

DEPARTMENT of the INTERIOR

GEOLOGICAL SURVEY

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GREAT DISMAL SWAMP BEGAN 9,000 YEARS AGO WITH ARTESIAN WATER

The Great Dismal Swamp, straddling the Virginia-North Carolina border, began forming about 9,000 years ago when subterranean water under artesian pressure started leaking to the surface, hydrologists for the U.S. Geological Survey, Department of the Interior, have concluded in a new theory. *Hydrology Res. Mgmt*

Under their hypothesis, the upward flow of water plus abundant rainfall and poor surface drainage led to formation of peat (partially decayed plant matter) on the floor of what is now the swamp, one of the few remaining large wet wilderness areas in the eastern United States. The peat further inhibited drainage, which in turn speeded the accumulation of peat in a progressive cycle that is still going on today.

The new theory is contained in a USGS technical report, which is a significant part of an overall report to be issued shortly by the Department of the Interior in response to a Congressional request to determine the feasibility and desirability of protecting and preserving the swamp and the Dismal Swamp Canal. Copies are available to the public free upon request from the USGS office at 200 West Grace Street in Richmond, Va. 23220.

"There has been much speculation concerning the hydrologic conditions that led to the formation of the swamp," according to the authors, William F. Lichtler and Patrick N. Walker, both hydrologists in the Survey's Richmond office. Little research has been done in the United States on swamp hydrology. Their theory differs from previous theories that beaver dams or rises and falls in sea level caused the swamp to form.

The 210,000 acre swamp is significant ecologically because it is the northern limit of some southern species of plants and animals as well as the southern limit of some northern species.

Nathaniel P. Reed, Assistant Interior Secretary for Fish and Wildlife and Parks, has described the Great Dismal Swamp as "an unbelievable realm of mystery and charm, holding within its marshy confines the enchantment of southern American swamps. It is the northernmost habitat of some of our most exotic flowers. Bears, few in number, claim it as home. It is the last surviving wilderness area in the Middle Atlantic region where cypress and Spanish moss can be seen." Reed also noted that the swamp has cottonmouth moccasins, and that the canebrake rattler reaches its northern limits in the Great Dismal Swamp.

(more)

The Interior Department previously designated 50,000 acres of the swamp as the Dismal Swamp National Wildlife Refuge, and President Ford on Aug. 30 signed a bill to establish by statute the Great Dismal Swamp National Wildlife Refuge. The measure authorized \$7 million over three years, through Fiscal Year 1977, to carry out the Act, including acquisition of additional acreage.

The 50,000 acres initially set aside for the refuge was donated to The Nature Conservancy by the Union Camp Corporation, which conducted logging operations in the swamp. The Nature Conservancy then turned the property over to the Interior Department.

Estimates of the original size of the swamp range as high as one million acres. The activities of man since Colonial times, and probably of the Indians before that, greatly affected and changed the natural conditions of the swamp, Lichtler and Walker noted. Roads and navigable ditches were constructed through it, the original stand of timber was cut for lumber, and the size of the swamp was reduced by draining fringe areas. George Washington owned large tracts in the swamp, personally supervised drainage and logging operations and conducted the survey for construction of the four and one-half mile-long Washington Ditch through the swamp.

"The Dismal Swamp has changed since Colonial times, and it is likely that American Indians modified the swamp by burning and other means long before Europeans ever saw it," the Survey hydrologists said, adding that "since George Washington's time, drainage canals, ditches and their accompanying spoilbanks have changed surface water levels and flow patterns. In at least parts of the swamp, roads built on spoilbanks have provided high ground and sunlit areas. Such changes and repeated lumbering have caused different flora and fauna to evolve."

They said actions of man "have probably resulted in a generally drier swamp as indicated by changes in the vegetation. If present trends continue, the swamp of the future will be more like an upland forest than it is at present."

The two scientists emphasized that "restoring the swamp to its original condition is impossible because that condition is unknown. The swamp has been and is still evolving, even without human interference. Therefore, perhaps it would be better to manage the swamp within the framework of conservation, rather than try to return it to some previous condition."

In developing their theory, Lichtler and Walker did some field work in the swamp, but relied mainly on previous studies by other scientists on the surface and underground geologic formations in the area. The two USGS scientists said more detailed studies of the hydrology of the swamp would be needed to properly preserve and maintain the swamp as a wetlands refuge.

With its surface sloping gently to the east, the Great Dismal Swamp is rimmed on the east by the Fentress Rise and on the west by the Suffolk Scarp, both of which restrain surface drainage. Surface drainage is primarily through the Dismal Swamp Canal, a part of the Intracoastal Waterway along the eastern side of the swamp.

