State of Connecticut

TWENTY-EIGHTH BIENNIAL REPORT OF THE
COMMISSIONERS OF THE

STATE GEOLOGICAL AND NATURAL HISTORY SURVEY

1957-1958

Bulletin No. 90

STORRS

Published by the State Geological and Natural History Survey.
1959

Twenty-eighth Biennial Report of the Commissioners

OF THE

STATE GEOLOGICAL AND NATURAL HISTORY SURVEY

1957-58

BULLETIN NO. 90

STORRS

Published by the State Geological and Natural History Survey.

1959

State Geological and Natural History Survey

COMMISSIONERS

THE HON. ABRAHAM A. RIBICOFF, *Governor of Connecticut*

RANDOLPH W. CHAPMAN, Ph.D., *Professor of Geology, Trinity College*

RICHARD H. GOODWIN, Ph.D., *Professor of Botany. Connecticut College*

G. EVELYN HUTCHINSON, Ph.D., *Professor of Biology, Yale University*

JOHN B. LUCKE, Ph.D., *Professor of Geology, University of Connecticut*

JOE WEBB PEOPLES, Ph.D., *Professor of Geology, Wesleyan University*

DIRECTOR

JOHN B. LUCKE, Ph.D.
University of Connecticut
Storrs, Connecticut

EDITOR

ELIZABETH G. WEINMAN

DISTRIBUTION AND EXCHANGE AGENT

ROBERT C. SALE, *State Librarian*
State Library, Hartford

LETTER OF TRANSMITTAL

Storrs, Connecticut
January 1, 1959

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-Eighth Biennial Report of the Survey, covering the two years ending December 31, 1958.

Respectfully submitted,
JOHN B. LUCKE
Director

INTRODUCTION

Natural resources exert an increasing influence on the everyday activities, the industrial economy and even the way of life of the people of Connecticut. As its title implies, the State Geological and Natural History Survey is charged with the study, analysis, and evaluation of both biological and mineral resources (see below under PURPOSE). In discharging these responsibilities, its activities are coordinated, as closely as possible, with those of the Water Resources Commission, Park and Forest Commission, Development Commission, Highway Department, Board of Fisheries and Game, Department of Agriculture and other sister agencies of both the State and the Federal government.

Proper conservation of these resources, in the modern sense of the word, does not mean withdrawal from public use, but the most efficient and economical public use, both now and for the distant future. Even though Connecticut has unimportant mineral production, compared to the larger mining and petroleum producing states, it is an area of a rapidly expanding economy with increasing demand for both surface and groundwater supplies and for its many non-metallic geological resources.

As population increases by leaps and bounds, more areas become restricted for industrial and highway building sites, defense purposes, recreation, wild-life zones, parks and shoreline real estate. For these reasons, the future exploitation of the non-metallic mineral wealth and other natural resources of Connecticut may be seriously crippled if their importance is not thoroughly appreciated by all the people of the state.

The basic geologic studies, only recently begun at a satisfactory rate of progress, will be of inestimable value in guiding building ventures, locating travel ways, aiding in the location and migration of underground water, and assisting in the enjoyment and useful understanding of the picturesque landscapes that have made the state a Mecca as a residential site and center of tourism. Furthermore, the Survey has been repeatedly called upon for basic geologic information essential to the attraction of new industries, now located outside of Connecticut, both to more efficiently utilize its non-metallic resources and to better serve the immense industrial market areas within and adjacent to Connecticut.

The rapidly increasing land values, in which no diminution seems possible, dwarf to insignificance the money currently appropriated to support the Survey in its effort to enhance the future development of the state's expanding economy.

The bulk of the present report attempts to outline the statutory purposes of the Survey and the extent to which it is currently fulfilling those directives. It will be seen that, while healthy progress is being made, many unfulfilled objectives remain, without which we cannot hope to accomplish the services regarded as routine by most of the 46 sister Surveys in other states.

ORGANIZATION

The State Geological and Natural History Survey was created by the 1903 statutes of the General Assembly (Chapter 133, Public Acts of 1903) as amended in 1915 (Chapter 185) and 1945 (H. B. No. 1145, P.A. No. 301, Sect. 2227). Indented paragraphs below are verbatim excerpts from these statutes.

