

**Base Location:** Horn Island, Gulf Islands National Seashore, Mississippi  
**Installation Date:** 07-11-2008  
**Day of Year:** 193  
**Site Name:** WHRN  
**Installation Crew:** U.S. Geological Survey  
**Location:**

Latitude	30° 14' 33.48079 N	NAD83 CORS96
Longitude	88° 46' 00.81143 W	NAD83 CORS96
Ellipsoid Height (m)	-26.430	NAD83 CORS96
Geoid03	-27.841	GEOID03
Orthometric Height (m)	1.417	NAVD88

**Position Determined:**

All static occupation sessions were post-processed using the National Geodetic Service (NGS) Online Positioning User Service (OPUS). All sessions were averaged and erroneous values or poor occupation sessions were removed from the average. The ellipsoid height value is the weighted average of all inclusive occupation sessions, meaning the longer sessions hold more weight than shorter sessions. The GEOID03 value was calculated using the NGS GEOID03 tool. The orthometric height here is calculated using the equation  $O=E-G$ .

**Installation Crew:** USGS

**Installation Materials:**

Aluminum  $\frac{3}{4}$ - inch diameter spiral tip (Berntsen International, Inc.)  
Aluminum  $\frac{3}{4}$  -inch diameter x 3-foot-long aluminum rods with threads (Berntsen International, Inc.)  
3-inch aluminum cap inscribed U.S. Geological Survey (Berntsen International, Inc.)

**Installation Summary:**

Survey mark is driven 12 feet into the sediment via sledgehammer and capped with a 3-inch aluminum cap. The rod is approximately 12 inches above the sediment and flagged with orange survey tape. The elevated cap will help preserve the benchmark from burial in the short term. Rapid burial may be caused by eolian sediment transport and (or) storm-related deposits (fig. A7).

**Reason for Installation:**

There was a need for a benchmark on Horn Island to provide 15-kilometer radial coverage for differential GPS control during nearshore bathymetric surveys. This benchmark would overlap the 15-kilometer radial coverage provided by NGS PID BH1894 atop Fort Massachusetts as well as extend GPS coverage farther east.

**Location:** West end of Horn Island, on sound (north) side. Figures A1 through A5 are provided as guidance for benchmark location.



Figure 1. Overview showing location of WHRN benchmark. Imagery downloaded from ESRI.

