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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

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July 18, 1990

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TO: ~~Dick Cunningham~~

FROM: David Hallock *DH*

SUBJECT: Results of the 1990 Water Quality Index Analysis

This memo describes the Water Quality Index (WQI), records the procedures used to produce the 1990 WQI, and presents the results of the analysis.

Introduction

The WQI is a unitless number, ranging from 0 to 100, which is derived primarily from data collected by the Ambient Monitoring Section (AMS) of Environmental Investigations and Laboratory Services (EILS); however, data collected by USGS, METRO, and USBR were also used in the 1990 analysis. Scores are determined by comparing measured values to specified criteria. Criteria were developed by a national study group and modified to better evaluate Washington's water quality. In general, the criteria are based on Washington State Water Quality Standards for Class A waters. The following variables were included in the 1990 WQI:

- | | |
|-----------------------|------------------------|
| 1. Temperature | 2. Oxygen |
| 3. Bacteria | 4. pH |
| 5. Turbidity | 6. Nutrients (N and P) |
| 7. Suspended Sediment | 8. Ammonia Toxicity |

For marine stations, only the first five variables were included.

The higher the WQI, the worse the water quality. For the first four variables above, an index below 20 implies compliance with state Class A standards. For the other variables, state standards do not exist or are not compatible with the WQI analysis. In general, scores between 0 and 20 meet the goals of the Federal Water Pollution Control Act, scores between 20 and 60 are considered marginal, and scores over 60 are unacceptable.

The WQI is produced for each variable by a computer program developed by Ray Peterson, EPA, Region X. WQIs are determined by converting raw data to an index score based on the criteria curve for that variable. The computer program then calculates a monthly WQI by averaging the data for each month in the period selected. For example, for a three-year period the January WQI would be an average of three Januarys. A monthly overall WQI is calculated by averaging the monthly WQI for each variable with a penalty applied for values over 20, excluding turbidity. The final WQI for a given variable is the average of the WQI's for the highest three consecutive months. The final overall WQI is the average of the highest three consecutive months of the monthly overall WQI.

Procedures Used in the 1990 WQI Analysis

The analyst can determine the variables to be evaluated, the number of years to include in the index, the criteria curve for each variable, and the weight of each variable in the overall WQI. The analyst can also use different criteria curves for different seasons.

For the 1990 analysis, "current" stations had at least one sample per quarter for four consecutive quarters (three consecutive quarters for marine stations) collected any time in the three water years (WY) prior to the analysis (WY 1990). This three-year average masks anomalies in the data set and the effects of low- or high-water years but may also mask actual changes in water quality. The 1988 WQI analysis used five years for current stations but I felt that three years would provide a more accurate assessment of current conditions. "Historic" stations were those with sufficient data in the five years preceding the current period (WY 1982 through 1986). Those stations where no data has been collected since WY 1981 are not included in the 1990 WQI. Historic station WQI's should be used with caution because of possible changes since those stations were sampled last. Monitoring data from USGS, USBR, and METRO were used where available. If data from both Ecology and another agency were available, the data was aggregated from both data sets prior to running the analysis.

I used the same criteria curve for a given variable as was used in the 1988 analysis. The actual curves used are available on request. Most variables have several criteria curves (for example, one for cold water, one for warm water, one for spawning and rearing, etc.) In general, only the cold water curve corresponds to state standards.

All variables were weighted equally in determining the overall WQI. That is, temperature, for example, was not considered more important than turbidity. Nutrients and suspended sediment were compared to more stringent standards from June through October and less stringent standards from November through May. Some streams were

designated as "glacial" which set the maximum WQI for turbidity and suspended sediment at 25.

General Comments

There is great potential for misusing any index. The following points should be considered carefully before interpreting the WQI:

1. An index greater than 20 for temperature, oxygen, bacteria, or pH indicates water quality exceeded state standards at least once and probably several times. Criteria for other variables are not based on standards.
2. Because the WQI is the average of the highest three consecutive months, the index may be below 20 even though violations of standards occurred. Similarly, violations may be masked because the monthly index is an average for the period evaluated.
3. The current station WQI's are, in most cases, based on three years of data. The WQI's do not, therefore, indicate water quality for any given year. The degradation (or improvement) of a stream in WY 1989 may not be reflected in the 1990 WQI. For this reason, trends should not be inferred from successive WQI's without testing against raw data. In addition, a trend analysis based on WQI may be biased because of changes in the procedures used to determine the WQI (standards changes, use of different curves, different periods of analysis, etc.).
4. The overall WQI is not a simple mean but includes a penalty factor for WQI's greater than 20 (excluding turbidity):
5. The WQI is based on data from a single station and in many cases may not be representative of an entire stream. Caution should be used in extrapolating the index to entire basins or sub-basins.

Results

The results of the 1990 Water Quality Index analysis are presented in the attached tables. Table 1 contains the WQI sorted by Water Body Tracking System Number (WBTS). Table 2 contains the WQI sorted by Department of Ecology Region and sub-sorted by Ambient Monitoring Station number. In these first two tables, the approximate area assessed by a particular station is indicated by the segment size (miles

for freshwater stations and square miles for marine stations). Whether or not a station was considered water quality limited in the 1988 305(b) report is indicated in the "WQL in 1988" column. "Comments and possible sources of WQIs greater than 20" is based largely on remarks from Ecology's regional offices. Table 3 contains a listing of the ten stations in the state with the highest WQI (lowest water quality) for each variable.

The South Fork of the Palouse River in Pullman (34B110) had the highest water quality index in the state (WQI=100), unchanged from the 1988 report. This score, the highest possible, resulted from high bacteria and especially high nutrients. With the exception of turbidity, this station was not on the "worst ten" list for any other variable.

The two Mill Creek (King County) stations had nearly as high a WQI score as the South Fork of the Palouse River, resulting primarily from low dissolved oxygen levels, high fecal coliform bacteria, and high nutrients. These results, from stations at river miles 3.1 and 4.7, indicate significant problems in the lower reaches of Mill Creek.

The 1990 WQI indicated low oxygen problems at more stations than any other variable analyzed. However, of the 56 stations with oxygen WQI's greater than 20, all but six were marine stations. Marine stations are particularly susceptible to high WQI scores for dissolved oxygen because the index is an average of all depths sampled (usually 0, 10, and 30 meters), and does not compensate for the possibility of naturally low oxygen below the photic zone. (Note, however, that the Water Quality Standards for dissolved oxygen in marine waters make no reference to depth.)

Besides oxygen, bacteria and temperature had the most stations with scores greater than or equal to 20 (42 and 40, respectively). In other words, high fecal coliform bacteria and high temperatures were the factors most often responsible for the failure of a station to meet the goals of the Federal Water Pollution Control Act. The total number of stations evaluated was 177.

Recommendations

1. The consistent poor water quality in the South Fork of the Palouse River in Pullman has been discussed in a receiving water survey by Joy (1987). The Ambient Monitoring Section should consider adding stations to its rotating network based on the results of that survey. One possible station is Paradise Creek, the receiving water for the Moscow, Idaho WWTP which Joy identified as the most significant source of nutrients to the upstream reach of the South Fork.

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2. Adjusting oxygen water quality standards and WQI criteria to account for the effect of depth in marine systems on dissolved oxygen concentrations should be considered.
3. Future WQI reports should discuss the meteorological characteristics of the water years included in the analysis of "current" stations. This is particularly important when only three years of data are used. Whether these years were drier or wetter, or warmer or colder than normal will influence the results of the WQI.
4. The criteria curves used in the WQI were developed more than 10 years ago without documentation. These curves need to be re-evaluated. In addition, consideration should be given for using different curves in different ecoregions (Omernik and Gallant 1986). It is not practical to compare a stream like the Walla Walla River to the same standards as the Nisqually River.

References

- Joy, J. 1987. A water quality assessment and receiving water survey of the South Fork of the Palouse River at Pullman, September 1986. Wash. Dept. of Ecology, Water Quality Investigations Section report, Olympia, WA. 40 pp.
- Omernik, J. M. and A. L. Gallant. 1986. Ecoregions of the Pacific Northwest. USEPA publication, EPA/600/3-86/033, Environmental Research Laboratory, Corvallis, OR. 39 pp.

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Table 1. 1990 Water Segment Analysis Using the Water Quality Index. Sorted by Water Body Tracking Systems (WBTS) number.

**** indicates insufficient data, 'C' and 'H' by station number indicate data is current (last three years) or historical (last eight years), respectively.

Station Number	WBTS Number	Station Name	Seg. Class	Seg. Yrs										WQL in 1988	Comments and Possible Sources of WQIs Greater Than 20	
				Size (mi)	Anal	Temp	Oxy	pH	Bact	Nutr	Turb	Susp Sed	Amo Tox			Over all
DRA001	C WA-01-0020	Drayton Hbr Entrance Channel	A	4.2	2	11	20	15	22	***	1	***	***	19	N	Industrial sewage and waste (fish processing) (recently corrected).
BLL008	C WA-01-0040	Bellingham Bay at Post Point	A	63.5	2	6	24	18	3	***	1	***	***	14	N	
BLL009	C WA-01-0040	Bellingham Bay nr Pt. Frances	A	63.5	3	9	16	12	0	***	1	***	***	7	N	
BLL006	C WA-01-0050	Bellingham Bay @ Nun Buoy #4	B	3.6	2	12	24	17	14	***	4	***	***	15	Y	Georgia Pacific Corp. pulp mill. Urban runoff.
01A050	C WA-01-1010	Nooksack R @ Brennan	A	28.2	3	11	7	4	34	15	15	24	3	25	Y	Nonpoint agr. runoff, dairy wastes, forest practices. Glacial fed.
01A120	C WA-01-1020	Nooksack R @ No Cedarville	A	8.4	3	5	6	3	12	12	16	22	1	11	N	Forest practices. Glacial fed.
01D070	C WA-01-2010	Sumas R nr Huntingdon BC	A	11.0	3	13	18	4	50	39	7	5	9	40	Y	Agr. runoff. Asbestos from natural slides.
HRO001	C WA-02-0010	Haro Strait at Skipjack Island	AA	425.0	2	5	27	8	4	***	1	***	***	13	N	
SJI001	C WA-02-0010	San Juan Channel at Reid Rock	AA	425.0	2	6	25	7	7	***	1	***	***	12	N	
GRG002	C WA-02-0010	Str. of Georgia N. of Pateros	AA	0.0	1	7	2	6	1	***	1	***	***	3	N	Frazer River plume.
03A060	C WA-03-1010	Skagit R nr Mount Vernon	A	25.6	3	5	7	5	12	8	7	21	1	11	N	
03B050	C WA-03-2010	Semish R nr Burlington	A	31.1	3	5	8	6	35	12	9	9	3	19	Y	Cattle (dairy). Septic tank failures (?).
04A060	C WA-04-1010	Skagit R @ Concrete	AA	10.9	3	4	6	4	5	6	5	14	1	7	N	
04B070	C WA-04-1020	Baker R @ Concrete	AA	1.2	3	7	8	5	2	6	3	3	1	4	N	
04C070	C WA-04-1060	Sauk R nr Rockport	AA	13.2	3	2	6	4	11	8	13	25	1	13	N	Glacial fed. Natural slides.
04A100	C WA-04-1090	Skagit R @ Marblemount	AA	10.9	3	1	6	5	5	4	2	5	1	3	N	
05A070	C WA-05-1010	Stillaguamish R nr Silvana	A	17.8	3	11	10	9	22	12	9	14	3	13	Y	Nonpoint agr. sources. Upstream landslide (Deer Cr).
05B070	C WA-05-1020	NF Stillaguamish @ Cicero	A	31.2	3	6	8	4	20	12	14	18	1	11	Y	Upstream landslide (Deer Cr).
05A090	C WA-05-1040	SF Stillaguamish @ Arlington	A	15.9	3	8	9	5	22	10	7	16	1	16	Y	Nonpoint agr. sources. Soil erosion.
SAR003	C WA-06-0010	Saratoga Passage off East Pnt	A	66.6	3	6	25	9	0	***	1	***	***	12	N	
PHN001	C WA-06-0020	Penn Cove near Penn Cove Park	A	5.2	2	8	43	13	1	***	1	***	***	25	N	
HLM001	C WA-06-0030	Holmes Harbor at Honeymoon Bay	A	9.5	2	7	35	13	0	***	1	***	***	21	N	
PSS008	C WA-07-0010	Pt Gardner Bay at Pier 3	B	0.2	2	11	54	8	42	***	1	***	***	53	Y	Combined sewer overflows. Weyerhaeuser and Scott Paper pulp mills. Urban runoff.
PSS015	C WA-07-0010	Snohomish R at Highway 99 Brdg	A	0.2	2	22	46	34	34	***	3	***	***	49	Y	Combined sewer overflows. Weyerhaeuser and Scott Paper pulp mills. Urban and agr. runoff.
PSS020	C WA-07-0010	Ebey Slough near Marysville	A	0.2	2	14	43	31	13	***	6	***	***	34	Y	Combined sewer overflows. Weyerhaeuser and Scott Paper pulp mills. Urban runoff. STP's?
07A090	C WA-07-1020	Snohomish R @ Snohomish	A	5.3	3	12	8	12	24	12	6	11	1	16	Y	Agr. runoff. Cattle (dairy, etc).
07B055	C WA-07-1030	Pilchuck R @ Snohomish	A	26.8	3	17	7	7	23	12	8	19	2	17	N	Low summer flows.

