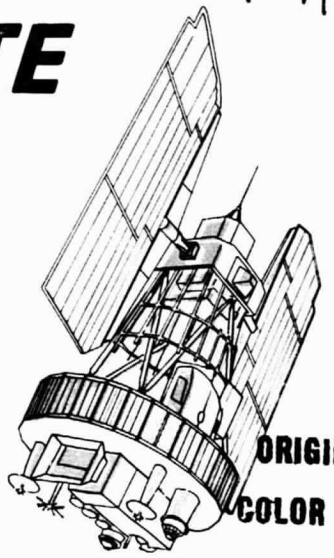
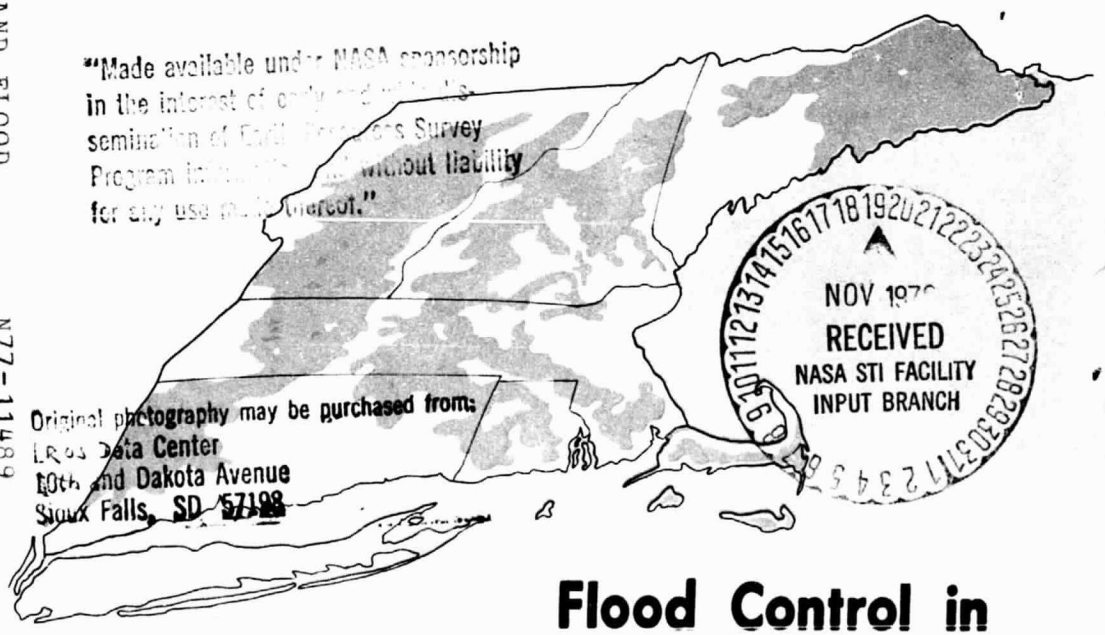
LANDSAT SATELLITE



ORIGINAL CONTAINS COLOR ILLUSTRATIONS



Flood Control in NEW ENGLAND

DEPARTMENT OF THE ARMY • NEW ENGLAND DIVISION • CORPS OF ENGINEERS • WALTHAM, MA.

