

State of Connecticut

TWENTY-SEVENTH BIENNIAL REPORT
OF THE COMMISSIONERS OF THE

STATE GEOLOGICAL AND NATURAL HISTORY SURVEY

1955-1956

Bulletin No. 85



STORRS

Published by the State Geological and Natural History Survey

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**Twenty-seventh Biennial Report of the
Commissioners**

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State Geological and Natural History Survey

COMMISSIONERS

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LETTER OF TRANSMITTAL

STORRS, CONNECTICUT

January 1, 1957

His Excellency, Abraham A. Ribicoff
Governor of Connecticut
Hartford, Connecticut

Sir:

I have the honor to transmit to you herewith on behalf of the Commissioners of the State Geological and Natural History Survey, in compliance with past custom, the Twenty-seventh Biennial Report of the Survey, covering the two years ending December 31, 1956.

Respectfully submitted,

JOHN B. LUCKE

Director

INTRODUCTION

Organization of the Survey. The State Geological and Natural History Survey was established by the 1903 statutes of the General Assembly (Chapter 133, Public Acts of 1903) as amended, especially in 1915 (Chapter 185) and in 1945 (H. B. N. 1145, Public Act No. 301, Section 2227).

Until 1945, the Commission was composed of the Governor (ex-officio), the presidents of Yale, Trinity, Wesleyan, Connecticut College and the University of Connecticut,

"or so many of them as shall accept such office, each of whom shall serve without compensation, but shall be reimbursed for expenses incurred in the performance of official duties; and said commissioners shall have general charge of the Survey, and shall appoint as Superintendent (now Director) of the same, a scientist of established reputation, and such assistants and employees as may be necessary; and they shall also determine the compensation of, and may remove, all persons employed by the Commission." (Chap. 115, Section 2193, p. 675 of the General Statutes)

During World War II, the press of urgent affairs brought the Survey to a standstill. At the time, the inappropriateness of the quoted organization law became apparent. The Commission had, in fact, been a "rubber stamp" for the Superintendent. Therefore, the 1945 General Assembly stipulated that the presidents of the five above-named institutions each appoint an active scientist from his faculty to serve on the Commission. Furthermore (Section 2227):

"Each person so designated, upon acceptance of such office, shall serve as commissioner without further appointment until his removal from the state, death or resignation, unless sooner removed for cause. Any vacancy occurring in the membership of the Commission shall be filled by a new designation by the president or other administrative head of the institution from whose faculty the vacated membership was originally drawn. Said commissioners shall have general charge of the Survey, and shall choose as Superintendent (Director) of the same, one of the appointed members of the Commission."

Under these foresighted amendments, the Survey has proceeded for the past decade. The commissioners may call meetings, but ordinarily meet at least four times a year at the call of the Director who implements policies established by the Commission. The state has few more public-spirited citizens than the scientist-commissioners (and their predecessors), listed opposite the letter of transmittal, who serve solely as a labor of love in the interests of state service.

Since the present Director was elected in 1953, the Survey office has been at 114 Holcomb Hall, adjacent to the University of Connecticut Geology and Geography Department. Both the Director and the Survey secretary serve on a part-time basis, being busiest during summer months when most activity, particularly field work (see Functions), occurs. The time when at least one full-time geologist may be required is approaching, but, mainly because of severely congested office quarters at present, provisions to acquire such aid and thereby increase the Survey's utility to the state, cannot be made until after the 1957-59 biennium.

FUNCTIONS OF THE SURVEY

In common with sister organizations in 46 other states and a few territories, the Connecticut Survey is a scientific service agency. According to the amended statutes, the Survey shall conduct (Section 2194):

"1) An examination of the geological formations of the state, with special reference to its economic products, to wit, building stones, clay, ores and other mineral substances. 2) An examination of the animal and plant life of the state, with special reference to its economic and educational value. 3) The preparation of special maps to illustrate the resources of the state. 4) The preparation of special reports, with necessary illustrations and maps, which shall embrace both a general and a detailed description of the geology and natural history of the state."

It was long ago stipulated that (Section 2196):

"The regular and special reports of the Survey, with proper illustrations and maps, shall be prepared for publication, and when printed, the reports shall be distributed or sold by the Commissioners *as the interests of the state and of science demand*, and all monies obtained by such sales shall be paid into the state treasury." (Italics by the writers)

These are the policies which have governed the activities of the Survey for over half a century, and still do. After World War II, however, a more specific "operation plan" was formalized at Yale University in 1948 (see our Bulletin No. 72, pp. 11-12, 1949) recognizing the need for systematic mapping of Connecticut, both topographically and geologically.

