WHAT DO YOU MEAN BY MEAN HIGH TIDE? THE PUBLIC TRUST DOCTRINE IN RHODE ISLAND

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INTRODUCTION

The Rhode Island State Constitution guarantees shoreline privileges that include but are not limited to fishing from the shore, collecting seaweed, leaving the shore to swim in the ocean and passing along the shore (Article I, Section 17). Traditionally the "seaweed line" has been interpreted as the boundary between private property and public trust lands. This boundary has been one that is clearly visible on the beach and, except at high tide, affords the people the shoreline privileges that are specified in the Constitution. On wave dominated shorelines, the position of the "seaweed line", or the last high tide swash line (LHTS), is dependent on the wave climate as much or more than tidal phase. Tide coordinated aerial surveys and in-field delineation of the water line in shoreline mapping surveys reinforced the concept of including wave dynamics in demarcating an interpreted MHW line.

BACKGROUND

In 1979, a group of people were arrested in Westerly, RI during a beach clean up. The individuals were clearly seaward of the LHTS line but were landward of a staked line that the littoral property owner claimed marked mean high water. The staked line was under water at the time of the arrest. In the ensuing case, *State v. Ibbison,* 448 A.2d 728 (1982), the Rhode Island Supreme Court ruled that the boundary between private property and public trust lands was the mean high tide line (MHW) defined as the intersection of the plane of mean high water with the shore. The plane of mean high tide was defined as the average of all high water elevations observed over an 18.6 year period or Tidal Epoch. Although the court correctly defined MHW and the methods used to determine the MHW line, the court attributed the discrepancy between the LHTS line on the beach and the staked MHW line to the tidal phase, implying that the LHTS line would be landward of the MHW line half the time and seaward half the time. The decision was based on the ruling in *Borax Consolidated Ltd. v. City of Los Angeles* 296 U.S. 10, 22-23, 56 S. Ct. 23, 29 (citing *Attorney General v. Chambers,* citations omitted). In *Borax,* the mean high water line was used to define the ownership of tidelands on Morman Island in the inner Los Angeles Harbor. The island was in a protected area, where wave energy was reduced. The wave dominated Westerly beach in Ibbison, was a very different coastal environment. The *Ibbison* ruling failed to consider all factors that influence the movement of water onto the shore.

METHODS

In order to determine the relationship between the mean high water line and the last high tide swash line a long term record was needed. The University of Rhode Island Department of Geosciences, under the direction of Dr. Jon Boothroyd, has been measuring the beach profile at Cha-EZ in Charlestown, RI since 1977. Profilers use a modified version of the Emory

Method (Rosenberg, 1985; Boothroyd, 1986) which allows rapid data collection, with little in the way of high tech equipment. The profiles are measured weekly and data is used to examine shoreline dynamics, to quantify beach volume changes and to study long term trends (Blais, 1986; Graves, 1990; Harwood, 1993). Data records include time the profile was taken, wave height, wind speed and direction, and, sometimes but not always, details such as the location of the last high tide swash line and the current swash line where the profilers hit the water.

The distance of the LHTS and MHW line from the profile datum was calculated for the 19 year Tidal Epoch between 1983 and 2001. A total of 716 profiles recorded both the LHTS and the MHW. The number of profiles per year ranged from 16 to 59, averaging 38 profiles per year. Tide elevations from the Newport, RI tide station were downloaded from the NOAA CO-OPS website (www.co-ops.nos.noaa.gov). The annual mean high water elevations were compared with the average tide heights of the high tide immediately preceding each beach profile. This was done to determine if the data set was selecting for stormy days or if it represented average conditions. A subset of profiles (569) taken during years where the average annual high tide level was less than 0.03 m (0.10 ft) difference in elevation from the average tide heights occurring prior to the profile reading was also analyzed.

