Third Harvest

Port Angeles, Washington

November 16, 2026

To the Clallam County Board of Commissioners, the Clallam County Planning Commission, and interested readers

Re: Drost 2.0, a public-records update of USGS Water-Resources Investigations Report 83-4227 (Drost, 1986)

The 1986 U.S. Geological Survey inventory by B.W. Drost, prepared in cooperation with the Clallam County Board of Commissioners and the Washington Department of Ecology, remains the most recent countywide study of the county's ground water. It compiled records for about 2,100 wells and springs, and its field visits, in the summer of 1979, reached about 440 wells.

The enclosed draft is research the 1986 team could not do, using 40 years of public data it did not have. It screens 17,418 Washington Department of Ecology well reports, including 9,210 water-well logs (about 7,400 of them dated after 1980), against Drost's findings in all five of his study areas, together with later USGS and Ecology water-level records and studies published since. Every figure names its public source.

In brief, the records show patterns:

- Wells are deeper. The median water well drilled since 2010 is 129 ft deep, against 87 ft for logs to 1980.
- More logs report low yields: about 14% of logs since 2010 test under 5 gallons per minute, against about 7% to 1980.
- In Sequim-Dungeness, the one area with repeat measurements, the monitored wells record declines: a median 1.8 ft at 62 USGS wells between 1975-81 and 1994-97, and about 0.2 ft per year at 16 Ecology wells from 1997 to 2017.
- 537 water-well logs within 1 km of the shore reach below sea level. No public chloride data after 2006 could be retrieved.

This report is not a determination, and it reaches no firm conclusion. A typed water level exists for only 17% of the logs, and almost none from 1980 to 2009. Deeper drilling practice biases the comparisons: for wells of similar depth in the same tract, the median water level is only about 4 ft deeper. The monitoring networks lean toward wells with known declines, and no long-term observation well was found in the Port Angeles area. Those questions stay open until they are measured in the field.

> *"Best available science is a phrase. It should have significant meaning, and that only comes from the field. We cannot simply use the phrase as a basis for determination."*

We therefore ask that the County, with the Department of Ecology, pursue a new USGS-cooperative countywide field survey. The County's comprehensive plan already says it should undertake further studies of the groundwater regime (CCC 31.02.320(4)(c)), and federal law lets the USGS pay up to half the cost of a cooperative study (43 U.S.C. § 50). The survey should include ground temperatures and heat flow, which the 1986 study did not address, and a statistically sound sample: a systematic design with repeat measurements and an observation-well network, rather than one season's visits to a fraction of the records.

Respectfully,

George Peterson
Third Harvest
Port Angeles, Washington

Enclosure: Drost 2.0, draft countywide screening (pages 2 to 14). Sources: Drost (1986), USGS WRIR 83-4227; Ecology well-report geodatabase; USGS field measurements; Thomas and others (1999), USGS WRIR 99-4048; Ecology (2018), pub. 18-11-011. Full source list on the last page.

Drost 2.0: Clallam County ground water 40 years later

A countywide screening of every public Washington Department of Ecology well report for Clallam County against the findings of USGS Water-Resources Investigations Report 83-4227, *Water Resources of Clallam County, Washington: Phase 1 Report*, by B.W. Drost (1986). It covers all five of Drost's study areas, plus the rest of the county where logs exist. Compiled November 16, 2026 from public records. This is a draft for discussion, not an engineering or legal opinion.

17,418
Ecology well reports screened, including 9,210 water-well logs

87 → 129 ft
median depth of water wells, logs to 1980 vs logs since 2010

+1.8 ft
median change at 62 Sequim-Dungeness wells measured in 1975-81 and again in 1994-97

7% → 14%
share of logs with a test yield under 5 gpm

What this does not conclude

This records screening reaches **no firm conclusion**. It is not a determination and not a basis for one. The records show patterns (deeper wells, more low-yield logs, and water-level declines in the monitored Sequim-Dungeness subsets), but these gaps keep the questions open until they are measured in the field:

- **Thin sample.** A typed static water level exists for only 17% of water-well logs, and almost none for 1980 to 2009.
- **Drilling-practice bias.** Newer wells go deeper for sanitary-seal, lender and adequacy reasons, so deeper wells are not by themselves evidence of a lower water table. For wells of similar depth in the same tract (40 tracts), the median water level is only about 4 ft deeper.
- **Network bias.** The Sequim-Dungeness declines come from monitored subsets, and the monitoring networks lean toward wells with known declines. The rough 5 to 8 ft cumulative decline since 1979 is an inference across different well sets, not one measured series.
- **No Port Angeles observation well.** No long-term observation well was found in the Port Angeles area. The trend there is unknown, not shown to be stable.

Patterns in the records

- **Wells are deeper.** Countywide, the median water well drilled since 2010 is 129 ft deep, compared with 87 ft for logs to 1980. Drost's Table 1 medians were 33 to 140 ft depending on the area. In 414 40-acre tracts that have logs from both periods, newer wells are a median 29 ft deeper. The Miller Peninsula and Port Angeles areas deepened most. Soleduck-Calawah (Forks) did not.
- **Water levels: declines in the monitored Sequim-Dungeness subsets; unknown elsewhere.** Where wells of similar depth in the same tract can be compared (40 tracts), the median static level is +4 ft deeper now. In the Sequim-Dungeness area, 62 USGS wells measured in 1975-81 and again in 1994-97 show a median change of +1.8 ft (23 wells more than 3 ft deeper, 4 more than 3 ft shallower, 35 within 3 ft). Later studies of monitored subsets report continued declines there: Ecology found a median of −0.20 ft per year at 16 Dungeness wells over 1997 to 2017, and a USGS continuous well near Carlsborg dropped about 1.8 ft from 2018 to 2023. Outside Sequim-Dungeness there are too few repeat measurements to call a trend.
- **More low-yield wells.** 14% of recent logs report a test yield under 5 gpm, compared with 7% before 1981. The rise is sharpest in Drost's bedrock problem areas: the foothills southeast of Port Angeles and the Soleduck valley from Forks to Sappho.
- **Saltwater exposure.** 537 water-well logs within 1 km of the marine shore have a bottom below sea level (rough screen), and 74 of them were drilled since 2010. The six public chloride samples over 250 mg/L are all from 1959 to 1978, at Neah Bay, the west shore of Sequim Bay and the Miller Peninsula. No newer public chloride data could be retrieved, so the screen cannot say whether conditions changed.
- **The record is thin.** Ecology's database has a typed static water level for only 17% of water-well logs and a yield for 18%. Logs from 1980 to 2009 are nearly blank in those fields. Drawdown, specific capacity, aquifer material and dry holes appear only on the scanned driller logs.

How to read this. Each well log records one well at one moment, usually when it was drilled. Comparing logs from different decades mixes changes in the aquifer with changes in where and how wells are drilled. Confounders are named next to each result. Repeat measurements of the same wells (USGS, Ecology) are the strongest evidence and are kept separate.