CONNECTICUT'S MAP NEEDS — I

What is a topographic (or geologic) map?

Who (or how many people) in Connecticut need such maps?

These are common questions we here attempt to answer. Since geology is the science of the earth, its portrayal, in any but vague, general terms, depends upon precise geographic measurements, i.e., upon maps, the more detailed the better in thickly populated areas with highly industrialized economies like Connecticut.

The common road or railroad maps show only two dimensions, as though the earth's surface were flat. Their use is limited to those features and activities which depend upon horizontal distances. They answer questions like "How far is it from Waterbury to New London?" But suppose we wish to dig a canal from one to the other? Or, suppose we need to know the occurrences of granite, or limestone, or iron ore, or clay along the route? Suppose we wish to build a regional high school, or large factory which will require huge amounts of pure water? Suppose we wish to industrialize a large area now largely rural? Will the lands involved afford safe foundations, adequate water, cheap concrete aggregate, safety from flood, et cetera, without prohibitive expenses? Detailed maps, of the types described below, will provide most of the answers to such questions. They serve as "blueprints" for expanding economy. The layman (or voter) does not need them, personally, any more than the homebuilder needs to fully understand his architect's blueprints. But we need more "architects and more blueprints" as Connecticut's population and industry expand.

CONNECTICUT'S MAP NEEDS — II

Topographic Maps. A topographic map shows all the relief features (ups and downs) of the land by means of brown contour lines, as well as drainage (streams, lakes, swamps) by blue symbols, and works of man (buildings, bridges, et cetera) by black ink. Modern, accurate topographic maps are now (October, 1956) available for the entire state from the U. S. Geological Survey in Washington, D. C. Figure 1 shows there are about one hundred "quadrangles" wholly or partly in Connecticut. They are all on a scale of 1:31,680, which means approximately one-half mile (on the ground) equals one inch (on the map).

Topographic maps are especially useful for: a) bases for planning and zoning, particularly for public works and power utilization; b) water supply problems, both surface and sub-surface, flood control, and conservation; c) wholesale and retail merchants in laying out routes and distribution centers; d) education at all levels, especially for geography, geology, social studies, and population growth; e) bases for geologic mapping (see below) since both bedrock and surficial geology may control the texture or form of the land's surface and drainage pattern.

All Connecticut map users must be grateful for the completion of the topographic quadrangle series in 1956 and also, thanks to funds contributed by the Highway Department, to the now-settled custom of revision of each map every ten years by the U. S. Geological Survey.

Geologic Maps. A geologic map shows, by colors or symbols, the surface distribution of the underlying rocks, that is, of the hard materials commonly called *bedrock* by geologists. In 1956, the State Survey published a Preliminary Geological Map of Connecticut on a scale of one inch to four miles. On the back of the map are brief descriptions of the rock types, only a few of which, such as granite and marble, are familiar to laymen. Because of incomplete information and the small scale, only broad general features can be portrayed. Detailed bedrock maps are needed for each of the quadrangles. Figure 1 shows that only six (of the 100 total) are available at present. Connecticut lags far behind all of its neighboring states in geologic mapping progress.

Another kind of geologic map is needed for areas, like Connecticut, which have been covered by continental glaciers. As a result, deposits of loose (unconsolidated) gravels, hardpan, sands, silts and clays, rest upon bedrock in most of the state. Geological maps, known as *surficial* maps, which show only these loose surface materials are as important as bedrock maps. The Index Map (Figure 1) shows that not one surficial quadrangle map is yet available, but a small beginning has been made.

Such maps are particularly useful, for example, in estimating available supplies of ground water, concrete aggregate, molding sands and clays. They complement water supply maps, soil maps and other special land use maps.

Who uses geologic maps? Engineers and contractors need geologic maps perhaps as much as geologists. For all heavy construction, geologic maps aid in *location, design, estimation* and *maintenance* of such projects as highways, tunnels, bridges, aqueducts and heavy industries. They provide

data which, upon proper interpretation by experts, permit accurate blasting estimates, drainage characteristics, construction materials, and economically useful raw materials. Far from adequate is our basic information on the locations of, for example, proper shale for lightweight concrete aggregate, quartz for glassmaking, limestone suitable for cement-making, clays for uses other than brick-making, suitable varieties of dimension stone and occurrence of various industrial minerals whose presence has been reported.

