North Carolina Department of Natural Resources & Community Development

James B. Hunt, Jr., Governor

Joseph W. Grimsley, Secretary

OFFICE OF WATER RESOURCES

John N. Morris, Director

Telephone 919 733-4064

March 29, 1982

Dear Citizens Concerned About White Lake:

In the fall of 1980, users of White Lake became concerned about declining water levels at the lake. A number of citizens contacted our Department and requested an investigation of the cause of this condition.

The Office of Water Resources made a number of field visits to White Lake to gather information on factors that could affect the level of the lake. A public meeting was held in Elizabethtown on February 11, 1981, to report on the results of this investigation. At that time, representatives of the Division of Parks and Recreation, the Division of Environmental Management, and the Wildlife Resources Commission also presented information to the public concerning conditions at White Lake.

After the public meeting, the Office of Water Resources has continued to monitor lake levels and groundwater levels at White Lake. The attached report summarizes our findings. We have concluded that the low water levels in 1980 and 1981 were the result of natural variations in rainfall and evaporation rates. North Carolina suffered a severe drought that affected many regions of the State during this period. Lake levels can be expected to return to normal when rainfall gets back in the normal range. We investigated a number of culverts, ditches and drains which local residents felt might be related to the lowered lake level. Based on a careful study of the lake level in relation to groundwater levels surrounding the lake, we do not believe that any of these features have caused any significant lowering of the lake level.

Participants at the public meeting in Elizabethtown were concerned about other problems in addition to the low lake level. Some individuals described a problem with sediment and debris suspended in the water and collected along the shoreline, creating serious problems for swimmers and other recreational users. Many participants in the public meeting believe that the unusually low water level in the lake contributed to this problem by causing boat propellers to be closer to the bottom of the lake and therefore, to stir up more organic matter from the bottom. We believe that this is a plausible explanation. In a shallow lake like White Lake, a difference of one or two feet in water levels can have a substantial effect.

Other participants in the public meeting were concerned about congestion of the lake by motorboats during peak summer weekends and about boating safety problems. The representative of the Wildlife Resources Commission explained at the meeting that local governments have the authority to request changes in boating regulations when needed. These requests should be addressed to the Wildlife Resources Commission which has the authority to consider them and take appropriate action.

Mr. Tom Wells, of the Division of Parks and Recreation, is now coordinating the development of a management plan for White Lake. This plan will include consideration of boating safety, water quality, construction of piers in the lake, and all other aspects related to public use of White Lake. The management plan will be developed with participation by the public through public meetings and a public advisory group. Citizens interested in the future of White Lake should contact Mr. Wells to participate in the development of the plan. Mr. Wells can be reached at P. O. Box 27687, Raleigh, North Carolina, 27611, telephone 733-7701.

The Office of Water Resources appreciated the opportunity to meet with citizens concerned about White Lake and to take part in an exchange of ideas and information about the lake level. This report completes our investigation of the lake level issue unless further questions arise. Please feel free to contact us at any time if you have any questions about this report. The Office of Water Resources will continue to keep an interest in White Lake and serve as a consultant to Mr. Wells for the development of the management plan.

Sincerely yours,

John N. Morris

John N. Morris

Department of Natural Resources and
Community Development

Hydrological Investigation of White Lake, Bladen County, North Carolina, 1980-81

In response to public concerns about declining water levels at White Lake, the Office of Water Resources, North Carolina Department of Natural Resources and Community Development (DNRCD), performed an analysis of hydrological conditions at the Lake and reported the findings of this research at a public meeting in Elizabethtown, North Carolina on February 11, 1981. Since this public meeting, investigations by DNRCD have continued with the installation of several permanent groundwater observation wells which will provide information about the relationship between the groundwater system and the Lake level. The purpose of this report is to summarize the results of the hydrological analysis and to present additional information that has resulted from the continuing study of the hydrology of White Lake.