The Commission, excepting the Governor, is composed of five active scientists (currently three geologists, a biologist, and a botanist) appointed by the presidents of Yale, Trinity, Wesleyan, Connecticut College and the University of Connecticut:

> **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. Said Commissioners shall have general charge of the Survey and shall choose as Director of the same, one of the appointed members of the Commission.**

PURPOSE

The Survey has three closely interrelated objectives—scientific, economic and educational. It is charged by law to conduct

> 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.**
>
> 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.**

Since information in a scientist's head or in dusty notebooks is of doubtful value,

> **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 ..... as the interest of the state and of science demand.**

The Commissioners receive no compensation, save expenses of attending meetings. Aside from the Director, they are also empowered

> **to appoint such assistants and employees as may be necessary. They shall also determine the compensation of, and may remove, all persons employed by the Commission.**

The Survey has never had any full-time employees, including its Director. Some 15 scientists and assistants are now active, including consultants, editors, professional geologists, biologists, a climatologist, and graduate assistants. The extent to which it is fulfilling its statutory functions is indicated below under DEVELOPMENT AND PLANS.

OPERATING PROGRAM

GENERAL:

The Survey Commission attracts or obtains its scientific personnel in three ways:

1. A professor interests a promising graduate student or junior colleague in a problem dealing with some branch of Connecticut geology or natural history. If the problem (or area) is carefully blocked out, the Survey is asked to support it by hiring the young scientist, backed by the recommendation of his superiors, one of whom agrees to act as project supervisor. Upon submission of a manuscript and/or maps approved by the Commissioners or their consultants, the Survey publishes the report as soon as budgetary limitations permit.

2. A scientist of recognized ability (usually a professor whose summers are free to pursue research) visualizes a problem he would like to work in Connecticut, and applies personally for Survey approval and support. This is reviewed and acted upon as above, except that no recommendations nor supervisor are required. The project must, of course, satisfy basic Survey objectives as well as the curiosity of the scientist.

3. The Commission itself decides there is need for a new study or revision of an old one. If one or more scientists can be found who are available and interested in the problem, they are hired directly after agreement on the problem and probable costs is reached.

GEOLOGICAL PROGRAM:

The Survey established as its major objective, ten years ago, the detailed geological mapping of the state, quadrangle by quadrangle (see Index Map). A larger team of U. S. Geological Survey geologists has been added to the State Survey's small staff by way of a cooperative agreement first signed in 1955 and renewed annually. This rather new program is outlined below under DEVELOPMENTS.

Special reports on rock origins, structures or geo-chemistry, statewide descriptions of our rocks and their distribution have also been actively pursued. Examples are Bulletins 84 and 88, noted below, one in press November, 1958 and the other just off the press.

NON-GEOLOGICAL PROGRAM:

Botanical research under the direction of Commissioner Goodwin at the Connecticut Arboretum is a continuous program, as is research on insects, particularly insect pests, under the direction of Dr. Charles L. Remington, Entomological Editor (see Bulletin 87 listed below).

A revision of our old Bulletin 61 (now out of print) on Weather and Climate of Connecticut is in preparation by Dr. A. Boyd Pack of the U. S. Weather Bureau; also a new Annotated Checklist of the Birds of Connecticut by E. Alexander Bergstrom. Both of these involve no cost to the State for preparation—we have simply agreed to publish approved manuscripts when ready, subject to budget limitations.

NOTEWORTHY DEVELOPMENTS

Research published in 1958 and available at the State Library for sale or distribution:

Bulletin 86.	**Bedrock Geology of the Guilford 15-minute Quadrangle and a Portion of the New Haven Quadrangle, by Harry Mikami and Ralph Digman (116 pp.)**
Bulletin 87.	**Guide to the Insects of Connecticut. Part VI: The Diptera. Sixth Fascicle: March Flies and Gall Midges: Bibionidae by D. E. Hardy; Itonididae by A. E. Pritchard and E. P. Felt, revised by C. L. and J. E. Remington (218 pp.)**
Bulletin 88.	**The Preston Gabbro and the Associated Metamorphic Gneisses, by C. G. Sclar (136 pp.)**
Bulletin 89.	**Petrogenesis of the Voluntown and Oneco Quadrangles, by R. M. Perhac (32 pp.)**
Quadrangle Report No. 7.	**The Bedrock Geology of the Danbury Quadrangle, with map, by J. W. Clarke (36 pp.)**

These five published works constituted a backlog of unpublished manuscripts at the beginning of this biennium (July 1, 1957). It was estimated that complete publication would cost $9,800.00 and this sum was so earmarked. Actual total costs were $9,625.79.

