Appendix X Terminal Tidal Information

Appendix X describes the means, methods and sources for developing Exhibit 330-11 Terminal Tidal Datums and Exhibit 330-12 Design Tidal Ranges. Additional information is found in the following tables and graphics.

Terminal Tidal Datums were developed from two sources:

1. North American Vertical Datum of 1988 (NAVD 88) values were determined from survey data provided by the WSDOT GeoMetrix Geodetic Survey Office in 2013 and tabulated in Exhibit 340-3 and illustrated in Appendix Z.
2. Mean High Water (MHW) and Mean Higher High Water (MHHW) values were calculated using NOAA's VDatum 3.2 program using bridge seat coordinates established for the 2013 survey for each terminal as listed in Exhibit 340-3.

Design Tidal Ranges were developed by the following steps:

1. For each terminal, the appropriate NOAA Reference Station was determined. For all terminals, except Friday Harbor, either Port Townsend or Seattle is the Reference Station. Friday Harbor, Port Townsend and Seattle are each their own Reference Station.
2. Based on the past 17 years of NOAA tidal data, Low and High Reference Water Levels for the three Reference Stations were calculated for a 75-year return period using a Log-Pearson Type III Analysis.
3. Height offset factors were tabulated for each terminal based on NOAA Tide Prediction Tables. These factors were used to convert the minimum and maximum Reference Water Level for each NOAA Reference Station to the NOAA Subordinate Station at or near each terminal. The appropriate height offset factor for each NOAA Subordinate Station was applied to the Reference Water Levels to get the Minimum and Maximum Design Water Levels.
4. The Estimated Projected Medium Change in Sea Level from the WSDOT Climate Impacts Vulnerability Assessment Report Appendix A was determined to be 13 inches at the year 2100. This 13-inch Sea Level Rise (SLR) was added to only the Maximum Design Water Level.

APPENDIX X: TERMINAL TIDAL INFORMATION
TERMINAL TIDAL DATUMS

TERMINAL	NORTHING (FEET)	EASTING (FEET)	LONGITUDE	LATITUDE	ELEVATION (FEET)			
					MLLW	NAVD 88	MHW	MHHW
ANACORTES	555,118.591	1,193,345.946	-122 40 39.89973	48 30 25.59002	0.00	0.55	7.31	8.05
BAINBRIDGE ISLAND	231,594.001	1,227,009.972	-122 30 35.43267	47 37 21.21008	0.00	2.51	10.50	11.31
BREMERTON	210,152.600	1,198,069.985	-122 37 30.49696	47 33 43.21549	0.00	2.50	10.86	11.74
CLINTON	359,334.347	1,269,055.959	-122 20 58.50264	47 58 30.24625	0.00	2.05	10.23	11.10
COUPEVILLE	428,258.521	1,191,534.484	-122 40 21.76856	48 09 27.40000	0.00	1.12	7.78	8.59
EDMONDS	300,486.626	1,259,178.327	-122 23 06.21164	47 48 47.64105	0.00	2.05	10.07	10.93
FAUNTLEROY	194,761.325	1,254,308.356	-122 23 46.09482	47 31 23.44583	0.00	2.43	10.67	11.55
FRIDAY HARBOR	567,584.984	1,112,106.527	-123 00 51.10937	48 32 07.60201	0.00	0.49	7.08	7.72
KINGSTON	294,447.798	1,232,044.946	-122 29 41.75869	47 47 42.46505	0.00	2.05	10.14	10.99
LOPEZ	579,546.063	1,144,138.170	-122 53 00.06277	48 34 14.27481	0.00	0.52	7.11	7.82
MUKILTEO	349,711.970	1,279,904.395	-122 18 16.38255	47 56 57.37809	0.00	2.06	10.19	11.05
ORCAS	589,759.042	1,129,780.997	-122 56 37.62261	48 35 51.18770	0.00	0.58	7.17	7.88
POINT DEFIANCE	116,178.976	1,223,430.655	-122 30 50.87590	47 18 21.64154	0.00	2.49	11.06	11.94
PORT TOWNSEND	411,277.068	1,169,980.504	-122 45 33.32613	48 06 40.87547	0.00	1.11	7.86	8.55
SEATTLE	223,419.724	1,268,887.331	-122 20 21.88875	47 36 09.09811	0.00	2.33	10.49	11.36
SHAW	584,895.599	1,133,024.810	-122 55 47.41215	48 35 04.08944	0.00	0.52	7.14	7.84
SOUTHWORTH	191,480.176	1,229,538.675	-122 29 45.87608	47 30 45.94736	0.00	2.51	10.69	11.58
TAHLEQUAH	125,719.268	1,225,240.566	-122 30 27.63234	47 19 56.16433	0.00	2.49	11.01	11.89
VASHON	190,530.458	1,237,485.872	-122 27 49.84015	47 30 38.25451	0.00	2.53	10.66	11.53

ALL ELEVATIONS IN FEET

ALL NAVD 88 ELEVATIONS FROM WSDOT GEOMETRIX OFFICE SURVEY OF TERMINAL BRIDGE SEAT ELEVATIONS. SEE EXHIBIT 340-3 AND APPENDIX Z.

ALL OTHER DATUMS (MLLW, MHW AND MHHW) FROM NOAA VDATUM V3.2
- HORIZONTAL DATUM: NAD83(2011/2007/CORS96HARN) - NORTH AMERICA
- COORDINATE SYSTEM: GEOGRAPHIC (LONGITUDE AND LATITUDE)
- LONGITUDE AND LATITUDE IN DDD MM SS.SSSSS
- SOURCE VERTICAL DATUM: MLLW
- TARGET VERTICAL DATUMS: MHW AND MHHW
- UNIT: FOOT (INTERNATIONAL)

ASCII FILE CONVERSION SETTINGS (TO CREATE BATCH FILE OUTPUT)
- FILE NAME: TERMINALS.TXT
- DELIMITER COMMA
- LON/EAST/Y 1
- LAT/NORTH/X 2
- HEIGHT/Z 3
- SKIP (LINES) 0
- OUTPUT FILE NAME: VDATUM RESULTS.TXT

COUPEVILLE LATITUDE ADJUSTED FROM TERMINAL COORDINATES BY 6.22" SOUTHWARD TO YIELD VALID TIDAL DATUM TRANSFORMATIONS. COORDINATES AT THE BRIDGE SEAT ARE TOO FAR INLAND FROM THE NATURAL COASTLINE (I.E., OUTSIDE OF THE TIDAL TRANSFORMATION GRID).

APPENDIX X: TERMINAL VDATUM RESULTS

INPUT

```
TERMINAL,LONGITUDE,LATITUDE,MLLW
ANACORTES,-122 40 39.89973,48 30 25.59002,0.00
BAINBRIDGE ISLAND,-122 30 35.43267,47 37 21.21008,0.00
BREMERTON,-122 37 30.49696,47 33 43.21549,0.00
CLINTON,-122 20 58.50264,47 58 30.24625,0.00
COUPEVILLE,-122 40 21.76856,48 09 27.40000,0.00
EDMONDS,-122 23 06.21164,47 48 47.64105,0.00
FAUNTLEROY,-122 23 46.09482,47 31 23.44583,0.00
FRIDAY HARBOR,-123 00 51.10937,48 32 07.60201,0.00
KINGSTON,-122 29 41.75869,47 47 42.46505,0.00
LOPEZ,-122 53 00.06277,48 34 14.27481,0.00
MUKILTEO,-122 18 16.38255,47 56 57.37809,0.00
ORCAS,-122 56 37.62261,48 35 51.18770,0.00
POINT DEFIANCE,-122 30 50.87590,47 18 21.64154,0.00
PORT TOWNSEND,-122 45 33.32613,48 06 40.87547,0.00
SEATTLE,-122 20 21.88875,47 36 09.09811,0.00
SHAW,-122 55 47.41215,48 35 04.08944,0.00
SOUTHWORTH,-122 29 45.87608,47 30 45.94736,0.00
TAHLEQUAH,-122 30 27.63234,47 19 56.16433,0.00
VASHON,-122 27 49.84015,47 30 38.25451,0.00
```

OUTPUT

```
TERMINAL,MHW
ANACORTES,-7.3069
BAINBRIDGE ISLAND,-10.5018
BREMERTON,-10.8596
CLINTON,-10.2339
COUPEVILLE,-7.7820
EDMONDS,-10.0674
FAUNTLEROY,-10.6694
FRIDAY HARBOR,-7.0837
KINGSTON,-10.1395
LOPEZ,-7.1102
MUKILTEO,-10.1931
ORCAS,-7.1702
POINT DEFIANCE,-11.0578
PORT TOWNSEND,-7.8649
SEATTLE,-10.4928
SHAW,-7.1445
SOUTHWORTH,-10.6942
TAHLEQUAH,-11.0105
VASHON,-10.6594

TERMINAL,MHHW
ANACORTES,-8.0470
BAINBRIDGE ISLAND,-11.3113
BREMERTON,-11.7388
CLINTON,-11.0973
COUPEVILLE,-8.5892
EDMONDS,-10.9331
FAUNTLEROY,-11.5450
FRIDAY HARBOR,-7.7182
KINGSTON,,-10.9895
LOPEZ,-7.8169
MUKILTEO,-11.0522
ORCAS,-7.8769
POINT DEFIANCE,-11.9372
PORT TOWNSEND,-8.5539
SEATTLE,-11.3589
SHAW,-7.8385
SOUTHWORTH,-11.5785
TAHLEQUAH,-11.8898
VASHON,-11.5289
```

VDatum results.txt

APPENDIX X: TERMINAL TIDAL INFORMATION
DESIGN TIDAL RANGES

TERMINAL	NOAA REFERENCE STATION	REFERENCE WATER LEVEL		HEIGHT OFFSET FACTOR		SLR	DESIGN TIDAL RANGE		
		MIN	MAX	LOW	HIGH		MIN	MAX	W/ SLR
ANACORTES	PORT TOWNSEND	-4.36	11.60	1.00	0.94	1.08	-4.36	10.90	11.98
BAINBRIDGE ISLAND	SEATTLE	-4.88	14.60	1.02	1.00	1.08	-4.98	14.60	15.68
BREMERTON	SEATTLE	-4.88	14.60	1.00	1.04	1.08	-4.88	15.18	16.26
CLINTON	SEATTLE	-4.88	14.60	0.99	0.97	1.08	-4.83	14.16	15.24
COUPEVILLE	PORT TOWNSEND	-4.36	11.60	-0.10	0.00	1.08	-4.46	11.60	12.68
EDMONDS	SEATTLE	-4.88	14.60	0.99	0.96	1.08	-4.83	14.02	15.10
FAUNTLEROY	SEATTLE	-4.88	14.60	1.01	1.02	1.08	-4.93	14.89	15.97
FRIDAY HARBOR	FRIDAY HARBOR	-4.09	10.90	1.00	1.00	1.08	-4.09	10.90	11.98
KINGSTON	SEATTLE	-4.88	14.60	1.00	0.97	1.08	-4.88	14.16	15.24
LOPEZ	PORT TOWNSEND	-4.36	11.60	0.93	0.93	1.08	-4.05	10.79	11.87
MUKILTEO	SEATTLE	-4.88	14.60	0.99	0.97	1.08	-4.83	14.16	15.24
ORCAS	PORT TOWNSEND	-4.36	11.60	0.90	0.90	1.08	-3.92	10.44	11.52
POINT DEFIANCE	SEATTLE	-4.88	14.60	1.01	1.05	1.08	-4.93	15.33	16.41
PORT TOWNSEND	PORT TOWNSEND	-4.36	11.60	1.00	1.00	1.08	-4.36	11.60	12.68
SEATTLE	SEATTLE	-4.88	14.60	1.00	1.00	1.08	-4.88	14.60	15.68
SHAW	PORT TOWNSEND	-4.36	11.60	0.99	0.90	1.08	-4.32	10.44	11.52
SOUTHWORTH	SEATTLE	-4.88	14.60	0.99	1.02	1.08	-4.83	14.89	15.97
TAHLEQUAH	SEATTLE	-4.88	14.60	1.01	1.05	1.08	-4.93	15.33	16.41
VASHON	SEATTLE	-4.88	14.60	1.01	1.02	1.08	-4.93	14.89	15.97

ALL WATER LEVELS ARE IN FEET

REFERENCE WATER LEVELS FROM 17 YEARS OF VERIFIED LOW AND HIGH TIDE DATA

NOAA REFERENCE STATION	75-YEAR RETURN PERIOD	
	LOW	HIGH
FRIDAY HARBOR	-4.09	10.90
PORT TOWNSEND	-4.36	11.60
SEATTLE	-4.88	14.60

HEIGHT OFFSET FACTORS FROM NOAA TIDE PREDICTION TABLES

SEA LEVEL RISE (SLR) FROM CLIMATE IMPACTS VULNERABILITY ASSESSMENT REPORT (APPENDIX A), WSDOT, NOVEMBER 2011

PROJECTED MEDIUM CHANGE IN WA SEA LEVEL IN 2050: 6 INCHES
PROJECTED MEDIUM CHANGE IN WA SEA LEVEL IN 2100: 13 INCHES
FOR SEA LEVEL RISE USE: **13** INCHES

SEA LEVEL RISE ADDED TO MAX WATER LEVEL ONLY

ALL DESIGN TIDAL RANGES = REFERENCE WATER LEVEL X HEIGHT OFFSET FACTOR EXCEPT
COUPEVILLE DESIGN TIDAL RANGE = REFERENCE WATER LEVEL + HEIGHT OFFSET FACTOR

WSF Tidal Data.xlsx
APP X DESIGN TIDAL RANGES
8/7/2013

Reference Water Levels

The Log-Pearson Type III Distribution was used to calculate the return periods for the below reference tidal stations. This statistical analysis is often used to calculate river stream flow return periods to estimate the frequency of flooding. However for this application it was used to determine return periods for tidal levels.

In order to account for tidal anomalies, such as storm surges, actual verified data from NOAA was used for analysis instead of predicted tidal data. Predicted tidal data is derived from a fixed multivariable equation and does not take into account atmospheric weather conditions which can significantly affect actual tide levels.

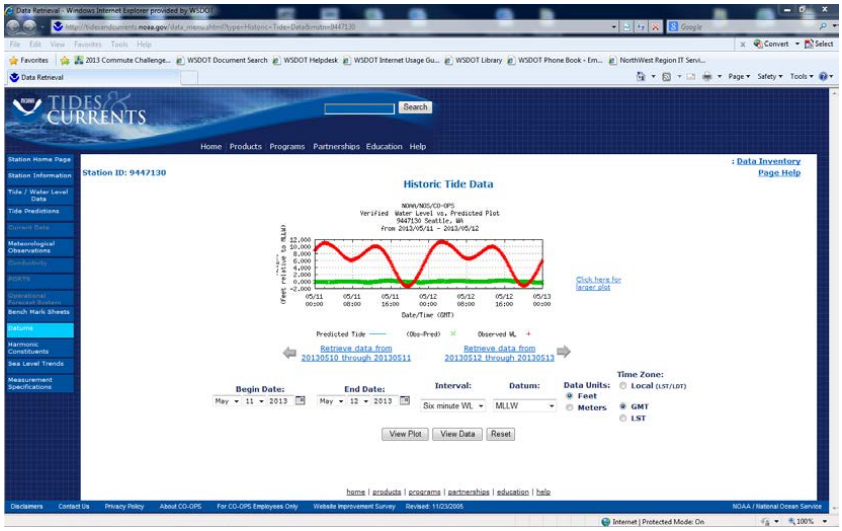
Data Acquisition and Analysis

1. Visit NOAA's website using the following links to the NOAA Reference Stations:

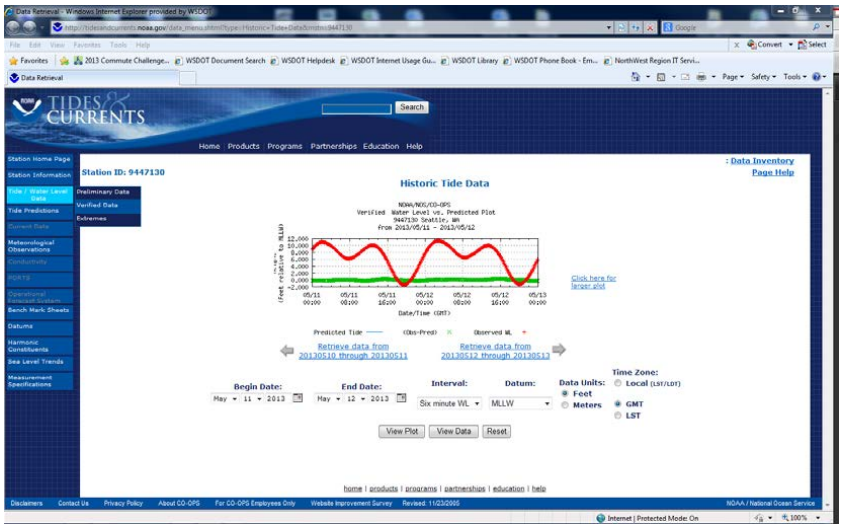
    a. Friday Harbor:
    http://tidesandcurrents.noaa.gov/data_menu.shtml?stn=9449880 Friday Harbor, WA&type=Historic+Tide+Data

    b. Port Townsend:
    http://tidesandcurrents.noaa.gov/data_menu.shtml?type=Historic+Tide+Data&mstn=9444900

    c. Seattle:
    http://tidesandcurrents.noaa.gov/data_menu.shtml?type=Historic+Tide+Data&mstn=9447130

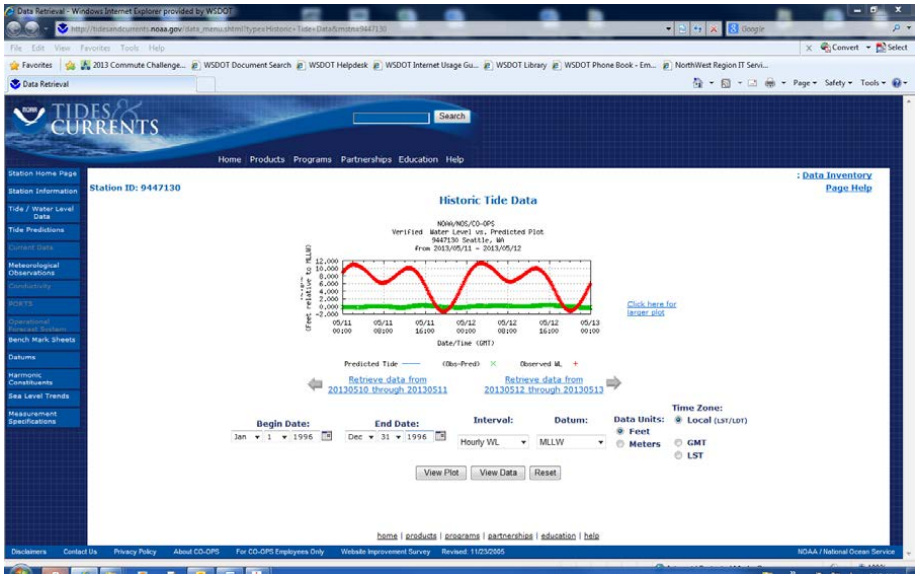


2. Click on **"Tide / Water Level Data"** on the left and select **"Verified Data"**

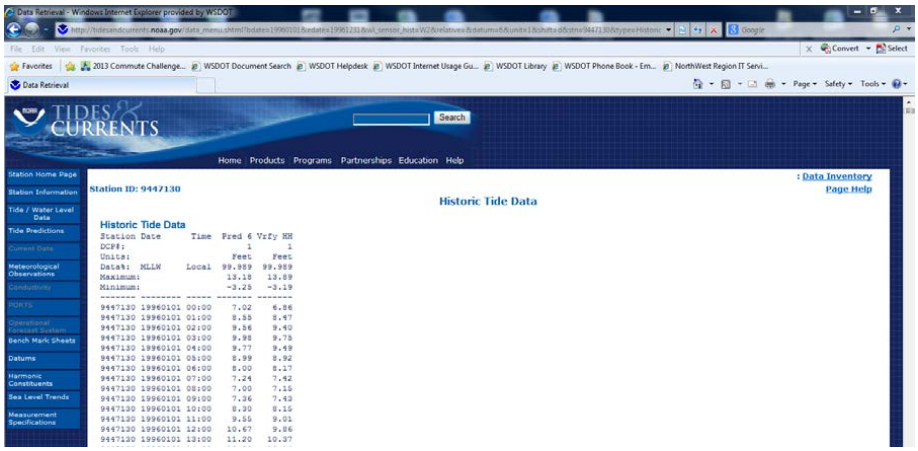


3. As an example, input the following settings

Begin Date = **Jan 1, 2012**
End Date = **Dec 31, 2012**
Interval = **Hourly WL**
Datum = **MLLW**
Data Units = **Feet**
Time Zone = **Local (LST/LDT)**
Note: NOAA's website allows data output for 1 year only using the "Hourly WL" setting. Therefore data can only be downloaded 1 year at a time. Alternatively, data may be ordered from NOAA at a cost of $50 for the first year and $5 for each additional year.



4. Click on **"View Data"** and copy/paste all data below the "Historic Tide Data" header to an Excel file. (Only "year" and the "verified tidal data" will be required for the analysis)



5. Repeat Steps 3 and 4 until you have all the data required (Must have data in whole year increments). Use the "Text to Columns" function in MS Excel to covert the single column text data into a table. The total number of "whole" years gathered will equal "n." For example, if you collected 25 years of data, n=25.

6. Summarize your data by the Mean, Max, and Min tidal values for each year captured.

	A	B	C	D
1	**Seattle, WA**			
2	Station ID: 9447130			
3	Historic Tide Data			
4				
5		Seattle		
6	Year	Mean	Max	Min
7	1996	6.66	13.89	-3.19
8	1997	6.87	14.01	-3.23
9	1998	6.83	13.78	-3.12
10	1999	6.64	13.17	-4.27
11	2000	6.57	12.83	-3.82
12	2001	6.52	13.10	-3.88
13	2002	6.61	13.53	-3.39
14	2003	6.74	14.22	-4.14
15	2004	6.68	13.07	-4.13
16	2005	6.71	14.07	-4.07
17	2006	6.80	13.93	-3.76
18	2007	6.60	13.68	-4.58
19	2008	6.56	13.47	-4.32
20	2009	6.57	13.36	-4.57
21	2010	6.80	13.90	-3.65
22	2011	6.68	13.58	-3.95
23	2012	6.80	14.47	-3.67

7. Copy the year and Max tidal (T_{max}) values into a new table and rank the tidal values from high to low (see columns A, B, and C below).

	A	B	C	D	E	F
4	**Step 7**			**Step 8**	**Step 9**	**Step 10**
5		Verified	Max Tide (T_{max})			
6	Rank	Year	MLLW (ft)	log T_{max}	$(\log T_{max} - \text{avg}(\log T_{max}))^2$	$(\log T_{max} - \text{avg}(\log T_{max}))^3$
7	1	2012	14.47	1.1605E+00	6.5214E-04	1.6654E-05
8	2	2003	14.22	1.1529E+00	3.2285E-04	5.8011E-06
9	3	2005	14.07	1.1483E+00	1.7856E-04	2.3860E-06
10	4	1997	14.01	1.1464E+00	1.3240E-04	1.5235E-06
11	5	2006	13.93	1.1440E+00	8.1354E-05	7.3379E-07
12	6	2010	13.9	1.1430E+00	6.5340E-05	5.2817E-07
13	7	1996	13.89	1.1427E+00	6.0385E-05	4.6924E-07
14	8	1998	13.78	1.1392E+00	1.8643E-05	8.0496E-08
15	9	2007	13.68	1.1361E+00	1.3332E-06	1.5394E-09
16	10	2011	13.58	1.1329E+00	4.1278E-06	-8.3863E-09
17	11	2002	13.53	1.1313E+00	1.3203E-05	-4.7977E-08
18	12	2008	13.47	1.1294E+00	3.0957E-05	-1.7224E-07
19	13	2009	13.36	1.1258E+00	8.3266E-05	-7.5980E-07
20	14	1999	13.17	1.1196E+00	2.3549E-04	-3.6138E-06
21	15	2001	13.1	1.1173E+00	3.1188E-04	-5.5079E-06
22	16	2004	13.07	1.1163E+00	3.4804E-04	-6.4930E-06
23	17	2000	12.83	1.1082E+00	7.1315E-04	-1.9044E-05
24			**Average**	**Average**	**Sum**	**Sum**
25			**13.651**	**1.135**	**0.003253**	**-0.000007**

8. Calculate the Log of each ranked tidal value in column D and average all the Log tidal values at the bottom of column D.

9. In column E, subtract the average log tide value calculated in step 8 from each ranked log tide value. Sum all the squared differences at the bottom of column E.

10. In column F, repeat step 9 but cube each difference. Sum all the cubed differences at the bottom of column F.

11. Calculate the **Variance** by dividing the sum of the values calculated in step 9 (cell E25) by the total number of data years collected minus 1.

$$\frac{\sum_1^n (logT_{max} - avg(logT_{max}))^2}{n-1}$$

Variable Definitions:

σ = standard deviation
C_s = Skew Coefficient
n = number of years analyzed
T_{max} = Max Tide Data

	A	B	C	D	E	F
4	**Step 7**			**Step 8**	**Step 9**	**Step 10**
5		Verified	Max Tide (T_{max})			
6	Rank	Year	MLLW (ft)	log T_{max}	(log T_{max}- avg(log T_{max}))^2	(log T_{max}- avg(log T_{max}))^3
7	1	2012	14.47	1.1605E+00	6.5214E-04	1.6654E-05
8	2	2003	14.22	1.1529E+00	3.2285E-04	5.8011E-06
9	3	2005	14.07	1.1483E+00	1.7856E-04	2.3860E-06
10	4	1997	14.01	1.1464E+00	1.3240E-04	1.5235E-06
11	5	2006	13.93	1.1440E+00	8.1354E-05	7.3379E-07
12	6	2010	13.9	1.1430E+00	6.5340E-05	5.2817E-07
13	7	1996	13.89	1.1427E+00	6.0385E-05	4.6924E-07
14	8	1998	13.78	1.1392E+00	1.8643E-05	8.0496E-08
15	9	2007	13.68	1.1361E+00	1.3332E-06	1.5394E-09
16	10	2011	13.58	1.1329E+00	4.1278E-06	-8.3863E-09
17	11	2002	13.53	1.1313E+00	1.3203E-05	-4.7977E-08
18	12	2008	13.47	1.1294E+00	3.0957E-05	-1.7224E-07
19	13	2009	13.36	1.1258E+00	8.3266E-05	-7.5980E-07
20	14	1999	13.17	1.1196E+00	2.3549E-04	-3.6138E-06
21	15	2001	13.1	1.1173E+00	3.1188E-04	-5.5079E-06
22	16	2004	13.07	1.1163E+00	3.4804E-04	-6.4930E-06
23	17	2000	12.83	1.1082E+00	7.1315E-04	-1.9044E-05
24			**Average**	**Average**	**Sum**	**Sum**
25			**13.651**	**1.135**	**0.003253**	**-0.000007**
26						
27						
28	**Step 11**		Variance	0.00020	=$E$25/($B$2-1)	
29	**Step 12**		Standard Deviation	0.01426	=$D$28^0.5	
30	**Step 13**		Skew Coefficient	-0.18250	=($B$2*F25)/(((B$2-1)*($B$2-2)*($D$29^3)))	

12. Calculate the **Standard Deviation** by taking the square root of the value calculated in step 11.

$$\sigma logT_{max} = \sqrt{variance}$$

13. Calculate the Skew Coefficient by using the below formula:

$$C_s = \frac{n \times \sum_1^n (logT_{max} - avg(logT_{max}))^3}{(n-1)(n-2)(\sigma logT_{max})^3}$$

14. Use the frequency factor table (Haan, 1977, Table 7.7) and the skew coefficient to find the k values for the 2, 5, 10, 25, 50, 100, and 200 recurrence intervals. If the calculated skew coefficient is between two given skew coefficients in the Haan frequency factor table, you can linearly interpolate between the two skew coefficients to the get the interpolated k values.

	A	B	C	D	E	F
24			**Average**	**Average**	**Sum**	**Sum**
25			**13.651**	**1.135**	**0.003253**	**-0.000007**
26						
27						
28	**Step 11**		Variance	0.00020	=$E$25/($B$2-1)	
29	**Step 12**		Standard Deviation	0.01426	=$D$28^0.5	
30	**Step 13**		Skew Coefficient	-0.18250	=($B$2*F25)/((($B$2-1)*($B$2-2)*($D$29^3)))	
31						
32						
33				**Step 14**	**Step 15**	
34		-0.2	-0.1	-0.18250		
35	T_r (yr)	K (lower)*	K (upper)*	K (actual)	T_{max} MLLW (ft)	
36	2	0.033	0.017	0.030	13.7	=10^($D$25+D36*$D$29)
37	5	0.850	0.846	0.849	14.0	=10^($D$25+D37*$D$29)
38	10	1.258	1.270	1.260	14.2	=10^($D$25+D38*$D$29)
39	25	1.680	1.716	1.686	14.4	=10^($D$25+D39*$D$29)
40	50	1.945	2.000	1.955	14.5	=10^($D$25+D40*$D$29)
41	100	2.178	2.252	2.191	14.7	=10^($D$25+D41*$D$29)
42	200	2.388	2.482	2.404	14.8	=10^($D$25+D42*$D$29)
43	*75*	*N/A*	*N/A*	*N/A*	*14.60***	
44	*lower and upper K factors for each return period are from Haan's 1977 "K" factor table.					
45	**T_{max} for 75 years was read off the data plots.					

Variable Definitions:

σ = standard deviation
C_s = Skew Coefficient
K= frequency factor
n = number of years analyzed
T_{max} = Max Tide Data
T_r = Return Period

15. Solve for the Max tide using the following formula

$$logT_{max} = avg(logT_{max}) + [K(T_r, C_s)] \times \sigma logT_{max}$$

16. In order to calculate return periods for low tides, Start from step 7 but use the min tidal (T_{min}) data and multiply the values by negative 1 (-1) to remove the negative sign.

17. Repeat Steps 8 through 15.

18. Finally, multiply the calculated return periods for Min tides (T_{min}) by negative 1.

19. See archived Excel files for template and formulas.

Glossary:

The selected definitions are copied from NOAA's "Tide and Current Glossary" published in January 2000.
http://tidesandcurrents.noaa.gov/publications/glossary2.pdf

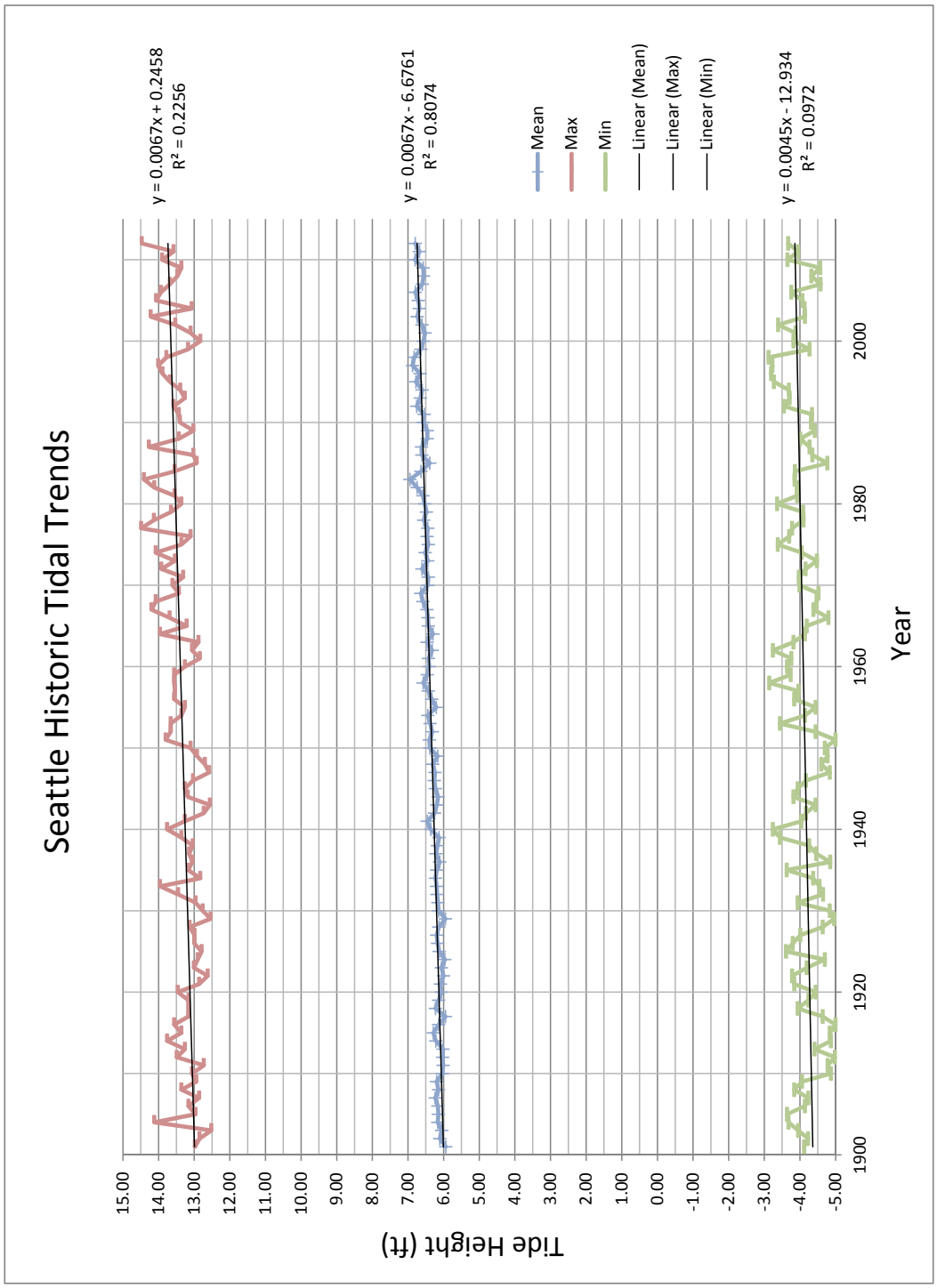
datum (vertical)—For marine applications, a base elevation used as a reference from which to reckon heights or depths. It is called a tidal datum when defined in terms of a certain phase of the tide. Tidal datums are local datums and should not be extended into areas which have differing hydrographic characteristics without substantiating measurements. In order that they may be recovered when needed, such datums are referenced to fixed points known as bench marks. See chart datum.

National Tidal Datum Epoch—The specific 19-year period adopted by the National Ocean Service as the official time segment over which tide observations are taken and reduced to obtain mean values (e.g., mean lower low water, etc.) for tidal datums. It is necessary for standardization because of periodic and apparent secular trends in sea level. The present National Tidal Datum Epoch is 1960 through 1978. It is reviewed annually for possible revision and must be actively considered for revision every 25 years.

North American Vertical Datum of 1988 [NAVD 1988]—A fixed reference for elevations determined by geodetic leveling. The datum was derived from a general adjustment of the first-order terrestrial leveling nets of the United States, Canada, and Mexico. In the adjustment, only the height of the primary tidal bench mark, referenced to the International Great Lakes Datum of 1985 (IGLD 1985) local mean sea level height value, at Father Point, Rimouski, Quebec, Canada was held fixed, thus providing minimum constraint. NAVD 1988 and IGLD 1985 are not identical. However, NAVD 1988 bench mark values are given in Helmert orthometric height units while IGLD 1985 values are in dynamic heights. See International Great Lakes Datum of 1985, National Geodetic Vertical Datum of 1929, and geopotential difference.

mean higher high water (MHHW)—A tidal datum. The average of the higher high water height of each tidal day observed over the National Tidal Datum Epoch. For stations with shorter series, comparison of simultaneous observations with a control tide station is made in order to derive the equivalent datum of the National Tidal Datum Epoch.

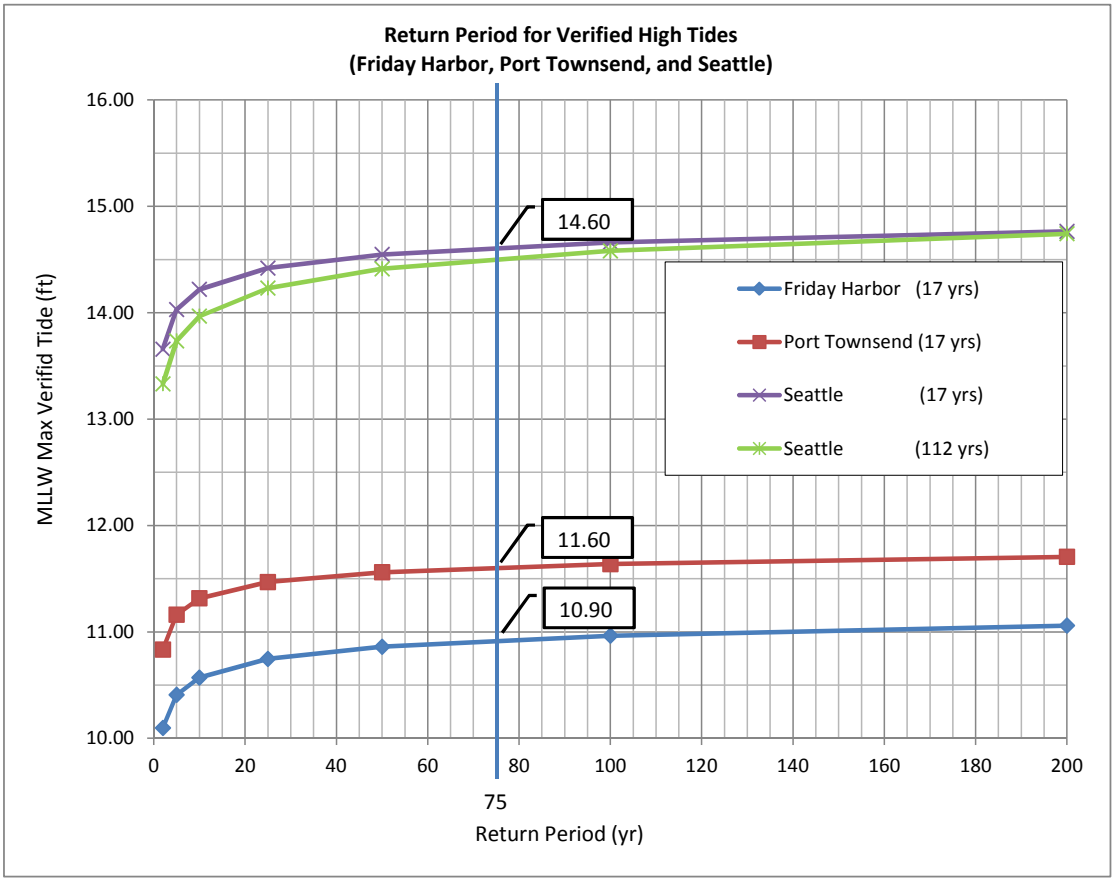
mean lower low water (MLLW)—A tidal datum. The average of the lower low water height of each tidal day observed over the National Tidal Datum Epoch. For stations with shorter series, comparison of simultaneous observations with a control tide station is made in order to derive the equivalent datum of the National Tidal Datum Epoch.