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				Size (mi)	in							Turb	Sed	Tox			
07A111	H WA-07-1050	Snohomish R nr Monroe (USGS)	A	7.1	4	10	10	19	25	13	7	9	3	15	Y	Cattle (dairy).	
07D070	C WA-07-1060	Snoqualmie R nr Carnation	A	26.9	3	9	8	9	15	8	5	8	1	8	N	Influenced by Tolt R. Not representative of lower Snoqualmie.	
07D130	C WA-07-1100	Snoqualmie R @ Snoqualmie	A	19.5	3	5	8	5	15	9	5	11	1	6	Y		
07C070	C WA-07-1160	Skykomish R @ Monroe	A	13.9	3	10	7	6	12	8	4	7	2	6	N		
07C120	C WA-07-1200	Skykomish R nr Gold Bar	AA	8.4	3	7	8	8	7	7	2	8	1	5	N		
08E110	C WA-08-1018	Upper Kelsey Cr	AA	4.6	3	12	8	10	***	24	4	6	4	24	Y	Urban runoff.	
08H070	C WA-08-1020	Thornton Cr nr Mouth	AA	5.7	3	9	9	4	***	26	2	3	4	26	N	Urban runoff.	
08A070	C WA-08-1030	McAleer Cr nr Mouth	AA	6.1	3	9	8	7	***	26	7	8	8	26	Y		
08B070	C WA-08-1070	Sammamish R @ Bothell	AA	3.8	3	20	18	7	46	24	4	9	3	35	Y	Originates in shallow lake. Septic tank seepage. Turf farm runoff. Urban runoff.	
08K071	C WA-08-1095	Bear Cr. below Cottage Lake Cr	AA		3	11	9	2	***	25	3	7	4	25	Y		
08B110	C WA-08-1100	Sammamish R @ Redmond	AA	1.7	3	25	12	23	***	7	2	3	6	25	Y	Urban runoff.	
08B130	C WA-08-1110	Issaquah Cr nr Issaquah	A	21.7	3	8	7	4	***	16	5	4	4	16	Y		
08F070	C WA-08-1130	May Cr nr Mouth	AA	8.1	3	7	8	6	***	18	4	2	1	18	Y		
08C070	C WA-08-1140	Cedar R @ Logan St/Renton	A	19.5	3	9	6	7	22	12	3	13	3	10	Y	Urban runoff.	
08C110	C WA-08-1150	Cedar R nr Landsburg	AA	16.1	3	2	6	4	6	7	1	3	1	3	N		
08D070	C WA-08-2100	Mercer Slough nr Bellevue	AA	0.0	3	11	20	3	***	25	9	5	3	25	N	Urban runoff.	
PSB009	C WA-08-9340	Ship Canal @ Montlake Bridge	L		3	26	16	9	***	4	2	2	2	26	Y	Dredging. Saltwater influx.	
ELB005	C WA-09-0010	Elliott Bay near Harbor Island	B	6.3	2	14	29	13	6	***	1	***	***	18	Y	Urban runoff. Combined sewer overflows. Organic tox may be a problem in sediments.	
ELB010	C WA-09-0010	Duwamish Waterway @ 16th St Br	B	11.0	2	19	24	18	35	***	5	***	***	35	Y	Naturally low oxygen. Renton STP (recently corrected). Combined sewer overflows. Organic tox may be a problem in sediments.	
09A060	C WA-09-1010	Duwamish R @ Allentown Br	B	11.0	3	19	19	4	37	31	4	8	8	32	Y	Nat. low oxygen. Renton STP (recently corrected). Combined sewer overflows. Organic tox in sediments? Urban & indust. runoff.	
09E070	C WA-09-1015	Mill Creek @ Orillia	A	9.0	3	20	86	8	55	50	22	9	21	93	Y	Urban and industrial runoff. Dairy waste.	
09E090	C WA-09-1015	Mill Creek - Kent on W Valley	A	9.0	3	19	61	8	60	45	18	13	19	91	Y	Urban and industrial runoff. Dairy waste.	
09G071	C WA-09-1015	Springbrook Cr. @ N. end Longa	A		3	16	70	9	***	43	22	11	14	70	Y	Urban and industrial runoff.	
09A090	C WA-09-1020	Green R @ 212th St nr Kent	A	31.3	3	17	14	6	24	19	3	7	6	17	Y	Cattle (dairy, etc.). Urban runoff.	
09F071	C WA-09-1028	Newaukum Cr nr Mouth	A		3	7	8	7	***	33	4	4	10	33	Y	Dairy waste.	
09A190	C WA-09-1030	Green R @ Kanaskat	AA	22.2	3	7	7	7	10	7	5	8	2	6	N		
CHB003	C WA-10-0010	Commencement Bay	A	9.8	3	9	31	7	9	***	1	***	***	16	Y	Urban runoff. Combined sewer. Agr.	

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Station Number	WBTS Number	Station Name	Seg. Class	Seg. Yrs			Anal	Temp	Oxy	pH	Bact	Nutr	Turb	Susp Sed	Amo Tox	Over all	WQL 1988	Comments and Possible Sources of WQIs Greater Than 20
				Size in (mi)														
CHB006	C WA-10-0020	Commencement Bay mth City Wt	B	2.6	2	16	31	9	11	***	2	***	***	21	Y	runoff. Tacoma STP (recently corrected). Organic tox may be problem in sed. Puyallup R.		
CHB010	C WA-10-0020	Commencement-Puyallup R Mouth	B	2.6	2	13	29	8	9	***	2	***	***	17	Y	Urban runoff. Combined sewer. Tacoma STP (recently corrected). Organic tox may be problem in sed. Puyallup R.		
10A050	C WA-10-1020	Puyallup R @ Puyallup (USGS)	A	9.4	3	8	31	6	33	16	22	25	2	35	Y	Puyallup and Tacoma STP's (recently upgraded). White R. sources. Pulp mill (?). Sonoco.		
10A070	C WA-10-1020	Puyallup R @ Meridian St	A	9.4	3	8	7	7	32	16	25	25	4	27	Y	Puyallup and Tacoma STP's (recently upgraded). White R. sources. Pulp mill (?). Sonoco.		
10C070	C WA-10-1030	White R @ Sumner	A	29.6	3	12	8	4	29	13	18	25	3	25	Y	Nonpoint agr. Cattle (dairy). Glacial fed. Flushing from Puget Power settling basins.		
10A110	C WA-10-1060	Puyallup R @ Orting	A	16.0	3	2	5	3	10	13	25	25	3	15	N			
11A070	C WA-11-1010	Nisqually R @ Nisqually	A	19.1	3	11	7	8	11	14	18	17	5	11	N	Glacial fed.		
11A090	C WA-11-1020	Nisqually R abv Powell Cr	A	25.1	3	6	7	5	8	11	21	15	3	10	N	Glacial fed.		
11A140	H WA-11-1030	Nisqually R @ Elbe	AA	27.0	1	2	7	9	9	11	20	***	***	20	N	Glacial fed.		
12A070	C WA-12-1110	Chambers Cr nr Steilacoom	A	0.0	3	11	9	4	19	25	5	5	5	16	N	Septic tank seepage (sewered 1986). Fish hatchery.		
BUD005	C WA-13-0020	Budd Inlet-Oly Shoal at Horn	A	3.8	3	13	17	14	5	***	1	***	***	9	Y	Boaters. Wood waste (?) Misc STP's. Developed shoreline.		
BUD002	C WA-13-0030	Budd Inlet S End Oly Port Dock	B	1.1	3	14	25	8	15	***	2	***	***	17	Y	Urban runoff. Boaters. Wood waste (?) Misc STP's. LOTT STP. Deschutes River.		
13A060	C WA-13-1010	Deschutes R @ E St Bridge	A	18.3	3	18	6	10	13	13	5	6	6	10	N			
13A150	C WA-13-1020	Deschutes R nr Rainier	A	23.3	3	10	8	10	14	12	4	3	4	7	N			
PCK001	C WA-14-0010	Pickering Psg nr Harstena Is.	A	14.2	2	12	28	9	4	***	1	***	***	15	N	Naturally low oxygen.		
ELD001	C WA-14-0020	Eld Inlet near Flapjack Point	A	6.2	3	12	25	13	2	***	1	***	***	12	Y	Naturally low oxygen.		
ELD002	C WA-14-0020	Eld Inlet @ Young Cove	A	0.0	1	13	***	22	2	***	1	***	***	10	Y			
TOTO01	C WA-14-0030	Totten Inlet near Windy Point	A	9.5	3	15	30	16	3	***	1	***	***	16	N	Land development. Septic systems.		
OAK004	C WA-14-0040	Oakland Bay nr Eagle Point	A	4.7	3	17	30	14	8	***	3	***	***	17	Y	Shallow water. Wood products industry. Development. Slow circulation. STP. Urban runoff. Agriculture.		

