

## **BISCAYNE AQUIFER**

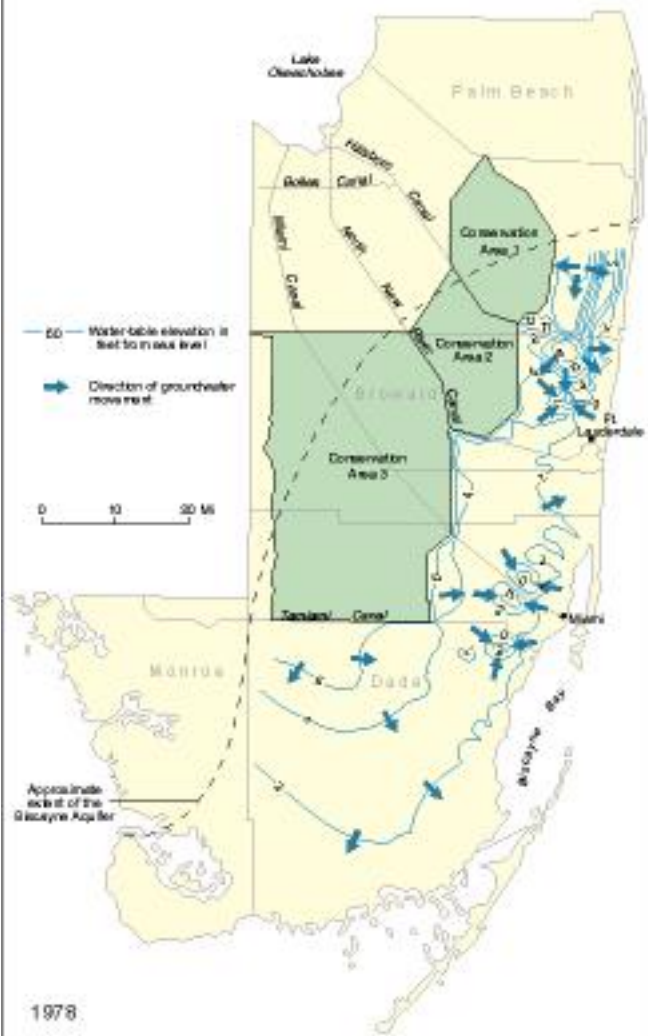
The Biscayne aquifer underlies almost all of Dade and Broward counties and small parts of Palm Beach and Monroe counties. It also extends beneath Biscayne Bay and under the near shore of the Atlantic Ocean, where its highly permeable sediments contain saltwater. The Biscayne aquifer is the sole source of drinking water for over 3 million people in southern Florida. The Biscayne aquifer is wedge-shaped and ranges in thickness from 20 feet on its western edge, to more than 300 feet toward the coast in parts of coastal Broward and Palm Beach counties. The aquifer consists of highly permeable interbedded limestone and sandstone. These highly permeable rocks are covered in most places only by a thin veneer of porous soil. Accordingly, water levels in the aquifer rise rapidly in response to rainfall. The high permeability of the Biscayne aquifer is created largely by extensive dissolution of the carbonate minerals that comprise the limestone units. The thickest and most extensive geologic unit in the Biscayne aquifer is the Fort Thompson Formation. Other units that comprise the aquifer include the Anastasia Formation, Key Largo Limestone, Miami Limestone, and Pamlico Sand.

Before development in southern Florida, a large proportion of the abundant precipitation that fell on the flat, low-lying interior land during the wet season drained southward to the Gulf of Mexico and Florida Bay. Most of this drainage was in the form of wide, shallow sheets of water that moved sluggishly southward. This drainage was a major source of recharge to the Biscayne aquifer. Since the early 1900s, well fields, canals, control structures, levees, and conservation areas have substantially altered natural flow patterns of both surface water and groundwater.