Seattle Historic Tidal Trends
y = 0.0067x + 0.2458
R² = 0.2256
y = 0.0067x - 6.6761
R² = 0.8074
y = 0.0045x - 12.934
R² = 0.0972
Mean
Max
Min
Linear (Mean)
Linear (Max)
Linear (Min)
Tide Height (ft)
15.00
14.00
13.00
12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
1900
1920
1940
1960
1980
2000
Year

Verified High Tide Return Periods using Log-Pearson Type III Analysis

Jun-13

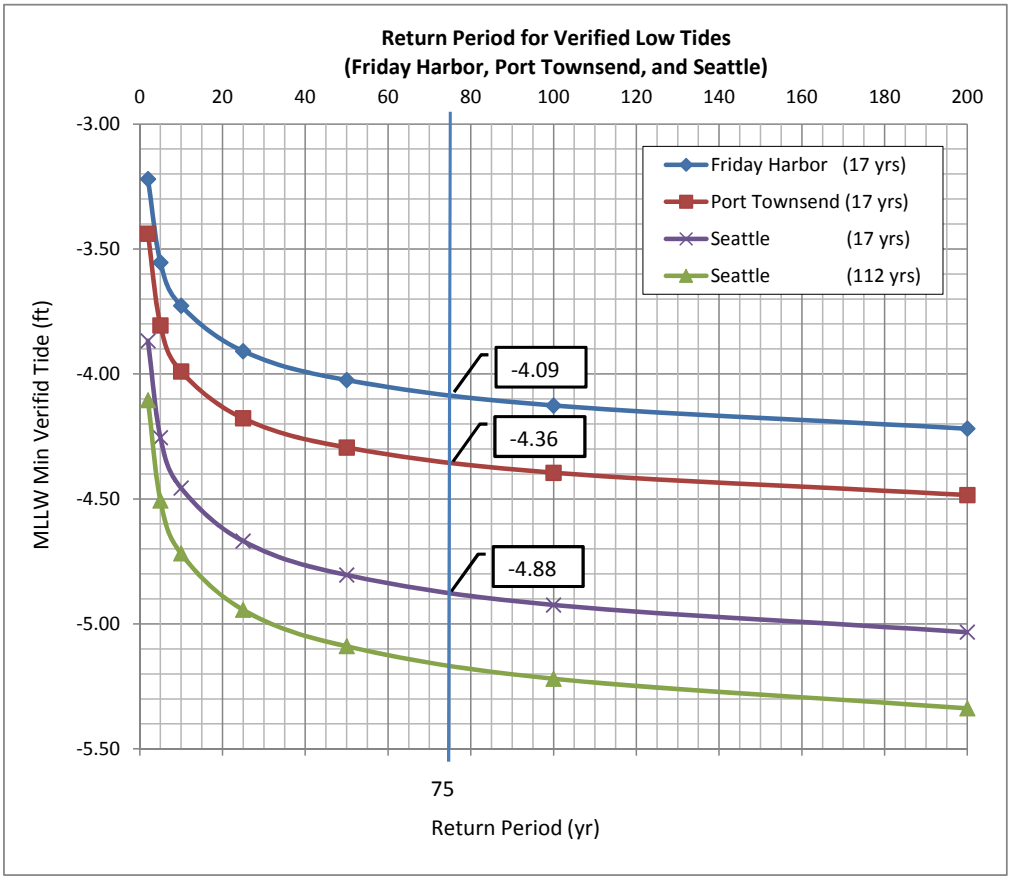
Year	Friday Harbor (17 yrs)	Port Townsend (17 yrs)	Seattle (17 yrs)	Seattle (112 yrs)
2	10.10	10.83	13.66	13.33
5	10.41	11.16	14.03	13.74
10	10.57	11.32	14.22	13.97
25	10.75	11.47	14.42	14.23
50	10.86	11.56	14.55	14.41
100	10.96	11.64	14.66	14.58
200	11.06	11.71	14.76	14.74



Verified Low Tide Return Periods using Log Pearson Type III Analysis

Jun-13

Return Period	Friday Harbor (17 yrs)	Port Townsend (17 yrs)	Seattle (17 yrs)	Seattle (112 yrs)
2	-3.22	-3.44	-3.87	-4.11
5	-3.55	-3.81	-4.26	-4.51
10	-3.73	-3.99	-4.46	-4.72
25	-3.91	-4.18	-4.67	-4.94
50	-4.02	-4.29	-4.80	-5.09
100	-4.13	-4.40	-4.92	-5.22
200	-4.22	-4.48	-5.03	-5.34



Friday Harbor Verified Max

n= 17

Rank	Verified Year	Max Tide (T_{max}) MLLW (ft)	log T_{max}	(log T_{max}- avg(log T_{max}))^2	(log T_{max}- avg(log T_{max}))^3	Return Period T_r=(n+1)/m	Exceedance Probability $1/T_r$
1	2006	10.78	1.0326E+00	8.1603E-04	2.3311E-05	18.0	0.056
2	2005	10.53	1.0224E+00	3.3767E-04	6.2050E-06	9.0	0.111
3	2003	10.51	1.0216E+00	3.0801E-04	5.4056E-06	6.0	0.167
4	2010	10.37	1.0158E+00	1.3750E-04	1.6124E-06	4.5	0.222
5	1997	10.36	1.0154E+00	1.2785E-04	1.4457E-06	3.6	0.278
6	2012	10.35	1.0149E+00	1.1854E-04	1.2907E-06	3.0	0.333
7	2007	10.31	1.0133E+00	8.4752E-05	7.8024E-07	2.6	0.389
8	2008	10.21	1.0090E+00	2.4732E-05	1.2300E-07	2.3	0.444
9	2002	9.98	9.9913E-01	2.4226E-05	-1.1924E-07	2.0	0.500
10	2009	9.98	9.9913E-01	2.4226E-05	-1.1924E-07	1.8	0.556
11	2001	9.96	9.9826E-01	3.3561E-05	-1.9443E-07	1.6	0.611
12	1998	9.94	9.9739E-01	4.4438E-05	-2.9623E-07	1.5	0.667
13	2011	9.94	9.9739E-01	4.4438E-05	-2.9623E-07	1.4	0.722
14	1996	9.78	9.9034E-01	1.8807E-04	-2.5791E-06	1.3	0.778
15	2004	9.62	9.8318E-01	4.3587E-04	-9.0999E-06	1.2	0.833
16	1999	9.61	9.8272E-01	4.5493E-04	-9.7034E-06	1.1	0.889
17	2000	9.47	9.7635E-01	7.6743E-04	-2.1260E-05	1.1	0.944
		Average	**Average**	**Sum**	**Sum**		
		10.100	**1.004**	**0.003972**	**-0.000003**		

Variance	0.00025
Standard Deviation	0.01576
Skew Coefficient	-0.06327

	-0.1	0	-0.06327	
T_r (yr)	K (lower)*	K (upper)*	K (actual)	T_{max} MLLW (ft)
2	0.017	0.000	0.011	10.10
5	0.846	0.842	0.845	10.41
10	1.270	1.282	1.274	10.57
25	1.716	1.751	1.729	10.75
50	2.000	2.054	2.020	10.86
100	2.252	2.326	2.279	10.96
200	2.482	2.576	2.517	11.06

Port Townsend Verified Max

n= 17

Rank	Verified Year	Max Tide (T_{max}) MLLW (ft)	log T_{max}	(log T_{max} - avg(log T_{max}))^2	(log T_{max} - avg(log T_{max}))^3	Return Period T_r=(n+1)/m	Exceedance Probability $1/T_r$
1	2006	11.38	1.0561E+00	5.1916E-04	1.1829E-05	18.0	0.056
2	2003	11.36	1.0554E+00	4.8493E-04	1.0679E-05	9.0	0.111
3	2012	11.26	1.0515E+00	3.3056E-04	6.0100E-06	6.0	0.167
4	1997	11.18	1.0484E+00	2.2755E-04	3.4325E-06	4.5	0.222
5	2005	11.18	1.0484E+00	2.2755E-04	3.4325E-06	3.6	0.278
6	2010	11	1.0414E+00	6.4571E-05	5.1886E-07	3.0	0.333
7	2007	10.99	1.0410E+00	5.8379E-05	4.4605E-07	2.6	0.389
8	2008	10.8	1.0334E+00	4.4437E-09	2.9622E-13	2.3	0.444
9	1998	10.79	1.0330E+00	1.1266E-07	-3.7815E-11	2.0	0.500
10	2002	10.78	1.0326E+00	5.4514E-07	-4.0249E-10	1.8	0.556
11	2011	10.78	1.0326E+00	5.4514E-07	-4.0249E-10	1.6	0.611
12	2009	10.69	1.0290E+00	1.9179E-05	-8.3993E-08	1.5	0.667
13	1996	10.64	1.0269E+00	4.1158E-05	-2.6405E-07	1.4	0.722
14	2001	10.47	1.0199E+00	1.7984E-04	-2.4117E-06	1.3	0.778
15	2004	10.23	1.0099E+00	5.5138E-04	-1.2947E-05	1.2	0.833
16	1999	10.18	1.0077E+00	6.5584E-04	-1.6796E-05	1.1	0.889
17	2000	9.99	9.9957E-01	1.1419E-03	-3.8586E-05	1.1	0.944
		Average	**Average**	**Sum**	**Sum**		
		10.806	**1.033**	**0.004503**	**-0.000035**		

Variance	0.00028
Standard Deviation	0.01678
Skew Coefficient	-0.52117

	-0.6	-0.5	-0.52117	
T_r (yr)	K (lower)*	K (upper)*	K (actual)	T_{max} MLLW (ft)
2	0.099	0.083	0.086	10.83
5	0.857	0.856	0.856	11.16
10	1.200	1.216	1.213	11.32
25	1.528	1.567	1.559	11.47
50	1.720	1.777	1.765	11.56
100	1.880	1.955	1.939	11.64
200	2.016	2.108	2.089	11.71

Seattle Verified Max

n= 17

Step 7			Step 8	Step 9	Step 10
Rank	Verified Year	Max Tide (T_{max}) MLLW (ft)	log T_{max}	(log T_{max}- avg(log T_{max}))^2	(log T_{max}- avg(log T_{max}))^3
1	2012	14.47	1.1605E+00	6.5214E-04	1.6654E-05
2	2003	14.22	1.1529E+00	3.2285E-04	5.8011E-06
3	2005	14.07	1.1483E+00	1.7856E-04	2.3860E-06
4	1997	14.01	1.1464E+00	1.3240E-04	1.5235E-06
5	2006	13.93	1.1440E+00	8.1354E-05	7.3379E-07
6	2010	13.9	1.1430E+00	6.5340E-05	5.2817E-07
7	1996	13.89	1.1427E+00	6.0385E-05	4.6924E-07
8	1998	13.78	1.1392E+00	1.8643E-05	8.0496E-08
9	2007	13.68	1.1361E+00	1.3332E-06	1.5394E-09
10	2011	13.58	1.1329E+00	4.1278E-06	-8.3863E-09
11	2002	13.53	1.1313E+00	1.3203E-05	-4.7977E-08
12	2008	13.47	1.1294E+00	3.0957E-05	-1.7224E-07
13	2009	13.36	1.1258E+00	8.3266E-05	-7.5980E-07
14	1999	13.17	1.1196E+00	2.3549E-04	-3.6138E-06
15	2001	13.1	1.1173E+00	3.1188E-04	-5.5079E-06
16	2004	13.07	1.1163E+00	3.4804E-04	-6.4930E-06
17	2000	12.83	1.1082E+00	7.1315E-04	-1.9044E-05
		Average 13.651	**Average 1.135**	**Sum 0.003253**	**Sum -0.000007**

Step 11	Variance	0.00020	=$E$25/($B$2-1)
Step 12	Standard Deviation	0.01426	=$D$28^0.5
Step 13	Skew Coefficient	-0.18250	=($B$2*F25)/((($B$2-1)*($B$2-2)*($D$29^3)))

			Step 14	Step 15	
	-0.2	-0.1	-0.18250		
T_r (yr)	K (lower)*	K (upper)*	K (actual)	T_{max} MLLW (ft)	
2	0.033	0.017	0.030	13.7	=10^($D$25+D36*$D$29)
5	0.850	0.846	0.849	14.0	=10^($D$25+D37*$D$29)
10	1.258	1.270	1.260	14.2	=10^($D$25+D38*$D$29)
25	1.680	1.716	1.686	14.4	=10^($D$25+D39*$D$29)
50	1.945	2.000	1.955	14.5	=10^($D$25+D40*$D$29)
100	2.178	2.252	2.191	14.7	=10^($D$25+D41*$D$29)
200	2.388	2.482	2.404	14.8	=10^($D$25+D42*$D$29)
75	*N/A*	*N/A*	*N/A*	*14.60***	

*lower and upper K factors for each return period are from Haan's 1977 "K" factor table.

**T_{max} for 75 years was read off the data plots.

Friday Harbor Verified Min

n= 17

Rank	Verified Year	Min Tide (T_{min}) MLLW (ft)	log Tmax	$(\log T_{min} - \text{avg}(\log T_{min}))^2$	$(\log T_{min} - \text{avg}(\log T_{min}))^3$	Return Period $T_r=(n+1)/m$	Exceedance Probability $1/T_r$
1	2009	-3.79	5.7864E-01	5.4853E-03	4.0625E-04	18.0	0.056
2	2007	-3.68	5.6585E-01	3.7541E-03	2.3002E-04	9.0	0.111
3	2003	-3.64	5.6110E-01	3.1950E-03	1.8060E-04	6.0	0.167
4	1999	-3.59	5.5509E-01	2.5520E-03	1.2892E-04	4.5	0.222
5	2004	-3.57	5.5267E-01	2.3128E-03	1.1123E-04	3.6	0.278
6	2008	-3.56	5.5145E-01	2.1971E-03	1.0299E-04	3.0	0.333
7	2005	-3.41	5.3275E-01	7.9398E-04	2.2373E-05	2.6	0.389
8	2006	-3.31	5.1983E-01	2.3260E-04	3.5475E-06	2.3	0.444
9	2001	-3.27	5.1455E-01	9.9422E-05	9.9134E-07	2.0	0.500
10	2011	-3.15	4.9831E-01	3.9265E-05	-2.4604E-07	1.8	0.556
11	2010	-3.01	4.7857E-01	6.7653E-04	-1.7597E-05	1.6	0.611
12	2012	-3	4.7712E-01	7.5380E-04	-2.0696E-05	1.5	0.667
13	2000	-2.99	4.7567E-01	8.3553E-04	-2.4151E-05	1.4	0.722
14	2002	-2.85	4.5484E-01	2.4733E-03	-1.2300E-04	1.3	0.778
15	1998	-2.68	4.2813E-01	5.8434E-03	-4.4668E-04	1.2	0.833
16	1997	-2.64	4.2160E-01	6.8845E-03	-5.7122E-04	1.1	0.889
17	1996	-2.58	4.1162E-01	8.6410E-03	-8.0324E-04	1.1	0.944
		Average	**Average**	**Sum**	**Sum**		
		-3.219	**0.505**	**0.046770**	**-0.000820**		

Variance	0.00292
Standard Deviation	0.05407
Skew Coefficient	-0.36749

	-0.4	-0.3	-0.36749		
T_r (yr)	K (lower)*	K (upper)*	K (actual)	T_{min} MLLW (ft)	T_{min} MLLW (ft)
2	0.066	0.050	0.061	3.2	-3.2
5	0.855	0.853	0.854	3.6	-3.6
10	1.231	1.245	1.236	3.7	-3.7
25	1.606	1.643	1.618	3.9	-3.9
50	1.834	1.890	1.852	4.0	-4.0
100	2.029	2.104	2.053	4.1	-4.1
200	2.201	2.294	2.231	4.2	-4.2

Port Townsend Verified Min

n= 17

Rank	Verified Year	Min Tide (T_{min}) MLLW (ft)	log Tmax	$(\log T_{min} - \text{avg}(\log T_{min}))^2$	$(\log T_{min} - \text{avg}(\log T_{min}))^3$	Return Period $T_r=(n+1)/m$	Exceedance Probability $1/T_r$
1	2007	-4.16	6.1909E-01	7.6375E-03	6.6746E-04	18.0	0.056
2	2009	-3.96	5.9770E-01	4.3553E-03	2.8743E-04	9.0	0.111
3	1999	-3.89	5.8995E-01	3.3929E-03	1.9764E-04	6.0	0.167
4	2008	-3.88	5.8883E-01	3.2640E-03	1.8647E-04	4.5	0.222
5	2003	-3.69	5.6703E-01	1.2479E-03	4.4083E-05	3.6	0.278
6	2004	-3.67	5.6467E-01	1.0867E-03	3.5824E-05	3.0	0.333
7	2005	-3.56	5.5145E-01	3.9004E-04	7.7031E-06	2.6	0.389
8	2006	-3.52	5.4654E-01	2.2029E-04	3.2695E-06	2.3	0.444
9	2011	-3.41	5.3275E-01	1.1105E-06	1.1703E-09	2.0	0.500
10	2000	-3.39	5.3020E-01	2.2526E-06	-3.3809E-09	1.8	0.556
11	2001	-3.39	5.3020E-01	2.2526E-06	-3.3809E-09	1.6	0.611
12	2010	-3.35	5.2504E-01	4.4299E-05	-2.9484E-07	1.5	0.667
13	2012	-3.18	5.0243E-01	8.5693E-04	-2.5085E-05	1.4	0.722
14	2002	-2.99	4.7567E-01	3.1393E-03	-1.7589E-04	1.3	0.778
15	1996	-2.85	4.5484E-01	5.9068E-03	-4.5397E-04	1.2	0.833
16	1997	-2.76	4.4091E-01	8.2431E-03	-7.4840E-04	1.1	0.889
17	1998	-2.64	4.2160E-01	1.2121E-02	-1.3345E-03	1.1	0.944
		Average	**Average**	**Sum**	**Sum**		
		-3.429	**0.532**	**0.051912**	**-0.001308**		

Variance	0.00324
Standard Deviation	0.05696
Skew Coefficient	-0.50144

	-0.6	-0.5	-0.50144		
T_r (yr)	K (lower)*	K (upper)*	K (actual)	T_{min} MLLW (ft)	T_{min} MLLW (ft)
2	0.099	0.083	0.083	3.4	-3.4
5	0.857	0.856	0.856	3.8	-3.8
10	1.200	1.216	1.216	4.0	-4.0
25	1.528	1.567	1.566	4.2	-4.2
50	1.720	1.777	1.776	4.3	-4.3
100	1.880	1.955	1.954	4.4	-4.4
200	2.016	2.108	2.107	4.5	-4.5

Seattle Verified Min

n= 17

Rank	Verified Year	Min Tide (T_{min}) MLLW (ft)	log Tmax	$(\log T_{min} - \text{avg}(\log T_{min}))^2$	$(\log T_{min} - \text{avg}(\log T_{min}))^3$	Return Period $T_r=(n+1)/m$	Exceedance Probability $1/T_r$
1	2007	-4.58	6.6087E-01	5.8342E-03	4.4562E-04	18.0	0.056
2	2009	-4.57	6.5992E-01	5.6900E-03	4.2921E-04	9.0	0.111
3	2008	-4.32	6.3548E-01	2.6010E-03	1.3265E-04	6.0	0.167
4	1999	-4.27	6.3043E-01	2.1109E-03	9.6981E-05	4.5	0.222
5	2003	-4.14	6.1700E-01	1.0573E-03	3.4381E-05	3.6	0.278
6	2004	-4.13	6.1595E-01	9.9013E-04	3.1156E-05	3.0	0.333
7	2005	-4.07	6.0959E-01	6.3054E-04	1.5833E-05	2.6	0.389
8	2011	-3.95	5.9660E-01	1.4673E-04	1.7774E-06	2.3	0.444
9	2001	-3.88	5.8883E-01	1.8904E-05	8.2195E-08	2.0	0.500
10	2000	-3.82	5.8206E-01	5.8585E-06	-1.4180E-08	1.8	0.556
11	2006	-3.76	5.7519E-01	8.6415E-05	-8.0331E-07	1.6	0.611
12	2012	-3.67	5.6467E-01	3.9274E-04	-7.7833E-06	1.5	0.667
13	2010	-3.65	5.6229E-01	4.9244E-04	-1.0928E-05	1.4	0.722
14	2002	-3.39	5.3020E-01	2.9468E-03	-1.5996E-04	1.3	0.778
15	1997	-3.23	5.0920E-01	5.6673E-03	-4.2664E-04	1.2	0.833
16	1996	-3.19	5.0379E-01	6.5114E-03	-5.2542E-04	1.1	0.889
17	1998	-3.12	4.9415E-01	8.1594E-03	-7.3703E-04	1.1	0.944
		Average	**Average**	**Sum**	**Sum**		
		-3.867	**0.584**	**0.043342**	**-0.000681**		

Variance	0.00271
Standard Deviation	0.05205
Skew Coefficient	-0.34208

	-0.4	-0.3	-0.34208		
T_r (yr)	K (lower)*	K (upper)*	K (actual)	T_{min} MLLW (ft)	T_{min} MLLW (ft)
2	0.066	0.050	0.057	3.9	-3.9
5	0.855	0.853	0.854	4.3	-4.3
10	1.231	1.245	1.239	4.5	-4.5
25	1.606	1.643	1.627	4.7	-4.7
50	1.834	1.890	1.866	4.8	-4.8
100	2.029	2.104	2.072	4.9	-4.9
200	2.201	2.294	2.255	5.0	-5.0

Frequency Factors K for Gamma and log-Pearson Type III Distributions (Haan, 1977, Table 7.7)

	Recurrence Interval In Years							
	1.0101	2	5	10	25	50	100	200
SKEW COEFFICIENT Cs	Percent Chance (>=) = 1-F							
	99	50	20	10	4	2	1	0.5
3.0	-0.667	-0.396	0.420	1.180	2.278	3.152	4.051	4.970
2.9	-0.690	-0.390	0.440	1.195	2.277	3.134	4.013	4.904
2.8	-0.714	-0.384	0.460	1.210	2.275	3.114	3.973	4.847
2.7	-0.740	-0.376	0.479	1.224	2.272	3.093	3.932	4.783
2.6	-0.769	-0.368	0.499	1.238	2.267	3.071	3.889	4.718
2.5	-0.799	-0.360	0.518	1.250	2.262	3.048	3.845	4.652
2.4	-0.832	-0.351	0.537	1.262	2.256	3.023	3.800	4.584
2.3	-0.867	-0.341	0.555	1.274	2.248	2.997	3.753	4.515
2.2	-0.905	-0.330	0.574	1.284	2.240	2.970	3.705	4.444
2.1	-0.946	-0.319	0.592	1.294	2.230	2.942	3.656	4.372
2.0	-0.990	-0.307	0.609	1.302	2.219	2.912	3.605	4.298
1.9	-1.037	-0.294	0.627	1.310	2.207	2.881	3.553	4.223
1.8	-1.087	-0.282	0.643	1.318	2.193	2.848	3.499	4.147
1.7	-1.140	-0.268	0.660	1.324	2.179	2.815	3.444	4.069
1.6	-1.197	-0.254	0.675	1.329	2.163	2.780	3.388	3.990
1.5	-1.256	-0.240	0.690	1.333	2.146	2.743	3.330	3.910
1.4	-1.318	-0.225	0.705	1.337	2.128	2.706	3.271	3.828
1.3	-1.383	-0.210	0.719	1.339	2.108	2.666	3.211	3.745
1.2	-1.449	-0.195	0.732	1.340	2.087	2.626	3.149	3.661
1.1	-1.518	-0.180	0.745	1.341	2.066	2.585	3.087	3.575
1.0	-1.588	-0.164	0.758	1.340	2.043	2.542	3.022	3.489
0.9	-1.660	-0.148	0.769	1.339	2.018	2.498	2.957	3.401
0.8	-1.733	-0.132	0.780	1.336	1.993	2.453	2.891	3.312
0.7	-1.806	-0.116	0.790	1.333	1.967	2.407	2.824	3.223
0.6	-1.880	-0.099	0.800	1.328	1.939	2.359	2.755	3.132
0.5	-1.955	-0.083	0.808	1.323	1.910	2.311	2.686	3.041
0.4	-2.029	-0.066	0.816	1.317	1.880	2.261	2.615	2.949
0.3	-2.104	-0.050	0.824	1.309	1.849	2.211	2.544	2.856
0.2	-2.178	-0.033	0.830	1.301	1.818	2.159	2.472	2.763
0.1	-2.252	-0.017	0.836	1.292	1.785	2.107	2.400	2.670
0.0	-2.326	0.000	0.842	1.282	1.751	2.054	2.326	2.576
-0.1	-2.400	0.017	0.846	1.270	1.716	2.000	2.252	2.482
-0.2	-2.472	0.033	0.850	1.258	1.680	1.945	2.178	2.388
-0.3	-2.544	0.050	0.853	1.245	1.643	1.890	2.104	2.294
-0.4	-2.615	0.066	0.855	1.231	1.606	1.834	2.029	2.201
-0.5	-2.686	0.083	0.856	1.216	1.567	1.777	1.955	2.108
-0.6	-2.755	0.099	0.857	1.200	1.528	1.720	1.880	2.016
-0.7	-2.824	0.116	0.857	1.183	1.488	1.663	1.806	1.926
-0.8	-2.891	0.132	0.856	1.166	1.448	1.606	1.733	1.837
-0.9	-2.957	0.148	0.854	1.147	1.407	1.549	1.660	1.749
-1.0	-3.022	0.164	0.852	1.128	1.366	1.492	1.588	1.664
-1.1	-3.087	0.180	0.848	1.107	1.324	1.435	1.518	1.581
-1.2	-3.149	0.195	0.844	1.086	1.282	1.379	1.449	1.501
-1.3	-3.211	0.210	0.838	1.064	1.240	1.324	1.383	1.424
-1.4	-3.271	0.225	0.832	1.041	1.198	1.270	1.318	1.351
-1.5	-3.330	0.240	0.825	1.018	1.157	1.217	1.256	1.282
-1.6	-3.880	0.254	0.817	0.994	1.116	1.166	1.197	1.216
-1.7	-3.444	0.268	0.808	0.970	1.075	1.116	1.140	1.155
-1.8	-3.499	0.282	0.799	0.945	1.035	1.069	1.087	1.097
-1.9	-3.553	0.294	0.788	0.920	0.996	1.023	1.037	1.044
-2.0	-3.605	0.307	0.777	0.895	0.959	0.980	0.990	0.995
-2.1	-3.656	0.319	0.765	0.869	0.923	0.939	0.946	0.949
-2.2	-3.705	0.330	0.752	0.844	0.888	0.900	0.905	0.907
-2.3	-3.753	0.341	0.739	0.819	0.855	0.864	0.867	0.869
-2.4	-3.800	0.351	0.725	0.795	0.823	0.830	0.832	0.833
-2.5	-3.845	0.360	0.711	0.711	0.793	0.798	0.799	0.800
-2.6	-3.899	0.368	0.696	0.747	0.764	0.768	0.769	0.769
-2.7	-3.932	0.376	0.681	0.724	0.738	0.740	0.740	0.741
-2.8	-3.973	0.384	0.666	0.702	0.712	0.714	0.714	0.714
-2.9	-4.013	0.390	0.651	0.681	0.683	0.689	0.690	0.690
-3.0	-4.051	0.396	0.636	0.660	0.666	0.666	0.667	0.667

APPENDIX X: TERMINAL TIDAL INFORMATION
NOAA TIDE PREDICTION DATA

TERMINAL	LATITUDE	LONGITUDE	NOAA SUBORDINATE OR (HARMONIC) STATION	STATION ID	LATITUDE	LONGITUDE	NOAA REFERENCE (HARMONIC) STATION	HEIGHT OFFSET FACTOR		TIME OFFSET (MIN)		Δ LATITUDE	Δ LONGITUDE
								LOW	HIGH	LOW	HIGH		
ANACORTES	48° 30' 26" N	122° 40' 40" W	SHIP HARBOR, FIDALGO ISLAND	9448772	48° 30' 24" N	122° 40' 37" W	PORT TOWNSEND	*1.00	*0.94	25	16	2"	3"
BAINBRIDGE ISLAND	47° 37' 21" N	122° 30' 35" W	EAGLE HARBOR, BAINBRIDGE ISLAND	9445882	47° 37' 12" N	122° 30' 54" W	SEATTLE	*1.02	*1.00	5	4	9"	19"
BREMERTON	47° 33' 43" N	122° 37' 30" W	BREMERTON, SINCLAIR INL, PT ORCHARD	9445958	47° 33' 42" N	122° 37' 23" W	SEATTLE	*1.00	*1.04	18	11	1"	7"
CLINTON	47° 58' 30" N	122° 20' 59" W	GLENDALE, WHIDBEY ISLAND	9447814	47° 56' 24" N	122° 21' 25" W	SEATTLE	*0.99	*0.97	-3	1	2' 6"	26"
COUPEVILLE	48° 09' 34" N	122° 40' 22" W	ADMIRALTY HEAD	9447905	48° 09' 30" N	122° 40' 05" W	PORT TOWNSEND	-0.10	+0.00	20	-11	4"	17"
EAGLE HARBOR	47° 37' 18" N	122° 30' 51" W	EAGLE HARBOR, BAINBRIDGE ISLAND	9445882	47° 37' 12" N	122° 30' 54" W	SEATTLE	*1.02	*1.00	5	4	6"	3"
EDMONDS	47° 48' 48" N	122° 23' 06" W	EDMONDS	9447427	47° 48' 48" N	122° 22' 59" W	SEATTLE	*0.99	*0.96	-4	0	0"	7"
FAUNTLEROY	47° 31' 23" N	122° 23' 46" W	POINT VASHON, VASHON ISLAND	9446025	47° 30' 42" N	122° 27' 47" W	SEATTLE	*1.01	*1.02	2	2	41"	4' 1"
FRIDAY HARBOR	48° 32' 08" N	123° 00' 51" W	(FRIDAY HARBOR)	9449880	48° 32' 48" N	123° 00' 36" W	FRIDAY HARBOR	NA	NA	NA	NA	40"	15"
KINGSTON	47° 47' 42" N	122° 29' 42" W	KINGSTON, APPLETREE COVE	9445639	47° 47' 48" N	122° 29' 35" W	SEATTLE	*1.00	*0.97	-5	-5	6"	7"
LOPEZ	48° 34' 14" N	122° 53' 00" W	UPRIGHT HEAD, LOPEZ ISLAND	9449911	48° 34' 18" N	122° 53' 06" W	PORT TOWNSEND	*0.93	*0.93	44	26	4"	6"
MUKILTEO	47° 56' 57" N	122° 18' 16" W	GLENDALE, WHIDBEY ISLAND	9447814	47° 56' 24" N	122° 21' 25" W	SEATTLE	*0.99	*0.97	-3	1	33"	3' 9"
ORCAS	48° 35' 51" N	122° 56' 38" W	ORCAS, ORCAS ISLAND	9449798	48° 36' 00" N	122° 57' 00" W	PORT TOWNSEND	*0.90	*0.90	56	33	9"	22"
POINT DEFIANCE	47° 18' 22" N	122° 30' 51" W	TAHLEQUAH, NEIL PT, DALCO PASS, VASHON I	9446375	47° 20' 00" N	122° 30' 25" W	SEATTLE	*1.01	*1.05	5	4	1'38"	26"
PORT TOWNSEND	48° 06' 41" N	122° 45' 33" W	(PORT TOWNSEND)	9444900	48° 06' 42" N	122° 45' 29" W	PORT TOWNSEND	NA	NA	NA	NA	1"	4"
SEATTLE	47° 36' 09" N	122° 20' 22" W	(SEATTLE)	9447130	47° 36' 09" N	122° 20' 21" W	SEATTLE	NA	NA	NA	NA	0	1"
SHAW	48° 35' 04" N	122° 55' 47" W	SHAW ISLAND,FERRY TERM,HARNEY CHANN	9449904	48° 35' 06" N	122° 55' 41" W	PORT TOWNSEND	*0.99	*0.90	56	31	2"	6"
SOUTHWORTH	47° 30' 46" N	122° 29' 46" W	HARPER, YUKON HARBOR	9445993	47° 31' 24" N	122° 31' 01" W	SEATTLE	*0.99	*1.02	-1	-6	38"	1' 15"
TAHLEQUAH	47° 19' 56" N	122° 30' 28" W	TAHLEQUAH,NEIL PT,DALCO PASS,VASHON I	9446375	47° 20' 00" N	122° 30' 25" W	SEATTLE	*1.01	*1.05	5	4	4"	3"
VASHON	47° 30' 38" N	122° 27' 50" W	POINT VASHON, VASHON ISLAND	9446025	47° 30' 42" N	122° 27' 47" W	SEATTLE	*1.01	*1.02	2	2	4"	3"

NOAA USES HEIGHT OFFSET FACTORS AND TIME OFFSETS TO CONVERT TIDE PREDICTION DATA FROM ITS REFERENCE (HARMONIC) STATIONS TO SUBORDINATE STATIONS.
THESE HEIGHT OFFSET FACTORS ARE USED TO CONVERT THE 17-YEAR MINIMUM AND MAXIMUM REFERENCE WATER LEVELS AT THE THREE REFERENCE STATIONS TO SUBORDINATE STATIONS AT OR NEAR THE TERMINALS.

Δ INDICATES THE DISTANCE IN LATITUDE AND LONGITUDE FROM THE TERMINAL TO ITS NEAREST SUBORDINATE STATION.
FOR EXAMPLE, THE ANACORTES TERMINAL IS WITHIN 3 SECONDS (~ 220 FEET) OF THE SHIP HARBOR, FIDALGO ISLAND SUBORDINATE STATION. THE FAUNTLEROY TERMINAL IS OVER 4 MINUTES (~ 3 MILES) FROM THE NEAREST SUBORDINATE STATION, POINT VASHON, VASHON ISLAND.

WSF Tidal Data.xlsx
APP X NOAA TIDE PREDICTION DATA
8/7/2013

NOAA Tide Predictions

Admiralty Head,Washington,2013

The NOAA Tide Predictions application provides predictions in both graphical and tabular formats, with many user selected options, for over 3000 stations broken down by key areas in each state. Users can also access stations via the Google map interface. Additional information can be found in the help page.

Station Types: The NOAA Tide Predictions application provides predictions from 2 distinct categories of stations at over 3000 locations:
Harmonic - The predicted height values for Harmonic stations are conducted by combining the harmonic constituents into a single tide curve.
Subordinate - The high and low height values for Subordinate stations are obtained by means and differences, and ratios applied to the full harmonic constant predictions at a specific Harmonic station (a Reference station).

Disclaimer: The official Tide prediction tables are published annually on October 1, for the following calendar year. Tide predictions generated prior to the publishing date of the official tables are subject to change. The predictions from the web based NOAA Tidal Predictions are based upon the latest information available as of the date of your request. Tide predictions generated may differ from the official published predictions if information for the station requested has been updated since the publishing date of the official published tables.