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Station Number	WBTS Number	Station Name	Seg. Class	Seg. Yrs			pH	Bact	Nutr	Turb	Suap Sed	Ammo Tox	Over all	WQL in 1988	Comments and Possible Sources of WQIs Greater Than 20	
				Size in (mi)	Anal	Temp Oxy										
POD005	C WA-15-0030	Port Orchard at Brownville	AA	21.3	2	16	22	7	2	***	1	***	***	14	Y	
POD006	C WA-15-0030	Liberty Bay at Virginia Point	A	21.3	2	16	22	14	2	***	1	***	***	18	Y	
SIN001	C WA-15-0040	Sinclair Inlet at Naval Shpyrd	A	3.2	2	15	21	7	3	***	1	***	***	14	Y	Urban and industrial runoff. Contaminated sediment?
DYE003	C WA-15-0050	Dyes Inlet at Wash. Narrows	A	7.7	2	15	22	6	1	***	1	***	***	13	N	
CRR001	C WA-15-0060	Carr Inlet off Green Point	AA	31.4	3	11	25	10	0	***	1	***	***	12	N	Naturally low oxygen.
BML001	C WA-15-0070	Burley-Hinter Lagoon	AA	0.0	1	13	***	13	3	***	1	***	***	7	Y	
16A070	C WA-16-1010	Skokomish R nr Potlatch	AA	9.0	3	1	8	10	10	7	4	5	3	5	N	
HCB002	C WA-17-0010	Hood Canal at Pulali Point	AA	27.4	2	15	54	13	0	***	1	***	***	33	N	Naturally low oxygen.
PTH005	C WA-17-0020	Pt Townsend Hbr near Wala Pnt	A	11.1	2	8	25	9	2	***	1	***	***	12	Y	
PAH008	C WA-18-0010	Port Angeles Hbr @ Morse Creek	AA	333.6	2	2	36	6	5	***	1	***	***	19	N	Upstream recreational development (inadequate septic systems). Naturally low oxygen.
PAH003	C WA-18-0020	Prt Angeles Hbr @ Ediz Hook Hd	A	4.0	2	1	40	22	3	***	1	***	***	26	N	Naturally low oxygen.
21A080	C WA-21-1010	Queets R nr Clearwater (USGS)	AA	6.0	3	15	14	3	12	8	3	2	1	6	N	Glacial fed.
21D070	H WA-21-2030	NF Quinault R @ Amanda (USGS)	AA	14.5	4	1	6	10	5	12	1	25	9	15	N	Lake outlet.
GYS015	C WA-22-0020	Grays Hrb nr N Whitcomb Flats	A	80.3	2	9	21	4	4	***	1	***	***	8	Y	Naturally low oxygen.
GYS016	C WA-22-0020	Grays Harbor near Damon Point	A	80.3	2	9	29	4	0	***	3	***	***	14	Y	Naturally low oxygen.
GYS004	C WA-22-0030	Grays Hbr-Chehalis R @ Std Oil	B	20.6	3	18	26	6	16	***	11	***	***	15	Y	Weyerhauser and ITT mills. Aberdeen and Hoquiam combined sewer. Shoreline erosion. Shallow. Agr. runoff.
GYS006	H WA-22-0030	Grays Hbr at E End Rennie Is.	B	20.6	1	4	12	3	57	***	10	***	***	37	Y	Weyerhauser and ITT mills. Aberdeen and Hoquiam combined sewer overflows. Shoreline erosion. Shallow. Agriculture.
GYS007	C WA-22-0030	Grays Hbr N Chnl nr Rayonier	B	20.6	2	16	28	6	23	***	9	***	***	19	Y	Weyerhauser and ITT mills. Aberdeen and Hoquiam combined sewer overflows. Shoreline erosion. Shallow.
GYS008	C WA-22-0030	Grays Hbr near Mid S. Channel	B	20.6	3	16	31	10	13	***	14	***	***	18	Y	Weyerhauser and ITT mills. Aberdeen and Hoquiam combined sewers. Shoreline erosion. Shallow. Dredging?
GYS009	C WA-22-0030	Grays Hrb @ Moon Is. Reach	B	20.6	3	15	26	10	13	***	8	***	***	15	Y	Weyerhauser and ITT mills. Aberdeen and Hoquiam combined sewers. Shoreline erosion. Shallow. Dredging?
22A070	C WA-22-1010	Humtulpis R nr Humtulpis	A	28.1	3	15	7	5	10	9	3	4	2	6	N	
22C050	C WA-22-4040	Chehalis R nr Montesano	A	20.3	3	19	12	5	34	15	5	9	2	19	Y	Cattle (dairy). Misc small STP's. Septic tank seepage (?) Aquaculture.
22G070	C WA-22-4050	Satsop R nr Satsop	A	6.4	3	10	7	4	14	11	5	8	2	6	N	Silviculture

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Station Number	WBTS Number	Station Name	Seg. Class	Seg. Yrs			Size in										WQL in 1988	Comments and Possible Sources of WQIs Greater Than 20
				Anal	Temp	Oxy	pH	Bact	Nutr	Turb	Sed	Tox	all					
23A070	C WA-23-1010	Chehalis R @ Porter	A	32.5	3	22	12	3	19	23	4	5	4	15	Y	Low flows. Cattle (dairy). STP's. Black River aquaculture.		
23A120	C WA-23-1020	Chehalis R @ Centralia	A	9.4	3	29	28	7	16	23	5	5	14	27	Y	Low flows. Cattle (dairy). Horse ranching. STP's.		
23A160	C WA-23-1100	Chehalis R @ Dryad	A	31.5	3	22	8	8	17	9	2	3	3	11	N	Low flows. Slack water condition.		
WPA003	C WA-24-0020	Willapa River @ Johnson Slough	A	94.4	3	20	28	17	4	***	7	***	***	16	Y	Raymond and South Bend STP's (recently corrected). Inadequate septic systems. Raw sewage. Low flows. Shallow. Agriculture.		
WPA004	C WA-24-0020	Willapa Bay at Toke Point	A	0.0	3	12	29	19	2	***	2	***	***	16	Y	Naturally low oxygen. Upwelling.		
WPA001	C WA-24-0020	Willapa River at Raymond	A	11.8	3	23	21	9	8	***	10	***	***	15	Y	Raymond and South Bend STP's (recently corrected). Inadequate septic systems. Raw sewage. Low flows. Agriculture.		
24B090	C WA-24-2020	Willapa R nr Willapa	A	11.8	3	24	9	5	33	13	2	4	4	24	Y	Septic tank seepage. Raw sewage. Agr. runoff. Low flow.		
24B130	C WA-24-2030	Willapa R @ Lebam	A	23.2	3	13	10	5	59	17	3	5	2	35	Y	Cattle (dairy).		
26B070	C WA-26-1010	Cowlitz R @ Kelso	A	18.7	3	8	7	6	12	17	18	23	2	14	N	Glacial fed. Volcanic and dredging activities.		
26C070	C WA-26-1020	Cowaman R @ Kelso	A	18.4	3	23	16	3	21	10	4	7	7	16	Y	Little bank veg. Low flows. Shallow, bedrock substrate.		
26O070	C WA-26-1050	Toutle R nr Castle Rock	A	17.2	3	28	8	6	9	18	25	25	5	21	Y	Volcanic and dredging activities. Little bank veg. Low flows (?)		
26E070	H WA-26-1110	Cispus R nr Koamos	AA	19.9	1	1	6	3	7	5	9	8	3	5	N			
26B190	H WA-26-1120	Cowlitz R nr Randle	AA	44.2	?	9	8	7	10	8	9	***	***	11	N	Glacial fed.		
27B070	C WA-27-1010	Kalama R nr Kalama	A	10.4	3	13	7	8	11	9	2	5	6	6	N			
27D090	C WA-27-2020	EF Lewis R nr Dollan Corner	A	24.6	3	24	8	6	13	7	2	3	4	12	N			
27C110	H WA-27-2040	Lewis R @ Ariel (USGS)	A	16.0	?	6	8	8	5	9	3	5	3	11	N			
29C070	H WA-29-1010	Wind R nr Carson	A	2.3	2	9	6	3	12	6	11	6	3	7	N			
29B070	H WA-29-3010	White Salmon R nr Underwood	A	31.2	2	2	6	2	19	9	3	5	6	8	N			
30B070	H WA-30-1010	Klickitat R nr Pitt (USGS)	A	19.8	?	10	8	7	8	14	5	11	14	15	N	Glacial fed tributary.		
32A070	C WA-32-1010	Walla Walla R nr Touchet	A	21.6	3	45	6	29	29	34	19	43	20	47	Y	Agr. runoff. Little bank veg. Low summer flows.		
32B070	C WA-32-1020	Touchet R @ Touchet	A	54.8	3	42	6	29	24	23	28	43	19	39	Y	Little bank veg. Low summer flows. Agr. runoff.		
33A050	C WA-33-1010	Snake R @ Burbank	A	70.3	3	32	14	11	5	15	8	9	13	20	N	Summer slack water condition.		
34A070	C WA-34-1010	Palouse R @ Hooper	B	89.6	3	26	14	26	23	45	46	59	23	62	Y	Low summer flows. Irrig. returns. Little bank veg. Agr. runoff. Cattle (feedlot).		