THE LANDSAT SATELLITE
and
FLOOD CONTROL IN NEW ENGLAND

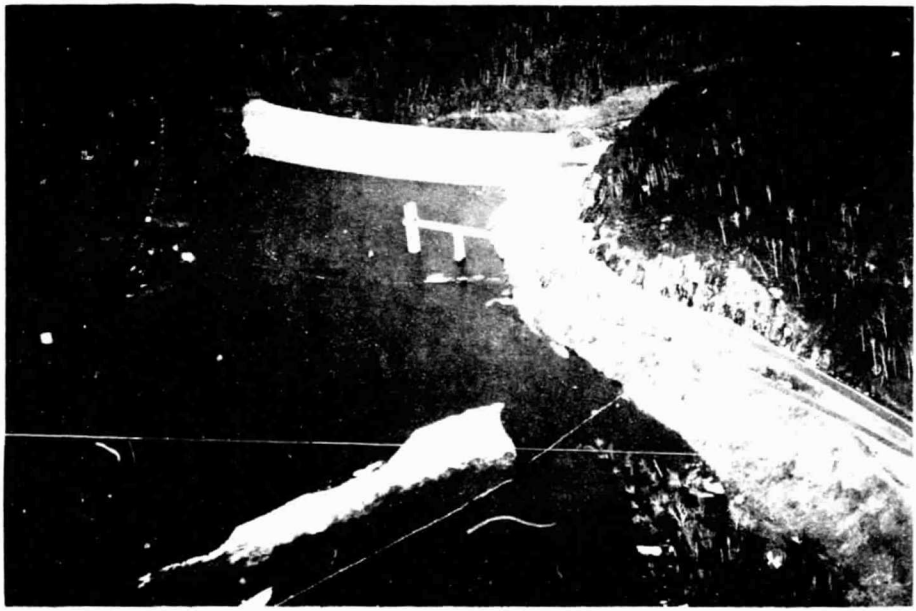
JUNE 1976

HISTORY AND BACKGROUND

Since the Industrial Revolution in the 1800's, the rivers of New England have been developed to supply water for power and transportation. As new means of transportation became more economical both railroad and highway systems were built along the banks of the rivers to service the expanding needs of the industrial, commercial and urban centers. Structures, such as buildings, roads, bridges and dams have restricted floodways to such an extent that considerable property and environmental damages have occurred during moderate and major floods. Notable floods of November 1927, March 1936, September 1938 and August 1955 have demonstrated the need for flood control to prevent these natural catastrophes.

AUGUST 1955 FLOOD DAMAGE AT WINSTED, CONNECTICUT

At the direction of Congress, the U.S. Army Corps of Engineers developed a comprehensive plan of protection for each river basin after a careful analysis of all water resources. Protective works generally consist of a combination of channel improvements, dikes and / or floodwalls at major damage centers augmented by upstream flood control reservoirs. Many of these reservoirs contain additional storage reserved for other uses such as water supply, conservation and recreation. The Corps has built 35 flood control reservoirs, 37 local protection projects and 4 hurricane barriers in New England at a total investment of over $350 million.



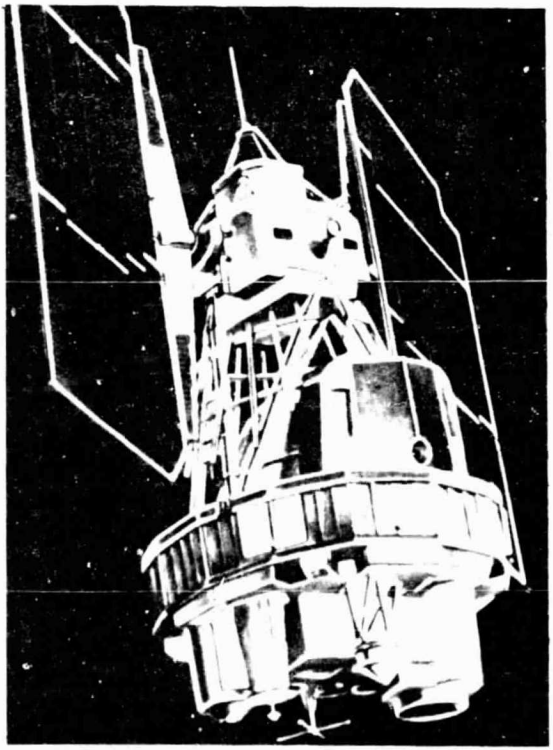
BALL MOUNTAIN DAM AND RESERVOIR JAMAICA, VERMONT

To achieve optimum operating benefits from this comprehensive protection system, the New England Division requires hydrologic data such as river, reservoir and tidal levels, wind velocity and direction, barometric pressure and precipitation.

In the past this data was collected from field observation and relayed via telephone or voice radio. It took several hours to compile and assess the data in this manner. With the need for timely and reliable information increasing, the Corps began development of new methods of data collection.

