

where extensive ditching and drainage canals have routed waters eastward into the estuary. These waters probably were part of the St. Johns marsh and flowed northward and westward, forming part of the headwaters of the St. Johns River.

Brooks (1981) describes the physiography of the basin as part of the eastern flatwoods district, consisting of five distinct sub-districts that originated during the late Pleistocene. Generally, the basin is a series of well drained ridges interspersed with relic inlets and terraces. The extreme coast is dominated by offshore barrier islands perched on top of middle and late Pleistocene coquina and sand shell ridges. Where the basin is widest, drainage canals have increased the basin's western limits to include areas of poorly drained flatwoods and organic soils of the St. Johns Marsh.

#### Driving Energies of the Estuary

The estuary is a complex system whose main driving energies come from both the sea and land (see Figure 2). From seaward come the driving forces of wind, waves, and tides that continually shape and reshape the coastal beach and dunes systems; the most energy intensive of Florida's ecological systems. The never ending surf and tidal cycles and the ever changing winds buffet the seaward edge of the dune causing less than ideal conditions for life. The vegetation that colonizes and lives on the dune has adapted to life in a very harsh environment. Sometimes considered fragile, the plants that have adapted to these conditions are actually quite hardy. However, stabilization of the high energy coastline is a demanding role that leaves little excess energy to cope with additional stress. As a consequence, a small amount of additional stress is usually all it takes to begin the processes of decline, ending in their erosion from winds, waves or tides.

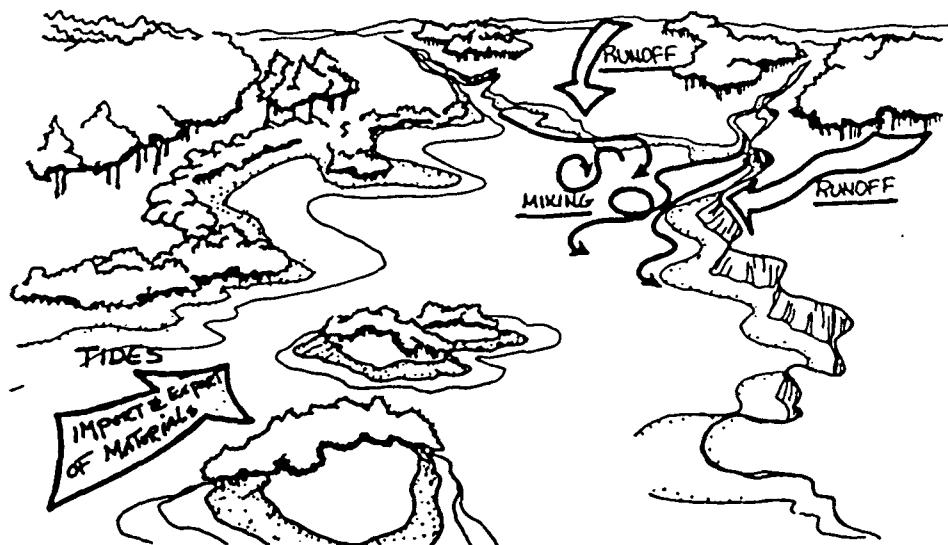


Figure 2. The estuary is a complex ecological system whose most important sources of energy are the flushing by tidal cycles, and the inflow of nutrient laden runoff from the landscape.