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				Anal	Temp	Oxy	pH	Bact	Nutr	Turb	Sed	Amo	Tox	Over all				
34B110	C	WA-34-1020	SF	Palouse R @ Pullman	A	23.3	3	19	7	19	76	<u>100</u>	25	21	23	100	Y	Dryland agr. Misc STP's. Moscow, ID STP. Agr. runoff. Little bank veg.
35B060	C	WA-35-2010		Tucannon R @ Powers	A	32.7	3	15	10	7	25	<u>22</u>	21	28	4	22	Y	Agr. runoff. Cattle (open range).
37A090	C	WA-37-1010		Yakima R @ Kiona	A	80.4	3	38	10	17	18	<u>37</u>	9	21	18	46	Y	Irrigation returns. Misc STP's. Silviculture.
37A190	C	WA-37-1040		Yakima R @ Parker	A	12.5	3	13	8	6	20	<u>22</u>	4	17	7	12	Y	Agr. runoff/irrigation returns. Feedlots. Yakima STP. Silviculture.
37A200	C	WA-37-1040		Yakima R abv Ahtanum Cr (USGS)	A	12.5	3	17	11	10	24	<u>25</u>	15	21	14	33	Y	Agr. runoff/irrigation returns. Feedlots. Yakima STP. Silviculture.
38A061	H	WA-38-1010		Naches River @ Nelson Bridge	A		?	10	11	4	***	9	5	8	5	13	N	
39A051	H	WA-39-1010		Yakima River @ Umtanum	A		5	12	11	3	***	14	8	14	4	17	Y	
39A041	H	WA-39-1010		Yakima River below Roza Dam	A		1	18	11	5	***	<u>20</u>	17	43	3	43	Y	
39E071	C	WA-39-1110		Cabin Creek nr Easton	AA		3	8	9	6	***	7	6	13	1	14	N	
41A070	C	WA-41-1010		Crab Cr nr Beverly	B	45.8	3	34	9	25	21	<u>34</u>	15	40	20	61	N	Agr. runoff/irrigation return.
41A101	C	WA-41-1010		Crab Creek @ McHannon Road	B		3	31	13	14	15	19	5	11	21	31	N	Agr. runoff/irrigation return.
41A110	H	WA-41-1030		Crab Cr nr Moses Lake	B	17.9	2	24	5	16	28	14	25	12	20	22	N	Agr runoff/irrigation return.
41B071	C	WA-41-1110		Winchester Wasteway @ Gage	A		3	37	13	9	17	17	5	10	21	37	N	Agr. runoff/irrigation return.
41C071	C	WA-41-1120		Frenchman Hills Wasteway @ Gag	A		3	26	9	12	23	<u>45</u>	6	25	22	45	N	Agr. runoff/irrigation return.
45A070	C	WA-45-1010		Wenatchee R @ Wenatchee	A	27.1	3	19	6	27	8	7	4	8	16	19	N	Irrigation returns. Silviculture.
45A110	C	WA-45-1020		Wenatchee R nr Leavenworth	AA	27.1	3	11	9	12	3	4	1	3	1	4	N	
46A070	C	WA-46-1010		Entiat R nr Entiat	A	20.5	3	17	8	20	5	6	2	11	13	12	N	
47A070	C	WA-47-9020		Chelan R @ Chelan	L	33104	3	31	10	10	3	4	1	1	7	16	N	Elevated surface temp in lake. WQL due to hist. pesticides.
48A070	C	WA-48-1010		Methow R nr Pateros	A	35.2	3	16	8	17	9	8	4	8	9	8	N	
48A130	C	WA-48-1020		Methow R nr Twisp	A	5.0	3	7	7	16	7	4	1	6	7	7	N	
48C070	C	WA-48-1058		Andrews Cr nr Mazama (USGS)	AA	0.0	3	0	8	3	1	7	0	3	1	3	N	
49A070	C	WA-49-1010		Okanogan R @ Malott	A	25.7	3	27	19	14	15	7	13	15	11	19	Y	Little bank vegetation, wide shallow channel.
49A090	C	WA-49-1020		Okanogan R @ Okanogan	A	48.4	2	30	18	14	15	4	2	15	9	19	Y	Little bank vegetation, wide shallow channel.
49B070	C	WA-49-1030		Similkameen R @ Oroville	A	27.1	3	22	12	21	10	3	5	12	9	12	N	Little bank vegetation, wide shallow channel. Upstream mining activity.
49A190	C	WA-49-1040		Okanogan R @ Oroville	A	4.9	3	31	16	24	8	6	2	12	18	26	Y	Little bank vegetation, wide shallow channel. Influenced by Lake Osoyoos temperature.
51A070	C	WA-51-1010		Nespelem R @ Nespelem	A	18.0	3	6	8	10	20	12	1	3	4	9	N	

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Station Number	WBTS Number	Station Name	Seg. Class	Seg. Yrs			Size in							Over all	WQI 1988	Comments and Possible Sources of WQIs Greater Than 20	
				Anal	Temp	Oxy	pH	Bact	Nutr	Turb	Sed	Tox					
52A070	C	WA-52-1010	Sanpoil R @ Keller	A	64.4	3	14	8	15	9	7	2	4	8	8	N	
54A070	H	WA-54-1010	Spokane R @ Long Lake (USGS)	A	33.9	4	20	17	5	6	15	13	6	14	11	N	
54A120	C	WA-54-1020	Spokane R @ Riverside State Pk	A	17.4	3	17	8	16	24	24	17	13	24	18	Y	Urban runoff. Spokane STP.
55B070	C	WA-55-1010	Little Spokane R nr Mouth	A	48.6	3	10	11	13	12	12	11	12	7	10	Y	
56A070	C	WA-56-1010	Hangman Cr @ Mouth	A	57.4	3	31	5	27	20	31	40	26	26	41	Y	Low summer flows. Agr. runoff. Urban runoff.
57A190	C	WA-57-1010	Spokane R nr Post Falls	A	24.1	3	31	17	7	5	4	1	2	2	16	Y	Low summer flows. Nutrient load from Lake Coeur d'Alene, Post Falls STP.
59A070	C	WA-59-1010	Colville R @ Kettle Falls	A	52.9	3	21	13	15	20	21	11	11	15	18	Y	Silviculture. Upstream impoundment. Agr. runoff. Small STP's.
60A070	C	WA-60-1010	Kettle R nr Barstow	A	32.9	3	21	10	13	8	3	3	6	7	10	N	
62A080	H	WA-62-1010	Pend Oreille R @ Border (USGS)	A	18.5	4	23	14	17	3	8	2	5	21	20	N	Upstream impoundments.
62A150	C	WA-62-1020	Pend Oreille R @ Newport	A	53.2	3	24	13	13	3	3	2	3	8	13	N	
28A165	C	WA-CR-1010	Columbia R @ Warrendale	A	146.1	3	29	17	7	5	10	5	17	10	20	Y	Hanford. Surface sample not representative.
36A065	C	WA-CR-1030	Columbia R @ Richland	A	61.9	3	15	9	12	6	9	3	24	9	24	N	
36A070	C	WA-CR-1030	Columbia R nr Vernita	A	61.9	3	21	11	13	3	7	2	7	8	11	N	Upstream impoundment.
44A070	C	WA-CR-1040	Columbia R b/w Rock Is Dam	A	148.0	3	26	9	19	16	9	2	5	13	22	N	Summer slack water condition.
53A070	C	WA-CR-1050	Columbia R @ Grand Coulee	A	51.5	3	20	14	9	1	8	1	1	5	8	N	
61A070	H	WA-CR-9010	Columbia R @ Northport (USGS)	AA	0.0	4	12	8	9	8	9	1	6	16	8	N	
SKG001	C	WA-PS-0010	Skagit Bay at Hope Island	A	60.4	2	7	25	13	5	***	1	***	***	12	Y	Influenced by Skagit River.
SUZ001	C	WA-PS-0020	Port Susan at Kayak Point	A	42.8	2	16	46	16	19	***	1	***	***	46	Y	Influenced by Stillaguamish River.
PSS019	C	WA-PS-0030	Possession Snd off E Gedney Is	A	50.0	3	7	33	9	7	***	1	***	***	18	N	Snohomish R. influence. Urban runoff. Port Gardner.
PSB003	C	WA-PS-0050	Puget Sound at West Point	AA	126.6	3	8	27	9	5	***	1	***	***	14	N	West Point STP. Elliott Bay influence.
ADM003	C	WA-PS-0050	Admiralty Inlet S. of Useless	AA	0.0	1	5	4	8	1	***	1	***	***	4	N	
EAP001	C	WA-PS-0060	East Passage SW of Three Tree	AA	0.0	1	7		10	6	***	1	***	***	5	N	
NRR001	C	WA-PS-0060	Tacoma Narrows nr Pt Defiance	AA	108.7	3	8	26	6	1	***	1	***	***	13	N	Influence from Commencement Bay?
NSQ001	C	WA-PS-0080	Nisqually Reach @ Nisqually R.	AA	52.1	3	10	28	10	5	***	1	***	***	15	N	Nisqually River. Agr runoff.
NSQ002	H	WA-PS-0080	Nisqually Reach nr Devil's Hd	AA	0.0	1	8	10	4	0	***	1	***	***	5	N	
CSE001	C	WA-PS-0090	Case Inlet off S. Heron Is	AA	31.5	3	12	24	12	0	***	1	***	***	14	N	Land development. Runoff.
DNA001	C	WA-PS-0090	Dana Passage near Brisco Point	AA	0.0	1	10	2	11	1	***	1	***	***	4	N	
HCB006	C	WA-PS-0100	Hood Canal near King Spit	AA	42.4	3	8	31	8	0	***	1	***	***	17	N	Naturally low oxygen.
HCB003	C	WA-PS-0110	Hood Canal at Eldon	AA	78.1	3	7	54	10	1	***	1	***	***	33	N	Naturally low oxygen. Aquaculture. Septic systems.
HCB004	C	WA-PS-0110	Hood Canal at Sisters Point	AA	78.1	2	11	64	9	1	***	1	***	***	40	N	Naturally low oxygen. Aquaculture. Septic systems.

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				Size (mi)	Anal	Temp	Oxy										
ADM001 C	WA-PS-0120	Admiralty Inlet S Whidbey Is	AA	136.5	2	5	26	8	0	***	1	***	***	14	N		
ADM002 C	WA-PS-0130	Admiralty Inlet NW of Pt Wilso	AA	0.0	1	3	2	4	0	***	1	***	***	2	N		

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Station Number	WBTS Number	Station Name	Seg. Class	Seg. Yrs			WQL										Comments and Possible Sources of WQIs Greater Than 20
				Size (mi)	Anal	Temp	Oxy	pH	Bact	Nutr	Turb	Sed	Tox	all	1988		
ECOLOGY REGION: -C-																	
30B070	H	WA-30-1010	Klickitat R nr Pitt (USGS)	A	19.8	?	10	8	7	8	14	5	11	14	15	N	Glacial fed tributary.
37A090	C	WA-37-1010	Yakima R @ Kiona	A	80.4	3	38	10	17	18	37	9	21	18	46	Y	Irrigation returns. Misc STP's. Silviculture.
37A190	C	WA-37-1040	Yakima R @ Parker	A	12.5	3	13	8	6	20	22	4	17	7	12	Y	Agr. runoff/irrigation returns. Feedlots. Yakima STP. Silviculture.
37A200	C	WA-37-1040	Yakima R abv Ahtanum Cr (USGS)	A	12.5	3	17	11	10	24	25	15	21	14	33	Y	Agr. runoff/irrigation returns. Feedlots. Yakima STP. Silviculture.
38A061	H	WA-38-1010	Naches River @ Nelson Bridge	A		?	10	11	4	***	9	5	8	5	13	N	
39A041	H	WA-39-1010	Yakima River below Roza Dam	A		1	18	11	5	***	20	17	43	3	43	Y	
39A051	H	WA-39-1010	Yakima River @ Umtanum	A		5	12	11	3	***	14	8	14	4	17	Y	
39E071	C	WA-39-1110	Cabin Creek nr Easton	AA		3	8	9	6	***	7	6	13	1	14	N	
44A070	C	WA-CR-1040	Columbia R blw Rock Is Dam	A	148.0	3	26	9	19	16	9	2	5	13	22	N	Summer slack water condition.
45A070	C	WA-45-1010	Wenatchee R @ Wenatchee	A	27.1	3	19	6	27	8	7	4	8	16	19	N	Irrigation returns. Silviculture.
45A110	C	WA-45-1020	Wenatchee R nr Leavenworth	AA	27.1	3	11	9	12	3	4	1	3	1	4	N	
46A070	C	WA-46-1010	Entiat R nr Entiat	A	20.5	3	17	8	20	5	6	2	11	13	12	N	
47A070	C	WA-47-9020	Chelan R @ Chelan	L	33104	3	31	10	10	3	4	1	1	7	16	N	Elevated surface temp in lake. WQL due to hist. pesticides.
48A070	C	WA-48-1010	Methow R nr Pateros	A	35.2	3	16	8	17	9	8	4	8	9	8	N	
48A130	C	WA-48-1020	Methow R nr Twisp	A	5.0	3	7	7	16	7	4	1	6	7	7	N	
48C070	C	WA-48-1058	Andrews Cr nr Mazama (USGS)	AA	0.0	3	0	8	3	1	7	0	3	1	3	N	
49A070	C	WA-49-1010	Okanogan R @ Malott	A	25.7	3	27	19	14	15	7	13	15	11	19	Y	Little bank vegetation, wide shallow channel.
49A090	C	WA-49-1020	Okanogan R @ Okanogan	A	48.4	2	30	18	14	15	4	2	15	9	19	Y	Little bank vegetation, wide shallow channel.
49A190	C	WA-49-1040	Okanogan R @ Oroville	A	4.9	3	31	16	24	8	6	2	12	18	26	Y	Little bank vegetation, wide shallow channel. Influenced by Lake Osoyoos temperature.
49B070	C	WA-49-1030	Similkameen R @ Oroville	A	27.1	3	22	12	21	10	3	5	12	9	12	N	Little bank vegetation, wide shallow channel. Upstream mining activity.
51A070	C	WA-51-1010	Nespelem R @ Nespelem	A	18.0	3	6	8	10	20	12	1	3	4	9	N	
53A070	C	WA-CR-1050	Columbia R @ Grand Coulee	A	51.5	3	20	14	9	1	8	1	1	5	8	N	
ECOLOGY REGION: -E-																	
32A070	C	WA-32-1010	Walla Walla R nr Touchet	A	21.6	3	45	6	29	29	34	19	43	20	47	Y	Agr. runoff. Little bank veg. Low summer flows.

