

The 1.8-ft gage datum discrepancy

The USGS stated in its November 5, 2008 letter,

“...the gage datum of Stewart’s historical HWM elevations was likely to be 142.7 ft NGVD’29 and not 140.9 ft.” (142.7 – 140.9 = 1.8 ft)

The 1.8-ft gage datum discrepancy

- Stewart's surveyed 1921 HWM at upper Dalles gage is El. 175.75 (gage height 34.86 + gage datum El. 140.89)
- USGS published 1921 HWM at current Dalles gage is El. 177.6 (gage height 34.86 + gage datum El. 130.00 + gage datum difference 12.69)
- 1.8 ft is the difference between USGS published and Stewart's surveyed 1921 HWM elevations

The 1.8-ft gage datum discrepancy

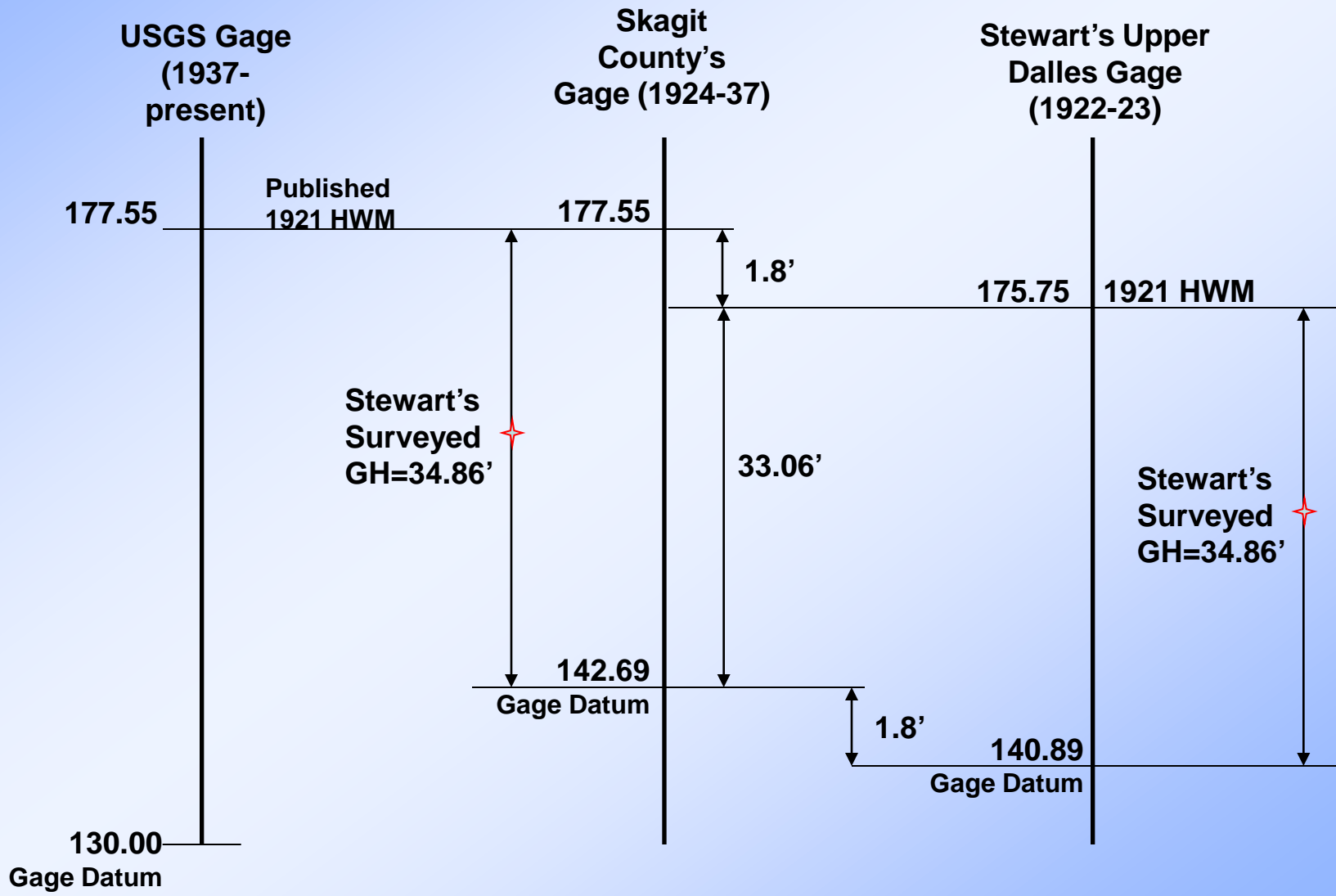
- Skagit County operated a gage at upper Dalles in 1924 – 37, with gage datum El. 142.69
- 12.69 ft is the gage datum difference between County's old gage and USGS current Dalles gage
- USGS has a record of this 12.69-ft datum conversion between County's old gage and USGS current Dalles gage

