RIVER BASIN WATER QUALITY

STATUS REPORT

Lower Columbia River Basin

ENVIRONMENTAL PROTECTION AGENCY

SURVEILLANCE AND ANALYSIS DIVISION REGION X SEATTLE WASHINGTON

1975

FORWARD

This basin status report is one of 27 scheduled for completion in Region X of EPA for the calendar year 1975. The information presented herein is based upon all of the documented data available to EPA at the time of the report distribution.

Several of these reports include a minimal amount of information which may not be enough to adequately evaluate the water quality status of the basin. We feel that it is important to distribute these reports regardless of the availability of data since the knowledge of a lack of data is also important to the decision makers.

A report update is scheduled annually, therefore, additional data made available in 1975 will be included in the next report.

We welcome comments on this report as well as information concerning additional data and/or sources where additional data might be obtained. Any correspondence can be addressed to Bill Schmidt, Chief, Water Quality Monitoring Section, 1200 Sixth Avenue, Seattle, Washington, 98101. Telephone (206)(442-1193).

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Reviewed by:

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OVERVIEW

This basin status report encompasses the Lower Columbia River and its tributaries.

Each section of the report is sub-divided into the following three parts:

1. Mainstem Columbia River
2. Washington Tributaries
3. Oregon Tributaries

The Washington tributaries are further divided into water quality segments as defined by the State of Washington Department of Ecology (DOE) so that DOE personnel can extract the information in a format compatible with their reports.

The Walla Walla River is given special emphasis in the "Cause and Effect" section of the report since it is an interstate stream.

Much of the data presented in the report is compared to water quality criteria. The following table gives the reference for the criteria used.

WATER QUALITY CRITERIA REFERENCE TABLE

PARAMETER	INDICATED MEASUREMENT	ENVIRONMENTAL IMPACT	REFERENCE
Ammonia Nitrate (NH3-N)	.2 mg/l	Organic Pollution Level	Klein,L. River Pollution 1., Chemical Analysis Academic Press Inc., New York 1959 Sawyer,C.N., Factors Involved in Disposal of Sewage Effluents to Lakes, Sewage and Industrial Wastes, Vol. 26 No. 3 pp.317-325 1954
Cadmium	30 ug/l 3 ug/l	Generally Toxic to Aquatic Life Toxic to Salmonoid Eggs	EPA R3.73.033 Ecological Research Series, Water Quality Criteria 1972, U.S.Government Printing Office, March 1973 p.180
Chlorophyll-A	less than 3 mg/l between 3 and 20 mg/l more than 20 mg/l	Oligtrophic Mesotrphic Eutrophic	Vollenweider, Dr.R.A., Water Management Research-Scientific Fundamentals of the Eutrofication of Lakes and Flowing Waters with Particular Reference to Nitrogen and Phosphorus as Factors in Eutrophication , DAS/CSI/68.27, Organisation For Economic Cooperation And Development - Directorate For Scientific Affairs, 1968 p.40
Lead	30 ug/l	Generally Toxic to Aquatic Life	EPA R3.73.033 op.cit. p.181
Nitrate-Nitrogen	.3 mg/l	Algal Bloom Potential	Klein op.cit. Sawyer op.cit.
Phosphorus, Dissolved Ortho	.01 mg/l	Algal Bloom Potential	Klein op.cit. Sawyer op.cit.
Phosphorus, Total	.05 mg/l	Algal Bloom Potential	Klein op.cit. Sawyer op.cit.
Zinc, Total	300 ug/l	Approximate Algacidal Concentration for Selenastrum Capriconutum	Green, et.al National Eutrophication Research Program, Report To Region X On The Results Of The Spokane River Algal Assays , Corvallis, Ore 1973.

PROFILE SUMMARY

SUMMARY

Ambient Profile

I. Columbia River @ Bradwood (RM 39.0) and Columbia River at Clatskanie (RM 53.5)

1. Nitrate + Nitrite (NO_2+NO_3) levels during both periods exceed algal bloom potential levels during the winter and spring months.

2. Total Phosphorus levels are above algal bloom potential levels during the majority of the year for both periods examined.

II. Columbia River below Bonneville Dam (146.0)

1. Both nitrogen (NO_2+NO_3) and total phosphorus levels exceed potential algal bloom levels of .3 mg/l and .5 mg/l respectively during the winter and spring months of the year. Averaged data from the period 1972 to 1975 shows greater nutrient levels than 1968 to 1970 data. Discrepancies can be partly explained by the higher average river flow occuring during April of 1972 to 1975 period.

III. Cowlitz Columbia Esturary

Cowlitz River

1. Nitrogen (NO_2+NO_3) concentrations near the mouth exceed the algal bloom potential levels from November to March. High levels occur during high flow which indicates a direct relationship to flow.

2. Total phosphorus levels exceed algal bloom potential levels sporatically throughout the year, with most of those violations occuring during the summer months. River flow is low during the summer indicating a potential point source cause. High ammonia levels during this period also indicates point source causes.

3. Total coliform concentrations sporatically violate water quality standards near the mouth.

Coweeman River

1. Dissolved Oxygen concentrations are in violation of water quality standards during the summer months.

2. Nitrogen (NO_2+NO_3) concentrations exceed algal bloom potential levels from November through May. These levels are associated with high river flow levels.

3. Total phosphorus concentrations are above algal bloom potential levels sporatically throughout the year.

4. Bacteria concentrations violate the water quality standards throughout most of the year.

5. Low river flow and dissolved oxygen levels together with high phosphorus, ammonia and total coliform levels are indicators of point source causes in the river. The Kelso municipality which is the largest point source contributor of BOD_5 and total phosphorus on the river could be the cause of the problem.

Toutle River

1. During the winter period, NO_2+NO_3, NH_3, and total phosphorus levels are directly related to river flows based upon 1971 through 1972 data. This relationship may indicate a non-point source problem during this time of year.

2. Phosphorus levels are also high in the late summer periods and exceed algal bloom threshold levels when flow is low.

3. Total Coliform values violate water quality standards sporatically during the year.

IV. Lewis

Lewis River

1. Total phsophorus exceeds the level considered necessary for algal bloom during the period of February through April of 1972. Dissolved ortho phosphorus values are above the algal bloom level during most of the 1972 water year. This station is approximately one mile below Woodland Washington, however, it is not known to what extent Woodland contributes to this problem.

Burnt Bridge Creek

Based upon 1972-1973 data at RM 14.7, the water quality of Burnt Bridge Creek appears to be severly degraded.

1. Ammonia levels sporadically exceed a level of .2mg/l indicating organic pollution.

2. $NO_2 + NO_3$, total phosphorus, and dissolved ortho phosphorus concentrations continually exceed the excepted levels for potential algal bloom.

3. Total Coliform concentrations continually exceed water quality standards throughout the entire year.

Kalama River

1. High concentrations of ammonia, nutrients, and bacteria accompanied high flows during the winter months of 1972-1973 indicating non-point source pollution.

2. Total colifrom populations that violated water quality standards during the summer months were probably animal orgin.

V. Middle Columbia

White Salmon River

1. Total phosphorus values sporatically exceed the level considered conducive for algal growth and dissolved ortho phosphorus concentrations are above algal bloom levels during the entire year. Thses levels are associated with higher river flows indicating non-point source relationships.

2. Total coliform levels violate water quality standards during several months of the year.

Wind River

1. Dissolved ortho phosphorus concentrations are above algal bloom levels throughout the entire year.

2. Total coliform concentrations sporatically violate water quality standards.

Klickitat River

1. Total phosphorus concentrations infrequently exceed algal bloom potential levels, yet dissolved ortho phosphorus values are well above algal bloom levels during the entire year.

2. Total coliform values sporatically violate water quality standards.

VI. Oregon Tributaries

Umatilla River

1. Water temperature is extremely high during the summer months, reaching 86 F in August.

2. pH values exceed water quality standards during the summer months indicating aboundant algal productivity.

3. Nitrogen (NO_2 +NO_3) concentrations are above algal bloom potential levels throughout the entire year.

4. Both total and dissolved ortho phosphorus concentrations are extremely high during the whole year. They are above levels considered conducive for algal blooms.

John Day River

1. pH values exceed water quality standards during the summer months.

2. Nitrogen (NO_2 + NO_3) concentrations sporatically during the year exceed the level of algal bloom potential.

3. Total and Dissolved ortho phosphorus are above algal bloom potential levels throughout the entire year.

Deschutes River

1. pH values on the Deschutes violate water quality standards during the summer.

2. Both total and dissolved ortho phosphorus concentrations exceed algal bloom potential levels throughout the year.

Hood River

1. Total phosphorus concentrations are above algal bloom levels sporatically during the year.

2. Dissolved ortho phosphorus concentrations are above the level considered conducive for algal growth during the entire year.

Sandy River

1. Dissolved ortho phosphorus concentrations are above levels considered conducive for algal growth during the winter and spring and are right at the levels during spring and summer.

2. Total coliform levels exceed water quality standards during a few months of the year.

Source Profile

1. The major basin point source c ontributors are:

Discharger	% BOD_5	% Sus.S.	% NO_3	% T.Phos.
Weyerhauser	36.9	-	-	-
Longview Fibre	21.8	-	5.4	7.0
Crown Zellerbach	35.1	-	-	11.9
Boise Cascade	-	69.1	-	-
Longview, West	1.0	8.9	-	8.1
Vancouver, East	2.8	-	12.0	9.8
Cowlitz Co.	-	-	25.0	22.1

2. The industrial and municipal point sources contribute the following percentanges of BOD_5, Sus. Solids, Nitrogen, and Total phosphorus.

	% BOD_5	% Sus. S.	% NO_3	% T.Phos.
INDUSTRIAL	94%	80%	33%	29%
MUNICIPAL	6%	20%	67%	71%

3. The majority of total phosphorus and nitrogen loading in the lower Columbia is from it's tributaries. The following table summaries the relative municipal, industrial, and tributary contributions of total phosphorus and nitrogen. Data is based upon 1972 sampling.

rce	Total Phos. (lbs/day) Q_1*	Q_2	Q_3	Q_4	$NO_2 + NO_3$ (lbs/day) Q_1	Q_2	Q_3	Q_4
& I	4,287	4,287	4,287	4,287	10,005	10,005	10,005	10,005
ib.	116,200	228,000	45,000	13,000	370,000	888,000	155,000	173,000

* Q_1 = Jan-March, Q_2 = April-June, Q_3 = July-Sept, Q_4 = Oct-Dec.

Cause & Effect

I. Mainstem Columbia

1. Dissolved gas standards of 110% saturation were exceeded during the high flow period of April through June of 1975. Some violations occured below all Columbia River dams, however, the greatest number occured below the Dalles Dam and in the lower Columbia (measured at about RM 70).

2. NO_2 + NO_3 concentrations exceed algal bloom potential levels during the winter months from the Snake River confluences to the mouth of the Columbia.

3. Total phosphorus levels are above algal bloom potential levels from November through June throughout the entire river reach.

4. Dissolved ortho phosphorus concentrations exceed algal bloom potential levels from November through June. From July through October, the levels are low indicating possible algal uptake.

5. Both total and fecal coliform levels increase from The Dalles Dam to the mouth of the Columbia river. Water quality standards for total coliform are violated in the Columbia river below the Willamette river confluence.

II. Walla Walla

Walla Walla River (Washington)

Water quality degradation is significant between RM 38.7 and RM 15.3 based upon 1974 data. Point & non-point sources on the Touchet River and Mill Creek greatly effect the Walla Walla River.

1. Water temperature standards are violated during the summer months.

2. Low dissolved oxygen values occur at the lower stations.

3. pH values violate the upper limit of the water quality standard during the summer months. This is an indication of algal activity at both stations.

4. Ammonia levels frequently exceed .2 mg/l at the lower station throughout the early part of the year and during the summer months at the upper stations.

5. Total coliform levels violate water quality standards throughout the year and fecal coliform levels are extremely high during most of the year.

Walla Walla River (Oregon)

1. Total nitrate plus nitrite levels are considerably greater downstream of Milton Freewater than above it whereas ortho phosphate levels are approximately the same indicating that groundwater is the probable cause of the difference.

2. Total phosphorus levels above Milton Freewater as well as at the state line exceed the algal bloom potential levels.

Touchet River

Water quality in the Touchet river is severely degraded. Samples taken during 1974 at stations located at RM .5 and 49.6 show pollution occuring throughout the length of the river from below Dayton to the mouth.

1. Water temperature near the mouth violate the water quality standards during the summer months.

2. pH values violate the upper limit water quality standard during the summer months at river mile 49.6

3. $NO_2 + NO_3$ concentrations are above the algal bloom potential levels from January through June.

4. Both total phosphorus and dissolved ortho phosphorus concentrations are well above the level considered conducive for algal bloom during the entire year.

5. Total coliform values are well above the water quality standards throughout the entire year.

Mill Creek

Water quality in Mill Creek is effected by communities of College Place and Walla Walla. Samples taken at RM 4.0 and RM 10.0 show an increase in pollution resulting from the two localities.

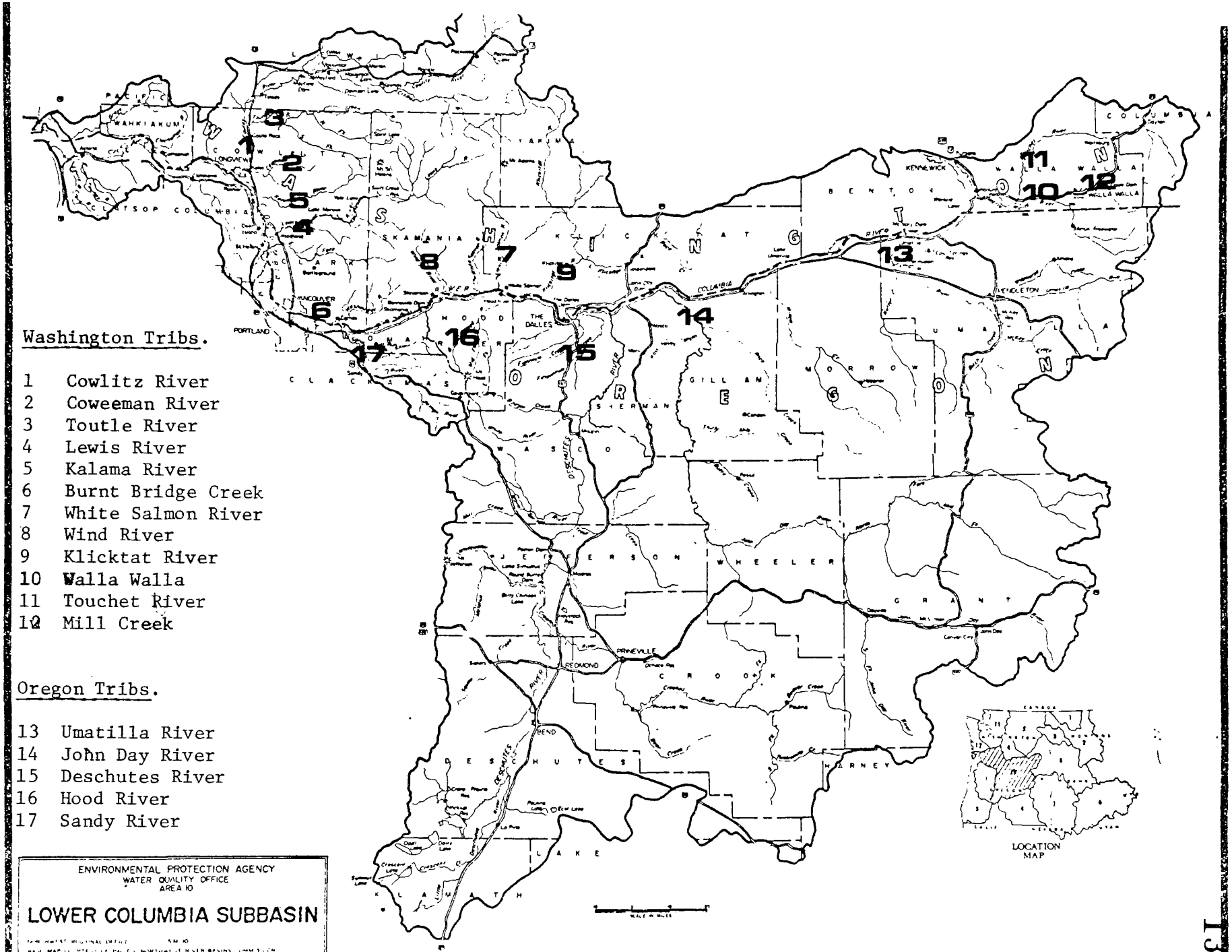
1. pH values near the mouth violate the upper limit of the water quality standards from July through October. No violations occur upstream.

2. NO_2 + NO_3 , total phosphorus, and dissolved ortho phosphorus concentrations greatly exceed the algal bloom potential levels below these communities, whereas, bloom levels are exceeded only sporatically at the above stations.

3. Total coliform concentrations at the mouth sporatically exceed water quality standards. No violations occur at the upstream stations.

BASIN DESCRIPTION

LOWER COLUMBIA RIVER


Washington Tribs.
1 Cowlitz River
2 Coweeman River
3 Toutle River
4 Lewis River
5 Kalama River
6 Burnt Bridge Creek
7 White Salmon River
8 Wind River
9 Klicktat River
10 Walla Walla
11 Touchet River
12 Mill Creek
Oregon Tribs.
13 Umatilla River
14 John Day River
15 Deschutes River
16 Hood River
17 Sandy River
ENVIRONMENTAL PROTECTION AGENCY
WATER QUALITY OFFICE
AREA 10
LOWER COLUMBIA SUBBASIN
LOCATION MAP

LOWER COLUMBIA BASIN DESCRIPTION

Geographic Setting

The main geographic features of the Lower Columbia area are the Coastal and Cascade mountain ranges extending north and south on the western side, the Columbia Plateau in the center, and The Blue Mountains near the eastern boundary. As a consequence of these features, topography of the Lower Columbia Basin is widely varied. The Coast Range contains crest elevations between 460 and 760 meters (1500 and 2500 feet) with peaks over 1220 meters (4000 feet) whereas in the Cascade Range crest elevations vary from 1520 to 1980 meters (5000 to 6500 feet) with peaks over 3050 meters (10,000 feet). The central part of the basin is characterized by moderately undulating topography formed by the Columbia Plateau. To the east, the Blue Mountains rise to crest elevations between 1220 and 1370 meters (4000 and 4500 feet). Geologically, the basin is largely underlain by igneous materials with basalt lava flows being very common. Alluvial deposits frequently are found along the major river valleys. The Coastal Range rocks are composed of marine and continental sedimentary material whereas the Cascades are almost entirely from lava flows.

Demographic Aspects

The Lower Columbia area is strongly oriented to pulp and paper with dependence on agricultural, chemical textile, lumber and aluminum industry as well. Approximately one-half million people inhabit the Lower Columbia River basin. On the order of one-half of the number live in the larger population centers of Walla Walla, Pendleton, Bend, The Dalles, Vancouver, Camas and Longview-Kelso. The remainder is scattered in small communities throughout the basin.

Development of the Columbia River was only minor prior to 1933. Early use of the river was limited to upstream irrigation and power generation projects. Most early shipping was confined to waters below Vancouver, Washington. The Great Depression preceded federal programs to stimulate economic stability through hydro-electric projects such as Grand Coulee Dam in the Upper Columbia River and Bonneville Dam.

Climate

The climate of the Lower Columbia Basin is largely controlled by maritime air masses moving from the Pacific Ocean to the east. The orographic effect of the Coast and Cascade Ranges is the predominant factor in the distribution of precipitation in the western portions of the basin. Annual precipitation in the Coastal Range crests averaged from 230 to 500 centimeters (90 to 200 inches). In the valley between the ranges it drops to 100 to 125 centimeters

(40 to 50 inches) or less and then increases again up to 80 to 100 inches in the Cascades. East of the Cascades, annual precipitation may be as low as 23 centimeters (9 inches) in areas such as the John Day drainage south of the Columbia River. However the orographic effect of the Blue Mountains is to raise annual precipitation to 90 to 100 centimeters (35 to 40 inches) in the area south and east of Pendleton.

Hydrologic Framework

The Columbia River basin below Pasco makes a major direction change as it flows easterly through Pasco and turns to the west as it proceeds towards the Pacific Ocean along the Oregon border. The Columbia is joined by the Snake River below Pasco which drains approximately 285,000 km^2 (110,000 sq. mi), compared to a total Columbia River drainage of about 554,000 km^2 (214,000 sq. mi.) at McNary Dam which is about 40 river miles below Pasco. At the mount, the Columbia River drains a total area of 671,000 km^2 (259,000

Tributaries on the north side of the Columbia between Pasco and The Dalles drain from a narrow band about 48 km (30 mi.) wide which extends to the southern boundry of the Yakima River. The Klickitat and White Salmon Rivers enter below The Dalles and contain drainage from the eastern Cascade Range north of the Columbia River. Further inflow on the north is contributed by both the Lewis and Cowlitz Rivers which drain southwesterly from the Cascade Range.

The tributaries of the Columbia River below Pasco entering from the south side drain a much greater area than those of the north. The three largest are the John Day River, the Deschutes River and the Willamette River. The John Day River is the most eastern of the three and drains northwesternly from the B lue Mountains. The Deschutes River drains the central part of the state collecting flow from the east side of the Cascade Range . The Willamette River extends from the Cascade Range on the east to the Coast Range on the west. It drains from approximately 240 km (150 mi.) south of the Columbia River and contains about 28,500 km^2 (11,000 sq. mi.). The Willamette River will be examined exlusively in another report.

Several dams interrupt the natural flow of the Columbia River. Bonneville Dam is the farthest downstream at river mile 145. McNary Dam, at river mile 292, was begun in 1947 and is the farthest upsteam below Pasco. The Dalles Dam was constructed from 1952 to 1960 and is at river mile 192.5. The last of the four Lower Columbia River dams constructed by the Corps of Engineers is John Day Dam, built from 1959 to 1963 and located at river mile 216. All four dams are basically navigation and run-of-the-river power projects with only minor storage for flood control and seasonal flow regulation.

Most rainfall and runoff in the Basin occurs in the winter months. Winter temperatures are low enough to produce heavy snowfall and even small glaciers on the higher peaks of the Cascades. The precipitation and temperature distributions produce interesting variations in monthly flow patterns in the basin. In areas west of the Cascades, such as Willamette, Cowlitz and Lewis basins, the winter precipitation contributes to runoff more directly than in other basins and results in peak runoff during November, December and January. In the middle of Oregon however, snowmelt is a larger factor in producing runoff and produces peak flows during April, May and June. The Columbia River displays this type of pattern also, but with an intermediate peak in February resulting from high rainfall. The major peak occurs in May and June, mostly as a result of snow-melt runoff.

The effect of tides is felt from the mouth as far upstream as Bonneville Dam. During periods of low flow, stage variations of over three feet are not uncommon at Vancouver, Washington and flow reversal has been measured near Prescott, Oregon (river mile 72).

