



MONTGOMERY
WATER GROUP, INC.

MEMORANDUM

To: Dan McDonald, P.E.
MWH Americas

Date: February 19, 2003

From: Bob Montgomery, P.E.

RE: Ordinary High Water Definition and Survey for Lake Wenatchee

The purpose of this memo is to present the definition of the term "Ordinary High Water" (OHW) used for lakes and the results of our field survey to interpret the OHW elevation on Lake Wenatchee.

Definition of Ordinary High Water

A search for the commonly used definitions of OHW was made. The OHW is generally interpreted as the line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank; shelving; changes in the character of soil destruction on terrestrial vegetation, or the presence of litter and debris; or other appropriate means that consider the characteristics of the surrounding area. It is usually marked as the lowest limit of perennial vegetation.

The legal definition of OHW used by the Department of Fish and Wildlife and defined in WAC (220-110-020(57)) is:

"Ordinary high water line means the mark on the shores of all waters that will be found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual and so long continued in ordinary years, as to mark upon the soil or vegetation a character distinct from that of the abutting upland: Provided, That in any area where the ordinary high water line cannot be found the ordinary high water line adjoining saltwater shall be the line of mean higher high water and the ordinary high water line adjoining freshwater shall be the elevation of the mean annual flood".

Considerable judgment is required to identify representative OHW marks. It may be difficult to identify the mark on cut or rocky banks. A biologist experienced in vegetation typing typically performs the interpretation of OHW.

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Fieldwork Performed to Interpret OHW

On February 14, 2003 Scott Stoneman, P.E. and Bob Montgomery, P.E. of Montgomery Water Group and Tom Kahler of The Watershed Company surveyed lake level, ordinary high water (OHW) marks, and other high water marks at various locations on Lake Wenatchee. Tom is a biologist experienced in vegetation surveys. Surveyed elevations are based on the USGS benchmark located at the outlet end of the lake. The USGS benchmark is stamped "1880 T" and is 1878.47 feet NGVD 1929 datum.

We began by surveying the lake level near the benchmark. The lake level was 1868.69 feet at 11:00 am. Ordinary High Water marks were interpreted and surveyed near Lake Wenatchee State Park and at several locations on both the north and south sides of the lake. We could not find published benchmarks at other locations adjacent to the lake so we used the lake level as our benchmark. It is our opinion that the interpretation of OHW is subject to more uncertainty than the use of the lake as a benchmark so our methodology should be acceptable for this level of study. We also reviewed stream gaging records from the Department of Ecology (DOE) station on Wenatchee River below Lake Wenatchee and found the river stage fluctuated between 2.62 and 2.65 feet during the time of our surveys. Since the fluctuation in the DOE stage measurements was only 0.03 feet during the time of the survey, water level fluctuations should not be a factor in the use of the Lake as a benchmark.

Table 1 presents the elevations and locations of the OHW marks interpreted and surveyed. The quality of the sites varied as some of the sites were heavily disturbed from shoreline development and were very rocky. The best sites to interpret the OHW, in our opinion, are those near the State Park. Those OHW's were interpreted and surveyed to be 1870.2 to 1870.4 feet.

The average OHW mark of all the sites reviewed is 1870.3 feet, which is also within the range of the sites interpreted and surveyed near the State Park. The 95% confidence interval for the OHW marks is 0.7 feet. Appendix A contains photographs of the OHW marks interpreted and surveyed.

Table 1
Ordinary High Water Marks
Interpreted and Surveyed

Ordinary High Water Mark Location	Elevation
300 yds South of YMCA Camp	1870.5
300 yds South of YMCA Camp	1870.4
300 yds South of YMCA Camp	1870.2
Halfway between YMCA Camp and State Park	1870.2
Near USGS BM in State Park	1870.4
Near USGS BM in State Park	1870.2
Kane Beach - 18045 North Shore Drive	1870.8
Hoyt Beach - 16181 North Shore Drive	1870.7
Aspiri Beach - 16925 North Shore Drive	1869.8
South of Aspiri Beach	1869.6
Starr Beach - 15300 South Shore Road	1870.1
<i>Average</i>	<i>1870.3</i>
<i>95% Confidence (2 x Std. Dev.)</i>	<i>0.7</i>

APPENDIX A
ORDINARY HIGH WATER PHOTOS



Photograph 1 - Approximately 300 yards south of YMCA Camp, Elev. 1870.5



Photograph 2 - Approximately 300 yards south of YMCA Camp, Elev. 1870.4



Photograph 3 - Approximately 300 yards south of YMCA Camp, Elev. 1870.2



Photograph 4 - Halfway between YMCA Camp and State Park, Elev. 1870.2



Photograph 5 - Near USGS BM at State Park, Elev. 1870.4 – 1870.2



Photograph 6 - Kane beach, Elev. 1870.8



Photograph 7 - Hoyt beach, Elev. 1870.7



Photograph 8 - Aspiri beach, Elev. 1869.8



Photograph 9 - South of Aspiri beach, Elev. 1869.6



Photograph 10 - Starr beach, Elev. 1870.1