1. What was screened

We pulled every public Ecology well report for Clallam County. The base is Ecology's statewide well-report geodatabase (downloaded November 16, 2026; the file is dated August 22, 2025 and its newest Clallam logs are from January 2025). We added 550 newer reports from a November 15, 2026 pull of Ecology's live well-construction service for the Port Angeles area. The live service was down ("service not started") all morning on November 16, so logs filed after January 2025 outside the Port Angeles area are missing.

Reports by type

Report type	Count
Water well	9,210
Decommissioning	3,519
Soil boring	2,234
Resource protection	1,585
Environmental boring	429
Dewatering	374
Ground source (geothermal loop)	67
Total	**17,418**

All types are in the CSV. The analysis uses the 9,210 water-well logs. Decommissioning reports mostly close old wells and are not dry holes.

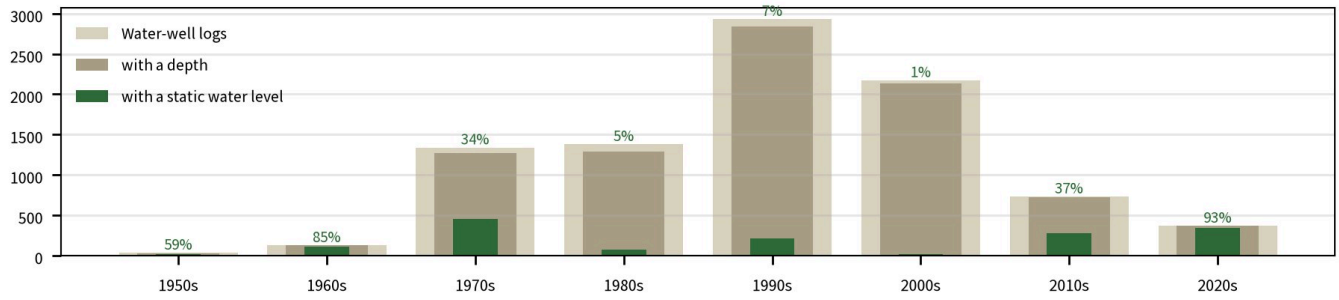
Water-well logs: fields filled in

Field	Logs	Share
Completion date	9,107	99%
Location to 40-acre tract (quarter-quarter section)	9,208	100%
Well depth	8,877	96%
Static water level (typed)	1,540	17%
Test yield, gpm (typed)	1,675	18%
Test method (air, bailer, pump)	1,657	18%
Flowing artesian flagged	35	0%
Drawdown / specific capacity	0	0%
Aquifer material (lithology)	0	0%
Dry hole flag	0	0%

168 static levels typed as 0 ft (mostly 2010s) were treated as blank. 6 logs list a static level deeper than the well. 6 logs report a 0 gpm test.

Where the electronic record is thin

Water-well logs per decade, and the share (green %) with a static water level typed into Ecology's database. Yields follow the same pattern.



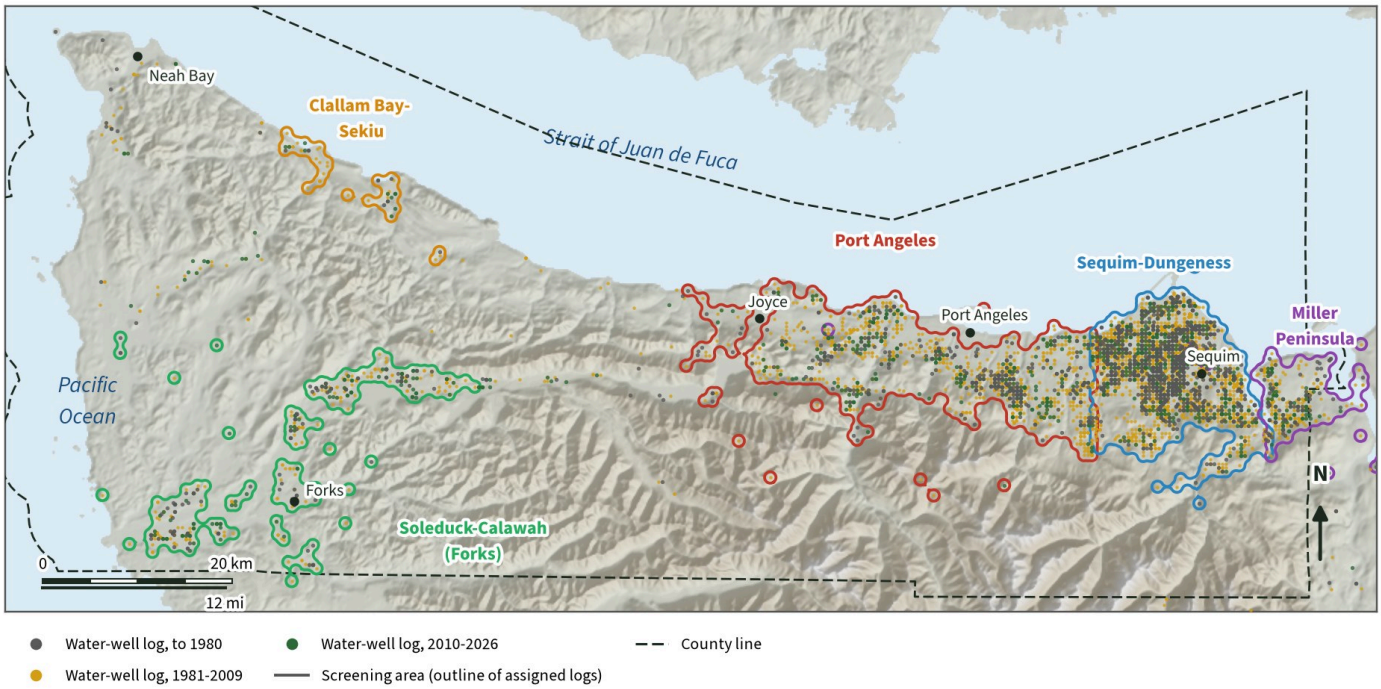
WA Ecology well-report database, Clallam County. Values for logs without typed fields exist only on the scanned driller logs.

Other public data used. USGS depth-to-water field measurements for 2,017 sites in Clallam County (4,110 measurements; almost all end in 1995 or 1996) and one USGS continuous well (2018 to 2024). USGS chloride and iron samples from the Water Quality Portal. Drost's Table 6 (about 2,000 wells), machine-read from the scan, with 315 Port Angeles-area rows checked against an earlier hand transcription. Published reports for Sequim-Dungeness (Thomas and others, 1999; Pacific Groundwater Group, 2002 and 2009; Ecology, 2018).

2. The five study areas, then and now

9,210 water-well logs, grouped into Drost's five study areas

Every Ecology water-well report for Clallam County, placed at its 40-acre tract and colored by when it was drilled.
Most wells drilled since 1980 are in the Sequim-Dungeness area.



Wells: WA Ecology well-report database (statewide geodatabase, Aug 2025 extract, plus Nov 15, 2026 service pull for the Port Angeles area); located at quarter-quarter section centroids. Area outlines are approximations of Drost (1986) plates 1 to 5 (not digitized), drawn around the logs assigned to each area. Terrain: USGS 3DEP. UTM 10N, NAD83.