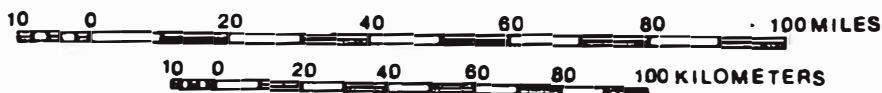
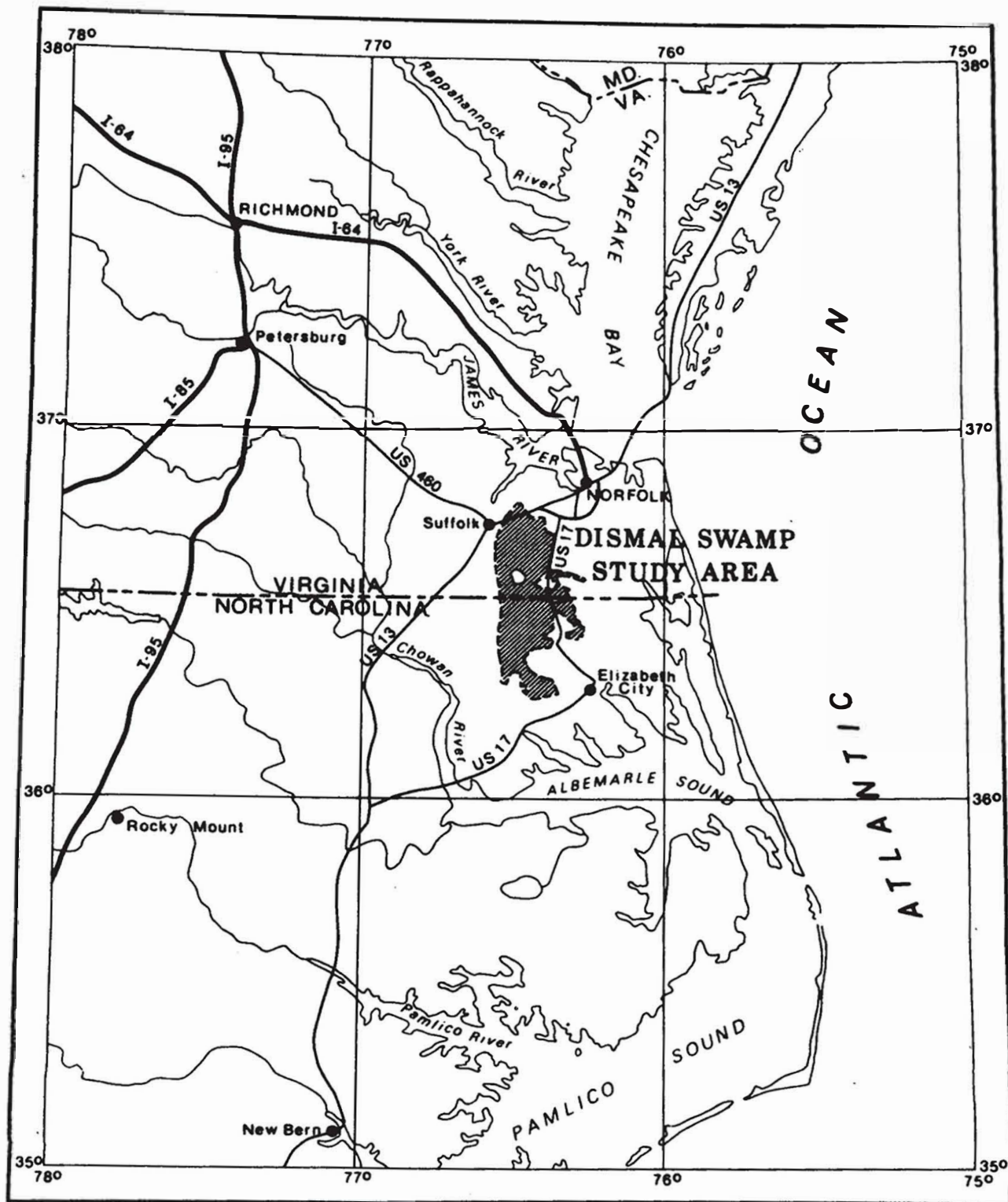
The report said the hydrology that led to the formation of the swamp is believed to have been controlled mainly by what is called the Norfolk Formation and the layers of clay above and below it. The sandy Norfolk Formation is water permeable and ranges from just below the surface to a depth of about 30 feet, averaging about five feet in thickness. Formed about 100,000 years ago, the Norfolk Formation was sandwiched between the clayey silt of the overlying Londonbridge Formation and the marine clay in the underlying Yorktown Formation, which restricted the vertical inflow and outflow of water. However, water drained into the Norfolk Formation laterally from the west where it crops out on the Suffolk Scarp. Since the water intake areas on the Scarp were higher than the surface of the swamp, artesian pressure existed in the Norfolk Formation under what is now the swamp.

As surface erosion began removing the overlying Londonbridge Formation and exposing the Norfolk Formation, the artesian pressure caused the subterranean water to seep to the surface, starting the chain of action that formed the swamp, the report explained.

"This seepage, combined with the abundant rainfall and naturally sluggish surface drainage, may have been sufficient to trigger the formation of peat along stream valleys about 9,000 years ago," the report said. "The peat further inhibited surface drainage, which in turn accelerated the a cumulation of peat until the interfluvial (areas between stream valleys) were covered. The present role of the Norfolk Formation in the hydrology of the swamp is not clear, but it is considered to be one of the most important aspects of the hydrology to be studied in future investigations."

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(Note to Editors: See attached map)



Dismal Swamp study area.