Generated On: Mon Jun 17 22:33:15 GMT 2013

Page 1 of 5

StationId:9447905
Source:NOAA/NOS/CO-OPS
Station Type:Subordinate
Time Zone:LST/LDT
Datum:mean lower low water (MLLW) which is the chart datum of soundings

NOAA Tide Predictions

Admiralty Head,Washington,2013

Times and Heights of High and Low Waters

January

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 Tu	12:02 AM -0.3 -9 07:19 AM 9.3 283 01:25 PM 5.2 158 05:46 PM 6.6 201		**16** W	12:46 AM 0.8 24 07:39 AM 9.5 290 02:20 PM 3.4 104 07:28 PM 6.2 189	
2 W	12:39 AM 0.4 12 07:49 AM 9.3 283 02:16 PM 4.5 137 06:48 PM 6.1 186		**17** Th	01:30 AM 2.2 67 08:11 AM 9.3 283 03:22 PM 2.7 82 08:54 PM 5.8 177	
3 Th	01:18 AM 1.4 43 08:19 AM 9.3 283 03:09 PM 3.6 110 08:02 PM 5.6 171		**18** F	02:17 AM 3.5 107 08:44 AM 9.1 277 04:23 PM 2.1 64 11:00 PM 5.8 177	
4 F	01:59 AM 2.5 76 08:51 AM 9.2 280 04:02 PM 2.6 79 09:33 PM 5.4 165		**19** Sa	03:11 AM 4.8 146 09:17 AM 8.8 268 05:20 PM 1.5 46	
5 Sa	02:46 AM 3.7 113 09:25 AM 9.2 280 04:55 PM 1.5 46 11:36 PM 5.7 174		**20** Su	12:58 AM 6.4 195 04:19 AM 5.8 177 09:52 AM 8.5 259 06:11 PM 1.1 34	
6 Su	03:47 AM 4.9 149 10:02 AM 9.2 280 05:47 PM 0.4 12		**21** M	02:10 AM 7.2 219 05:42 AM 6.5 198 10:32 AM 8.2 250 06:57 PM 0.6 18	
7 M	01:34 AM 6.6 201 05:02 AM 5.9 180 10:43 AM 9.2 280 06:38 PM -0.7 -21		**22** Tu	03:00 AM 7.9 241 07:05 AM 6.8 207 11:17 AM 8.1 247 07:38 PM 0.3 9	
8 Tu	02:38 AM 7.6 232 06:19 AM 6.5 198 11:30 AM 9.2 280 07:28 PM -1.6 -49		**23** W	03:38 AM 8.3 253 08:11 AM 6.9 210 12:07 PM 8.0 244 08:15 PM -0.1 -3	
9 W	03:24 AM 8.4 256 07:29 AM 6.8 207 12:24 PM 9.2 280 08:16 PM -2.2 -67		**24** Th	04:10 AM 8.6 262 08:58 AM 6.7 204 12:57 PM 7.9 241 08:50 PM -0.3 -9	
10 Th	04:05 AM 9.0 274 08:31 AM 6.7 204 01:21 PM 9.1 277 09:03 PM -2.6 -79		**25** F	04:37 AM 8.7 265 09:34 AM 6.5 198 01:45 PM 7.9 241 09:23 PM -0.5 -15	
11 F	04:43 AM 9.4 287 09:29 AM 6.4 195 02:19 PM 8.9 271 09:49 PM -2.5 -76		**26** Sa	05:00 AM 8.8 268 10:06 AM 6.1 186 02:32 PM 7.8 238 09:57 PM -0.5 -15	
12 Sa	05:20 AM 9.6 293 10:25 AM 6.0 183 03:17 PM 8.6 262 10:34 PM -2.1 -64		**27** Su	05:20 AM 8.9 271 10:40 AM 5.7 174 03:19 PM 7.7 235 10:30 PM -0.4 -12	
13 Su	05:56 AM 9.7 296 11:21 AM 5.4 165 04:16 PM 8.1 247 11:18 PM -1.4 -43		**28** M	05:41 AM 9.0 274 11:16 AM 5.1 155 04:07 PM 7.5 229 11:05 PM -0.1 -3	
14 M	06:31 AM 9.7 296 12:19 PM 4.7 143 05:16 PM 7.5 229		**29** Tu	06:04 AM 9.1 277 11:56 AM 4.5 137 04:59 PM 7.2 219 11:40 PM 0.5 15	
15 Tu	12:02 AM -0.4 -12 07:06 AM 9.7 296 01:19 PM 4.0 122 06:19 PM 6.9 210		**30** W	06:31 AM 9.1 277 12:39 PM 3.8 116 05:54 PM 6.9 210	
			31 Th	12:17 AM 1.3 40 06:59 AM 9.2 280 01:25 PM 3.0 91 06:56 PM 6.5 198	

February

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	12:55 AM 2.4 73 07:30 AM 9.2 280 02:16 PM 2.2 67 08:07 PM 6.2 189		**16** Sa	01:53 AM 4.5 137 07:44 AM 8.5 259 03:08 PM 1.6 49 10:24 PM 6.4 195	
2 Sa	01:37 AM 3.5 107 08:02 AM 9.1 277 03:11 PM 1.4 43 09:36 PM 6.1 186		**17** Su	02:48 AM 5.4 165 08:18 AM 8.2 250 04:05 PM 1.5 46	
3 Su	02:25 AM 4.7 143 08:38 AM 9.0 274 04:10 PM 0.6 18 11:41 PM 6.3 192		**18** M	12:20 AM 6.8 207 04:01 AM 6.1 186 08:56 AM 7.9 241 05:05 PM 1.3 40	
4 M	03:29 AM 5.7 174 09:19 AM 8.9 271 05:11 PM -0.1 -3		**19** Tu	01:34 AM 7.3 223 05:32 AM 6.5 198 09:44 AM 7.6 232 06:04 PM 1.1 34	
5 Tu	01:24 AM 7.1 216 04:51 AM 6.4 195 10:09 AM 8.8 268 06:11 PM -0.7 -21		**20** W	02:22 AM 7.7 235 07:00 AM 6.5 198 10:42 AM 7.4 226 06:56 PM 0.9 27	
6 W	02:21 AM 7.8 238 06:16 AM 6.7 204 11:10 AM 8.6 262 07:08 PM -1.2 -37		**21** Th	02:58 AM 8.0 244 07:59 AM 6.3 192 11:46 AM 7.3 223 07:42 PM 0.6 18	
7 Th	03:03 AM 8.4 256 07:29 AM 6.5 198 12:18 PM 8.6 262 08:01 PM -1.4 -43		**22** F	03:26 AM 8.1 247 08:37 AM 5.9 180 12:47 PM 7.4 226 08:21 PM 0.4 12	
8 F	03:40 AM 8.8 268 08:30 AM 6.0 183 01:26 PM 8.5 259 08:49 PM -1.5 -46		**23** Sa	03:48 AM 8.2 250 09:06 AM 5.5 168 01:43 PM 7.5 229 08:57 PM 0.4 12	
9 Sa	04:14 AM 9.1 277 09:23 AM 5.4 165 02:29 PM 8.4 256 09:34 PM -1.2 -37		**24** Su	04:06 AM 8.3 253 09:34 AM 4.9 149 02:35 PM 7.6 232 09:32 PM 0.5 15	
10 Su	04:45 AM 9.2 280 10:12 AM 4.6 140 03:28 PM 8.2 250 10:17 PM -0.6 -18		**25** M	04:24 AM 8.5 259 10:05 AM 4.2 128 03:25 PM 7.6 232 10:06 PM 0.7 21	
11 M	05:16 AM 9.3 283 11:00 AM 3.9 119 04:26 PM 7.9 241 10:59 PM 0.2 6		**26** Tu	04:45 AM 8.6 262 10:40 AM 3.4 104 04:16 PM 7.6 232 10:42 PM 1.2 37	
12 Tu	05:46 AM 9.3 283 11:48 AM 3.2 98 05:23 PM 7.5 229 11:41 PM 1.2 37		**27** W	05:10 AM 8.7 265 11:18 AM 2.5 76 05:09 PM 7.6 232 11:19 PM 1.9 58	
13 W	06:15 AM 9.2 280 12:36 PM 2.6 79 06:22 PM 7.1 216		**28** Th	05:38 AM 8.8 268 12:00 PM 1.7 52 06:05 PM 7.4 226 11:58 PM 2.8 85	
14 Th	12:23 AM 2.3 70 06:44 AM 9.0 274 01:24 PM 2.2 67 07:25 PM 6.8 207				
15 F	01:06 AM 3.4 104 07:13 AM 8.8 268 02:15 PM 1.8 55 08:40 PM 6.5 198				

March

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	06:08 AM 8.8 268 12:46 PM 1.0 30 07:06 PM 7.3 223		**16** Sa	01:49 AM 4.6 140 07:16 AM 8.1 247 02:19 PM 0.8 24 09:24 PM 7.3 223	
2 Sa	12:40 AM 3.7 113 06:41 AM 8.8 268 01:35 PM 0.5 15 08:16 PM 7.1 216		**17** Su	02:40 AM 5.3 162 07:49 AM 7.8 238 03:07 PM 0.9 27 10:40 PM 7.2 219	
3 Su	01:27 AM 4.6 140 07:17 AM 8.7 265 02:31 PM 0.1 3 09:40 PM 7.0 213		**18** M	03:41 AM 5.8 177 08:25 AM 7.5 229 03:59 PM 1.1 34	
4 M	02:24 AM 5.5 168 07:58 AM 8.5 259 03:32 PM -0.1 -3 11:23 PM 7.2 219		**19** Tu	12:13 AM 7.2 219 05:02 AM 6.1 186 09:09 AM 7.1 216 04:58 PM 1.3 40	
5 Tu	03:39 AM 6.1 186 08:49 AM 8.2 250 04:37 PM -0.2 -6		**20** W	01:29 AM 7.4 226 06:38 AM 6.1 186 10:04 AM 6.8 207 06:01 PM 1.4 43	
6 W	12:47 AM 7.6 232 05:08 AM 6.3 192 09:54 AM 7.9 241 05:44 PM -0.3 -9		**21** Th	02:19 AM 7.6 232 07:53 AM 5.8 177 11:12 AM 6.6 201 07:01 PM 1.4 43	
7 Th	01:42 AM 8.0 244 06:34 AM 6.0 183 11:12 AM 7.6 232 06:47 PM -0.3 -9		**22** F	02:54 AM 7.7 235 08:38 AM 5.3 162 12:28 PM 6.5 198 07:55 PM 1.4 43	
8 F	02:24 AM 8.3 253 07:41 AM 5.4 165 12:32 PM 7.6 232 07:42 PM -0.1 -3		**23** Sa	03:19 AM 7.8 238 09:06 AM 4.8 146 01:41 PM 6.7 204 08:40 PM 1.4 43	
9 Sa	03:00 AM 8.6 262 08:32 AM 4.6 140 01:45 PM 7.7 235 08:32 PM 0.2 6		**24** Su	03:38 AM 7.9 241 09:32 AM 4.0 122 02:44 PM 6.9 210 09:21 PM 1.6 49	
10 Su	04:31 AM 8.7 265 10:16 AM 3.7 113 03:49 PM 7.8 238 10:16 PM 0.7 21		**25** M	03:57 AM 8.0 244 10:00 AM 3.2 98 03:40 PM 7.3 223 10:00 PM 1.9 58	
11 M	05:00 AM 8.8 268 10:56 AM 2.9 88 04:47 PM 7.8 238 10:59 PM 1.3 40		**26** Tu	04:19 AM 8.2 250 10:32 AM 2.2 67 04:33 PM 7.6 232 10:38 PM 2.3 70	
12 Tu	05:26 AM 8.7 265 11:36 AM 2.1 64 05:41 PM 7.8 238 11:40 PM 2.1 64		**27** W	04:44 AM 8.4 256 11:07 AM 1.2 37 05:26 PM 7.9 241 11:18 PM 2.9 88	
13 W	05:52 AM 8.7 265 12:15 PM 1.5 46 06:34 PM 7.8 238		**28** Th	05:13 AM 8.5 259 11:46 AM 0.3 9 06:20 PM 8.0 244 11:59 PM 3.6 110	
14 Th	12:21 AM 2.9 88 06:19 AM 8.6 262 12:55 PM 1.1 34 07:27 PM 7.6 232		**29** F	05:44 AM 8.6 262 12:28 PM -0.4 -12 07:16 PM 8.1 247	
15 F	01:04 AM 3.8 116 06:46 AM 8.4 256 01:36 PM 0.9 27 08:23 PM 7.5 229		**30** Sa	12:43 AM 4.3 131 06:18 AM 8.5 259 01:14 PM -0.9 -27 08:16 PM 8.1 247	
			31 Su	01:32 AM 5.0 152 06:56 AM 8.4 256 02:04 PM -1.0 -30 09:21 PM 8.0 244	

Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.
Referenced to Station: PORT TOWNSEND (9444900) Height offset in feet (low:-0.10 high: +0.00) Time offset in mins (low:20 high: -11)

Generated On: Mon Jun 17 22:33:15 GMT 2013

Page 2 of 5

StationId:9445958
Source:NOAA/NOS/CO-OPS
Station Type:Subordinate
Time Zone:LST/LDT
Datum:mean lower low water (MLLW) which is the chart datum of soundings

NOAA Tide Predictions

Bremerton, Sinclair Inlet, Port Orchard,Washington,2013

Times and Heights of High and Low Waters

January

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 Tu	12:58 AM -0.2 -6 07:57 AM 12.9 393 02:07 PM 5.6 171 07:02 PM 9.6 293		**16** W	01:45 AM 1.0 30 08:26 AM 13.3 405 03:01 PM 3.6 110 08:30 PM 9.5 290	
2 W	01:37 AM 0.6 18 08:29 AM 12.9 393 02:53 PM 4.9 149 07:58 PM 9.2 280		**17** Th	02:31 AM 2.7 82 09:04 AM 12.9 393 03:55 PM 3.0 91 09:44 PM 8.9 271	
3 Th	02:17 AM 1.8 55 09:04 AM 12.9 393 03:43 PM 4.0 122 09:04 PM 8.8 268		**18** F	03:20 AM 4.3 131 09:44 AM 12.5 381 04:52 PM 2.5 76 11:16 PM 8.7 265	
4 F	03:01 AM 3.1 94 09:42 AM 12.8 390 04:37 PM 3.0 91 10:23 PM 8.6 262		**19** Sa	04:17 AM 5.9 180 10:28 AM 11.9 363 05:50 PM 2.0 61	
5 Sa	03:52 AM 4.6 140 10:23 AM 12.6 384 05:34 PM 1.9 58 11:55 PM 8.8 268		**20** Su	01:08 AM 9.0 274 05:35 AM 7.1 216 11:16 AM 11.4 347 06:47 PM 1.5 46	
6 Su	04:56 AM 6.1 186 11:08 AM 12.5 381 06:32 PM 0.7 21		**21** M	02:39 AM 9.8 299 07:13 AM 7.7 235 12:07 PM 11.0 335 07:38 PM 1.0 30	
7 M	01:32 AM 9.5 290 06:15 AM 7.2 219 11:59 AM 12.4 378 07:27 PM -0.5 -15		**22** Tu	03:37 AM 10.6 323 08:35 AM 7.8 238 01:00 PM 10.7 326 08:23 PM 0.6 18	
8 Tu	02:54 AM 10.6 323 07:38 AM 7.7 235 12:53 PM 12.4 378 08:20 PM -1.5 -46		**23** W	04:19 AM 11.2 341 09:32 AM 7.7 235 01:50 PM 10.6 323 09:03 PM 0.1 3	
9 W	03:52 AM 11.6 354 08:50 AM 7.7 235 01:49 PM 12.4 378 09:11 PM -2.4 -73		**24** Th	04:51 AM 11.6 354 10:13 AM 7.4 226 02:36 PM 10.6 323 09:40 PM -0.2 -6	
10 Th	04:39 AM 12.4 378 09:51 AM 7.4 226 02:44 PM 12.4 378 09:59 PM -2.8 -85		**25** F	05:17 AM 11.9 363 10:46 AM 7.1 216 03:19 PM 10.7 326 10:15 PM -0.5 -15	
11 F	05:20 AM 13.0 396 10:46 AM 6.9 210 03:39 PM 12.3 375 10:46 PM -2.8 -85		**26** Sa	05:38 AM 12.1 369 11:15 AM 6.7 204 03:59 PM 10.8 329 10:50 PM -0.5 -15	
12 Sa	05:59 AM 13.4 408 11:37 AM 6.3 192 04:34 PM 12.0 366 11:32 PM -2.4 -73		**27** Su	05:58 AM 12.3 375 11:44 AM 6.2 189 04:40 PM 10.8 329 11:25 PM -0.4 -12	
13 Su	06:36 AM 13.6 415 12:27 PM 5.6 171 05:29 PM 11.6 354		**28** M	06:21 AM 12.5 381 12:16 PM 5.5 168 05:22 PM 10.7 326	
14 M	12:17 AM -1.6 -49 07:13 AM 13.6 415 01:17 PM 4.9 149 06:26 PM 10.9 332		**29** Tu	12:00 AM -0.1 -3 06:46 AM 12.7 387 12:52 PM 4.8 146 06:07 PM 10.5 320	
15 Tu	01:01 AM -0.4 -12 07:49 AM 13.5 411 02:08 PM 4.2 128 07:26 PM 10.2 311		**30** W	12:37 AM 0.6 18 07:15 AM 12.9 393 01:31 PM 3.9 119 06:56 PM 10.3 314	
			31 Th	01:15 AM 1.6 49 07:45 AM 12.9 393 02:14 PM 3.1 94 07:51 PM 10.0 305	

February

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	01:55 AM 2.8 85 08:19 AM 12.9 393 03:02 PM 2.3 70 08:54 PM 9.6 293		**16** Sa	02:52 AM 5.2 158 08:51 AM 11.7 357 03:48 PM 1.9 58 10:31 PM 9.3 283	
2 Sa	02:39 AM 4.2 128 08:56 AM 12.7 387 03:55 PM 1.6 49 10:08 PM 9.3 283		**17** Su	03:47 AM 6.4 195 09:35 AM 11.1 338 04:43 PM 1.9 58	
3 Su	03:30 AM 5.6 171 09:39 AM 12.4 378 04:54 PM 0.9 27 11:39 PM 9.4 287		**18** M	12:10 AM 9.3 283 05:04 AM 7.3 223 10:26 AM 10.5 320 05:43 PM 1.8 55	
4 M	04:37 AM 6.9 210 10:30 AM 12.0 366 05:57 PM 0.3 9		**19** Tu	01:51 AM 9.8 299 06:52 AM 7.7 235 11:26 AM 10.0 305 06:44 PM 1.6 49	
5 Tu	01:24 AM 9.9 302 06:06 AM 7.7 235 11:31 AM 11.8 360 07:01 PM -0.4 -12		**20** W	02:55 AM 10.3 314 08:18 AM 7.5 229 12:30 PM 9.8 299 07:41 PM 1.3 40	
6 W	02:45 AM 10.8 329 07:38 AM 7.8 238 12:38 PM 11.6 354 08:01 PM -1.1 -34		**21** Th	03:36 AM 10.8 329 09:10 AM 7.0 213 01:30 PM 9.9 302 08:29 PM 0.9 27	
7 Th	03:39 AM 11.6 354 08:51 AM 7.3 223 01:44 PM 11.7 357 08:55 PM -1.5 -46		**22** F	04:06 AM 11.1 338 09:45 AM 6.5 198 02:22 PM 10.1 308 09:11 PM 0.6 18	
8 F	04:20 AM 12.2 372 09:48 AM 6.5 198 02:45 PM 11.7 357 09:45 PM -1.7 -52		**23** Sa	04:28 AM 11.4 347 10:13 AM 5.9 180 03:09 PM 10.4 317 09:49 PM 0.4 12	
9 Sa	04:55 AM 12.7 387 10:36 AM 5.7 174 03:42 PM 11.8 360 10:32 PM -1.5 -46		**24** Su	04:48 AM 11.7 357 10:40 AM 5.3 162 03:52 PM 10.6 323 10:26 PM 0.5 15	
10 Su	05:28 AM 13.0 396 11:21 AM 4.8 146 04:37 PM 11.7 357 11:16 PM -0.9 -27		**25** M	05:09 AM 11.9 363 11:09 AM 4.4 134 04:34 PM 10.9 332 11:02 PM 0.7 21	
11 M	06:00 AM 13.1 399 12:04 PM 3.9 119 05:30 PM 11.4 347 11:59 PM 0.0 0		**26** Tu	05:32 AM 12.2 372 11:41 AM 3.5 107 05:18 PM 11.0 335 11:39 PM 1.2 37	
12 Tu	06:31 AM 13.1 399 12:47 PM 3.2 98 06:23 PM 11.0 335		**27** W	05:59 AM 12.4 378 12:17 PM 2.6 79 06:04 PM 11.1 338	
13 W	12:41 AM 1.2 37 07:04 AM 13.0 396 01:30 PM 2.6 79 07:17 PM 10.6 323		**28** Th	12:17 AM 2.0 61 06:28 AM 12.5 381 12:57 PM 1.7 52 06:54 PM 11.0 335	
14 Th	01:22 AM 2.5 76 07:37 AM 12.7 387 02:13 PM 2.2 67 08:13 PM 10.1 308				
15 F	02:05 AM 3.9 119 08:13 AM 12.3 375 02:59 PM 1.9 58 09:16 PM 9.6 293				

March

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	12:57 AM 3.0 91 07:00 AM 12.5 381 01:40 PM 0.9 27 07:48 PM 10.8 329		**16** Sa	02:46 AM 5.0 152 08:23 AM 11.3 344 03:09 PM 0.8 24 09:50 PM 10.4 317	
2 Sa	01:40 AM 4.1 125 07:36 AM 12.4 378 02:27 PM 0.4 12 08:49 PM 10.5 320		**17** Su	03:33 AM 5.9 180 09:02 AM 10.7 326 03:53 PM 1.0 30 10:50 PM 10.1 308	
3 Su	02:28 AM 5.3 162 08:17 AM 12.0 366 03:20 PM 0.2 6 10:00 PM 10.2 311		**18** M	04:29 AM 6.6 201 09:46 AM 10.0 305 04:43 PM 1.3 40	
4 M	03:26 AM 6.4 195 09:05 AM 11.6 354 04:20 PM 0.1 3 11:26 PM 10.1 308		**19** Tu	12:02 AM 9.9 302 05:44 AM 7.1 216 10:40 AM 9.4 287 05:40 PM 1.7 52	
5 Tu	04:42 AM 7.1 216 10:06 AM 11.0 335 05:27 PM 0.1 3		**20** W	01:26 AM 9.9 302 07:27 AM 7.1 216 11:47 AM 9.0 274 06:44 PM 1.9 58	
6 W	01:02 AM 10.4 317 06:19 AM 7.3 223 11:20 AM 10.6 323 06:36 PM 0.0 0		**21** Th	02:37 AM 10.1 308 08:47 AM 6.7 204 01:00 PM 8.8 268 07:47 PM 1.9 58	
7 Th	02:15 AM 11.0 335 07:47 AM 6.8 207 12:38 PM 10.5 320 07:41 PM -0.1 -3		**22** F	03:23 AM 10.4 317 09:33 AM 6.0 183 02:08 PM 9.0 274 08:44 PM 1.8 55	
8 F	03:05 AM 11.5 351 08:50 AM 5.8 177 01:51 PM 10.6 323 08:39 PM -0.2 -6		**23** Sa	03:55 AM 10.7 326 10:06 AM 5.3 162 03:06 PM 9.4 287 09:33 PM 1.7 52	
9 Sa	03:44 AM 11.9 363 09:39 AM 4.8 146 02:55 PM 10.9 332 09:30 PM 0.0 0		**24** Su	04:21 AM 11.0 335 10:33 AM 4.4 134 03:57 PM 9.9 302 10:16 PM 1.8 55	
10 Su	05:17 AM 12.2 372 11:21 AM 3.7 113 04:52 PM 11.1 338 11:16 PM 0.5 15		**25** M	04:45 AM 11.3 344 11:02 AM 3.3 101 04:44 PM 10.5 320 10:57 PM 2.0 61	
11 M	05:46 AM 12.4 378 12:00 PM 2.8 85 05:44 PM 11.3 344		**26** Tu	05:11 AM 11.6 354 11:33 AM 2.2 67 05:29 PM 11.0 335 11:37 PM 2.4 73	
12 Tu	12:00 AM 1.2 37 06:15 AM 12.4 378 12:37 PM 2.0 61 06:33 PM 11.3 344		**27** W	05:38 AM 11.9 363 12:07 PM 1.1 34 06:15 PM 11.4 347	
13 W	12:41 AM 2.0 61 06:44 AM 12.3 375 01:14 PM 1.3 40 07:21 PM 11.2 341		**28** Th	12:17 AM 3.0 91 06:08 AM 12.1 369 12:45 PM 0.1 3 07:03 PM 11.6 354	
14 Th	01:22 AM 3.0 91 07:15 AM 12.1 369 01:51 PM 0.9 27 08:09 PM 11.0 335		**29** F	01:00 AM 3.7 113 06:41 AM 12.1 369 01:26 PM -0.7 -21 07:54 PM 11.7 357	
15 F	02:03 AM 4.0 122 07:48 AM 11.7 357 02:29 PM 0.7 21 08:58 PM 10.8 329		**30** Sa	01:44 AM 4.5 137 07:18 AM 12.0 366 02:11 PM -1.2 -37 08:48 PM 11.7 357	
			31 Su	02:33 AM 5.3 162 07:59 AM 11.7 357 03:00 PM -1.3 -40 09:48 PM 11.4 347	

Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.
Referenced to Station: SEATTLE (Madison St.), Elliott Bay (9447130) Height offset in feet (low:*1.00 high: * 1.04) Time offset in mins (low:18 high: 11)

Generated On: Mon Jun 17 22:35:05 GMT 2013

StationId:9445882
Source:NOAA/NOS/CO-OPS
Station Type:Subordinate
Time Zone:LST/LDT
Datum:mean lower low water (MLLW) which is the chart datum of soundings

NOAA Tide Predictions

Eagle Harbor, Bainbridge Island,Washington,2013

Times and Heights of High and Low Waters

January

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 Tu	12:45 AM -0.2 -6 07:50 AM 12.4 378 01:54 PM 5.7 174 06:55 PM 9.2 280		**16** W	01:32 AM 1.0 30 08:19 AM 12.8 390 02:48 PM 3.6 110 08:23 PM 9.1 277	
2 W	01:24 AM 0.7 21 08:22 AM 12.4 378 02:40 PM 5.0 152 07:51 PM 8.8 268		**17** Th	02:18 AM 2.7 82 08:57 AM 12.4 378 03:42 PM 3.1 94 09:37 PM 8.6 262	
3 Th	02:04 AM 1.8 55 08:57 AM 12.4 378 03:30 PM 4.1 125 08:57 PM 8.4 256		**18** F	03:07 AM 4.4 134 09:37 AM 12.0 366 04:39 PM 2.6 79 11:09 PM 8.3 253	
4 F	02:48 AM 3.2 98 09:35 AM 12.3 375 04:24 PM 3.1 94 10:16 PM 8.2 250		**19** Sa	04:04 AM 6.0 183 10:21 AM 11.5 351 05:37 PM 2.1 64	
5 Sa	03:39 AM 4.7 143 10:16 AM 12.1 369 05:21 PM 2.0 61 11:48 PM 8.4 256		**20** Su	01:01 AM 8.7 265 05:22 AM 7.2 219 11:09 AM 10.9 332 06:34 PM 1.6 49	
6 Su	04:43 AM 6.2 189 11:01 AM 12.0 366 06:19 PM 0.7 21		**21** M	02:32 AM 9.5 290 07:00 AM 7.9 241 12:00 PM 10.5 320 07:25 PM 1.0 30	
7 M	01:25 AM 9.2 280 06:02 AM 7.3 223 11:52 AM 11.9 363 07:14 PM -0.5 -15		**22** Tu	03:30 AM 10.2 311 08:22 AM 8.0 244 12:53 PM 10.3 314 08:10 PM 0.6 18	
8 Tu	02:47 AM 10.2 311 07:25 AM 7.9 241 12:46 PM 11.9 363 08:07 PM -1.6 -49		**23** W	04:12 AM 10.8 329 09:19 AM 7.8 238 01:43 PM 10.2 311 08:50 PM 0.1 3	
9 W	03:45 AM 11.2 341 08:37 AM 7.9 241 01:42 PM 12.0 366 08:58 PM -2.4 -73		**24** Th	04:44 AM 11.2 341 10:00 AM 7.6 232 02:29 PM 10.2 311 09:27 PM -0.2 -6	
10 Th	04:32 AM 11.9 363 09:38 AM 7.6 232 02:37 PM 11.9 363 09:46 PM -2.9 -88		**25** F	05:10 AM 11.4 347 10:33 AM 7.2 219 03:12 PM 10.3 314 10:02 PM -0.5 -15	
11 F	05:13 AM 12.5 381 10:33 AM 7.1 216 03:32 PM 11.8 360 10:33 PM -2.9 -88		**26** Sa	05:31 AM 11.6 354 11:02 AM 6.8 207 03:52 PM 10.3 314 10:37 PM -0.6 -18	
12 Sa	05:52 AM 12.8 390 11:24 AM 6.4 195 04:27 PM 11.6 354 11:19 PM -2.5 -76		**27** Su	05:51 AM 11.8 360 11:31 AM 6.3 192 04:33 PM 10.3 314 11:12 PM -0.4 -12	
13 Su	06:29 AM 13.0 396 12:14 PM 5.7 174 05:22 PM 11.1 338		**28** M	06:14 AM 12.0 366 12:03 PM 5.6 171 05:15 PM 10.3 314 11:47 PM -0.1 -3	
14 M	12:04 AM -1.6 -49 07:06 AM 13.1 399 01:04 PM 5.0 152 06:19 PM 10.5 320		**29** Tu	06:39 AM 12.2 372 12:39 PM 4.9 149 06:00 PM 10.1 308	
15 Tu	12:48 AM -0.4 -12 07:42 AM 13.0 396 01:55 PM 4.3 131 07:19 PM 9.8 299		**30** W	12:24 AM 0.6 18 07:08 AM 12.4 378 01:18 PM 4.0 122 06:49 PM 9.9 302	
			31 Th	01:02 AM 1.6 49 07:38 AM 12.4 378 02:01 PM 3.2 98 07:44 PM 9.6 293	

February

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	01:42 AM 2.8 85 08:12 AM 12.4 378 02:49 PM 2.4 73 08:47 PM 9.2 280		**16** Sa	02:39 AM 5.3 162 08:44 AM 11.2 341 03:35 PM 1.9 58 10:24 PM 9.0 274	
2 Sa	02:26 AM 4.3 131 08:49 AM 12.2 372 03:42 PM 1.6 49 10:01 PM 9.0 274		**17** Su	03:34 AM 6.6 201 09:28 AM 10.6 323 04:30 PM 1.9 58	
3 Su	03:17 AM 5.7 174 09:32 AM 11.9 363 04:41 PM 1.0 30 11:32 PM 9.0 274		**18** M	12:03 AM 9.0 274 04:51 AM 7.5 229 10:19 AM 10.1 308 05:30 PM 1.8 55	
4 M	04:24 AM 7.0 213 10:23 AM 11.6 354 05:44 PM 0.3 9		**19** Tu	01:44 AM 9.4 287 06:39 AM 7.8 238 11:19 AM 9.6 293 06:31 PM 1.6 49	
5 Tu	01:17 AM 9.5 290 05:53 AM 7.8 238 11:24 AM 11.3 344 06:48 PM -0.4 -12		**20** W	02:48 AM 9.9 302 08:05 AM 7.6 232 12:23 PM 9.4 287 07:28 PM 1.3 40	
6 W	02:38 AM 10.4 317 07:25 AM 7.9 241 12:31 PM 11.2 341 07:48 PM -1.1 -34		**21** Th	03:29 AM 10.4 317 08:57 AM 7.2 219 01:23 PM 9.5 290 08:16 PM 0.9 27	
7 Th	03:32 AM 11.2 341 08:38 AM 7.4 226 01:37 PM 11.2 341 08:42 PM -1.5 -46		**22** F	03:59 AM 10.7 326 09:32 AM 6.7 204 02:15 PM 9.7 296 08:58 PM 0.6 18	
8 F	04:13 AM 11.8 360 09:35 AM 6.7 204 02:38 PM 11.3 344 09:32 PM -1.7 -52		**23** Sa	04:21 AM 11.0 335 10:00 AM 6.1 186 03:02 PM 10.0 305 09:36 PM 0.5 15	
9 Sa	04:48 AM 12.2 372 10:23 AM 5.8 177 03:35 PM 11.3 344 10:19 PM -1.5 -46		**24** Su	04:41 AM 11.2 341 10:27 AM 5.4 165 03:45 PM 10.2 311 10:13 PM 0.5 15	
10 Su	05:21 AM 12.5 381 11:08 AM 4.9 149 04:30 PM 11.2 341 11:03 PM -0.9 -27		**25** M	05:02 AM 11.5 351 10:56 AM 4.5 137 04:27 PM 10.5 320 10:49 PM 0.7 21	
11 M	05:53 AM 12.6 384 11:51 AM 4.0 122 05:23 PM 11.0 335 11:46 PM 0.0 0		**26** Tu	05:25 AM 11.7 357 11:28 AM 3.6 110 05:11 PM 10.6 323 11:26 PM 1.3 40	
12 Tu	06:24 AM 12.6 384 12:34 PM 3.2 98 06:16 PM 10.6 323		**27** W	05:52 AM 11.9 363 12:04 PM 2.6 79 05:57 PM 10.7 326	
13 W	12:28 AM 1.2 37 06:57 AM 12.5 381 01:17 PM 2.6 79 07:10 PM 10.2 311		**28** Th	12:04 AM 2.0 61 06:21 AM 12.1 369 12:44 PM 1.7 52 06:47 PM 10.6 323	
14 Th	01:09 AM 2.5 76 07:30 AM 12.2 372 02:00 PM 2.2 67 08:06 PM 9.7 296				
15 F	01:52 AM 3.9 119 08:06 AM 11.8 360 02:46 PM 2.0 61 09:09 PM 9.3 283				

March

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	12:44 AM 3.0 91 06:53 AM 12.1 369 01:27 PM 1.0 30 07:41 PM 10.4 317		**16** Sa	02:33 AM 5.1 155 08:16 AM 10.8 329 02:56 PM 0.8 24 09:43 PM 10.0 305	
2 Sa	01:27 AM 4.2 128 07:29 AM 11.9 363 02:14 PM 0.4 12 08:42 PM 10.1 308		**17** Su	03:20 AM 6.0 183 08:55 AM 10.3 314 03:40 PM 1.0 30 10:43 PM 9.7 296	
3 Su	02:15 AM 5.4 165 08:10 AM 11.6 354 03:07 PM 0.2 6 09:53 PM 9.8 299		**18** M	04:16 AM 6.8 207 09:39 AM 9.6 293 04:30 PM 1.4 43 11:55 PM 9.5 290	
4 M	03:13 AM 6.5 198 08:58 AM 11.1 338 04:07 PM 0.1 3 11:19 PM 9.7 296		**19** Tu	05:31 AM 7.3 223 10:33 AM 9.1 277 05:27 PM 1.7 52	
5 Tu	04:29 AM 7.3 223 09:59 AM 10.6 323 05:14 PM 0.1 3		**20** W	01:19 AM 9.5 290 07:14 AM 7.3 223 11:40 AM 8.6 262 06:31 PM 1.9 58	
6 W	12:55 AM 10.0 305 06:06 AM 7.5 229 11:13 AM 10.2 311 06:23 PM 0.0 0		**21** Th	02:30 AM 9.7 296 08:34 AM 6.8 207 12:53 PM 8.5 259 07:34 PM 1.9 58	
7 Th	02:08 AM 10.6 323 07:34 AM 6.9 210 12:31 PM 10.1 308 07:28 PM -0.1 -3		**22** F	03:16 AM 10.0 305 09:20 AM 6.1 186 02:01 PM 8.7 265 08:31 PM 1.8 55	
8 F	02:58 AM 11.1 338 08:37 AM 6.0 183 01:44 PM 10.2 311 08:26 PM -0.2 -6		**23** Sa	03:48 AM 10.3 314 09:53 AM 5.4 165 02:59 PM 9.1 277 09:20 PM 1.8 55	
9 Sa	03:37 AM 11.5 351 09:26 AM 4.9 149 02:48 PM 10.5 320 09:17 PM 0.0 0		**24** Su	04:14 AM 10.6 323 10:20 AM 4.4 134 03:50 PM 9.5 290 10:03 PM 1.8 55	
10 Su	05:10 AM 11.8 360 11:08 AM 3.8 116 04:45 PM 10.7 326 11:03 PM 0.5 15		**25** M	04:38 AM 10.9 332 10:49 AM 3.4 104 04:37 PM 10.1 308 10:44 PM 2.0 61	
11 M	05:39 AM 11.9 363 11:47 AM 2.8 85 05:37 PM 10.8 329 11:47 PM 1.2 37		**26** Tu	05:04 AM 11.2 341 11:20 AM 2.3 70 05:22 PM 10.5 320 11:24 PM 2.5 76	
12 Tu	06:08 AM 11.9 363 12:24 PM 2.0 61 06:26 PM 10.8 329		**27** W	05:31 AM 11.4 347 11:54 AM 1.1 34 06:08 PM 10.9 332	
13 W	12:28 AM 2.1 64 06:37 AM 11.9 363 01:01 PM 1.4 43 07:14 PM 10.8 329		**28** Th	12:04 AM 3.1 94 06:01 AM 11.6 354 12:32 PM 0.1 3 06:56 PM 11.2 341	
14 Th	01:09 AM 3.1 94 07:08 AM 11.6 354 01:38 PM 0.9 27 08:02 PM 10.6 323		**29** F	12:47 AM 3.8 116 06:34 AM 11.7 357 01:13 PM -0.7 -21 07:47 PM 11.3 344	
15 F	01:50 AM 4.1 125 07:41 AM 11.3 344 02:16 PM 0.8 24 08:51 PM 10.3 314		**30** Sa	01:31 AM 4.6 140 07:11 AM 11.6 354 01:58 PM -1.2 -37 08:41 PM 11.2 341	
			31 Su	02:20 AM 5.4 165 07:52 AM 11.3 344 02:47 PM -1.3 -40 09:41 PM 11.0 335	

Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.
Referenced to Station: SEATTLE (Madison St.), Elliott Bay (9447130) Height offset in feet (low:*1.02 high: * 1.00) Time offset in mins (low:5 high: 4)

Generated On: Mon Jun 17 22:34:48 GMT 2013

StationId:9447427
Source:NOAA/NOS/CO-OPS
Station Type:Subordinate
Time Zone:LST/LDT
Datum:mean lower low water (MLLW) which is the chart datum of soundings