Reports completed and in press, as of November, 1958:

Bulletin 84.	**Explanatory Text to Accompany Preliminary Geological Map of Connecticut, (published in 1956) by J. Rodgers, J. L. Rosenfeld and R. M. Gates.**
Bulletin 90.	**Twenty-Eighth Biennial Report of the Commissioners, 1957-58.**
Quadrangle Report No. 8.	**The Bedrock Geology of the Middletown Quadrangle, with map, by E. P. Lehmann.**
U.S.G.S. Geologic Quadrangle Map series.	**Geological Quadrangle Map of Roxbury, Bedrock Geology by R. M. Gates (to be published by the U. S. Geological Survey in cooperation with the Connecticut Geological and Natural History Survey).**

Reports completed, to go to press in 1959:

Quadrangle Report No. 9.	**The Bedrock Geology of the Bethel Quadrangle, with map, by J. W. Clarke.**

Reports near completion, final manuscripts expected during fiscal 1959, with possible publication 1959-60:

A. Irreducible minimum cut from total as result of economy demands:

Quadrangle Report No. 10.	**The Bedrock Geology of the Deep River Quadrangle, with map, by L. Lundgren, Jr.**

Quadrangle
Report No. 11. **The Bedrock Geology of the Essex Quadrangle, with map, by L. Lundgren, Jr.**

Quadrangle
Report No. 12. **The Bedrock Geology of the Naugatuck Quadrangle, with map, by M. Carr.**

B. To be held as carry-over for future years if budgetary restrictions not eased:

Quadrangle
Report No. 13. **The Bedrock Geology of the Branford Quadrangle, with map, by J. E. Sanders.**

Quadrangle
Report No. 14. **The Surficial Geology of the South Coventry Quadrangle, with map, by Larry Frankel.**

Research in progress, final manuscripts expected in the 1959-61 biennium, with possible publication in 1960-61:

A. Irreducible minimum cut from total as result of economy demands:

Bedrock Geology of the Thomaston Quadrangle, with map, by Robert M. Cassie.

Surficial Geology of the old New Haven 15-minute Quadrangle (includes present quadrangles of Mount Carmel, Wallingford, New Haven and Branford), with maps, by R. F. Flint.

Weather and Climate of Connecticut, by A. Boyd Pack.

B. To be held as carry-over for future years if budgetary restrictions not eased:

The Bedrock Geology of the Hamburg and Lyme Quadrangles, with maps, by L. Lundgren, Jr.

The Bedrock Geology of the Kent and New Milford Quadrangles, with maps, by G. F. Carroll.

The Surficial Geology of the Spring Hill Quadrangle, with map, by Larry Frankel.

The Surficial Geology of the Stafford Springs Quadrangle, with map, by S. E. White.

Guide to the Insects of Connecticut. Part VI: Fascicle VII: The Nematocera, by C. L. Remington and others.

Birds of Connecticut. An Annotated Checklist, by E. Alexander Bergstrom.

C. To be published by the U. S. Geological Survey as part of their U.S.G.S. Geologic Quadrangle map series in cooperation with the Connecticut Geological and Natural History Survey:

Geological Quadrangle Map of Cornwall, Bedrock Geology by R. M. Gates.

Geologic Quadrangle Maps of Hartford South, Middletown, Glastonbury and Middle Haddam, Surficial Geology by R. E. Deane.

WHERE DO SURVEY REPORTS AND MAPS GO?

As noted above, under PURPOSE, the Survey was given complete freedom as to whether to give away or sell its publications. By long custom, the State Librarian has acted as custodian and distributor. Copies go automatically to science libraries of colleges, universities and other research institutions on a mailing list of nearly 1,000. Also, it had been customary to distribute copies free to citizens of Connecticut, on request. Recent abuses of this generous policy, plus valid objection to it, in principle, by Governor Ribicoff, have brought the following modifications (effective October 1, 1958):

Survey maps and reports are available, without charge, to public officials, exchange libraries, scientists, teachers, or engineers who may have serious use for them in their work. All others, regardless of legal residence, will be charged prices quoted in our List of Publications, available from the Director of the Survey or from the State Library. Such monies go into the General Fund and play no part in the budget of the Survey.

THE U. S. GEOLOGICAL SURVEY COOPERATIVE

The Connecticut cooperative project presently constitutes the largest expense item in our budget, as a "fixed charge" for perhaps four more biennia, if continued as our last Biennial Report, Bulletin 85, stipulated.

