

**Using Tidal Data to Determine Highest Measured Tide (HMT)**  
**Oregon Department of State Lands**  
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**Introduction to Tidal Data**

The National Oceanic and Atmospheric Administration's National Ocean Service (NOAA NOS) maintains a network of tidal stations and tidal benchmarks along the Oregon coast. Because of their primarily nautical application, the water level data collected at NOAA NOS stations are referenced to tidal datums or 'zero marks.' For example, Mean Lower Low Water (MLLW) is a tidal datum that represents the average of the lowest of the two daily low tides. Tidal datums are specific to a location. Tidal data are grouped in time segments called tidal epochs to account for sea-level changes over time, and new tidal datums are derived for each epoch. The current epoch is 1983-2001.

The elevations used on most topographic maps, bridge plans, floodplain maps, and development plans are referenced to a fixed vertical datum. Unlike tidal datums, which are specific to a location, a fixed datum is a reference level surface that has a constant elevation over a large geographical area. Because topographic surveys use a different datum or zero mark, a tidal elevation from a station or benchmark Highest Measured Tide cannot be directly projected onto a topographic survey. The tidal elevations first need to be converted to the appropriate topographic or vertical datum (e.g., NAVD88, NGVD29).

The North American Vertical Datum of 1988 (NAVD 88) is the vertical control datum established for vertical control surveying in the United States of America based upon the General Adjustment of the North American Datum of 1988. The NAVD 88 was established in 1991 by observations in Canada, the United States, and Mexico. It held fixed the height of the primary tidal benchmark, referenced to the International Great Lakes Datum of 1985 local mean sea level height value, at Rimouski, Quebec, Canada. The NAVD 88 replaced the National Geodetic Vertical Datum of 1929 (NGVD 29).

**Retrieving Tidal Data**

Tidal data for Oregon can be retrieved at The National Oceanic and Atmospheric Administration's National Ocean Service (NOAA NOS) [Web site](#). Enter the city or zip code of the project where it says "Find a NOS station" in the upper left hand corner of the Web page. Tidal data for a specific parcel or city is likely not available due to a lack of widespread tidal elevation data for locations within each estuary. Nevertheless, this query will produce a list of data products for a nearby station to your city or zip code. Click on 'Datums.' This will generate a list of elevations referenced to the individual station's datum, or in other words, an arbitrary zero mark. The Highest Measured Tide elevation is the value in the 'Maximum' or 'Highest water level recorded on station datum' row. To convert this elevation of highest water to other zero marks such as MLLW or NAVD88, subtract the corresponding elevation from the Maximum value.

In addition to the NOAA NOS website, the 1989 document [Heads of Tide for Coastal Streams in Oregon](#) (has a table of highest measured tide elevations starting on page 85 under the column heading 'highest water'. These elevations are referenced to a historical fixed datum 'NGVD47' and superceded tidal epoch (1960-1978), but include data from historical stations not readily available through the NOAA NOS Web site.

*Table 1, Compilation of HMT Data*, provides a list of all HMT data from the aforementioned resources. The data are referenced to the tidal datum (MLLW) derived for each station and to the fixed geodetic datum NAVD88.

### **Converting Between Different Fixed Datums**

To convert HMT referenced to NGVD29 datum to HMT referenced to NAVD88 datum, use an online tool called [VERTCON](#). By entering the elevation, the reference datum, and location in latitude and longitude, the tool will convert the elevation into the desired fixed datum.

Table 1, Compilation of HMT Data

Station Name	Station ID	Latitude	Longitude	HMT_MLLW	HMT_NAVD	HMT Source
Chetco River - Brookings	9430104	42.043	-124.285	10.0	10.06	DSL
Rogue River - Wedderburn	9431027	42.43	-124.412	10.0	10.22	DSL
Port Orford , OR	9431647	42.739	-124.498	12.49	11.00	NOAA
Coquille River- Bandon	9432373	43.12	-124.413	10.5	10.40	DSL
Charleston , OR	9432780	43.345	-124.322	11.18	10.68	NOAA
Coos Bay - Entrance	9432784	43.348	-124.322	10.5	10.42	DSL
Coos Bay - Empire	9432864	43.392	-124.28	10.0	10.26	DSL
Umpqua River- Winchester Bay	9433446	43.682	-124.177	10.0	10.19	DSL
Umpqua River - Reedsport	9433501	43.708	-124.098	10.5	11.04	DSL
Siuslaw River - Florence	9434032	43.967	-124.103	10.5	10.40	DSL
Siuslaw River -Cushman	9434068	43.985	-124.045	10.5	10.45	DSL
Siuslaw River -Tiernan	9434126	44.015	-123.935	10.5	10.29	DSL
Siuslaw River -Entrance	9434132	44.017	-124.13	10.5	not available	DSL
Siuslaw River-Mapleton	9434148	44.027	-123.853	11.0	not available	DSL
DRIFT CREEK, ALSEA RIVER , OR	9434938	44.4133	-123.99	10.73	not available	NOAA
Alsea Bay - Waldport	9434939	44.435	-124.058	12.0	12.00	DSL
Yaquina - Yaquina Bay	9435328	44.603	-124.01	11.5	not available	DSL
South Beach , OR	9435380	44.625	-124.043	12.25	11.51	NOAA
DEPOE BAY , OR	9435827	44.81	-124.058	12.22	11.59	NOAA
Siletz Bay-Kernville	9436031	44.897	-124	10.0	not available	DSL
Siletz Bay-Taft	9436101	44.927	-124.013	10.5	11.41	DSL
Tillamook - Tillamook Bay (Hoquarten Slough)	9437331	45.46	-123.845	10.5	11.93	DSL
Tillamook Bay-Bay City	9437473	45.522	-123.898	11.0	11.51	DSL
Garibaldi , OR	9437540	45.5545	-123.919	11.96	not available	NOAA
Tillamook Bay-Barview	9437581	45.568	-123.943	12.0	12.08	DSL
Nehalem River-Brighton	9437815	45.67	-123.925	12.5	12.47	DSL
Nehalem River-Wheeler	9437858	45.688	-123.893	11.5	11.49	DSL
Nehalem River-Nehalem	9437908	45.71	-123.89	11.0	11.95	DSL
Necanicum River-Seaside	9438478	46	-123.922	10.0	12.80	DSL
FORT STEVENS , OR	9439008	46.2067	-123.95	12.0	12.06	DSL
HAMMOND NMFS PIER , OR	9439011	46.2017	-123.945	11.31	11.34	NOAA
Columbia River (Port Docks)-Astoria	9439023	46.187	-123.86	12.0	12.47	DSL
ASTORIA, YOUNGS BAY , OR	9439026	46.1717	-123.842	12	11.90	DSL
Astoria , OR	9439040	46.2073	-123.768	12.37	12.58	NOAA
Columbia River-Settler Point	9439054	46.175	-123.678	12.0	12.68	DSL

NOAA Data retrieved from NOAA NOS website 07/21/10. Tidal Epoch 1983-2001

Heads of tide for coastal streams in Oregon

DSL data (Tidal Epoch 1960-1978) from DSL's Heads of Tide in Coastal Streams document and converted to NAVD88 using NOAA's Vertcon tool.