Today, shallow, southward-moving surface water still provides some recharge to the Biscayne aquifer in addition to rain that falls directly on the aquifer. Where the Biscayne aquifer is exposed at the land surface or is covered by only a thin veneer of soil, the slowly moving surface water that passes over the aquifer is able to readily percolate downward into the aquifer. The general movement of water in the Biscayne aquifer is seaward. Water levels are highest near water conservation areas and lowest near the coast. The closed depressions in the water table in eastern Broward and Dade counties are caused by pumpage from major well fields. Withdrawal of large volumes of groundwater has reversed the natural eastward flow pattern of groundwater to westward and has increased the possibility of saltwater intrusion from Biscayne Bay and the Atlantic Ocean.

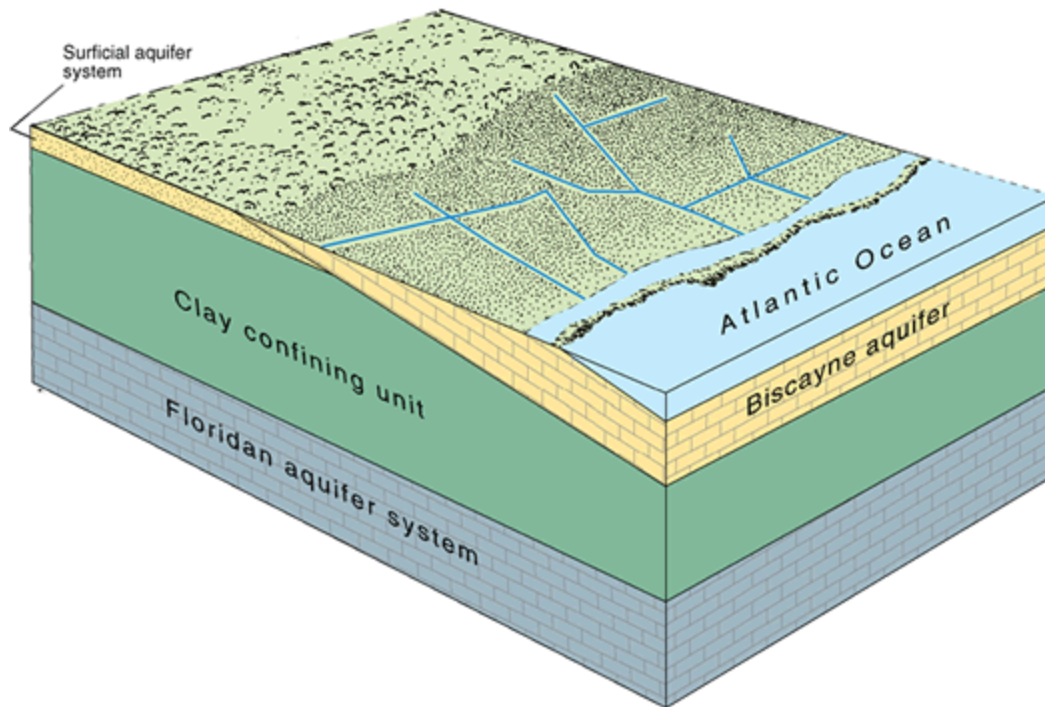
Canals have been used extensively for drainage and flood control and have lowered groundwater levels and altered groundwater flow patterns in southeast Florida. Levees were also constructed, first to prevent flooding from Lake Okeechobee, and later to impound excess water in three large water conservation areas for later release. A system of canals, levees, control structures, pumping stations and water conservation (storage) areas are used to manage the water resources of southern Florida. The goals of this system are to conserve freshwater, provide flood control, and minimize saltwater encroachment. Saltwater encroachment has long been a concern in southeastern Florida. The installation of canal control structures combined with the impoundment of water in the conservation areas have stabilized the saltwater-freshwater interface near the coast and at the entrances to major canals.

# Water-Table Level and Flow Biscayne Aquifer



# Sequence of Aquifers

## Southeastern Florida



### Study Questions

1. Why is the Biscayne Aquifer so very important to certain people of Florida?
2. Define permeable.
3. The Biscayne Aquifer is highly permeable and has historically been subject to rising water levels from rainfall. Since 1900 the water level of the aquifer has fallen. Why has this happened and what has happened to aquifer flow?
4. Why have canal control structures been built in southeastern Florida?
5. Why do you think Dade County (Miami) is interested in some of the larger springs way up in the western panhandle of Florida?