Check: do Ecology's pre-1981 logs match what Drost summarized?

Area	Drost: well records	Ecology logs to 1980	Drost median depth, ft	Ecology to 1980	Drost median water level, ft	Ecology to 1980
Port Angeles	219	319	87	100	20	26
Sequim-Dungeness	983	1146	78	82	26	32
Miller Peninsula	84	87	140	130	55	64
Soleduck-Calawah (Forks)	57	105	81	81	48	48
Clallam Bay-Sekiu	5	10	33	40	8	15

Drost (1986) Table 1, records through the first quarter of 1980. Area boundaries here are our approximations of Drost's plates 1 to 5, which were not digitized. Our Port Angeles area runs from the Lyre River to Bagley Creek and includes foothills that his may not have, which is why it holds more logs. The Miller Peninsula count matches exactly, and medians are within about 15 ft elsewhere, so the Ecology database is a reasonable stand-in for Drost's well set for screening purposes.

3. 1986 compared with now, by area

Area	Depth, ft Drost T1	Logs to 1980	1981-2009	2010-2026	Water level, ft Drost T1	Logs to 1980	2010-2026 (n)	Yield gpm to 1980	2010-2026	Under 5 gpm to 1980	2010-2026	Flowing Drost	Flowing logs to 1980/since 2010	Dry Drost
Port Angeles	87	100	141	159	20	26	62 (165)	15	10	9%	18%	7	2/3	10
Sequim-Dungeness	78	82	98	120	26	32	51 (326)	20	20	6%	10%	18	22/3	22
Miller Peninsula	140	130	168	200	55	64	130 (39)	12	12	10%	6%	2	1/0	0
Soleduck-Calawah (Forks)	81	81	58	79	48	48	39 (54)	20	15	5%	22%	0	0/1	8
Clallam Bay-Sekiu	33	40	42	52	8	15	15 (7)	18	5	0%	38%	0	0/0	1
Rest of county		85	84	102		51	26 (22)	22	10	10%	22%		1/0	
All county		**87**	**104**	**129**		**35**	**54 (613)**	**20**	**17**	**7%**	**14%**		**26/7**	

Medians. Water level = depth to water below land at completion, as reported by the driller. Yield = driller test rate, mostly short air or bailer tests. 1981-2009 water levels and yields rest on few logs (see section 1) and are left out. Ecology's database has no dry-hole field, so dry holes can be compared only through Drost's counts.

How many logs, and how deep the deeper wells go

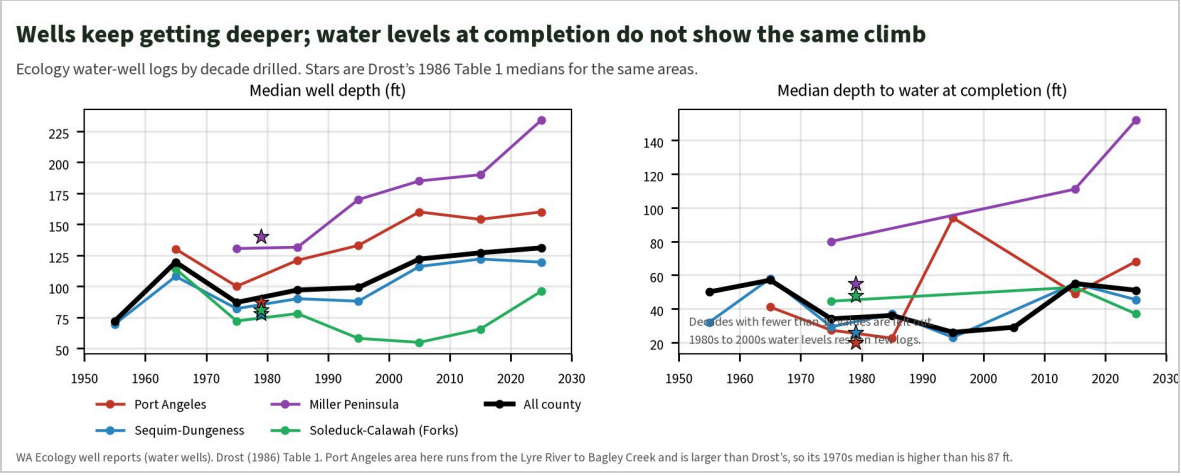
Area	Logs to 1980	1981-2009	2010-2026	75th pct depth, to 1980	2010-2026	Deeper than 200 ft, to 1980	2010-2026
Port Angeles	319	1373	286	150	234	12%	36%
Sequim-Dungeness	1146	4148	579	120	185	7%	22%
Miller Peninsula	87	382	87	249	280	36%	49%
Soleduck-Calawah (Forks)	105	253	99	112	122	1%	8%
Clallam Bay-Sekiu	10	34	10	72	68	0%	0%
Rest of county	35	119	35	125	180	10%	20%
All county	1702	6309	1096	128	204	9%	26%

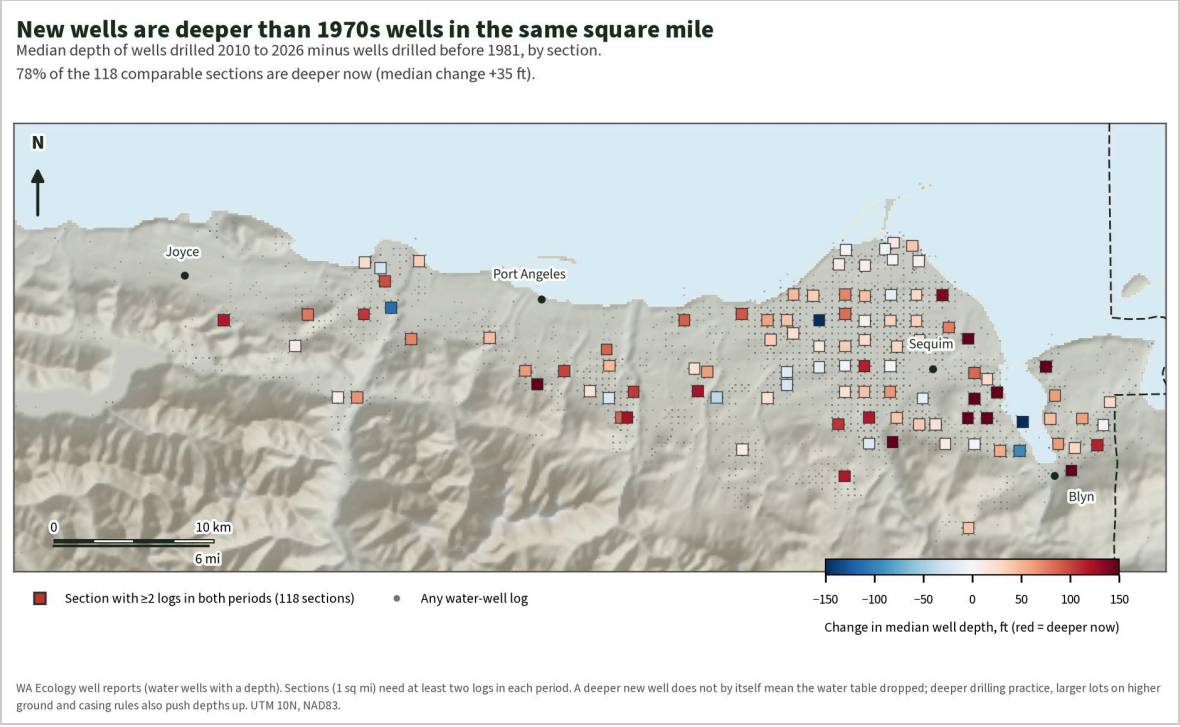
Cross-check: Drost's own Table 6 rows, machine-read

