, topography, natural resources, conservation problems and industries of Nebraska and serve as a factual Information Bureau relating to state development. Its departments are the Geological, Soil, Water, Biological, Resource and Industrial Surveys and an Information Bureau.

## Departmental Functions of The Conservation and Survey Division

*By*

G. E. CONDRA

*and*

E. C. REED

The departments of the Conservation and Survey Division, as defined by state law, are the (1) Geological Survey, (2) Soil Survey, (3) Water Survey, (4) Resource and Industrial Survey, (5) Biological Survey, (6) Conservation Survey, and (7) Public Information Service based on survey.

The Legislature placed these basic survey activities in the University in order to insure their continuity and freedom from partisan politics, and placed the regulatory control of industrial development in departments at the Capitol. This placement of activities has worked harmoniously and beneficially to the state.

The Legislature created the State Conservation and Soil Survey in 1911; changed the name to Conservation and Survey Division in 1921, and re-defined some of its functions in 1919, 1921, 1943 and 1951.

Fundamental survey is now recognized as a necessary basis for planning all phases of state development, as in agriculture, industry, reclamation, and education. Following is a brief review of the functions of the departments of the Conservation and Survey Division.

1. **Nebraska Geological Survey.** This department describes and maps the mantle rock and bed rock formations and structure of the land, based on a study of outcrops, and the logging of deep wells, some of which are drilled through mantle rock and bed rock formations to granite, i. e. to a depth of 5000 feet or more. The deepest of the more than 1000 logged wells is 8,846 feet. It is located southwest of Harrisburg, Banner County, and was drilled to granite.

The Geologic Section of Nebraska is described in bulletin No. 14 of the Geological Survey. It gives the thickness and nature of the mantle rock and bed rock formations under all of the state, and the locations of the larger anticlines, basins and faults.

Some limestones and shales exposed in the lower part of the Platte, in the Weeping Water, Nemaha, Big and Little Blue and

the Missouri River valleys extend into Iowa, Missouri, Kansas and Oklahoma, and at considerable depth in the state to Colorado, Wyoming, and the Black Hills, and are folded and faulted locally. Oil and gas geologists must know the formations and structure of the land.

The origin of the marine-formed beds, such as the limestones, and shales, and how and when they were elevated above sea level forming land, is an interesting geologic study, as are glaciation, land erosion and the origin of topography. Then too, the paleontologic study of the fossil life found in the formations of old to recent age, gives an interesting history of the origin of present day plant and animal life, and has been described in several special Survey bulletins.

The topography of more than half the state has been mapped and the maps are of use in many phases of development.

Passing upon the plugging of abandoned producing wells and test wells drilled for oil and gas, as required by state law of 1943 and 1951, calls for considerable time from the Geological Survey and is done to insure the prevention of soil and surface water deterioration by the escape of oil, gas and mineralized water from the wells.

The 1951 Legislature directed the State Geologist's office to adopt reasonable rules and regulations in connection with oil and gas exploration and development in Nebraska. These rules and regulations have been approved by the Attorney General's office and placed on file with the Secretary of State. They provide for written notification of intention to drill, the filing of samples, logs and records of wells drilled with the Geological Survey, consultation concerning plugging procedures, the filing of affidavits of plugging, and monthly oil and gas production reports. These rules and regulations make it possible for the State Geological Survey to collect, file and study all important geologic data developed in oil and gas exploration and facilitate the development of satisfactory plugging methods to give maximum protection to our potable water supplies and our commercial deposits of oil and gas. Thus satisfactory means are provided to permit maximum benefit to the state from oil and gas exploration. These rules and regulations have been in effect for more than a year under the direction of E. C. Reed and both large and small oil companies have cooperated very satisfactorily with the Geological Survey in this connection.

The Geological Survey has studied and described the limestone, sandstone, gypsum, salt, sand, gravel, clay, shale, bentonite,

volcanic ash, potash and coal resources of the state. It has named and described the many geological formations, and the origin of the many place names of the state, and the reports of the Survey are on file in most leading reference libraries of the United States and other countries.