A Plan of Attack on our Map Deficiencies. The 1955 General Assembly wisely recognized the problem and voted a sum of \$20,000 per year as the state's *half* of the cost of a new U. S. Geological Survey mapping program in cooperation with this agency. From the inception of the new program, the State Survey sought advice and counsel of its sister state agencies, notably the Highway, Water, and Development Commissions, Education and Agriculture Departments, Boards of Professional Engineers, Fish and Game, State Library, and Agricultural Experiment Station in the interests of full cooperation and to avoid overlapping of functions. Progress of the new program is indicated on the Index Map, Figure 1. Sample manuscript maps are now available. Finished published maps, issued as part of the Geologic Quadrangle Series of the U. S. Geological Survey will begin to appear for public use in 12 to 18 months. The advantages of the cooperative system are high uniform accuracy, speed of compilation, and a cartographic excellence unequalled in any other way, with the added advantage that the U. S. Geological Survey furnishes all personnel and pays one-half of the total cost. Beginning in 1956, Connecticut college geology students were hired as field assistants, thus attaining valuable field experience and expediting the program.

This is a gratifying beginning, but only that. Connecticut needs detailed geologic maps, both bedrock and surficial, *now*, not 20 or more years in the future. The "Inter-Agency" Committee was reconvened in 1956, augmented by executives of the State Department of Health, Forest and Park Association, Connecticut Electric and Gas Association, Connecticut Light and Power Company, Manufacturers Association of Connecticut, Connecticut Bankers Association, and the Soil Conservation Society of America. It was the unanimous consensus that the cooperative mapping program of the U. S. Geological Survey be accelerated to produce detailed bedrock and surficial maps for each Connecticut quadrangle as early as possible, consistent with accuracy and available personnel. It is estimated that a doubling of the present program, involving \$40,000 per year as the state's half of the cost, for the next ten years, could see a complete set of maps of the state in a decade. Since geologists are in almost as short supply as engineers, a still larger annual expenditure might find the U. S. Geological Survey unable to divert sufficient personnel to Connecticut on short notice. However, they have assured the State Survey that the proposal to double the present cooperative program in the next biennium can be adjusted to their plans and personnel. Furthermore, geological mapping proceeds best by orderly progression, and we wish to balance best professional practice against the urgency of the need.

The Geologic Mapping Goal. The continued cooperative mapping program of the U. S. Geological Survey is recommended at an annual rate

of \$40,000 per year, with the firm intention of maintaining this rate for the next ten years. This will complement the more modest progress of the part-time geologists on the staff of the State Survey. At the end of a decade, all citizens of the state, but especially industrial and public service leaders, will have a complete set of geologic maps for each of the almost 100 quadrangles. The benefits to all will far outweigh the modest investment costs.

REGULAR STATE SURVEY PROGRAM 1955-57

Publications:

1. Quadrangle Report No. 5. The Bedrock Geology of the Glastonbury Quadrangle, with map, by Norman Herz, Ph.D. Published in 1955.

2. Quadrangle Report No. 6. The Bedrock Geology of the Rockville Quadrangle, with map, by Janet M. Aitken, Ph.D. Published in 1955.

3. Bulletin No. 84. A Preliminary Geological Map of Connecticut, scale approximately 4 miles to the inch; by John Rodgers, Ph.D. Robert M. Gates, Ph.D., Eugene N. Cameron, Ph.D., Reuben J. Ross, Jr., Ph.D. Published in 1956.

Work Completed and Approved (awaiting publication due to insufficient funds):

1. Bulletin No. 86. The Bedrock Geology of the Guilford 15-minute Quadrangle and a Portion of the New Haven Quadrangle. Harry Mikami, Ph.D., and Ralph Digman, Ph.D.

2. Bulletin No. 87. Guide to the Insects of Connecticut. Part VI: The Diptera or True Flies of Connecticut. Sixth Fascicle: March Flies and Gall Midges: Bibionidae by D. Elmo Hardy, Ph.D.; Itonididae (*Cecidomyiidae*) by A. Earl Pritchard, Ph.D., and Ephraim Porter Felt, Ph.D. (with revisions by C. L. and J. E. Remington).