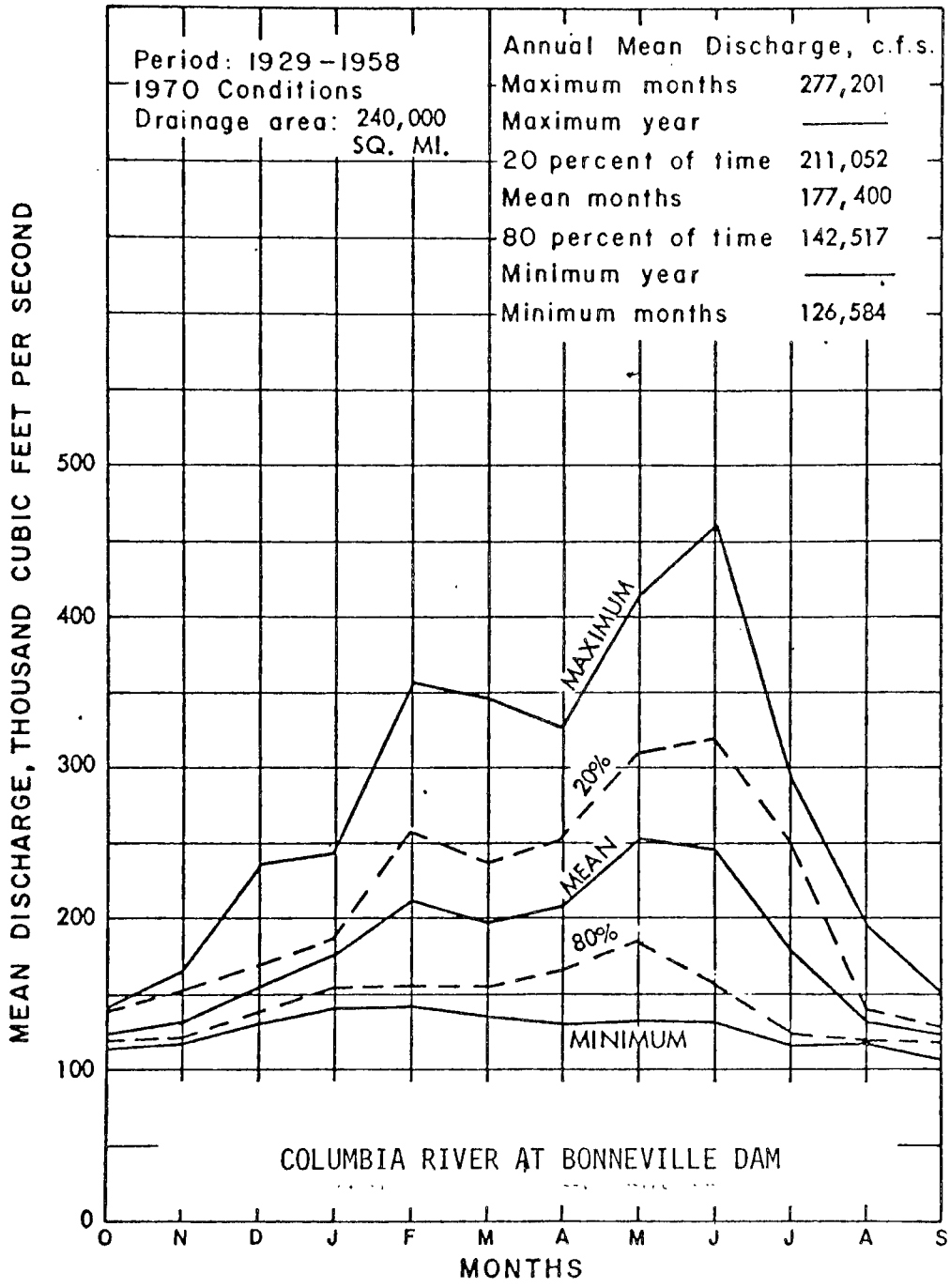


Figure 427 Monthly discharge, Mid-Columbia Subregion

LOWER COLUMBIA RIVER

1. Drainage Area - 245,103 sq. miles
2. Mainstem Mileages - 0.0 RM - 334.0 RM
3. Projected Population - 1980 539.3 2000 671.3 2020 845.7
4. Water Supplies from Mainstem - 1
5. Average Discharge - 239,677 cfs
6. Average Precipitation - 31.04 inches

RESERVOIRS HAVING A TOTAL CAPACITY
OF 5,000 ACRE-FEET OR MORE - LOWER COLUMBIA BASIN

Name	Stream	Total Storage (Acre-feet)	Active Storage (Acre-feet)	Surface Area (Acres)	Purpose[1]
Bonneville	Columbia R.	537,000	87,000	20,400	NPR
Clear Lake	Clear Lk.	13,100	11,900	555	IR
Cold Springs	Umatilla R.	45,000[2]	45,000[2]	1,550	IR
Crane Prairie	Deschutes R.	55,340	55,300	4,900	IR
Crescent Lake	Crescent Cr.	117,200	86,050	-	IR
Haystack	Haystack Cr.	5,650	5,630	225	I
Lake Umatilla	Columbia R.	2,530,000	530,000	51,000	FNPR
Lake Celilo	Columbia R.	330,000	53,000	11,650	INPR
Lake Wallula	Columbia R.	1,370,000	200,000	38,800	INPR
McKay	McKay Cr.	73,830	73,820	1,280	IR
Mill Creek	Mill Cr.	8,300	7,300	225	F
Ochoco	Ochoco Cr.	48,000	46,500	1,000	IR
Lake Simtustus	Deschutes R.	36,000	3,800	-	P
Prineville	Crooked R.	154,700	152,800	3,000	FIR
Lake Billy Chinook	Deschutes R.	534,700	273,900	4,000	P
Wickiup	Deschutes R.	182,100	182,100	10,600	IR
Lake Merwin	Lewis R.	421,600	246,000	3,920	P
Mayfield	Cowlitz R.	127,000	21,380	2,250	P
Davisson Lake	Cowlitz R.	1,586,000	1,297,000	-	P
Swift No. 1	Lewis R.	756,000	447,000	4,620	P
Yale	Lewis R.	401,780	189,530	3,780	MP

1 I-irrigation, F-flood control, N-navigation, P-power, R-recreation, M-Municipal
2 Reduced about 5,000 acre-feet by sedimentation.

AMBIENT PROFILE

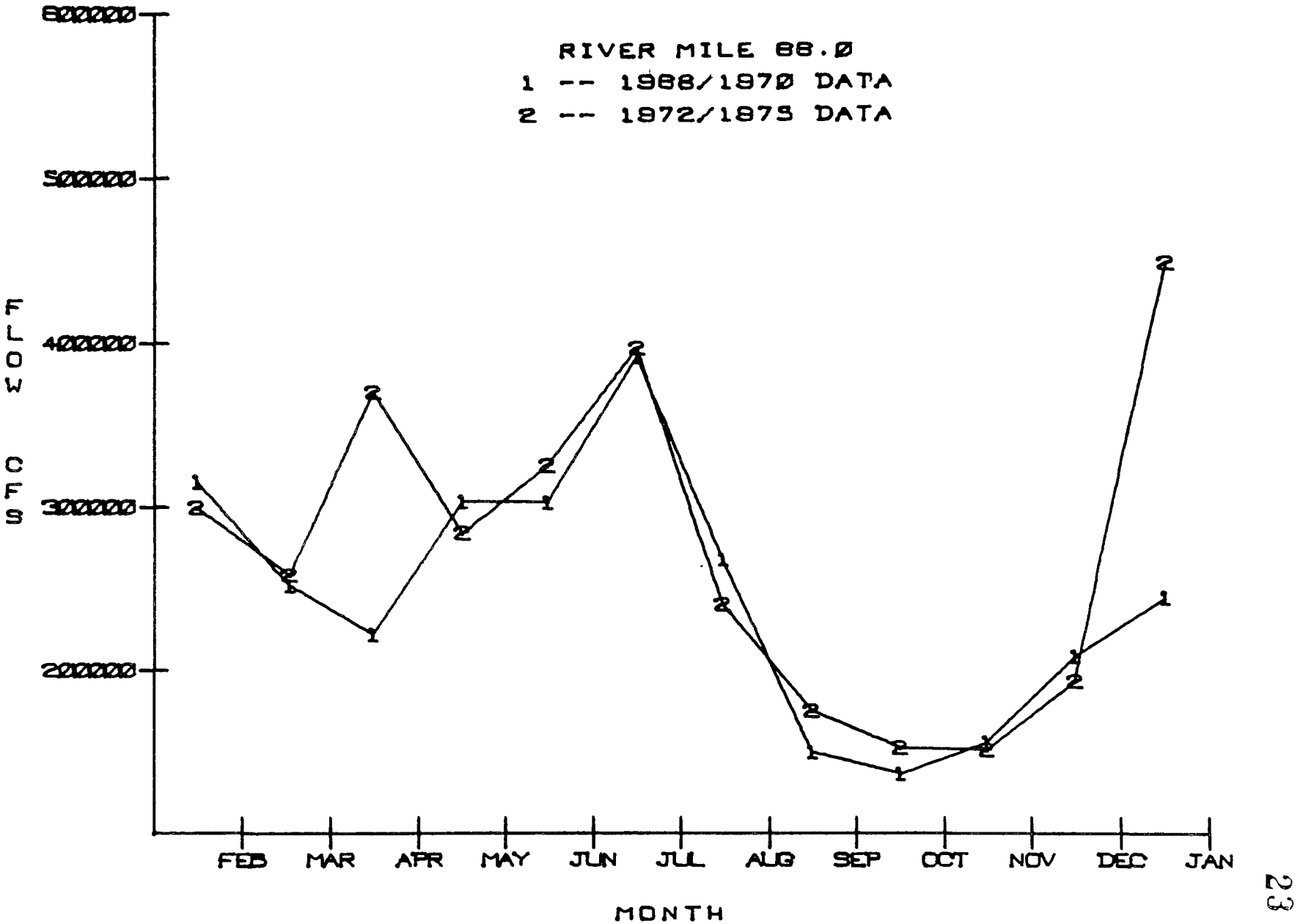
MAINSTEM COLUMBIA

Two stations Columbia River at Clatskanie and Columbia River at Bradwood were used as the two stations for trend comparision at the lower end of the river.

Columbia River at Clatskanie	River Mile 53.5
Columbia River at Bradwood	River Mile 39.0

All data is compiled from EPA data and are median values.