The 1.8-ft gage datum discrepancy

- 1.8 ft is the gage datum difference between Stewart's upper Dalles gage and County's old gage
- USGS looked for but could not find any record of the 1.8-ft datum conversion between Stewart's upper Dalles gage and County's old gage



The 1.8-ft gage datum discrepancy



The 1.8-ft gage datum discrepancy

- The USGS stated that “...the gage datum of Stewart’s historical HWM elevations was likely to be 142.7 ft NGVD’29 and not 140.9 ft.”
- If this USGS statement were correct, all of Stewart’s surveyed elevations would have been 1.8 ft too low



Comparison of water surface elevations surveyed by Stewart and others using NGVD-29 datum

Location	Stewart 1922-23 Survey	USACE 1911 Survey *	Recent Survey	Difference Between Stewart and Other Surveys (ft)
Near old Concrete Ferry Site	151.92 (01/27/23 – Stewart notes, p. 84, flow 9,740 cfs at Sedro-Woolley)	151.1 (8,570-9,980 cfs at Sedro-Woolley)	152.1 (Skagit County 04/28/08 – flow 9,420 cfs at Mt. Vernon and 7,680 cfs at Concrete, measured 151.92 - 152.32 at X-Sec 6)	0.82 and -0.18
Upper Dalles Gage	144.58 (01/27/23 – Stewart's Notes, p. 86, flow 9,740 cfs at Sedro-Woolley)	144.5 (8,570-9,980 cfs at Sedro-Woolley)		0.08
	147.55 (12/23/22 – Stewart's Notes, p. 34, 6.66+140.89, flow 14,200 cfs at Sedro-Woolley)		147.4 (PIE 9/30/04 – flow 12,500 cfs at Concrete, measured 147.1 at current gage)	0.15
Lower Dalles Gage	144.95 (01/25/23 – Stewart's notes, p. 54, 3.91+141.04, flow 10,100 cfs at Sedro-Woolley)	144.3 (8,570-9,980 cfs at Sedro-Woolley)	145.7 (PIE 9/30/04 – flow 12,500 cfs at Concrete, interpolated 146.9 lowered 1.2 ft for similar flow of Stewart's survey date)	0.65 and -0.75
Upper Slope Section	144.12 (01/30/23 – Stewart's notes, p. 64, flow 7,660 cfs at Sedro-Woolley)	143.6 (8,570-9,980 cfs at Sedro-Woolley)	144.7 (PIE 9/30/04 – flow 12,500 cfs at Concrete, interpolated 146.4 lowered 1.7 ft for similar flow of Stewart's survey date)	0.52 and -0.58
Lower Slope Section	142.35 (01/30/23 – Stewart's notes, p.64, flow 7,660 cfs at Sedro-Woolley)	142.1 (8,570-9,980 cfs at Sedro-Woolley)	141.9 (PIE 9/30/04 – flow 12,500 cfs at Concrete, interpolated 143.6 lowered 1.7 ft for similar flow of Stewart's survey date)	0.25 and 0.45

* Elevations based on extreme low water of Puget Sound were adjusted by -8.93 ft to NGVD-29. It was assumed that the survey in Concrete area was conducted in August 1911.

Maximum difference: 0.82 and -0.75

Conclusions

- Stewart's surveyed elevations are based on MSL, consistent with the use of NGVD-29 datum
- There is no evidence that Stewart's gage datum was incorrectly surveyed (by 1.8 ft too low as the USGS statement suggested)
- USGS published 1921 HWM El. 177.6 is based on an incorrect 12.69 ft gage datum difference, which does not include the 1.8 ft datum difference between Stewart's gage and County's gage
- USGS should have used the corrected 10.89 ft gage datum difference ($=12.69 - 1.8$)