Funds that have been, and are, available to the Cooperative are as follows:

Fiscal Year	State	U.S.G.S.	Total
1956	20,000.	20,000.	40,000.
1957	20,000.	20,000.	40,000.
1958	40,000.	40,000.	80,000.
		Total spent to date*	160,000.
1959	40,000.	40,000.	

*To date means to June 30, 1958. Actual expenditures ran slightly below these figures for each fiscal year.

These funds carry the work through the preparation and approval of manuscript maps and reports, ready for final drafting and publication. Only direct costs of salaries, travel and field expenses of the geologists, plus vital supervisory, clerical and drafting support, are charged to the Cooperative. Supporting services (libraries, equipment, laboratory tests and overhead) and all costs of publication are borne by the U. S. Geological Survey. Connecticut's real benefits, therefore, are far larger than the above seems to indicate, both annually and in the long run.

PURPOSES OF THE COOPERATIVE:

This investigation of the geology of Connecticut consists of detailed geological mapping of 7½-minute quadrangles, on a scale of 1:24,000, or one inch equals 2,000 feet. The accompanying status map shows each such quadrangle by name (diagonally). Two geologic maps of each quadrangle are required; one to show composition, distribution, structure and stratigraphy of bedrock formations; and the other to show the nature and dis-

tribution of surficial deposits—unconsolidated gravel, sand, peat or clays—which so widely cover bedrock in Connecticut.

Together, the surficial and bedrock maps of a quadrangle provide the basic geologic data for more specialized studies of geologic resources (water, construction materials and minerals) and for terrane studies related to industrial, engineering and construction projects. They, therefore, aid experts to interpret subsurface conditions, foundation materials and related features, as well as sources of sand and gravel, clays, concrete aggregate and industrial minerals. They serve, in short, as blueprints for our expanding economy. We could continue, of course, to locate factories, schools, highways and pipelines, or to plan valley or urban developments without these maps, as we have up to the present, but only haltingly, by hit-or-miss methods, at enormous waste of capital and our natural resources.

STATUS OF THE COOPERATIVE:

Toward the close of the third field season (1958), 12 separate party chiefs have worked on 21 separate quadrangle maps for the Survey cooperative.

Two manuscripts are in press, and published maps are expected by January 1, 1959.

Six more manuscripts will be completed within this biennium. Fourteen additional projects will have completed field work by June 30, 1959. The accompanying status map (furnished by courtesy of the Director of the U. S. Geological Survey) includes geologic mapping done by other agencies, but not included in these numerical counts.

The Connecticut maps of the U. S. Geologic Quadrangle Series will be sold by that agency in Washington and also by the Connecticut State Librarian, under identical conditions governing prices and quantity discounts.

Within the current appropriations, as an oil man would put it, the pipeline is nearly full. We may soon expect to see a steady flow of six or seven new geologic maps placed on sale each year until the entire state is mapped in this manner. Ultimately, it is expected that two state geologic maps (showing surficial and bedrock deposits) will be compiled directly from the completed quadrangle maps.

In the nature of such a project, getting into full production for a carefully-agreed-upon annual expenditure is slow. No increases are requested. It is essential no decreases retard this most promising program; that we insure a "full pipeline" through the next biennium and probably three more beyond.

PLANS FOR THE NEXT BIENNIUM

The foregoing brief outline of accomplishments indicates, at best, an incomplete compliance with our statutory directives. During the next biennium, the Survey headquarters will undoubtedly be moved to expanded quarters on the University of Connecticut campus. Two vitally needed additions are planned to start at that time, tentatively, July 1, 1960:

ASSISTANT GEOLOGIST:

Hitherto, it has been impossible to answer any on-the-spot questions on geology, which is "the science of the earth"—not merely of specimens sent by mail or carried in paper bags to our office. The Commission believes that when headquarters are enlarged, a full-time assistant geologist should be employed. He would be equipped to handle most routine geological questions, office or field, without delay. In all other matters, he would act as an unofficial, but full-time "assistant to the Director," aided by the secretary. His most important duties, for the first few years at least, would be to renew our educational suites of Connecticut Rocks and Minerals, and to organize and arrange extensive new collections (see below) of hand specimens, rock cores, thin sections and photographs of the geology of Connecticut. Funds for an assistant geologist's salary and travel are considered urgently needed by July 1, 1960.