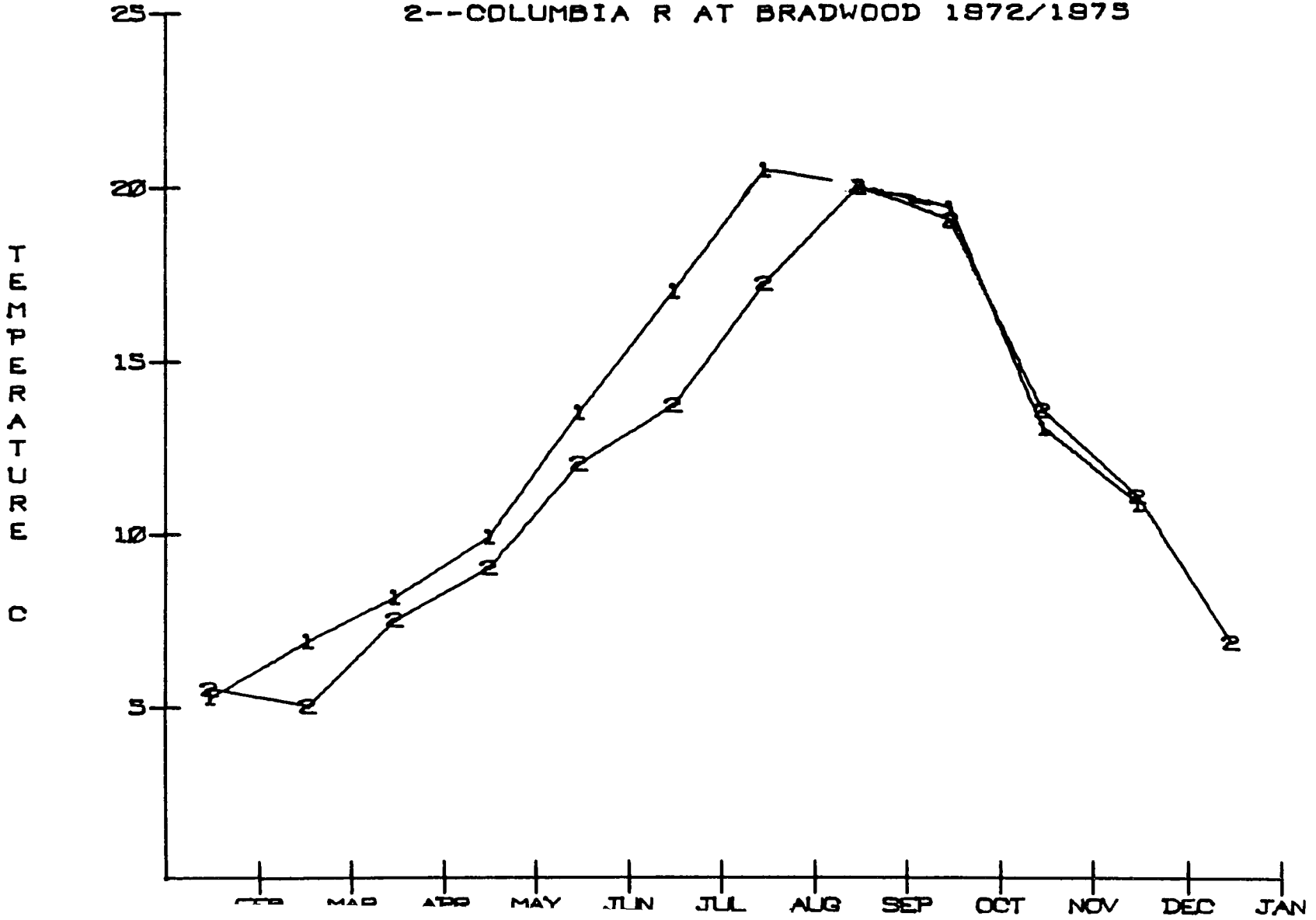
COLUMBIA RIVER BASIN

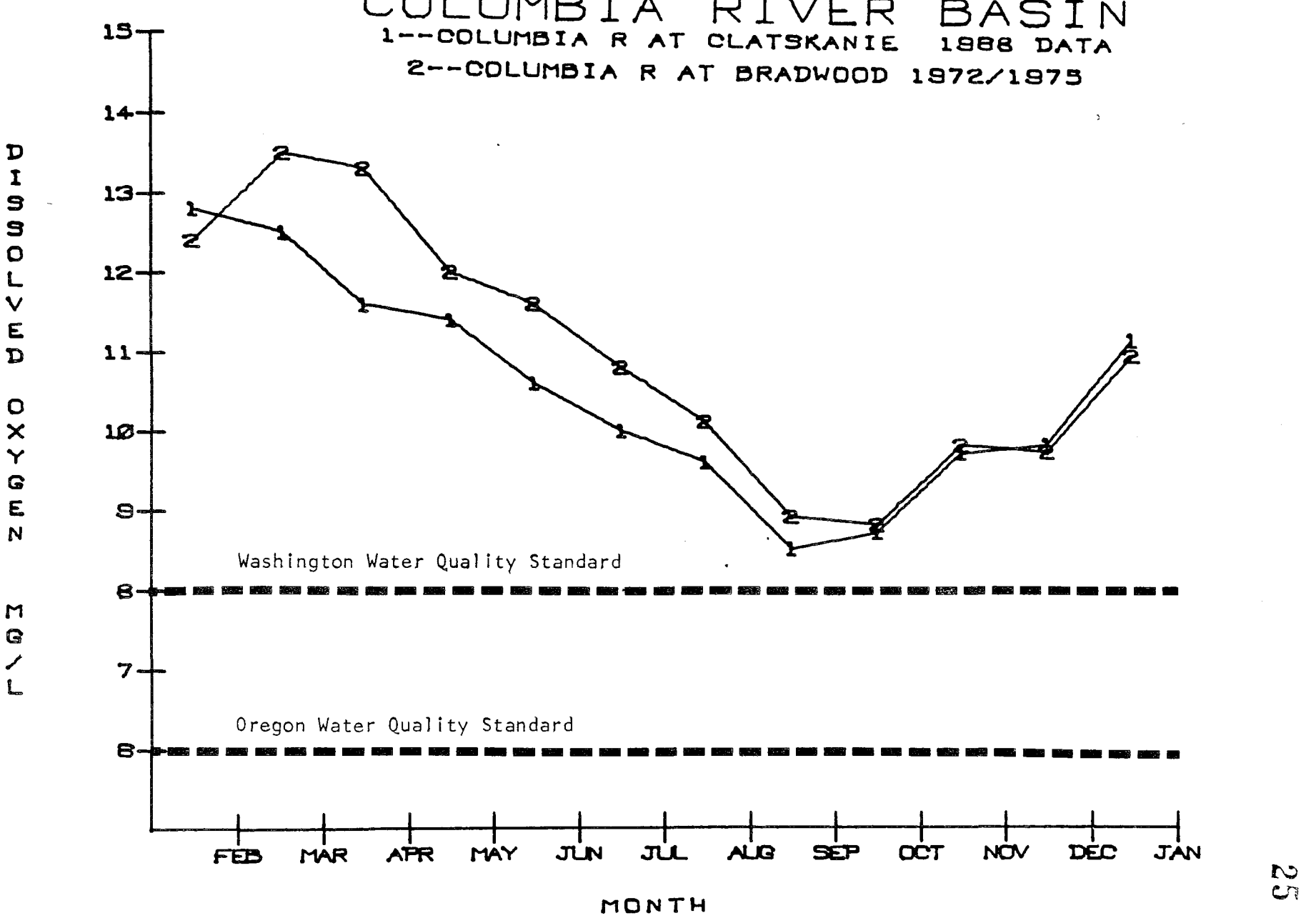


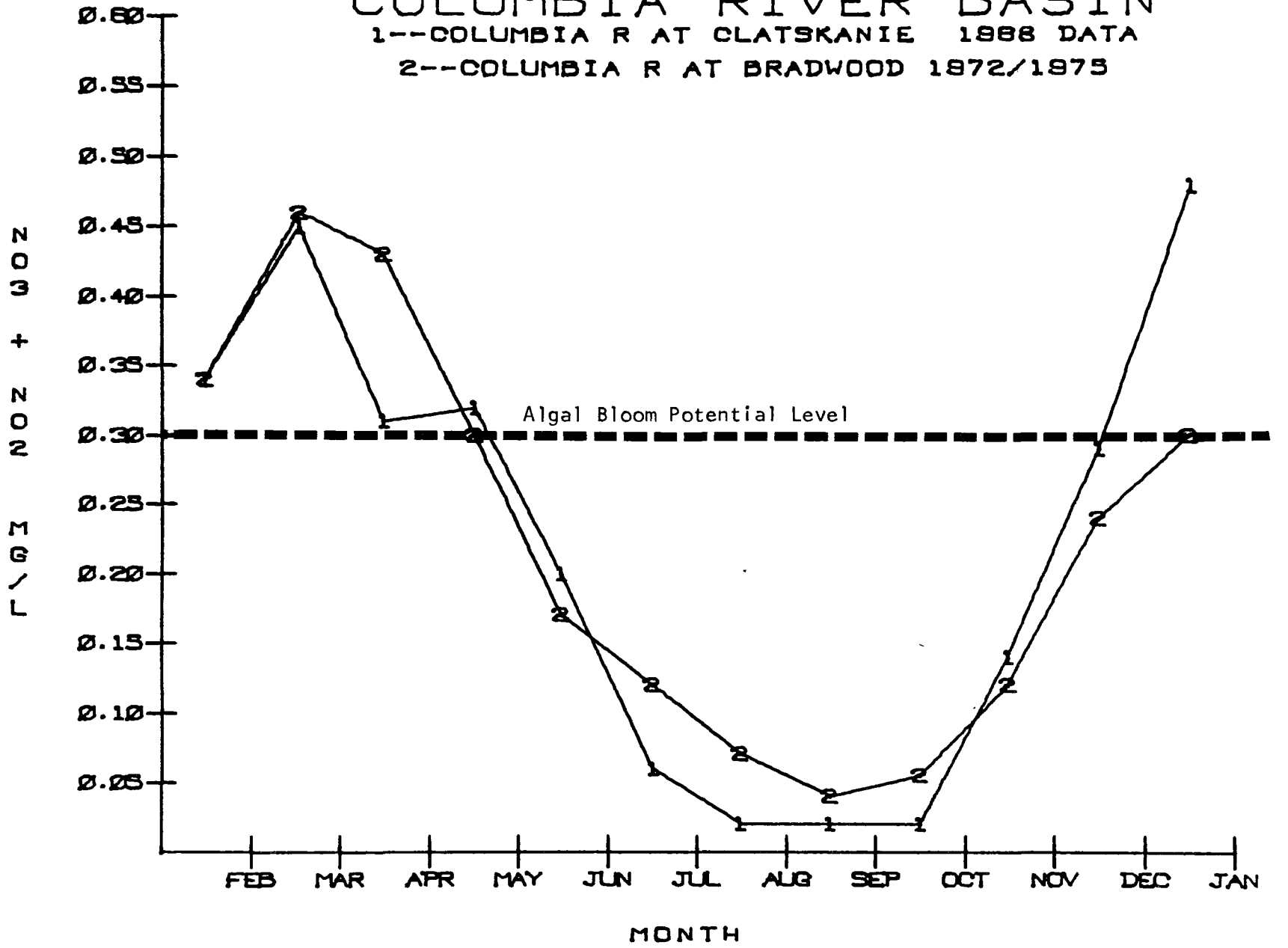
COLUMBIA RIVER BASIN

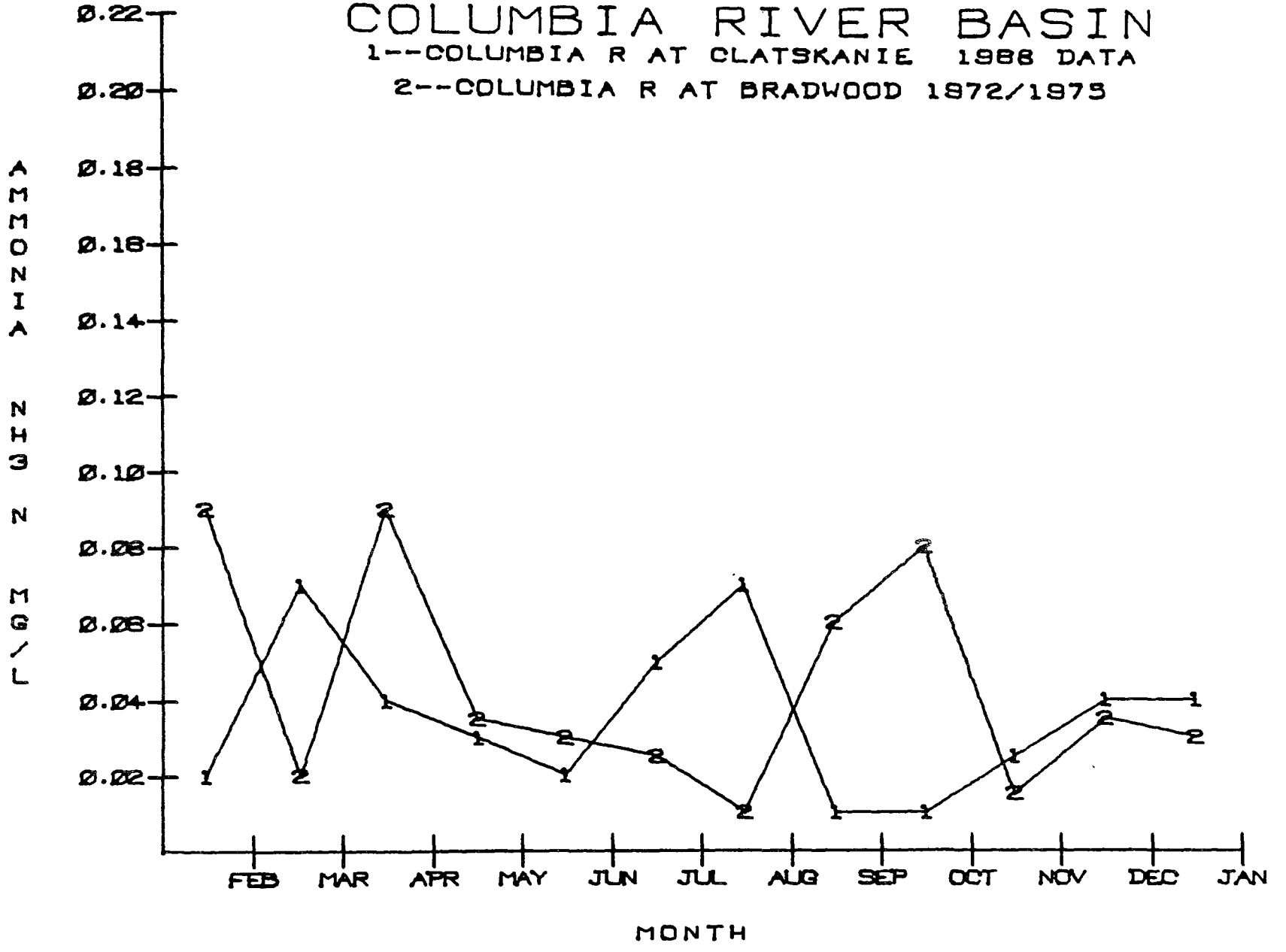
1--COLUMBIA R AT CLATSKANIE 1968 DATA

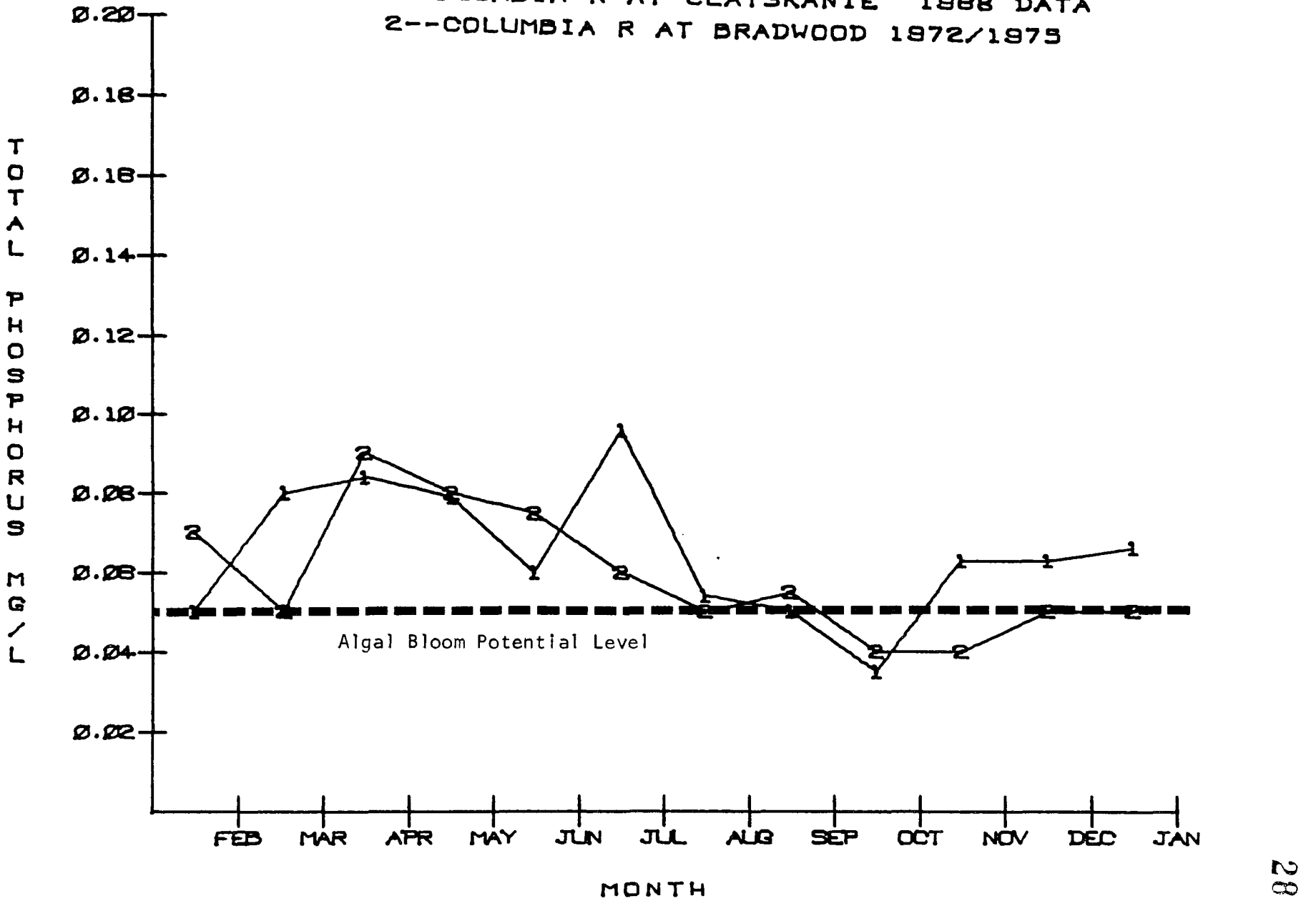
2--COLUMBIA R AT BRADWOOD 1972/1975




COLUMBIA RIVER BASIN
1--COLUMBIA R AT CLATSKANIE 1988 DATA
2--COLUMBIA R AT BRADWOOD 1972/1975
DISSOLVED OXYGEN MG/L
15
14
13
12
11
10
9
8
7
6
Washington Water Quality Standard
Oregon Water Quality Standard
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
JAN
MONTH


COLUMBIA RIVER BASIN
1--COLUMBIA R AT CLATSKANIE 1988 DATA
2--COLUMBIA R AT BRADWOOD 1972/1975
Ø.60
Ø.55
Ø.50
Ø.45
Ø.40
Ø.35
Ø.30
Ø.25
Ø.20
Ø.15
Ø.10
Ø.05
NO3 + NO2 MG/L
Algal Bloom Potential Level
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
JAN
MONTH


COLUMBIA RIVER BASIN
1--COLUMBIA R AT CLATSKANIE 1988 DATA
2--COLUMBIA R AT BRADWOOD 1972/1975
AMMONIA N H3 N MG\L
0.22
0.20
0.18
0.18
0.14
0.12
0.10
0.08
0.08
0.04
0.02
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
JAN
MONTH

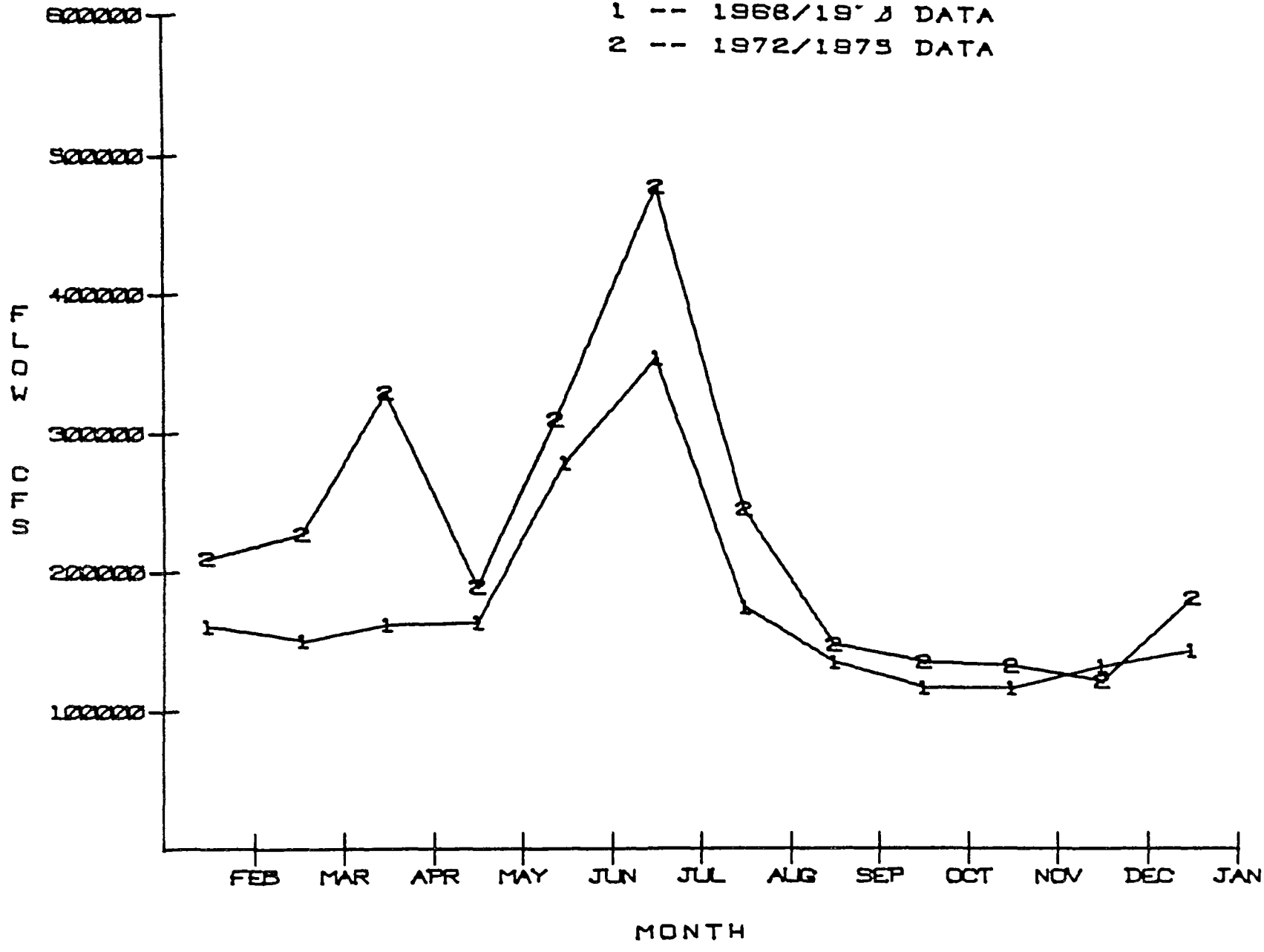

COLUMBIA RIVER BASIN
1--COLUMBIA R AT CLATSKANIE 1888 DATA
2--COLUMBIA R AT BRADWOOD 1972/1975
TOTAL PHOSPHORUS MG/L
Ø.20
Ø.18
Ø.18
Ø.14
Ø.12
Ø.10
Ø.08
Ø.06
Ø.04
Ø.02
Algal Bloom Potential Level
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
JAN
MONTH