#### REFERENCES:

1. *Upper Carboniferous Formations in the Lower Platte Valley*, by G. E. Condra and O. J. Scherer. Nebr. Geol. Surv. Paper 16.
2. *The Geological Section of Nebraska*, by G. E. Condra and E. C. Reed. Nebr. Geol. Surv. Bull. 14.
3. *The Nomenclature, Type Localities and Correlation of the Pennsylvanian Subdivisions in Eastern Nebraska and Adjacent States*, by G. E. Condra. Nebr. Geol. Surv. Bull. 16.
4. *Correlation of the Pleistocene Deposits of Nebraska*, by G. E. Condra, E. C. Reed and E. D. Gordon. Nebr. Geol. Surv. Bull. 15A.
5. *Correlation of the Formations of the Laramie Range, Hartville Uplift, Black Hills, and Western Nebraska*, by G. E. Condra, E. C. Reed and O. J. Scherer. Nebr. Geol. Surv. Bull. 13A.
6. *Correlation of the Members of the Shawnee Group in Southeastern Nebraska and Adjacent Areas of Iowa, Missouri and Kansas*, by G. E. Condra and E. C. Reed. Nebr. Geol. Surv. Bull. 11.
7. *Correlation of the Big Blue Series in Nebraska*, by G. E. Condra and J. E. Upp. Nebr. Geol. Surv. Bull. 6.
8. *Western Nebraska Oil and Gas Development (1952)*, by E. C. Reed. Reprint from "World Oil," February and March, 1952.
9. *Origin of the Place Names of Nebraska*, by J. T. Link. Nebr. Geol. Surv. Bull. 7.

2. **State Soil Survey.** The many kinds of soils in Nebraska are composed of weathered mineral matter and varying amounts of living and dead organic matter. They are porous and contain air, water, small animals, plant roots, and bacteria, and should not be confused with the silty and sandy mantle rock formations. They were formed on rough, hilly, undulating and plains land, on small areas of limy, sandy, and shaly bed rock, and on larger areas of silty, dune sand, and sandy mantle rock. The darker colored soils are in the eastern counties where there is most rainfall and the lighter colored soils are in the central and western counties where there is less rainfall and silty to sandy mantle rock.

The State-Federal soil survey is a phase of geological survey and has been underway in Nebraska for more than forty years. It has covered all but six counties of the state and detailed re-surveys have been made in Cass, Sarpy, Otoe, Lancaster and Saunders counties and are underway in Gage County and several irrigation areas.

The detailed survey includes the study, description and mapping of the origin, texture, profile, color, composition, and use capability of the various soils. The maps show the kinds of soil and the drainage and cultural features of a county in detail. They and the text are of use in farm planning, farm management, soil conservation, highway construction, and by land assessors, farm loan companies, real estate agents, and in the schools. Some of the early county reports are out of print but copies of them are in many farm homes, some libraries, and in the county offices of the Soil Conservation Service and Agricultural Extension Agents and in the library of the Conservation and Survey Division.

**3. State Water Survey.** Water is our basic resource. Without it there would be no plants, no animals, and no people. The water survey includes a study of rainfall, runoff, lakes, streams, soil water, and ground water, also water pollution, water treatment, water wastage, sanitary wells, and the priority and beneficial use of water.

The U. S. Weather Bureau, U. S. Geological Survey, U. S. Reclamation Service, State Engineer, county engineers, municipal engineers, State Board of Health, Soil Conservation Service, College of Agriculture, College of Engineering, State Soil and Water Conservation and Survey Committee, and the Water Survey Department of the Conservation and Survey Division are engaged in different phases of water survey and the control of water use. The functions of these agencies are defined by state and federal law.

The Water Survey proper is engaged in a detailed study of the ground water of the state made in cooperation with the U. S. Geological Survey. The purpose is to determine the quality, recharge, direction of movement, chemical quality, volume and use capability of the water.

The Water Survey conducts a short course for the well drillers of the state each year to acquaint them with water supply and the techniques involved in the location, drilling and finishing of sanitary wells and the drilling of irrigation wells. There were about 300 pump irrigation wells in the state when this survey was started about 22 years ago, and are now more than 8000 wells irrigating more than 400,000 acres of land in Nebraska.