A field survey was performed in the area around White Lake in the Fall of 1980 to determine the inflow and outflow characteristics of surface drainage at the Lake. The Lake is surrounded by a low sand ridge on all sides except for an area to the southwest which is crossed by NC 53 (Area A, Figure 1). From the top of the sand ridge, the land surface slopes downward away from the Lake except in an area to the northeast in the vicinity of the intersection of US 701, NC 41, and SR 1515 (Area B, Figure 1). The land surface at this location slopes upward for several hundred yards. A small culvert under SR 1515 (Site C, Figure 1) channels surface water runoff from the upland area into a swampy area adjacent to the Lake. During periods of high rainfall, flow through the culvert probably contributes small quantities of surface water runoff to the Lake, however during dry periods the surface water inflow to White Lake is minimal.

Since surface water contributes very little inflow to White Lake, attention was directed to the relationship between the groundwater system and lake levels. Because groundwater inflow and outflow at the Lake is poorly understood, the North Carolina Department of Natural Resources and Community Development (DNRCD) authorized the construction of five permanent groundwater monitoring wells at the Lake. The observation wells were installed during March, 1981 at two locations adjacent to the Lake. The wells are monitored periodically by DNRCD personnel. The research has provided evidence of a semi-confined groundwater aquifer which is probably the source for the springs that have been reported near the northeastern shore in the Lake. The exact relationship between rainfall, groundwater levels, and the Lake level should become more clear as hydrological monitoring at White Lake continues. The remainder of this report summarizes the general conclusions about factors affecting lake levels as they can be stated from existing data.

Surface water outflow at White Lake occurs on the west side of the Lake where manmade drainage outlet channels have been constructed through a low-lying area (Site D, Figure 1). The drains are constructed so that the Lake overflows through them whenever the Lake level elevation is higher than sixty-six feet above mean sea level. At the time of the field survey, the Lake level was approximately one foot below the elevation of the drains.

Several other features around the Lake were studied during the field survey to determine how they might affect the Lake water level. The