LOWER COLUMBIA BASIN

COLUMBIA RIVER BLW BONNEVILLE DAM

1 -- 1968/19[illegible] DATA

2 -- 1972/1975 DATA

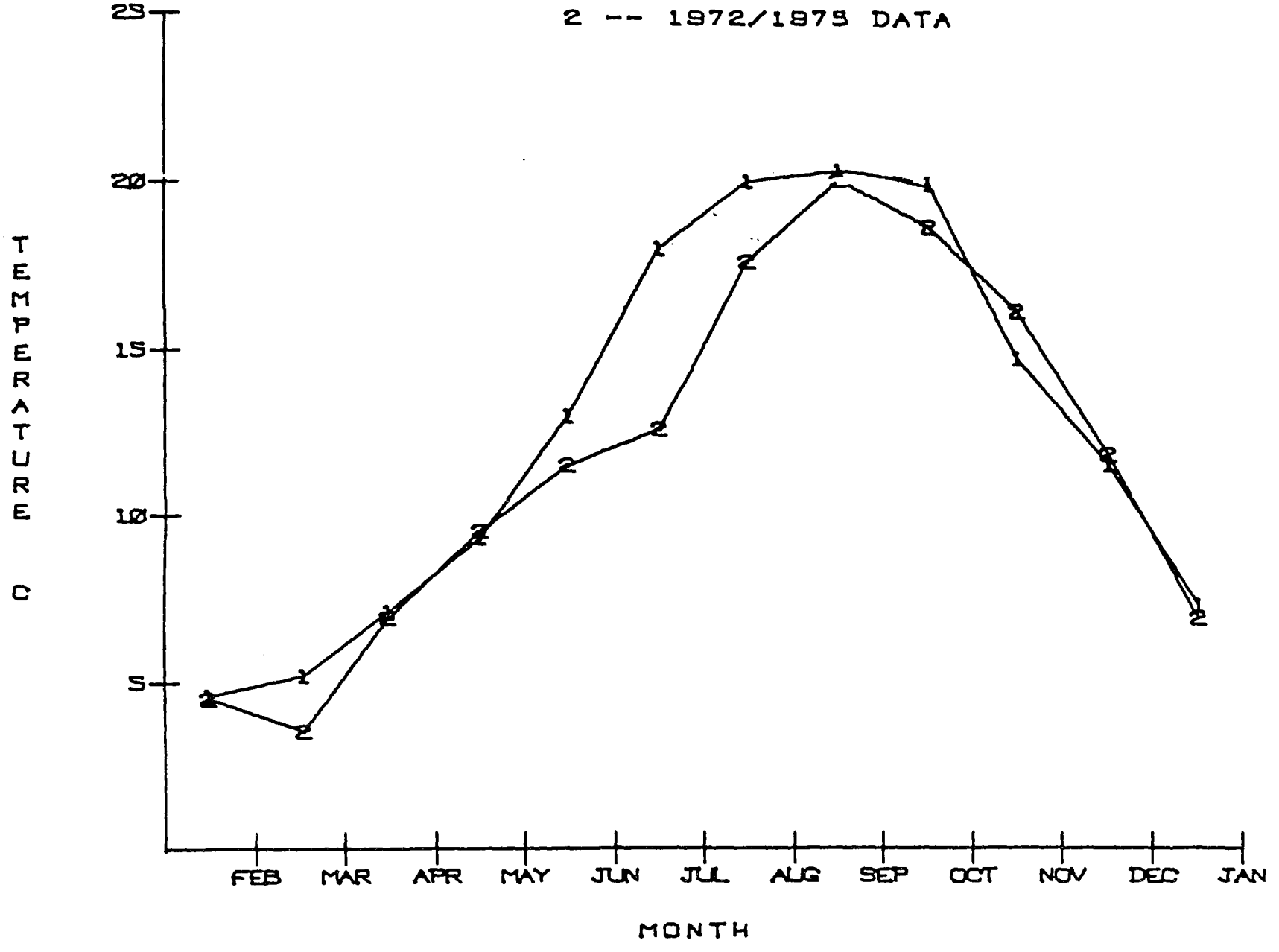


LOWER COLUMBIA BASIN

COLUMBIA RIVER BLW BONNEVILLE DAM

1 -- 1968/1970 DATA

2 -- 1972/1975 DATA

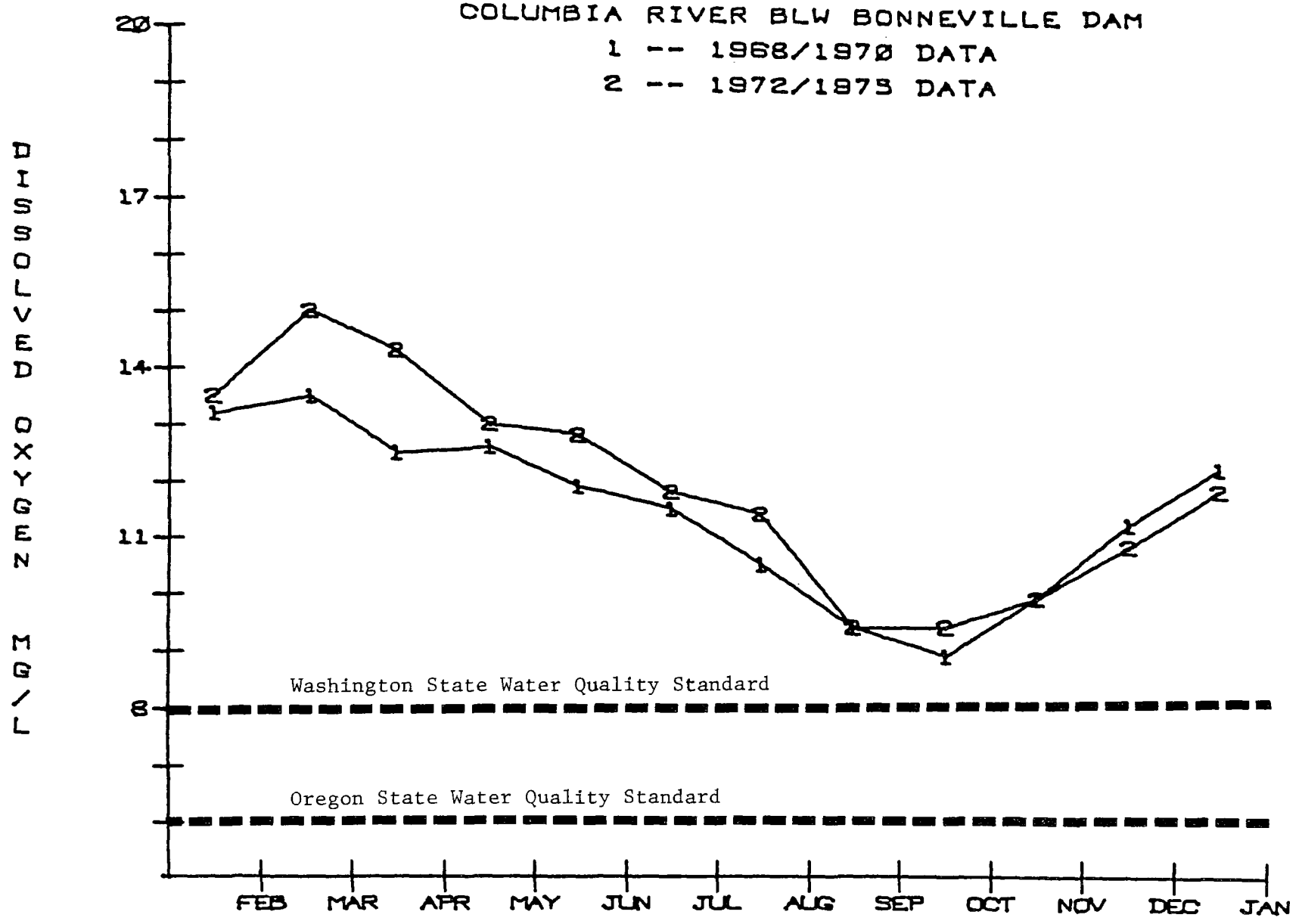


LOWER COLUMBIA BASIN

COLUMBIA RIVER BLW BONNEVILLE DAM

1 -- 1968/1970 DATA

2 -- 1972/1973 DATA

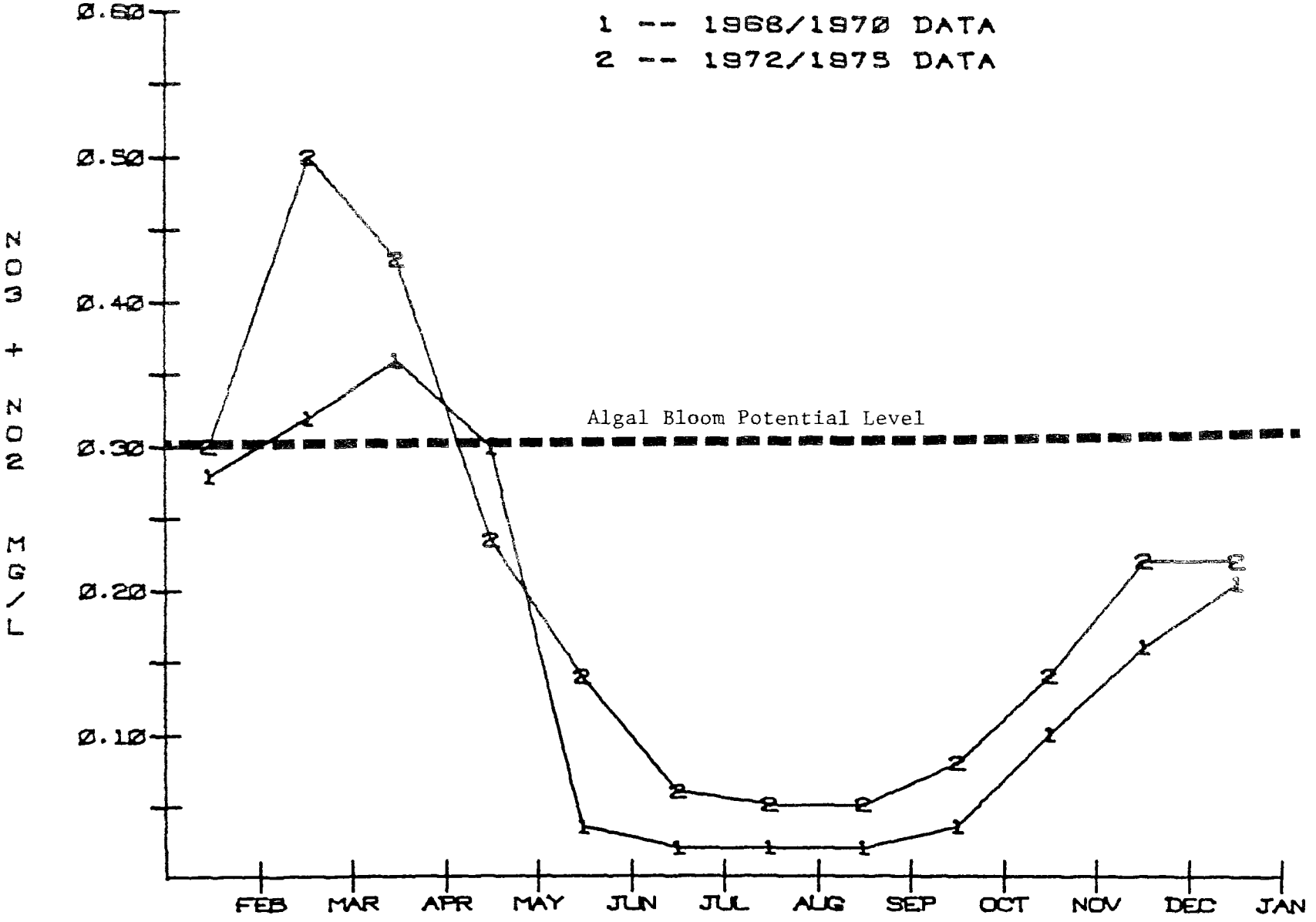


LOWER COLUMBIA BASIN

COLUMBIA RIVER BLW BONNEVILLE DAM

1 -- 1968/1970 DATA

2 -- 1972/1975 DATA

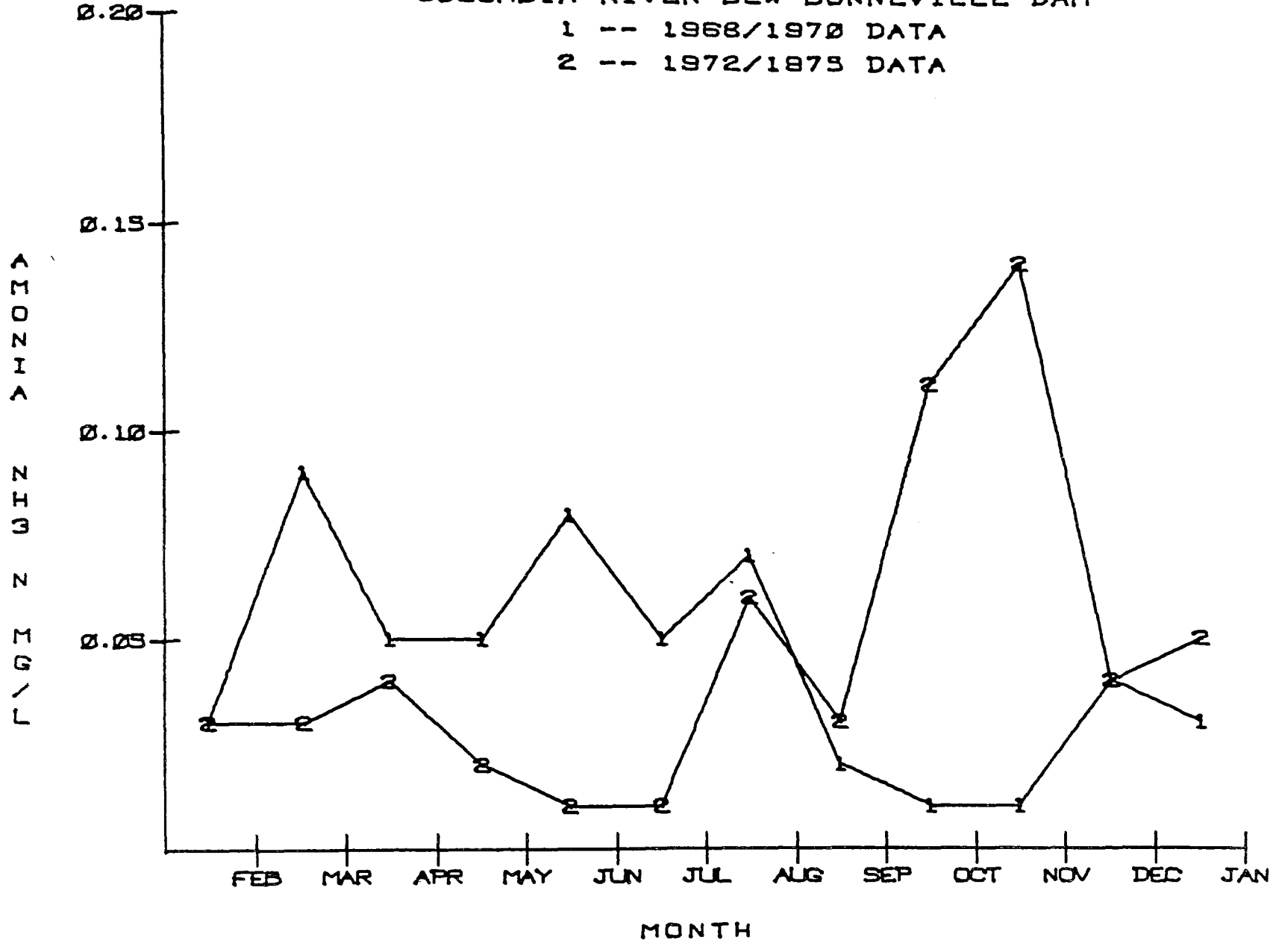


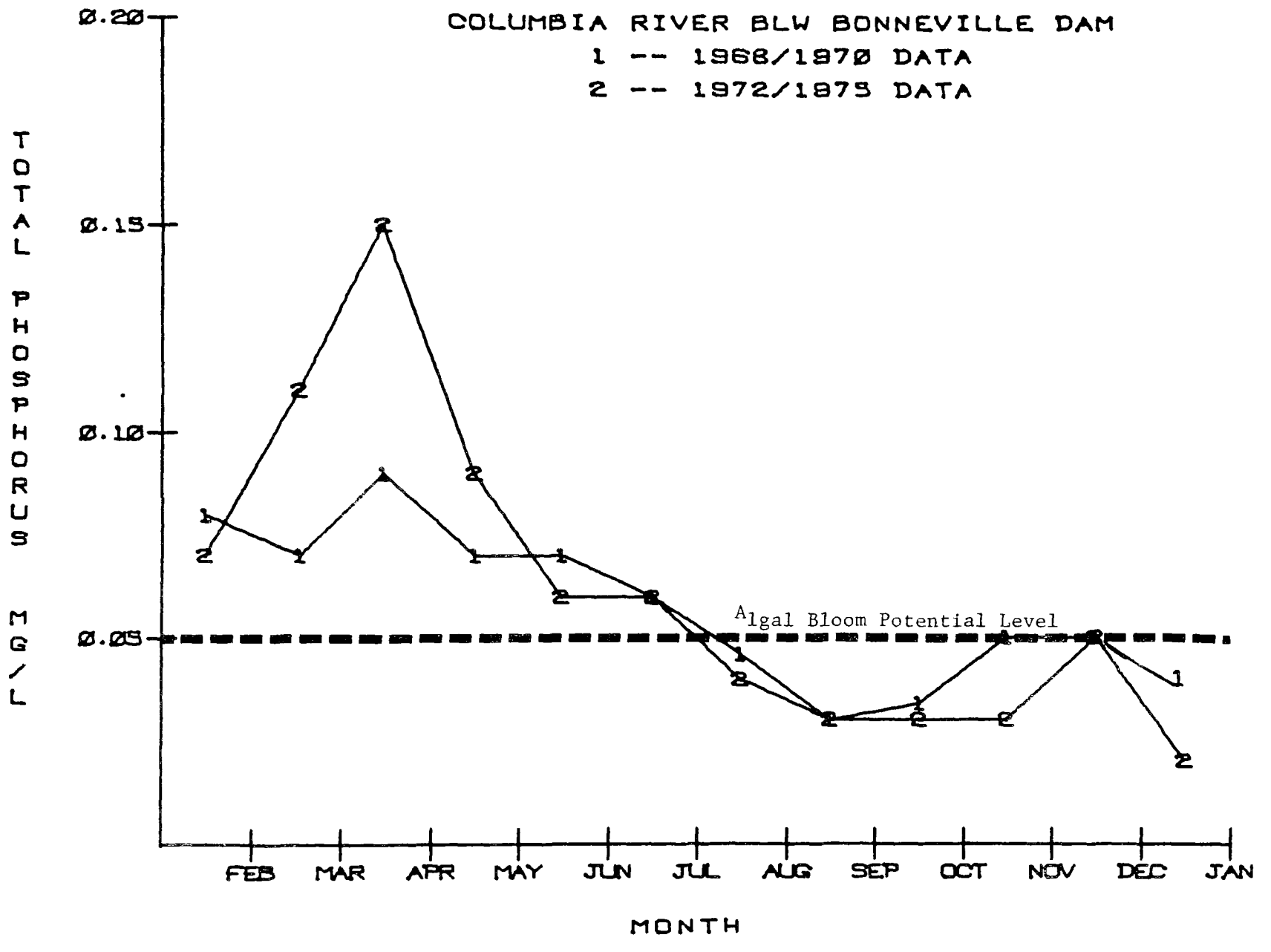
LOWER COLUMBIA BASIN

COLUMBIA RIVER BLW BONNEVILLE DAM

1 -- 1968/1970 DATA

2 -- 1972/1975 DATA




LOWER COLUMBIA BASIN
COLUMBIA RIVER BLW BONNEVILLE DAM
1 -- 1968/1970 DATA
2 -- 1972/1975 DATA
TOTAL PHOSPHORUS MG/L
Ø.20
Ø.15
Ø.10
Ø.05
Algal Bloom Potential Level
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
JAN
MONTH

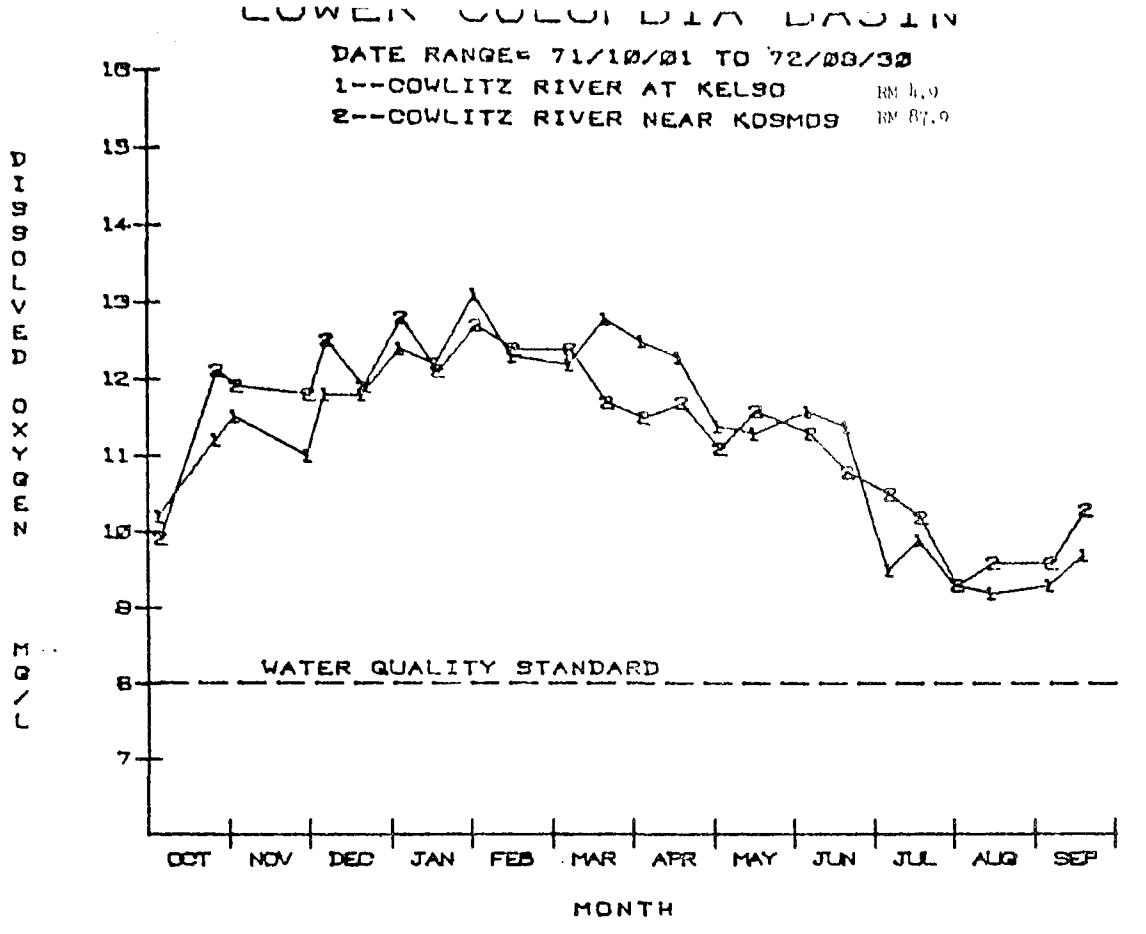
All data is compiled from DOE survey data and are median values.

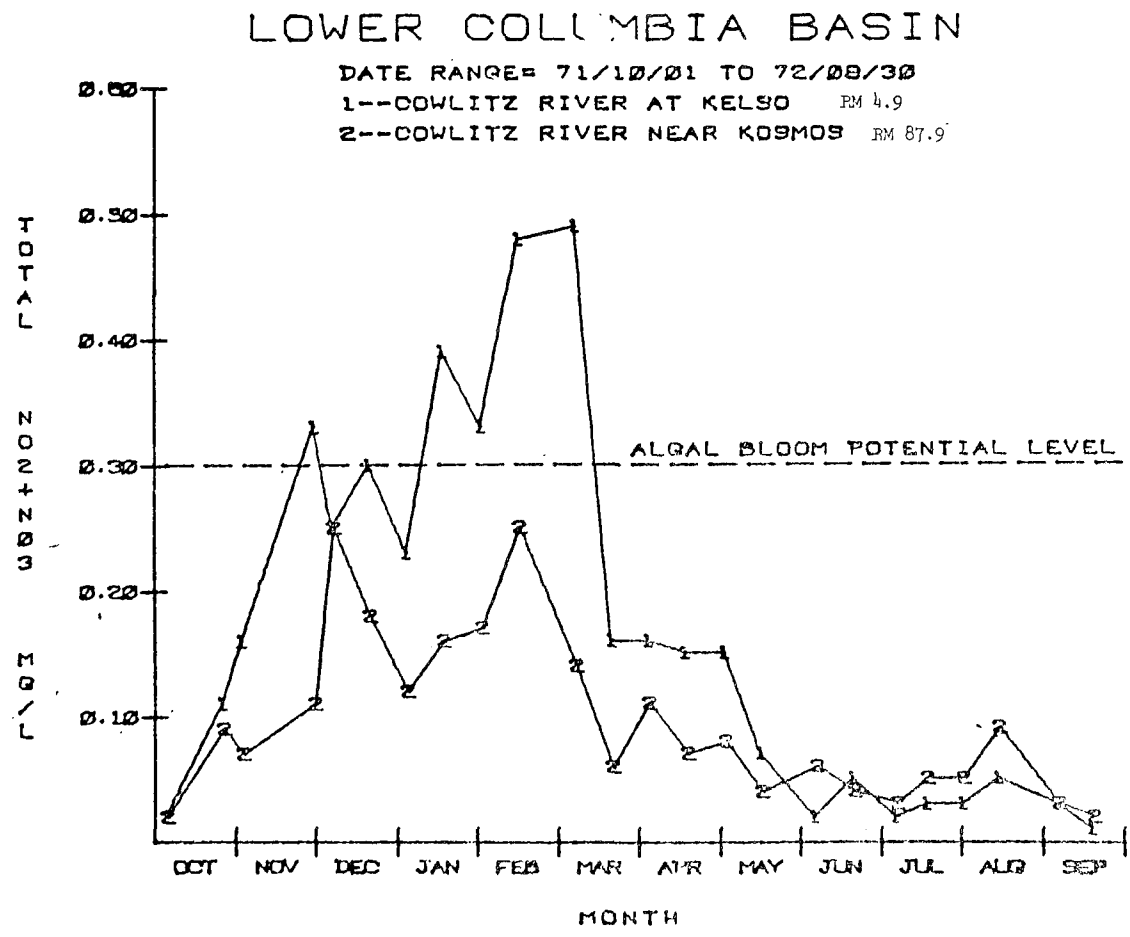
COWLITZ COLUMBIA ESTUARY

COWLITZ COLUMBIA ESTUARY

Segment Name	Segment Number	Class
Cowlitz River & Tribs.	12-26-04	WQ-NPS
Coweeman River & Tribs.	12-26-05	WQ-NPS
Grays Bay	12-25-01	EEF
Grays River	12-25-02	WQ-NPS
Elocohman	12-25-03	WQ-NPS

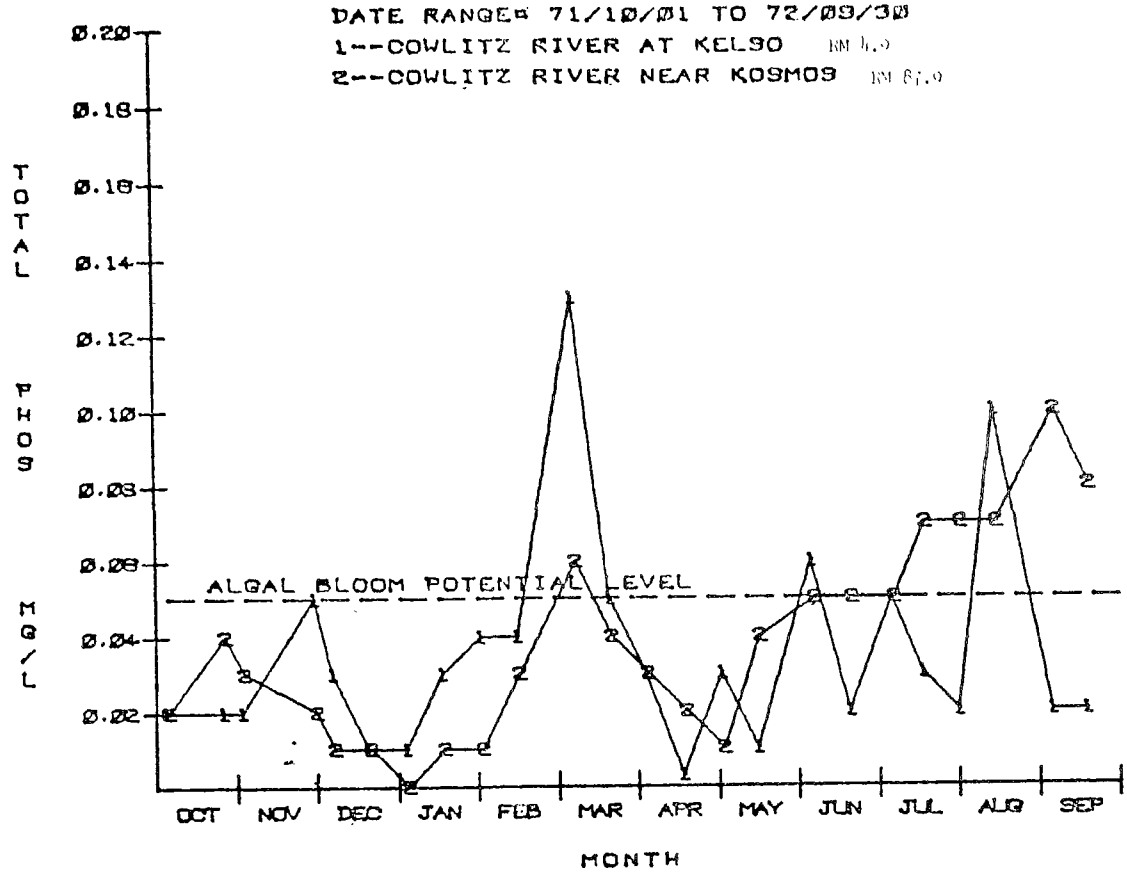
COWLITZ RIVER


LOWER COLUMBIA BASIN
DATE RANGE= 71/10/01 TO 72/09/30
1--COWLITZ RIVER AT KELSO RM 4.9
2--COWLITZ RIVER NEAR KOSMOS RM 87.9
DISSOLVED OXYGEN MG/L
16
15
14
13
12
11
10
9
8
7
WATER QUALITY STANDARD
OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP
MONTH


LOWER COLUMBIA BASIN
DATE RANGE= 71/10/01 TO 72/09/30
1--COWLITZ RIVER AT KELSO RM 4.9
2--COWLITZ RIVER NEAR KOSMOS RM 87.9
TOTAL NO2+NO3 MG/L
0.60
0.50
0.40
0.30
0.20
0.10
ALGAL BLOOM POTENTIAL LEVEL
OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP
MONTH