GEOLOGY OF CONNECTICUT COLLECTIONS:

The Survey Commission and the executive officers of the U. S. Geological Survey all agree that a "standard reference collection" would aid all those concerned with geologic mapping in the state, now and in the future. They further agree that such a collection should be established at Survey headquarters. President Jorgensen has embraced the plan for the University and made provisions for suitable "Geology of Connecticut" rooms in the next biennium. Eventually, permanent display facilities will be planned, but in 1960-61 only modest cabinet space for a small nucleus will be needed. Agreement to collect suitable specimens was reached unanimously in August, 1958. They will begin to arrive, in increasing numbers, until the mapping program is nearly complete. Suitable display facilities must not lag far behind.

Both of the new requests (above) have been carefully weighed and are deemed imperative in the interests of the state as a whole.

UNFULFILLED OBJECTIVES

In the full realization that the present economic climate is unfavorable for substantial increases in the appropriations for state agencies, regardless of their value and utility, it is still vital to keep in mind some of the functions of a State Geological and Natural History Survey which should be performed according to statute but must, under present conditions, be postponed.

The geology of Connecticut reference collections, provision for which has been outlined above, will be of primary value to geologists, prospectors, and those teachers and students who can find it possible to visit Storrs and devote considerable time to their study.

It is impossible to estimate the total number of requests, received annually, from students of all grades and their teachers, for pocket-sized reference collections of our minerals and rocks and for aid in identifying individual specimens. We should, at the earliest possible moment, renew and

maintain sufficient specimen stocks and accompanying illustrative material to place such educational aids in the hands of all possible educational users for a nominal fee, but primarily as a public service.

One of the most revolutionary changes in the map and in the way of life of the whole state is the tremendously expanded highway network recently begun and bound to increase in the near future. In neighboring states, particularly New York and New Jersey, Parkway and Thruway Guidebooks have been undertaken, both on the geology and the biological resources along these right-of-ways, as well as individual spot guidebooks for particularly popular state parks and forests, to enhance the understanding of such areas as natural resources, and to increase their aesthetic enjoyment, on which no dollar value can be placed.

As a service to individual mineral collectors, prospectors and the many enthusiastic mineral clubs in Connecticut, special collections of critical localities should be made as available. This is one of the many duties which require a full-time geologist and would seem to justify his appointment (as requested above).

As a further service to such mineralogists, we announce the recent (August, 1958) BIBLIOGRAPHY AND INDEX OF LITERATURE ON URANIUM AND THORIUM AND RADIOACTIVE OCCURRENCES IN THE U. S., PART V, covering all of New England and adjacent northeastern states. This is issued as SPECIAL PAPER 67 and should be ordered from the Geological Society of America, 419 West 117th, New York 27, New York, for $6.75.

For historical reasons, Connecticut has no Department of Natural Resources, but, as noted above, we share responsibilities in this field with many other state agencies. Some provision should be made, in the future, for contingency funds to foster closer cooperation where necessary.