Area	Table 6 wells located	Median depth, ft	Median water level, ft	Median specific capacity, gpm/ft (n)	Drost T1 specific capacity
Port Angeles	504	101	24	0.6 (271)	0.5
Sequim-Dungeness	1071	79	30	1.9 (628)	2.0
Miller Peninsula	95	149	85	1.9 (56)	1.1
Soleduck-Calawah (Forks)	52	111	63	2.6 (40)	4.8
Clallam Bay-Sekiu	7	45	11	12.0 (5)	2.0
Rest of county	33	52	6	0.4 (15)	

2,013 Table 6 rows were read by optical character recognition from the 1986 scan (PDF pp. 30 to 82). Owner names were not kept. Against the hand transcription, machine-read values match exactly 73% of the time for depth, 86% for water level, 89% for yield and 92% for specific capacity. Common errors are 1 read as 7 and reversed digits. Treat this table as a check on the Table 1 summaries, not as well-by-well data. Specific capacity has no modern counterpart in Ecology's electronic data.

4. Wells got deeper: by decade and by section





Is it the aquifer, or where people drill?

Area	Surface geology at the well	Logs to 1980	Median depth	Logs 2010-2026	Median depth
Port Angeles	unconsolidated at surface	25	72	11	91
Port Angeles	bedrock at surface	279	105	270	161
Soleduck-Calawah (Forks)	unconsolidated at surface	35	98	51	100
Clallam Bay-Sekiu	unconsolidated at surface	6	50	7	46
Rest of county	unconsolidated at surface	8	124	22	72
Rest of county	bedrock at surface	8	86	7	122

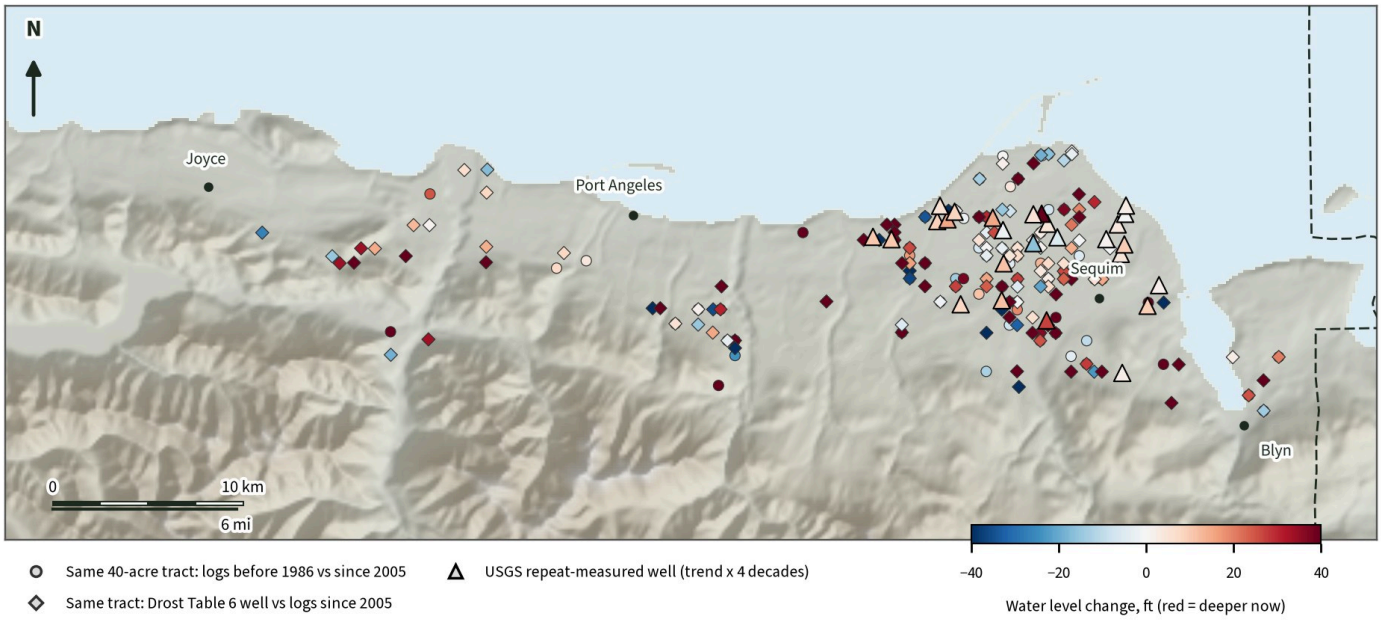
Surface geology from the DNR 1:100,000 map at the tract centroid. That map has no unit polygons over most of the Sequim-Dungeness and Miller Peninsula areas, so those areas are not split. In the Port Angeles area, deepening is concentrated in wells on mapped bedrock, mostly the foothills: 105 ft to 161 ft across the area. Same-tract comparisons hold location roughly constant, but newer wells there still go a median 29 ft deeper. Part of that reflects practice (deeper casing for sanitary seals, lenders and County adequacy rules, drilling below the shallow aquifer for reliability), not only lower water.

5. Water levels, countywide

Water levels: mixed at the tract scale, slowly deeper in USGS repeat wells

Each symbol compares a depth to water then and now. Red is deeper now, blue is shallower.

Most tract pairs differ by less than 10 ft either way.



Tract pairs: WA Ecology well reports (static water level as reported by the driller at completion, different wells in the same 40-acre tract); Drost (1986) Table 6. USGS: field measurements of depth to water (parameter 72019), USGS Water Data API, wells with 5+ years spanning 10+ years, Theil-Sen trend; most records end in 1995 or 1996. UTM 10N, NAD83.

Same 40-acre tract, any depth

Area	Tracts	Median change, ft	>10 ft deeper	>10 ft shallower
Port Angeles	12	+16.2	50%	8%
Sequim-Dungeness	62	+12.0	52%	8%
Miller Peninsula	3	+24.0	67%	0%
Soleduck-Calawah (Forks)	2	+20.4	50%	0%
All county	79	+13.0	52%	8%

Ecology logs to 1985 vs logs since 2005 in the same tract. Positive = deeper now.