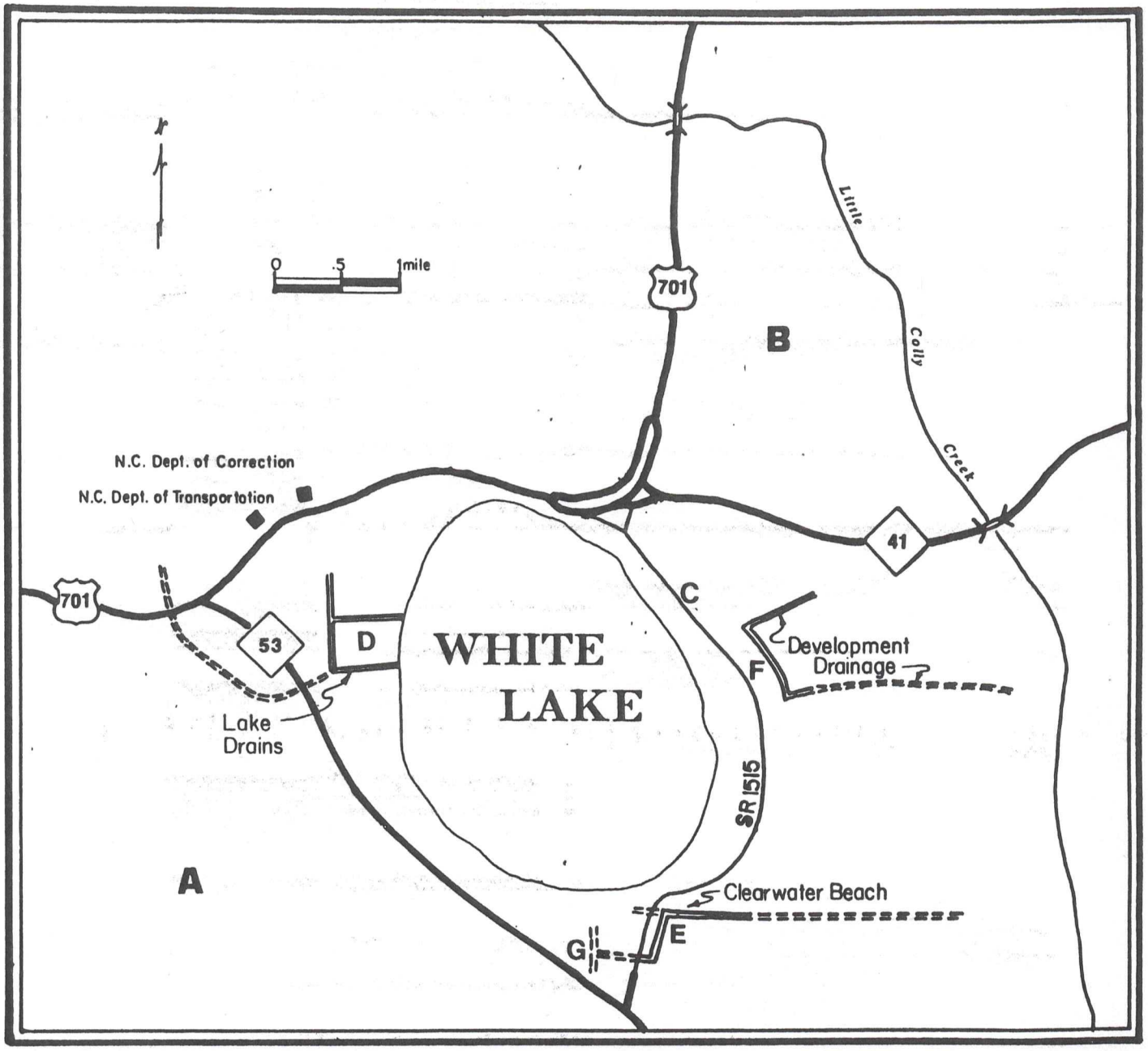

Figure 1 - White Lake Area

features studied included the large culverts under US 701 near the intersection with NC 53, two culverts that pass under SR 1515 near Clearwater Beach, and a project for draining low-lying land on the east side of the Lake (Figure 1). None of these features provide a surface outlet for Lake water and no modifications were observed which would violate a State Law which prohibits the placing of culverts at less than sixty-six feet below mean sea level under the roads around White Lake.

Since no features were observed through which surface water outflow was occurring, an effort was made to determine how existing structures might contribute to declining Lake levels through groundwater flow. In order for Lake water outflow to occur through the groundwater system, the water table must be at a lower elevation than the Lake level. Water table elevations were measured at numerous locations around the Lake with particular emphasis on those areas where manmade structures could lower groundwater levels.

Near Clearwater Beach, there are two small culverts under SR 1515 which are connected, on the east side of the road, by a subsurface drainage tile (Site E, Figure 1). During the field survey, there was no surface flow to these culverts, however approximately 25 gallons of water per minute was observed to be flowing through the subsurface tile toward Clearwater Beach. This flow was apparently caused by groundwater leakage into the tile through unsealed joints. Groundwater elevations were measured near the culverts and along the course of the subsurface tile. The measured water table elevations were higher than the Lake level, therefore the Lake was not contributing to the water flowing through the subsurface tile.

Groundwater elevations were also measured between the Lake and the development drainage to the east of SR 1515 (Site F, Figure 1). The water table elevations at this location were also higher than the Lake level, therefore Lake water was not flowing through the ground to this drainage feature.

Development has continued at White Lake with clearing and ditch construction near the intersection of SR 1515 and NC 53 (Site G, Figure 1). This ditching should not have an impact on the Lake level as long as new culverts are not constructed under the adjacent roads. The major effect of the ditching will be to collect surface water that drains from the cleared land.

No features or structures were observed during field surveys at White Lake which could be responsible for a rapid and sustained decline in the Lake level. Therefore, rainfall and evaporations records from the U. S. Weather Service were researched to determine if the declining Lake level could be explained by natural variations in weather patterns. Lake level records revealed that the Lake dropped below average levels during May 1980, and by December 1980 the Lake level was approximately one foot below normal (Figure 2). During the same period, rainfall was about 40% below normal and evaporation was slightly above normal (Figure 3). Groundwater levels during this period dropped as much as three feet in some parts of Bladen County. Records of other lakes in Bladen County showed similar declines to those of White Lake.