3. Bulletin No. 88. The Preston Gabbro and the Associated Metamorphic Gneisses, New London County, Connecticut. Charles B. Sclar, Ph.D.

4. Bulletin No. 89. Petrogenesis of the Voluntown and Oneco Quadrangles. Ralph M. Perhac.

5. Quadrangle Report No. 7. The Bedrock Geology of the Danbury Quadrangle, with map. James W. Clarke, Ph.D.

Total estimated cost of publication (1957-58) \$9,800.00.

Work in Progress (possible publication in 1958-59):

A. Reports submitted, now undergoing editing or revision:

1. The Surficial Geology of the Hartford South Quadrangle. R. E. Deane, Ph.D.

2. The Surficial Geology of the Middletown Quadrangle. R. E. Deane, Ph.D.

3. The Bedrock Geology of the Roxbury Quadrangle. Robert M. Gates, Ph.D.

B. Reports expected in fiscal 1958 or 1959:

1. The Bedrock Geology of the Bethel Quadrangle. James W. Clarke, Ph.D.

2. The Bedrock Geology of the Brewster and Peach Lake Quadrangles. Robert M. Sneider. (To be printed by the New York State Survey which will furnish reprints at cost to the Connecticut State Survey)

3. The Bedrock Geology of the Cornwall Quadrangle. Robert M. Gates, Ph.D.

4. The Bedrock Geology of the Deep River Quadrangle. Lawrence Lundgren, Jr.

5. The Bedrock Geology of the Essex Quadrangle. Lawrence Lundgren, Jr.

6. The Surficial Geology of the Glastonbury Quadrangle. R. E. Deane, Ph.D.

7. The Bedrock Geology of the Kent Quadrangle. Gerald V. Carroll.

8. The Surficial Geology of the Middle Haddam Quadrangle. R. E. Deane, Ph.D.

9. The Bedrock Geology of the Middletown Quadrangle. Elroy P. Lehmann, Ph.D.

10. The Bedrock Geology of the New Milford Quadrangle. Gerald V. Carroll.

11. The Surficial Geology of the Stafford Springs Quadrangle. Sidney White, Ph.D.

12. The Birds of Connecticut. An Annotated Checklist. E. Alexander Bergstrom.

13. Weather and Climate of Connecticut. A. Boyd Pack.

14. Text for Bulletin No. 84. The Preliminary Geological Map of Connecticut. John Rodgers and others.

15. Guide to the Insects of Connecticut. Part VI. Fascicle VII: The Nematocera (primitive suborder of the Diptera). Alan Stone, Ph.D., D. Elmo Hardy, Ph.D., William F. Rapp, Jr., C. P. Alexander, Ph.D., C. L. Remington, Ph.D.

16. Reprints of U. S. Geological Survey report "Mineral Deposits and Occurrences in Connecticut, exclusive of clay, sand and gravel, and peat" by Nancy Pearre.

Total estimated cost of publication (1958-59): \$29,800.

TOTAL ESTIMATED COST OF PUBLICATION FOR THE BIENNIUM (1957-59): \$39,600.

It should be noted that the Survey's ability to carry to completion its statutory duties depends directly on its *published* output of research materials. The above-named reports have either been finished, or are in advanced stages of progress, by a conscientious staff of able scientists, some of whom worked entirely without pay. All of them have been laboring in the service of the state, part-time, for from one to five or more years. Prompt publication has been impossible in the immediate past.

"*The interests of the state and of science demand,*" in the words of our statutes, prompt publication in the next biennium.

NATURAL HISTORY ACTIVITIES

Because the economy of the state so urgently needs detailed geologic work, as outlined above under MAP NEEDS, the lion's share of the Survey's activity is geological. Nevertheless, effort is continuing on biological and meteorological research projects.

Connecticut Arboretum. (Directed by Commissioner R. H. Goodwin) The Survey continued its support of the long-range vegetation studies in the Natural Area of the Connecticut Arboretum. The detailed vegetation mapping project, initiated in 1952, was essentially completed during the summer of 1955. An investigation of the vegetational history of the area was undertaken by Miss Nellie M. Beetham, who constructed a pollen profile for a local bog which is of great interest when compared with Dr. Estella B. Leopold's studies, supported by the Survey during the previous biennium. Miss Beetham also compiled evidence from historical sources and field studies indicating repeated and widespread ecological disturbances to the vegetation as a result of wind and fire damage. These studies are now being prepared for publication.