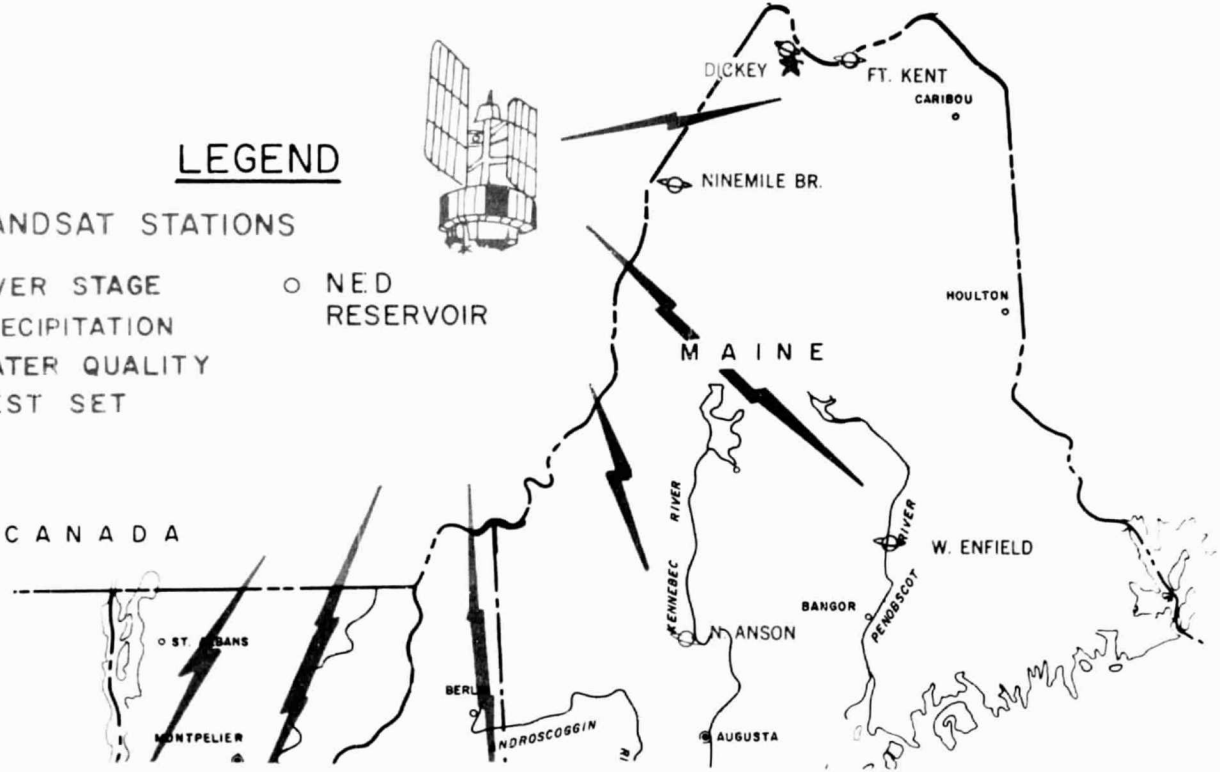
In 1970, the Automatic Hydrologic Radio Reporting Network was placed in operation. This ground-based radio relay system consists of 41 remote reporting stations, and a central control at Division Headquarters in Waltham, Massachusetts. This network, under computer programmed control, collects and analyzes, in real time mode, information which is essential for flood regulation. The remote reporting stations are strategically located in five major river basins and at key coastal points, with each contributing to a detailed, comprehensive hydrologic picture.