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				Size (mi)	Anal	Temp	Oxy	pH	Bact	Nutr	Turb	Susp Sed	Amo Tox			Over all
328070	C WA-32-1020	Touchet R @ Touchet	A	54.8	3	42	6	29	24	23	28	43	19	39	Y	Little bank veg. Low summer flows. Agr. runoff.
33A050	C WA-33-1010	Snake R @ Burbank	A	70.3	3	32	14	11	5	15	8	9	13	20	N	Summer slack water condition.
34A070	C WA-34-1010	Palouse R @ Hooper	B	89.6	3	26	14	26	23	45	46	59	23	62	Y	Low summer flows. irrig. returns. Little bank veg. Agr. runoff. Cattle (feedlot). Dryland agr. Misc STP's.
34B110	C WA-34-1020	SF Palouse R @ Pullman	A	23.3	3	19	7	19	76	100	25	21	23	100	Y	Moscow, ID STP. Agr. runoff. Little bank veg.
35B060	C WA-35-2010	Tucannon R @ Powers	A	32.7	3	15	10	7	25	22	21	28	4	22	Y	Agr. runoff. Cattle (open range).
36A065	C WA-CR-1030	Columbia R @ Richland	A	61.9	3	15	9	12	6	9	3	24	9	24	N	
36A070	C WA-CR-1030	Columbia R nr Vernita	A	61.9	3	21	11	13	3	7	2	7	8	11	N	Upstream impoundment.
41A070	C WA-41-1010	Crab Cr nr Beverly	B	45.8	3	34	9	25	21	34	15	40	20	61	N	Agr. runoff/irrigation return.
41A101	C WA-41-1010	Crab Creek @ McMannon Road	B		3	31	13	14	15	19	5	11	21	31	N	Agr. runoff/irrigation return.
41A110	H WA-41-1030	Crab Cr nr Moses Lake	B	17.9	2	24	5	16	28	14	25	12	20	22	N	Agr runoff/irrigation return.
41B071	C WA-41-1110	Winchester Wasteway @ Gage	A		3	37	13	9	17	17	5	10	21	37	N	Agr. runoff/irrigation return.
41C071	C WA-41-1120	Frenchman Hills Wasteway @ Gag	A		3	26	9	12	23	45	6	25	22	45	N	Agr. runoff/irrigation return.
52A070	C WA-52-1010	Sanpoil R @ Keller	A	64.4	3	14	8	15	9	7	2	4	8	8	N	
54A070	H WA-54-1010	Spokane R @ Long Lake (USGS)	A	33.9	4	20	17	5	6	15	13	6	14	11	N	
54A120	C WA-54-1020	Spokane R @ Riverside State Pk	A	17.4	3	17	8	16	24	24	17	13	24	18	Y	Urban runoff. Spokane STP.
55B070	C WA-55-1010	Little Spokane R nr Mouth	A	48.6	3	10	11	13	12	12	11	12	7	10	Y	
56A070	C WA-56-1010	Hangmen Cr @ Mouth	A	57.4	3	31	5	27	20	31	40	26	26	41	Y	Low summer flows. Agr. runoff. Urban runoff.
57A190	C WA-57-1010	Spokane R nr Post Falls	A	24.1	3	31	17	7	5	4	1	2	2	16	Y	Low summer flows. Nutrient load from Lake Coeur d'Alene, Post Falls STP.
59A070	C WA-59-1010	Colville R @ Kettle Falls	A	52.9	3	21	13	15	20	21	11	11	15	18	Y	Silviculture. Upstream impoundment. Agr. runoff. Small STP's.
60A070	C WA-60-1010	Kettle R nr Baratow	A	32.9	3	21	10	13	8	3	3	6	7	10	N	
61A070	H WA-CR-9010	Columbia R @ Northport (USGS)	AA	0.0	4	12	8	9	8	9	1	6	16	8	N	
62A080	H WA-62-1010	Pend Oreille R @ Border (USGS)	A	18.5	4	23	14	17	3	8	2	5	21	20	N	Upstream impoundments.
62A150	C WA-62-1020	Pend Oreille R @ Newport	A	53.2	3	24	13	13	3	3	2	3	8	13	N	
ECOLOGY REGION: -N-																
01A050	C WA-01-1010	Hooksock R @ Brennan	A	28.2	3	11	7	4	34	15	15	24	3	25	Y	Nonpoint agr. runoff, dairy wastes, forest practices. Glacial fed.
01A120	C WA-01-1020	Hooksock R @ No Cederville	A	8.4	3	5	6	3	12	12	16	22	1	11	N	Forest practices. Glacial fed.
01D070	C WA-01-2010	Sumas R nr Huntingdon BC	A	11.0	3	13	18	4	50	39	7	5	9	40	Y	Agr. runoff. Asbestos from natural slides.

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				Anal	Temp	Oxy	pH	Bact	Nutr	Turb	Susp Sed	Amo Tox	Over all				
03A060	C	WA-03-1010	Skagit R nr Mount Vernon	A	25.6	3	5	7	5	12	8	7	21	1	11	N	
03B050	C	WA-03-2010	Samish R nr Burlington	A	31.1	3	5	8	6	35	12	9	9	3	19	Y	Cattle (dairy). Septic tank failures (?).
04A060	C	WA-04-1010	Skagit R @ Concrete	AA	10.9	3	4	6	4	5	6	5	14	1	7	N	
04A100	C	WA-04-1090	Skagit R @ Marblemount	AA	10.9	3	1	6	5	5	4	2	5	1	3	N	
04B070	C	WA-04-1020	Baker R @ Concrete	AA	1.2	3	7	8	5	2	6	3	3	1	4	N	
04C070	C	WA-04-1060	Sauk R nr Rockport	AA	13.2	3	2	6	4	11	8	13	25	1	13	N	Glacial fed. Natural slides.
05A070	C	WA-05-1010	Stillaguamish R nr Silvana	A	17.8	3	11	10	9	22	12	9	14	3	13	Y	Nonpoint agr. sources. Upstream landslide (Deer Cr).
05A090	C	WA-05-1040	SF Stillaguamish @ Arlington	A	15.9	3	8	9	5	22	10	7	16	1	16	Y	Nonpoint agr. sources. Soil erosion.
05B070	C	WA-05-1020	NF Stillaguamish @ Cicero	A	31.2	3	6	8	4	20	12	14	18	1	11	Y	Upstream landslide (Deer Cr).
07A090	C	WA-07-1020	Snohomish R @ Snohomish	A	5.3	3	12	8	12	24	12	6	11	1	16	Y	Agr. runoff. Cattle (dairy, etc).
07A111	H	WA-07-1050	Snohomish R nr Monroe (USGS)	A	7.1	4	10	10	19	25	13	7	9	3	15	Y	Cattle (dairy).
07B055	C	WA-07-1030	Pilchuck R @ Snohomish	A	26.8	3	17	7	7	23	12	8	19	2	17	N	Low summer flows.
07C070	C	WA-07-1160	Skykomish R @ Monroe	A	13.9	3	10	7	6	12	8	4	7	2	6	N	
07C120	C	WA-07-1200	Skykomish R nr Gold Bar	AA	8.4	3	7	8	8	7	7	2	8	1	5	N	
07D070	C	WA-07-1060	Snoqualmie R nr Carnation	A	24.9	3	9	8	9	15	8	5	8	1	8	N	Influenced by Tolt R. Not representative of lower Snoqualmie.
07D130	C	WA-07-1100	Snoqualmie R @ Snoqualmie	A	19.5	3	5	8	5	15	9	5	11	1	6	Y	
08A070	C	WA-08-1030	McAleer Cr nr Mouth	AA	6.1	3	9	8	7	***	26	7	8	8	26	Y	
08B070	C	WA-08-1070	Sammemish R @ Bothell	AA	3.8	3	20	18	7	46	24	4	9	3	35	Y	Originates in shallow lake. Septic tank seepage. Turf farm runoff. Urban runoff.
08B110	C	WA-08-1100	Sammemish R @ Redmond	AA	1.7	3	25	12	23	***	7	2	3	6	25	Y	Urban runoff.
08B130	C	WA-08-1110	Issaquah Cr nr Issaquah	A	21.7	3	8	7	4	***	16	5	4	4	16	Y	
08C070	C	WA-08-1140	Cedar R @ Logan St/Renton	A	19.5	3	9	6	7	22	12	3	13	3	10	Y	Urban runoff.
08C110	C	WA-08-1150	Cedar R nr Landsburg	AA	16.1	3	2	6	4	6	7	1	3	1	3	N	
08D070	C	WA-08-2100	Mercer Slough nr Bellevue	AA	0.0	3	11	20	3	***	25	9	5	3	25	N	Urban runoff.
08E110	C	WA-08-1018	Upper Kelsey Cr	AA	4.6	3	12	8	10	***	24	4	6	4	24	Y	Urban runoff.
08F070	C	WA-08-1130	May Cr nr Mouth	AA	8.1	3	7	8	6	***	18	4	2	1	18	Y	
08H070	C	WA-08-1020	Thornton Cr nr Mouth	AA	5.7	3	9	9	4	***	26	2	3	4	26	N	Urban runoff.
08K071	C	WA-08-1095	Bear Cr. below Cottage Lake Cr	AA		3	11	9	2	***	25	3	7	4	25	Y	
09A060	C	WA-09-1010	Duwamish R @ Allentown Br	B	11.0	3	19	19	4	37	31	4	8	8	32	Y	Nat. low oxygen. Renton STP (recently corrected). Combined sewer overflows. Organic tox in sediments? Urban & indust. runoff.
09A090	C	WA-09-1020	Green R @ 212th St nr Kent	A	31.3	3	17	14	6	24	19	3	7	6	17	Y	Cattle (dairy, etc.). Urban runoff.
09A190	C	WA-09-1030	Green R @ Kanaskat	AA	22.2	3	7	7	7	10	7	5	8	2	6	N	
09E070	C	WA-09-1015	Mill Creek @ Orillia	A	9.0	3	20	86	8	55	50	22	9	21	93	Y	Urban and industrial runoff. Dairy waste.