RESULTS

There was considerable variability in the distance from datum (0 meters) and the MHW line in the different profiles. This distance was dependent on the amount of erosion or accretion along the shoreline (Figure 1). Average annual distances from datum to the MHW line ranged from a low of 62.35 meters in 1991, the year when the RI coast was hit by Hurricane Bob and the Perfect Storm, to a high of 84.02 meters in a relatively calm year. Figures 2 and 3 illustrate the variability for both the MHW and LHTS lines over the course of a year. In 1983 (Figure 2), the annual MHW level at Newport was approximately equal to the average elevations of the tides occurring prior to profile recording (1.190 m MLLW and 1.193 m MLLW). Two erosion events were documented in the profiles (41 and 46). The year 2000 (Figure 3) was a non-stormy year, as noted by the stable shoreline. The inter-annual migration of the MHW line was less than ten meters. There was more variability in the location of the LHTS than the MHW line in 2000, but it was considerably less than in 1983. For much of the year the distance between the MWH and LHTS lines was consistently 19-20 meters. Tide levels at the Newport Tide Gage were 0.027 m higher than the average of tides occurring before profiling.

The same uniformity is seen when comparing the average annual distance between the MHW and LHTS lines over the 1983-2001 Tidal Epoch. The distance averages 19.91 meters for all profiles and 19.23 meters when selecting for years when the difference between the average annual MHW and the mean of tides prior to profile recording is less than 0.03 m (0.10 ft). The distance between the two measures was lowest in the three years within the Tidal Epoch when the annual MHW was lowest, suggesting some tidal influence. However, wave dynamics are more significant than tides for delineating lands under the daily ebb and flow of the sea on ocean fronting shorelines.

MANAGEMENT IMPLICATIONS

Tensions between the private property owners and the public beach users seem to escalate with the rise in coastal property values. In an attempt to balance the needs of the private property owners with the public, the Rhode Island Supreme Court applied scientific principles to define public trust land boundaries without fully understanding coastal dynamics. Long term beach profile data demonstrates that the MHW line is not the appropriate measure for determining the boundary between public trust lands and private property on the wave dominated shorelines of Rhode Island. The LHTS line is never seaward of the MHW line. At the Cha-EZ profile, the MHW line averaged 19-20 meters seaward of the LHTS lines. This measure is probably typical for the RI south shore. Using this measure the shoreline privileges that are guaranteed in the RI State Constitution would be limited to only a few hours a day.

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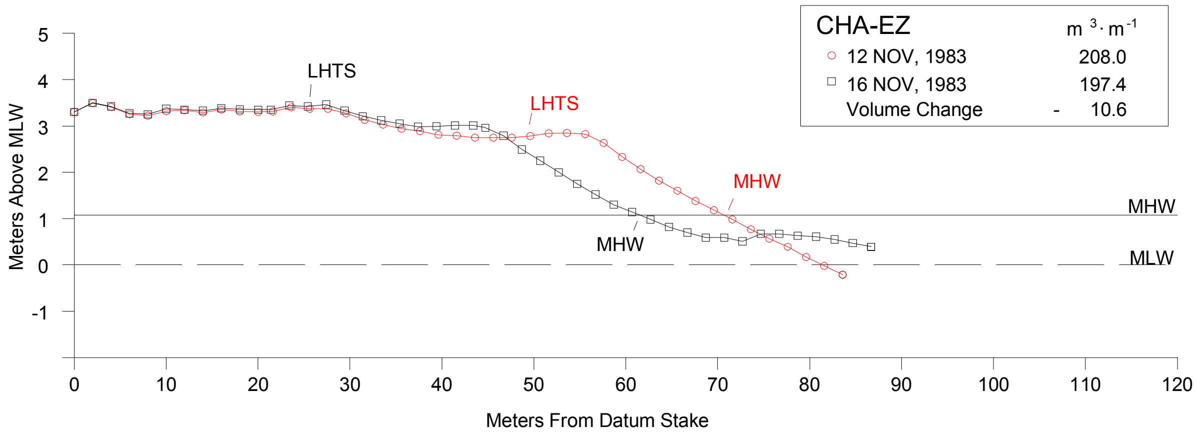


Figure 1. Cha-EZ pre- and post-storm beach profiles show the landward migration of the mean high water line (MHW) after the storm. The position of the last high tide swash line (LHTS) is dependant on wave height and the beach profile.