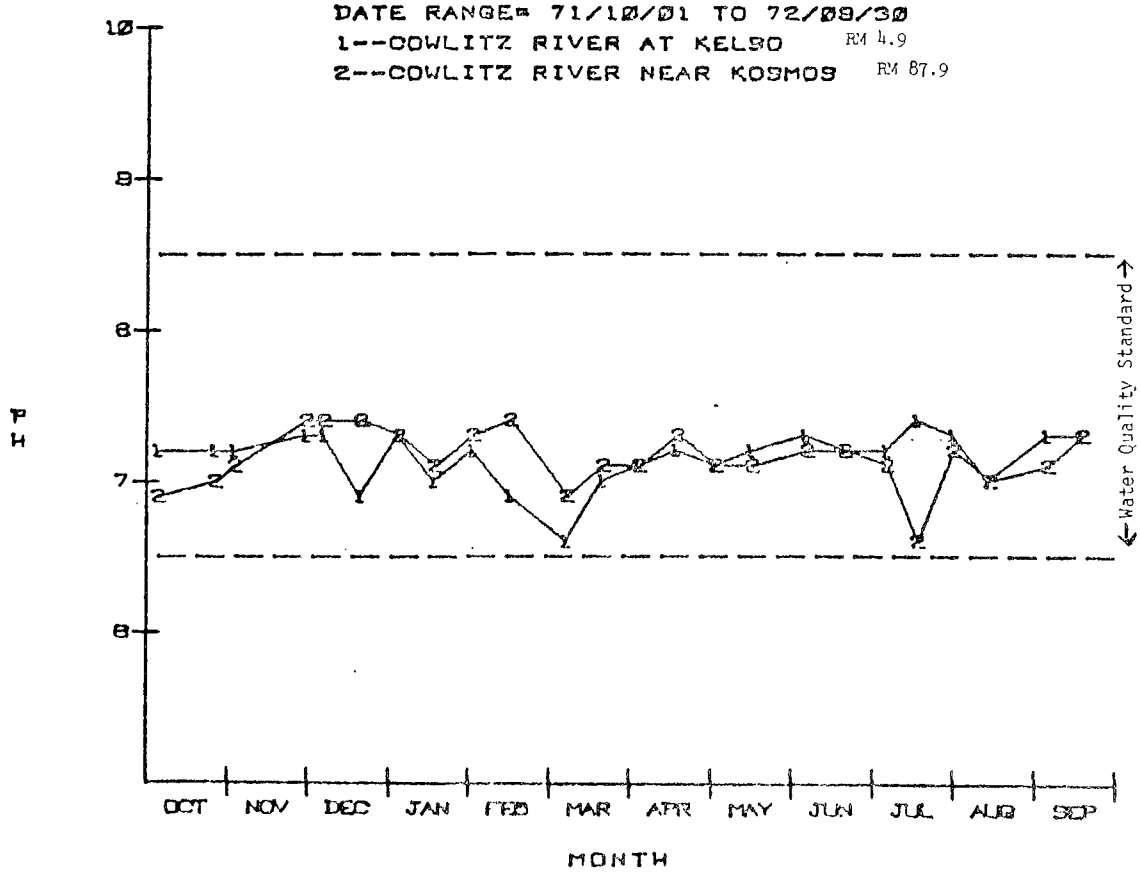
LOWER COLUMBIA BASIN

DATE RANGE= 71/10/01 TO 72/09/30
1--COWLITZ RIVER AT KELSO RM 4.9
2--COWLITZ RIVER NEAR KOSMOS RM 87.9



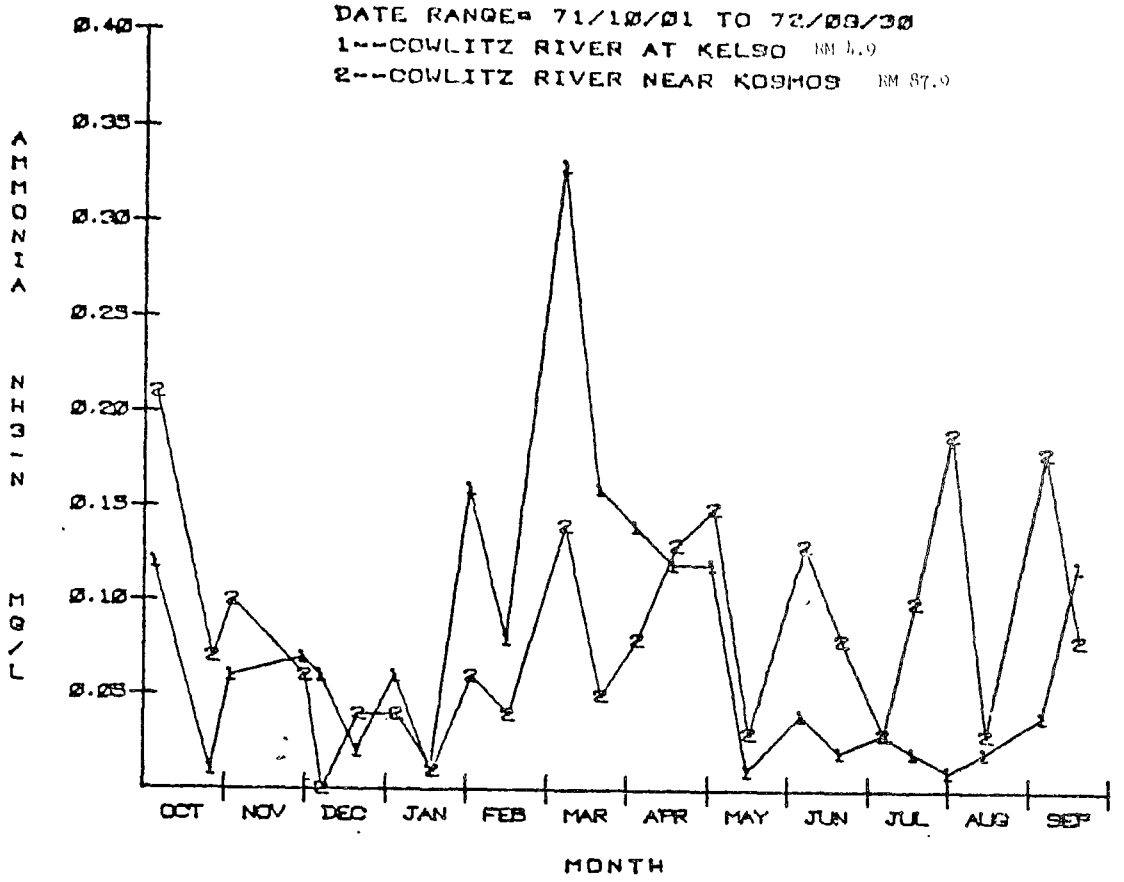
LOWER COLUMBIA BASIN

DATE RANGE= 71/10/01 TO 72/09/30
1--COWLITZ RIVER AT KELSO RM 4.9
2--COWLITZ RIVER NEAR KOSMOS RM 87.9



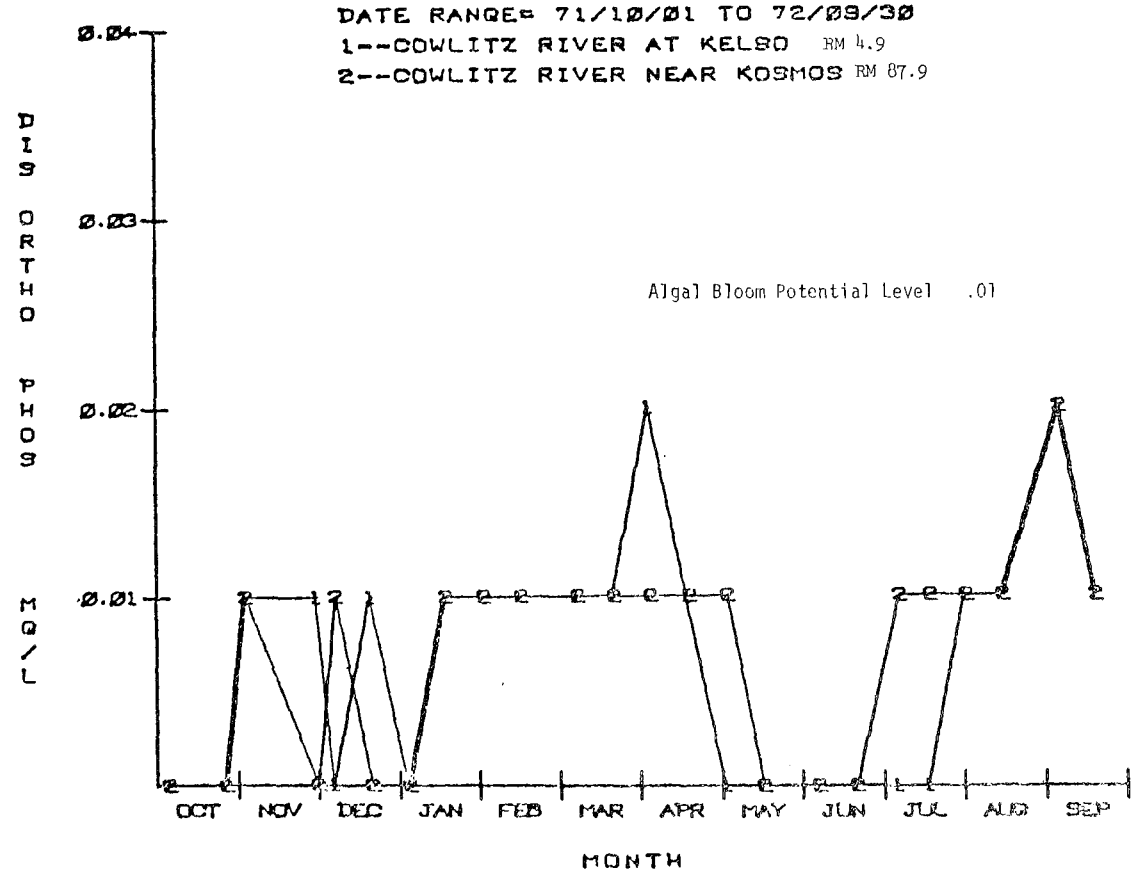
LOWER COLUMBIA BASIN

DATE RANGE= 71/10/01 TO 72/09/30
1--COWLITZ RIVER AT KELSO RM 4.9
2--COWLITZ RIVER NEAR KOSMOS RM 87.9



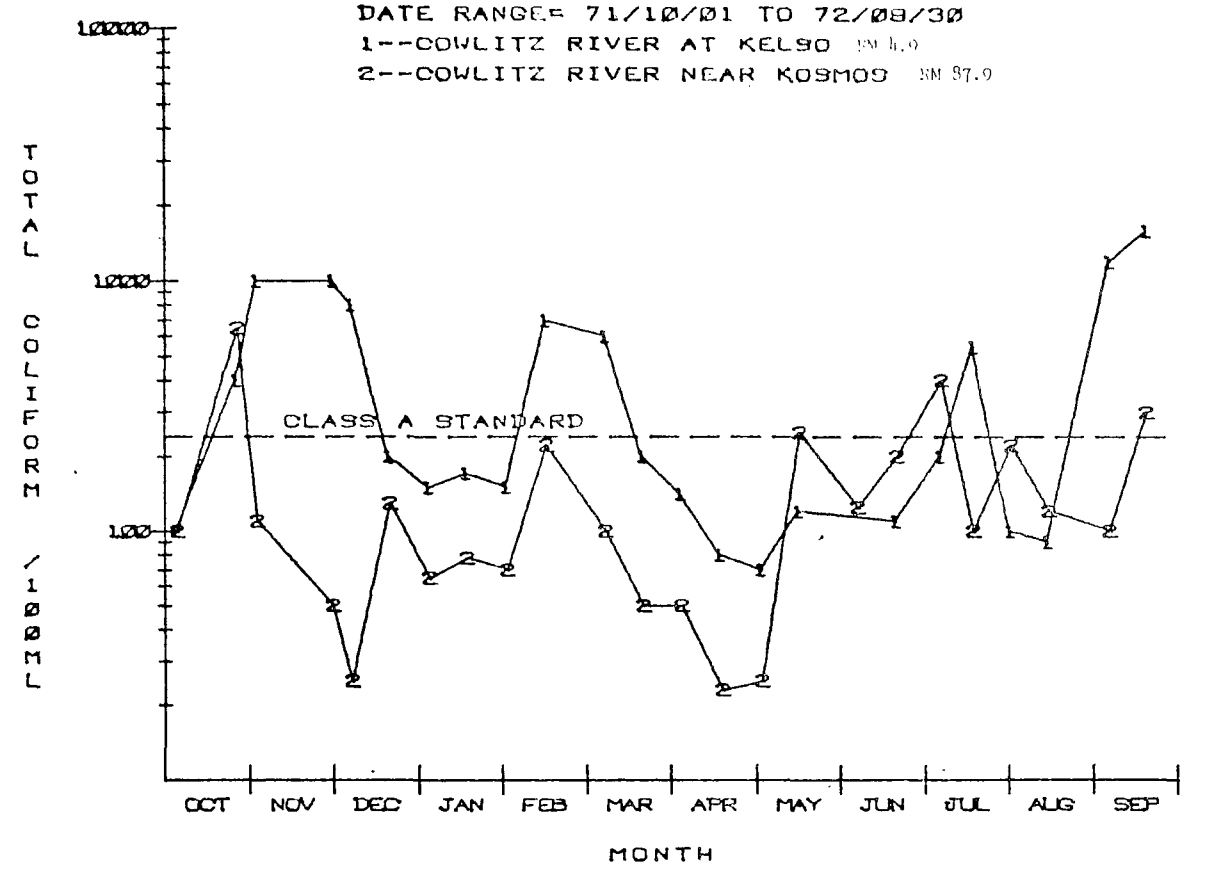
LOWER COLUMBIA BASIN

DATE RANGE= 71/10/01 TO 72/09/30
1--COWLITZ RIVER AT KELSO RM 4.9
2--COWLITZ RIVER NEAR KOSMOS RM 87.9



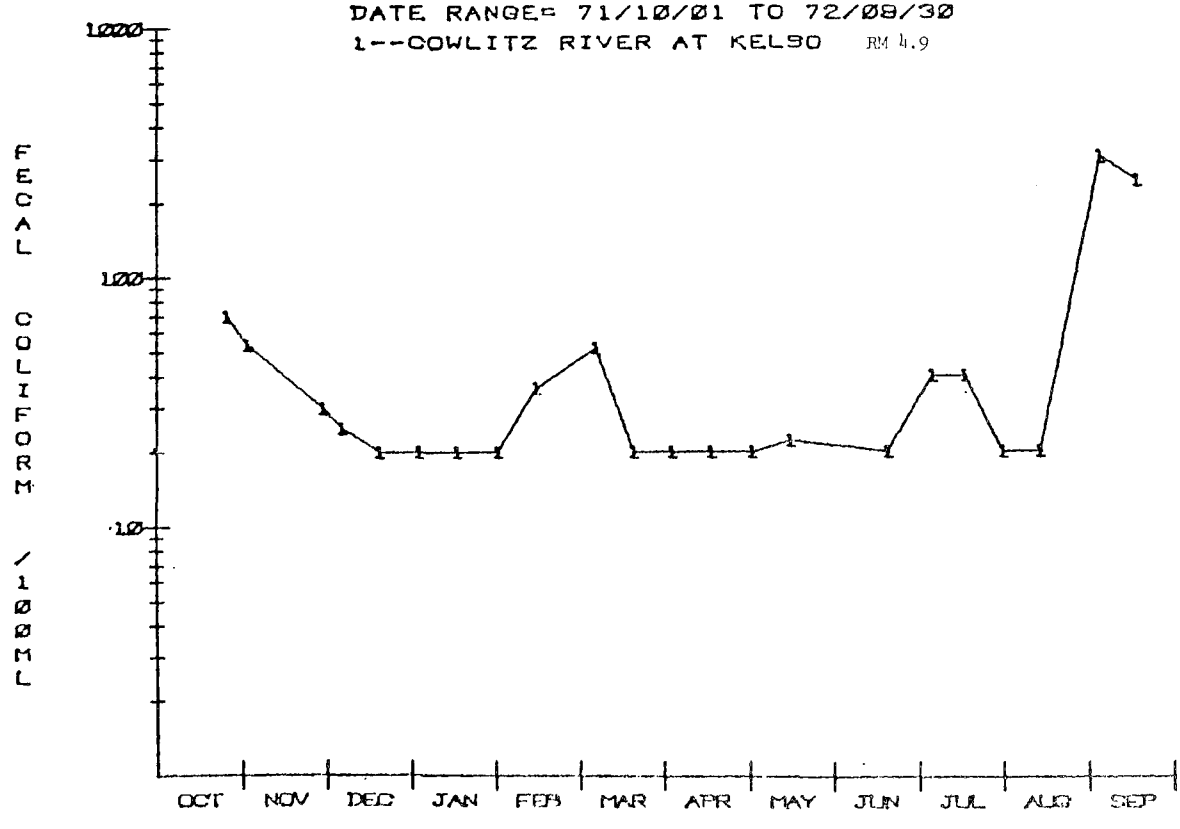
LOWER COLUMBIA BASIN

DATE RANGE= 71/10/01 TO 72/08/30
1--COWLITZ RIVER AT KELSO RM 4.9
2--COWLITZ RIVER NEAR KOSMOS RM 87.9



LOWER COLUMBIA BASIN

DATE RANGE= 71/10/01 TO 72/08/30
1--COWLITZ RIVER AT KELSO RM 4.9

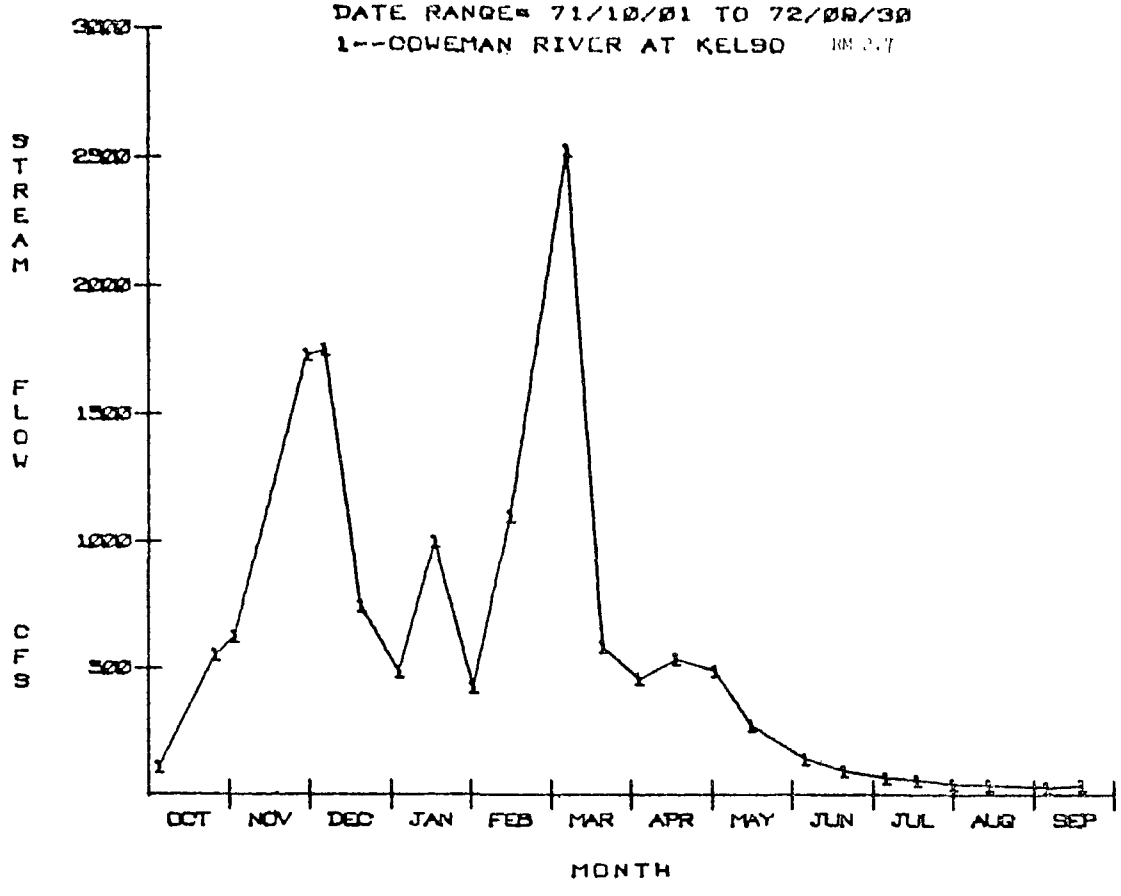


COWEEMAN RIVER

LOWER COLUMBIA BASIN

DATE RANGE= 71/10/01 TO 72/09/30

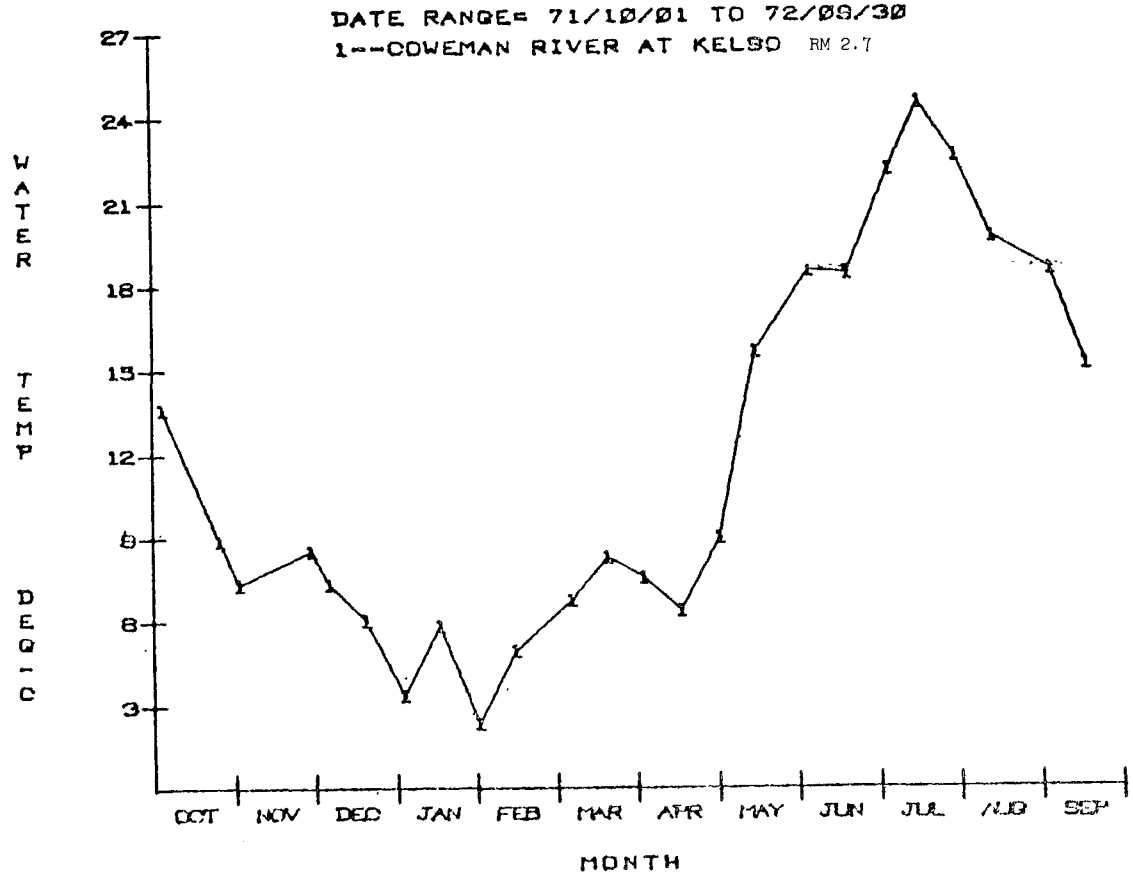
1--COWEMAN RIVER AT KELSO RM 2.7



LOWER COLUMBIA BASIN

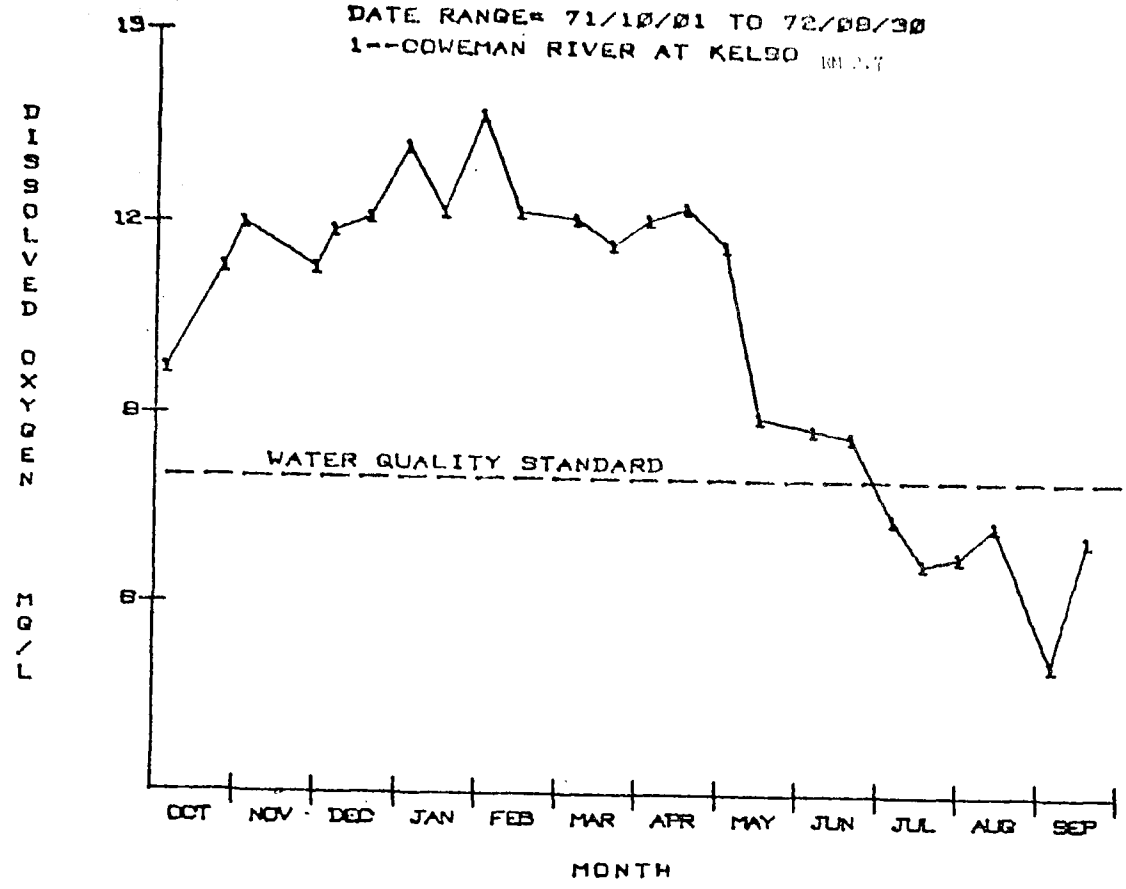
DATE RANGE= 71/10/01 TO 72/09/30

1--COWEMAN RIVER AT KELSO RM 2.7