NOAA Tide Predictions

Edmonds,Washington,2013

Times and Heights of High and Low Waters

January

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 Tu	12:36 AM -0.2 -6 07:46 AM 11.9 363 01:45 PM 5.6 171 06:51 PM 8.9 271		**16** W	01:23 AM 1.0 30 08:15 AM 12.3 375 02:39 PM 3.5 107 08:19 PM 8.7 265	
2 W	01:15 AM 0.6 18 08:18 AM 11.9 363 02:31 PM 4.8 146 07:47 PM 8.5 259		**17** Th	02:09 AM 2.6 79 08:53 AM 11.9 363 03:33 PM 3.0 91 09:33 PM 8.2 250	
3 Th	01:55 AM 1.8 55 08:53 AM 11.9 363 03:21 PM 4.0 122 08:53 PM 8.1 247		**18** F	02:58 AM 4.3 131 09:33 AM 11.5 351 04:30 PM 2.5 76 11:05 PM 8.0 244	
4 F	02:39 AM 3.1 94 09:31 AM 11.8 360 04:15 PM 3.0 91 10:12 PM 7.9 241		**19** Sa	03:55 AM 5.8 177 10:17 AM 11.0 335 05:28 PM 2.0 61	
5 Sa	03:30 AM 4.6 140 10:12 AM 11.7 357 05:12 PM 1.9 58 11:44 PM 8.1 247		**20** Su	12:57 AM 8.3 253 05:13 AM 7.0 213 11:05 AM 10.5 320 06:25 PM 1.5 46	
6 Su	04:34 AM 6.0 183 10:57 AM 11.5 351 06:10 PM 0.7 21		**21** M	02:28 AM 9.1 277 06:51 AM 7.7 235 11:56 AM 10.1 308 07:16 PM 1.0 30	
7 M	01:21 AM 8.8 268 05:53 AM 7.1 216 11:48 AM 11.5 351 07:05 PM -0.5 -15		**22** Tu	03:26 AM 9.8 299 08:13 AM 7.8 238 12:49 PM 9.9 302 08:01 PM 0.5 15	
8 Tu	02:43 AM 9.8 299 07:16 AM 7.6 232 12:42 PM 11.4 347 07:58 PM -1.5 -46		**23** W	04:08 AM 10.4 317 09:10 AM 7.6 232 01:39 PM 9.8 299 08:41 PM 0.1 3	
9 W	03:41 AM 10.7 326 08:28 AM 7.7 235 01:38 PM 11.5 351 08:49 PM -2.3 -70		**24** Th	04:40 AM 10.7 326 09:51 AM 7.3 223 02:25 PM 9.8 299 09:18 PM -0.2 -6	
10 Th	04:28 AM 11.5 351 09:29 AM 7.4 226 02:33 PM 11.5 351 09:37 PM -2.8 -85		**25** F	05:06 AM 11.0 335 10:24 AM 7.0 213 03:08 PM 9.9 302 09:53 PM -0.5 -15	
11 F	05:09 AM 12.0 366 10:24 AM 6.9 210 03:28 PM 11.4 347 10:24 PM -2.8 -85		**26** Sa	05:27 AM 11.2 341 10:53 AM 6.6 201 03:48 PM 9.9 302 10:28 PM -0.5 -15	
12 Sa	05:48 AM 12.3 375 11:15 AM 6.2 189 04:23 PM 11.1 338 11:10 PM -2.4 -73		**27** Su	05:47 AM 11.4 347 11:22 AM 6.1 186 04:29 PM 9.9 302 11:03 PM -0.4 -12	
13 Su	06:25 AM 12.5 381 12:05 PM 5.5 168 05:18 PM 10.7 326 11:55 PM -1.6 -49		**28** M	06:10 AM 11.6 354 11:54 AM 5.5 168 05:11 PM 9.9 302 11:38 PM -0.1 -3	
14 M	07:02 AM 12.6 384 12:55 PM 4.8 146 06:15 PM 10.1 308		**29** Tu	06:35 AM 11.8 360 12:30 PM 4.7 143 05:56 PM 9.7 296	
15 Tu	12:39 AM -0.4 -12 07:38 AM 12.5 381 01:46 PM 4.1 125 07:15 PM 9.4 287		**30** W	12:15 AM 0.6 18 07:04 AM 11.9 363 01:09 PM 3.9 119 06:45 PM 9.5 290	
			31 Th	12:53 AM 1.6 49 07:34 AM 11.9 363 01:52 PM 3.1 94 07:40 PM 9.2 280	

February

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	01:33 AM 2.8 85 08:08 AM 11.9 363 02:40 PM 2.3 70 08:43 PM 8.9 271		**16** Sa	02:30 AM 5.2 158 08:40 AM 10.8 329 03:26 PM 1.8 55 10:20 PM 8.6 262	
2 Sa	02:17 AM 4.1 125 08:45 AM 11.7 357 03:33 PM 1.6 49 09:57 PM 8.6 262		**17** Su	03:25 AM 6.4 195 09:24 AM 10.2 311 04:21 PM 1.8 55 11:59 PM 8.6 262	
3 Su	03:08 AM 5.6 171 09:28 AM 11.4 347 04:32 PM 0.9 27 11:28 PM 8.7 265		**18** M	04:42 AM 7.3 223 10:15 AM 9.7 296 05:21 PM 1.8 55	
4 M	04:15 AM 6.8 207 10:19 AM 11.1 338 05:35 PM 0.3 9		**19** Tu	01:40 AM 9.0 274 06:30 AM 7.6 232 11:15 AM 9.2 280 06:22 PM 1.6 49	
5 Tu	01:13 AM 9.2 280 05:44 AM 7.6 232 11:20 AM 10.9 332 06:39 PM -0.4 -12		**20** W	02:44 AM 9.5 290 07:56 AM 7.4 226 12:19 PM 9.1 277 07:19 PM 1.3 40	
6 W	02:34 AM 10.0 305 07:16 AM 7.7 235 12:27 PM 10.7 326 07:39 PM -1.0 -30		**21** Th	03:25 AM 10.0 305 08:48 AM 7.0 213 01:19 PM 9.1 277 08:07 PM 0.9 27	
7 Th	03:28 AM 10.7 326 08:29 AM 7.2 219 01:33 PM 10.8 329 08:33 PM -1.5 -46		**22** F	03:55 AM 10.3 314 09:23 AM 6.5 198 02:11 PM 9.3 283 08:49 PM 0.6 18	
8 F	04:09 AM 11.3 344 09:26 AM 6.5 198 02:34 PM 10.8 329 09:23 PM -1.6 -49		**23** Sa	04:17 AM 10.5 320 09:51 AM 5.9 180 02:58 PM 9.6 293 09:27 PM 0.4 12	
9 Sa	04:44 AM 11.7 357 10:14 AM 5.6 171 03:31 PM 10.9 332 10:10 PM -1.4 -43		**24** Su	04:37 AM 10.8 329 10:18 AM 5.2 158 03:41 PM 9.8 299 10:04 PM 0.5 15	
10 Su	05:17 AM 12.0 366 10:59 AM 4.7 143 04:26 PM 10.8 329 10:54 PM -0.9 -27		**25** M	04:58 AM 11.0 335 10:47 AM 4.4 134 04:23 PM 10.0 305 10:40 PM 0.7 21	
11 M	05:49 AM 12.1 369 11:42 AM 3.9 119 05:19 PM 10.5 320 11:37 PM 0.0 0		**26** Tu	05:21 AM 11.3 344 11:19 AM 3.5 107 05:07 PM 10.2 311 11:17 PM 1.2 37	
12 Tu	06:20 AM 12.1 369 12:25 PM 3.2 98 06:12 PM 10.2 311		**27** W	05:48 AM 11.5 351 11:55 AM 2.5 76 05:53 PM 10.2 311 11:55 PM 2.0 61	
13 W	12:19 AM 1.1 34 06:53 AM 12.0 366 01:08 PM 2.6 79 07:06 PM 9.8 299		**28** Th	06:17 AM 11.6 354 12:35 PM 1.7 52 06:43 PM 10.2 311	
14 Th	01:00 AM 2.4 73 07:26 AM 11.7 357 01:51 PM 2.2 67 08:02 PM 9.3 283				
15 F	01:43 AM 3.8 116 08:02 AM 11.3 344 02:37 PM 1.9 58 09:05 PM 8.9 271				

March

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	12:35 AM 2.9 88 06:49 AM 11.6 354 01:18 PM 0.9 27 07:37 PM 10.0 305		**16** Sa	02:24 AM 5.0 152 08:12 AM 10.4 317 02:47 PM 0.8 24 09:39 PM 9.6 293	
2 Sa	01:18 AM 4.1 125 07:25 AM 11.4 347 02:05 PM 0.4 12 08:38 PM 9.7 296		**17** Su	03:11 AM 5.9 180 08:51 AM 9.8 299 03:31 PM 1.0 30 10:39 PM 9.3 283	
3 Su	02:06 AM 5.2 158 08:06 AM 11.1 338 02:58 PM 0.2 6 09:49 PM 9.4 287		**18** M	04:07 AM 6.6 201 09:35 AM 9.3 283 04:21 PM 1.3 40 11:51 PM 9.1 277	
4 M	03:04 AM 6.3 192 08:54 AM 10.7 326 03:58 PM 0.1 3 11:15 PM 9.3 283		**19** Tu	05:22 AM 7.1 216 10:29 AM 8.7 265 05:18 PM 1.6 49	
5 Tu	04:20 AM 7.1 216 09:55 AM 10.2 311 05:05 PM 0.1 3		**20** W	01:15 AM 9.1 277 07:05 AM 7.1 216 11:36 AM 8.3 253 06:22 PM 1.9 58	
6 W	12:51 AM 9.6 293 05:57 AM 7.2 219 11:09 AM 9.8 299 06:14 PM 0.0 0		**21** Th	02:26 AM 9.3 283 08:25 AM 6.6 201 12:49 PM 8.2 250 07:25 PM 1.9 58	
7 Th	02:04 AM 10.1 308 07:25 AM 6.7 204 12:27 PM 9.7 296 07:19 PM -0.1 -3		**22** F	03:12 AM 9.6 293 09:11 AM 6.0 183 01:57 PM 8.3 253 08:22 PM 1.8 55	
8 F	02:54 AM 10.6 323 08:28 AM 5.8 177 01:40 PM 9.8 299 08:17 PM -0.2 -6		**23** Sa	03:44 AM 9.9 302 09:44 AM 5.2 158 02:55 PM 8.7 265 09:11 PM 1.7 52	
9 Sa	03:33 AM 11.0 335 09:17 AM 4.7 143 02:44 PM 10.1 308 09:08 PM 0.0 0		**24** Su	04:10 AM 10.2 311 10:11 AM 4.3 131 03:46 PM 9.2 280 09:54 PM 1.7 52	
10 Su	05:06 AM 11.3 344 10:59 AM 3.7 113 04:41 PM 10.3 314 10:54 PM 0.5 15		**25** M	04:34 AM 10.5 320 10:40 AM 3.3 101 04:33 PM 9.6 293 10:35 PM 2.0 61	
11 M	05:35 AM 11.4 347 11:38 AM 2.7 82 05:33 PM 10.4 317 11:38 PM 1.2 37		**26** Tu	05:00 AM 10.7 326 11:11 AM 2.2 67 05:18 PM 10.1 308 11:15 PM 2.4 73	
12 Tu	06:04 AM 11.5 351 12:15 PM 1.9 58 06:22 PM 10.4 317		**27** W	05:27 AM 11.0 335 11:45 AM 1.1 34 06:04 PM 10.5 320 11:55 PM 3.0 91	
13 W	12:19 AM 2.0 61 06:33 AM 11.4 347 12:52 PM 1.3 40 07:10 PM 10.3 314		**28** Th	05:57 AM 11.1 338 12:23 PM 0.1 3 06:52 PM 10.7 326	
14 Th	01:00 AM 3.0 91 07:04 AM 11.2 341 01:29 PM 0.9 27 07:58 PM 10.2 311		**29** F	12:38 AM 3.7 113 06:30 AM 11.2 341 01:04 PM -0.7 -21 07:43 PM 10.8 329	
15 F	01:41 AM 4.0 122 07:37 AM 10.8 329 02:07 PM 0.7 21 08:47 PM 9.9 302		**30** Sa	01:22 AM 4.5 137 07:07 AM 11.1 338 01:49 PM -1.1 -34 08:37 PM 10.8 329	
			31 Su	02:11 AM 5.3 162 07:48 AM 10.8 329 02:38 PM -1.2 -37 09:37 PM 10.5 320	

Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.
Referenced to Station: SEATTLE (Madison St.), Elliott Bay (9447130) Height offset in feet (low:*0.99 high: * 0.96) Time offset in mins (low:-4 high: 0)

Generated On: Mon Jun 17 22:33:37 GMT 2013

StationId:9449880
Source:NOAA/NOS/CO-OPS
Station Type:Harmonic
Time Zone:LST/LDT
Datum:mean lower low water (MLLW) which is the chart datum of soundings

NOAA Tide Predictions

FRIDAY HARBOR,Washington,2013

Times and Heights of High and Low Waters

January

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 Tu	12:22 AM	0.0 0	**16** W	01:02 AM	1.6 49
	08:20 AM	8.6 262		08:30 AM	9.1 277
	02:22 PM	5.1 155		03:15 PM	3.6 110
	05:54 PM	5.7 174		08:21 PM	5.5 168
2 W	12:57 AM	0.6 18	**17** Th	01:40 AM	2.8 85
	08:44 AM	8.5 259		09:01 AM	8.9 271
	03:11 PM	4.4 134		04:12 PM	2.9 88
	07:08 PM	5.1 155		09:59 PM	5.2 158
3 Th	01:32 AM	1.5 46	**18** F	02:18 AM	4.0 122
	09:09 AM	8.5 259		09:31 AM	8.6 262
	04:00 PM	3.5 107		05:06 PM	2.2 67
	08:40 PM	4.7 143			
4 F	02:10 AM	2.5 76	**19** Sa	12:06 AM	5.4 165
	09:35 AM	8.4 256		03:00 AM	5.1 155
	04:48 PM	2.4 73		10:01 AM	8.3 253
	10:35 PM	4.6 140		05:56 PM	1.5 46
5 Sa	02:54 AM	3.6 110	**20** Su	02:22 AM	6.1 186
	10:02 AM	8.3 253		04:05 AM	6.0 183
	05:35 PM	1.3 40		10:31 AM	7.9 241
				06:42 PM	1.0 30
6 Su	12:50 AM	5.1 155	**21** M	03:32 AM	6.8 207
	03:50 AM	4.7 143		05:57 AM	6.7 204
	10:32 AM	8.3 253		11:03 AM	7.6 232
	06:23 PM	0.2 6		07:25 PM	0.5 15
7 M	02:39 AM	6.0 183	**22** Tu	04:11 AM	7.4 226
	05:10 AM	5.8 177		07:41 AM	6.9 210
	11:07 AM	8.3 253		11:38 AM	7.4 226
	07:11 PM	-0.7 -21		08:05 PM	0.1 3
8 Tu	03:44 AM	7.0 213	**23** W	04:44 AM	7.7 235
	06:42 AM	6.6 201		08:56 AM	6.9 210
	11:48 AM	8.3 253		12:21 PM	7.2 219
	07:59 PM	-1.6 -49		08:42 PM	-0.2 -6
9 W	04:30 AM	7.8 238	**24** Th	05:13 AM	7.9 241
	08:05 AM	6.9 210		09:46 AM	6.7 204
	12:37 PM	8.3 253		01:10 PM	7.1 216
	08:46 PM	-2.1 -64		09:17 PM	-0.4 -12
10 Th	05:11 AM	8.4 256	**25** F	05:39 AM	8.0 244
	09:16 AM	7.0 213		10:23 AM	6.5 198
	01:33 PM	8.2 250		02:00 PM	7.0 213
	09:33 PM	-2.3 -70		09:51 PM	-0.5 -15
11 F	05:48 AM	8.9 271	**26** Sa	06:02 AM	8.1 247
	10:20 AM	6.8 207		10:55 AM	6.1 186
	02:33 PM	8.0 244		02:50 PM	6.8 207
	10:18 PM	-2.1 -64		10:23 PM	-0.4 -12
12 Sa	06:23 AM	9.1 277	**27** Su	06:23 AM	8.1 247
	11:19 AM	6.4 195		11:28 AM	5.7 174
	03:36 PM	7.7 235		03:40 PM	6.6 201
	11:01 PM	-1.6 -49		10:55 PM	-0.2 -6
13 Su	06:56 AM	9.2 280	**28** M	06:44 AM	8.2 250
	12:18 PM	5.8 177		12:04 PM	5.1 155
	04:41 PM	7.2 219		04:32 PM	6.4 195
	11:43 PM	-0.7 -21		11:27 PM	0.1 3
14 M	07:28 AM	9.2 280	**29** Tu	07:04 AM	8.2 250
	01:16 PM	5.1 155		12:43 PM	4.5 137
	05:48 PM	6.6 201		05:27 PM	6.1 186
15 Tu	12:23 AM	0.4 12	**30** W	12:01 AM	0.7 21
	07:59 AM	9.2 280		07:26 AM	8.3 253
	02:16 PM	4.4 134		01:25 PM	3.8 116
	06:59 PM	6.0 183		06:28 PM	5.8 177
			31 Th	12:36 AM	1.4 43
				07:49 AM	8.3 253
				02:10 PM	3.0 91
				07:38 PM	5.5 168

February

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	01:12 AM	2.4 73	**16** Sa	02:01 AM	4.8 146
	08:14 AM	8.3 253		08:29 AM	7.9 241
	03:00 PM	2.2 67		03:49 PM	1.7 52
	09:01 PM	5.3 162		11:27 PM	6.0 183
2 Sa	01:52 AM	3.4 104	**17** Su	02:51 AM	5.6 171
	08:41 AM	8.2 250		08:58 AM	7.5 229
	03:53 PM	1.4 43		04:44 PM	1.4 43
	10:45 PM	5.3 162			
3 Su	02:37 AM	4.5 137	**18** M	01:22 AM	6.4 195
	09:11 AM	8.1 247		04:09 AM	6.2 189
	04:49 PM	0.6 18		09:29 AM	7.2 219
				05:40 PM	1.1 34
4 M	12:51 AM	5.8 177	**19** Tu	02:40 AM	6.8 207
	03:37 AM	5.5 168		06:02 AM	6.4 195
	09:46 AM	8.1 247		10:07 AM	6.9 210
	05:47 PM	-0.2 -6		06:34 PM	0.8 24
5 Tu	02:31 AM	6.6 201	**20** W	03:26 AM	7.1 216
	05:10 AM	6.3 192		07:37 AM	6.4 195
	10:29 AM	8.0 244		10:59 AM	6.7 204
	06:44 PM	-0.8 -24		07:24 PM	0.5 15
6 W	03:28 AM	7.3 223	**21** Th	03:59 AM	7.2 219
	06:50 AM	6.7 204		08:36 AM	6.1 186
	11:23 AM	7.8 238		12:06 PM	6.5 198
	07:38 PM	-1.2 -37		08:08 PM	0.3 9
7 Th	04:08 AM	7.8 238	**22** F	04:25 AM	7.3 223
	08:13 AM	6.6 201		09:14 AM	5.8 177
	12:29 PM	7.7 235		01:13 PM	6.4 195
	08:29 PM	-1.4 -43		08:47 PM	0.2 6
8 F	04:43 AM	8.2 250	**23** Sa	04:47 AM	7.3 223
	09:18 AM	6.3 192		09:44 AM	5.3 162
	01:41 PM	7.5 229		02:15 PM	6.3 192
	09:17 PM	-1.3 -40		09:23 PM	0.2 6
9 Sa	05:14 AM	8.4 256	**24** Su	05:06 AM	7.3 223
	10:13 AM	5.7 174		10:14 AM	4.7 143
	02:52 PM	7.3 223		03:11 PM	6.3 192
	10:02 PM	-0.8 -24		09:57 PM	0.4 12
10 Su	05:43 AM	8.5 259	**25** M	05:24 AM	7.4 226
	11:02 AM	5.0 152		10:46 AM	4.1 125
	04:00 PM	7.1 216		04:05 PM	6.3 192
	10:44 PM	-0.2 -6		10:31 PM	0.7 21
11 M	06:11 AM	8.6 262	**26** Tu	05:43 AM	7.5 229
	11:49 AM	4.3 131		11:21 AM	3.3 101
	05:04 PM	6.8 207		04:59 PM	6.3 192
	11:23 PM	0.7 21		11:06 PM	1.2 37
12 Tu	06:38 AM	8.6 262	**27** W	06:04 AM	7.6 232
	12:36 PM	3.6 110		11:58 AM	2.6 79
	06:08 PM	6.5 198		05:55 PM	6.2 189
				11:43 PM	1.8 55
13 W	12:02 AM	1.7 52	**28** Th	06:26 AM	7.7 235
	07:06 AM	8.5 259		12:39 PM	1.9 58
	01:22 PM	3.0 91		06:55 PM	6.2 189
	07:13 PM	6.3 192			
14 Th	12:40 AM	2.8 85			
	07:33 AM	8.4 256			
	02:09 PM	2.5 76			
	08:24 PM	6.0 183			
15 F	01:19 AM	3.8 116			
	08:01 AM	8.2 250			
	02:57 PM	2.0 61			
	09:46 PM	5.9 180			

March

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	12:22 AM	2.6 79	**16** Sa	02:11 AM	4.7 143
	06:51 AM	7.8 238		07:57 AM	7.3 223
	01:24 PM	1.2 37		02:53 PM	1.0 30
	08:01 PM	6.2 189		10:28 PM	6.7 204
2 Sa	01:04 AM	3.6 110	**17** Su	03:02 AM	5.3 162
	07:19 AM	7.8 238		08:24 AM	7.0 213
	02:13 PM	0.6 18		03:40 PM	1.0 30
	09:18 PM	6.2 189		11:44 PM	6.6 201
3 Su	01:50 AM	4.5 137	**18** M	04:06 AM	5.7 174
	07:50 AM	7.7 235		08:52 AM	6.7 204
	03:08 PM	0.2 6		04:33 PM	1.0 30
	10:49 PM	6.3 192			
4 M	02:48 AM	5.3 162	**19** Tu	01:08 AM	6.6 201
	08:26 AM	7.5 229		05:37 AM	5.9 180
	04:08 PM	-0.1 -3		09:25 AM	6.3 192
				05:32 PM	1.0 30
5 Tu	12:29 AM	6.6 201	**20** W	02:21 AM	6.7 204
	04:09 AM	5.9 180		07:19 AM	5.8 177
	09:10 AM	7.3 223		10:13 AM	6.0 183
	05:12 PM	-0.4 -12		06:32 PM	1.0 30
6 W	01:49 AM	7.0 213	**21** Th	03:12 AM	6.7 204
	05:51 AM	6.1 186		08:29 AM	5.5 168
	10:08 AM	7.0 213		11:30 AM	5.7 174
	06:16 PM	-0.5 -15		07:29 PM	1.0 30
7 Th	02:43 AM	7.3 223	**22** F	03:47 AM	6.7 204
	07:21 AM	5.9 180		09:09 AM	5.0 152
	11:25 AM	6.7 204		01:01 PM	5.5 168
	07:15 PM	-0.4 -12		08:19 PM	1.0 30
8 F	03:23 AM	7.5 229	**23** Sa	04:13 AM	6.7 204
	08:26 AM	5.4 165		09:38 AM	4.4 134
	12:53 PM	6.5 198		02:22 PM	5.5 168
	08:09 PM	-0.2 -6		09:04 PM	1.1 34
9 Sa	03:55 AM	7.7 235	**24** Su	04:34 AM	6.7 204
	09:17 AM	4.7 143		10:06 AM	3.7 113
	02:15 PM	6.5 198		03:30 PM	5.6 171
	08:58 PM	0.3 9		09:45 PM	1.3 40
10 Su	05:24 AM	7.7 235	**25** M	04:52 AM	6.7 204
	11:00 AM	3.9 119		10:36 AM	2.9 88
	04:26 PM	6.5 198		04:30 PM	5.8 177
	10:43 PM	0.9 27		10:24 PM	1.6 49
11 M	05:50 AM	7.8 238	**26** Tu	05:11 AM	6.9 210
	11:40 AM	3.1 94		11:08 AM	2.0 61
	05:30 PM	6.6 201		05:25 PM	6.1 186
	11:24 PM	1.6 49		11:04 PM	2.0 61
12 Tu	06:16 AM	7.8 238	**27** W	05:33 AM	7.0 213
	12:18 PM	2.4 73		11:43 AM	1.2 37
	06:29 PM	6.7 204		06:20 PM	6.4 195
				11:45 PM	2.6 79
13 W	12:05 AM	2.4 73	**28** Th	05:56 AM	7.2 219
	06:41 AM	7.8 238		12:21 PM	0.4 12
	12:55 PM	1.8 55		07:15 PM	6.7 204
	07:26 PM	6.7 204			
14 Th	12:45 AM	3.2 98	**29** F	12:28 AM	3.3 101
	07:06 AM	7.7 235		06:23 AM	7.3 223
	01:32 PM	1.4 43		01:03 PM	-0.2 -6
	08:23 PM	6.7 204		08:13 PM	7.0 213
15 F	01:27 AM	4.0 122	**30** Sa	01:14 AM	4.0 122
	07:31 AM	7.5 229		06:53 AM	7.3 223
	02:11 PM	1.2 37		01:48 PM	-0.7 -21
	09:22 PM	6.7 204		09:16 PM	7.1 216
			31 Su	02:05 AM	4.7 143
				07:26 AM	7.3 223
				02:38 PM	-0.9 -27
				10:24 PM	7.1 216

Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.

Generated On: Mon Jun 17 22:29:30 GMT 2013

Page 2 of 5

StationId:9447814
Source:NOAA/NOS/CO-OPS
Station Type:Subordinate
Time Zone:LST/LDT
Datum:mean lower low water (MLLW) which is the chart datum of soundings

NOAA Tide Predictions

Glendale, Whidbey Island,Washington,2013

Times and Heights of High and Low Waters

January

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 Tu	12:37 AM -0.2 -6 07:47 AM 12.0 366 01:46 PM 5.6 171 06:52 PM 9.0 274		**16** W	01:24 AM 1.0 30 08:16 AM 12.4 378 02:40 PM 3.5 107 08:20 PM 8.8 268	
2 W	01:16 AM 0.6 18 08:19 AM 12.0 366 02:32 PM 4.8 146 07:48 PM 8.6 262		**17** Th	02:10 AM 2.6 79 08:54 AM 12.1 369 03:34 PM 3.0 91 09:34 PM 8.3 253	
3 Th	01:56 AM 1.8 55 08:54 AM 12.0 366 03:22 PM 4.0 122 08:54 PM 8.2 250		**18** F	02:59 AM 4.3 131 09:34 AM 11.6 354 04:31 PM 2.5 76 11:06 PM 8.1 247	
4 F	02:40 AM 3.1 94 09:32 AM 11.9 363 04:16 PM 3.0 91 10:13 PM 8.0 244		**19** Sa	03:56 AM 5.8 177 10:18 AM 11.1 338 05:29 PM 2.0 61	
5 Sa	03:31 AM 4.6 140 10:13 AM 11.8 360 05:13 PM 1.9 58 11:45 PM 8.2 250		**20** Su	12:58 AM 8.4 256 05:14 AM 7.0 213 11:06 AM 10.6 323 06:26 PM 1.5 46	
6 Su	04:35 AM 6.0 183 10:58 AM 11.7 357 06:11 PM 0.7 21		**21** M	02:29 AM 9.2 280 06:52 AM 7.7 235 11:57 AM 10.2 311 07:17 PM 1.0 30	
7 M	01:22 AM 8.9 271 05:54 AM 7.1 216 11:49 AM 11.6 354 07:06 PM -0.5 -15		**22** Tu	03:27 AM 9.9 302 08:14 AM 7.8 238 12:50 PM 10.0 305 08:02 PM 0.5 15	
8 Tu	02:44 AM 9.9 302 07:17 AM 7.6 232 12:43 PM 11.6 354 07:59 PM -1.5 -46		**23** W	04:09 AM 10.5 320 09:11 AM 7.6 232 01:40 PM 9.9 302 08:42 PM 0.1 3	
9 W	03:42 AM 10.8 329 08:29 AM 7.7 235 01:39 PM 11.6 354 08:50 PM -2.3 -70		**24** Th	04:41 AM 10.9 332 09:52 AM 7.3 223 02:26 PM 9.9 302 09:19 PM -0.2 -6	
10 Th	04:29 AM 11.6 354 09:30 AM 7.4 226 02:34 PM 11.6 354 09:38 PM -2.8 -85		**25** F	05:07 AM 11.1 338 10:25 AM 7.0 213 03:09 PM 10.0 305 09:54 PM -0.5 -15	
11 F	05:10 AM 12.1 369 10:25 AM 6.9 210 03:29 PM 11.5 351 10:25 PM -2.8 -85		**26** Sa	05:28 AM 11.3 344 10:54 AM 6.6 201 03:49 PM 10.0 305 10:29 PM -0.5 -15	
12 Sa	05:49 AM 12.5 381 11:16 AM 6.2 189 04:24 PM 11.2 341 11:11 PM -2.4 -73		**27** Su	05:48 AM 11.5 351 11:23 AM 6.1 186 04:30 PM 10.0 305 11:04 PM -0.4 -12	
13 Su	06:26 AM 12.6 384 12:06 PM 5.5 168 05:19 PM 10.8 329 11:56 PM -1.6 -49		**28** M	06:11 AM 11.7 357 11:55 AM 5.5 168 05:12 PM 10.0 305 11:39 PM -0.1 -3	
14 M	07:03 AM 12.7 387 12:56 PM 4.8 146 06:16 PM 10.2 311		**29** Tu	06:36 AM 11.9 363 12:31 PM 4.7 143 05:57 PM 9.8 299	
15 Tu	12:40 AM -0.4 -12 07:39 AM 12.6 384 01:47 PM 4.1 125 07:16 PM 9.5 290		**30** W	12:16 AM 0.6 18 07:05 AM 12.0 366 01:10 PM 3.9 119 06:46 PM 9.6 293	
			31 Th	12:54 AM 1.6 49 07:35 AM 12.1 369 01:53 PM 3.1 94 07:41 PM 9.3 283	

February

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	01:34 AM 2.8 85 08:09 AM 12.0 366 02:41 PM 2.3 70 08:44 PM 9.0 274		**16** Sa	02:31 AM 5.2 158 08:41 AM 10.9 332 03:27 PM 1.8 55 10:21 PM 8.7 265	
2 Sa	02:18 AM 4.1 125 08:46 AM 11.8 360 03:34 PM 1.6 49 09:58 PM 8.7 265		**17** Su	03:26 AM 6.4 195 09:25 AM 10.3 314 04:22 PM 1.8 55	
3 Su	03:09 AM 5.6 171 09:29 AM 11.5 351 04:33 PM 0.9 27 11:29 PM 8.8 268		**18** M	12:00 AM 8.7 265 04:43 AM 7.3 223 10:16 AM 9.8 299 05:22 PM 1.8 55	
4 M	04:16 AM 6.8 207 10:20 AM 11.2 341 05:36 PM 0.3 9		**19** Tu	01:41 AM 9.1 277 06:31 AM 7.6 232 11:16 AM 9.3 283 06:23 PM 1.6 49	
5 Tu	01:14 AM 9.3 283 05:45 AM 7.6 232 11:21 AM 11.0 335 06:40 PM -0.4 -12		**20** W	02:45 AM 9.6 293 07:57 AM 7.4 226 12:20 PM 9.2 280 07:20 PM 1.3 40	
6 W	02:35 AM 10.1 308 07:17 AM 7.7 235 12:28 PM 10.8 329 07:40 PM -1.0 -30		**21** Th	03:26 AM 10.1 308 08:49 AM 7.0 213 01:20 PM 9.2 280 08:08 PM 0.9 27	
7 Th	03:29 AM 10.8 329 08:30 AM 7.2 219 01:34 PM 10.9 332 08:34 PM -1.5 -46		**22** F	03:56 AM 10.4 317 09:24 AM 6.5 198 02:12 PM 9.4 287 08:50 PM 0.6 18	
8 F	04:10 AM 11.4 347 09:27 AM 6.5 198 02:35 PM 11.0 335 09:24 PM -1.6 -49		**23** Sa	04:18 AM 10.6 323 09:52 AM 5.9 180 02:59 PM 9.7 296 09:28 PM 0.4 12	
9 Sa	04:45 AM 11.8 360 10:15 AM 5.6 171 03:32 PM 11.0 335 10:11 PM -1.4 -43		**24** Su	04:38 AM 10.9 332 10:19 AM 5.2 158 03:42 PM 9.9 302 10:05 PM 0.5 15	
10 Su	05:18 AM 12.1 369 11:00 AM 4.7 143 04:27 PM 10.9 332 10:55 PM -0.9 -27		**25** M	04:59 AM 11.1 338 10:48 AM 4.4 134 04:24 PM 10.1 308 10:41 PM 0.7 21	
11 M	05:50 AM 12.2 372 11:43 AM 3.9 119 05:20 PM 10.6 323 11:38 PM 0.0 0		**26** Tu	05:22 AM 11.4 347 11:20 AM 3.5 107 05:08 PM 10.3 314 11:18 PM 1.2 37	
12 Tu	06:21 AM 12.2 372 12:26 PM 3.2 98 06:13 PM 10.3 314		**27** W	05:49 AM 11.6 354 11:56 AM 2.5 76 05:54 PM 10.4 317 11:56 PM 2.0 61	
13 W	12:20 AM 1.1 34 06:54 AM 12.1 369 01:09 PM 2.6 79 07:07 PM 9.9 302		**28** Th	06:18 AM 11.7 357 12:36 PM 1.7 52 06:44 PM 10.3 314	
14 Th	01:01 AM 2.4 73 07:27 AM 11.8 360 01:52 PM 2.2 67 08:03 PM 9.4 287				
15 F	01:44 AM 3.8 116 08:03 AM 11.4 347 02:38 PM 1.9 58 09:06 PM 9.0 274				

March

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	12:36 AM 2.9 88 06:50 AM 11.7 357 01:19 PM 0.9 27 07:38 PM 10.1 308		**16** Sa	02:25 AM 5.0 152 08:13 AM 10.5 320 02:48 PM 0.8 24 09:40 PM 9.7 296	
2 Sa	01:19 AM 4.1 125 07:26 AM 11.5 351 02:06 PM 0.4 12 08:39 PM 9.8 299		**17** Su	03:12 AM 5.9 180 08:52 AM 9.9 302 03:32 PM 1.0 30 10:40 PM 9.4 287	
3 Su	02:07 AM 5.2 158 08:07 AM 11.2 341 02:59 PM 0.2 6 09:50 PM 9.5 290		**18** M	04:08 AM 6.6 201 09:36 AM 9.4 287 04:22 PM 1.3 40 11:52 PM 9.2 280	
4 M	03:05 AM 6.3 192 08:55 AM 10.8 329 03:59 PM 0.1 3 11:16 PM 9.4 287		**19** Tu	05:23 AM 7.1 216 10:30 AM 8.8 268 05:19 PM 1.6 49	
5 Tu	04:21 AM 7.1 216 09:56 AM 10.3 314 05:06 PM 0.1 3		**20** W	01:16 AM 9.2 280 07:06 AM 7.1 216 11:37 AM 8.4 256 06:23 PM 1.9 58	
6 W	12:52 AM 9.7 296 05:58 AM 7.2 219 11:10 AM 9.9 302 06:15 PM 0.0 0		**21** Th	02:27 AM 9.4 287 08:26 AM 6.6 201 12:50 PM 8.2 250 07:26 PM 1.9 58	
7 Th	02:05 AM 10.2 311 07:26 AM 6.7 204 12:28 PM 9.8 299 07:20 PM -0.1 -3		**22** F	03:13 AM 9.7 296 09:12 AM 6.0 183 01:58 PM 8.4 256 08:23 PM 1.8 55	
8 F	02:55 AM 10.7 326 08:29 AM 5.8 177 01:41 PM 9.9 302 08:18 PM -0.2 -6		**23** Sa	03:45 AM 10.0 305 09:45 AM 5.2 158 02:56 PM 8.8 268 09:12 PM 1.7 52	
9 Sa	03:34 AM 11.1 338 09:18 AM 4.7 143 02:45 PM 10.2 311 09:09 PM 0.0 0		**24** Su	04:11 AM 10.3 314 10:12 AM 4.3 131 03:47 PM 9.3 283 09:55 PM 1.7 52	
10 Su	05:07 AM 11.4 347 11:00 AM 3.7 113 04:42 PM 10.4 317 10:55 PM 0.5 15		**25** M	04:35 AM 10.6 323 10:41 AM 3.3 101 04:34 PM 9.8 299 10:36 PM 2.0 61	
11 M	05:36 AM 11.5 351 11:39 AM 2.7 82 05:34 PM 10.5 320 11:39 PM 1.2 37		**26** Tu	05:01 AM 10.8 329 11:12 AM 2.2 67 05:19 PM 10.2 311 11:16 PM 2.4 73	
12 Tu	06:05 AM 11.6 354 12:16 PM 1.9 58 06:23 PM 10.5 320		**27** W	05:28 AM 11.1 338 11:46 AM 1.1 34 06:05 PM 10.6 323 11:56 PM 3.0 91	
13 W	12:20 AM 2.0 61 06:34 AM 11.5 351 12:53 PM 1.3 40 07:11 PM 10.4 317		**28** Th	05:58 AM 11.3 344 12:24 PM 0.1 3 06:53 PM 10.9 332	
14 Th	01:01 AM 3.0 91 07:05 AM 11.3 344 01:30 PM 0.9 27 07:59 PM 10.3 314		**29** F	12:39 AM 3.7 113 06:31 AM 11.3 344 01:05 PM -0.7 -21 07:44 PM 11.0 335	
15 F	01:42 AM 4.0 122 07:38 AM 11.0 335 02:08 PM 0.7 21 08:48 PM 10.0 305		**30** Sa	01:23 AM 4.5 137 07:08 AM 11.2 341 01:50 PM -1.1 -34 08:38 PM 10.9 332	
			31 Su	02:12 AM 5.3 162 07:49 AM 10.9 332 02:39 PM -1.2 -37 09:38 PM 10.6 323	

Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.
Referenced to Station: SEATTLE (Madison St.), Elliott Bay (9447130) Height offset in feet (low:*0.99 high: * 0.97) Time offset in mins (low:-3 high: 1)

Generated On: Mon Jun 17 22:36:54 GMT 2013

StationId:9445993
Source:NOAA/NOS/CO-OPS
Station Type:Subordinate
Time Zone:LST/LDT
Datum:mean lower low water (MLLW) which is the chart datum of soundings

NOAA Tide Predictions

Harper, Yukon Harbor,Washington,2013

Times and Heights of High and Low Waters

January

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 Tu	12:39 AM -0.2 -6 07:40 AM 12.6 384 01:48 PM 5.6 171 06:45 PM 9.4 287		**16** W	01:26 AM 1.0 30 08:09 AM 13.1 399 02:42 PM 3.5 107 08:13 PM 9.3 283	
2 W	01:18 AM 0.6 18 08:12 AM 12.7 387 02:34 PM 4.8 146 07:41 PM 9.0 274		**17** Th	02:12 AM 2.6 79 08:47 AM 12.7 387 03:36 PM 3.0 91 09:27 PM 8.7 265	
3 Th	01:58 AM 1.8 55 08:47 AM 12.6 384 03:24 PM 4.0 122 08:47 PM 8.6 262		**18** F	03:01 AM 4.3 131 09:27 AM 12.2 372 04:33 PM 2.5 76 10:59 PM 8.5 259	
4 F	02:42 AM 3.1 94 09:25 AM 12.5 381 04:18 PM 3.0 91 10:06 PM 8.4 256		**19** Sa	03:58 AM 5.8 177 10:11 AM 11.7 357 05:31 PM 2.0 61	
5 Sa	03:33 AM 4.6 140 10:06 AM 12.4 378 05:15 PM 1.9 58 11:38 PM 8.6 262		**20** Su	12:51 AM 8.9 271 05:16 AM 7.0 213 10:59 AM 11.2 341 06:28 PM 1.5 46	
6 Su	04:37 AM 6.0 183 10:51 AM 12.3 375 06:13 PM 0.7 21		**21** M	02:22 AM 9.7 296 06:54 AM 7.7 235 11:50 AM 10.8 329 07:19 PM 1.0 30	
7 M	01:15 AM 9.3 283 05:56 AM 7.1 216 11:42 AM 12.2 372 07:08 PM -0.5 -15		**22** Tu	03:20 AM 10.4 317 08:16 AM 7.8 238 12:43 PM 10.5 320 08:04 PM 0.5 15	
8 Tu	02:37 AM 10.4 317 07:19 AM 7.6 232 12:36 PM 12.2 372 08:01 PM -1.5 -46		**23** W	04:02 AM 11.0 335 09:13 AM 7.6 232 01:33 PM 10.4 317 08:44 PM 0.1 3	
9 W	03:35 AM 11.4 347 08:31 AM 7.7 235 01:32 PM 12.2 372 08:52 PM -2.3 -70		**24** Th	04:34 AM 11.4 347 09:54 AM 7.3 223 02:19 PM 10.4 317 09:21 PM -0.2 -6	
10 Th	04:22 AM 12.2 372 09:32 AM 7.4 226 02:27 PM 12.2 372 09:40 PM -2.8 -85		**25** F	05:00 AM 11.7 357 10:27 AM 7.0 213 03:02 PM 10.5 320 09:56 PM -0.5 -15	
11 F	05:03 AM 12.7 387 10:27 AM 6.9 210 03:22 PM 12.1 369 10:27 PM -2.8 -85		**26** Sa	05:21 AM 11.9 363 10:56 AM 6.6 201 03:42 PM 10.5 320 10:31 PM -0.5 -15	
12 Sa	05:42 AM 13.1 399 11:18 AM 6.2 189 04:17 PM 11.8 360 11:13 PM -2.4 -73		**27** Su	05:41 AM 12.1 369 11:25 AM 6.1 186 04:23 PM 10.6 323 11:06 PM -0.4 -12	
13 Su	06:19 AM 13.3 405 12:08 PM 5.5 168 05:12 PM 11.3 344 11:58 PM -1.6 -49		**28** M	06:04 AM 12.3 375 11:57 AM 5.5 168 05:05 PM 10.5 320 11:41 PM -0.1 -3	
14 M	06:56 AM 13.4 408 12:58 PM 4.8 146 06:09 PM 10.7 326		**29** Tu	06:29 AM 12.5 381 12:33 PM 4.7 143 05:50 PM 10.3 314	
15 Tu	12:42 AM -0.4 -12 07:32 AM 13.3 405 01:49 PM 4.1 125 07:09 PM 10.0 305		**30** W	12:18 AM 0.6 18 06:58 AM 12.6 384 01:12 PM 3.9 119 06:39 PM 10.1 308	
			31 Th	12:56 AM 1.6 49 07:28 AM 12.7 387 01:55 PM 3.1 94 07:34 PM 9.8 299	

February

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	01:36 AM 2.8 85 08:02 AM 12.6 384 02:43 PM 2.3 70 08:37 PM 9.4 287		**16** Sa	02:33 AM 5.2 158 08:34 AM 11.5 351 03:29 PM 1.8 55 10:14 PM 9.1 277	
2 Sa	02:20 AM 4.1 125 08:39 AM 12.4 378 03:36 PM 1.6 49 09:51 PM 9.2 280		**17** Su	03:28 AM 6.4 195 09:18 AM 10.8 329 04:24 PM 1.8 55 11:53 PM 9.1 277	
3 Su	03:11 AM 5.6 171 09:22 AM 12.1 369 04:35 PM 0.9 27 11:22 PM 9.2 280		**18** M	04:45 AM 7.3 223 10:09 AM 10.3 314 05:24 PM 1.8 55	
4 M	04:18 AM 6.8 207 10:13 AM 11.8 360 05:38 PM 0.3 9		**19** Tu	01:34 AM 9.6 293 06:33 AM 7.6 232 11:09 AM 9.8 299 06:25 PM 1.6 49	
5 Tu	01:07 AM 9.7 296 05:47 AM 7.6 232 11:14 AM 11.5 351 06:42 PM -0.4 -12		**20** W	02:38 AM 10.1 308 07:59 AM 7.4 226 12:13 PM 9.6 293 07:22 PM 1.3 40	
6 W	02:28 AM 10.6 323 07:19 AM 7.7 235 12:21 PM 11.4 347 07:42 PM -1.0 -30		**21** Th	03:19 AM 10.6 323 08:51 AM 7.0 213 01:13 PM 9.7 296 08:10 PM 0.9 27	
7 Th	03:22 AM 11.4 347 08:32 AM 7.2 219 01:27 PM 11.4 347 08:36 PM -1.5 -46		**22** F	03:49 AM 10.9 332 09:26 AM 6.5 198 02:05 PM 9.9 302 08:52 PM 0.6 18	
8 F	04:03 AM 12.0 366 09:29 AM 6.5 198 02:28 PM 11.5 351 09:26 PM -1.6 -49		**23** Sa	04:11 AM 11.2 341 09:54 AM 5.9 180 02:52 PM 10.2 311 09:30 PM 0.4 12	
9 Sa	04:38 AM 12.4 378 10:17 AM 5.6 171 03:25 PM 11.5 351 10:13 PM -1.4 -43		**24** Su	04:31 AM 11.4 347 10:21 AM 5.2 158 03:35 PM 10.4 317 10:07 PM 0.5 15	
10 Su	05:11 AM 12.7 387 11:02 AM 4.7 143 04:20 PM 11.4 347 10:57 PM -0.9 -27		**25** M	04:52 AM 11.7 357 10:50 AM 4.4 134 04:17 PM 10.7 326 10:43 PM 0.7 21	
11 M	05:43 AM 12.9 393 11:45 AM 3.9 119 05:13 PM 11.2 341 11:40 PM 0.0 0		**26** Tu	05:15 AM 12.0 366 11:22 AM 3.5 107 05:01 PM 10.8 329 11:20 PM 1.2 37	
12 Tu	06:14 AM 12.9 393 12:28 PM 3.2 98 06:06 PM 10.8 329		**27** W	05:42 AM 12.2 372 11:58 AM 2.5 76 05:47 PM 10.9 332 11:58 PM 2.0 61	
13 W	12:22 AM 1.1 34 06:47 AM 12.7 387 01:11 PM 2.6 79 07:00 PM 10.4 317		**28** Th	06:11 AM 12.3 375 12:38 PM 1.7 52 06:37 PM 10.8 329	
14 Th	01:03 AM 2.4 73 07:20 AM 12.5 381 01:54 PM 2.2 67 07:56 PM 9.9 302				
15 F	01:46 AM 3.8 116 07:56 AM 12.0 366 02:40 PM 1.9 58 08:59 PM 9.5 290				

March

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	12:38 AM 2.9 88 06:43 AM 12.3 375 01:21 PM 0.9 27 07:31 PM 10.6 323		**16** Sa	02:27 AM 5.0 152 08:06 AM 11.0 335 02:50 PM 0.8 24 09:33 PM 10.2 311	
2 Sa	01:21 AM 4.1 125 07:19 AM 12.1 369 02:08 PM 0.4 12 08:32 PM 10.3 314		**17** Su	03:14 AM 5.9 180 08:45 AM 10.5 320 03:34 PM 1.0 30 10:33 PM 9.9 302	
3 Su	02:09 AM 5.2 158 08:00 AM 11.8 360 03:01 PM 0.2 6 09:43 PM 10.0 305		**18** M	04:10 AM 6.6 201 09:29 AM 9.8 299 04:24 PM 1.3 40 11:45 PM 9.7 296	
4 M	03:07 AM 6.3 192 08:48 AM 11.3 344 04:01 PM 0.1 3 11:09 PM 9.9 302		**19** Tu	05:25 AM 7.1 216 10:23 AM 9.2 280 05:21 PM 1.6 49	
5 Tu	04:23 AM 7.1 216 09:49 AM 10.8 329 05:08 PM 0.1 3		**20** W	01:09 AM 9.7 296 07:08 AM 7.1 216 11:30 AM 8.8 268 06:25 PM 1.9 58	
6 W	12:45 AM 10.2 311 06:00 AM 7.2 219 11:03 AM 10.4 317 06:17 PM 0.0 0		**21** Th	02:20 AM 9.9 302 08:28 AM 6.6 201 12:43 PM 8.7 265 07:28 PM 1.9 58	
7 Th	01:58 AM 10.8 329 07:28 AM 6.7 204 12:21 PM 10.3 314 07:22 PM -0.1 -3		**22** F	03:06 AM 10.2 311 09:14 AM 6.0 183 01:51 PM 8.8 268 08:25 PM 1.8 55	
8 F	02:48 AM 11.3 344 08:31 AM 5.8 177 01:34 PM 10.4 317 08:20 PM -0.2 -6		**23** Sa	03:38 AM 10.5 320 09:47 AM 5.2 158 02:49 PM 9.2 280 09:14 PM 1.7 52	
9 Sa	03:27 AM 11.7 357 09:20 AM 4.7 143 02:38 PM 10.7 326 09:11 PM 0.0 0		**24** Su	04:04 AM 10.8 329 10:14 AM 4.3 131 03:40 PM 9.7 296 09:57 PM 1.7 52	
10 Su	05:00 AM 12.0 366 11:02 AM 3.7 113 04:35 PM 10.9 332 10:57 PM 0.5 15		**25** M	04:28 AM 11.1 338 10:43 AM 3.3 101 04:27 PM 10.3 314 10:38 PM 2.0 61	
11 M	05:29 AM 12.1 369 11:41 AM 2.7 82 05:27 PM 11.0 335 11:41 PM 1.2 37		**26** Tu	04:54 AM 11.4 347 11:14 AM 2.2 67 05:12 PM 10.7 326 11:18 PM 2.4 73	
12 Tu	05:58 AM 12.2 372 12:18 PM 1.9 58 06:16 PM 11.1 338		**27** W	05:21 AM 11.7 357 11:48 AM 1.1 34 05:58 PM 11.1 338 11:58 PM 3.0 91	
13 W	12:22 AM 2.0 61 06:27 AM 12.1 369 12:55 PM 1.3 40 07:04 PM 11.0 335		**28** Th	05:51 AM 11.8 360 12:26 PM 0.1 3 06:46 PM 11.4 347	
14 Th	01:03 AM 3.0 91 06:58 AM 11.9 363 01:32 PM 0.9 27 07:52 PM 10.8 329		**29** F	12:41 AM 3.7 113 06:24 AM 11.9 363 01:07 PM -0.7 -21 07:37 PM 11.5 351	
15 F	01:44 AM 4.0 122 07:31 AM 11.5 351 02:10 PM 0.7 21 08:41 PM 10.6 323		**30** Sa	01:25 AM 4.5 137 07:01 AM 11.8 360 01:52 PM -1.1 -34 08:31 PM 11.4 347	
			31 Su	02:14 AM 5.3 162 07:42 AM 11.5 351 02:41 PM -1.2 -37 09:31 PM 11.2 341	

Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.
Referenced to Station: SEATTLE (Madison St.), Elliott Bay (9447130) Height offset in feet (low:*0.99 high: * 1.02) Time offset in mins (low:-1 high: -6)

Generated On: Mon Jun 17 22:35:31 GMT 2013

StationId:9445639
Source:NOAA/NOS/CO-OPS
Station Type:Subordinate
Time Zone:LST/LDT
Datum:mean lower low water (MLLW) which is the chart datum of soundings

NOAA Tide Predictions

Kingston, Appletree Cove,Washington,2013

Times and Heights of High and Low Waters

January

	Time	Height			Time	Height			Time	Height			Time	Height		
	h m	ft	cm		h m	ft	cm		h m	ft	cm		h m	ft	cm	
1 Tu	12:35 AM	-0.2	-6	**16** W	01:22 AM	1.0	30	**1** F	01:32 AM	2.8	85	**16** Sa	02:29 AM	5.2	158	
	07:41 AM	12.0	366		08:10 AM	12.4	378		08:03 AM	12.0	366		08:35 AM	10.9	332	
	01:44 PM	5.6	171		02:38 PM	3.6	110		02:39 PM	2.3	70		03:25 PM	1.9	58	
	06:46 PM	9.0	274		08:14 PM	8.8	268		08:38 PM	9.0	274		10:15 PM	8.7	265	
2 W	01:14 AM	0.6	18	**17** Th	02:08 AM	2.7	82	**2** Sa	02:16 AM	4.2	128	**17** Su	03:24 AM	6.4	195	
	08:13 AM	12.0	366		08:48 AM	12.1	369		08:40 AM	11.8	360		09:19 AM	10.3	314	
	02:30 PM	4.9	149		03:32 PM	3.0	91		03:32 PM	1.6	49		04:20 PM	1.9	58	
	07:42 PM	8.6	262		09:28 PM	8.3	253		09:52 PM	8.7	265		11:54 PM	8.7	265	
3 Th	01:54 AM	1.8	55	**18** F	02:57 AM	4.3	131	**3** Su	03:07 AM	5.6	171	**18** M	04:41 AM	7.3	223	
	08:48 AM	12.0	366		09:28 AM	11.6	354		09:23 AM	11.5	351		10:10 AM	9.8	299	
	03:20 PM	4.0	122		04:29 PM	2.5	76		04:31 PM	0.9	27		05:20 PM	1.8	55	
	08:48 PM	8.2	250		11:00 PM	8.1	247		11:23 PM	8.8	268					
4 F	02:38 AM	3.1	94	**19** Sa	03:54 AM	5.9	180	**4** M	04:14 AM	6.9	210	**19** Tu	01:35 AM	9.1	277	
	09:26 AM	11.9	363		10:12 AM	11.1	338		10:14 AM	11.2	341		06:29 AM	7.7	235	
	04:14 PM	3.0	91		05:27 PM	2.0	61		05:34 PM	0.3	9		11:10 AM	9.3	283	
	10:07 PM	8.0	244										06:21 PM	1.6	49	
5 Sa	03:29 AM	4.6	140	**20** Su	12:52 AM	8.4	256	**5** Tu	01:08 AM	9.3	283	**20** W	02:39 AM	9.6	293	
	10:07 AM	11.8	360		05:12 AM	7.1	216		05:43 AM	7.7	235		07:55 AM	7.5	229	
	05:11 PM	1.9	58		11:00 AM	10.6	323		11:15 AM	11.0	335		12:14 PM	9.2	280	
	11:39 PM	8.2	250		06:24 PM	1.5	46		06:38 PM	-0.4	-12		07:18 PM	1.3	40	
6 Su	04:33 AM	6.1	186	**21** M	02:23 AM	9.2	280	**6** W	02:29 AM	10.1	308	**21** Th	03:20 AM	10.1	308	
	10:52 AM	11.7	357		06:50 AM	7.7	235		07:15 AM	7.8	238		08:47 AM	7.0	213	
	06:09 PM	0.7	21		11:51 AM	10.2	311		12:22 PM	10.8	329		01:14 PM	9.2	280	
					07:15 PM	1.0	30		07:38 PM	-1.1	-34		08:06 PM	0.9	27	
7 M	01:16 AM	8.9	271	**22** Tu	03:21 AM	9.9	302	**7** Th	03:23 AM	10.8	329	**22** F	03:50 AM	10.4	317	
	05:52 AM	7.2	219		08:12 AM	7.8	238		08:28 AM	7.3	223		09:22 AM	6.5	198	
	11:43 AM	11.6	354		12:44 PM	10.0	305		01:28 PM	10.9	332		02:06 PM	9.4	287	
	07:04 PM	-0.5	-15		08:00 PM	0.6	18		08:32 PM	-1.5	-46		08:48 PM	0.6	18	
8 Tu	02:38 AM	9.9	302	**23** W	04:03 AM	10.5	320	**8** F	04:04 AM	11.4	347	**23** Sa	04:12 AM	10.6	323	
	07:15 AM	7.7	235		09:09 AM	7.7	235		09:25 AM	6.5	198		09:50 AM	5.9	180	
	12:37 PM	11.6	354		01:34 PM	9.9	302		02:29 PM	11.0	335		02:53 PM	9.7	296	
	07:57 PM	-1.5	-46		08:40 PM	0.1	3		09:22 PM	-1.7	-52		09:26 PM	0.4	12	
9 W	03:36 AM	10.8	329	**24** Th	04:35 AM	10.9	332	**9** Sa	04:39 AM	11.8	360	**24** Su	04:32 AM	10.9	332	
	08:27 AM	7.7	235		09:50 AM	7.4	226		10:13 AM	5.7	174		10:17 AM	5.3	162	
	01:33 PM	11.6	354		02:20 PM	9.9	302		03:26 PM	11.0	335		03:36 PM	9.9	302	
	08:48 PM	-2.4	-73		09:17 PM	-0.2	-6		10:09 PM	-1.5	-46		10:03 PM	0.5	15	
10 Th	04:23 AM	11.6	354	**25** F	05:01 AM	11.1	338	**10** Su	05:12 AM	12.1	369	**25** M	04:53 AM	11.1	338	
	09:28 AM	7.4	226		10:23 AM	7.1	216		10:58 AM	4.8	146		10:46 AM	4.4	134	
	02:28 PM	11.6	354		03:03 PM	10.0	305		04:21 PM	10.9	332		04:18 PM	10.1	308	
	09:36 PM	-2.8	-85		09:52 PM	-0.5	-15		10:53 PM	-0.9	-27		10:39 PM	0.7	21	
11 F	05:04 AM	12.1	369	**26** Sa	05:22 AM	11.3	344	**11** M	05:44 AM	12.2	372	**26** Tu	05:16 AM	11.4	347	
	10:23 AM	6.9	210		10:52 AM	6.7	204		11:41 AM	3.9	119		11:18 AM	3.5	107	
	03:23 PM	11.5	351		03:43 PM	10.0	305		05:14 PM	10.6	323		05:02 PM	10.3	314	
	10:23 PM	-2.8	-85		10:27 PM	-0.5	-15		11:36 PM	0.0	0		11:16 PM	1.2	37	
12 Sa	05:43 AM	12.5	381	**27** Su	05:42 AM	11.5	351	**12** Tu	06:15 AM	12.2	372	**27** W	05:43 AM	11.6	354	
	11:14 AM	6.3	192		11:21 AM	6.2	189		12:24 PM	3.2	98		11:54 AM	2.6	79	
	04:18 PM	11.2	341		04:24 PM	10.0	305		06:07 PM	10.3	314		05:48 PM	10.4	317	
	11:09 PM	-2.4	-73		11:02 PM	-0.4	-12						11:54 PM	2.0	61	
13 Su	06:20 AM	12.6	384	**28** M	06:05 AM	11.7	357	**13** W	12:18 AM	1.2	37	**28** Th	06:12 AM	11.7	357	
	12:04 PM	5.6	171		11:53 AM	5.5	168		06:48 AM	12.1	369		12:34 PM	1.7	52	
	05:13 PM	10.8	329		05:06 PM	10.0	305		01:07 PM	2.6	79		06:38 PM	10.3	314	
	11:54 PM	-1.6	-49		11:37 PM	-0.1	-3		07:01 PM	9.9	302					
14 M	06:57 AM	12.7	387	**29** Tu	06:30 AM	11.9	363	**14** Th	12:59 AM	2.5	76					
	12:54 PM	4.9	149		12:29 PM	4.8	146		07:21 AM	11.8	360					
	06:10 PM	10.2	311		05:51 PM	9.8	299		01:50 PM	2.2	67					
									07:57 PM	9.4	287					
15 Tu	12:38 AM	-0.4	-12	**30** W	12:14 AM	0.6	18	**15** F	01:42 AM	3.9	119					
	07:33 AM	12.6	384		06:59 AM	12.0	366		07:57 AM	11.4	347					
	01:45 PM	4.2	128		01:08 PM	3.9	119		02:36 PM	1.9	58					
	07:10 PM	9.5	290		06:40 PM	9.6	293		09:00 PM	9.0	274					
				31 Th	12:52 AM	1.6	49									
					07:29 AM	12.1	369									
					01:51 PM	3.1	94									
					07:35 PM	9.3	283									

February

	Time	Height			Time	Height			Time	Height			Time	Height		
	h m	ft	cm		h m	ft	cm		h m	ft	cm		h m	ft	cm	
1 F	12:34 AM	3.0	91	**16** Sa	02:23 AM	5.0	152	**1** Su	02:05 AM	5.3	162	**16** M	04:06 AM	6.6	201	
	06:44 AM	11.7	357		08:07 AM	10.5	320		08:01 AM	11.2	341		09:30 AM	9.4	287	
	01:17 PM	0.9	27		02:46 PM	0.8	24		02:57 PM	0.2	6		04:20 PM	1.3	40	
	07:32 PM	10.1	308		09:34 PM	9.7	296		09:44 PM	9.5	290		11:46 PM	9.2	280	
2 Sa	01:17 AM	4.1	125	**17** Su	03:10 AM	5.9	180	**2** M	03:03 AM	6.4	195	**17** Tu	05:21 AM	7.1	216	
	07:20 AM	11.5	351		08:46 AM	9.9	302		08:49 AM	10.8	329		10:24 AM	8.8	268	
	02:04 PM	0.4	12		03:30 PM	1.0	30		03:57 PM	0.1	3		05:17 PM	1.7	52	
	08:33 PM	9.8	299		10:34 PM	9.4	287		11:10 PM	9.4	287					
3 Su	02:05 AM	5.3	162	**18** M	04:06 AM	6.6	201	**3** Tu	04:19 AM	7.1	216	**18** W	01:10 AM	9.2	280	
	08:01 AM	11.2	341		09:30 AM	9.4	287		09:50 AM	10.3	314		07:04 AM	7.1	216	
	02:57 PM	0.2	6		04:20 PM	1.3	40		05:04 PM	0.1	3		11:31 AM	8.4	256	
	09:44 PM	9.5	290		11:46 PM	9.2	280						06:21 PM	1.9	58	
4 M	03:03 AM	6.4	195	**19** Tu	05:21 AM	7.1	216	**4** W	12:46 AM	9.7	296	**19** Th	02:21 AM	9.4	287	
	08:49 AM	10.8	329		10:24 AM	8.8	268		05:56 AM	7.3	223		08:24 AM	6.7	204	
	03:57 PM	0.1	3		05:17 PM	1.7	52		11:04 AM	9.9	302		12:44 PM	8.2	250	
	11:10 PM	9.4	287						06:13 PM	0.0	0		07:24 PM	1.9	58	
5 Tu	04:19 AM	7.1	216	**20** W	01:10 AM	9.2	280	**5** Th	01:59 AM	10.2	311	**20** F	03:07 AM	9.7	296	
	09:50 AM	10.3	314		07:04 AM	7.1	216		07:24 AM	6.8	207		09:10 AM	6.0	183	
	05:04 PM	0.1	3		11:31 AM	8.4	256		12:22 PM	9.8	299		01:52 PM	8.4	256	
					06:21 PM	1.9	58		07:18 PM	-0.1	-3		08:21 PM	1.8	55	
6 W	12:46 AM	9.7	296	**21** Th	02:21 AM	9.4	287	**6** F	02:49 AM	10.7	326	**21** Sa	03:39 AM	10.0	305	
	05:56 AM	7.3	223		08:24 AM	6.7	204		08:27 AM	5.8	177		09:43 AM	5.3	162	
	11:04 AM	9.9	302		12:44 PM	8.2	250		01:35 PM	9.9	302		02:50 PM	8.8	268	
	06:13 PM	0.0	0		07:24 PM	1.9	58		08:16 PM	-0.2	-6		09:10 PM	1.7	52	
7 Th	01:59 AM	10.2	311	**22** F	03:07 AM	9.7	296	**7** Sa	03:28 AM	11.1	338	**22** Su	04:05 AM	10.3	314	
	07:24 AM	6.8	207		09:10 AM	6.0	183		09:16 AM	4.8	146		10:10 AM	4.4	134	
	12:22 PM	9.8	299		01:52 PM	8.4	256		02:39 PM	10.2	311		03:41 PM	9.3	283	
	07:18 PM	-0.1	-3		08:21 PM	1.8	55		09:07 PM	0.0	0		09:53 PM	1.8	55	
8 F	02:49 AM	10.7	326	**23** Sa	03:39 AM	10.0	305	**8** Su	04:05 AM	11.4	347	**23** M	04:29 AM	10.6	323	
	08:27 AM	5.8	177		09:43 AM	5.3	162		10:58 AM	3.7	113		10:39 AM	3.3	101	
	01:35 PM	9.9	302		02:50 PM	8.8	268		04:36 PM	10.4	317		04:28 PM	9.8	299	
	08:16 PM	-0.2	-6		09:10 PM	1.7	52		10:53 PM	0.5	15		10:34 PM	2.0	61	
9 Sa	03:28 AM	11.1	338	**24** Su	04:05 AM	10.3	314	**9** M	05:01 AM	11.4	347	**24** Tu	04:55 AM	10.8	329	
	09:16 AM	4.8	146		10:10 AM	4.4	134		10:58 AM	3.7	113		11:10 AM	2.2	67	
	02:39 PM	10.2	311		03:41 PM	9.3	283		04:36 PM	10.4	317		05:13 PM	10.2	311	
	09:07 PM	0.0	0		09:53 PM	1.8	55		10:53 PM	0.5	15		11:14 PM	2.4	73	
10 Su	04:29 AM	10.6	323	**25** M	04:29 AM	10.6	323	**10** Tu	05:01 AM	11.4	347	**25** W	05:22 AM	11.1	338	
	10:39 AM	3.3	101		10:39 AM	3.3	101		10:58 AM	3.7	113		11:44 AM	1.1	34	
	04:28 PM	9.8	299		04:28 PM	9.8	299		04:36 PM	10.4	317		05:59 PM	10.6	323	
	10:34 PM	2.0	61		10:34 PM	2.0	61		10:53 PM	0.5	15		11:54 PM	3.0	91	
11 M	05:04 AM	12.1	369	**26** Tu	04:55 AM	10.8	329	**11** W	05:30 AM	11.5	351	**26** Th	05:52 AM	11.3	344	
	10:23 AM	6.9	210		11:10 AM	2.2	67		11:37 AM	2.8	85		12:22 PM	0.1	3	
	03:23 PM	11.5	351		05:13 PM	10.2	311		05:28 PM	10.5	320		06:47 PM	10.9	332	
	10:23 PM	-2.8	-85		11:14 PM	2.4	73		11:37 PM	1.2	37					
12 Tu	05:43 AM	12.5	381	**27** W	05:22 AM	11.1	338	**12** Th	05:59 AM	11.6	354	**27** F	01:03 AM	-0.7	-21	
	11:14 AM	6.3	192		11:44 AM	1.1	34		12:14 PM	2.0	61		07:38 PM	11.0	335	
	04:18 PM	11.2	341		05:59 PM	10.6	323		06:17 PM	10.5	320					
	11:09 PM	-2.4	-73		11:54 PM	3.0	91									
13 W	06:20 AM	12.6	384	**28** Th	05:52 AM	11.3	344	**13** F	12:18 AM	2.0	61	**28** Sa	01:21 AM	4.5	137	
	12:04 PM	5.6	171		12:22 PM	0.1	3		06:28 AM	11.5	351		07:02 AM	11.2	341	
	05:13 PM	10.8	329		06:47 PM	10.9	332		12:51 PM	1.3	40		01:48 PM	-1.2	-37	
	11:54 PM	-1.6	-49						07:05 PM	10.4	317		08:32 PM	10.9	332	
14 Th	06:57 AM	12.7	387	**29** F	12:37 AM	3.7	113	**14** Sa	12:59 AM	3.0	91	**29** Su	02:10 AM	5.3	162	
	12:54 PM	4.9	149		06:25 AM	11.3	344		06:59 AM	11.3	344		07:43 AM	10.9	332	
	06:10 PM	10.2	311		01:03 PM	-0.7	-21		01:28 PM	0.9	27		02:37 PM	-1.3	-40	
					07:38 PM	11.0	335		07:53 PM	10.3	314		09:32 PM	10.6	323	
15 F	01:40 AM	4.0	122	**30** Sa	01:21 AM	4.5	137	**15** Su	01:40 AM	4.0	122					
	07:32 AM	11.0	335		07:02 AM	11.2	341		07:32 AM	11.0	335					
	02:06 PM	0.7	21		01:48 PM	-1.2	-37		02:06 PM	0.7	21					
	08:42 PM	10.0	305		08:32 PM	10.9	332		08:42 PM	10.0	305					
				31 Su	02:10 AM	5.3	162									
					07:43 AM	10.9	332									
					02:37 PM	-1.3	-40									
					09:32 PM	10.6	323									

March

	Time	Height			Time	Height			Time	Height			Time	Height		
	h m	ft	cm		h m	ft	cm		h m	ft	cm		h m	ft	cm	
1 F	12:34 AM	3.0	91	**16** Sa	02:23 AM	5.0	152	**1** Su	01:17 AM	4.1	125	**16** M	03:10 AM	5.9	180	
	06:44 AM	11.7	357		08:07 AM	10.5	320		07:20 AM	11.5	351		08:46 AM	9.9	302	
	01:17 PM	0.9	27		02:46 PM	0.8	24		02:04 PM	0.4	12		03:30 PM	1.0	30	
	07:32 PM	10.1	308		09:34 PM	9.7	296		08:33 PM	9.8	299		10:34 PM	9.4	287	
2 Sa	01:17 AM	4.1	125	**17** Su	03:10 AM	5.9	180	**2** M	02:05 AM	5.3	162	**17** Tu	04:06 AM	6.6	201	
	07:20 AM	11.5	351		08:46 AM	9.9	302		08:01 AM	11.2	341		09:30 AM	9.4	287	
	02:04 PM	0.4	12		03:30 PM	1.0	30		02:57 PM	0.2	6		04:20 PM	1.3	40	
	08:33 PM	9.8	299		10:34 PM	9.4	287		09:44 PM	9.5	290		11:46 PM	9.2	280	
3 Su	02:05 AM	5.3	162	**18** M	04:06 AM	6.6	201	**3** Tu	03:03 AM	6.4	195	**18** W	05:21 AM	7.1	216	
	08:01 AM	11.2	341		09:30 AM	9.4	287		08:49 AM	10.8	329		10:24 AM	8.8	268	
	02:57 PM	0.2	6		04:20 PM	1.3	40		03:57 PM	0.1	3		05:17 PM	1.7	52	
	09:44 PM	9.5	290		11:46 PM	9.2	280		11:10 PM	9.4	287					
4 M	03:03 AM	6.4	195	**19** Tu	05:21 AM	7.1	216	**4** W	04:19 AM	7.1	216	**19** Th	01:10 AM	9.2	280	
	08:49 AM	10.8	329		10:24 AM	8.8	268		09:50 AM	10.3	314		07:04 AM	7.1	216	
	03:57 PM	0.1	3		05:17 PM	1.7	52		05:04 PM	0.1	3		11:31 AM	8.4	256	
	11:10 PM	9.4	287										06:21 PM	1.9	58	
5 Tu	04:19 AM	7.1	216	**20** W	01:10 AM	9.2	280	**5** Th	12:46 AM	9.7	296	**20** F	02:21 AM	9.4	287	
	09:50 AM	10.3	314		07:04 AM	7.1	216		05:56 AM	7.3	223		08:24 AM	6.7	204	
	05:04 PM	0.1	3		11:31 AM	8.4	256		11:04 AM	9.9	302		12:44 PM	8.2	250	
					06:21 PM	1.9	58		06:13 PM	0.0	0		07:24 PM	1.9	58	
6 W	12:46 AM	9.7	296	**21** Th	02:21 AM	9.4	287	**6** F	01:59 AM	10.2	311	**21** Sa	03:07 AM	9.7	296	
	05:56 AM	7.3	223		08:24 AM	6.7	204		07:24 AM	6.8	207		09:10 AM	6.0	183	
	11:04 AM	9.9	302		12:44 PM	8.2	250		12:22 PM	9.8	299		01:52 PM	8.4	256	
	06:13 PM	0.0	0		07:24 PM	1.9	58		07:18 PM	-0.1	-3		08:21 PM	1.8	55	
7 Th	01:59 AM	10.2	311	**22** F	03:07 AM	9.7	296	**7** Sa	02:49 AM	10.7	326	**22** Su	03:39 AM	10.0	305	
	07:24 AM	6.8	207		09:10 AM	6.0	183		08:27 AM	5.8	177		09:43 AM	5.3	162	
	12:22 PM	9.8	299		01:52 PM	8.4	256		01:35 PM	9.9	302		02:50 PM	8.8	268	
	07:18 PM	-0.1	-3		08:21 PM	1.8	55		08:16 PM	-0.2	-6		09:10 PM	1.7	52	
8 F	02:49 AM	10.7	326	**23** Sa	03:39 AM	10.0	305	**8** Su	03:28 AM	11.1	338	**23** M	03:39 AM	10.0	305	
	08:27 AM	5.8	177		09:43 AM	5.3	162		09:16 AM	4.8	146		09:43 AM	5.3	162	
	01:35 PM	9.9	302		02:50 PM	8.8	268		02:39 PM	10.2	311		02:50 PM	8.8	268	
	08:16 PM	-0.2	-6		09:10 PM	1.7	52		09:07 PM	0.0	0		09:10 PM	1.7	52	
9 Sa	03:28 AM	11.1	338	**24** Su	04:05 AM	10.3	314	**9** M	04:05 AM	10.6	323	**24** Tu	04:05 AM	10.3	314	
	09:16 AM	4.8	146		10:10 AM	4.4	134		09:43 AM	5.3	162		10:10 AM	4.4	134	
	02:39 PM	10.2	311		03:41 PM	9.3	283		02:50 PM	8.8	268		03:41 PM	9.3	283	
	09:07 PM	0.0	0		09:53 PM	1.8	55		09:10 PM	1.7	52		09:53 PM	1.8	55	
10 Su	04:29 AM	10.6	323	**25** M	04:29 AM	10.6	323	**10** Tu	04:29 AM	10.6	323	**25** W	04:29 AM	10.6	323	
	10:39 AM	3.3	101		10:39 AM	3.3	101		10:39 AM	3.3	101		10:39 AM	3.3	101	
	04:28 PM	9.8	299		04:28 PM	9.8	299		04:28 PM	9.8	299		04:28 PM	9.8	299	
	10:34 PM	2.0	61		10:34 PM	2.0	61		10:34 PM	2.0	61		10:34 PM	2.0	61	
11 M	05:30 AM	11.5	351	**26** Tu	04:55 AM	10.8	329	**11** W	05:30 AM	11.5	351	**26** Th	04:55 AM	10.8	329	
	11:37 AM	2.8	85		11:10 AM	2.2	67		11:37 AM	2.8	85		11:10 AM	2.2	67	
	05:28 PM	10.5	320		05:13 PM	10.2	311		05:28 PM	10.5	320		05:13 PM	10.2	311	
	11:37 PM	1.2	37		11:14 PM	2.4	73		11:37 PM	1.2	37		11:14 PM	2.4	73	
12 Tu	05:59 AM	11.6	354	**27** W	05:22 AM	11.1	338	**12** Th	05:59 AM	11.6	354	**27** F	05:22 AM	11.1	338	
	12:14 PM	2.0	61		11:44 AM	1.1	34		12:14 PM	2.0	61		11:44 AM	1.1	34	
	06:17 PM	10.5	320		05:59 PM	10.6	323		06:17 PM	10.5	320		05:59 PM	10.6	323	
					11:54 PM	3.0	91						11:54 PM	3.0	91	
13 W	12:18 AM	2.0	61	**28** Th	05:52 AM	11.3	344	**13** F	12:18 AM	2.0	61	**28** Sa	05:52 AM	11.3	344	
	06:28 AM	11.5	351		12:22 PM	0.1	3		06:28 AM	11.5	351		12:22 PM	0.1	3	
	12:51 PM	1.3	40		06:47 PM	10.9	332		12:51 PM	1.3	40		06:47 PM	10.9	332	
	07:05 PM	10.4	317						07:05 PM	10.4	317					
14 Th	12:59 AM	3.0	91	**29** F	12:37 AM	3.7	113	**14** Sa	12:59 AM	3.0	91	**29** Su	12:37 AM	3.7	113	
	06:59 AM	11.3	344		06:25 AM	11.3	344		06:59 AM	11.3	344		06:25 AM	11.3	344	
	01:28 PM	0.9	27		01:03 PM	-0.7	-21		01:28 PM	0.9	27		01:03 PM	-0.7	-21	
	07:53 PM	10.3	314		07:38 PM	11.0	335		07:53 PM	10.3	314		07:38 PM	11.0	335	
15 F	01:40 AM	4.0	122	**30** Sa	01:21 AM	4.5	137	**15** Su	01:40 AM	4.0	122					
	07:32 AM	11.0	335		07:02 AM	11.2	341		07:32 AM	11.0	335					
	02:06 PM	0.7	21		01:48 PM	-1.2	-37		02:06 PM	0.7	21					
	08:42 PM	10.0	305		08:32 PM	10.9	332		08:42 PM	10.0	305					
				31 Su	02:10 AM	5.3	162									
					07:43 AM	10.9	332									
					02:37 PM	-1.3	-40									
					09:32 PM	10.6	323									

Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.
Referenced to Station: SEATTLE (Madison St.), Elliott Bay (9447130) Height offset in feet (low:*1.00 high: * 0.97) Time offset in mins (low:-5 high: -5)

Generated On: Mon Jun 17 22:34:32 GMT 2013

StationId:9449798
Source:NOAA/NOS/CO-OPS
Station Type:Subordinate
Time Zone:LST/LDT
Datum:mean lower low water (MLLW) which is the chart datum of soundings

NOAA Tide Predictions

Orcas, Orcas Island,Washington,2013

Times and Heights of High and Low Waters

January

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 Tu	12:38 AM	-0.2 -6	**16** W	01:22 AM	0.9 27
	08:03 AM	8.3 253		08:23 AM	8.6 262
	02:01 PM	4.8 146		02:56 PM	3.1 94
	06:30 PM	5.9 180		08:12 PM	5.6 171
2 W	01:15 AM	0.5 15	**17** Th	02:06 AM	2.1 64
	08:33 AM	8.3 253		08:55 AM	8.4 256
	02:52 PM	4.1 125		03:58 PM	2.5 76
	07:32 PM	5.5 168		09:38 PM	5.2 158
3 Th	01:54 AM	1.3 40	**18** F	02:53 AM	3.3 101
	09:03 AM	8.3 253		09:28 AM	8.1 247
	03:45 PM	3.4 104		04:59 PM	2.0 61
	08:46 PM	5.1 155		11:44 PM	5.2 158
4 F	02:35 AM	2.3 70	**19** Sa	03:47 AM	4.4 134
	09:35 AM	8.3 253		10:01 AM	7.9 241
	04:38 PM	2.4 73		05:56 PM	1.5 46
	10:17 PM	4.9 149			
5 Sa	03:22 AM	3.4 104	**20** Su	01:42 AM	5.8 177
	10:09 AM	8.3 253		04:55 AM	5.3 162
	05:31 PM	1.4 43		10:36 AM	7.6 232
				06:47 PM	1.0 30
6 Su	12:20 AM	5.1 155	**21** M	02:54 AM	6.5 198
	04:23 AM	4.5 137		06:18 AM	6.0 183
	10:46 AM	8.3 253		11:16 AM	7.4 226
	06:23 PM	0.4 12		07:33 PM	0.7 21
7 M	02:18 AM	5.9 180	**22** Tu	03:44 AM	7.1 216
	05:38 AM	5.4 165		07:41 AM	6.2 189
	11:27 AM	8.3 253		12:01 PM	7.2 219
	07:14 PM	-0.5 -15		08:14 PM	0.3 9
8 Tu	03:22 AM	6.8 207	**23** W	04:22 AM	7.5 229
	06:55 AM	6.0 183		08:47 AM	6.3 192
	12:14 PM	8.3 253		12:51 PM	7.2 219
	08:04 PM	-1.3 -40		08:51 PM	0.0 0
9 W	04:08 AM	7.5 229	**24** Th	04:54 AM	7.7 235
	08:05 AM	6.2 189		09:34 AM	6.1 186
	01:08 PM	8.3 253		01:41 PM	7.1 216
	08:52 PM	-1.9 -58		09:26 PM	-0.2 -6
10 Th	04:49 AM	8.1 247	**25** F	05:21 AM	7.8 238
	09:07 AM	6.1 186		10:10 AM	5.9 180
	02:05 PM	8.2 250		02:29 PM	7.1 216
	09:39 PM	-2.2 -67		09:59 PM	-0.4 -12
11 F	05:27 AM	8.4 256	**26** Sa	05:44 AM	7.9 241
	10:05 AM	5.9 180		10:42 AM	5.6 171
	03:03 PM	8.1 247		03:16 PM	7.1 216
	10:25 PM	-2.2 -67		10:33 PM	-0.4 -12
12 Sa	06:04 AM	8.6 262	**27** Su	06:04 AM	8.0 244
	11:01 AM	5.4 165		11:16 AM	5.2 158
	04:01 PM	7.8 238		04:03 PM	6.9 210
	11:10 PM	-1.8 -55		11:06 PM	-0.3 -9
13 Su	06:40 AM	8.7 265	**28** M	06:25 AM	8.1 247
	11:57 AM	4.9 149		11:52 AM	4.7 143
	05:00 PM	7.3 223		04:51 PM	6.8 207
	11:54 PM	-1.2 -37		11:41 PM	0.0 0
14 M	07:15 AM	8.7 265	**29** Tu	06:48 AM	8.2 250
	12:55 PM	4.3 131		12:32 PM	4.1 125
	06:00 PM	6.8 207		05:43 PM	6.5 198
15 Tu	12:38 AM	-0.3 -9	**30** W	12:16 AM	0.6 18
	07:50 AM	8.7 265		07:15 AM	8.2 250
	01:55 PM	3.7 113		01:15 PM	3.5 107
	07:03 PM	6.2 189		06:38 PM	6.2 189
			31 Th	12:53 AM	1.3 40
				07:43 AM	8.3 253
				02:01 PM	2.8 85
				07:40 PM	5.9 180

February

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	01:31 AM	2.2 67	**16** Sa	02:29 AM	4.1 125
	08:14 AM	8.2 250		08:28 AM	7.7 235
	02:52 PM	2.0 61		03:44 PM	1.5 46
	08:51 PM	5.6 171		11:08 PM	5.8 177
2 Sa	02:13 AM	3.2 98	**17** Su	03:24 AM	5.0 152
	08:46 AM	8.2 250		09:02 AM	7.4 226
	03:47 PM	1.3 40		04:41 PM	1.4 43
	10:20 PM	5.5 168			
3 Su	03:01 AM	4.3 131	**18** M	01:04 AM	6.1 186
	09:22 AM	8.1 247		04:37 AM	5.6 171
	04:46 PM	0.6 18		09:40 AM	7.1 216
				05:41 PM	1.3 40
4 M	12:25 AM	5.7 174	**19** Tu	02:18 AM	6.6 201
	04:05 AM	5.2 158		06:08 AM	5.9 180
	10:03 AM	8.0 244		10:28 AM	6.8 207
	05:47 PM	0.0 0		06:40 PM	1.1 34
5 Tu	02:08 AM	6.4 195	**20** W	03:06 AM	6.9 210
	05:27 AM	5.9 180		07:36 AM	5.9 180
	10:53 AM	7.9 241		11:26 AM	6.7 204
	06:47 PM	-0.5 -15		07:32 PM	0.9 27
6 W	03:05 AM	7.0 213	**21** Th	03:42 AM	7.2 219
	06:52 AM	6.1 186		08:35 AM	5.7 174
	11:54 AM	7.8 238		12:30 PM	6.6 201
	07:44 PM	-1.0 -30		08:18 PM	0.7 21
7 Th	03:47 AM	7.6 232	**22** F	04:10 AM	7.3 223
	08:05 AM	5.9 180		09:13 AM	5.4 165
	01:02 PM	7.7 235		01:31 PM	6.6 201
	08:37 PM	-1.2 -37		08:57 PM	0.5 15
8 F	04:24 AM	7.9 241	**23** Sa	04:32 AM	7.4 226
	09:06 AM	5.5 168		09:42 AM	5.0 152
	02:10 PM	7.6 232		02:27 PM	6.7 204
	09:25 PM	-1.2 -37		09:33 PM	0.4 12
9 Sa	04:58 AM	8.2 250	**24** Su	04:50 AM	7.5 229
	09:59 AM	4.9 149		10:10 AM	4.5 137
	03:13 PM	7.6 232		03:19 PM	6.8 207
	10:10 PM	-1.0 -30		10:08 PM	0.5 15
10 Su	05:29 AM	8.3 253	**25** M	05:08 AM	7.6 232
	10:48 AM	4.3 131		10:41 AM	3.8 116
	04:12 PM	7.4 226		04:09 PM	6.9 210
	10:53 PM	-0.5 -15		10:42 PM	0.7 21
11 M	06:00 AM	8.3 253	**26** Tu	05:29 AM	7.7 235
	11:36 AM	3.6 110		11:16 AM	3.1 94
	05:10 PM	7.1 216		05:00 PM	6.9 210
	11:35 PM	0.2 6		11:18 PM	1.2 37
12 Tu	06:30 AM	8.3 253	**27** W	05:54 AM	7.9 241
	12:24 PM	3.0 91		11:54 AM	2.4 73
	06:07 PM	6.8 207		05:53 PM	6.8 207
				11:55 PM	1.8 55
13 W	12:17 AM	1.1 34	**28** Th	06:22 AM	7.9 241
	06:59 AM	8.3 253		12:36 PM	1.7 52
	01:12 PM	2.4 73		06:49 PM	6.7 204
	07:06 PM	6.4 195			
14 Th	12:59 AM	2.1 64			
	07:28 AM	8.1 247			
	02:00 PM	2.0 61			
	08:09 PM	6.1 186			
15 F	01:42 AM	3.1 94			
	07:57 AM	7.9 241			
	02:51 PM	1.7 52			
	09:24 PM	5.8 177			

March

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	12:34 AM	2.6 79	**16** Sa	02:25 AM	4.2 128
	06:52 AM	8.0 244		08:00 AM	7.3 223
	01:22 PM	1.0 30		02:55 PM	0.8 24
	07:50 PM	6.5 198		10:08 PM	6.6 201
2 Sa	01:16 AM	3.4 104	**17** Su	03:16 AM	4.8 146
	07:25 AM	7.9 241		08:33 AM	7.0 213
	02:11 PM	0.5 15		03:43 PM	0.9 27
	09:00 PM	6.4 195		11:24 PM	6.5 198
3 Su	02:03 AM	4.3 131	**18** M	04:17 AM	5.3 162
	08:01 AM	7.8 238		09:09 AM	6.7 204
	03:07 PM	0.2 6		04:35 PM	1.1 34
	10:24 PM	6.3 192			
4 M	03:00 AM	5.0 152	**19** Tu	12:57 AM	6.5 198
	08:42 AM	7.6 232		05:38 AM	5.6 171
	04:08 PM	0.0 0		09:53 AM	6.4 195
				05:34 PM	1.2 37
5 Tu	12:07 AM	6.4 195	**20** W	02:13 AM	6.6 201
	04:15 AM	5.6 171		07:14 AM	5.6 171
	09:33 AM	7.4 226		10:48 AM	6.1 186
	05:13 PM	-0.1 -3		06:37 PM	1.3 40
6 W	01:31 AM	6.8 207	**21** Th	03:03 AM	6.8 207
	05:44 AM	5.7 174		08:29 AM	5.3 162
	10:38 AM	7.1 216		11:56 AM	5.9 180
	06:20 PM	-0.2 -6		07:37 PM	1.4 43
7 Th	02:26 AM	7.2 219	**22** F	03:38 AM	6.9 210
	07:10 AM	5.5 168		09:14 AM	4.9 149
	11:56 AM	6.9 210		01:12 PM	5.9 180
	07:23 PM	-0.1 -3		08:31 PM	1.4 43
8 F	03:08 AM	7.5 229	**23** Sa	04:03 AM	7.0 213
	08:17 AM	4.9 149		09:42 AM	4.4 134
	01:16 PM	6.8 207		02:25 PM	6.0 183
	08:18 PM	0.0 0		09:16 PM	1.4 43
9 Sa	03:44 AM	7.7 235	**24** Su	04:22 AM	7.1 216
	09:08 AM	4.2 128		10:08 AM	3.7 113
	02:29 PM	6.9 210		03:28 PM	6.2 189
	09:08 PM	0.2 6		09:57 PM	1.5 46
10 Su	05:15 AM	7.8 238	**25** M	04:41 AM	7.2 219
	10:52 AM	3.4 104		10:36 AM	2.9 88
	04:33 PM	7.0 213		04:24 PM	6.5 198
	10:52 PM	0.7 21		10:36 PM	1.8 55
11 M	05:44 AM	7.9 241	**26** Tu	05:03 AM	7.4 226
	11:32 AM	2.7 82		11:08 AM	2.1 64
	05:31 PM	7.0 213		05:17 PM	6.8 207
	11:35 PM	1.3 40		11:14 PM	2.2 67
12 Tu	06:10 AM	7.9 241	**27** W	05:28 AM	7.5 229
	12:12 PM	2.0 61		11:43 AM	1.2 37
	06:25 PM	7.0 213		06:10 PM	7.1 216
				11:54 PM	2.7 82
13 W	12:16 AM	2.0 61	**28** Th	05:57 AM	7.6 232
	06:36 AM	7.8 238		12:22 PM	0.4 12
	12:51 PM	1.4 43		07:04 PM	7.2 219
	07:18 PM	7.0 213			
14 Th	12:57 AM	2.7 82	**29** F	12:35 AM	3.3 101
	07:03 AM	7.7 235		06:28 AM	7.7 235
	01:31 PM	1.1 34		01:04 PM	-0.3 -9
	08:11 PM	6.9 210		08:00 PM	7.3 223
15 F	01:40 AM	3.5 107	**30** Sa	01:19 AM	4.0 122
	07:30 AM	7.5 229		07:02 AM	7.7 235
	02:12 PM	0.9 27		01:50 PM	-0.7 -21
	09:07 PM	6.7 204		09:00 PM	7.3 223
			31 Su	02:08 AM	4.6 140
				07:40 AM	7.5 229
				02:40 PM	-0.9 -27
				10:05 PM	7.2 219

Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.
Referenced to Station: PORT TOWNSEND (9444900) Height offset in feet (low:*0.90 high: * 0.90) Time offset in mins (low:56 high: 33)

Generated On: Mon Jun 17 22:38:09 GMT 2013

Page 2 of 5

StationId:9446025
Source:NOAA/NOS/CO-OPS
Station Type:Subordinate
Time Zone:LST/LDT
Datum:mean lower low water (MLLW) which is the chart datum of soundings

NOAA Tide Predictions

Point Vashon, Vashon Island,Washington,2013

Times and Heights of High and Low Waters

January

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 Tu	12:42 AM -0.2 -6 07:48 AM 12.6 384 01:51 PM 5.7 174 06:53 PM 9.4 287		**16** W	01:29 AM 1.0 30 08:17 AM 13.1 399 02:45 PM 3.6 110 08:21 PM 9.3 283	
2 W	01:21 AM 0.7 21 08:20 AM 12.7 387 02:37 PM 4.9 149 07:49 PM 9.0 274		**17** Th	02:15 AM 2.7 82 08:55 AM 12.7 387 03:39 PM 3.0 91 09:35 PM 8.7 265	
3 Th	02:01 AM 1.8 55 08:55 AM 12.6 384 03:27 PM 4.1 125 08:55 PM 8.6 262		**18** F	03:04 AM 4.4 134 09:35 AM 12.2 372 04:36 PM 2.5 76 11:07 PM 8.5 259	
4 F	02:45 AM 3.2 98 09:33 AM 12.5 381 04:21 PM 3.1 94 10:14 PM 8.4 256		**19** Sa	04:01 AM 5.9 180 10:19 AM 11.7 357 05:34 PM 2.0 61	
5 Sa	03:36 AM 4.7 143 10:14 AM 12.4 378 05:18 PM 1.9 58 11:46 PM 8.6 262		**20** Su	12:59 AM 8.9 271 05:19 AM 7.2 219 11:07 AM 11.2 341 06:31 PM 1.5 46	
6 Su	04:40 AM 6.1 186 10:59 AM 12.3 375 06:16 PM 0.7 21		**21** M	02:30 AM 9.7 296 06:57 AM 7.8 238 11:58 AM 10.8 329 07:22 PM 1.0 30	
7 M	01:23 AM 9.3 283 05:59 AM 7.2 219 11:50 AM 12.2 372 07:11 PM -0.5 -15		**22** Tu	03:28 AM 10.4 317 08:19 AM 7.9 241 12:51 PM 10.5 320 08:07 PM 0.6 18	
8 Tu	02:45 AM 10.4 317 07:22 AM 7.8 238 12:44 PM 12.2 372 08:04 PM -1.6 -49		**23** W	04:10 AM 11.0 335 09:16 AM 7.7 235 01:41 PM 10.4 317 08:47 PM 0.1 3	
9 W	03:43 AM 11.4 347 08:34 AM 7.8 238 01:40 PM 12.2 372 08:55 PM -2.4 -73		**24** Th	04:42 AM 11.4 347 09:57 AM 7.5 229 02:27 PM 10.4 317 09:24 PM -0.2 -6	
10 Th	04:30 AM 12.2 372 09:35 AM 7.5 229 02:35 PM 12.2 372 09:43 PM -2.8 -85		**25** F	05:08 AM 11.7 357 10:30 AM 7.2 219 03:10 PM 10.5 320 09:59 PM -0.5 -15	
11 F	05:11 AM 12.7 387 10:30 AM 7.0 213 03:30 PM 12.1 369 10:30 PM -2.9 -88		**26** Sa	05:29 AM 11.9 363 10:59 AM 6.7 204 03:50 PM 10.5 320 10:34 PM -0.6 -18	
12 Sa	05:50 AM 13.1 399 11:21 AM 6.3 192 04:25 PM 11.8 360 11:16 PM -2.5 -76		**27** Su	05:49 AM 12.1 369 11:28 AM 6.2 189 04:31 PM 10.6 323 11:09 PM -0.4 -12	
13 Su	06:27 AM 13.3 405 12:11 PM 5.6 171 05:20 PM 11.3 344		**28** M	06:12 AM 12.3 375 12:00 PM 5.6 171 05:13 PM 10.5 320 11:44 PM -0.1 -3	
14 M	12:01 AM -1.6 -49 07:04 AM 13.4 408 01:01 PM 4.9 149 06:17 PM 10.7 326		**29** Tu	06:37 AM 12.5 381 12:36 PM 4.8 146 05:58 PM 10.3 314	
15 Tu	12:45 AM -0.4 -12 07:40 AM 13.3 405 01:52 PM 4.2 128 07:17 PM 10.0 305		**30** W	12:21 AM 0.6 18 07:06 AM 12.6 384 01:15 PM 4.0 122 06:47 PM 10.1 308	
			31 Th	12:59 AM 1.6 49 07:36 AM 12.7 387 01:58 PM 3.2 98 07:42 PM 9.8 299	

February

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	01:39 AM 2.8 85 08:10 AM 12.6 384 02:46 PM 2.4 73 08:45 PM 9.4 287		**16** Sa	02:36 AM 5.3 162 08:42 AM 11.5 351 03:32 PM 1.9 58 10:22 PM 9.1 277	
2 Sa	02:23 AM 4.2 128 08:47 AM 12.4 378 03:39 PM 1.6 49 09:59 PM 9.2 280		**17** Su	03:31 AM 6.5 198 09:26 AM 10.8 329 04:27 PM 1.9 58	
3 Su	03:14 AM 5.7 174 09:30 AM 12.1 369 04:38 PM 1.0 30 11:30 PM 9.2 280		**18** M	12:01 AM 9.1 277 04:48 AM 7.4 226 10:17 AM 10.3 314 05:27 PM 1.8 55	
4 M	04:21 AM 7.0 213 10:21 AM 11.8 360 05:41 PM 0.3 9		**19** Tu	01:42 AM 9.6 293 06:36 AM 7.8 238 11:17 AM 9.8 299 06:28 PM 1.6 49	
5 Tu	01:15 AM 9.7 296 05:50 AM 7.8 238 11:22 AM 11.5 351 06:45 PM -0.4 -12		**20** W	02:46 AM 10.1 308 08:02 AM 7.5 229 12:21 PM 9.6 293 07:25 PM 1.3 40	
6 W	02:36 AM 10.6 323 07:22 AM 7.9 241 12:29 PM 11.4 347 07:45 PM -1.1 -34		**21** Th	03:27 AM 10.6 323 08:54 AM 7.1 216 01:21 PM 9.7 296 08:13 PM 0.9 27	
7 Th	03:30 AM 11.4 347 08:35 AM 7.4 226 01:35 PM 11.4 347 08:39 PM -1.5 -46		**22** F	03:57 AM 10.9 332 09:29 AM 6.6 201 02:13 PM 9.9 302 08:55 PM 0.6 18	
8 F	04:11 AM 12.0 366 09:32 AM 6.6 201 02:36 PM 11.5 351 09:29 PM -1.7 -52		**23** Sa	04:19 AM 11.2 341 09:57 AM 6.0 183 03:00 PM 10.2 311 09:33 PM 0.5 15	
9 Sa	04:46 AM 12.4 378 10:20 AM 5.7 174 03:33 PM 11.5 351 10:16 PM -1.5 -46		**24** Su	04:39 AM 11.4 347 10:24 AM 5.3 162 03:43 PM 10.4 317 10:10 PM 0.5 15	
10 Su	05:19 AM 12.7 387 11:05 AM 4.8 146 04:28 PM 11.4 347 11:00 PM -0.9 -27		**25** M	05:00 AM 11.7 357 10:53 AM 4.5 137 04:25 PM 10.7 326 10:46 PM 0.7 21	
11 M	05:51 AM 12.9 393 11:48 AM 4.0 122 05:21 PM 11.2 341 11:43 PM 0.0 0		**26** Tu	05:23 AM 12.0 366 11:25 AM 3.5 107 05:09 PM 10.8 329 11:23 PM 1.3 40	
12 Tu	06:22 AM 12.9 393 12:31 PM 3.2 98 06:14 PM 10.8 329		**27** W	05:50 AM 12.2 372 12:01 PM 2.6 79 05:55 PM 10.9 332	
13 W	12:25 AM 1.2 37 06:55 AM 12.7 387 01:14 PM 2.6 79 07:08 PM 10.4 317		**28** Th	12:01 AM 2.0 61 06:19 AM 12.3 375 12:41 PM 1.7 52 06:45 PM 10.8 329	
14 Th	01:06 AM 2.5 76 07:28 AM 12.5 381 01:57 PM 2.2 67 08:04 PM 9.9 302				
15 F	01:49 AM 3.9 119 08:04 AM 12.0 366 02:43 PM 2.0 61 09:07 PM 9.5 290				

March

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	12:41 AM 3.0 91 06:51 AM 12.3 375 01:24 PM 1.0 30 07:39 PM 10.6 323		**16** Sa	02:30 AM 5.1 155 08:14 AM 11.0 335 02:53 PM 0.8 24 09:41 PM 10.2 311	
2 Sa	01:24 AM 4.1 125 07:27 AM 12.1 369 02:11 PM 0.4 12 08:40 PM 10.3 314		**17** Su	03:17 AM 6.0 183 08:53 AM 10.5 320 03:37 PM 1.0 30 10:41 PM 9.9 302	
3 Su	02:12 AM 5.3 162 08:08 AM 11.8 360 03:04 PM 0.2 6 09:51 PM 10.0 305		**18** M	04:13 AM 6.7 204 09:37 AM 9.8 299 04:27 PM 1.3 40 11:53 PM 9.7 296	
4 M	03:10 AM 6.4 195 08:56 AM 11.3 344 04:04 PM 0.1 3 11:17 PM 9.9 302		**19** Tu	05:28 AM 7.2 219 10:31 AM 9.2 280 05:24 PM 1.7 52	
5 Tu	04:26 AM 7.2 219 09:57 AM 10.8 329 05:11 PM 0.1 3		**20** W	01:17 AM 9.7 296 07:11 AM 7.2 219 11:38 AM 8.8 268 06:28 PM 1.9 58	
6 W	12:53 AM 10.2 311 06:03 AM 7.4 226 11:11 AM 10.4 317 06:20 PM 0.0 0		**21** Th	02:28 AM 9.9 302 08:31 AM 6.7 204 12:51 PM 8.7 265 07:31 PM 1.9 58	
7 Th	02:06 AM 10.8 329 07:31 AM 6.8 207 12:29 PM 10.3 314 07:25 PM -0.1 -3		**22** F	03:14 AM 10.2 311 09:17 AM 6.1 186 01:59 PM 8.8 268 08:28 PM 1.8 55	
8 F	02:56 AM 11.3 344 08:34 AM 5.9 180 01:42 PM 10.4 317 08:23 PM -0.2 -6		**23** Sa	03:46 AM 10.5 320 09:50 AM 5.3 162 02:57 PM 9.2 280 09:17 PM 1.7 52	
9 Sa	03:35 AM 11.7 357 09:23 AM 4.8 146 02:46 PM 10.7 326 09:14 PM 0.0 0		**24** Su	04:12 AM 10.8 329 10:17 AM 4.4 134 03:48 PM 9.7 296 10:00 PM 1.8 55	
10 Su	05:08 AM 12.0 366 11:05 AM 3.8 116 04:43 PM 10.9 332 11:00 PM 0.5 15		**25** M	04:36 AM 11.1 338 10:46 AM 3.4 104 04:35 PM 10.3 314 10:41 PM 2.0 61	
11 M	05:37 AM 12.1 369 11:44 AM 2.8 85 05:35 PM 11.0 335 11:44 PM 1.2 37		**26** Tu	05:02 AM 11.4 347 11:17 AM 2.2 67 05:20 PM 10.7 326 11:21 PM 2.4 73	
12 Tu	06:06 AM 12.2 372 12:21 PM 2.0 61 06:24 PM 11.1 338		**27** W	05:29 AM 11.7 357 11:51 AM 1.1 34 06:06 PM 11.1 338	
13 W	12:25 AM 2.1 64 06:35 AM 12.1 369 12:58 PM 1.3 40 07:12 PM 11.0 335		**28** Th	12:01 AM 3.0 91 05:59 AM 11.8 360 12:29 PM 0.1 3 06:54 PM 11.4 347	
14 Th	01:06 AM 3.1 94 07:06 AM 11.9 363 01:35 PM 0.9 27 08:00 PM 10.8 329		**29** F	12:44 AM 3.8 116 06:32 AM 11.9 363 01:10 PM -0.7 -21 07:45 PM 11.5 351	
15 F	01:47 AM 4.1 125 07:39 AM 11.5 351 02:13 PM 0.7 21 08:49 PM 10.6 323		**30** Sa	01:28 AM 4.6 140 07:09 AM 11.8 360 01:55 PM -1.2 -37 08:39 PM 11.4 347	
			31 Su	02:17 AM 5.4 165 07:50 AM 11.5 351 02:44 PM -1.3 -40 09:39 PM 11.2 341	

Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.
Referenced to Station: SEATTLE (Madison St.), Elliott Bay (9447130) Height offset in feet (low:*1.01 high: * 1.02) Time offset in mins (low:2 high: 2)

Generated On: Mon Jun 17 22:35:59 GMT 2013

StationId:9444900
Source:NOAA/NOS/CO-OPS
Station Type:Harmonic
Time Zone:LST/LDT
Datum:mean lower low water (MLLW) which is the chart datum of soundings

NOAA Tide Predictions

PORT TOWNSEND,Washington,2013

Times and Heights of High and Low Waters

January

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 Tu	07:30 AM	9.3 283	**16** W	12:26 AM	0.9 27
	01:05 PM	5.3 162		07:50 AM	9.5 290
	05:57 PM	6.6 201		02:00 PM	3.5 107
				07:39 PM	6.2 189
2 W	12:19 AM	0.5 15	**17** Th	01:10 AM	2.3 70
	08:00 AM	9.3 283		08:22 AM	9.3 283
	01:56 PM	4.6 140		03:02 PM	2.8 85
	06:59 PM	6.1 186		09:05 PM	5.8 177
3 Th	12:58 AM	1.5 46	**18** F	01:57 AM	3.6 110
	08:30 AM	9.3 283		08:55 AM	9.1 277
	02:49 PM	3.7 113		04:03 PM	2.2 67
	08:13 PM	5.6 171		11:11 PM	5.8 177
4 F	01:39 AM	2.6 79	**19** Sa	02:51 AM	4.9 149
	09:02 AM	9.2 280		09:28 AM	8.8 268
	03:42 PM	2.7 82		05:00 PM	1.6 49
	09:44 PM	5.4 165			
5 Sa	02:26 AM	3.8 116	**20** Su	01:09 AM	6.4 195
	09:36 AM	9.2 280		03:59 AM	5.9 180
	04:35 PM	1.6 49		10:03 AM	8.5 259
	11:47 PM	5.7 174		05:51 PM	1.2 37
6 Su	03:27 AM	5.0 152	**21** M	02:21 AM	7.2 219
	10:13 AM	9.2 280		05:22 AM	6.6 201
	05:27 PM	0.5 15		10:43 AM	8.2 250
				06:37 PM	0.7 21
7 M	01:45 AM	6.6 201	**22** Tu	03:11 AM	7.9 241
	04:42 AM	6.0 183		06:45 AM	6.9 210
	10:54 AM	9.2 280		11:28 AM	8.1 247
	06:18 PM	-0.6 -18		07:18 PM	0.4 12
8 Tu	02:49 AM	7.6 232	**23** W	03:49 AM	8.3 253
	05:59 AM	6.6 201		07:51 AM	7.0 213
	11:41 AM	9.2 280		12:18 PM	8.0 244
	07:08 PM	-1.5 -46		07:55 PM	0.0 0
9 W	03:35 AM	8.4 256	**24** Th	04:21 AM	8.6 262
	07:09 AM	6.9 210		08:38 AM	6.8 207
	12:35 PM	9.2 280		01:08 PM	7.9 241
	07:56 PM	-2.1 -64		08:30 PM	-0.2 -6
10 Th	04:16 AM	9.0 274	**25** F	04:48 AM	8.7 265
	08:11 AM	6.8 207		09:14 AM	6.6 201
	01:32 PM	9.1 277		01:56 PM	7.9 241
	08:43 PM	-2.5 -76		09:03 PM	-0.4 -12
11 F	04:54 AM	9.4 287	**26** Sa	05:11 AM	8.8 268
	09:09 AM	6.5 198		09:46 AM	6.2 189
	02:30 PM	8.9 271		02:43 PM	7.8 238
	09:29 PM	-2.4 -73		09:37 PM	-0.4 -12
12 Sa	05:31 AM	9.6 293	**27** Su	05:31 AM	8.9 271
	10:05 AM	6.1 186		10:20 AM	5.8 177
	03:28 PM	8.6 262		03:30 PM	7.7 235
	10:14 PM	-2.0 -61		10:10 PM	-0.3 -9
13 Su	06:07 AM	9.7 296	**28** M	05:52 AM	9.0 274
	11:01 AM	5.5 168		10:56 AM	5.2 158
	04:27 PM	8.1 247		04:18 PM	7.5 229
	10:58 PM	-1.3 -40		10:45 PM	0.0 0
14 M	06:42 AM	9.7 296	**29** Tu	06:15 AM	9.1 277
	11:59 AM	4.8 146		11:36 AM	4.6 140
	05:27 PM	7.5 229		05:10 PM	7.2 219
	11:42 PM	-0.3 -9		11:20 PM	0.6 18
15 Tu	07:17 AM	9.7 296	**30** W	06:42 AM	9.1 277
	12:59 PM	4.1 125		12:19 PM	3.9 119
	06:30 PM	6.9 210		06:05 PM	6.9 210
				11:57 PM	1.4 43
			31 Th	07:10 AM	9.2 280
				01:05 PM	3.1 94
				07:07 PM	6.5 198

February

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	12:35 AM	2.5 76	**16** Sa	01:33 AM	4.6 140
	07:41 AM	9.2 280		07:55 AM	8.5 259
	01:56 PM	2.3 70		02:48 PM	1.7 52
	08:18 PM	6.2 189		10:35 PM	6.4 195
2 Sa	01:17 AM	3.6 110	**17** Su	02:28 AM	5.5 168
	08:13 AM	9.1 277		08:29 AM	8.2 250
	02:51 PM	1.5 46		03:45 PM	1.6 49
	09:47 PM	6.1 186			
3 Su	02:05 AM	4.8 146	**18** M	12:31 AM	6.8 207
	08:49 AM	9.0 274		03:41 AM	6.2 189
	03:50 PM	0.7 21		09:07 AM	7.9 241
	11:52 PM	6.3 192		04:45 PM	1.4 43
4 M	03:09 AM	5.8 177	**19** Tu	01:45 AM	7.3 223
	09:30 AM	8.9 271		05:12 AM	6.6 201
	04:51 PM	0.0 0		09:55 AM	7.6 232
				05:44 PM	1.2 37
5 Tu	01:35 AM	7.1 216	**20** W	02:33 AM	7.7 235
	04:31 AM	6.5 198		06:40 AM	6.6 201
	10:20 AM	8.8 268		10:53 AM	7.4 226
	05:51 PM	-0.6 -18		06:36 PM	1.0 30
6 W	02:32 AM	7.8 238	**21** Th	03:09 AM	8.0 244
	05:56 AM	6.8 207		07:39 AM	6.4 195
	11:21 AM	8.6 262		11:57 AM	7.3 223
	06:48 PM	-1.1 -34		07:22 PM	0.7 21
7 Th	03:14 AM	8.4 256	**22** F	03:37 AM	8.2 250
	07:09 AM	6.6 201		08:17 AM	6.0 183
	12:29 PM	8.6 262		12:58 PM	7.4 226
	07:41 PM	-1.3 -40		08:01 PM	0.5 15
8 F	03:51 AM	8.8 268	**23** Sa	03:59 AM	8.2 250
	08:10 AM	6.1 186		08:46 AM	5.6 171
	01:37 PM	8.5 259		01:54 PM	7.5 229
	08:29 PM	-1.4 -43		08:37 PM	0.5 15
9 Sa	04:25 AM	9.1 277	**24** Su	04:17 AM	8.3 253
	09:03 AM	5.5 168		09:14 AM	5.0 152
	02:40 PM	8.4 256		02:46 PM	7.6 232
	09:14 PM	-1.1 -34		09:12 PM	0.6 18
10 Su	04:56 AM	9.2 280	**25** M	04:35 AM	8.5 259
	09:52 AM	4.7 143		09:45 AM	4.3 131
	03:39 PM	8.2 250		03:36 PM	7.6 232
	09:57 PM	-0.5 -15		09:46 PM	0.8 24
11 M	05:27 AM	9.3 283	**26** Tu	04:56 AM	8.6 262
	10:40 AM	4.0 122		10:20 AM	3.5 107
	04:37 PM	7.9 241		04:27 PM	7.6 232
	10:39 PM	0.3 9		10:22 PM	1.3 40
12 Tu	05:57 AM	9.3 283	**27** W	05:21 AM	8.7 265
	11:28 AM	3.3 101		10:58 AM	2.6 79
	05:34 PM	7.5 229		05:20 PM	7.6 232
	11:21 PM	1.3 40		10:59 PM	2.0 61
13 W	06:26 AM	9.2 280	**28** Th	05:49 AM	8.8 268
	12:16 PM	2.7 82		11:40 AM	1.8 55
	06:33 PM	7.1 216		06:16 PM	7.4 226
				11:38 PM	2.9 88
14 Th	12:03 AM	2.4 73			
	06:55 AM	9.0 274			
	01:04 PM	2.3 70			
	07:36 PM	6.8 207			
15 F	12:46 AM	3.5 107			
	07:24 AM	8.8 268			
	01:55 PM	1.9 58			
	08:51 PM	6.5 198			

March

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	06:19 AM	8.8 268	**16** Sa	01:29 AM	4.7 143
	12:26 PM	1.1 34		07:27 AM	8.1 247
	07:17 PM	7.3 223		01:59 PM	0.9 27
				09:35 PM	7.3 223
2 Sa	12:20 AM	3.8 116	**17** Su	02:20 AM	5.4 165
	06:52 AM	8.8 268		08:00 AM	7.8 238
	01:15 PM	0.6 18		02:47 PM	1.0 30
	08:27 PM	7.1 216		10:51 PM	7.2 219
3 Su	01:07 AM	4.8 146	**18** M	03:21 AM	5.9 180
	07:28 AM	8.7 265		08:36 AM	7.5 229
	02:11 PM	0.2 6		03:39 PM	1.2 37
	09:51 PM	7.0 213			
4 M	02:04 AM	5.6 171	**19** Tu	12:24 AM	7.2 219
	08:09 AM	8.5 259		04:42 AM	6.2 189
	03:12 PM	0.0 0		09:20 AM	7.1 216
	11:34 PM	7.2 219		04:38 PM	1.4 43
5 Tu	03:19 AM	6.2 189	**20** W	01:40 AM	7.4 226
	09:00 AM	8.2 250		06:18 AM	6.2 189
	04:17 PM	-0.1 -3		10:15 AM	6.8 207
				05:41 PM	1.5 46
6 W	12:58 AM	7.6 232	**21** Th	02:30 AM	7.6 232
	04:48 AM	6.4 195		07:33 AM	5.9 180
	10:05 AM	7.9 241		11:23 AM	6.6 201
	05:24 PM	-0.2 -6		06:41 PM	1.5 46
7 Th	01:53 AM	8.0 244	**22** F	03:05 AM	7.7 235
	06:14 AM	6.1 186		08:18 AM	5.4 165
	11:23 AM	7.6 232		12:39 PM	6.5 198
	06:27 PM	-0.2 -6		07:35 PM	1.5 46
8 F	02:35 AM	8.3 253	**23** Sa	03:30 AM	7.8 238
	07:21 AM	5.5 168		08:46 AM	4.9 149
	12:43 PM	7.6 232		01:52 PM	6.7 204
	07:22 PM	0.0 0		08:20 PM	1.5 46
9 Sa	03:11 AM	8.6 262	**24** Su	03:49 AM	7.9 241
	08:12 AM	4.7 143		09:12 AM	4.1 125
	01:56 PM	7.7 235		02:55 PM	6.9 210
	08:12 PM	0.3 9		09:01 PM	1.7 52
10 Su	04:42 AM	8.7 265	**25** M	04:08 AM	8.0 244
	09:56 AM	3.8 116		09:40 AM	3.3 101
	04:00 PM	7.8 238		03:51 PM	7.3 223
	09:56 PM	0.8 24		09:40 PM	2.0 61
11 M	05:11 AM	8.8 268	**26** Tu	04:30 AM	8.2 250
	10:36 AM	3.0 91		10:12 AM	2.3 70
	04:58 PM	7.8 238		04:44 PM	7.6 232
	10:39 PM	1.4 43		10:18 PM	2.4 73
12 Tu	05:37 AM	8.7 265	**27** W	04:55 AM	8.4 256
	11:16 AM	2.2 67		10:47 AM	1.3 40
	05:52 PM	7.8 238		05:37 PM	7.9 241
	11:20 PM	2.2 67		10:58 PM	3.0 91
13 W	06:03 AM	8.7 265	**28** Th	05:24 AM	8.5 259
	11:55 AM	1.6 49		11:26 AM	0.4 12
	06:45 PM	7.8 238		06:31 PM	8.0 244
				11:39 PM	3.7 113
14 Th	12:01 AM	3.0 91	**29** F	05:55 AM	8.6 262
	06:30 AM	8.6 262		12:08 PM	-0.3 -9
	12:35 PM	1.2 37		07:27 PM	8.1 247
	07:38 PM	7.6 232			
15 F	12:44 AM	3.9 119	**30** Sa	12:23 AM	4.4 134
	06:57 AM	8.4 256		06:29 AM	8.5 259
	01:16 PM	1.0 30		12:54 PM	-0.8 -24
	08:34 PM	7.5 229		08:27 PM	8.1 247
			31 Su	01:12 AM	5.1 155
				07:07 AM	8.4 256
				01:44 PM	-0.9 -27
				09:32 PM	8.0 244

Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.