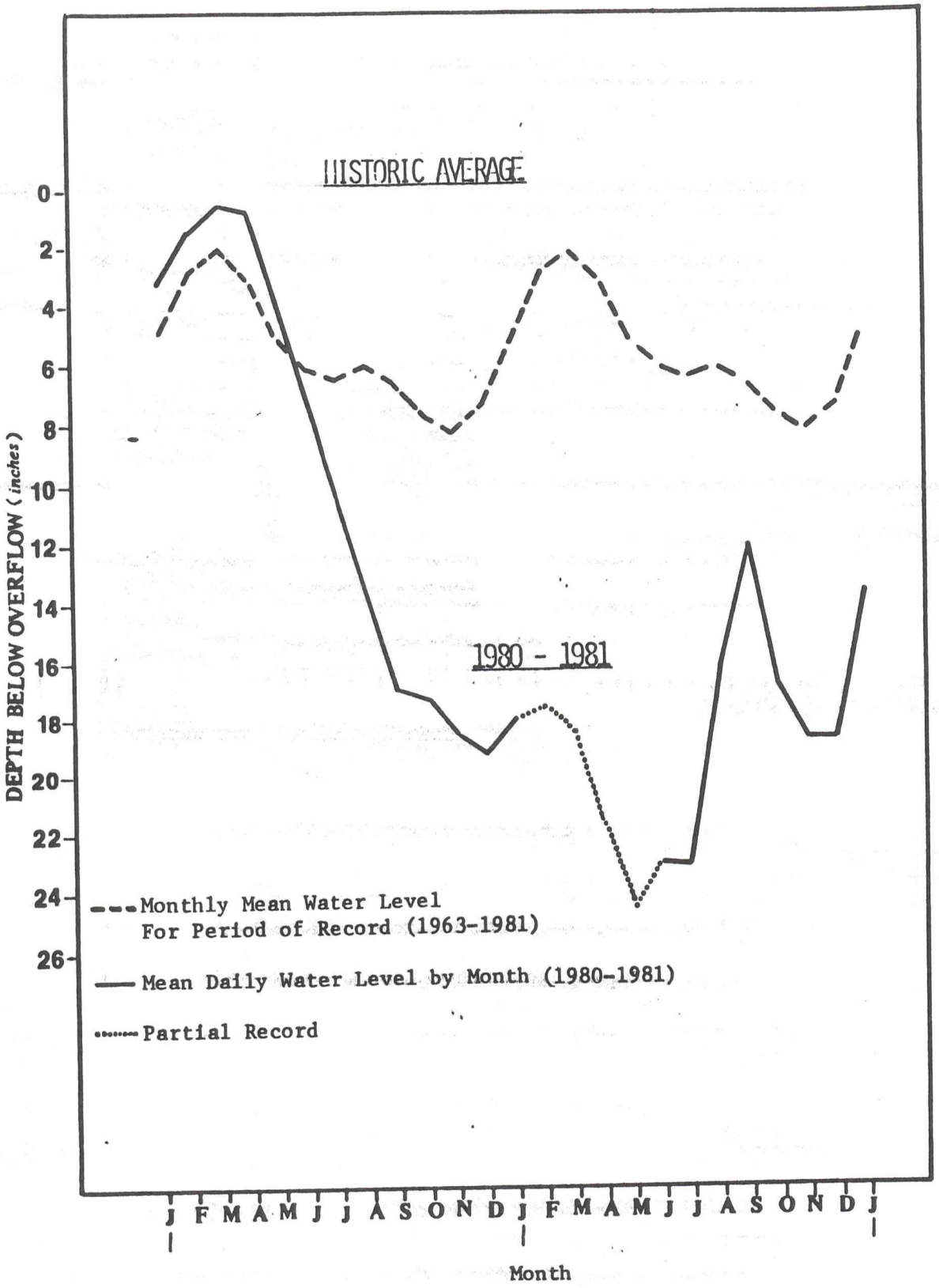

Figure 2 - White Lake Water Level, January 1980-January 1982

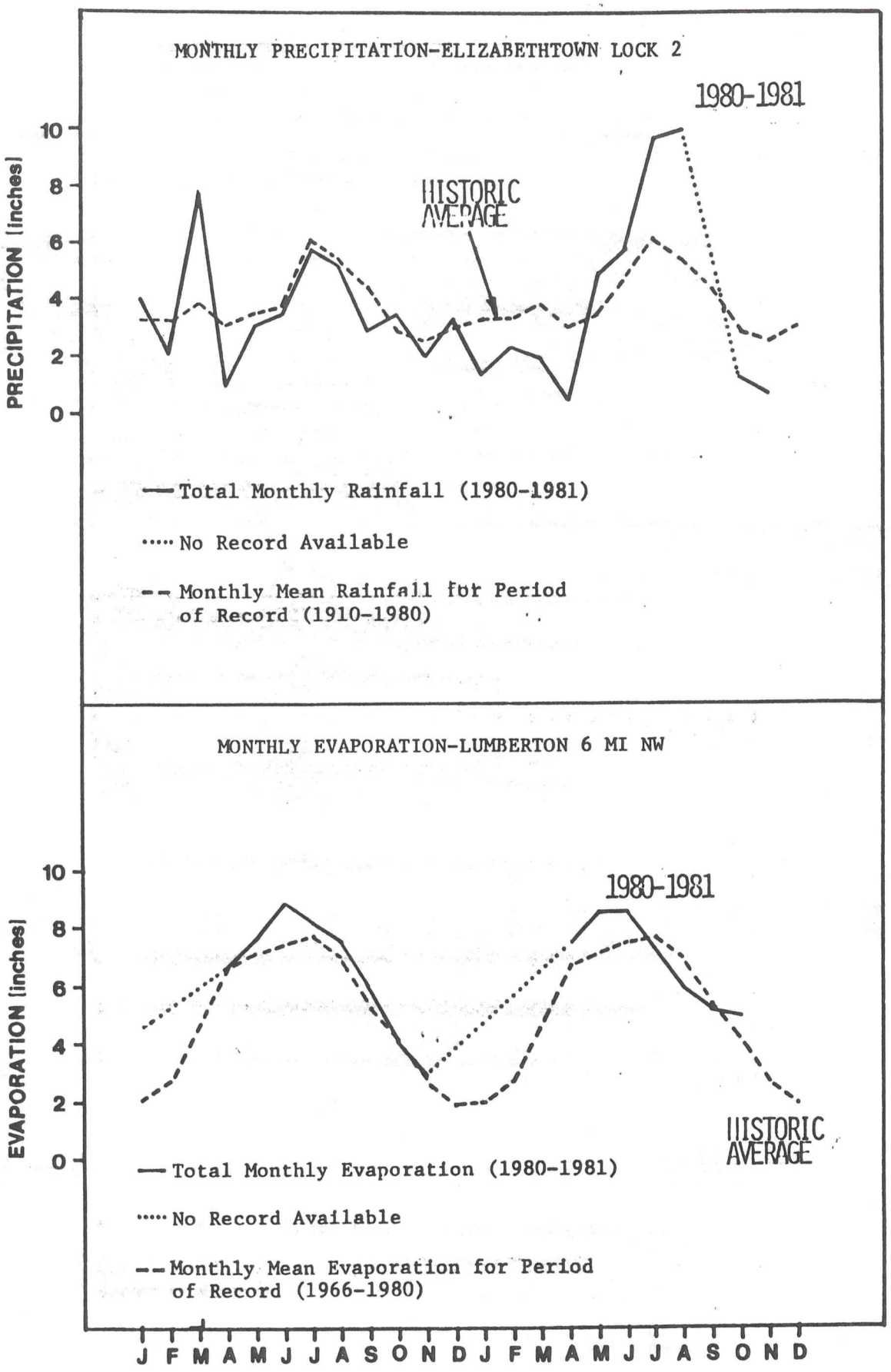

Figure 3 - Precipitation and Evaporation Records in the Vicinity of White Lake

Based on the field survey and research into available hydrologic records, the conclusion was reached that the water level declines at White Lake in 1980-81 were the result of natural variations in weather patterns and that Lake levels can be expected to return to "normal" when normal rainfall patterns return. The culverts, ditches, and drains in the vicinity of the Lake were investigated and not found to be contributing to lowered water levels.

March 18, 1982