

Water Resources of Southeastern Florida

By GARALD G. PARKER, G. E. FERGUSON, S. K. LOVE, and others

WITH SPECIAL REFERENCE TO THE GEOLOGY AND GROUND
WATER OF THE MIAMI AREA

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1255

*Prepared in cooperation with the Florida
Geological Survey, Dade County, cities
of Miami and Miami Beach, and other
agencies*



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PREFACE

The research incident to the preparation of this report was performed by the Water Resources Division of the U. S. Geological Survey under the general supervision of N. C. Grover (retired, 1940), G. L. Parker (died, 1946), and C. G. Paulsen, all of whom successively held the position of chief hydraulic engineer.

The geologic and ground-water investigations were made under the general administrative supervision of the late O. E. Meinzer, geologist in charge, Ground Water Branch (retired, 1946), and A. N. Sayre, present geologist in charge. V. T. Stringfield, geologist, exercised general technical supervision of the project, and the general field and office work in southern Florida was under the direct supervision of W. P. Cross, hydraulic engineer (Oct. 1939–May 1942), R. H. Brown, hydraulic engineer (June 1942–June 1943), and Garald G. Parker, district geologist (June 1943–April 1949). Geologic research and test-well drilling was under the direction of Garald G. Parker beginning in February 1940.

The surface-water investigations were made under the general administrative supervision of R. G. Kasel, chief of the Surface Water Branch (died, 1946), and J. V. B. Wells, present chief. The field and office work in Florida was under the direct supervision of D. S. Wallace (until 1941), G. E. Ferguson (1941–47), and A. O. Patterson (after 1947), all of whom successively held the position of district engineer. C. C. Yonker, hydraulic engineer, developed field methods and supervised the computation of records for stream-gaging stations. D. B. Bogart, hydraulic engineer, supervised the surface-water activities of the Miami sub-office from 1942 to 1949.

Quality of water investigations were made under the general administrative direction of W. D. Collins, chief of the Quality of Water Branch (retired, 1946), and S. K. Love, present chief. Technical supervision of quality of water studies, including chemical analyses of water samples, was exercised by S. K. Love, assisted by H. A. Swenson, chemist.

From field tabulations, R. W. Davenport, chief of the Technical Coordination Branch, and W. B. Langbein, hydraulic engineer, prepared the section on quantitative surface-water studies.

Acknowledgment is made to all who have aided in this investigation. So many individuals and organizations have helped that it is impossible to name and give credit to each in this report.

Chief credit for starting the investigation is due to Alexander Orr, Jr., former city commissioner and former mayor of Miami. Others who materially aided in the early planning of the project included Malcolm Pirnie, consulting engineer of New York City; Dr. Abel Wolman and G. W. Simons, Jr., Water-Resources Committee of the National Resources Planning Board; A. B. Hale and Dr. A. P. Black, Peninsular Florida Basin Committee; G. W. Simons, Jr., Florida State Planning Board; C. A. Renshaw, city manager of Miami Beach; U. S. Senators Charles O. Andrews and Claude Pepper; U. S. Representative Pat Cannon; and other public officials and private citizens. As a result of their efforts—particularly Mr. Orr's—Miami, Miami Beach, Coral Gables and Dade County, jointly with the U. S. Geological Survey, furnished the financial support for the major part of the investigation.

The city of Miami furnished office, laboratory, drafting room, and storage space for the survey from 1939 through 1946; since 1946, the city of Miami and Dade County have jointly contributed one-half and the U. S. Geological Survey and the Florida Geological Survey have contributed the other half of the cost of rented quarters. Personnel of the Miami city manager's office, of the Department of Public Service, and of the Department of Water and Sewers have been especially helpful; officials of Miami Beach, Coral Gables and Dade County generously contributed of their time and efforts.

Thanks are extended to the municipalities of Fort Myers, Fort Lauderdale, Fort Pierce, Lake Worth, Delray Beach, and Dania for the use of data, equipment, materials and labor in cooperative investigations of the geology and water resources during and since World War II.