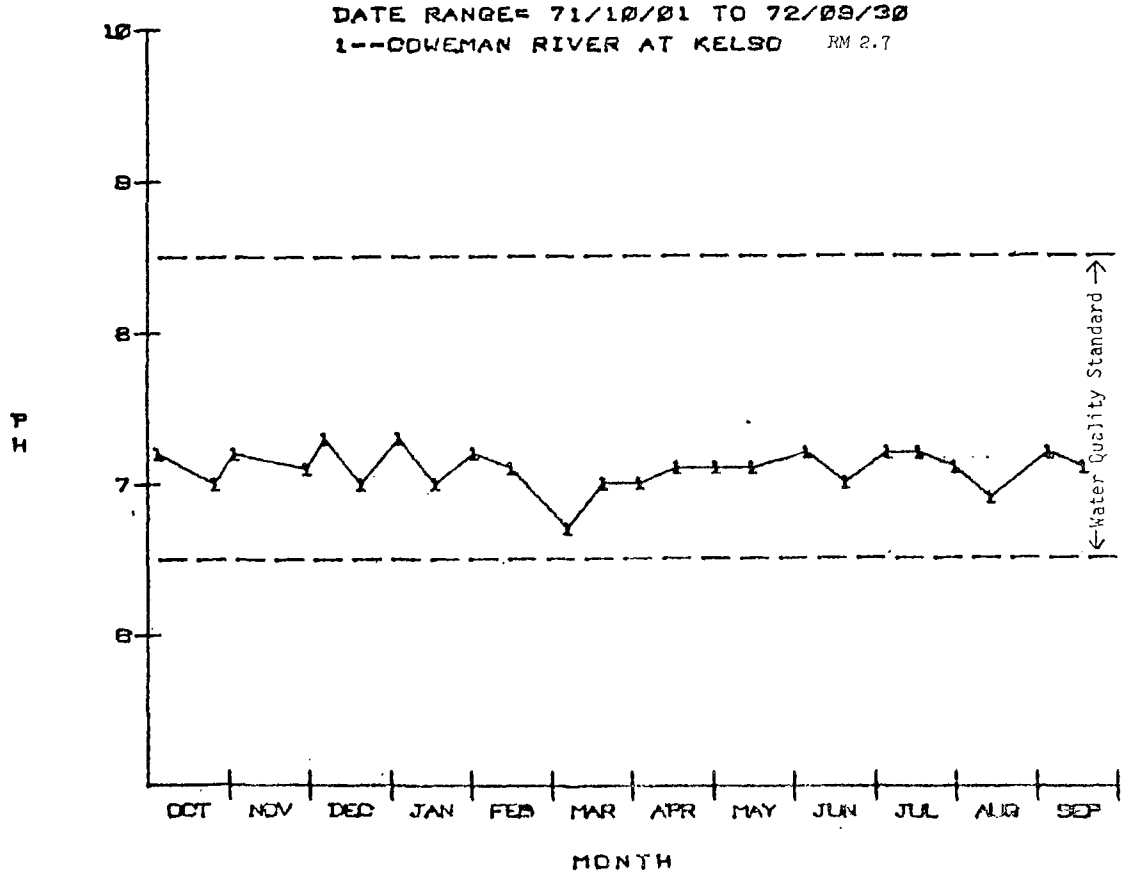
LOWER COLUMBIA BASIN

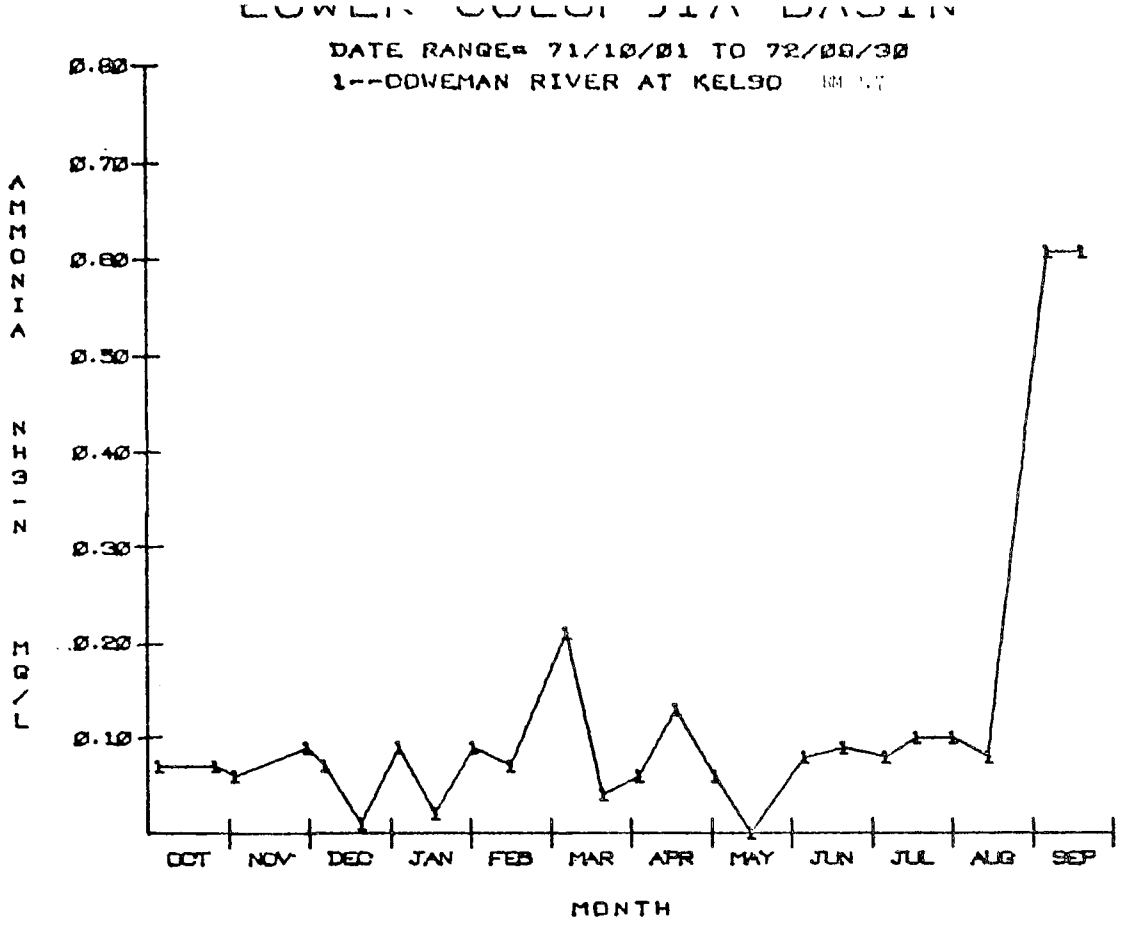
DATE RANGE= 71/10/01 TO 72/09/30
1--COWEMAN RIVER AT KELSO RM 2.7

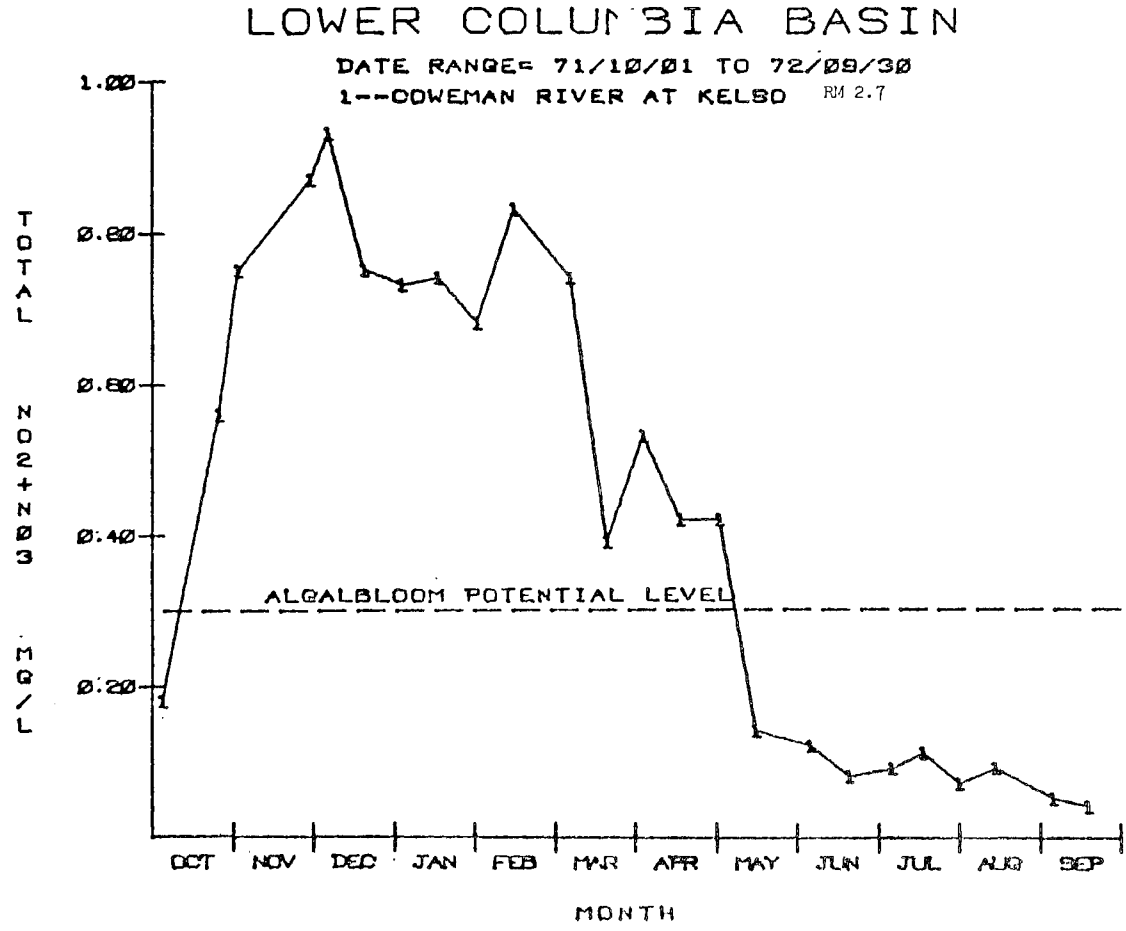


LOWER COLUMBIA BASIN

DATE RANGE= 71/10/01 TO 72/09/30
1--COWEMAN RIVER AT KELSO RM 2.7

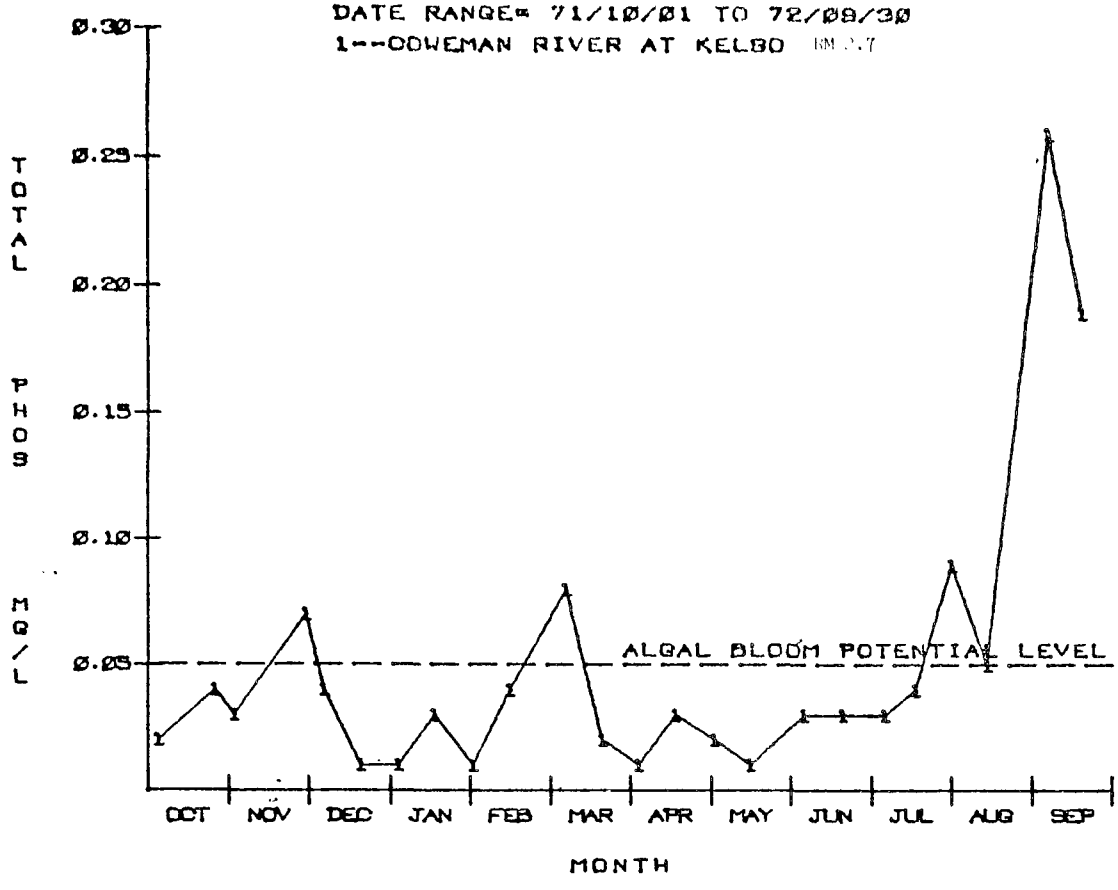



LOWER COLUMBIA BASIN
DATE RANGE= 71/10/01 TO 72/09/30
1--ODWEMAN RIVER AT KELSO RM 2.7
AMMONIA NH3-N MG/L
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP
MONTH


LOWER COLUMBIA BASIN
DATE RANGE= 71/10/01 TO 72/09/30
1--ODWEMAN RIVER AT KELSO RM 2.7
TOTAL NO2+NO3 MG/L
1.00
0.80
0.60
0.40
0.20
ALGALBLOOM POTENTIAL LEVEL
OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP
MONTH

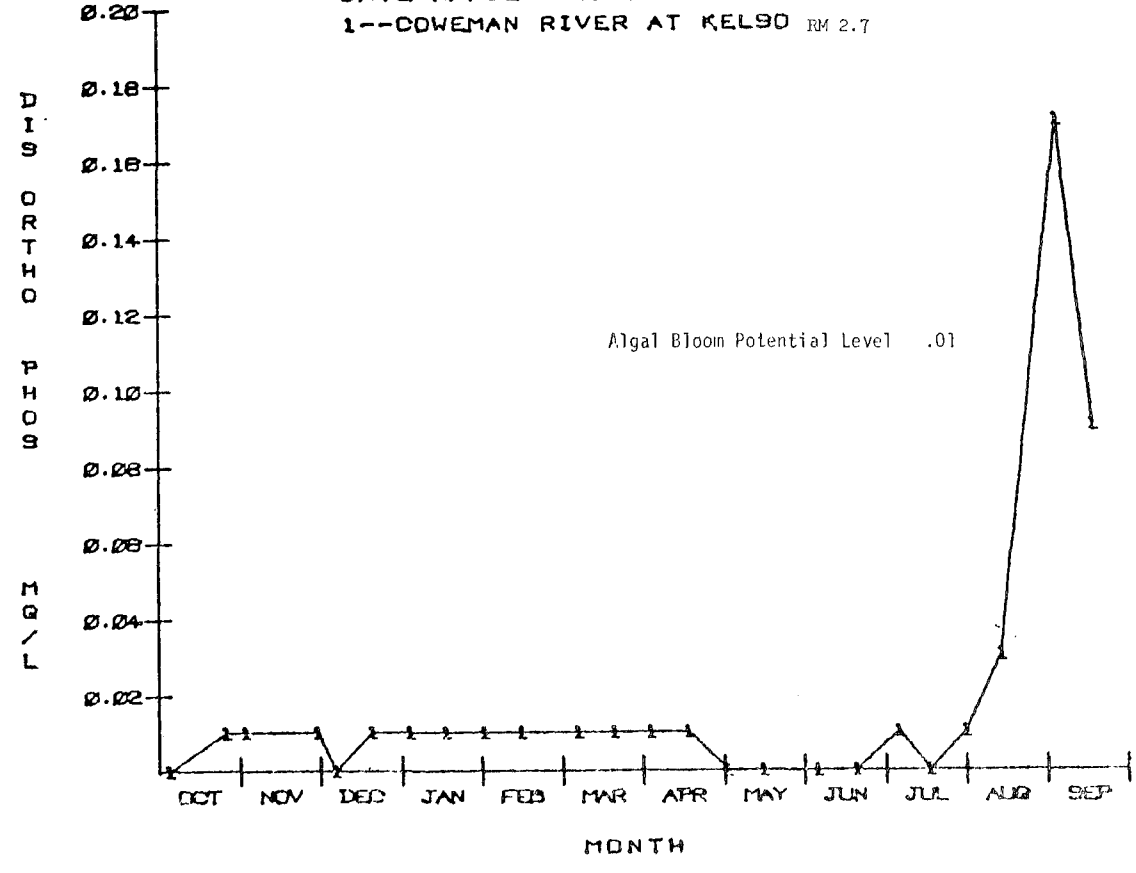
LOWER COLUMBIA BASIN

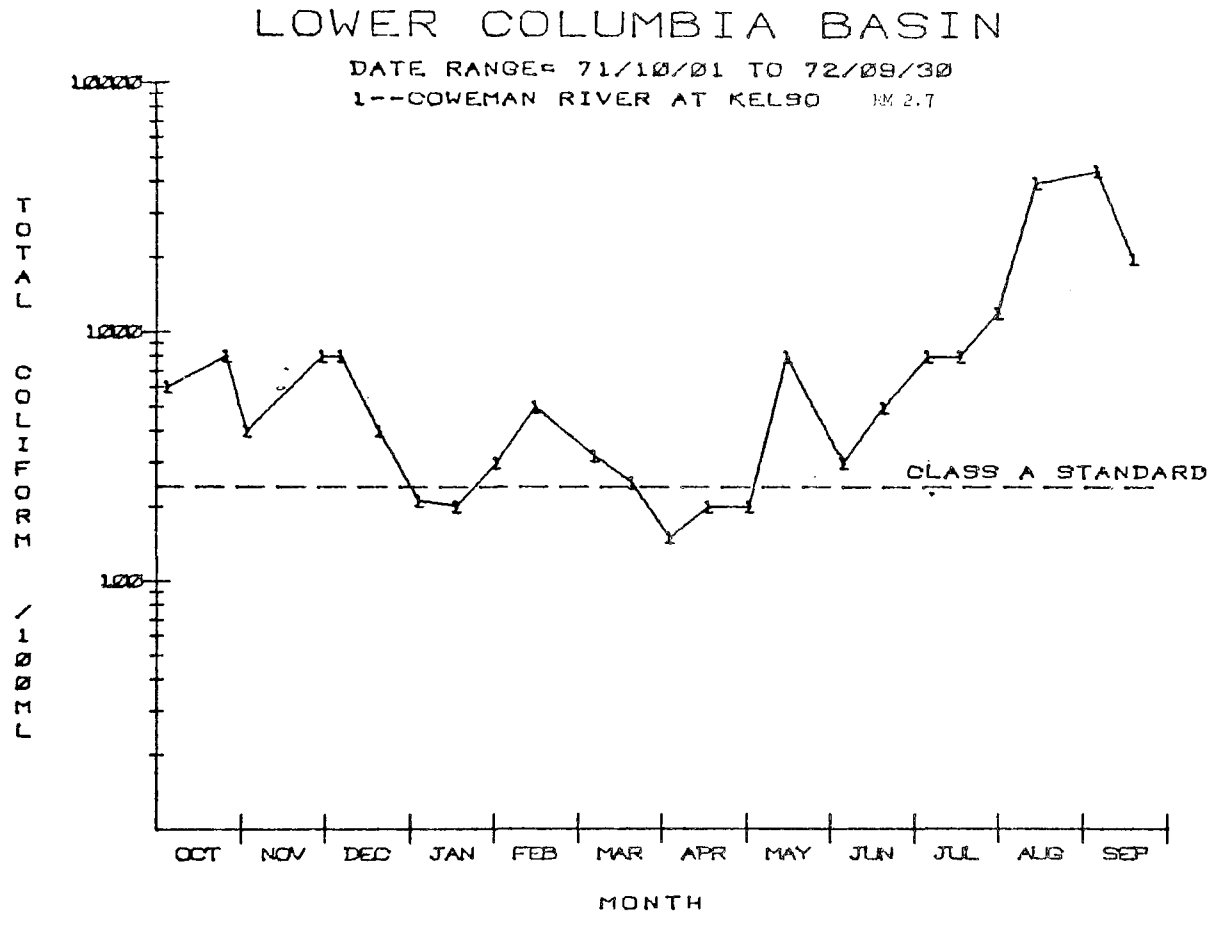
DATE RANGE= 71/10/01 TO 72/09/30
1--COWEMAN RIVER AT KELSO RM 2.7



LOWER COLUMBIA BASIN

DATE RANGE= 71/10/01 TO 72/09/30
1--COWEMAN RIVER AT KELSO RM 2.7

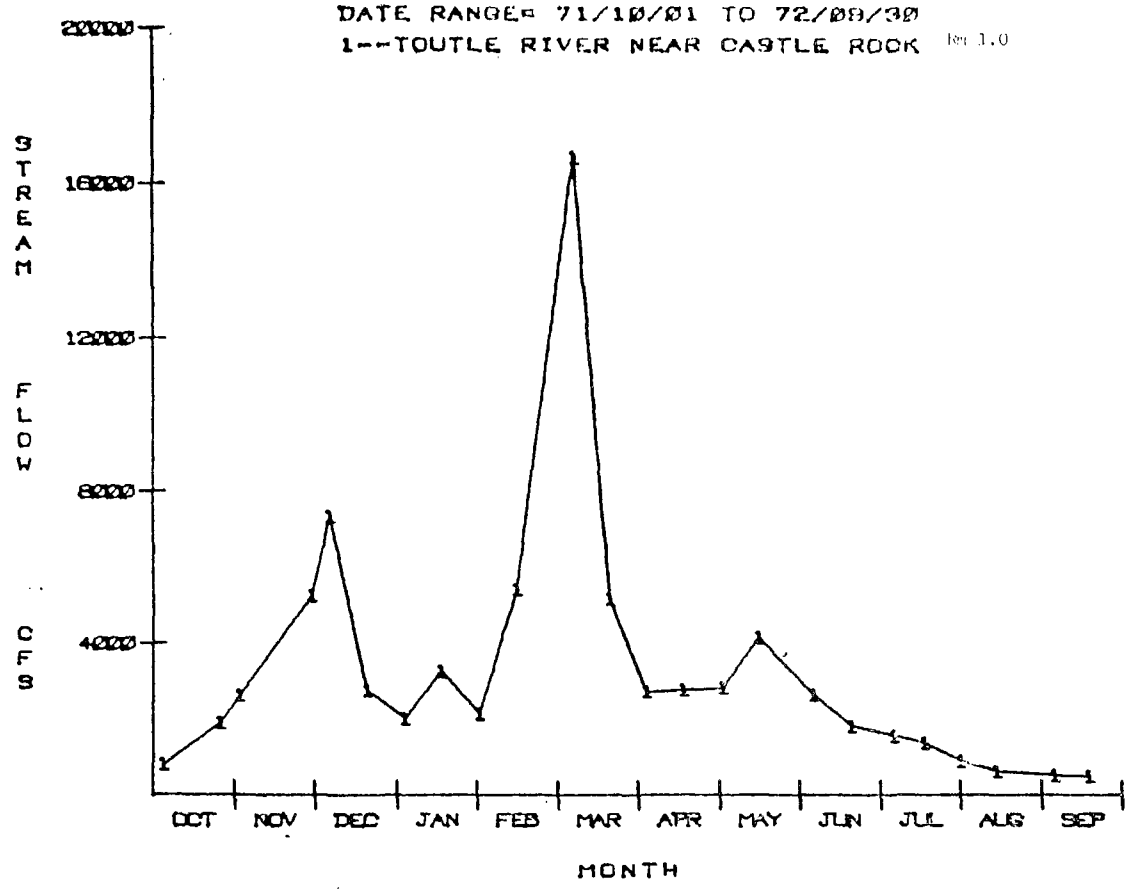



LOWER COLUMBIA BASIN
DATE RANGE= 71/10/01 TO 72/09/30
1--COWEMAN RIVER AT KELSO RM 2.7
TOTAL COLIFORM /100ML
10000
1000
100
CLASS A STANDARD
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
MONTH