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				Size (mi)	Anal	Temp					Oxy	Sed	Tox			
09E090 C	WA-09-1015	Mill Creek - Kent on W Valley	A	9.0	3	19	61	8	60	45	18	13	19	91	Y	Urban and industrial runoff. Dairy waste.
09F071 C	WA-09-1028	Newaukum Cr nr Mouth	A		3	7	8	7	***	33	4	4	10	33	Y	Dairy waste.
09G071 C	WA-09-1015	Springbrook Cr. @ N. end Longa	A		3	16	70	9	***	43	22	11	14	70	Y	Urban and industrial runoff.
ADM001 C	WA-PS-0120	Admiralty Inlet S Whidbey Is	AA	136.5	2	5	26	8	0	***	1	***	***	14	N	
ADM002 C	WA-PS-0130	Admiralty Inlet NW of Pt Wilso	AA	0.0	1	3	2	4	0	***	1	***	***	2	N	
BLL006 C	WA-01-0050	Bellingham Bay @ Nun Buoy #4	B	3.6	2	12	24	17	14	***	4	***	***	15	Y	Georgia Pacific Corp. pulp mill. Urban runoff.
BLL008 C	WA-01-0040	Bellingham Bay at Post Point	A	63.5	2	6	24	18	3	***	1	***	***	14	N	
BLL009 C	WA-01-0040	Bellingham Bay nr Pt. Frances	A	63.5	3	9	16	12	0	***	1	***	***	7	N	
DRA001 C	WA-01-0020	Drayton Hbr Entrance Channel	A	4.2	2	11	20	15	22	***	1	***	***	19	N	Industrial sewage and waste (fish processing) (recently corrected).
DYE003 C	WA-15-0050	Dyes Inlet at Wash. Narrows	A	7.7	2	15	22	6	1	***	1	***	***	13	N	
EAP001 C	WA-PS-0060	East Passage SW of Three Tree	AA	0.0	1	7		10	6	***	1	***	***	5	N	
ELB005 C	WA-09-0010	Elliott Bay near Harbor Island	B	6.3	2	14	29	13	6	***	1	***	***	18	Y	Urban runoff. Combined sewer overflows. Organic tox may be a problem in sediments.
ELB010 C	WA-09-0010	Duwamish Waterway @ 16th St Br	B	11.0	2	19	24	18	35	***	5	***	***	35	Y	Naturally low oxygen. Renton STP (recently corrected). Combined sewer overflows. Organic tox may be a problem in sediments.
GRG002 C	WA-02-0010	Str. of Georgia N. of Pateros	AA	0.0	1	7	2	6	1	***	1	***	***	3	N	Frazer River plume.
HCB002 C	WA-17-0010	Hood Canal at Pulali Point	AA	27.4	2	15	54	13	0	***	1	***	***	33	N	Naturally low oxygen.
HCB006 C	WA-PS-0100	Hood Canal near King Spit	AA	42.4	3	8	31	8	0	***	1	***	***	17	N	Naturally low oxygen.
HLM001 C	WA-06-0030	Holmes Harbor at Honeymoon Bay	A	9.5	2	7	35	13	0	***	1	***	***	21	N	
HRO001 C	WA-02-0010	Haro Strait at Skipjack Island	AA	425.0	2	5	27	8	4	***	1	***	***	13	N	
PNM001 C	WA-06-0020	Penn Cove near Penn Cove Park	A	5.2	2	8	43	13	1	***	1	***	***	25	N	
POD005 C	WA-15-0030	Port Orchard at Brownville	AA	21.3	2	16	22	7	2	***	1	***	***	14	Y	
POD006 C	WA-15-0030	Liberty Bay at Virginia Point	A	21.3	2	16	22	14	2	***	1	***	***	18	Y	
PSB003 C	WA-PS-0050	Puget Sound at West Point	AA	126.6	3	8	27	9	5	***	1	***	***	14	N	West Point STP. Elliott Bay influence.
PSB009 C	WA-08-9340	Ship Canal @ Montlake Bridge	L		3	26	16	9	***	4	2	2	2	26	Y	Dredging. Saltwater influx.
PSS008 C	WA-07-0010	Pt Gardner Bay at Pier 3	B	0.2	2	11	54	8	42	***	1	***	***	53	Y	Combined sewer overflows. Meyerhauser and Scott Paper pulp mills. Urban runoff.
PSS015 C	WA-07-0010	Snohomish R at Highway 99 Brdg	A	0.2	2	22	46	34	34	***	3	***	***	49	Y	Combined sewer overflows. Meyerhauser and Scott Paper pulp mills. Urban and agr. runoff.
PSS019 C	WA-PS-0030	Possession Snd off E Gedney Is	A	50.0	3	7	33	9	7	***	1	***	***	18	N	Snohomish R. influence. Urban runoff. Port Gardner.

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Station Number	WBTS Number	Station Name	Seg. Class	Seg. Yrs			WQL										Comments and Possible Sources of WQIs Greater Than 20
				Size (mi)	Anal	Temp	Oxy	pH	Bact	Nutr	Turb	Susp	Amo	Over	in	1988	
PSS020	C	WA-07-0010	Ebey Slough near Marysville	A	0.2	2	14	43	31	13	***	6	***	***	34	Y	Combined sewer overflows. Weyerhaeuser and Scott Paper pulp mills. Urban runoff. STP's?
PTH005	C	WA-17-0020	Pt Townsend Hbr near Malan Pnt	A	11.1	2	8	25	9	2	***	1	***	***	12	Y	
SAR003	C	WA-06-0010	Saratoga Passage off East Pnt	A	66.6	3	6	25	9	0	***	1	***	***	12	N	
SIN001	C	WA-15-0040	Sinclair Inlet at Naval Shpyrd	A	3.2	2	15	21	7	3	***	1	***	***	14	Y	Urban and industrial runoff. Contaminated sediment?
SJ1001	C	WA-02-0010	San Juan Channel at Reid Rock	AA	425.0	2	6	25	7	7	***	1	***	***	12	N	
SKG001	C	WA-PS-0010	Skagit Bay at Hope Island	A	60.4	2	7	25	13	5	***	1	***	***	12	Y	Influenced by Skagit River.
SUZ001	C	WA-PS-0020	Port Susan at Kayak Point	A	42.8	2	16	46	16	19	***	1	***	***	46	Y	Influenced by Stillaguamish River.
ECOLOGY REGION: -S-																	
10A050	C	WA-10-1020	Puyallup R @ Puyallup (USGS)	A	9.4	3	8	31	6	33	16	22	25	2	35	Y	Puyallup and Tacoma STP's (recently upgraded). White R. sources. Pulp mill (?). Sonoco.
10A070	C	WA-10-1020	Puyallup R @ Meridian St	A	9.4	3	8	7	7	32	16	25	25	4	27	Y	Puyallup and Tacoma STP's (recently upgraded). White R. sources. Pulp mill (?). Sonoco.
10A110	C	WA-10-1060	Puyallup R @ Orting	A	16.0	3	2	5	3	10	13	25	25	3	15	N	
10C070	C	WA-10-1030	White R @ Sumner	A	29.6	3	12	8	4	29	13	18	25	3	25	Y	Nonpoint agr. Cattle (dairy). Glacial fed. Flushing from Puget Power settling basins.
11A070	C	WA-11-1010	Nisqually R @ Nisqually	A	19.1	3	11	7	8	11	14	18	17	5	11	N	Glacial fed.
11A090	C	WA-11-1020	Nisqually R abv Powell Cr	A	25.1	3	6	7	5	8	11	21	15	3	10	N	Glacial fed.
11A140	H	WA-11-1030	Nisqually R @ Elbe	AA	27.0	1	2	7	9	9	11	20	***	***	20	N	Glacial fed.
12A070	C	WA-12-1110	Chambers Cr nr Steilacoom	A	0.0	3	11	9	4	19	25	5	5	5	16	N	Septic tank seepage (sewered 1986). Fish hatchery.
13A060	C	WA-13-1010	Deschutes R @ E St Bridge	A	18.3	3	18	6	10	13	13	5	6	6	10	N	
13A150	C	WA-13-1020	Deschutes R nr Rainier	A	23.3	3	10	8	10	14	12	4	3	4	7	N	
16A070	C	WA-16-1010	Skokomish R nr Potlatch	AA	9.0	3	1	8	10	10	7	4	5	3	5	N	
21A080	C	WA-21-1010	Queets R nr Clearwater (USGS)	AA	6.0	3	15	14	3	12	8	3	2	1	6	N	Glacial fed.
21D070	H	WA-21-2030	NF Quinault R @ Amende (USGS)	AA	14.5	4	1	6	10	5	12	1	25	9	15	N	Lake outlet.
22A070	C	WA-22-1010	Humtulpis R nr Humtulpis	A	28.1	3	15	7	5	10	9	3	4	2	6	N	
22C050	C	WA-22-4040	Chehalis R nr Montesano	A	20.3	3	19	12	5	34	15	5	9	2	19	Y	Cattle (dairy). Misc small STP's. Septic tank seepage (?) Aquaculture.
22G070	C	WA-22-4050	Satsop R nr Satsop	A	6.4	3	10	7	4	14	11	5	8	2	6	N	Silviculture
23A070	C	WA-23-1010	Chehalis R @ Porter	A	32.5	3	22	12	3	19	23	4	5	4	15	Y	Low flows. Cattle (dairy). STP's. Black

