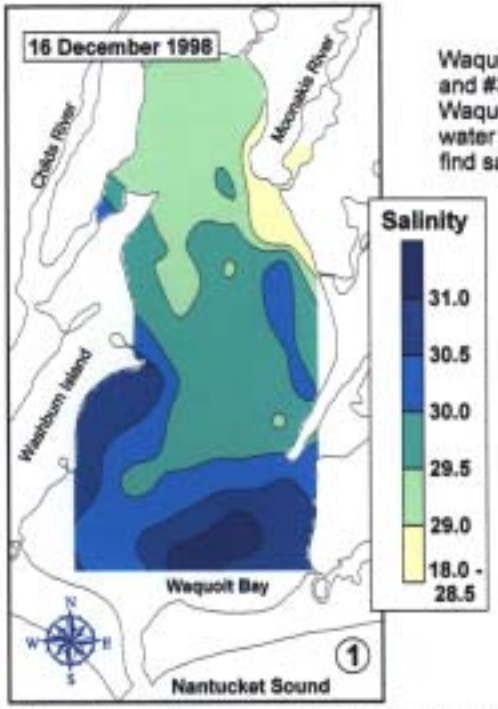
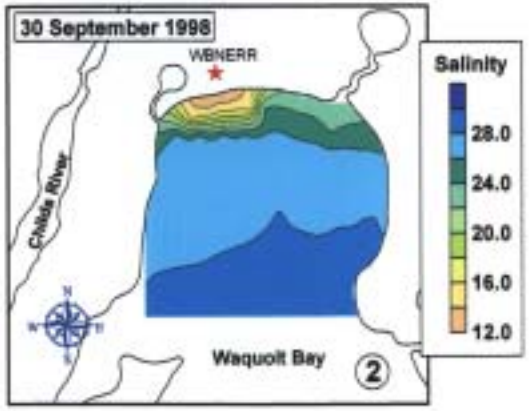
Groundwater Flow Research at Waquoit Bay

Waquoit Bay is an estuary - a place where saltwater mixes with fresh. In this case, water from Nantucket Sound (darker blue colors in #1, #2 and #3) mixes with fresh water (pale yellow) from the Moonakis River and groundwater springs, like the one near the headquarters of the Waquoit Bay National Estuarine Research Reserve or WBNERR (#2). One expects to find a general trend that ranges from salty, high salinity water in the southern end to the lower salinity, brackish waters (pale greens) in the northern end (#1 and #2). It is a surprise, then, when scientists find saltwater entering the bay from the north (3). An unexpected phenomenon is at play here and researchers are working to unravel its mystery.



Although daily patterns depend on the vagaries of wind and tide, salinity in Waquoit Bay is higher in its southern end, near Nantucket Sound, and lower (brackish) in its northern end.



An array of test wells (pipes) have been driven in a pattern that runs from the base of the bluff near WBNERR Headquarters across the beach and out into the bay (#4). Scientists draw water from the pipes to study the mixing of salt and fresh water here. They also use devices buried in the bay's bottom (#5) to measure the flow rates of freshwater (and saltwater!) entering the bay. What they learn here will help them better understand the principles and dynamics involved when subterranean groundwater enters the sea.