Water-resources investigations that began in 1930 in cooperation with the Florida Geological Survey, the Corps of Engineers, and other agencies, made it possible to anticipate some of the problems and conditions to be encountered, and intensive work started in the Miami area as soon as funds became available. Special acknowledgment is due Dr. Herman Gunter, director of the Florida Geological Survey, and his staff (particularly Dr. Robert O. Vernon, assistant director), for their very considerable assistance in this investigation.

State agencies, in addition to the Florida Geological Survey, who have contributed valuable aid include the trustees of the Florida Internal Improvement Fund, Florida Division of Water Surveys and Research, Florida State Board of Health, Everglades Drainage District, Okeechobee Flood Control District, Lake Worth Drainage District, University of Florida Agricultural Experiment Stations, and the Florida State Road Department.

The Department of Agriculture, Soil Conservation Service, Everglades Project, and Farm Security Administration; Department of the Army, Corps of Engineers, Jacksonville District; and the U. S. Weather Bureau have been of help, either through cooperative investigations that required financial support, or by furnishing data, machinery, and equipment.

Consulting engineers practicing in Florida have been instrumental in starting the southeastern Florida water-resources investigation as well as later cooperative investigations, and they have given their full support to all these investigations. The following consulting engineers and chemists have furnished data, loaned equipment, and assisted with field investigations: Alvin P. Black, head of the Department of Chemistry, University of Florida; C. K. Dodd, city engineer, Sarasota; Prof. N. C. Ebaugh, head of the Department of Mechanical Engineering, University of Florida; H. M. Freeborn, engineer, Philadelphia; Wylie W. Gillespie, Jacksonville; Elson T. Killam, engineer, New York; Harvey F. Pierce, engineer, and Edmund Friedman, Maurice H. Connell & Associates, Miami; Malcolm Pirnie, engineer, Malcolm Pirnie Engineers, New York; Charles A. Pohl, engineer, Bogart and Pohl, New York; O. J. Seiplein, chemist, Miami; George W. Simons, Jr., engineer, Jacksonville; Leslie B. Taylor, engineer, Miami; Joseph Weil, Dean of the College of Engineering, University of Florida, Gainesville; Claude F. Wertz, engineer, Day & Zimmermann, Inc., Philadelphia; Joe Williamson, Jr., engineer, Russell & Axon, Daytona Beach; George E. Wingerter, engineer, H. C. Nutting Co., Miami; and Abel Wolman, engineer, Johns Hopkins University, Baltimore.

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Others who have been especially helpful were H. H. Hyman, engineer, Florida Power & Light Co., who furnished data on the historical development of the Miami water supply, and other engineers of the same company who supplied information on test wells, including logs, water levels, quality of water results, and reports of pumping tests. R. Y. Patterson, H. A. Bestor, and others of the U. S. Sugar Corporation at Clewiston, furnished data on wells and water levels and contributed information on the historical development of drainage and industries in the Everglades. J. M. McBride, Agricultural Agent of the Seaboard Air Line R. R. Co., gave detailed data on the geology and ground water of the Indian Town area. Stanley B. Wright, National Resources Planning Board, who served as coordinator of the Southeastern Florida Joint Investigation during 1940-41.

Many persons have helped in the geologic studies, and appreciation is expressed to each of them. Particular acknowledgment is made of the work of these geologists of the U. S. Geological Survey: Nevin D. Hoy, whose unflinching assistance from 1929 through the present, contributed immeasurably to the progress on the ground-water studies; C. Wythe Cooke, who spent several weeks in the field with Garald G. Parker studying areal geology; and J. B. Reeside, Jr., Julia A. Gardner, J. A. Cushman, Ruth Todd, Remington Kellogg, F. Stearns MacNeil, and Lloyd B. Henbest, who aided by identifying fossils. Other scientists, not connected with either the Florida or the U. S. Geological Survey, have been of great help, including Horace G. Richards of the Philadelphia Academy of Sciences, who directly aided this investigation by his identification of fossils from several test wells; Robert B. Campbell, petroleum geologist, who furnished data on the geology and ground water of the deeper formations; and Richard F. Flint, of Yale University, who aided in the study of Pleistocene geology.