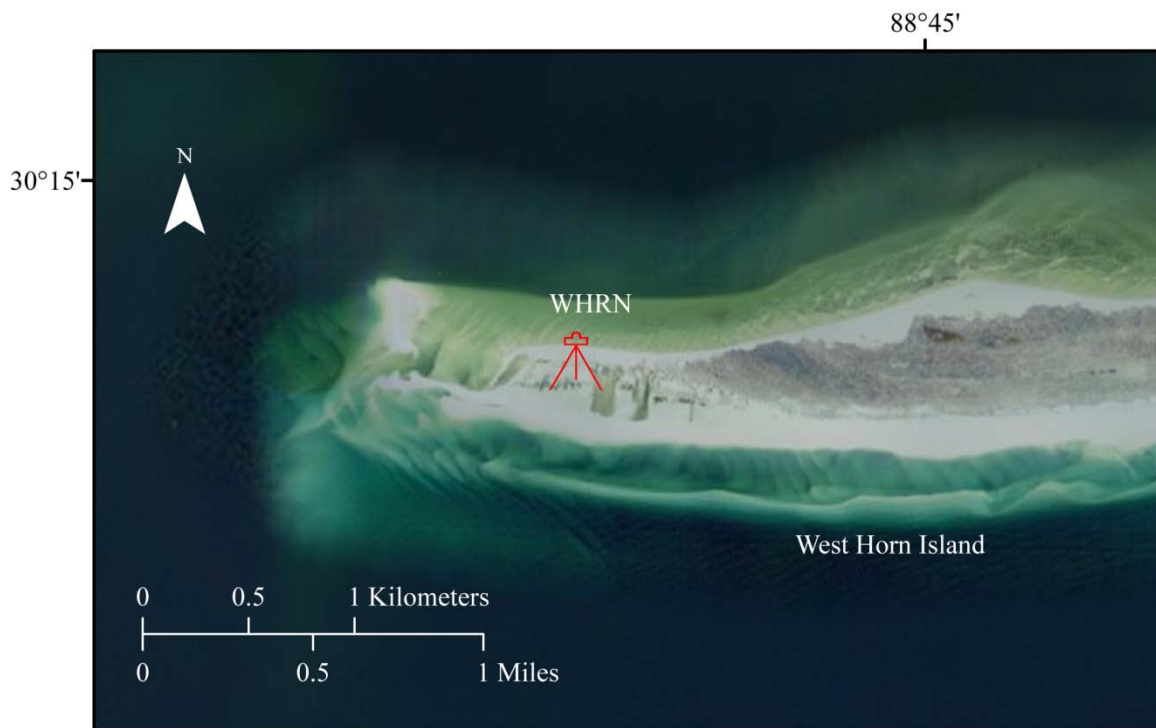


Figure 2. Closer approach of the aerial view of WHRN benchmark. Satellite imagery downloaded from ESRI.

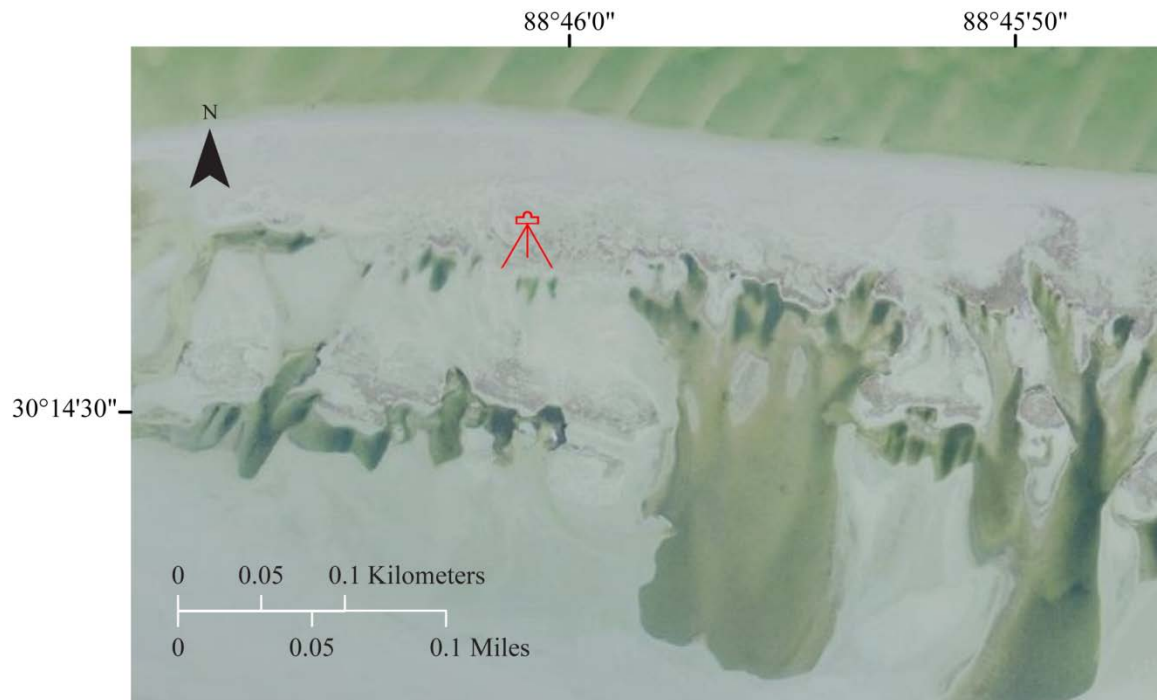


Figure 3. Aerial view of WHRN benchmark location showing detailed topography and shallow water bodies adjacent to the location. Satellite imagery downloaded from ESRI.



Figure 4. USGS oblique aerial photograph taken in 2007 showing detailed vegetative cover and approximate location of WHRN benchmark, as indicated by the arrow.



Figure 5. WHRN benchmark location as seen when approaching from a boat, sound (north) side of the island.



Figure 6. WHRN benchmark. The view is looking south.



Figure 7. Photograph of the WHRN elevated benchmark cap.