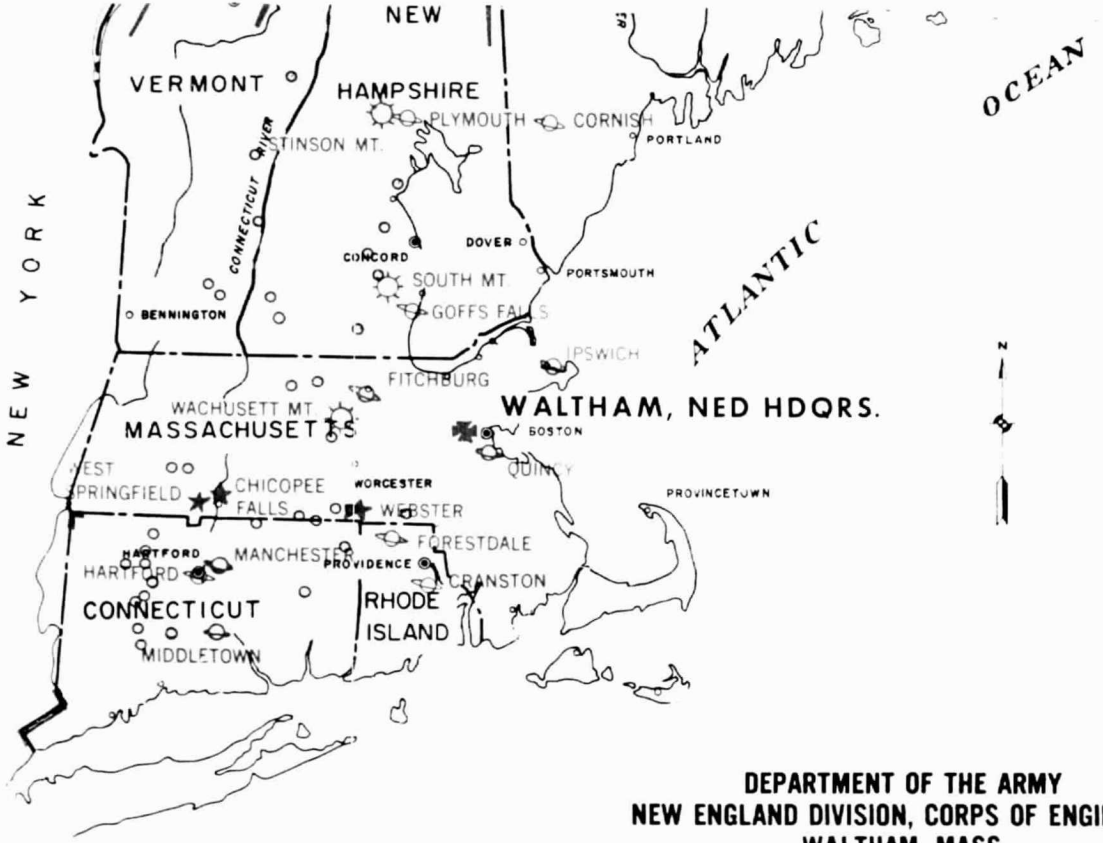
In June 1972, NASA entered into a contract with the Corps for an experiment to study the feasibility of using the Earth Resources Technology Satellite (ERTS or LANDSAT) for collecting environmental data from Data Collection Platforms (DCP's) which are installed at 27 locations throughout New England. Many are situated at existing U.S. Geological Survey gaging stations.



LANDSAT SATELLITE

LANDSAT—2 DATA REPORTING STATIONS





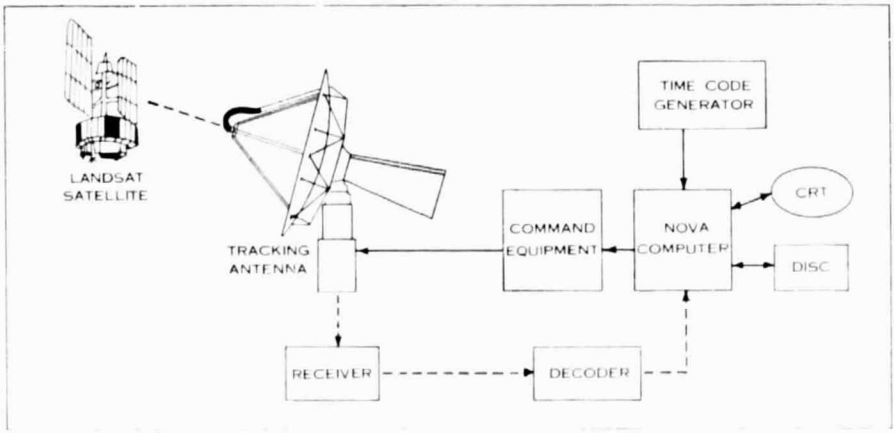
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

LANDSAT

Since July 1972, LANDSAT has been relaying river stage, precipitation and water quality data from DCP's via the Goddard Space Flight Center to the U.S. Army Corps of Engineers, New England Division, in near real time. This is the first resources satellite designed to obtain data from the planet Earth exclusively for planning, design, operations and research of land and water resources.