Same tract, wells of similar depth

Area	Tracts	Median change, ft	>10 ft deeper	>10 ft shallower
Port Angeles	3	+4.0	33%	0%
Sequim-Dungeness	36	+3.9	33%	8%
Soleduck-Calawah (Forks)	1	+9.9	0%	0%
All county	40	+4.0	32%	8%

Pairs whose depths differ by no more than 20 ft or 20%.

Drost Table 6 wells against logs since 2005 in the same tract

Area	Tracts	Median change, ft	>10 ft deeper	>10 ft shallower
Port Angeles	32	+10.4	50%	28%
Sequim-Dungeness	91	+7.6	49%	18%
Miller Peninsula	5	+20.0	60%	20%
Soleduck-Calawah (Forks)	1	-11.0	0%	100%
All county	129	+8.0	50%	21%

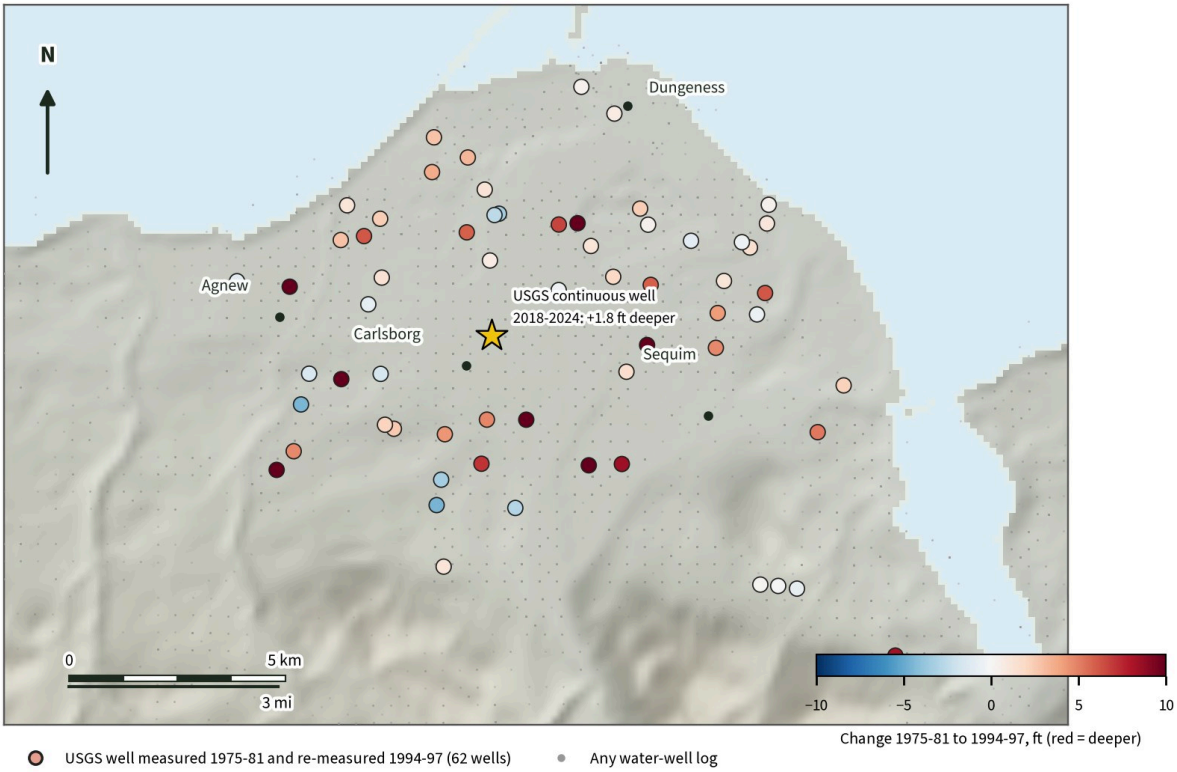
Reading these together. Raw same-tract comparisons show modern static levels a median 13 ft deeper. Once the comparison is limited to wells of similar depth, the median falls to 4 ft. So much of the raw difference comes from newer wells tapping deeper zones with deeper water levels, not only from a falling water table. Driller levels are single readings taken at different seasons, often right after drilling, and are accurate to a few feet at best. Only Sequim-Dungeness has enough pairs to say more (next pages).

6. Sequim-Dungeness water levels: repeat measurements

Sequim-Dungeness: the same wells, measured about 17 years apart

Median change +1.8 ft (deeper); 23 wells more than 3 ft deeper, 4 more than 3 ft shallower, 35 within 3 ft.

The later round is the Thomas and others (1999) inventory, which re-measured wells first visited for Drost.



USGS field measurements of depth to water (parameter 72019), USGS Water Data API, pulled Nov 16, 2026; median of each well's measurements in each period, all seasons (summer-fall only: median +1.9 ft, 34 wells). Some 1970s values are driller-reported at construction. Continuous well USGS-480546123100901, annual median depth 40.8 ft (2018) to 42.6 ft (2023). UTM 10N, NAD83.

The 1975-81 and 1994-97 rounds are mostly the same USGS-numbered wells. The first round includes Drost's 1979 field inventory. The second is the Thomas and others (1999) inventory, which re-inventoried 117 of Drost's wells and measured water levels in 238 wells. Of the 62 wells with measurements in both periods, the median change is +1.8 ft and the mean is +3.5 ft. A signed-rank test says the shift is unlikely to be chance ($p < 0.001$). The largest change is 31 ft deeper at one well; the largest rise is 4.6 ft. Using only July to October measurements in both periods (34 wells), the median is +1.9 ft.

7. Sequim-Dungeness: what each record shows

Period	Source	Wells	Result (positive = deeper / lower water)
1975-81 to 1994-97	USGS wells measured in both periods (this screening, from USGS field measurements)	62 wells	Median +1.8 ft (deeper); 23 wells more than 3 ft deeper, 4 more than 3 ft shallower
Oct 1978-Sep 1980 to Oct 1993-Sep 1997	Thomas and others (1999), Table 12: average levels in wells with 12 to 38 readings in each period	30 wells	Median −1.5 ft, mean −2.5 ft (negative = decline); 20 declined, 7 rose, 3 unchanged; largest decline 10 ft
1978 to 1997	Thomas and others (1999), text by recharge type	12 / 4 / 3 wells	Shallow aquifer, precipitation recharge: average −2 ft. Shallow aquifer, irrigation recharge: −6 ft. Middle aquifer: −2 ft. Declines of about 3 to 10 ft over about 7 sq mi east of the Dungeness River
1993-1997 to 2000	PGG (2009) review of the Clallam County water-level database	73 wells (59 usable)	3 declines, 44 no significant trend, 7 suggested rises, 5 rises of about 1 to 5 ft
1996 to 2001	PGG (2002), City of Sequim monitoring report, Port Williams wellfield	shallow, middle and lower aquifer wells	Declines of about 1 to 2 ft per year in all three aquifers near the wellfield; declines also noted near the Silberhorn wellfield
Late 1970s to mid-1990s; 1997 to 2007	PGG (2009), as quoted in the Dungeness Water Resources Planning appendix (2022)	shallow and 5 middle-aquifer wells	Shallow aquifer near where US 101 crosses the Dungeness: about 3 to 9 ft (late 1970s to mid-1990s) and about 8 to 17 ft (1997 to 2007). Middle aquifer: 7.7 to 9.7 ft near Gierin and Bell creeks, 7 ft near Agnew (1997 to 2007)
1997 to 2017	Ecology (2018), Statewide Groundwater Assessment 2017, Dungeness area	16 wells	Median −0.20 ft per year (about 4 ft over 20 years); average −0.13; range −0.55 to +0.58 ft per year
Long term to 2015	Ecology (2016) drought evaluation, as reported by the Sequim Gazette (Mar 30, 2016)	11 Sequim and Agnew wells	Only one showed an upward trend; two Agnew wells set record lows in 2015. Secondary source; the Ecology report itself was not retrieved
2018 to 2023	USGS continuous well USGS-480546123100901 (west of Sequim, near Carlsborg), daily data	1 well, 2,414 days	Annual median depth 40.8 ft (2018) to 42.6 ft (2023), about 0.23 ft per year. A 2007 reading at the same well was 38.0 ft
Logs to 1985 vs since 2005	Ecology well logs in the same tract (this screening)	62 tracts; 36 depth-matched	Median +12 ft any depth; +3.9 ft for wells of similar depth