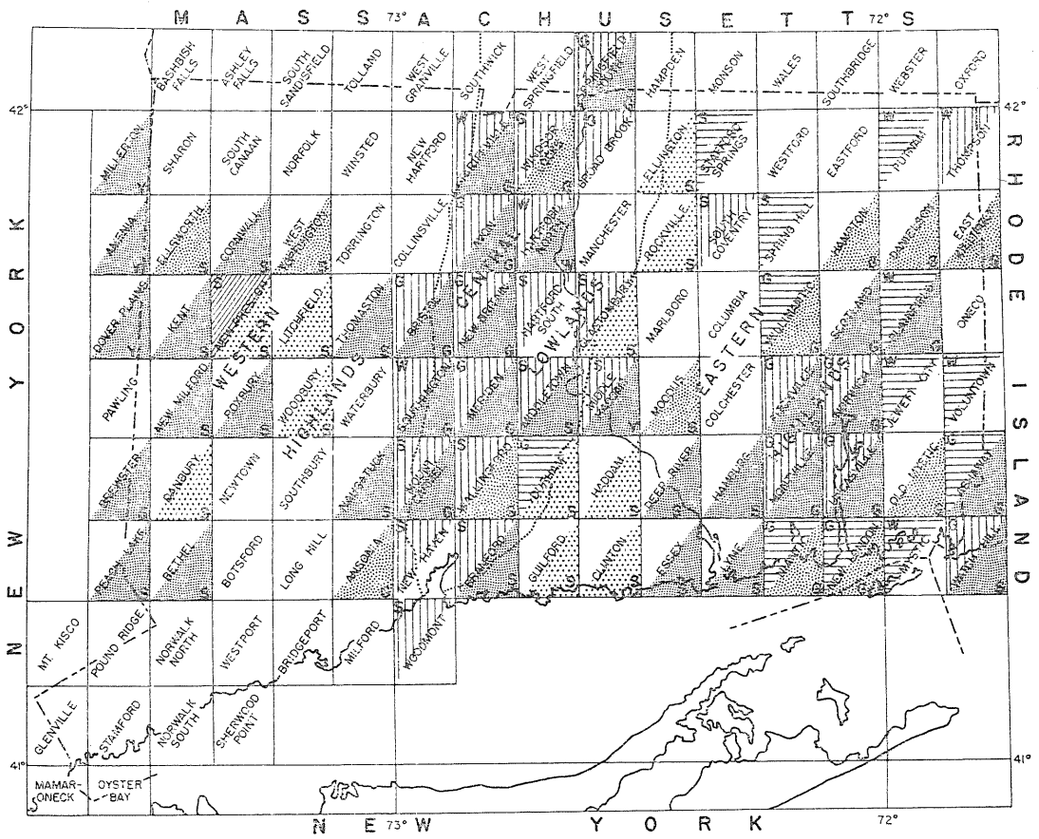
Two examples, within recent months, may serve to illustrate such a need. The State Board of Fisheries and Game recently completed extensive research on a Survey of Lakes and Ponds in Connecticut, but was unable to publish it promptly and appealed, quite properly, to this agency for financial support of the publication as a bulletin of this agency, even though the research had been done by others.

Similarly, the problem of serious depletion of our coastal salt marshes, with all of the closely-related natural resources dependent thereon, specifically wild fowl, shell fish and marine life, came to the attention of a group of interested naturalists, representing this agency, the State Board of Fisheries and Game, the Development Commission, Water Resources Commission, the Universities of Yale and Connecticut, and diverse conservationists, in the summer of 1958. No one of these agencies had facilities or funds to organize the extensive researches necessary to evaluate and to prevent further inroads on these resources.

Both of these instances are fairly typical of what may well increase rather than decrease in the future. Problems of natural resources of the state cannot always be foreseen two or four years ahead, as budgetary restrictions now require.

It would seem easy to provide adequate checks and safeguards against misuse of public money, but at the same time provide contingency funds to permit this agency to cooperate more fully for the general purpose of enhancing or conserving our natural resources, regardless of the source from which such problems may arise.

With increasing population and decreasing natural resources, it is essential that all of the agencies concerned with natural resources be enabled to cooperate more fully and, in certain instances, to act in emergencies, such as the marsh case cited above, rather than be restricted to their routine duties based upon past performances and spelled out in great detail, years in advance for budgetary purposes. Such cooperation should be supported, providing suitable safeguards, by a far-sighted Legislature with its eyes on the state as a whole and all of its future, rather than on just the specific performance, year by year, of individual agencies.



STATE OF CONNECTICUT

Status of geologic quadrangle mapping and plans

August 18, 1958

Bedrock mapping, 7½' quadrangles

Bedrock published

Bedrock in progress, or will definitely start by October, 1959 *(includes some maps finished and awaiting publication; also includes some maps in theses, on small scales, or not in 7½' quadrangle form.)*

Bedrock planned to start in spring of 1960 or later

Surficial mapping, 7½' quadrangles

Surficial published *(small scale, probably inadequate)*

Surficial in progress, or will definitely start by October, 1959

Surficial planned to start in spring of 1960 or later

Auspices

S – Connecticut Geological Survey

G – Geologic Division, U.S.G.S.–Connecticut Geological Survey coop.

W – Ground Water Branch, U.S.G.S.–Connecticut Water Resources Commission coop.

Y – Other institutions

Notes

1. Bedrock of Clinton, Durham, Haddam, Guilford, Jewett City, Old Mystic, Oneco and Voluntown will eventually have to be remapped in part to meet quadrangle map standards.
2. Ground Water indicated (1958) special needs for surficial quadrangle maps of the following, and wishes to map some or all of them itself: Tariffville, Naugatuck, Bridgeport, Milford, Eastford, Voluntown and Uncasville quadrangles.
3. Surficial of Mystic will be done as part of the Ground Water Branch Fishers Island Project of New York State.
4. Surficial of Ashaway will be done by Rhode Island Geologic Mapping Coop. on a repay basis.