State law requires the Water Survey to furnish farmers, municipalities and industries with factual service relating to the availability and quality of ground water supply. This service has been utilized by many farms, most cities and towns, several industries and the 14 military bases in the state.

When the groundwater survey is completed in a county, detailed reports and maps of the area are sent to the offices of the County Agricultural Agent and the Soil Conservation Service for their use in furthering the development of sanitary water wells and pump irrigation.

The lakes, streams, and most springs and artesian wells of the state have been studied and described by the Geological and Water surveys. To date, about half of the state has been covered by the detailed ground water survey.

The relation of low rainfall and drouth to soil water, surface water and ground water has been investigated and published. Ground water depth and fluctuation are being measured systematically at about 1600 stations in Nebraska by the U. S. Geological Survey. Stream gaging is done at many stations by the U. S. Geological Survey in cooperation with the office of the State Engineer. And the State Department of Irrigation, Water Power and Drainage is in charge of drainage control and water allocation for irrigation and water power development.

#### REFERENCES:

1. *Terminology Relating to the Occurrence, Behavior and Use of Water in Nebraska*, by G. E. Condra. Nebr. Water Surv. Bull. 1.
  2. *Groundwater Levels in the Lower Platte River Valley, Nebraska*, by H. A. Waite. Nebr. Water Surv. Bull. 3.
  3. *Groundwater Survey of Area North of O'Neill, Holt County, Nebraska*, by E. C. Reed. Nebr. Water Surv. Bull. 2.
  4. *Drouth, Its Effects and Measures of Control in Nebraska*, by G. E. Condra. Conservation and Survey Div. Bull. 25.
  5. *Lincoln's Water Supply Problem*, by G. E. Condra. Conservation and Survey Div. Bull. 4.
  6. *Integration of Water Use in Nebraska*, by G. E. Condra. Conservation and Survey Div. Bull. 29.
  7. *Water-Bearing Formations of Nebraska*, by G. E. Condra and E. C. Reed. Nebr. Geol. Surv. Paper 10, out of print; to be reprinted.
- Water Survey Papers* prepared by the Conservation and Survey Division, U. S. Geological Survey and the Bureau of Irrigation, Water Power and Drainage:
1. *Nuckolls, Webster and Franklin Counties*, by H. A. Waite, E. C. Reed, and Dan Jones, Jr.
  2. *Furnas County*, by H. A. Waite, E. C. Reed and D. S. Jones, Jr.
  3. *Red Willow and Frontier Counties*, by H. A. Waite, E. C. Reed and D. S. Jones, Jr.
  4. *Hitchcock, Hayes, Dundy, and Chase Counties*, by H. A. Waite, E. C. Reed, and D. S. Jones, Jr.
- Water Supply Papers*, published by the U. S. Geological Survey, in cooperation with the Nebraska Geological and Water surveys:
1. *Geology and Water Resources of a Portion of the Missouri River Valley in North Eastern Nebraska*, Water Supply Paper 215, by G. E. Condra. Out of print.

2. *Geology and Water Resources of the Republican River Valley*, Water Supply Paper 215, by G. E. Condra. Out of print.
3. *Geology and Ground Water Resources of South Central Nebraska*, Water Supply Paper 779, by A. L. Lugn and L. K. Wenzel.
4. *Ground Water in Keith County*, Water Supply Paper 848, by L. K. Wenzel and H. A. Waite.
5. *Geology and Ground-Water Resources of Scotts Bluff County*, Water Supply Paper 943, by L. K. Wenzel, R. C. Cady and H. A. Waite.
6. *Geology and Ground-Water Resources of Box Butte County*, Water Supply Paper 969, by R. C. Cady and O. J. Scherer.

Note: So long as they are available, papers (3) to (6) listed above are available by requests made to Nebraska Congressmen and Senators.

4. **State Biological Survey.** This includes the survey of native water plants, grasses, shrubs and trees, fish, insects, reptiles, amphibians, birds and mammals. The ecologic and biologic study has been made by the Survey personnel but largely by professors and graduate students in the departments of Botany and Zoology in the University and College of Agriculture.