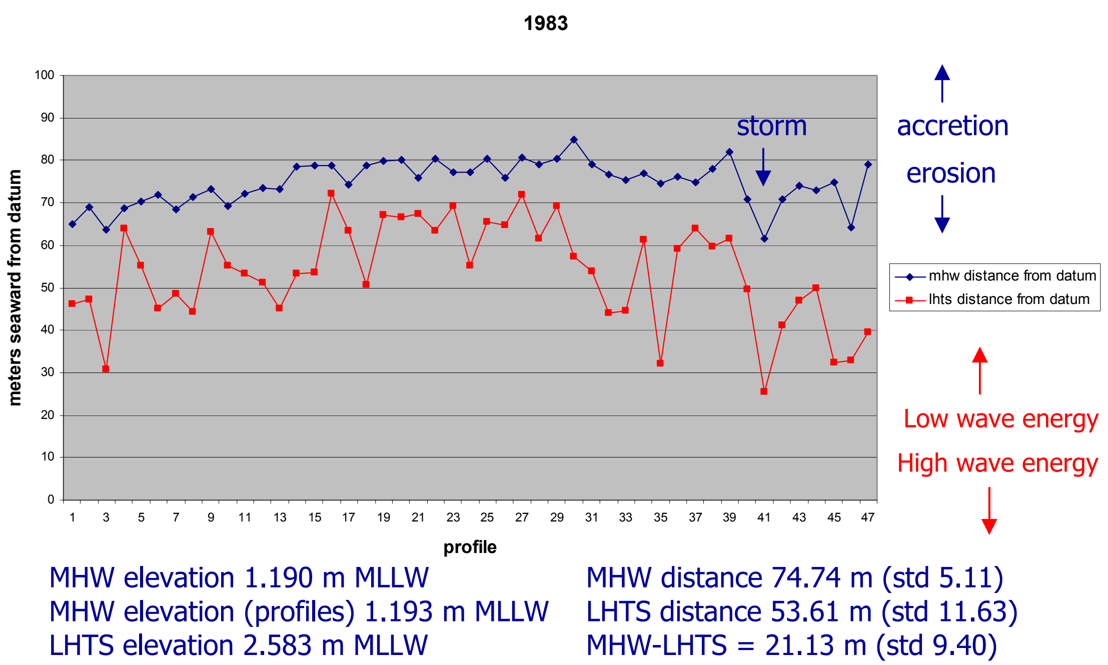
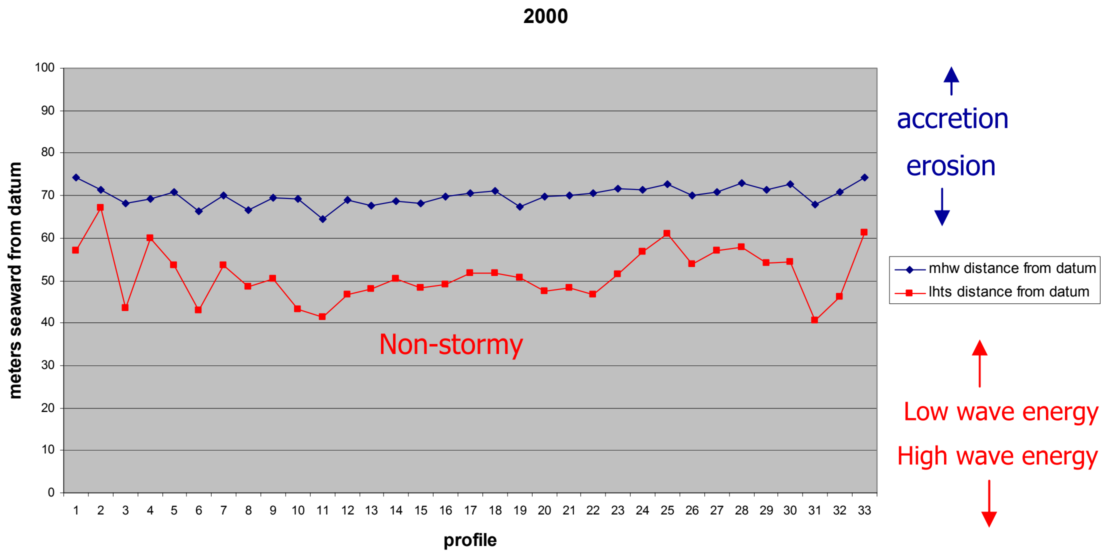