Generated On: Mon Jun 17 22:32:17 GMT 2013

StationId:9447130
Source:NOAA/NOS/CO-OPS
Station Type:Harmonic
Time Zone:LST/LDT
Datum:mean lower low water (MLLW) which is the chart datum of soundings

NOAA Tide Predictions

SEATTLE, PUGET SOUND,Washington,2013

Times and Heights of High and Low Waters

January

	Time	Height		Time	Height
	h m	ft	cm	h m	ft	cm
1 Tu	12:40 AM	-0.2	-6	**16** W	01:27 AM	1.0	30
	07:46 AM	12.4	378		08:15 AM	12.8	390
	01:49 PM	5.6	171		02:43 PM	3.6	110
	06:51 PM	9.2	280		08:19 PM	9.1	277
2 W	01:19 AM	0.6	18	**17** Th	02:13 AM	2.6	79
	08:18 AM	12.4	378		08:53 AM	12.4	378
	02:35 PM	4.9	149		03:37 PM	3.0	91
	07:47 PM	8.8	268		09:33 PM	8.6	262
3 Th	01:59 AM	1.8	55	**18** F	03:02 AM	4.3	131
	08:53 AM	12.4	378		09:33 AM	12.0	366
	03:25 PM	4.0	122		04:34 PM	2.5	76
	08:53 PM	8.4	256		11:05 PM	8.3	253
4 F	02:43 AM	3.1	94	**19** Sa	03:59 AM	5.9	180
	09:31 AM	12.3	375		10:17 AM	11.5	351
	04:19 PM	3.0	91		05:32 PM	2.0	61
	10:12 PM	8.2	250				
5 Sa	03:34 AM	4.6	140	**20** Su	12:57 AM	8.7	265
	10:12 AM	12.1	369		05:17 AM	7.1	216
	05:16 PM	1.9	58		11:05 AM	10.9	332
	11:44 PM	8.4	256		06:29 PM	1.5	46
6 Su	04:38 AM	6.1	186	**21** M	02:28 AM	9.5	290
	10:57 AM	12.0	366		06:55 AM	7.7	235
	06:14 PM	0.7	21		11:56 AM	10.5	320
					07:20 PM	1.0	30
7 M	01:21 AM	9.2	280	**22** Tu	03:26 AM	10.2	311
	05:57 AM	7.2	219		08:17 AM	7.8	238
	11:48 AM	11.9	363		12:49 PM	10.3	314
	07:09 PM	-0.5	-15		08:05 PM	0.5	15
8 Tu	02:43 AM	10.2	311	**23** W	04:08 AM	10.8	329
	07:20 AM	7.7	235		09:14 AM	7.7	235
	12:42 PM	11.9	363		01:39 PM	10.2	311
	08:02 PM	-1.5	-46		08:45 PM	0.1	3
9 W	03:41 AM	11.2	341	**24** Th	04:40 AM	11.2	341
	08:32 AM	7.7	235		09:55 AM	7.4	226
	01:38 PM	11.9	363		02:25 PM	10.2	311
	08:53 PM	-2.4	-73		09:22 PM	-0.2	-6
10 Th	04:28 AM	11.9	363	**25** F	05:06 AM	11.4	347
	09:33 AM	7.4	226		10:28 AM	7.1	216
	02:33 PM	11.9	363		03:08 PM	10.3	314
	09:41 PM	-2.8	-85		09:57 PM	-0.5	-15
11 F	05:09 AM	12.5	381	**26** Sa	05:27 AM	11.6	354
	10:28 AM	6.9	210		10:57 AM	6.7	204
	03:28 PM	11.8	360		03:48 PM	10.3	314
	10:28 PM	-2.8	-85		10:32 PM	-0.6	-18
12 Sa	05:48 AM	12.8	390	**27** Su	05:47 AM	11.8	360
	11:19 AM	6.3	192		11:26 AM	6.2	189
	04:23 PM	11.6	354		04:29 PM	10.3	314
	11:14 PM	-2.4	-73		11:07 PM	-0.4	-12
13 Su	06:25 AM	13.0	396	**28** M	06:10 AM	12.0	366
	12:09 PM	5.6	171		11:58 AM	5.5	168
	05:18 PM	11.1	338		05:11 PM	10.3	314
	11:59 PM	-1.6	-49		11:42 PM	-0.1	-3
14 M	07:02 AM	13.1	399	**29** Tu	06:35 AM	12.2	372
	12:59 PM	4.9	149		12:34 PM	4.8	146
	06:15 PM	10.5	320		05:56 PM	10.1	308
15 Tu	12:43 AM	-0.4	-12	**30** W	12:19 AM	0.6	18
	07:38 AM	13.0	396		07:04 AM	12.4	378
	01:50 PM	4.2	128		01:13 PM	3.9	119
	07:15 PM	9.8	299		06:45 PM	9.9	302
				31 Th	12:57 AM	1.6	49
					07:34 AM	12.4	378
					01:56 PM	3.1	94
					07:40 PM	9.6	293

February

	Time	Height		Time	Height
	h m	ft	cm	h m	ft	cm
1 F	01:37 AM	2.8	85	**16** Sa	02:34 AM	5.2	158
	08:08 AM	12.4	378		08:40 AM	11.2	341
	02:44 PM	2.3	70		03:30 PM	1.9	58
	08:43 PM	9.2	280		10:20 PM	9.0	274
2 Sa	02:21 AM	4.2	128	**17** Su	03:29 AM	6.4	195
	08:45 AM	12.2	372		09:24 AM	10.6	323
	03:37 PM	1.6	49		04:25 PM	1.8	55
	09:57 PM	9.0	274		11:59 PM	9.0	274
3 Su	03:12 AM	5.6	171	**18** M	04:46 AM	7.3	223
	09:28 AM	11.9	363		10:15 AM	10.1	308
	04:36 PM	0.9	27		05:25 PM	1.8	55
	11:28 PM	9.0	274				
4 M	04:19 AM	6.9	210	**19** Tu	01:40 AM	9.4	287
	10:19 AM	11.6	354		06:34 AM	7.7	235
	05:39 PM	0.3	9		11:15 AM	9.6	293
					06:26 PM	1.6	49
5 Tu	01:13 AM	9.5	290	**20** W	02:44 AM	9.9	302
	05:48 AM	7.7	235		08:00 AM	7.5	229
	11:20 AM	11.3	344		12:19 PM	9.4	287
	06:43 PM	-0.4	-12		07:23 PM	1.3	40
6 W	02:34 AM	10.4	317	**21** Th	03:25 AM	10.4	317
	07:20 AM	7.8	238		08:52 AM	7.0	213
	12:27 PM	11.2	341		01:19 PM	9.5	290
	07:43 PM	-1.1	-34		08:11 PM	0.9	27
7 Th	03:28 AM	11.2	341	**22** F	03:55 AM	10.7	326
	08:33 AM	7.3	223		09:27 AM	6.5	198
	01:33 PM	11.2	341		02:11 PM	9.7	296
	08:37 PM	-1.5	-46		08:53 PM	0.6	18
8 F	04:09 AM	11.8	360	**23** Sa	04:17 AM	11.0	335
	09:30 AM	6.5	198		09:55 AM	5.9	180
	02:34 PM	11.3	344		02:58 PM	10.0	305
	09:27 PM	-1.7	-52		09:31 PM	0.4	12
9 Sa	04:44 AM	12.2	372	**24** Su	04:37 AM	11.2	341
	10:18 AM	5.7	174		10:22 AM	5.2	158
	03:31 PM	11.3	344		03:41 PM	10.2	311
	10:14 PM	-1.5	-46		10:08 PM	0.5	15
10 Su	05:17 AM	12.5	381	**25** M	04:58 AM	11.5	351
	11:03 AM	4.8	146		10:51 AM	4.4	134
	04:26 PM	11.2	341		04:23 PM	10.5	320
	10:58 PM	-0.9	-27		10:44 PM	0.7	21
11 M	05:49 AM	12.6	384	**26** Tu	05:21 AM	11.7	357
	11:46 AM	3.9	119		11:23 AM	3.5	107
	05:19 PM	11.0	335		05:07 PM	10.6	323
	11:41 PM	0.0	0		11:21 PM	1.2	37
12 Tu	06:20 AM	12.6	384	**27** W	05:48 AM	11.9	363
	12:29 PM	3.2	98		11:59 AM	2.6	79
	06:12 PM	10.6	323		05:53 PM	10.7	326
					11:59 PM	2.0	61
13 W	12:23 AM	1.1	34	**28** Th	06:17 AM	12.1	369
	06:53 AM	12.5	381		12:39 PM	1.7	52
	01:12 PM	2.6	79		06:43 PM	10.6	323
	07:06 PM	10.2	311				
14 Th	01:04 AM	2.5	76				
	07:26 AM	12.2	372				
	01:55 PM	2.2	67				
	08:02 PM	9.7	296				
15 F	01:47 AM	3.9	119				
	08:02 AM	11.8	360				
	02:41 PM	1.9	58				
	09:05 PM	9.3	283				

March

	Time	Height		Time	Height
	h m	ft	cm	h m	ft	cm
1 F	12:39 AM	3.0	91	**16** Sa	02:28 AM	5.0	152
	06:49 AM	12.0	366		08:12 AM	10.8	329
	01:22 PM	0.9	27		02:51 PM	0.8	24
	07:37 PM	10.4	317		09:39 PM	10.0	305
2 Sa	01:22 AM	4.1	125	**17** Su	03:15 AM	5.9	180
	07:25 AM	11.9	363		08:51 AM	10.3	314
	02:09 PM	0.4	12		03:35 PM	1.0	30
	08:38 PM	10.1	308		10:39 PM	9.7	296
3 Su	02:10 AM	5.3	162	**18** M	04:11 AM	6.6	201
	08:06 AM	11.6	354		09:35 AM	9.6	293
	03:02 PM	0.2	6		04:25 PM	1.3	40
	09:49 PM	9.8	299		11:51 PM	9.5	290
4 M	03:08 AM	6.4	195	**19** Tu	05:26 AM	7.1	216
	08:54 AM	11.1	338		10:29 AM	9.1	277
	04:02 PM	0.1	3		05:22 PM	1.7	52
	11:15 PM	9.7	296				
5 Tu	04:24 AM	7.1	216	**20** W	01:15 AM	9.5	290
	09:55 AM	10.6	323		07:09 AM	7.1	216
	05:09 PM	0.1	3		11:36 AM	8.6	262
					06:26 PM	1.9	58
6 W	12:51 AM	10.0	305	**21** Th	02:26 AM	9.7	296
	06:01 AM	7.3	223		08:29 AM	6.7	204
	11:09 AM	10.2	311		12:49 PM	8.5	259
	06:18 PM	0.0	0		07:29 PM	1.9	58
7 Th	02:04 AM	10.6	323	**22** F	03:12 AM	10.0	305
	07:29 AM	6.8	207		09:15 AM	6.0	183
	12:27 PM	10.1	308		01:57 PM	8.7	265
	07:23 PM	-0.1	-3		08:26 PM	1.8	55
8 F	02:54 AM	11.1	338	**23** Sa	03:44 AM	10.3	314
	08:32 AM	5.8	177		09:48 AM	5.3	162
	01:40 PM	10.2	311		02:55 PM	9.1	277
	08:21 PM	-0.2	-6		09:15 PM	1.7	52
9 Sa	03:33 AM	11.5	351	**24** Su	04:10 AM	10.6	323
	09:21 AM	4.8	146		10:15 AM	4.4	134
	02:44 PM	10.5	320		03:46 PM	9.5	290
	09:12 PM	0.0	0		09:58 PM	1.8	55
10 Su	05:06 AM	11.8	360	**25** M	04:34 AM	10.9	332
	11:03 AM	3.7	113		10:44 AM	3.3	101
	04:41 PM	10.7	326		04:33 PM	10.1	308
	10:58 PM	0.5	15		10:39 PM	2.0	61
11 M	05:35 AM	11.9	363	**26** Tu	05:00 AM	11.2	341
	11:42 AM	2.8	85		11:15 AM	2.2	67
	05:33 PM	10.8	329		05:18 PM	10.5	320
	11:42 PM	1.2	37		11:19 PM	2.4	73
12 Tu	06:04 AM	11.9	363	**27** W	05:27 AM	11.4	347
	12:19 PM	2.0	61		11:49 AM	1.1	34
	06:22 PM	10.8	329		06:04 PM	10.9	332
					11:59 PM	3.0	91
13 W	12:23 AM	2.0	61	**28** Th	05:57 AM	11.6	354
	06:33 AM	11.8	360		12:27 PM	0.1	3
	12:56 PM	1.3	40		06:52 PM	11.2	341
	07:10 PM	10.8	329				
14 Th	01:04 AM	3.0	91	**29** F	12:42 AM	3.7	113
	07:04 AM	11.6	354		06:30 AM	11.7	357
	01:33 PM	0.9	27		01:08 PM	-0.7	-21
	07:58 PM	10.6	323		07:43 PM	11.3	344
15 F	01:45 AM	4.0	122	**30** Sa	01:26 AM	4.5	137
	07:37 AM	11.3	344		07:07 AM	11.6	354
	02:11 PM	0.7	21		01:53 PM	-1.2	-37
	08:47 PM	10.3	314		08:37 PM	11.2	341
				31 Su	02:15 AM	5.3	162
					07:48 AM	11.3	344
					02:42 PM	-1.3	-40
					09:37 PM	11.0	335

Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.

Generated On: Mon Jun 17 22:33:53 GMT 2013

StationId:9449904
Source:NOAA/NOS/CO-OPS
Station Type:Subordinate
Time Zone:LST/LDT
Datum:mean lower low water (MLLW) which is the chart datum of soundings

NOAA Tide Predictions

Shaw Island, Ferry Terminal, Harney Channel,Washington,2013

Times and Heights of High and Low Waters

January

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 Tu	12:38 AM	-0.2 -6	**16** W	01:22 AM	0.9 27
	08:01 AM	8.3 253		08:21 AM	8.6 262
	02:01 PM	5.3 162		02:56 PM	3.4 104
	06:28 PM	5.9 180		08:10 PM	5.6 171
2 W	01:15 AM	0.5 15	**17** Th	02:06 AM	2.3 70
	08:31 AM	8.3 253		08:53 AM	8.4 256
	02:52 PM	4.6 140		03:58 PM	2.8 85
	07:30 PM	5.5 168		09:36 PM	5.2 158
3 Th	01:54 AM	1.4 43	**18** F	02:53 AM	3.6 110
	09:01 AM	8.3 253		09:26 AM	8.1 247
	03:45 PM	3.7 113		04:59 PM	2.2 67
	08:44 PM	5.1 155		11:42 PM	5.2 158
4 F	02:35 AM	2.5 76	**19** Sa	03:47 AM	4.8 146
	09:33 AM	8.3 253		09:59 AM	7.9 241
	04:38 PM	2.7 82		05:56 PM	1.6 49
	10:15 PM	4.9 149			
5 Sa	03:22 AM	3.8 116	**20** Su	01:40 AM	5.8 177
	10:07 AM	8.3 253		04:55 AM	5.9 180
	05:31 PM	1.6 49		10:34 AM	7.6 232
				06:47 PM	1.2 37
6 Su	12:18 AM	5.1 155	**21** M	02:52 AM	6.5 198
	04:23 AM	4.9 149		06:18 AM	6.6 201
	10:44 AM	8.3 253		11:14 AM	7.4 226
	06:23 PM	0.5 15		07:33 PM	0.7 21
7 M	02:16 AM	5.9 180	**22** Tu	03:42 AM	7.1 216
	05:38 AM	5.9 180		07:41 AM	6.9 210
	11:25 AM	8.3 253		11:59 AM	7.2 219
	07:14 PM	-0.6 -18		08:14 PM	0.4 12
8 Tu	03:20 AM	6.8 207	**23** W	04:20 AM	7.5 229
	06:55 AM	6.6 201		08:47 AM	6.9 210
	12:12 PM	8.3 253		12:49 PM	7.2 219
	08:04 PM	-1.5 -46		08:51 PM	0.0 0
9 W	04:06 AM	7.5 229	**24** Th	04:52 AM	7.7 235
	08:05 AM	6.8 207		09:34 AM	6.7 204
	01:06 PM	8.3 253		01:39 PM	7.1 216
	08:52 PM	-2.1 -64		09:26 PM	-0.2 -6
10 Th	04:47 AM	8.1 247	**25** F	05:19 AM	7.8 238
	09:07 AM	6.8 207		10:10 AM	6.5 198
	02:03 PM	8.2 250		02:27 PM	7.1 216
	09:39 PM	-2.4 -73		09:59 PM	-0.4 -12
11 F	05:25 AM	8.4 256	**26** Sa	05:42 AM	7.9 241
	10:05 AM	6.5 198		10:42 AM	6.2 189
	03:01 PM	8.1 247		03:14 PM	7.1 216
	10:25 PM	-2.4 -73		10:33 PM	-0.4 -12
12 Sa	06:02 AM	8.6 262	**27** Su	06:02 AM	8.0 244
	11:01 AM	6.0 183		11:16 AM	5.7 174
	03:59 PM	7.8 238		04:01 PM	6.9 210
	11:10 PM	-2.0 -61		11:06 PM	-0.3 -9
13 Su	06:38 AM	8.7 265	**28** M	06:23 AM	8.1 247
	11:57 AM	5.4 165		11:52 AM	5.2 158
	04:58 PM	7.3 223		04:49 PM	6.8 207
	11:54 PM	-1.3 -40		11:41 PM	0.0 0
14 M	07:13 AM	8.7 265	**29** Tu	06:46 AM	8.2 250
	12:55 PM	4.8 146		12:32 PM	4.6 140
	05:58 PM	6.8 207		05:41 PM	6.5 198
15 Tu	12:38 AM	-0.3 -9	**30** W	12:16 AM	0.6 18
	07:48 AM	8.7 265		07:13 AM	8.2 250
	01:55 PM	4.1 125		01:15 PM	3.8 116
	07:01 PM	6.2 189		06:36 PM	6.2 189
			31 Th	12:53 AM	1.4 43
				07:41 AM	8.3 253
				02:01 PM	3.0 91
				07:38 PM	5.9 180

February

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	01:31 AM	2.4 73	**16** Sa	02:29 AM	4.5 137
	08:12 AM	8.2 250		08:26 AM	7.7 235
	02:52 PM	2.2 67		03:44 PM	1.7 52
	08:49 PM	5.6 171		11:06 PM	5.8 177
2 Sa	02:13 AM	3.6 110	**17** Su	03:24 AM	5.5 168
	08:44 AM	8.2 250		09:00 AM	7.4 226
	03:47 PM	1.5 46		04:41 PM	1.5 46
	10:18 PM	5.5 168			
3 Su	03:01 AM	4.7 143	**18** M	01:02 AM	6.1 186
	09:20 AM	8.1 247		04:37 AM	6.2 189
	04:46 PM	0.7 21		09:38 AM	7.1 216
				05:41 PM	1.4 43
4 M	12:23 AM	5.7 174	**19** Tu	02:16 AM	6.6 201
	04:05 AM	5.7 174		06:08 AM	6.5 198
	10:01 AM	8.0 244		10:26 AM	6.8 207
	05:47 PM	0.0 0		06:40 PM	1.2 37
5 Tu	02:06 AM	6.4 195	**20** W	03:04 AM	6.9 210
	05:27 AM	6.4 195		07:36 AM	6.5 198
	10:51 AM	7.9 241		11:24 AM	6.7 204
	06:47 PM	-0.6 -18		07:32 PM	1.0 30
6 W	03:03 AM	7.0 213	**21** Th	03:40 AM	7.2 219
	06:52 AM	6.7 204		08:35 AM	6.3 192
	11:52 AM	7.8 238		12:28 PM	6.6 201
	07:44 PM	-1.1 -34		08:18 PM	0.7 21
7 Th	03:45 AM	7.6 232	**22** F	04:08 AM	7.3 223
	08:05 AM	6.5 198		09:13 AM	6.0 183
	01:00 PM	7.7 235		01:29 PM	6.6 201
	08:37 PM	-1.3 -40		08:57 PM	0.5 15
8 F	04:22 AM	7.9 241	**23** Sa	04:30 AM	7.4 226
	09:06 AM	6.0 183		09:42 AM	5.5 168
	02:08 PM	7.6 232		02:25 PM	6.7 204
	09:25 PM	-1.4 -43		09:33 PM	0.5 15
9 Sa	04:56 AM	8.2 250	**24** Su	04:48 AM	7.5 229
	09:59 AM	5.4 165		10:10 AM	4.9 149
	03:11 PM	7.6 232		03:17 PM	6.8 207
	10:10 PM	-1.1 -34		10:08 PM	0.5 15
10 Su	05:27 AM	8.3 253	**25** M	05:06 AM	7.6 232
	10:48 AM	4.7 143		10:41 AM	4.2 128
	04:10 PM	7.4 226		04:07 PM	6.9 210
	10:53 PM	-0.5 -15		10:42 PM	0.8 24
11 M	05:58 AM	8.3 253	**26** Tu	05:27 AM	7.7 235
	11:36 AM	3.9 119		11:16 AM	3.4 104
	05:08 PM	7.1 216		04:58 PM	6.9 210
	11:35 PM	0.3 9		11:18 PM	1.3 40
12 Tu	06:28 AM	8.3 253	**27** W	05:52 AM	7.9 241
	12:24 PM	3.3 101		11:54 AM	2.6 79
	06:05 PM	6.8 207		05:51 PM	6.8 207
				11:55 PM	2.0 61
13 W	12:17 AM	1.2 37	**28** Th	06:20 AM	7.9 241
	06:57 AM	8.3 253		12:36 PM	1.8 55
	01:12 PM	2.7 82		06:47 PM	6.7 204
	07:04 PM	6.4 195			
14 Th	12:59 AM	2.3 70			
	07:26 AM	8.1 247			
	02:00 PM	2.2 67			
	08:07 PM	6.1 186			
15 F	01:42 AM	3.5 107			
	07:55 AM	7.9 241			
	02:51 PM	1.9 58			
	09:22 PM	5.8 177			

March

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	12:34 AM	2.8 85	**16** Sa	02:25 AM	4.6 140
	06:50 AM	8.0 244		07:58 AM	7.3 223
	01:22 PM	1.1 34		02:55 PM	0.9 27
	07:48 PM	6.5 198		10:06 PM	6.6 201
2 Sa	01:16 AM	3.8 116	**17** Su	03:16 AM	5.3 162
	07:23 AM	7.9 241		08:31 AM	7.0 213
	02:11 PM	0.6 18		03:43 PM	1.0 30
	08:58 PM	6.4 195		11:22 PM	6.5 198
3 Su	02:03 AM	4.7 143	**18** M	04:17 AM	5.8 177
	07:59 AM	7.8 238		09:07 AM	6.7 204
	03:07 PM	0.2 6		04:35 PM	1.2 37
	10:22 PM	6.3 192			
4 M	03:00 AM	5.5 168	**19** Tu	12:55 AM	6.5 198
	08:40 AM	7.6 232		05:38 AM	6.1 186
	04:08 PM	0.0 0		09:51 AM	6.4 195
				05:34 PM	1.4 43
5 Tu	12:05 AM	6.4 195	**20** W	02:11 AM	6.6 201
	04:15 AM	6.1 186		07:14 AM	6.1 186
	09:31 AM	7.4 226		10:46 AM	6.1 186
	05:13 PM	-0.1 -3		06:37 PM	1.5 46
6 W	01:29 AM	6.8 207	**21** Th	03:01 AM	6.8 207
	05:44 AM	6.3 192		08:29 AM	5.8 177
	10:36 AM	7.1 216		11:54 AM	5.9 180
	06:20 PM	-0.2 -6		07:37 PM	1.5 46
7 Th	02:24 AM	7.2 219	**22** F	03:36 AM	6.9 210
	07:10 AM	6.0 183		09:14 AM	5.4 165
	11:54 AM	6.9 210		01:10 PM	5.9 180
	07:23 PM	-0.2 -6		08:31 PM	1.5 46
8 F	03:06 AM	7.5 229	**23** Sa	04:01 AM	7.0 213
	08:17 AM	5.4 165		09:42 AM	4.8 146
	01:14 PM	6.8 207		02:23 PM	6.0 183
	08:18 PM	0.0 0		09:16 PM	1.5 46
9 Sa	03:42 AM	7.7 235	**24** Su	04:20 AM	7.1 216
	09:08 AM	4.6 140		10:08 AM	4.1 125
	02:27 PM	6.9 210		03:26 PM	6.2 189
	09:08 PM	0.3 9		09:57 PM	1.7 52
10 Su	05:13 PM	7.8 238	**25** M	04:39 AM	7.2 219
	10:52 AM	3.8 116		10:36 AM	3.2 98
	04:31 PM	7.0 213		04:22 PM	6.5 198
	10:52 PM	0.8 24		10:36 PM	2.0 61
11 M	05:42 AM	7.9 241	**26** Tu	05:01 AM	7.4 226
	11:32 AM	2.9 88		11:08 AM	2.3 70
	05:29 PM	7.0 213		05:15 PM	6.8 207
	11:35 PM	1.4 43		11:14 PM	2.4 73
12 Tu	06:08 AM	7.9 241	**27** W	05:26 AM	7.5 229
	12:12 PM	2.2 67		11:43 AM	1.3 40
	06:23 PM	7.0 213		06:08 PM	7.1 216
				11:54 PM	3.0 91
13 W	12:16 AM	2.2 67	**28** Th	05:55 AM	7.6 232
	06:34 AM	7.8 238		12:22 PM	0.4 12
	12:51 PM	1.6 49		07:02 PM	7.2 219
	07:16 PM	7.0 213			
14 Th	12:57 AM	3.0 91	**29** F	12:35 AM	3.6 110
	07:01 AM	7.7 235		06:26 AM	7.7 235
	01:31 PM	1.2 37		01:04 PM	-0.3 -9
	08:09 PM	6.9 210		07:58 PM	7.3 223
15 F	01:40 AM	3.8 116	**30** Sa	01:19 AM	4.3 131
	07:28 AM	7.5 229		07:00 AM	7.7 235
	02:12 PM	1.0 30		01:50 PM	-0.8 -24
	09:05 PM	6.7 204		08:58 PM	7.3 223
			31 Su	02:08 AM	5.0 152
				07:38 AM	7.5 229
				02:40 PM	-0.9 -27
				10:03 PM	7.2 219

Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.
Referenced to Station: PORT TOWNSEND (9444900) Height offset in feet (low:*0.99 high: * 0.90) Time offset in mins (low:56 high: 31)

Generated On: Mon Jun 17 22:38:24 GMT 2013

StationId:9448772
Source:NOAA/NOS/CO-OPS
Station Type:Subordinate
Time Zone:LST/LDT
Datum:mean lower low water (MLLW) which is the chart datum of soundings

NOAA Tide Predictions

Ship Harbor, Fidalgo Island,Washington,2013

Times and Heights of High and Low Waters

January

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 Tu	12:07 AM	-0.2 -6	**16** W	12:51 AM	0.9 27
	07:46 AM	8.7 265		08:06 AM	8.9 271
	01:30 PM	5.3 162		02:25 PM	3.5 107
	06:13 PM	6.2 189		07:55 PM	5.9 180
2 W	12:44 AM	0.5 15	**17** Th	01:35 AM	2.3 70
	08:16 AM	8.7 265		08:38 AM	8.8 268
	02:21 PM	4.6 140		03:27 PM	2.8 85
	07:15 PM	5.7 174		09:21 PM	5.4 165
3 Th	01:23 AM	1.5 46	**18** F	02:22 AM	3.6 110
	08:46 AM	8.7 265		09:11 AM	8.5 259
	03:14 PM	3.7 113		04:28 PM	2.2 67
	08:29 PM	5.3 162		11:27 PM	5.5 168
4 F	02:04 AM	2.6 79	**19** Sa	03:16 AM	4.9 149
	09:18 AM	8.7 265		09:44 AM	8.2 250
	04:07 PM	2.7 82		05:25 PM	1.6 49
	10:00 PM	5.1 155			
5 Sa	02:51 AM	3.8 116	**20** Su	01:25 AM	6.1 186
	09:52 AM	8.6 262		04:24 AM	5.9 180
	05:00 PM	1.6 49		10:19 AM	8.0 244
				06:16 PM	1.2 37
6 Su	12:03 AM	5.4 165	**21** M	02:37 AM	6.8 207
	03:52 AM	5.0 152		05:47 AM	6.6 201
	10:29 AM	8.6 262		10:59 AM	7.7 235
	05:52 PM	0.5 15		07:02 PM	0.7 21
7 M	02:01 AM	6.2 189	**22** Tu	03:27 AM	7.4 226
	05:07 AM	6.0 183		07:10 AM	6.9 210
	11:10 AM	8.6 262		11:44 AM	7.6 232
	06:43 PM	-0.6 -18		07:43 PM	0.4 12
8 Tu	03:05 AM	7.1 216	**23** W	04:05 AM	7.8 238
	06:24 AM	6.6 201		08:16 AM	7.0 213
	11:57 AM	8.6 262		12:34 PM	7.5 229
	07:33 PM	-1.5 -46		08:20 PM	0.0 0
9 W	03:51 AM	7.9 241	**24** Th	04:37 AM	8.1 247
	07:34 AM	6.9 210		09:03 AM	6.8 207
	12:51 PM	8.6 262		01:24 PM	7.4 226
	08:21 PM	-2.1 -64		08:55 PM	-0.2 -6
10 Th	04:32 AM	8.4 256	**25** F	05:04 AM	8.2 250
	08:36 AM	6.8 207		09:39 AM	6.6 201
	01:48 PM	8.6 262		02:12 PM	7.4 226
	09:08 PM	-2.5 -76		09:28 PM	-0.4 -12
11 F	05:10 AM	8.8 268	**26** Sa	05:27 AM	8.3 253
	09:34 AM	6.5 198		10:11 AM	6.2 189
	02:46 PM	8.4 256		02:59 PM	7.4 226
	09:54 PM	-2.4 -73		10:02 PM	-0.4 -12
12 Sa	05:47 AM	9.0 274	**27** Su	05:47 AM	8.3 253
	10:30 AM	6.1 186		10:45 AM	5.8 177
	03:44 PM	8.1 247		03:46 PM	7.3 223
	10:39 PM	-2.0 -61		10:35 PM	-0.3 -9
13 Su	06:23 AM	9.1 277	**28** M	06:08 AM	8.4 256
	11:26 AM	5.5 168		11:21 AM	5.2 158
	04:43 PM	7.7 235		04:34 PM	7.1 216
	11:23 PM	-1.3 -40		11:10 PM	0.0 0
14 M	06:58 AM	9.1 277	**29** Tu	06:31 AM	8.5 259
	12:24 PM	4.8 146		12:01 PM	4.6 140
	05:43 PM	7.1 216		05:26 PM	6.8 207
				11:45 PM	0.6 18
15 Tu	12:07 AM	-0.3 -9	**30** W	06:58 AM	8.6 262
	07:33 AM	9.1 277		12:44 PM	3.9 119
	01:24 PM	4.1 125		06:21 PM	6.5 198
	06:46 PM	6.5 198			
			31 Th	12:22 AM	1.4 43
				07:26 AM	8.6 262
				01:30 PM	3.1 94
				07:23 PM	6.1 186

February

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	01:00 AM	2.5 76	**16** Sa	01:58 AM	4.6 140
	07:57 AM	8.6 262		08:11 AM	8.0 244
	02:21 PM	2.3 70		03:13 PM	1.7 52
	08:34 PM	5.8 177		10:51 PM	6.1 186
2 Sa	01:42 AM	3.6 110	**17** Su	02:53 AM	5.5 168
	08:29 AM	8.6 262		08:45 AM	7.7 235
	03:16 PM	1.5 46		04:10 PM	1.6 49
	10:03 PM	5.7 174			
3 Su	02:30 AM	4.8 146	**18** M	12:47 AM	6.4 195
	09:05 AM	8.5 259		04:06 AM	6.2 189
	04:15 PM	0.7 21		09:23 AM	7.4 226
				05:10 PM	1.4 43
4 M	12:08 AM	6.0 183	**19** Tu	02:01 AM	6.9 210
	03:34 AM	5.8 177		05:37 AM	6.6 201
	09:46 AM	8.4 256		10:11 AM	7.1 216
	05:16 PM	0.0 0		06:09 PM	1.2 37
5 Tu	01:51 AM	6.7 204	**20** W	02:49 AM	7.3 223
	04:56 AM	6.5 198		07:05 AM	6.6 201
	10:36 AM	8.2 250		11:09 AM	7.0 213
	06:16 PM	-0.6 -18		07:01 PM	1.0 30
6 W	02:48 AM	7.4 226	**21** Th	03:25 AM	7.5 229
	06:21 AM	6.8 207		08:04 AM	6.4 195
	11:37 AM	8.1 247		12:13 PM	6.9 210
	07:13 PM	-1.1 -34		07:47 PM	0.7 21
7 Th	03:30 AM	7.9 241	**22** F	03:53 AM	7.7 235
	07:34 AM	6.6 201		08:42 AM	6.0 183
	12:45 PM	8.0 244		01:14 PM	6.9 210
	08:06 PM	-1.3 -40		08:26 PM	0.5 15
8 F	04:07 AM	8.3 253	**23** Sa	04:15 AM	7.8 238
	08:35 AM	6.1 186		09:11 AM	5.6 171
	01:53 PM	8.0 244		02:10 PM	7.0 213
	08:54 PM	-1.4 -43		09:02 PM	0.5 15
9 Sa	04:41 AM	8.5 259	**24** Su	04:33 AM	7.8 238
	09:28 AM	5.5 168		09:39 AM	5.0 152
	02:56 PM	7.9 241		03:02 PM	7.1 216
	09:39 PM	-1.1 -34		09:37 PM	0.6 18
10 Su	05:12 AM	8.7 265	**25** M	04:51 AM	8.0 244
	10:17 AM	4.7 143		10:10 AM	4.3 131
	03:55 PM	7.7 235		03:52 PM	7.2 219
	10:22 PM	-0.5 -15		10:11 PM	0.8 24
11 M	05:43 AM	8.7 265	**26** Tu	05:12 AM	8.1 247
	11:05 AM	4.0 122		10:45 AM	3.5 107
	04:53 PM	7.4 226		04:43 PM	7.2 219
	11:04 PM	0.3 9		10:47 PM	1.3 40
12 Tu	06:13 AM	8.7 265	**27** W	05:37 AM	8.2 250
	11:53 AM	3.3 101		11:23 AM	2.6 79
	05:50 PM	7.1 216		05:36 PM	7.1 216
	11:46 PM	1.3 40		11:24 PM	2.0 61
13 W	06:42 AM	8.6 262	**28** Th	06:05 AM	8.3 253
	12:41 PM	2.7 82		12:05 PM	1.8 55
	06:49 PM	6.7 204		06:32 PM	7.0 213
14 Th	12:28 AM	2.4 73			
	07:11 AM	8.5 259			
	01:29 PM	2.3 70			
	07:52 PM	6.4 195			
15 F	01:11 AM	3.5 107			
	07:40 AM	8.3 253			
	02:20 PM	1.9 58			
	09:07 PM	6.1 186			