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				Size (mi)	Anal	Temp					Oxy	Sed	Tox			all	
23A120	C	WA-23-1020	Chehalis R @ Centralia	A	9.4	3	29	28	7	16	23	5	5	14	27	Y	River aquaculture. Low flows. Cattle (dairy). Horse ranching. STP's.
23A160	C	WA-23-1100	Chehalis R @ Dryad	A	31.5	3	22	8	8	17	9	2	3	3	11	N	Low flows. Slack water condition.
24B090	C	WA-24-2020	Willapa R nr Willapa	A	11.8	3	24	9	5	33	13	2	4	4	24	Y	Septic tank seepage. Raw sewage. Agr. runoff. Low flow.
24B130	C	WA-24-2030	Willapa R @ Lebam	A	23.2	3	13	10	5	59	17	3	5	2	35	Y	Cattle (dairy).
26B070	C	WA-26-1010	Cowlitz R @ Kelso	A	18.7	3	8	7	6	12	17	18	23	2	14	N	Glacial fed. Volcanic and dredging activities.
26B190	H	WA-26-1120	Cowlitz R nr Randle	AA	44.2	?	9	8	7	10	8	9	***	***	11	N	Glacial fed.
26C070	C	WA-26-1020	Coweman R @ Kelso	A	18.4	3	23	16	3	21	10	4	7	7	16	Y	Little bank veg. Low flows. Shallow, bedrock substrate.
26D070	C	WA-26-1050	Toutle R nr Castle Rock	A	17.2	3	28	8	6	9	18	25	25	5	21	Y	Volcanic and dredging activities. Little bank veg. Low flows (?)
26E070	H	WA-26-1110	Cispus R nr Kosmos	AA	19.9	1	1	6	3	7	5	9	8	3	5	N	
27B070	C	WA-27-1010	Kalama R nr Kalama	A	10.4	3	13	7	8	11	9	2	5	6	6	N	
27C110	H	WA-27-2040	Lewis R @ Ariel (USGS)	A	16.0	?	6	8	8	5	9	3	5	3	11	N	
27D090	C	WA-27-2020	EF Lewis R nr Dollar Corner	A	24.6	3	24	8	6	13	7	2	3	4	12	N	
28A165	C	WA-CR-1010	Columbia R @ Warrendale	A	146.1	3	29	17	7	5	10	5	17	10	20	Y	Hanford. Surface sample not representative.
29B070	H	WA-29-3010	White Salmon R nr Underwood	A	31.2	2	2	6	2	19	9	3	5	6	8	N	
29C070	H	WA-29-1010	Wind R nr Carson	A	2.3	2	9	6	3	12	6	11	6	3	7	N	
ADM003	C	WA-PS-0050	Admiralty Inlet S. of Useless	AA	0.0	1	5	4	8	1	***	1	***	***	4	N	
BNL001	C	WA-15-0070	Burley-Minter Lagoon	AA	0.0	1	13	***	13	3	***	1	***	***	7	Y	
BUD002	C	WA-13-0030	Budd Inlet S End Oly Port Dock	B	1.1	3	14	25	8	15	***	2	***	***	17	Y	Urban runoff. Boaters. Wood waste (?)
BUD005	C	WA-13-0020	Budd Inlet-Oly Shoal at Horn	A	3.8	3	13	17	14	5	***	1	***	***	9	Y	Misc STP's. LOTT STP. Deschutes River. Boaters. Wood waste (?) Misc STP's.
CMB003	C	WA-10-0010	Commencement Bay	A	9.8	3	9	31	7	9	***	1	***	***	16	Y	Developed shoreline. Urban runoff. Combined sewer. Agr. runoff. Tacoma STP (recently corrected). Organic tox may be problem in sed. Puyallup R.
CMB006	C	WA-10-0020	Commencement Bay nth City W	B	2.6	2	16	31	9	11	***	2	***	***	21	Y	Urban runoff. Combined sewer. Tacoma STP (recently corrected). Organic tox may be problem in sed. Puyallup R.
CMB010	C	WA-10-0020	Commencement-Puyallup R Mouth	B	2.6	2	13	29	8	9	***	2	***	***	17	Y	Urban runoff. Combined sewer. Tacoma STP (recently corrected). Organic tox may be

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Station Number	WBTS Number	Station Name	Seg. Class	Seg. Yrs				WQL							Comments and Possible Sources of WQIs Greater Than 20		
				Size in (mi)	Anal	Temp	Oxy	pH	Bact	Nutr	Turb	Susp Sed	Amo Tox	Over all		in 1988	
CRR001	C	WA-15-0060	Carr Inlet off Green Point	AA	31.4	3	11	25	10	0	***	1	***	***	12	N	problem in sed. Puyallup R. Naturally low oxygen.
CSE001	C	WA-PS-0090	Case Inlet off S. Heron Is	AA	31.5	3	12	24	12	0	***	1	***	***	14	N	Land development. Runoff.
DNA001	C	WA-PS-0090	Dana Passage near Briaco Point	AA	0.0	1	10	2	11	1	***	1	***	***	4	N	
ELD001	C	WA-14-0020	Eld Inlet near Flapjack Point	A	6.2	3	12	25	13	2	***	1	***	***	12	Y	Naturally low oxygen.
ELD002	C	WA-14-0020	Eld Inlet @ Young Cove	A	0.0	1	13	***	22	2	***	1	***	***	10	Y	
GYS004	C	WA-22-0030	Grays Hbr-Chehalis R @ Std Oil	B	20.6	3	18	26	6	16	***	11	***	***	15	Y	Meyerhauser and ITT mills. Aberdeen and Hoquiam combined sewer. Shoreline erosion. Shallow. Agr. runoff.
GYS006	H	WA-22-0030	Grays Hbr at E End Rennie Is.	B	20.6	1	4	12	3	57	***	10	***	***	37	Y	Meyerhauser and ITT mills. Aberdeen and Hoquiam combined sewer overflows.
GYS007	C	WA-22-0030	Grays Hbr N Chnl nr Rayonier	B	20.6	2	16	28	6	23	***	9	***	***	19	Y	Shoreline erosion. Shallow. Agriculture. Meyerhauser and ITT mills. Aberdeen and Hoquiam combined sewer overflows.
GYS008	C	WA-22-0030	Grays Hbr near Mid S. Channel	B	20.6	3	16	31	10	13	***	14	***	***	18	Y	Shoreline erosion. Shallow. Meyerhauser and ITT mills. Aberdeen and Hoquiam combined sewers. Shoreline erosion. Shallow. Dredging?
GYS009	C	WA-22-0030	Grays Hrb @ Moon Is. Reach	B	20.6	3	15	26	10	13	***	8	***	***	15	Y	Meyerhauser and ITT mills. Aberdeen and Hoquiam combined sewers. Shoreline erosion. Shallow. Dredging?
GYS015	C	WA-22-0020	Grays Hrb nr N Whitcomb Flats	A	80.3	2	9	21	4	4	***	1	***	***	8	Y	Naturally low oxygen.
GYS016	C	WA-22-0020	Grays Harbor near Damon Point	A	80.3	2	9	29	4	0	***	3	***	***	14	Y	Naturally low oxygen.
HCB003	C	WA-PS-0110	Hood Canal at Eldon	AA	78.1	3	7	54	10	1	***	1	***	***	33	N	Naturally low oxygen. Aquaculture. Septic systems.
HCB004	C	WA-PS-0110	Hood Canal at Sisters Point	AA	78.1	2	11	64	9	1	***	1	***	***	40	N	Naturally low oxygen. Aquaculture. Septic systems.
NRR001	C	WA-PS-0060	Tacoma Narrows nr Pt Defiance	AA	108.7	3	8	26	6	1	***	1	***	***	13	N	Influence from Commencement Bay?
NSQ001	C	WA-PS-0080	Nisqually Reach @ Nisqually R.	AA	52.1	3	10	28	10	5	***	1	***	***	15	N	Nisqually River. Agr runoff.
NSQ002	H	WA-PS-0080	Nisqually Reach nr Devil's Hd	AA	0.0	1	8	10	4	0	***	1	***	***	5	N	
OAK004	C	WA-14-0040	Oakland Bay nr Eagle Point	A	4.7	3	17	30	14	8	***	3	***	***	17	Y	Shallow water. Wood products industry. Development. Slow circulation. STP. Urban runoff. Agriculture.
PAH003	C	WA-18-0020	Prt Angeles Hbr @ Ediz Hook Hd	A	4.0	2	1	40	22	3	***	1	***	***	26	N	Naturally low oxygen.
PAH008	C	WA-18-0010	Port Angeles Hbr @ Morse Creek	AA	333.6	2	2	36	6	5	***	1	***	***	19	N	Upstream recreational development (inadequate septic systems). Naturally low oxygen.

Table 2. 1990 Water Segment Analysis Using the Water Quality Index. Sorted by Department of Ecology Region and station number.
 '***' indicates insufficient data, 'C' and 'H' by station number indicate data is current (last three years) or historical (last eight years), respectively.

Station Number	WBTS Number	Station Name	Seg. Class	Yrs Size (mi)	Seg. Yrs										WQL	Comments and Possible Sources of WQIs Greater Than 20
					Anal	Temp	Oxy	pH	Bact	Nutr	Turb	Sed	Amo	Tox		
PCK001	C WA-14-0010	Pickering Pag nr Harstene Is.	A	14.2	2	12	28	9	4	***	1	***	***	15	N	Naturally low oxygen.
TOT001	C WA-14-0030	Totten Inlet near Windy Point	A	9.5	3	15	30	16	3	***	1	***	***	16	N	Land development. Septic systems.
WPA001	C WA-24-0020	Willapa River at Raymond	A	11.8	3	23	21	9	8	***	10	***	***	15	Y	Raymond and South Bend STP's (recently corrected). Inadequate septic systems. Raw sewage. Low flows. Agriculture.
WPA003	C WA-24-0020	Willapa River @ Johnson Slough	A	94.4	3	20	28	17	4	***	7	***	***	16	Y	Raymond and South Bend STP's (recently corrected). Inadequate septic systems. Raw sewage. Low flows. Shallow. Agriculture.
WPA004	C WA-24-0020	Willapa Bay at Toke Point	A	0.0	3	12	29	19	2	***	2	***	***	16	Y	Naturally low oxygen. Upwelling.

Table 3. The ten stations receiving the highest Water Quality Index (indicating low water quality) for each category.

Station Number	Current	Station Name	Ecology Region	Eco-Class	Region	WQI
Temperature						
*32A070	C	Walla Walla R nr Touchet	E	A	7	45
*32B070	C	Touchet R @ Touchet	E	A	7	42
*37A090	C	Yakima R @ Kiona	C	A	7	38
41B071	C	Winchester Wasteway @ Gage	E	A	7	37
41A070	C	Crab Cr nr Beverly	E	B	7	34
33A050	C	Snake R @ Burbank	E	A	7	32
41A101	C	Crab Creek @ McMannon Road	E	B	7	31
*57A190	C	Spokane R nr Post Falls	E	A	7	31
*56A070	C	Hangman Cr @ Mouth	E	A	7	31
*49A190	C	Okanogan R @ Oroville	C	A	7	31
Oxygen						
09E070	C	Mill Creek @ Orillia	N	A	2	86
09G071	C	Springbrook Cr. @ N. end Longacres	N	A	2	70
*HCB004	C	Hood Canal at Sisters Point	S	AA	A	64
09E090	C	Mill Creek - Kent on W Valley Hwy	N	A	2	61
PSS008	C	Pt Gardner Bay at Pier 3	N	B	A	54
*HCB003	C	Hood Canal at Eldon	S	AA	B	54
*HCB002	C	Hood Canal at Pulali Point	N	AA	A	54
SUZ001	C	Port Susan at Kayak Point	N	A	A	46
PSS015	C	Snohomish R at Highway 99 Brdg	N	A	A	46
PSS020	C	Ebey Slough near Marysville	N	A	A	43
pH						
PSS015	C	Snohomish R at Highway 99 Brdg	N	A	A	34
PSS020	C	Ebey Slough near Marysville	N	A	A	31
*32B070	C	Touchet R @ Touchet	E	A	7	29
*32A070	C	Walla Walla R nr Touchet	E	A	7	29
*56A070	C	Hangman Cr @ Mouth	E	A	7	27
45A070	C	Wenatchee R @ Wenatchee	C	A	7	27
*34A070	C	Palouse R @ Hooper	E	B	7	26
41A070	C	Crab Cr nr Beverly	E	B	7	25
49A190	C	Okanogan R @ Oroville	C	A	7	24
08B110	C	Sammamish R @ Redmond	N	AA	2	23

* Indicates stations that were in the top ten in the same category in the 1988 WQI. Ecoregion is based on Omernik and Gallant (1986).