Figure 2. The distance of the LHTS and MHW lines seaward from the profile datum is influenced by the shape of the shoreline and the amount of wave energy. Variability in the position of the MHW line and the LHTS line is due to erosion and accretion. Variability in the position of the LHTS line is also dependent on wave energy.



MHW elevation 1.186 m MLLW
MHW elevation (profiles) 1.159 m MLLW
LHTS elevation 2.600 m MLLW

MHW distance 69.95 m (std 2.18)
LHTS distance 51.34 m (std 6.09)
MHW-LHTS = 18.60 m (std 4.81)

Figure 3. In non-stormy years there is less variability in the position of the MHW line and the LHTS line. The LHTS line is still meters landward of the MHW line.

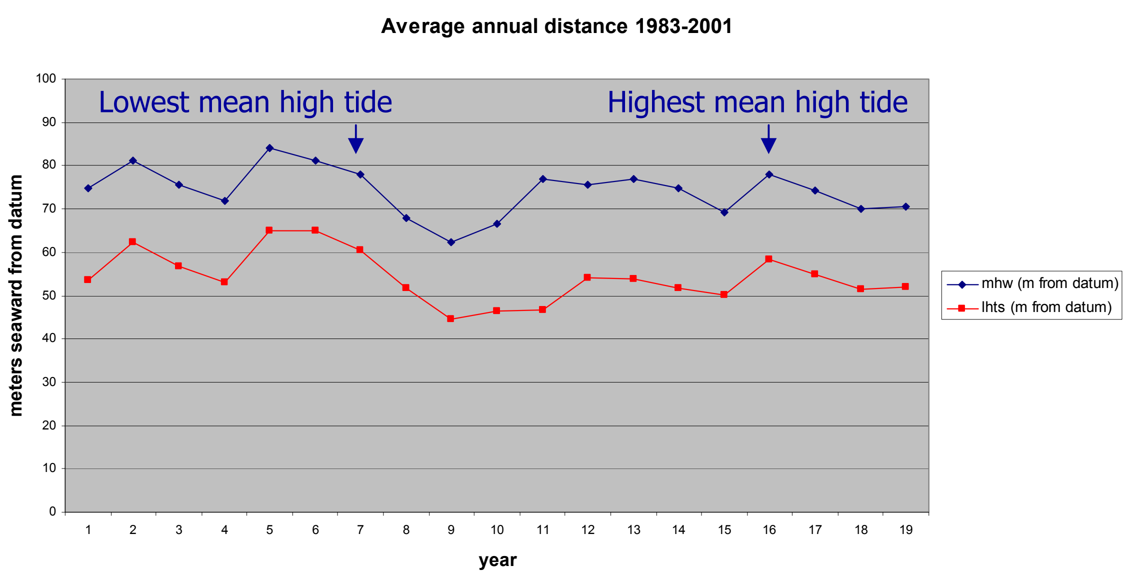


Figure 4. The average annual distance between the MHW line and the LHTS line is consistent over time. The MHW line intersected the shoreline at approximately the same location for the years with the lowest annual mean high tide level and the highest mean high tide level within the Tidal Epoch.