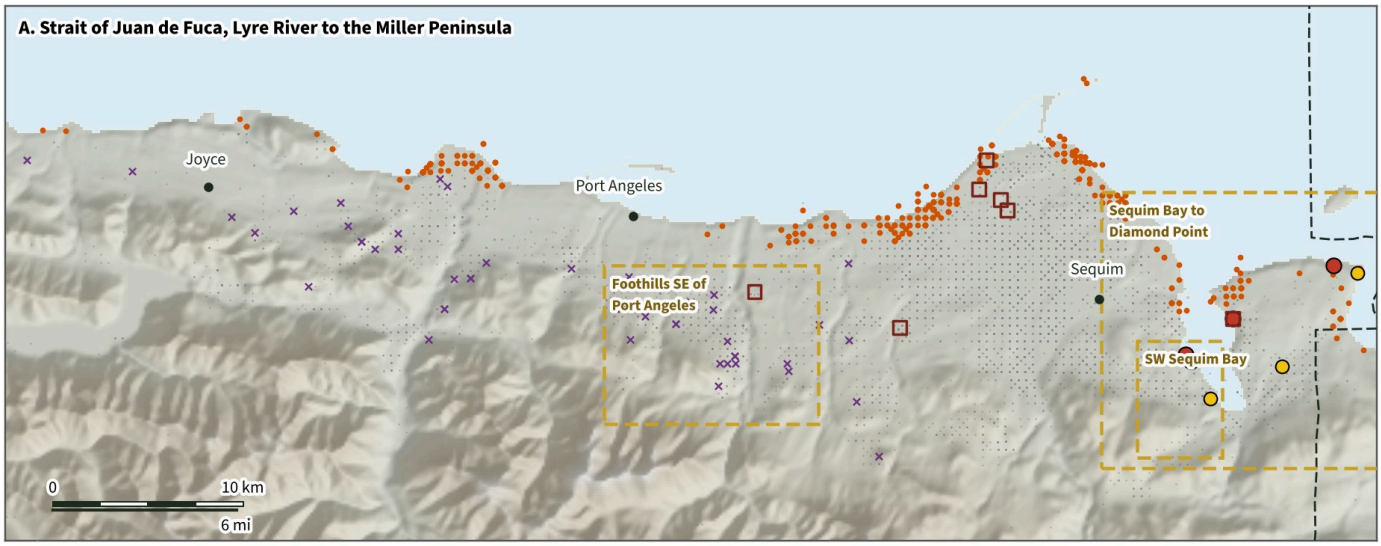
What the records suggest, and what they do not settle

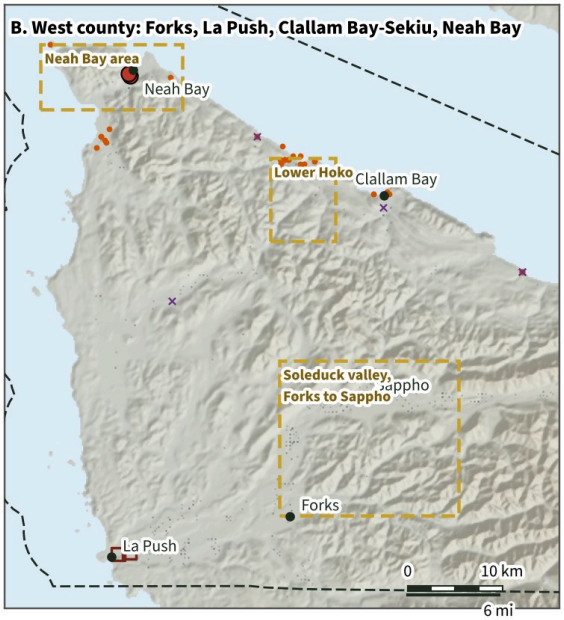
- **Direction.** Records spanning ten years or more (1979 to the mid-1990s, 1997 to 2007, 1997 to 2017) find water levels falling at most monitored wells, with a minority stable or rising. The exception is PGG's review of the County database for 1993 to 2000, which found mostly no significant trend and slightly more rises than declines over that shorter window.
- **Size.** From Drost's era to the mid-1990s, the typical change was about 1.5 to 2 ft, with 3 to 10 ft over about 7 sq mi east of the Dungeness River. From 1997 to 2017, Ecology's median rate (0.20 ft per year) adds about 4 ft. Larger declines (8 to 17 ft, and 1 to 2 ft per year near the Port Williams wellfield) are reported locally. Adding the periods gives a rough cumulative decline since 1979 on the order of 5 to 8 ft at a typical monitored well, and more near the Dungeness crossing of US 101 and the city wellfields. This is an inference from different well sets, not a single measured series, and the monitoring networks lean toward wells with known declines.
- **Causes named in the sources.** Thomas and others (1999) and PGG (2002, 2009) link the declines mainly to less recharge from irrigation leakage (Dungeness diversions fell from about 115 cfs in 1979 to about 55 cfs in 2000 as conservation measures took effect) and to more pumping. Because irrigation leakage had raised shallow water levels, part of the decline reflects the loss of that artificial recharge. Year-to-year precipitation also moves levels. This screening did not test causes.
- **Dungeness rule monitoring.** The 2013 Dungeness instream flow rule (WAC 173-518) is supported by Ecology water-use metering and observation wells. Those measurements sit in Ecology's EIM database, which releases bulk downloads only by emailed request, and in the County's water-level database, which is not online. Neither could be pulled for this draft. They are the main data needed to extend the record past 2017 (section 11).
- **Flowing wells.** 22 flowing-artesian logs date from 1980 or earlier (Drost listed 18) and 3 from 2010 or later. That is consistent with lower heads near the shore, but it is also what you would expect from fewer new shoreline wells, so it is weak evidence on its own.
- **What this does not settle.** These are records from monitored subsets, not a designed sample of the aquifer. They do not establish how far, how fast or why levels have changed across Sequim-Dungeness as a whole. That needs field measurement.