TOUTLE RIVER

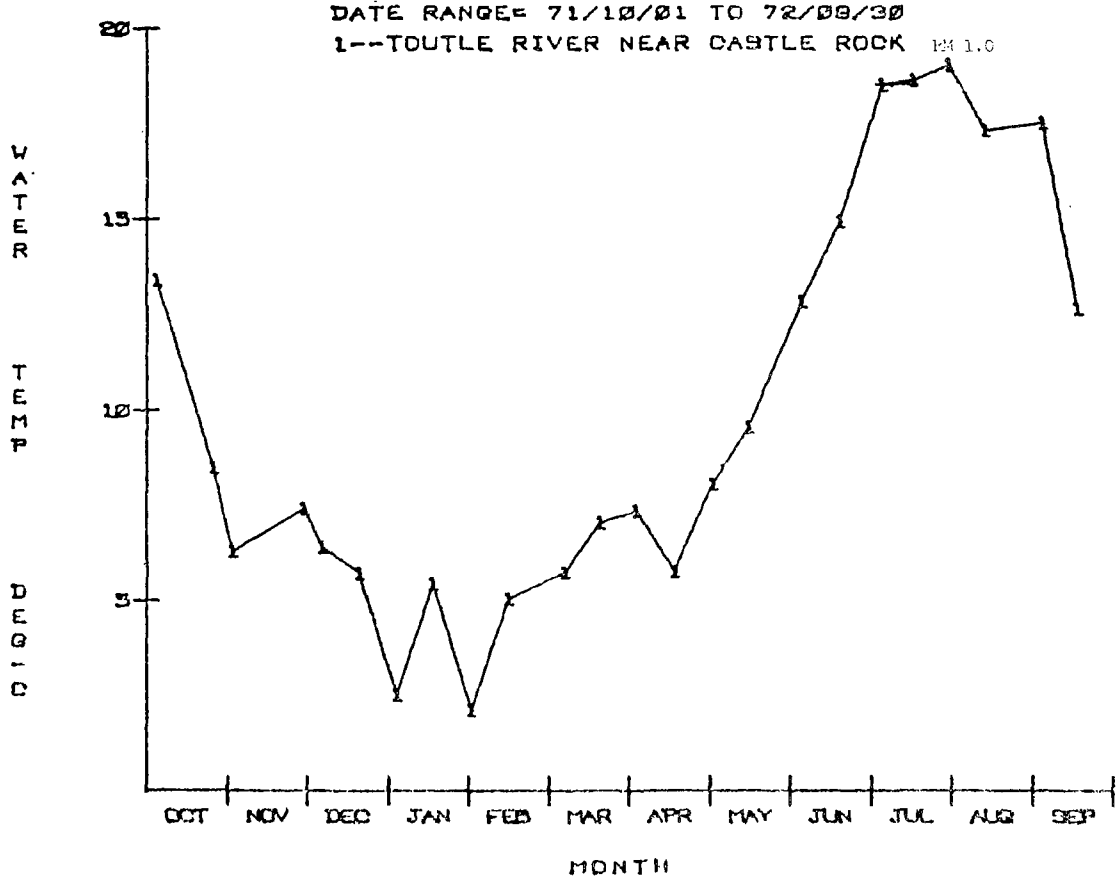
LOWER COLUMBIA BASIN

DATE RANGE= 71/10/01 TO 72/09/30
1--TOUTLE RIVER NEAR CASTLE ROCK PM 1.0



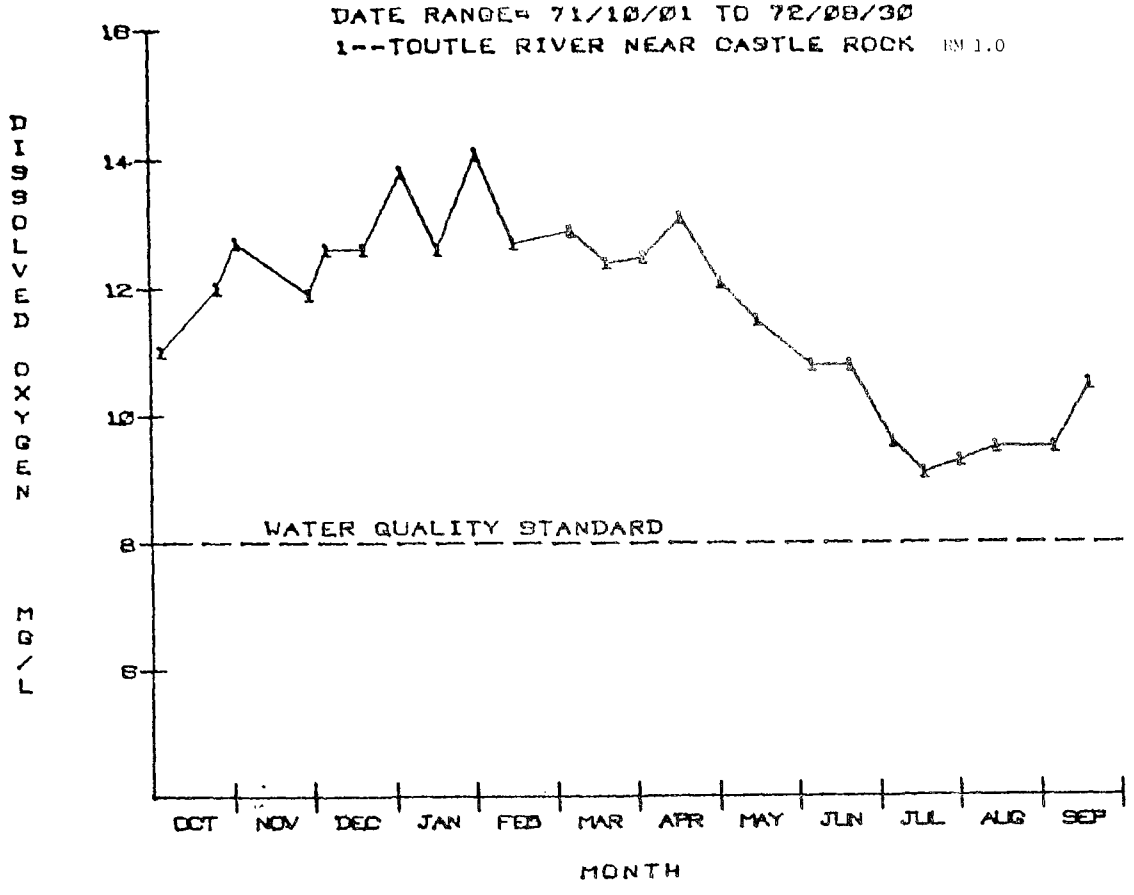
LOWER COLUMBIA BASIN

DATE RANGE= 71/10/01 TO 72/09/30
1--TOUTLE RIVER NEAR CASTLE ROCK PM 1.0



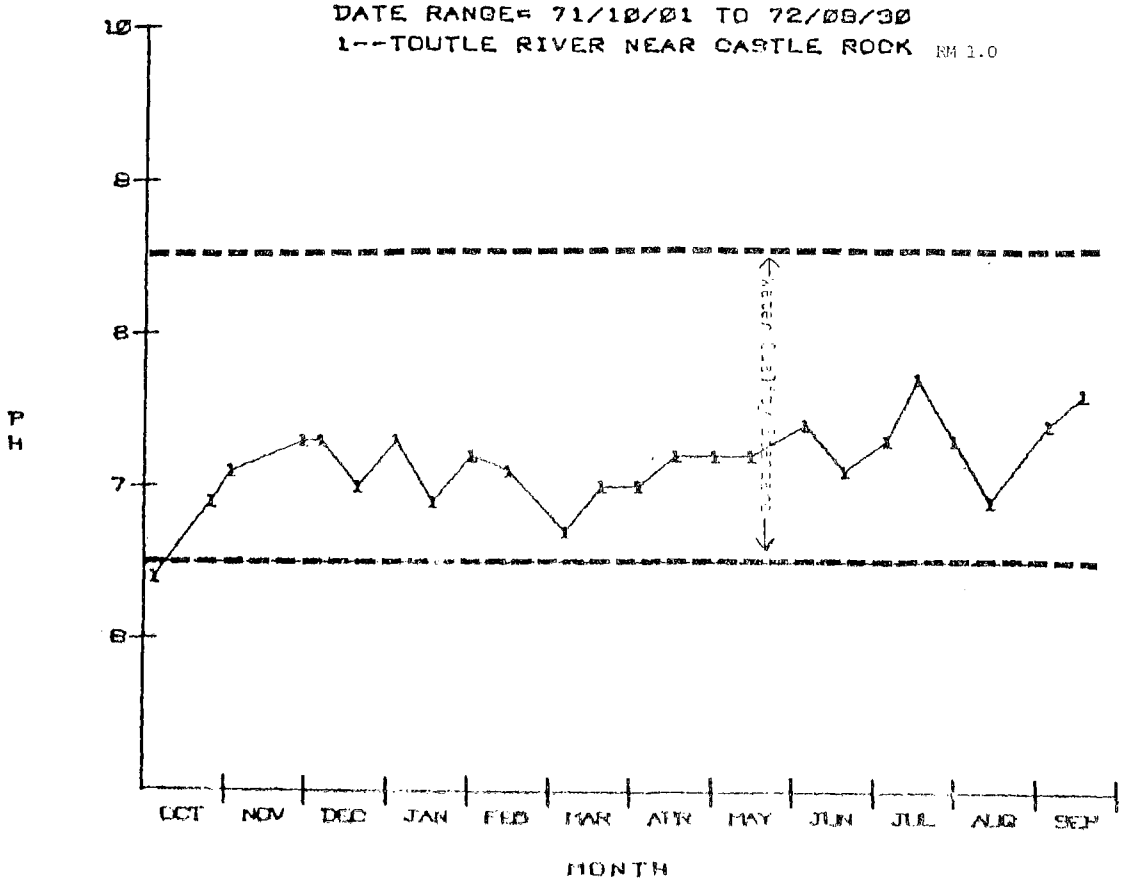
LOWER COLUMBIA BASIN

DATE RANGE= 71/10/01 TO 72/08/30
1--TOUTLE RIVER NEAR CASTLE ROCK RM 1.0



LOWER COLUMBIA BASIN

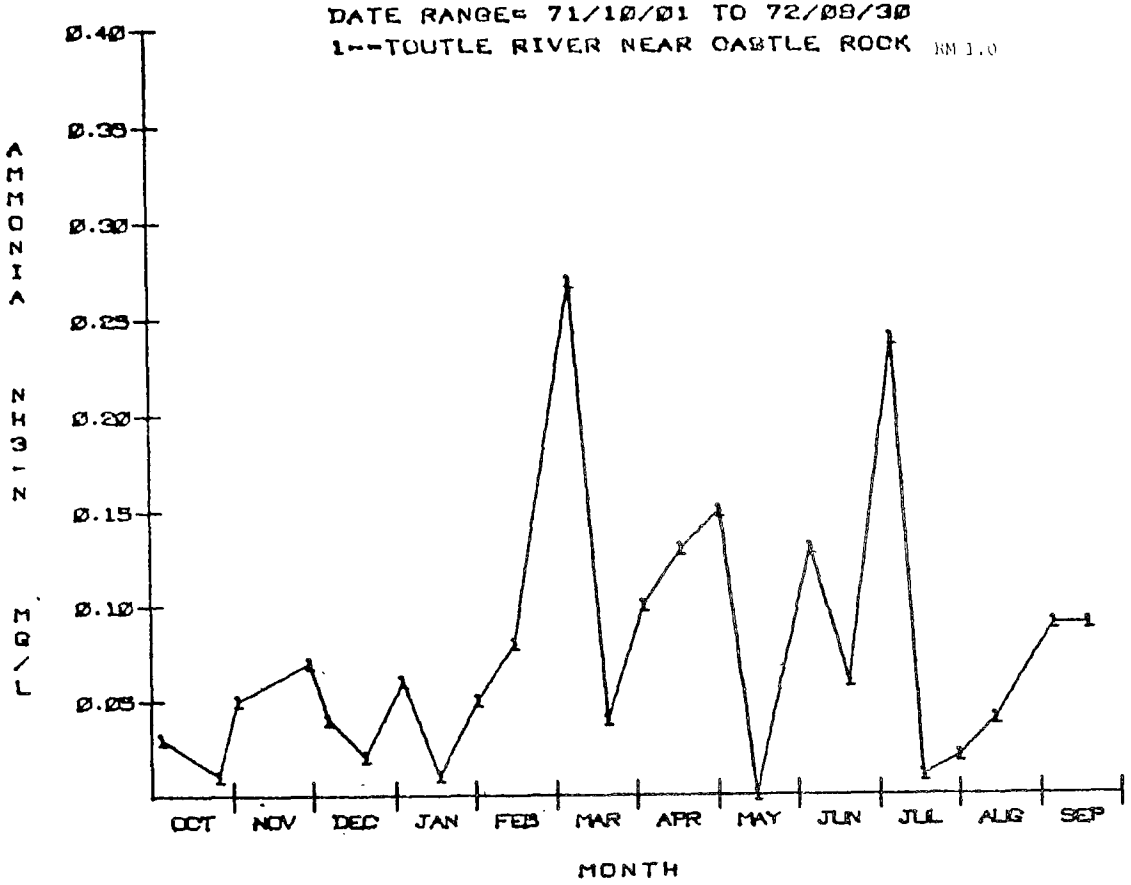
DATE RANGE= 71/10/01 TO 72/08/30
1--TOUTLE RIVER NEAR CASTLE ROCK RM 1.0



LOWER COLUMBIA BASIN

DATE RANGE= 71/10/01 TO 72/09/30

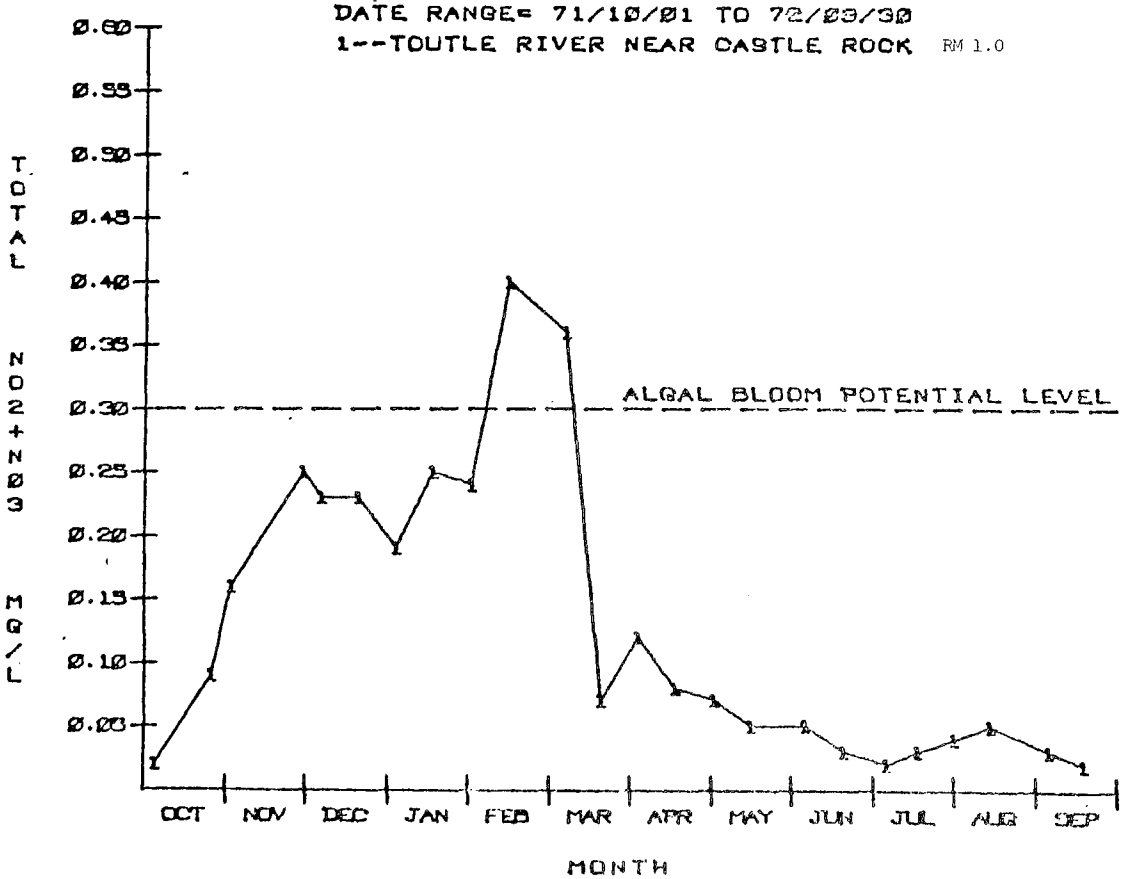
1--TOUTLE RIVER NEAR CASTLE ROCK RM 1.0



LOWER COLUMBIA BASIN

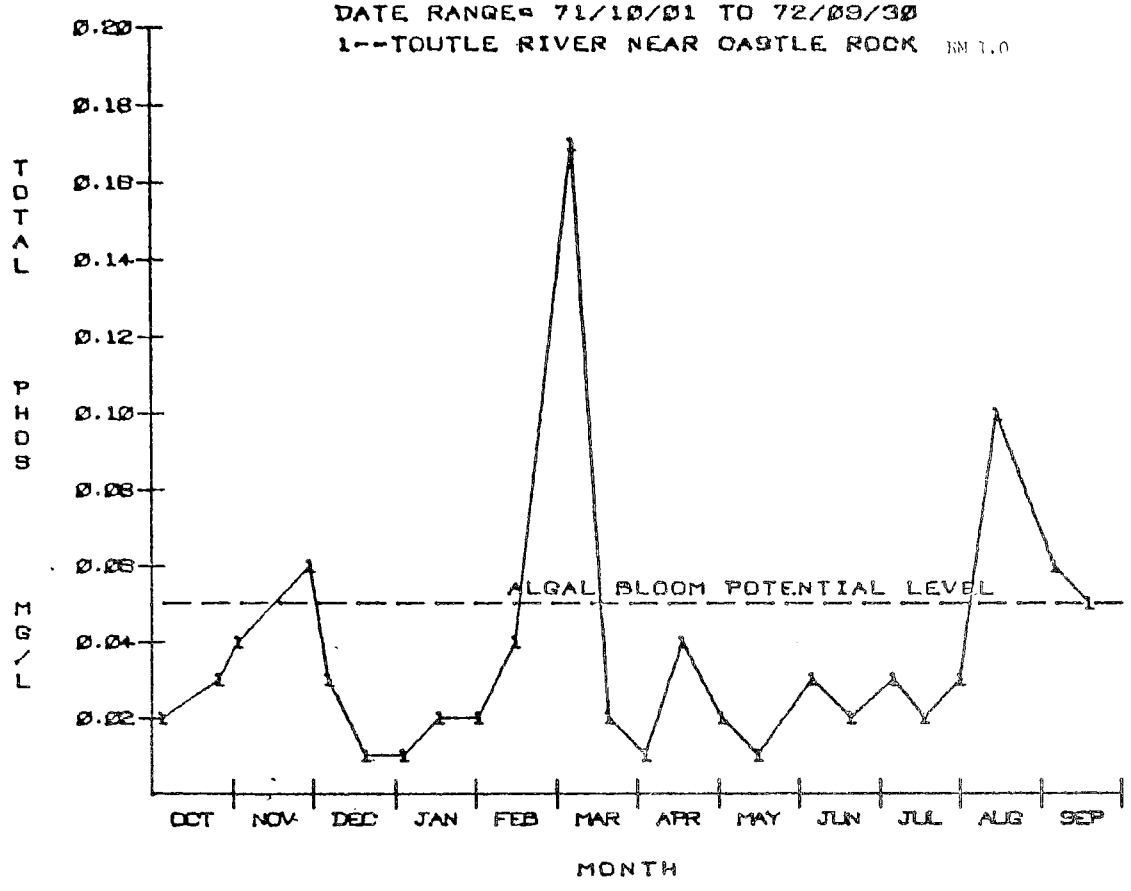
DATE RANGE= 71/10/01 TO 72/09/30

1--TOUTLE RIVER NEAR CASTLE ROCK RM 1.0



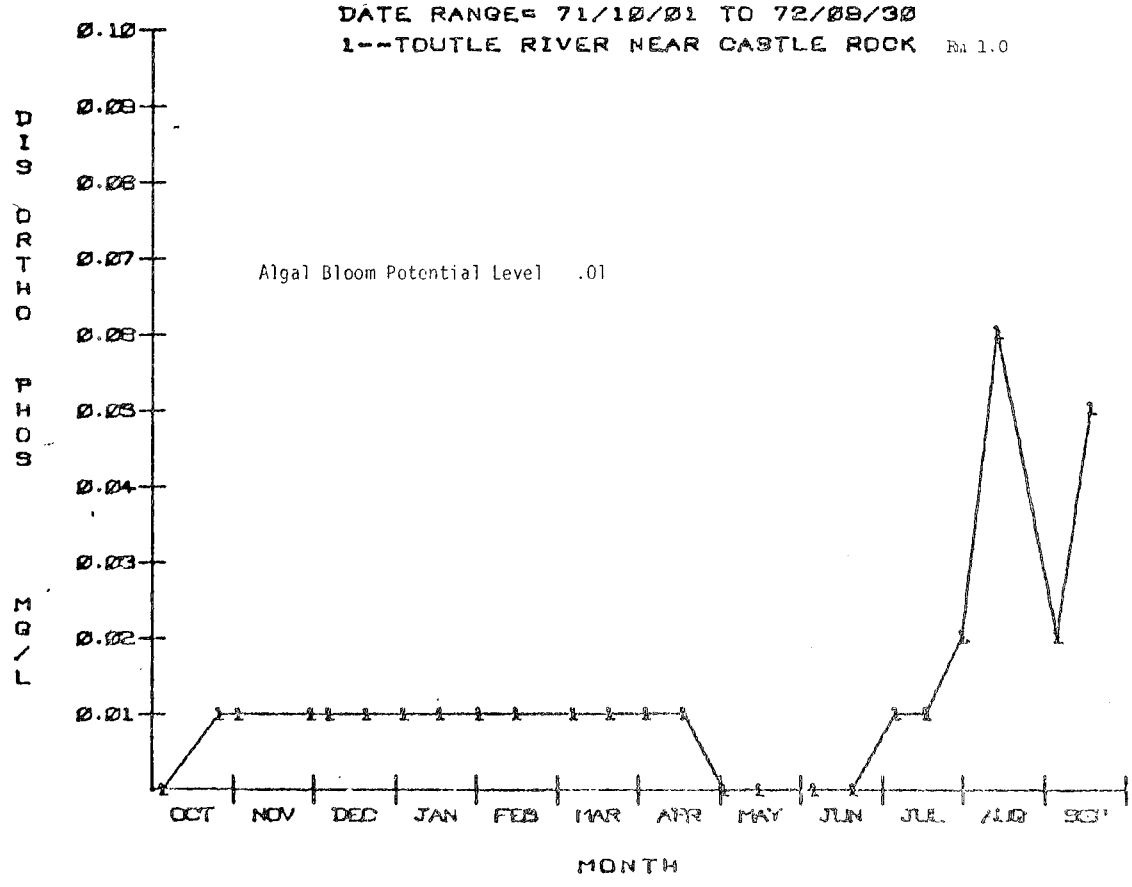
LOWER COLU'1BIA BASIN

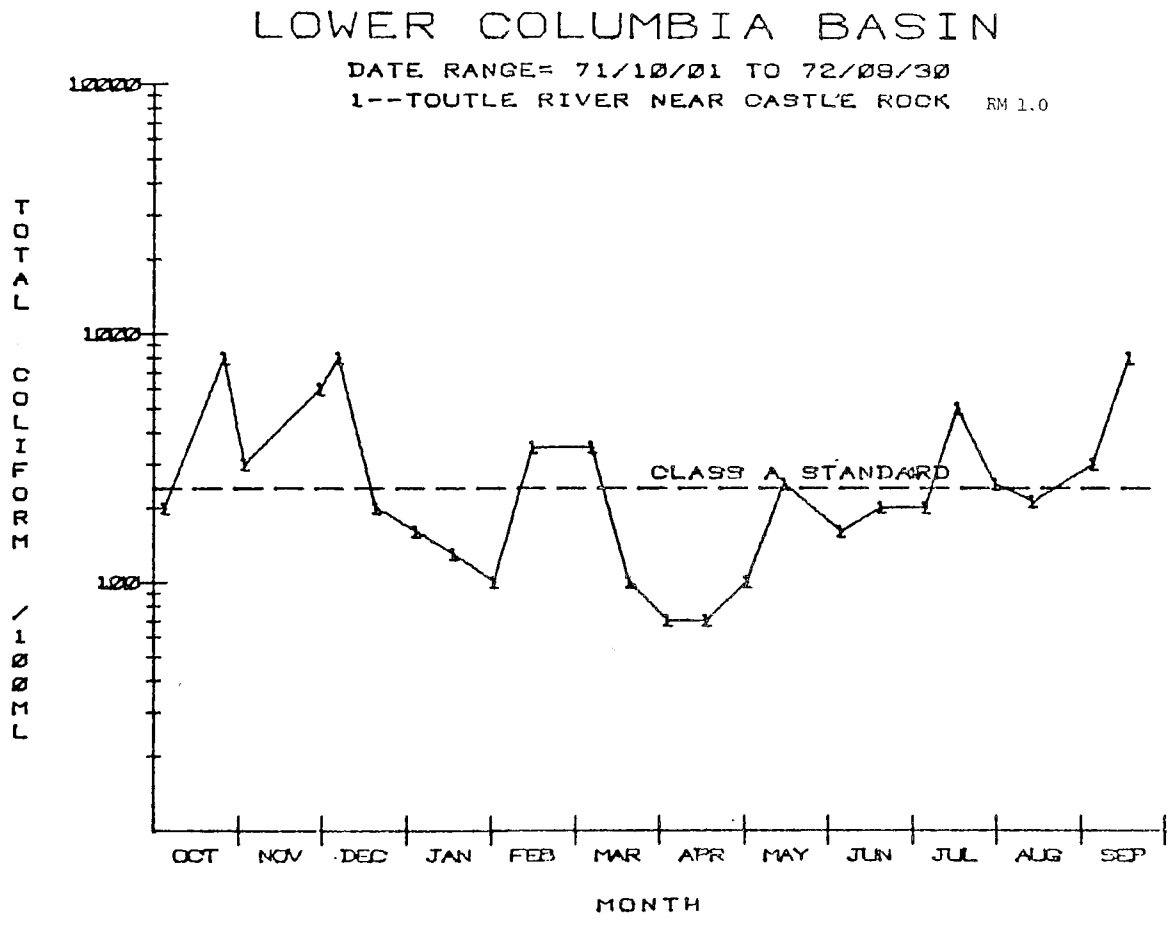
DATE RANGE= 71/10/01 TO 72/09/30
1--TOUTLE RIVER NEAR CASTLE ROCK RM 1.0



LOWER COLI MBIA BASIN

DATE RANGE= 71/10/01 TO 72/09/30
1--TOUTLE RIVER NEAR CASTLE ROCK Rm 1.0




LOWER COLUMBIA BASIN
DATE RANGE= 71/10/01 TO 72/09/30
1--TOUTLE RIVER NEAR CASTLE ROCK RM 1.0
TOTAL COLIFORM /100ML
10000
1000
100
CLASS A STANDARD
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
MONTH