Table 3. Continued.

Station Number	Current	Station Name	Ecology Region	Eco-Class	Region	WQI
Bacteria						
*34B110	C	SF Palouse R @ Pullman	E	A	7	76
09E090	C	Mill Creek - Kent on W Valley Hwy	N	A	2	60
24B130	C	Willapa R @ Lebam	S	A	1	59
*GYS006	H	Grays Hbr at E End Rennie Is.	S	B	A	57
09E070	C	Mill Creek @ Orillia	N	A	2	55
01D070	C	Sumas R nr Huntingdon BC	N	A	2	50
08B070	C	Sammamish R @ Bothell	N	AA	2	46
*PSS008	C	Pt Gardner Bay at Pier 3	N	B	A	42
09A060	C	Duwamish R @ Allentown Br	N	B	2	37
*ELB010	C	Duwamish Waterway @ 16th St Br	N	B	A	35
Nutrients						
*34B110	C	SF Palouse R @ Pullman	E	A	7	100
09E070	C	Mill Creek @ Orillia	N	A	2	50
*34A070	C	Palouse R @ Hooper	E	B	7	45
41C071	C	Frenchman Hills Wasteway @ Gage	E	A	7	45
09E090	C	Mill Creek - Kent on W Valley Hwy	N	A	2	45
09G071	C	Springbrook Cr. @ N. end Longacres	N	A	2	43
*01D070	C	Sumas R nr Huntingdon BC	N	A	2	39
*37A090	C	Yakima R @ Kiona	C	A	7	37
*41A070	C	Crab Cr nr Beverly	E	B	7	34
*32A070	C	Walla Walla R nr Touchet	E	A	7	34
Turbidity						
*34A070	C	Palouse R @ Hooper	E	B	7	46
*56A070	C	Hangman Cr @ Mouth	E	A	7	40
*32B070	C	Touchet R @ Touchet	E	A	7	28
41A110	H	Crab Cr nr Moses Lake	E	B	7	25
*34B110	C	SF Palouse R @ Pullman	E	A	7	25
26D070	C	Toutle R nr Castle Rock	S	A	2	25
10A110	C	Puyallup R @ Orting	S	A	2	25
10A070	C	Puyallup R @ Meridian St	S	A	2	25
09G071	C	Springbrook Cr. @ N. end Longacres	N	A	2	22
09E070	C	Mill Creek @ Orillia	N	A	2	22

Table 3. Continued.

Station Number	Current	Station Name	Ecology Region	Eco-Class	Region	WQI
Suspended Solids						
*34A070	C	Palouse R @ Hooper	E	B	7	59
39A041	H	Yakima River below Roza Dam	C	A	7	43
*32B070	C	Touchet R @ Touchet	E	A	7	43
*32A070	C	Walla Walla R nr Touchet	E	A	7	43
*41A070	C	Crab Cr nr Beverly	E	B	7	40
35B060	C	Tucannon R @ Powers	E	A	7	28
56A070	C	Hangman Cr @ Mouth	E	A	7	26
41C071	C	Frenchman Hills Wasteway @ Gage	E	A	7	25
*26D070	C	Toutle R nr Castle Rock	S	A	2	25
21D070	H	NF Quinault R @ Amanda (USGS)	S	AA	1	25
Ammonia Toxicity						
56A070	C	Hangman Cr @ Mouth	E	A	7	26
54A120	C	Spokane R @ Riverside State Pk	E	A	8	24
34B110	C	SF Palouse R @ Pullman	E	A	7	23
34A070	C	Palouse R @ Hooper	E	B	7	23
41C071	C	Frenchman Hills Wasteway @ Gage	E	A	7	22
41A101	C	Crab Creek @ McMannon Road	E	B	7	21
41B071	C	Winchester Wasteway @ Gage	E	A	7	21
09E070	C	Mill Creek @ Orillia	N	A	2	21
62A080	H	Pend Oreille R @ Border (USGS)	E	A	8	21
Overall						
*34B110	C	SF Palouse R @ Pullman	E	A	7	100
09E070	C	Mill Creek @ Orillia	N	A	2	93
09E090	C	Mill Creek - Kent on W Valley Hwy	N	A	2	91
09G071	C	Springbrook Cr. @ N. end Longacres	N	A	2	70
*34A070	C	Palouse R @ Hooper	E	B	7	62
*41A070	C	Crab Cr nr Beverly	E	B	7	61
*PSS008	C	Pt Gardner Bay at Pier 3	N	B	A	53
*PSS015	C	Snohomish R at Highway 99 Brdg	N	A	A	49
32A070	C	Walla Walla R nr Touchet	E	A	7	47
SUZ001	C	Port Susan at Kayak Point	N	A	A	46

Dave H.



CHRISTINE O. GREGOIRE
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

7171 Cleanwater Lane, Building 8, LH-14 • Olympia, Washington 98504

January 18, 1991

TO: Dick Cunningham
FROM: ~~David Hallock~~ *DH*
SUBJECT: 1990 Water Quality Index Analysis

Table 3 in my memo to Dick Cunningham dated July 18, 1990, (Results of the 1990 Water Quality Index Analysis) incorrectly states that no station had an ammonia toxicity value over 20. In fact, nine stations had ammonia toxicity scores greater than 20. A revised Table 3 is attached.

DH:blt
Attachment

cc: Lynn Singleton
Brad Hopkins
Joe Joy
Steve Saunders

Bob Barwin, CRO
Carl Nuechterlien, ERO
Bill Bachous, SWRO
John Glynn, NWRO

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41A070	C	Crab Cr nr Beverly	E	B	7	34
33A050	C	Snake R @ Burbank	E	A	7	32
41A101	C	Crab Creek @ McMannon Road	E	B	7	31
*57A190	C	Spokane R nr Post Falls	E	A	7	31
*56A070	C	Hangman Cr @ Mouth	E	A	7	31
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Oxygen						
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09G071	C	Springbrook Cr. @ N. end Longacres	N	A	2	70
*HCB004	C	Hood Canal at Sisters Point	S	AA	A	64
09E090	C	Mill Creek - Kent on W Valley Hwy	N	A	2	61
PSS008	C	Pt Gardner Bay at Pier 3	N	B	A	54
*HCB003	C	Hood Canal at Eldon	S	AA	B	54
*HCB002	C	Hood Canal at Pulali Point	N	AA	A	54
SUZ001	C	Port Susan at Kayak Point	N	A	A	46
PSS015	C	Snohomish R at Highway 99 Brdg	N	A	A	46
PSS020	C	Ebey Slough near Marysville	N	A	A	43
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PSS015	C	Snohomish R at Highway 99 Brdg	N	A	A	34
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*32B070	C	Touchet R @ Touchet	E	A	7	29
*32A070	C	Walla Walla R nr Touchet	E	A	7	29
*56A070	C	Hangman Cr @ Mouth	E	A	7	27
45A070	C	Wenatchee R @ Wenatchee	C	A	7	27
*34A070	C	Palouse R @ Hooper	E	B	7	26
41A070	C	Crab Cr nr Beverly	E	B	7	25
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08B070	C	Sammamish R @ Bothell	N	AA	2	46
*PSS008	C	Pt Gardner Bay at Pier 3	N	B	A	42
09A060	C	Duwamish R @ Allentown Br	N	B	2	37
*ELB010	C	Duwamish Waterway @ 16th St Br	N	B	A	35
Nutrients						
*34B110	C	SF Palouse R @ Pullman	E	A	7	100
09E070	C	Mill Creek @ Orillia	N	A	2	50
*34A070	C	Palouse R @ Hooper	E	B	7	45
41C071	C	Frenchman Hills Wasteway @ Gage	E	A	7	45
09E090	C	Mill Creek - Kent on W Valley Hwy	N	A	2	45
09G071	C	Springbrook Cr. @ N. end Longacres	N	A	2	43
*01D070	C	Sumas R nr Huntingdon BC	N	A	2	39
*37A090	C	Yakima R @ Kiona	C	A	7	37
*41A070	C	Crab Cr nr Beverly	E	B	7	34
*32A070	C	Walla Walla R nr Touchet	E	A	7	34
Turbidity						
*34A070	C	Palouse R @ Hooper	E	B	7	46
*56A070	C	Hangman Cr @ Mouth	E	A	7	40
*32B070	C	Touchet R @ Touchet	E	A	7	28
41A110	H	Crab Cr nr Moses Lake	E	B	7	25
*34B110	C	SF Palouse R @ Pullman	E	A	7	25
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10A110	C	Puyallup R @ Orting	S	A	2	25
10A070	C	Puyallup R @ Meridian St	S	A	2	25
09G071	C	Springbrook Cr. @ N. end Longacres	N	A	2	22
09E070	C	Mill Creek @ Orillia	N	A	2	22

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*32A070	C	Walla Walla R nr Touchet	E	A	7	43
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56A070	C	Hangman Cr @ Mouth	E	A	7	26
41C071	C	Frenchman Hills Wasteway @ Gage	E	A	7	25
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21D070	H	NF Quinault R @ Amanda (USGS)	S	AA	1	25
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54A120	C	Spokane R @ Riverside State Pk	E	A	8	24
34B110	C	SF Palouse R @ Pullman	E	A	7	23
34A070	C	Palouse R @ Hooper	E	B	7	23
41C071	C	Frenchman Hills Wasteway @ Gage	E	A	7	22
41A101	C	Crab Creek @ McMannon Road	E	B	7	21
41B071	C	Winchester Wasteway @ Gage	E	A	7	21
09E070	C	Mill Creek @ Orillia	N	A	2	21
62A080	H	Pend Oreille R @ Border (USGS)	E	A	8	21
Overall						
*34B110	C	SF Palouse R @ Pullman	E	A	7	100
09E070	C	Mill Creek @ Orillia	N	A	2	93
09E090	C	Mill Creek - Kent on W Valley Hwy	N	A	2	91
09G071	C	Springbrook Cr. @ N. end Longacres	N	A	2	70
*34A070	C	Palouse R @ Hooper	E	B	7	62
*41A070	C	Crab Cr nr Beverly	E	B	7	61
*PSS008	C	Pt Gardner Bay at Pier 3	N	B	A	53
*PSS015	C	Snohomish R at Highway 99 Brdg	N	A	A	49
32A070	C	Walla Walla R nr Touchet	E	A	7	47
SUZ001	C	Port Susan at Kayak Point	N	A	A	46