8. Screening against Drost's problem areas

Screening against the problem areas Drost named in 1986

Salty-water and failed-well areas from Drost's recommendations, with today's logs and the public chemistry samples that could be found.





- Log: bottom below sea level, within 1 km of shore
- Log on bedrock with test yield under 5 gpm
- USGS chloride sample 100 to 250 mg/L
- USGS chloride sample over 250 mg/L
- USGS iron sample over 0.3 mg/L
- Problem area named by Drost (1986), approx.

Logs: WA Ecology well reports; bottom elevation = land elevation from a 150 m USGS 3DEP grid at the tract centroid minus well depth (rough, ±30 ft or more on bluffs). Bedrock = DNR 1:100,000 surface geology at the tract centroid. Chemistry: USGS samples via the Water Quality Portal (chloride 1952 to 2006, iron 1953 to 1996); DOH and Ecology results were not retrievable as bulk data. Problem areas: Drost (1986) p. 19 to 20, boxes drawn by hand. UTM 10N, NAD83.

9. Problem-area screens

Bedrock and failed-well areas (Drost p. 19)

Zone	Logs	Median depth to 1980	1981-2009	2010-2026	90th pct depth since 2010	Under 5 gpm, to 1980	Since 2010
Foothills southeast of Port Angeles (bedrock)	671	105	145	170	339	4/36	12/54
Soleduck valley, Forks to east of Sappho	260	100	61	98	214	2/20	11/35
Southwest shore of Sequim Bay	325	185	214	200	699	6/15	11/29
Lake Crescent shoreline (within 500 m)	17	78	47				

“Under 5 gpm” = logs with a typed test yield under 5 gpm / logs with any typed yield. Foothills zone limited to wells on mapped bedrock. Drost described these areas as places where two or three holes were often drilled before one found water in bedrock fractures. Electronic data cannot count dry holes, but new wells here are deeper and more often low-yield. The Lake Crescent shore has too few logs to judge.

Saltwater screen: logs within 1 km of the marine shore

Area	Logs within 1 km	Bottom below sea level	of which to 1980	since 2010	Median depth near shore, to 1980	since 2010
Port Angeles	221	136	17	23	80	200
Sequim-Dungeness	393	308	66	40	85	129
Miller Peninsula	84	56	14	5	256	257
Soleduck-Calawah (Forks)	1	0	0	0		
Clallam Bay-Sekiu	27	20	6	4	56	52
Rest of county	34	17	3	2	51	122
All county	760	537	106	74	87	160

Drost salty-water area (within 1.5 km of shore)	Logs	Bottom below sea level	Drilled since 2010	Below sea level and since 2010
Neah Bay area	7	3	2	1
Sequim Bay SW shore to NE Miller Peninsula (incl. Diamond Point)	215	154	26	19
Lower Hoko River valley	22	15	3	3

Bottom elevation = land elevation from a 150 m grid at the tract centroid minus well depth. It is rough (±30 ft or more on bluffs), so these are candidates for a closer look, not findings of intrusion. Near-shore wells in the Port Angeles and Sequim-Dungeness areas are much deeper now than before 1981.

Water chemistry that could be retrieved

Area	Chloride sites	Over 250 mg/L	Iron sites	Over 0.3 mg/L
Port Angeles	30	0	10	1
Sequim-Dungeness	181	2	43	5
Miller Peninsula	13	2	7	1
Soleduck-Calawah (Forks)	8	0	6	2
Clallam Bay-Sekiu	0	0	0	0
Rest of county	12	2	4	0

USGS samples via the Water Quality Portal: chloride 244 sites (1952 to 2006); iron 70 sites (1953 to 1996); manganese had no quantified results. All six chloride exceedances date from 1959 to 1978 (up to 3,320 mg/L at Neah Bay). The iron exceedances include La Push (2.2 and 1.3 mg/L, 1967) and several Sequim-area wells (1996). Drost reported iron or manganese over limits in 24% of tested wells, worst near La Push, Forks and the lower Hoko. DOH public-water-system results (Sentry) and Ecology EIM results can only be queried system by system or by emailed request, so they are not included. This is the biggest gap in the chemistry screen.

10. Findings by area

Port Angeles (Lyre River to Bagley Creek)

1,996 water-well logs. The median depth rose from 100 ft (logs to 1980) to 159 ft (since 2010); Drost's median was 87 ft. The share deeper than 200 ft went from 12% to 36%. Low-yield logs rose from 9% to 18%. The foothills southeast of town (Drost's first problem area) show the largest change in the records: bedrock wells there went from 105 to 170 ft, and 22% of recent logs test under 5 gpm. Same-tract water levels are a median +16 ft deeper in 12 tracts, but only 3 tracts allow a depth-matched check, and no long-term observation well was found. The water-level trend is unknown, not shown to be stable. Near-shore wells are deeper (median 80 to 200 ft), and 136 sit below sea level within 1 km of the shore. No public chloride sample over 250 mg/L was found in this area.

Sequim-Dungeness

5,934 water-well logs, two-thirds of the county's. The median depth went from 82 ft to 120 ft (Drost: 78). This is the only area with repeat measurements. The monitored wells record declines at most sites: about 2 ft from 1979 to the mid-1990s at the typical well (3 to 10 ft east of the river), and about 0.2 ft per year from 1997 to 2017, with larger local declines near the city wellfields and the US 101 crossing. Flowing logs fell from 22 (to 1980) to 3 (since 2010). Two chloride samples over 250 mg/L (1978) are on the west shore of Sequim Bay.

Miller Peninsula

565 water-well logs. Already the deepest area in 1986 (Drost median 140 ft), it is now deeper still: 130 ft to 200 ft, with 49% of recent wells over 200 ft. Recent static levels are deep (median 130 ft). Drost singled out this shore, especially Diamond Point, for salty water and asked for chloride monitoring. In the Sequim Bay to Diamond Point zone, 154 of 215 near-shore logs reach below sea level, 19 of them drilled since 2010. Two public chloride samples there exceed 250 mg/L (1959, 1968), and no public chloride data after 2006 were found anywhere in the county. Whether Drost's recommended monitoring network exists could not be confirmed from public bulk data.

Soleduck-Calawah (Forks)

461 water-well logs. This is the one area where wells did not deepen (81 ft to 79 ft; Drost 81 ft). Static levels are similar (48 ft to 39 ft). Low-yield logs rose from 5% to 22%, mostly in the Soleduck valley toward Sappho (Drost's third failed-well area). Iron over 0.3 mg/L at La Push (1967) matches Drost's iron problem area. No modern chemistry was found.

Clallam Bay-Sekiu

Only 57 water-well logs (Drost had 5). Wells stay shallow (median 40 ft to 52 ft). In the lower Hoko valley, a Drost salty-water and iron area, 15 of 22 near-shore logs reach below sea level. There is no public chemistry. The sample is too small for trends.