THE NED GROUND RECEIVE STATION

Since any operational satellite configuration should include ground receiving stations at all major user locales, NED, with NASA support has constructed and is now operating an inexpensive semiautomatic and easily maintained ground receive station as a follow-up to its original study. The Division is now able to receive hydrometeorological data from data collection platforms in the field directly at its headquarters in Waltham, Massachusetts with no time delays. The software to drive the antenna system has been developed with the intention that the antenna operate in an unattended mode automatically over nights and during weekends and holidays, with a computer controlling all processes. A diagram of the overall facility is shown.



NED GROUND RECEIVING STATION DIAGRAM

A major objective of the program has been to compare the cost, reliability, and operational effectiveness of the LANDSAT Data Collection System with the existing NED radio network.

Data collection platforms tested by the Corps have performed successfully in all seasons including the winter months and also during significant flood events, transmitting near real time operationally useful data for our flood fighting missions.

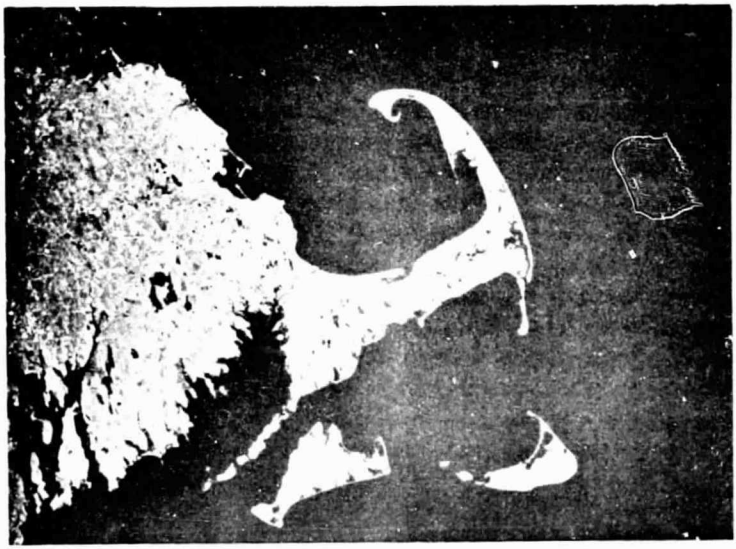
TRACKING ANTENNA AT NED WALTHAM, MA.

DATA COLLECTION PLATFORM SACO RIVER CORNISH, MAINE

The satellite proved invaluable in April and early May of 1973 and 1974, monitoring flooding in Maine Rivers. LANDSAT relayed data from five remote river points in that state to aid the New England Division in the coordination of the flood emergencies.

The successful testing of the LANDSAT Data Collection System at the New England Division should encourage serious consideration of the institution of an operational satellite data relay system on a Corps-wide basis. System analysis is being performed to refine cost data and to articulate the data collection needs of Corps users.

The New England Division is also studying imagery regularly collected by LANDSAT to determine the usefulness in planning, designing, and managing water resource systems. It is well established that such imagery is suited to measuring areal extent of ice, snow, and open water, and for estimating moisture regimes. Our studies involve computer analysis of scenes and will explore indirect methods of calculating other hydrologic parameters as well.



IMAGERY PHOTO TAKEN FROM LANDSAT

FLOOD CONTROL OPERATIONS

Data received at the New England Division's Reservoir Control Center from either the Automatic Hydrologic Radio Reporting Network or the LANDSAT Data Collection System is compiled by computer. This is augmented by information from other sources such as the National Weather Service Meteorologic and River Forecast Offices and the U.S. Geological Survey. Experienced engineers and hydrologists at the Reservoir Control Center analyze the data for timely operation of dams and hurricane barriers, and then issue instructions to operating field personnel.

Flood control reservoirs, local protection projects and hurricane barriers built by the Corps in New England have been responsible for prevention of about $300 million in flood and storm damage.

Lieutenant General
William C. Gribble, Jr.
Chief of Engineers

Colonel
John H. Mason
Division Engineer

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