A second breeding-bird census was conducted in 1955 and the results of these first two census were reported in *Audubon Field Notes*.

Mr. K. P. Jansson finished mapping the woody collections in the Arboretum and added some new species of trees and shrubs to the plantations.

Flora of Connecticut. G. Safford Torrey of the University of Connecticut is planning a report on the *Flora of Connecticut* in the near future. The Survey would welcome the opportunity to publish such a compilation and to aid in support of its progress.

In the last year, the Survey was pleased to lend support to an ecological survey of Connecticut's salt marshes, a matter of considerable concern also to the State Board of Fisheries and Game. Data were collected on the size and distribution of our salt marshes, their quantitative and qualitative changes in historic times, and a discussion of these changes in terms of wild life.

Birds of Connecticut. E. Alexander Bergstrom has begun work on a new *Annotated Checklist of the Birds of Connecticut* which the Survey has supported. Completion in time for publication in the next biennium is planned.

Weather and Climate. Dr. A. Boyd Pack, State Climatologist for Connecticut on the staff of the U. S. Weather Bureau, has begun an extensive successor to our Bulletin 61, now nearly 20 years old, *The Weather and Climate of Connecticut* by J. M. Kirk. Especially in view of the catastrophic floods of 1955, an up-to-date study should be of immense value to our economy. This also is to appear as a Survey bulletin within the next biennium.

Insects. Dr. Charles L. Remington continues as Entomological Editor to compile additions to the *Guide to the Insects of Connecticut Series*. Part VI, Fascicle VI on the March Flies and Gall Midges, has already been delayed a year due to lack of publication funds. Part VI, Fascicle VII

on the Nematocera, is nearing completion. Future bulletins on the Myriopoda, the butterflies (Rhopalocera), the Apterygota, and the Arachnida are planned.

EDUCATIONAL ACTIVITIES

Since the main business of the Survey — the preparation, publication and dissemination of scientific maps and reports — has been seriously hampered by lack of funds, other important functions have been repeatedly postponed, to our great regret.

Nearly a decade ago, we prepared and boxed suites of 36 common minerals and rocks of Connecticut, accompanied by an explanatory pamphlet, for distribution to schools. These were so popular, they became exhausted immediately. Neither funds nor facilities are available at present to renew this educational service for our youth.

Many other states, notably New York, New Jersey and Ohio, have prepared informative geological and botanical guidebooks to enhance the enjoyment of travel along their parkways and thruways. We hope to bring Connecticut up-to-date in this type of educational service which might also have practical value toward establishment of new industries.

It remains for the General Assembly to decide whether Connecticut shall continue to look longingly at such public services provided as a matter of course by other state surveys, or shall provide similar if not better service for its own citizenry.

HOW DOES CONNECTICUT COMPARE?

The Association of American State Geologists makes an effort to compile annual statistics of the expenditures and activities of the 46 state geological surveys. Because of different methods of accounting and reporting, it is not possible to break down these figures into such separate categories as, for example, topographic mapping, geologic mapping, basic research, public services and the like, but following are the most nearly complete figures for the fiscal year 1955 from the 45 states which submitted reports:

Only two states, New Hampshire and Maine, spent less than Connecticut which spent \$19,000 that year.

Twenty-six states spent \$100,000 or more. Of these, ten states, including Georgia, Indiana, Missouri, Tennessee and Virginia, none of which is noted for heavy dependence upon income from mineral industries, spent \$200,000 or more.

The five leading states and their expenditures for the one year, are Illinois, \$880,000; California, \$470,000; Michigan, \$370,000; Kansas, \$380,000; and Missouri, \$350,000. These are all states with important mineral industries, although, as has been noted above, there is often little relation between the amount spent by a state for geologic work done and the income received by that state from mineral industries. This is especially true of thickly populated states in the East and Northeast.

On a comparative basis, therefore, Connecticut stands very near the bottom of the list in support of its State Geological Survey, only New Hampshire and Maine having lower budgets for these purposes. An annual increase of 100% for the next biennium would still not lift Connecticut to anything like the national average in this regard, nor would it remotely reflect our high per capita income and vaunted industrial progress.