Rest of county (Neah Bay, Joyce west to Pysht, Ozette, Beaver, interior)

197 water-well logs. The median depth went from 85 ft to 102 ft. Neah Bay has the county's highest recorded chloride (3,320 mg/L, 1967). Records are too sparse for trends.

11. Caveats, confounders and how to close the gaps

Confounders in log comparisons

- **Deeper drilling practice.** Sanitary-seal and casing rules (WAC 173-160), County adequacy reviews and lender expectations push new wells below the shallow aquifer even where it still yields. Deeper wells often show deeper static levels in upland recharge areas, as the depth-matched comparison shows.
- **Bias toward newer construction.** New homes go on remaining lots, often higher, farther from town, or on bedrock foothills. Older shallow wells near the shore and valley floors are under-represented after 1980 because those areas were already built out or are served by water systems.
- **Log quality.** Driller levels are single readings, often taken the day of drilling and before full recovery, at any season. Yields are short air or bailer tests. Before about 2010, static level and yield were rarely typed into the database (5% of 1980s logs, 1% of 2000s logs). Mandatory filing began in 1971, so pre-1971 wells are under-counted.
- **Location.** Logs are placed at 40-acre tract centroids, not at the well. Land elevations come from a 150 m grid. Area boundaries are approximations of Drost's plates.
- **Data currency.** The countywide extract ends in January 2025 (November 2026 for the Port Angeles area). Ecology's live service was down during this compilation.

What would bring Drost fully current

Gap	Public route
Post-2017 Ecology and County observation-well records (Dungeness rule monitoring)	Ecology EIM bulk download (requires an emailed request); Clallam County water-level database (public records request)
Logs filed after January 2025 countywide	Re-pull Ecology's well-construction service when it is back up
Drawdown, specific capacity, lithology and dry holes for about 7,700 logs with blank fields	Read the scanned driller logs (Ecology Well Report Viewer); a sample of a few hundred per area would give usable medians
Chloride, iron and manganese since 2006	DOH Sentry results for Group A and B systems; Ecology EIM; Jamestown S'Klallam Tribe and City of Sequim monitoring reports
Repeat water levels outside Sequim-Dungeness	Re-measure a set of Drost's 1979 field-checked wells in each area. Drost Table 6 gives their numbers, and this screening's CSV gives the matching modern tracts
Drost's plates 1 to 5	Digitize from the full-resolution USGS scans to fix study-area boundaries and well positions

Closing: what this screening does not conclude

This draft reaches **no firm conclusion** and is not a determination. The records show patterns (deeper wells, more low-yield logs, and declines in the monitored Sequim-Dungeness subsets), but:

- **Thin sample.** A typed static water level exists for only 17% of water-well logs, and almost none for 1980 to 2009.
- **Drilling-practice bias.** Newer wells go deeper for sanitary-seal, lender and adequacy reasons, so deeper wells are not by themselves evidence of a lower water table. For wells of similar depth in the same tract (40 tracts), the median water level is only about 4 ft deeper.
- **Network bias.** The Sequim-Dungeness declines come from monitored subsets, and the monitoring networks lean toward wells with known declines. The rough 5 to 8 ft cumulative decline since 1979 is an inference across different well sets, not one measured series.
- **No Port Angeles observation well.** No long-term observation well was found in the Port Angeles area. The trend there is unknown, not shown to be stable.

Records can flag where to look. They cannot by themselves answer whether, where or how much the county's ground water has changed. That takes a new field survey: USGS-cooperative, countywide, with a statistically sound sample, repeat measurements, an observation-well network, and ground temperatures and heat flow (geothermal).

12. Sources and files

1. Drost, B.W., 1986, Water resources of Clallam County, Washington: Phase 1 report. USGS WRI 83-4227. https://pubs.usgs.gov/wri/1983/4227/report.pdf
2. Thomas, B.E., Goodman, L.A., and Olsen, T.D., 1999, Hydrogeologic assessment of the Sequim-Dungeness area. USGS WRI 99-4048. https://pubs.usgs.gov/wri/1999/4048/report.pdf
3. Pacific Groundwater Group, 2002, City of Sequim 2001 hydrologic monitoring report (Ecology pub. 12-03-288). https://apps.ecology.wa.gov/publications/documents/1203288.pdf
4. Pacific Groundwater Group, 2009, 2008 Dungeness groundwater flow model (Ecology pub. 12-03-341). https://apps.ecology.wa.gov/publications/documents/1203341.pdf
5. Dungeness Water Resources Planning Recommendations, Appendix (approved Aug 10, 2022). https://dungenessriverteam.org/wp-content/uploads/2023/07/APPENDIX-to-Summary-Report_Approved.pdf
6. Ecology, 2018, Statewide groundwater assessment: 2017 (pub. 18-11-011). https://apps.ecology.wa.gov/publications/documents/1811011.pdf
7. Sequim Gazette, Mar 30, 2016, Study suggests long-term groundwater declines. https://www.sequimgazette.com/2016/03/30/study-suggest-long-term-groundwater-declines/
8. Ecology, Washington State Well Construction Reports geodatabase (WR_GEO_WellReports). https://fortress.wa.gov/ecy/gispublic/DataDownload/WR_GEO_WellReports.htm
9. Ecology Well Report Viewer. https://ecology.wa.gov/regulations-permits/guidance-technical-assistance/well-report-viewer
10. USGS Water Data API, field measurements and daily values (parameter 72019). https://api.waterdata.usgs.gov/ogcapi/v0/
11. Water Quality Portal (USGS chloride, iron, manganese results). https://www.waterqualitydata.us/
12. WA DOH, public water system source data. https://doh.wa.gov/data-statistical-reports/environmental-health/drinking-water-system-data/data-download
13. WA DNR, 1:100,000 surface geology (GeMS). https://geologyportal.dnr.wa.gov/
14. US Census TIGER/Line 2024 coastline; USGS 3DEP elevation. https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.html
15. WAC 173-518, Dungeness water management rule. https://app.leg.wa.gov/wac/default.aspx?cite=173-518

Files delivered with this report

- **Clallam well logs screened vs Drost 1986 - Nov 16 2026.csv**: all 17,418 Ecology reports with parsed date, tract, coordinates, depth, static level, yield, test method, flowing flag, surface geology, land and bottom elevation, distance to shore, study area, era and screening flags. Owner names and addresses are not carried.
- **data/**: tract and section comparisons, USGS repeat-well trends, Sequim pairs, chemistry sites, Drost Table 6 machine-read rows (owner names omitted) and summary statistics (stats.json, sequim.json).
- **maps/**: full-resolution maps and charts. **src/**: scripts to rebuild everything.

Screening flags in the CSV: bottom below sea level within 1 km of shore (537); inside a Drost salty-water area (244); inside a Drost failed-well area (1273); test yield under 5 gpm (167); flowing artesian (35). A flag marks a log for a closer look; it is not a finding about that well.