A study of the plant life in the rivers and sandhill lakes was made by instructors in the department of Botany; Dr. J. E. Weaver and Dr. W. L. Tolstead have studied and described the prairie grasses in detail; Dr. R. J. Pool's favorite study has been the trees; the late Dr. R. H. Wolcott, when head of the Department of Zoology, described the birds; Dr. Ray Johnson of the Department of Zoology and now of Michigan, described the fish; Dr. George Hudson of the Department of Zoology, later connected with the State and Federal Survey in Michigan and now in the State College at Pullman, Washington, described the reptiles and amphibians, and the late Professor Lawrence Bruner of the College of Agriculture was one of the world's leading authorities on insects. So the prairie, forest, and so-called wild-life of the state have not been neglected, but the Biological Survey's activity is now restricted mainly to the publication of reports on ecology, forest, and wild life made by members of the Botany and Zoology departments, and most of the biologic study of fish, game and the fur-bearers is being carried on by the State Fish, Game and Parks Commission in cooperation with the U. S. Biological Survey.

The fish resources of the state are increasing with the development of irrigation reservoirs and canals; prairie chickens are decreasing in numbers and the grouse show some increase; pheasants are holding on well in most of the state and the Bob White quail is increasing in numbers where there is protective shrubby vegetation. The deer and beaver are increasing in numbers and

the muskrat population is about normal. And there are open seasons for fishing, hunting and trapping.

The Conservation and Survey Division formerly employed a State Forester, but discontinued this service during the second World War when State Forester, M. B. Jenkins, joined the U. S. Forest Service as a technician in the Guayule project, and most of the State Forester's service was taken over by the Agricultural Extension Service, Soil Conservation Service and the State Fish, Game and Parks Commission. The State Forester was changed to the College of Agriculture by Legislative act in 1950, at the request of the Director of the Division because this service belongs there and not under biologic research.

#### REFERENCES:

Many biological reports have been published by the Survey but most of them are out of print. Copies of the following reports are available so long as they last.

1. *Native Midwestern Pastures, Their Origin, Composition and Degeneration*, by J. E. Weaver and W. W. Hansen. Conservation and Survey Div. Bull. 22.
2. *Regeneration of Native Midwestern Pastures Under Protection*, by J. E. Weaver and W. W. Hansen. Conservation and Survey Div. Bull. 23.
3. *Ecological Studies in a Midwestern Range: The Vegetation and Effects of Cattle on its Composition and Distribution*, by J. E. Weaver and G. W. Tomanek. Conservation and Survey Div. Bull. 31.
4. *Vegetation of the Northern Part of Cherry County, Nebraska*, by William L. Tolstead. This was reprinted by the Conservation and Survey Division from Ecological Monograph 12, p. 255-292, in July 1942.
5. *Handbook of Nebraska Trees (Third Edition)*, by Raymond J. Pool. Conservation and Survey Div. Bull. 32.
6. *Tree Planting in Nebraska*, by G. E. Condra. Conservation and Survey Div. Bull. 1. Out of print.
7. *Nebraska Game Resources and their Conservation*, by Robert H. Wolcott, Bull. 12, 1st Series; out of print.
8. *The Amphibians and Reptiles of Nebraska*, by G. E. Hudson. Conservation and Survey Div. Bull. 24.

The State Fish, Game and Parks Commission publishes frequently on fish, birds and native mammals; also on the State Parks and Recreational areas.

5. **State Resource and Industry Survey.** According to the 1921 statutes, the Conservation and Survey Division shall study and describe the natural resources of the state, also the operation, production and importance of the leading industries. These

functions were placed under the Division because naturally certain resources and industries are studied and described in the Geological, Soil and Water Surveys. Among the geologic resources and industries that have been published are stone, sand and gravel, cement, concrete, brick and tile, oil and gas, volcanic ash, gypsum, salt, potash, bentonite and coal. And bulletins have been published on milk, butter, cheese, ice cream, and the sugar beet industries; two bulletins, now out of print, were published on the Resources of Nebraska, also bulletins on Industrial Nebraska in Outline.