March

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	12:03 AM	2.9 88	**16** Sa	01:54 AM	4.7 143
	06:35 AM	8.3 253		07:43 AM	7.6 232
	12:51 PM	1.1 34		02:24 PM	0.9 27
	07:33 PM	6.8 207		09:51 PM	6.9 210
2 Sa	12:45 AM	3.8 116	**17** Su	02:45 AM	5.4 165
	07:08 AM	8.3 253		08:16 AM	7.4 226
	01:40 PM	0.6 18		03:12 PM	1.0 30
	08:43 PM	6.6 201		11:07 PM	6.8 207
3 Su	01:32 AM	4.7 143	**18** M	03:46 AM	5.9 180
	07:44 AM	8.2 250		08:52 AM	7.0 213
	02:36 PM	0.2 6		04:04 PM	1.2 37
	10:07 PM	6.6 201			
4 M	02:29 AM	5.6 171	**19** Tu	12:40 AM	6.8 207
	08:25 AM	8.0 244		05:07 AM	6.2 189
	03:37 PM	0.0 0		09:36 AM	6.7 204
	11:50 PM	6.7 204		05:03 PM	1.4 43
5 Tu	03:44 AM	6.2 189	**20** W	01:56 AM	6.9 210
	09:16 AM	7.7 235		06:43 AM	6.2 189
	04:42 PM	-0.1 -3		10:31 AM	6.4 195
				06:06 PM	1.5 46
6 W	01:14 AM	7.1 216	**21** Th	02:46 AM	7.1 216
	05:13 AM	6.4 195		07:58 AM	5.9 180
	10:21 AM	7.4 226		11:39 AM	6.2 189
	05:49 PM	-0.2 -6		07:06 PM	1.5 46
7 Th	02:09 AM	7.5 229	**22** F	03:21 AM	7.2 219
	06:39 AM	6.1 186		08:43 AM	5.4 165
	11:39 AM	7.2 219		12:55 PM	6.1 186
	06:52 PM	-0.2 -6		08:00 PM	1.5 46
8 F	02:51 AM	7.8 238	**23** Sa	03:46 AM	7.3 223
	07:46 AM	5.5 168		09:11 AM	4.9 149
	12:59 PM	7.1 216		02:08 PM	6.3 192
	07:47 PM	0.0 0		08:45 PM	1.5 46
9 Sa	03:27 AM	8.0 244	**24** Su	04:05 AM	7.4 226
	08:37 AM	4.7 143		09:37 AM	4.1 125
	02:12 PM	7.2 219		03:11 PM	6.5 198
	08:37 PM	0.3 9		09:26 PM	1.7 52
10 Su	04:58 AM	8.2 250	**25** M	04:24 AM	7.5 229
	10:21 AM	3.8 116		10:05 AM	3.3 101
	04:16 PM	7.3 223		04:07 PM	6.8 207
	10:21 PM	0.8 24		10:05 PM	2.0 61
11 M	05:27 AM	8.2 250	**26** Tu	04:46 AM	7.7 235
	11:01 AM	3.0 91		10:37 AM	2.3 70
	05:14 PM	7.4 226		05:00 PM	7.1 216
	11:04 PM	1.4 43		10:43 PM	2.4 73
12 Tu	05:53 AM	8.2 250	**27** W	05:11 AM	7.9 241
	11:41 AM	2.2 67		11:12 AM	1.3 40
	06:08 PM	7.4 226		05:53 PM	7.4 226
	11:45 PM	2.2 67		11:23 PM	3.0 91
13 W	06:19 AM	8.2 250	**28** Th	05:40 AM	8.0 244
	12:20 PM	1.6 49		11:51 AM	0.4 12
	07:01 PM	7.3 223		06:47 PM	7.6 232
14 Th	12:26 AM	3.0 91	**29** F	12:04 AM	3.7 113
	06:46 AM	8.0 244		06:11 AM	8.0 244
	01:00 PM	1.2 37		12:33 PM	-0.3 -9
	07:54 PM	7.2 219		07:43 PM	7.6 232
15 F	01:09 AM	3.9 119	**30** Sa	12:48 AM	4.4 134
	07:13 AM	7.9 241		06:45 AM	8.0 244
	01:41 PM	1.0 30		01:19 PM	-0.8 -24
	08:50 PM	7.0 213		08:43 PM	7.6 232
			31 Su	01:37 AM	5.1 155
				07:23 AM	7.9 241
				02:09 PM	-0.9 -27
				09:48 PM	7.5 229

Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.
Referenced to Station: PORT TOWNSEND (9444900) Height offset in feet (low:*1.00 high: * 0.94) Time offset in mins (low:25 high: 16)

Generated On: Mon Jun 17 22:37:28 GMT 2013

StationId:9446375
Source:NOAA/NOS/CO-OPS
Station Type:Subordinate
Time Zone:LST/LDT
Datum:mean lower low water (MLLW) which is the chart datum of soundings

NOAA Tide Predictions

Tahlequah, Neil Pt., Dalco Passage, Vashon I.,Washington,2013

Times and Heights of High and Low Waters

January

	Time	Height		Time	Height
	h m	ft	cm	h m	ft	cm
1 Tu	12:45 AM	-0.2	-6	**16** W	01:32 AM	1.0	30
	07:50 AM	13.0	396		08:19 AM	13.4	408
	01:54 PM	5.7	174		02:48 PM	3.6	110
	06:55 PM	9.7	296		08:23 PM	9.6	293
2 W	01:24 AM	0.7	21	**17** Th	02:18 AM	2.7	82
	08:22 AM	13.0	396		08:57 AM	13.1	399
	02:40 PM	4.9	149		03:42 PM	3.0	91
	07:51 PM	9.3	283		09:37 PM	9.0	274
3 Th	02:04 AM	1.8	55	**18** F	03:07 AM	4.4	134
	08:57 AM	13.0	396		09:37 AM	12.6	384
	03:30 PM	4.1	125		04:39 PM	2.5	76
	08:57 PM	8.8	268		11:09 PM	8.8	268
4 F	02:48 AM	3.2	98	**19** Sa	04:04 AM	5.9	180
	09:35 AM	12.9	393		10:21 AM	12.0	366
	04:24 PM	3.1	94		05:37 PM	2.0	61
	10:16 PM	8.6	262				
5 Sa	03:39 AM	4.7	143	**20** Su	01:01 AM	9.1	277
	10:16 AM	12.8	390		05:22 AM	7.2	219
	05:21 PM	1.9	58		11:09 AM	11.5	351
	11:48 PM	8.9	271		06:34 PM	1.5	46
6 Su	04:43 AM	6.1	186	**21** M	02:32 AM	9.9	302
	11:01 AM	12.6	384		07:00 AM	7.8	238
	06:19 PM	0.7	21		12:00 PM	11.1	338
					07:25 PM	1.0	30
7 M	01:25 AM	9.6	293	**22** Tu	03:30 AM	10.8	329
	06:02 AM	7.2	219		08:22 AM	7.9	241
	11:52 AM	12.5	381		12:53 PM	10.8	329
	07:14 PM	-0.5	-15		08:10 PM	0.6	18
8 Tu	02:47 AM	10.7	326	**23** W	04:12 AM	11.4	347
	07:25 AM	7.8	238		09:19 AM	7.7	235
	12:46 PM	12.5	381		01:43 PM	10.7	326
	08:07 PM	-1.6	-49		08:50 PM	0.1	3
9 W	03:45 AM	11.7	357	**24** Th	04:44 AM	11.8	360
	08:37 AM	7.8	238		10:00 AM	7.5	229
	01:42 PM	12.5	381		02:29 PM	10.7	326
	08:58 PM	-2.4	-73		09:27 PM	-0.2	-6
10 Th	04:32 AM	12.5	381	**25** F	05:10 AM	12.0	366
	09:38 AM	7.5	229		10:33 AM	7.2	219
	02:37 PM	12.5	381		03:12 PM	10.8	329
	09:46 PM	-2.8	-85		10:02 PM	-0.5	-15
11 F	05:13 AM	13.1	399	**26** Sa	05:31 AM	12.2	372
	10:33 AM	7.0	213		11:02 AM	6.7	204
	03:32 PM	12.4	378		03:52 PM	10.9	332
	10:33 PM	-2.9	-88		10:37 PM	-0.6	-18
12 Sa	05:52 AM	13.5	411	**27** Su	05:51 AM	12.4	378
	11:24 AM	6.3	192		11:31 AM	6.2	189
	04:27 PM	12.1	369		04:33 PM	10.9	332
	11:19 PM	-2.5	-76		11:12 PM	-0.4	-12
13 Su	06:29 AM	13.7	418	**28** M	06:14 AM	12.7	387
	12:14 PM	5.6	171		12:03 PM	5.6	171
	05:22 PM	11.7	357		05:15 PM	10.8	329
					11:47 PM	-0.1	-3
14 M	12:04 AM	-1.6	-49	**29** Tu	06:39 AM	12.9	393
	07:06 AM	13.7	418		12:39 PM	4.8	146
	01:04 PM	4.9	149		06:00 PM	10.6	323
	06:19 PM	11.0	335				
15 Tu	12:48 AM	-0.4	-12	**30** W	12:24 AM	0.6	18
	07:42 AM	13.7	418		07:08 AM	13.0	396
	01:55 PM	4.2	128		01:18 PM	4.0	122
	07:19 PM	10.3	314		06:49 PM	10.4	317
				31 Th	01:02 AM	1.6	49
					07:38 AM	13.1	399
					02:01 PM	3.2	98
					07:44 PM	10.1	308

February

	Time	Height		Time	Height
	h m	ft	cm	h m	ft	cm
1 F	01:42 AM	2.8	85	**16** Sa	02:39 AM	5.3	162
	08:12 AM	13.0	396		08:44 AM	11.8	360
	02:49 PM	2.4	73		03:35 PM	1.9	58
	08:47 PM	9.7	296		10:24 PM	9.4	287
2 Sa	02:26 AM	4.2	128	**17** Su	03:34 AM	6.5	198
	08:49 AM	12.8	390		09:28 AM	11.2	341
	03:42 PM	1.6	49		04:30 PM	1.9	58
	10:01 PM	9.4	287				
3 Su	03:17 AM	5.7	174	**18** M	12:03 AM	9.4	287
	09:32 AM	12.5	381		04:51 AM	7.4	226
	04:41 PM	1.0	30		10:19 AM	10.6	323
	11:32 PM	9.5	290		05:30 PM	1.8	55
4 M	04:24 AM	7.0	213	**19** Tu	01:44 AM	9.9	302
	10:23 AM	12.1	369		06:39 AM	7.8	238
	05:44 PM	0.3	9		11:19 AM	10.1	308
					06:31 PM	1.6	49
5 Tu	01:17 AM	10.0	305	**20** W	02:48 AM	10.4	317
	05:53 AM	7.8	238		08:05 AM	7.5	229
	11:24 AM	11.9	363		12:23 PM	9.9	302
	06:48 PM	-0.4	-12		07:28 PM	1.3	40
6 W	02:38 AM	10.9	332	**21** Th	03:29 AM	10.9	332
	07:25 AM	7.9	241		08:57 AM	7.1	216
	12:31 PM	11.7	357		01:23 PM	10.0	305
	07:48 PM	-1.1	-34		08:16 PM	0.9	27
7 Th	03:32 AM	11.7	357	**22** F	03:59 AM	11.2	341
	08:38 AM	7.4	226		09:32 AM	6.6	201
	01:37 PM	11.8	360		02:15 PM	10.2	311
	08:42 PM	-1.5	-46		08:58 PM	0.6	18
8 F	04:13 AM	12.3	375	**23** Sa	04:21 AM	11.5	351
	09:35 AM	6.6	201		10:00 AM	6.0	183
	02:38 PM	11.9	363		03:02 PM	10.5	320
	09:32 PM	-1.7	-52		09:36 PM	0.5	15
9 Sa	04:48 AM	12.8	390	**24** Su	04:41 AM	11.8	360
	10:23 AM	5.7	174		10:27 AM	5.3	162
	03:35 PM	11.9	363		03:45 PM	10.7	326
	10:19 PM	-1.5	-46		10:13 PM	0.5	15
10 Su	05:21 AM	13.1	399	**25** M	05:02 AM	12.0	366
	11:08 AM	4.8	146		10:56 AM	4.5	137
	04:30 PM	11.8	360		04:27 PM	11.0	335
	11:03 PM	-0.9	-27		10:49 PM	0.7	21
11 M	05:53 AM	13.2	402	**26** Tu	05:25 AM	12.3	375
	11:51 AM	4.0	122		11:28 AM	3.5	107
	05:23 PM	11.5	351		05:11 PM	11.1	338
	11:46 PM	0.0	0		11:26 PM	1.3	40
12 Tu	06:24 AM	13.2	402	**27** W	05:52 AM	12.5	381
	12:34 PM	3.2	98		12:04 PM	2.6	79
	06:16 PM	11.1	338		05:57 PM	11.2	341
13 W	12:28 AM	1.2	37	**28** Th	12:04 AM	2.0	61
	06:57 AM	13.1	399		06:21 AM	12.7	387
	01:17 PM	2.6	79		12:44 PM	1.7	52
	07:10 PM	10.7	326		06:47 PM	11.1	338
14 Th	01:09 AM	2.5	76				
	07:30 AM	12.8	390				
	02:00 PM	2.2	67				
	08:06 PM	10.2	311				
15 F	01:52 AM	3.9	119				
	08:06 AM	12.4	378				
	02:46 PM	2.0	61				
	09:09 PM	9.7	296				

March

	Time	Height		Time	Height
	h m	ft	cm	h m	ft	cm
1 F	12:44 AM	3.0	91	**16** Sa	02:33 AM	5.1	155
	06:53 AM	12.7	387		08:16 AM	11.4	347
	01:27 PM	1.0	30		02:56 PM	0.8	24
	07:41 PM	10.9	332		09:43 PM	10.5	320
2 Sa	01:27 AM	4.1	125	**17** Su	03:20 AM	6.0	183
	07:29 AM	12.5	381		08:55 AM	10.8	329
	02:14 PM	0.4	12		03:40 PM	1.0	30
	08:42 PM	10.6	323		10:43 PM	10.2	311
3 Su	02:15 AM	5.3	162	**18** M	04:16 AM	6.7	204
	08:10 AM	12.1	369		09:39 AM	10.1	308
	03:07 PM	0.2	6		04:30 PM	1.3	40
	09:53 PM	10.3	314		11:55 PM	10.0	305
4 M	03:13 AM	6.4	195	**19** Tu	05:31 AM	7.2	219
	08:58 AM	11.7	357		10:33 AM	9.5	290
	04:07 PM	0.1	3		05:27 PM	1.7	52
	11:19 PM	10.2	311				
5 Tu	04:29 AM	7.2	219	**20** W	01:19 AM	10.0	305
	09:59 AM	11.1	338		07:14 AM	7.2	219
	05:14 PM	0.1	3		11:40 AM	9.1	277
					06:31 PM	1.9	58
6 W	12:55 AM	10.5	320	**21** Th	02:30 AM	10.2	311
	06:06 AM	7.4	226		08:34 AM	6.7	204
	11:13 AM	10.7	326		12:53 PM	8.9	271
	06:23 PM	0.0	0		07:34 PM	1.9	58
7 Th	02:08 AM	11.1	338	**22** F	03:16 AM	10.5	320
	07:34 AM	6.8	207		09:20 AM	6.1	186
	12:31 PM	10.6	323		02:01 PM	9.1	277
	07:28 PM	-0.1	-3		08:31 PM	1.8	55
8 F	02:58 AM	11.6	354	**23** Sa	03:48 AM	10.8	329
	08:37 AM	5.9	180		09:53 AM	5.3	162
	01:44 PM	10.7	326		02:59 PM	9.5	290
	08:26 PM	-0.2	-6		09:20 PM	1.7	52
9 Sa	03:37 AM	12.1	369	**24** Su	04:14 AM	11.1	338
	09:26 AM	4.8	146		10:20 AM	4.4	134
	02:48 PM	11.0	335		03:50 PM	10.0	305
	09:17 PM	0.0	0		10:03 PM	1.8	55
10 Su	05:10 AM	12.3	375	**25** M	04:38 AM	11.4	347
	11:08 AM	3.8	116		10:49 AM	3.4	104
	04:45 PM	11.2	341		04:37 PM	10.6	323
	11:03 PM	0.5	15		10:44 PM	2.0	61
11 M	05:39 AM	12.5	381	**26** Tu	05:04 AM	11.7	357
	11:47 AM	2.8	85		11:20 AM	2.2	67
	05:37 PM	11.4	347		05:22 PM	11.1	338
	11:47 PM	1.2	37		11:24 PM	2.4	73
12 Tu	06:08 AM	12.5	381	**27** W	05:31 AM	12.0	366
	12:24 PM	2.0	61		11:54 AM	1.1	34
	06:26 PM	11.4	347		06:08 PM	11.5	351
13 W	12:28 AM	2.1	64	**28** Th	12:04 AM	3.0	91
	06:37 AM	12.4	378		06:01 AM	12.2	372
	01:01 PM	1.3	40		12:32 PM	0.1	3
	07:14 PM	11.3	344		06:56 PM	11.8	360
14 Th	01:09 AM	3.1	94	**29** F	12:47 AM	3.8	116
	07:08 AM	12.2	372		06:34 AM	12.2	372
	01:38 PM	0.9	27		01:13 PM	-0.7	-21
	08:02 PM	11.1	338		07:47 PM	11.9	363
15 F	01:50 AM	4.1	125	**30** Sa	01:31 AM	4.6	140
	07:41 AM	11.9	363		07:11 AM	12.1	369
	02:16 PM	0.7	21		01:58 PM	-1.2	-37
	08:51 PM	10.9	332		08:41 PM	11.8	360
				31 Su	02:20 AM	5.4	165
					07:52 AM	11.8	360
					02:47 PM	-1.3	-40
					09:41 PM	11.5	351

Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.
Referenced to Station: SEATTLE (Madison St.), Elliott Bay (9447130) Height offset in feet (low:*1.01 high: * 1.05) Time offset in mins (low:5 high: 4)

Generated On: Mon Jun 17 22:36:15 GMT 2013

StationId:9449911
Source:NOAA/NOS/CO-OPS
Station Type:Subordinate
Time Zone:LST/LDT
Datum:mean lower low water (MLLW) which is the chart datum of soundings

NOAA Tide Predictions

Upright Head, Lopez Island,Washington,2013

Times and Heights of High and Low Waters

January

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 Tu	12:26 AM	-0.2 -6	**16** W	01:10 AM	0.9 27
	07:56 AM	8.6 262		08:16 AM	8.9 271
	01:49 PM	5.0 152		02:44 PM	3.2 98
	06:23 PM	6.1 186		08:05 PM	5.8 177
2 W	01:03 AM	0.5 15	**17** Th	01:54 AM	2.1 64
	08:26 AM	8.6 262		08:48 AM	8.7 265
	02:40 PM	4.3 131		03:46 PM	2.6 79
	07:25 PM	5.7 174		09:31 PM	5.4 165
3 Th	01:42 AM	1.3 40	**18** F	02:41 AM	3.4 104
	08:56 AM	8.6 262		09:21 AM	8.4 256
	03:33 PM	3.5 107		04:47 PM	2.0 61
	08:39 PM	5.2 158		11:37 PM	5.4 165
4 F	02:23 AM	2.4 73	**19** Sa	03:35 AM	4.6 140
	09:28 AM	8.6 262		09:54 AM	8.2 250
	04:26 PM	2.5 76		05:44 PM	1.5 46
	10:10 PM	5.0 152			
5 Sa	03:10 AM	3.5 107	**20** Su	01:35 AM	6.0 183
	10:02 AM	8.5 259		04:43 AM	5.5 168
	05:19 PM	1.5 46		10:29 AM	7.9 241
				06:35 PM	1.1 34
6 Su	12:13 AM	5.3 162	**21** M	02:47 AM	6.7 204
	04:11 AM	4.6 140		06:06 AM	6.2 189
	10:39 AM	8.5 259		11:09 AM	7.7 235
	06:11 PM	0.4 12		07:21 PM	0.7 21
7 M	02:11 AM	6.1 186	**22** Tu	03:37 AM	7.3 223
	05:26 AM	5.6 171		07:29 AM	6.4 195
	11:20 AM	8.5 259		11:54 AM	7.5 229
	07:02 PM	-0.6 -18		08:02 PM	0.3 9
8 Tu	03:15 AM	7.0 213	**23** W	04:15 AM	7.7 235
	06:43 AM	6.2 189		08:35 AM	6.5 198
	12:07 PM	8.5 259		12:44 PM	7.4 226
	07:52 PM	-1.4 -43		08:39 PM	0.0 0
9 W	04:01 AM	7.8 238	**24** Th	04:47 AM	8.0 244
	07:53 AM	6.4 195		09:22 AM	6.3 192
	01:01 PM	8.5 259		01:34 PM	7.4 226
	08:40 PM	-2.0 -61		09:14 PM	-0.2 -6
10 Th	04:42 AM	8.3 253	**25** F	05:14 AM	8.1 247
	08:55 AM	6.3 192		09:58 AM	6.1 186
	01:58 PM	8.5 259		02:22 PM	7.3 223
	09:27 PM	-2.3 -70		09:47 PM	-0.4 -12
11 F	05:20 AM	8.7 265	**26** Sa	05:37 AM	8.2 250
	09:53 AM	6.1 186		10:30 AM	5.8 177
	02:56 PM	8.3 253		03:09 PM	7.3 223
	10:13 PM	-2.3 -70		10:21 PM	-0.4 -12
12 Sa	05:57 AM	8.9 271	**27** Su	05:57 AM	8.2 250
	10:49 AM	5.6 171		11:04 AM	5.4 165
	03:54 PM	8.0 244		03:56 PM	7.2 219
	10:58 PM	-1.9 -58		10:54 PM	-0.3 -9
13 Su	06:33 AM	9.0 274	**28** M	06:18 AM	8.3 253
	11:45 AM	5.1 155		11:40 AM	4.9 149
	04:53 PM	7.6 232		04:44 PM	7.0 213
	11:42 PM	-1.2 -37		11:29 PM	0.0 0
14 M	07:08 AM	9.0 274	**29** Tu	06:41 AM	8.4 256
	12:43 PM	4.5 137		12:20 PM	4.3 131
	05:53 PM	7.0 213		05:36 PM	6.7 204
15 Tu	12:26 AM	-0.3 -9	**30** W	12:04 AM	0.6 18
	07:43 AM	9.0 274		07:08 AM	8.5 259
	01:43 PM	3.9 119		01:03 PM	3.6 110
	06:56 PM	6.4 195		06:31 PM	6.4 195
			31 Th	12:41 AM	1.3 40
				07:36 AM	8.5 259
				01:49 PM	2.9 88
				07:33 PM	6.1 186

February

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	01:19 AM	2.3 70	**16** Sa	02:17 AM	4.2 128
	08:07 AM	8.5 259		08:21 AM	7.9 241
	02:40 PM	2.1 64		03:32 PM	1.6 49
	08:44 PM	5.8 177		11:01 PM	6.0 183
2 Sa	02:01 AM	3.3 101	**17** Su	03:12 AM	5.1 155
	08:39 AM	8.5 259		08:55 AM	7.6 232
	03:35 PM	1.4 43		04:29 PM	1.4 43
	10:13 PM	5.6 171			
3 Su	02:49 AM	4.4 134	**18** M	12:57 AM	6.3 192
	09:15 AM	8.4 256		04:25 AM	5.8 177
	04:34 PM	0.7 21		09:33 AM	7.3 223
				05:29 PM	1.3 40
4 M	12:18 AM	5.9 180	**19** Tu	02:11 AM	6.8 207
	03:53 AM	5.4 165		05:56 AM	6.1 186
	09:56 AM	8.3 253		10:21 AM	7.1 216
	05:35 PM	0.0 0		06:28 PM	1.1 34
5 Tu	02:01 AM	6.6 201	**20** W	02:59 AM	7.2 219
	05:15 AM	6.1 186		07:24 AM	6.1 186
	10:46 AM	8.1 247		11:19 AM	6.9 210
	06:35 PM	-0.5 -15		07:20 PM	0.9 27
6 W	02:58 AM	7.3 223	**21** Th	03:35 AM	7.4 226
	06:40 AM	6.3 192		08:23 AM	5.9 180
	11:47 AM	8.0 244		12:23 PM	6.8 207
	07:32 PM	-1.0 -30		08:06 PM	0.7 21
7 Th	03:40 AM	7.8 238	**22** F	04:03 AM	7.6 232
	07:53 AM	6.1 186		09:01 AM	5.6 171
	12:55 PM	8.0 244		01:24 PM	6.9 210
	08:25 PM	-1.3 -40		08:45 PM	0.5 15
8 F	04:17 AM	8.2 250	**23** Sa	04:25 AM	7.7 235
	08:54 AM	5.7 174		09:30 AM	5.2 158
	02:03 PM	7.9 241		02:20 PM	6.9 210
	09:13 PM	-1.3 -40		09:21 PM	0.4 12
9 Sa	04:51 AM	8.4 256	**24** Su	04:43 AM	7.8 238
	09:47 AM	5.1 155		09:58 AM	4.6 140
	03:06 PM	7.8 238		03:12 PM	7.0 213
	09:58 PM	-1.0 -30		09:56 PM	0.5 15
10 Su	05:22 AM	8.6 262	**25** M	05:01 AM	7.9 241
	10:36 AM	4.4 134		10:29 AM	4.0 122
	04:05 PM	7.6 232		04:02 PM	7.1 216
	10:41 PM	-0.5 -15		10:30 PM	0.8 24
11 M	05:53 AM	8.6 262	**26** Tu	05:22 AM	8.0 244
	11:24 AM	3.7 113		11:04 AM	3.2 98
	05:03 PM	7.4 226		04:53 PM	7.1 216
	11:23 PM	0.2 6		11:06 PM	1.2 37
12 Tu	06:23 AM	8.6 262	**27** W	05:47 AM	8.1 247
	12:12 PM	3.1 94		11:42 AM	2.5 76
	06:00 PM	7.0 213		05:46 PM	7.0 213
				11:43 PM	1.9 58
13 W	12:05 AM	1.2 37	**28** Th	06:15 AM	8.2 250
	06:52 AM	8.5 259		12:24 PM	1.7 52
	01:00 PM	2.5 76		06:42 PM	6.9 210
	06:59 PM	6.6 201			
14 Th	12:47 AM	2.2 67			
	07:21 AM	8.4 256			
	01:48 PM	2.1 64			
	08:02 PM	6.3 192			
15 F	01:30 AM	3.2 98			
	07:50 AM	8.2 250			
	02:39 PM	1.8 55			
	09:17 PM	6.0 183			

March

	Time	Height		Time	Height
	h m	ft cm		h m	ft cm
1 F	12:22 AM	2.7 82	**16** Sa	02:13 AM	4.3 131
	06:45 AM	8.2 250		07:53 AM	7.6 232
	01:10 PM	1.0 30		02:43 PM	0.9 27
	07:43 PM	6.7 204		10:01 PM	6.8 207
2 Sa	01:04 AM	3.5 107	**17** Su	03:04 AM	5.0 152
	07:18 AM	8.2 250		08:26 AM	7.3 223
	01:59 PM	0.5 15		03:31 PM	0.9 27
	08:53 PM	6.6 201		11:17 PM	6.7 204
3 Su	01:51 AM	4.4 134	**18** M	04:05 AM	5.5 168
	07:54 AM	8.1 247		09:02 AM	7.0 213
	02:55 PM	0.2 6		04:23 PM	1.1 34
	10:17 PM	6.5 198			
4 M	02:48 AM	5.2 158	**19** Tu	12:50 AM	6.7 204
	08:35 AM	7.9 241		05:26 AM	5.8 177
	03:56 PM	0.0 0		09:46 AM	6.6 201
				05:22 PM	1.3 40
5 Tu	12:00 AM	6.7 204	**20** W	02:06 AM	6.9 210
	04:03 AM	5.8 177		07:02 AM	5.7 174
	09:26 AM	7.6 232		10:41 AM	6.3 192
	05:01 PM	-0.1 -3		06:25 PM	1.4 43
6 W	01:24 AM	7.0 213	**21** Th	02:56 AM	7.0 213
	05:32 AM	5.9 180		08:17 AM	5.5 168
	10:31 AM	7.3 223		11:49 AM	6.1 186
	06:08 PM	-0.2 -6		07:25 PM	1.4 43
7 Th	02:19 AM	7.4 226	**22** F	03:31 AM	7.2 219
	06:58 AM	5.7 174		09:02 AM	5.1 155
	11:49 AM	7.1 216		01:05 PM	6.1 186
	07:11 PM	-0.2 -6		08:19 PM	1.4 43
8 F	03:01 AM	7.8 238	**23** Sa	03:56 AM	7.2 219
	08:05 AM	5.1 155		09:30 AM	4.5 137
	01:09 PM	7.1 216		02:18 PM	6.2 189
	08:06 PM	0.0 0		09:04 PM	1.4 43
9 Sa	03:37 AM	8.0 244	**24** Su	04:15 AM	7.3 223
	08:56 AM	4.3 131		09:56 AM	3.8 116
	02:22 PM	7.1 216		03:21 PM	6.4 195
	08:56 PM	0.2 6		09:45 PM	1.6 49
10 Su	05:08 AM	8.1 247	**25** M	04:34 AM	7.5 229
	10:40 AM	3.5 107		10:24 AM	3.0 91
	04:26 PM	7.2 219		04:17 PM	6.7 204
	10:40 PM	0.7 21		10:24 PM	1.8 55
11 M	05:37 AM	8.1 247	**26** Tu	04:56 AM	7.6 232
	11:20 AM	2.7 82		10:56 AM	2.1 64
	05:24 PM	7.3 223		05:10 PM	7.1 216
	11:23 PM	1.3 40		11:02 PM	2.2 67
12 Tu	06:03 AM	8.1 247	**27** W	05:21 AM	7.8 238
	12:00 PM	2.1 64		11:31 AM	1.2 37
	06:18 PM	7.3 223		06:03 PM	7.3 223
				11:42 PM	2.8 85
13 W	12:04 AM	2.0 61	**28** Th	05:50 AM	7.9 241
	06:29 AM	8.1 247		12:10 PM	0.4 12
	12:39 PM	1.5 46		06:57 PM	7.5 229
	07:11 PM	7.2 219			
14 Th	12:45 AM	2.8 85	**29** F	12:23 AM	3.4 104
	06:56 AM	8.0 244		06:21 AM	8.0 244
	01:19 PM	1.1 34		12:52 PM	-0.3 -9
	08:04 PM	7.1 216		07:53 PM	7.6 232
15 F	01:28 AM	3.6 110	**30** Sa	01:07 AM	4.1 125
	07:23 AM	7.8 238		06:55 AM	7.9 241
	02:00 PM	0.9 27		01:38 PM	-0.7 -21
	09:00 PM	7.0 213		08:53 PM	7.5 229
			31 Su	01:56 AM	4.7 143
				07:33 AM	7.8 238
				02:28 PM	-0.9 -27
				09:58 PM	7.4 226

Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.
Referenced to Station: PORT TOWNSEND (9444900) Height offset in feet (low:*0.93 high: * 0.93) Time offset in mins (low:44 high: 26)

Generated On: Mon Jun 17 22:37:56 GMT 2013

Page 2 of 5

Climate Impacts Vulnerability Assessment

REPORT

Prepared by the Washington State Department of Transportation for submittal to the Federal Highway Administration

In fulfillment of the matching grant of Surface Transportation Research, Development, and Deployment funds as obligated by the FHWA-Washington Division, FHWA program code 4L30.

November 2011

Washington State Department of Transportation

Appendix A Summary of Projected Pacific Northwest Climate Change Impacts

Climate information used in the WSDOT pilot project was prepared by the University of Washington Climate Impacts Group.

December 16, 2010

The following information is largely assembled from work completed for the 2009 Washington Climate Change Impacts Assessment. Other sources have been used where relevant, but this summary should not be viewed as a comprehensive literature review of Pacific Northwest climate change impacts. Confidence statements are strictly qualitative, with the exception of IPCC text regarding rates of 20th century global sea level rise. Note that periods of months are abbreviated by each month's first letter (DJF = Dec, Jan, Feb).

Climate Variable	General Change Expected	Specific Change Expected	Size of Projected Change Compared to Recent Changes	Information About Seasonal Patterns of Change	Confidence	Sources
					contributions in any given basin may affect late summer flows. For all changes in streamflow, confidence in *specific* projected values is low due to high uncertainty about changes in precipitation and decadal variability.	
SEA LEVEL	Varying amounts of sea level rise (or decline) projected in Washington due to regional variations in land movement and coastal winds.	Projected global change (2090-2099) according to the IPCC: 7-23", relative to 1980-99 average *(Solomon et al. 2007)*** 2050: Projected medium change in Washington sea level (with range) *(Mote et al. 2008)*: • NW Olympic Pen: 0" (-5-14") • Central & So. Coast: 5" (1-18") • Puget Sound: 6" (3-22") 2100: Projected medium change in WA sea level (with range) *(Mote et al. 2008)*: • NW Olympic Peninsula: 2" (-9-35")	Relative change in Washington varies by location. Globally, the average rate of sea level rise during the 21st century very likely[‡] (>90%) exceeds the 1961-2003 average rate (0.07 ± 0.02 in/year) *(Solomon et al. 2007)* --- [‡] *= as defined by the IPCC's treatment of uncertainties. (Solomon et al. 2007, Box TS1)*	Wind-driven enhancement of PNW sea level is common during winter months (even more so during El Niño events). On the whole, analysis of more than 30 scenarios found minimal changes in average wintertime northward winds in the PNW. However, several models produced strong increases. These potential increases contribute to the upper estimates for WA sea level rise. *(Mote et al. 2008)*	High confidence that sea level will rise globally. Confidence in the amount of change at any specific location in Washington varies depending on the amount of uncertainty associated with the global and local/regional factors affecting rates of sea level rise. Regionally, there is high confidence that	Mote et al. 2008 Solomon et al. 2007

Climate Variable	General Change Expected	Specific Change Expected	Size of Projected Change Compared to Recent Changes	Information About Seasonal Patterns of Change	Confidence	Sources
		• Central & So. Coast: 11" (2-43") • Puget Sound: 13" (6-50") ---------- *** Since 2008, numerous peer-reviewed studies have offered alternate estimates of global sea level rise. The basis for these updates are known deficiencies in the IPCC's 2007 approach to calculating of global sea level rise, including assumptions of a near-zero net contribution from the Greenland and Antarctic ice sheets to 21st century sea level rise. A comparison of several studies in Rahmstorf 2010 (Figure 1) shows projections in the range of 1.5ft to over 6ft. Overall, recent studies appear to be converging on projected increases in the range of 2-4ft (e.g., Vermeer and Rahmstorf (2009), Pfeffer et al. 2008, Grinsted et al. 2009, Jevrejeva et al. 2010).*			the NW Olympic Peninsula is experiencing uplift at >2 mm/yr. There is less confidence about rates of uplift along the central and southern WA coast due to sparse data, but available data generally indicate uplift in range of 0-2mm/yr. There is high uncertainty about subsidence, and rates of subsidence where it exists, in the Puget Sound region. Although annual rates of current and future uplift and subsidence (a.k.a. "VLM") are well established at large geographic scales, determining rates at specific locations requires additional analysis and/or monitoring.	

Climate Variable	General Change Expected	Specific Change Expected	Size of Projected Change Compared to Recent Changes	Information About Seasonal Patterns of Change	Confidence	Sources
					Uncertainties around future rates are unknown and would be affected by the occurrence of a subduction zone earthquake.	
WAVE HEIGHTS	Increase in "significant wave height" ** expected in the near term (through 2020s) based on research showing that a future warmer climate may contain fewer overall extra-tropical cyclones but an increased frequency of very intense extra-tropical cyclones (which may affect the extreme wave climate). ----------	Based on extrapolation of historical data‡ and assumptions that the historical trends continue into the future, the 25-, 50-, and 100-year significant wave height events are projected to increase approximately 0.07m/yr (2.8 in/yr) through 2020s. ---------- ‡ *The five highest significant wave heights measured at Washington NDBC Buoy #46005 (at the WA/OR border)*	Projected changes through 2020 are comparable to the observed increase in the average of the five highest significant wave heights for the mid 1970s-2007 (0.07m/yr, or 2.6 in/yr). *More on past changes:* Over the last 30 years, the rate of increase for more extreme wave heights has been greater than the rate of increase in average winter wave height. For the WA/OR outer coast	These findings relate to the winter season (Oct-March), which is the dominant season of strong storms	*Regarding general trend:* There is low confidence that significant wave height will increase given the dependence of this increase on a limited number of studies showing potential increases in the intensity of the extra-tropical cyclones that can affect the extreme wave climate. *Regarding specific projected increases in wave height:* There is low confidence in the calculated trend for 25-, 50-, and 100-year significant wave	Ruggiero et al. 2010