The College of Agriculture, Agricultural Experiment Stations, Soil Conservation Service, College of Business Education, and the State Department of Agriculture and Inspection have much to do with certain resources and industries, and a department called the Division of Resources was established at the Capitol a few years ago to further the Industrial Development of Nebraska. The name of this important department is confusing and probably should be changed to the State Industrial Development Commission. This would give it a distinctive important field of service and establish favorable relations with the several agencies engaged in resource and industrial survey and research.

#### REFERENCES:

1. Each of the many county soil survey reports is a resource bulletin.
2. The geologic resources and industries are discussed in various Geological Survey reports, and the water resources and industries are discussed in the Water Survey reports.
3. *Industrial Nebraska in Outline*, by G. E. Condra. Conservation and Survey Div. Bull. 28.
4. *Ground-Water Resources of Nebraska*, by George H. Taylor, Ground-Water Branch, U. S. Geological Survey, released Jan. 24, 1952.

**6. State Conservation Survey.** This activity covers a wide field of investigation relating to mineral resources, soil erosion, alkali soil, land use, forestation, irrigation, reclamation, drainage, floods, drouth, integration of multiple water use, sanitary water supply, and industrial processing.

The leading conservation activities of the state are covered by state and federal law. All of the state is organized in Soil Conservation Districts with five supervisors and technicians in each and the program is moving along harmoniously and successfully.

The State Soil and Water Conservation Committee is composed of the Dean of the Conservation and Survey Division, Dean of the College of Agriculture, Associate Director of Agricultural

Extension, and District Supervisors Everett Barr and William Richards. Emrys Jones is Secretary of the Committee.

The factual surveys of the Conservation and Survey Division and the many services of the College of Agriculture and the Extension Service are parts of the conservation program of the state and many papers and bulletins have been published on the various conservation problems and activities.

#### REFERENCES:

1. *The Conservation of Nebraska's Water Resources*, by G. E. Condra. Bulletin 3, Conservation Survey; out of print.
2. *Conservation of Land and Water Resources of Nebraska*, by G. E. Condra, Bulletin 14, Conservation Department; out of print.
3. *Land and Water Conservation Problems of the Missouri River Basin*, by G. E. Condra. Conservation and Survey Div. Bull. 26.

**7. State Information Service.** This service, as defined by state law, is made available to the citizens of the state by correspondence, conferences, phone, and bulletins, and many inquiries are received from other states. Most inquiries relate to soil problems, rural and municipal water supplies, pump irrigation, and oil and gas development. Many of those who come to the office want bulletins and maps.

Formerly, as required by law, the Information Bureau, on request received from an interested party, was required to investigate and report on foreign lands and oil and gas projects offered for sale in Nebraska. Most of these projects were located in the southern states and Mexico, and were found to be misrepresented and fraudulent. All projects found to be fraudulent were refused the right to operate in Nebraska and were told to not sell here else their cases would be turned to the Attorney General for action. And this procedure saved many Nebraskans from financial disaster, but has become less necessary the past few years, due in considerable part to the fact that the use of the U. S. Mails for fraudulent purposes has become illegal, through federal enactment.

Persons now wanting to sell real estate or oil and mineral interests of other states in Nebraska are required to register with the Board of Securities of the State Department of Banking, and the Conservation and Survey Division serves this board with information upon request.

According to law, the Conservation and Survey Division is required to serve the state in photographic work relating to motion pictures and other visual aids to be used in education and



state publicity. Several years ago about 80,000 feet of motion pictures were made on such subjects as Cattle Raising in the Sandhills, Fish and Game, Agricultural Nebraska, Journey Down the Niobrara, Dairying, Water Power, Irrigation, and Scenic Nebraska, and the films were shown widely in Nebraska and other states. However, with the development of color photography and narrow gauge films and with the establishment of photography at the Capitol and in the University, and with increased need for funds to support the fundamental surveys, the Conservation and Survey Division asked the Legislature for permission to discontinue the program of photographic service and that funds no longer be provided for this purpose, but the law has not been repealed.

Note: The departments of the Conservation and Survey Division are housed in Nebraska Hall on the University City Campus, at 12th and T street, Lincoln.