LEWIS

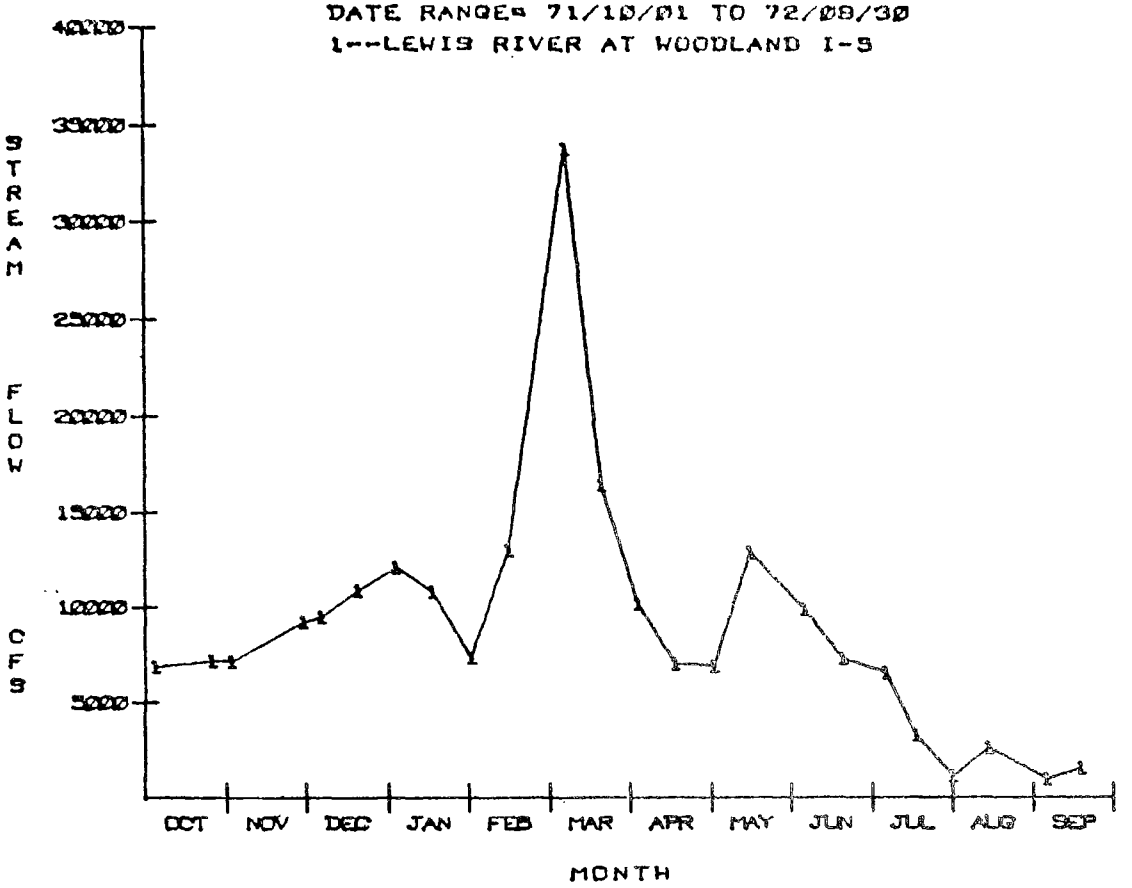
LEWIS

Segment Name	Segment Number	Class
Lewis River & Tribs.	13-27-01	WQ-NPS
Burnt Bridge Cr. & Tribs.	13-28-04	WQ-NPS
Kalama River & Tribs	13-27-02	WQ-NPS
Salmon Cr. & Tribs	13-28-03	WQ-NPS
Washougal	13-28-05	WQ-NPS

LEWIS RIVER

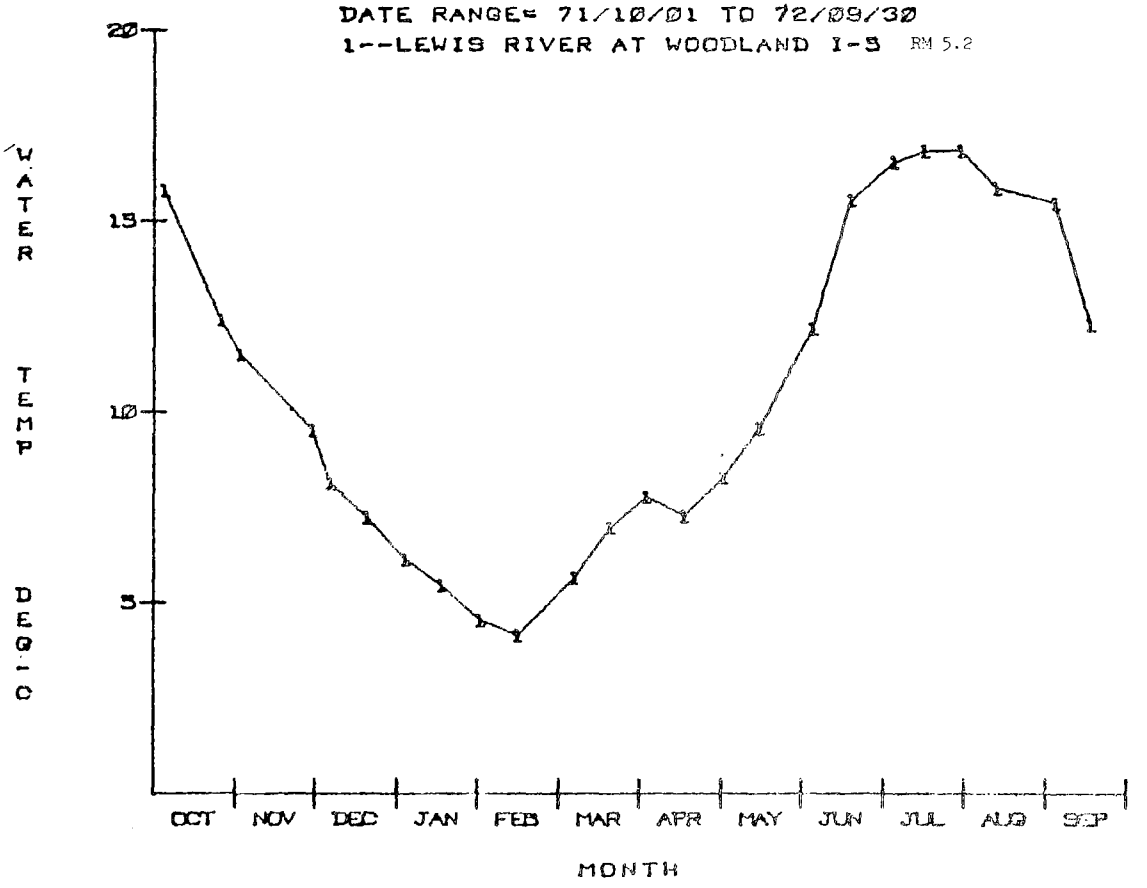
LOWER COLUMBIA BASIN

DATE RANGE= 71/10/01 TO 72/09/30
1--LEWIS RIVER AT WOODLAND I-5



LOWER COLUMBIA BASIN

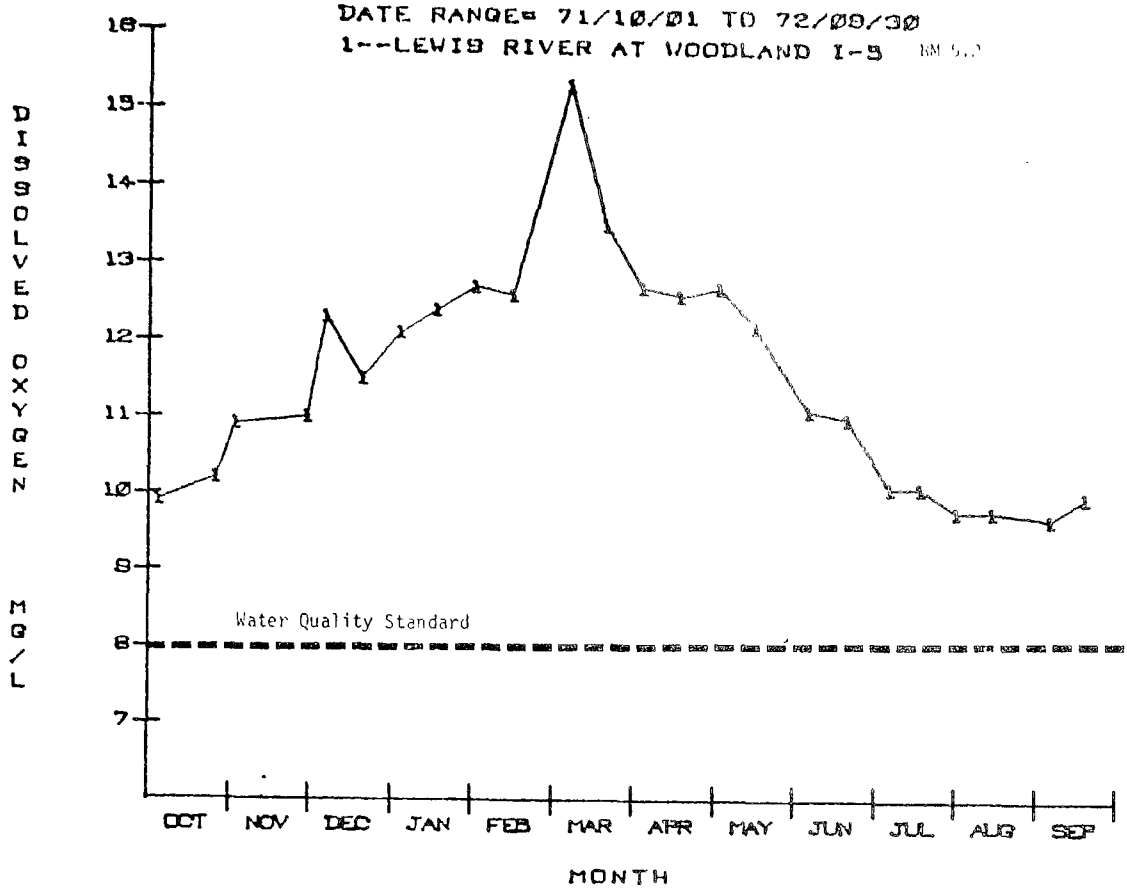
DATE RANGE= 71/10/01 TO 72/09/30
1--LEWIS RIVER AT WOODLAND I-5 RM 5.2



LOWER COLUMBIA BASIN

DATE RANGE= 71/10/01 TO 72/09/30

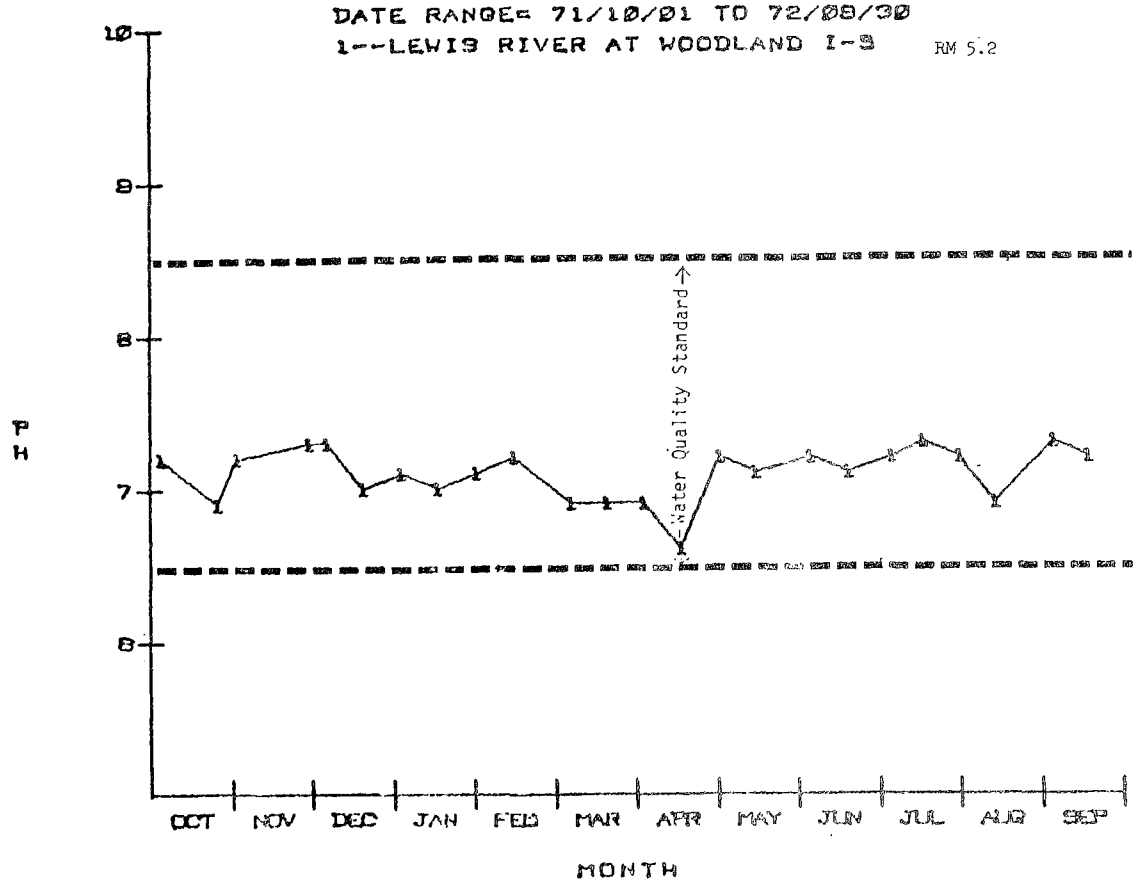
1--LEWIS RIVER AT WOODLAND I-5 RM 5.2



LOWER COLUMBIA BASIN

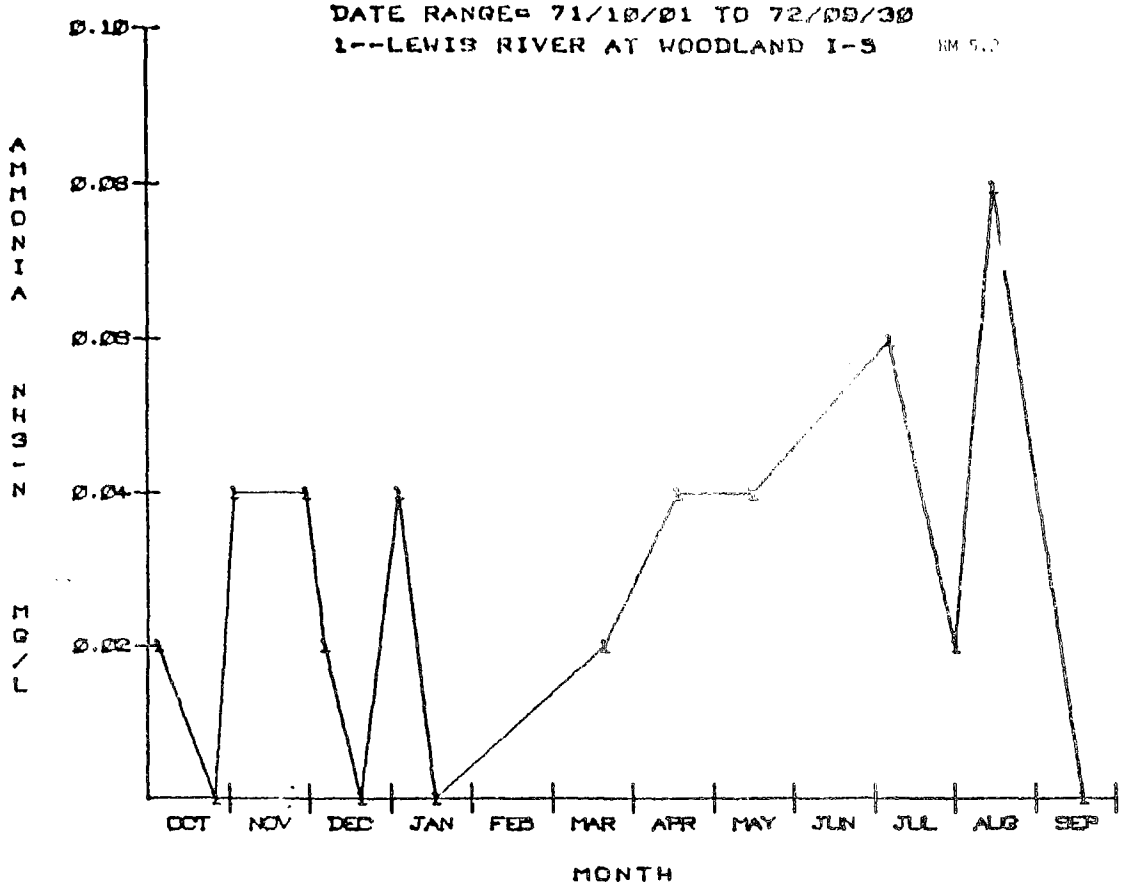
DATE RANGE= 71/10/01 TO 72/09/30

1--LEWIS RIVER AT WOODLAND I-5 RM 5.2



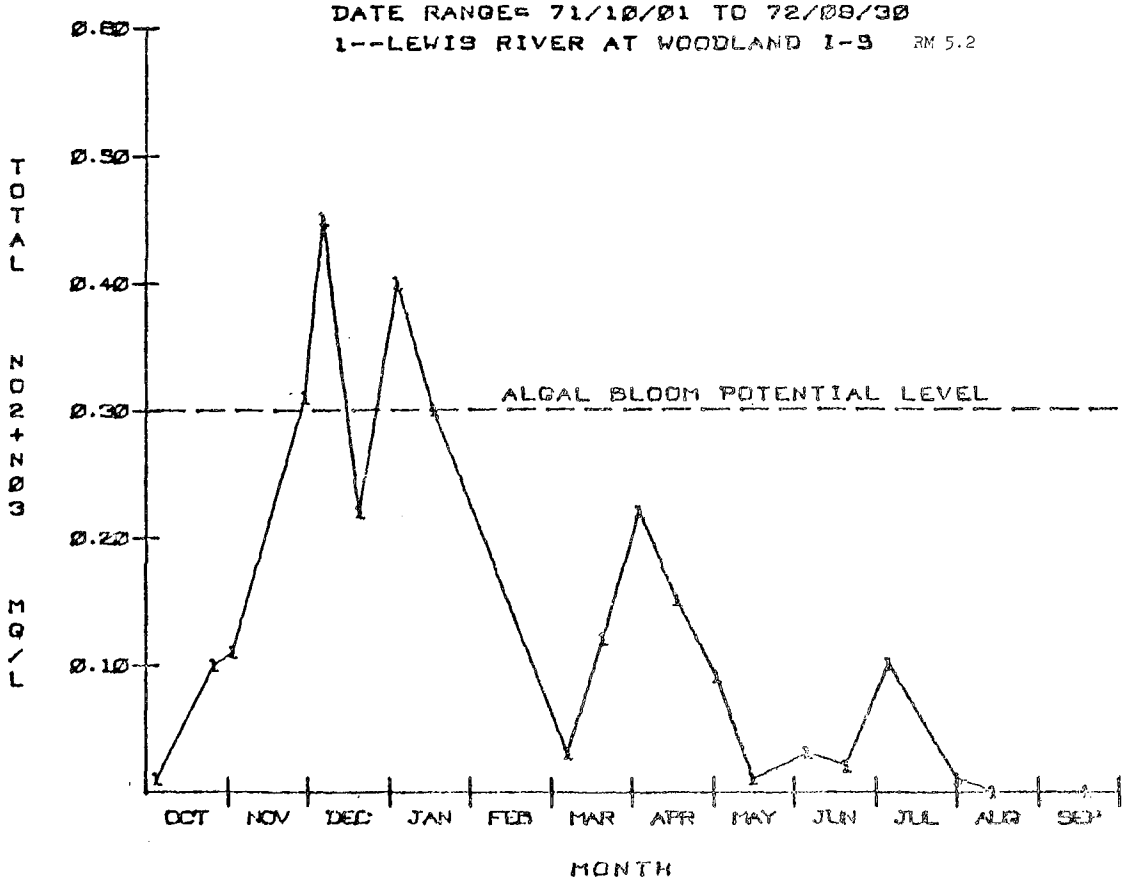
LOWER COLUMBIA BASIN

DATE RANGE= 71/10/01 TO 72/09/30
1--LEWIS RIVER AT WOODLAND I-5 RM 5.2



LOWER COLUMBIA BASIN

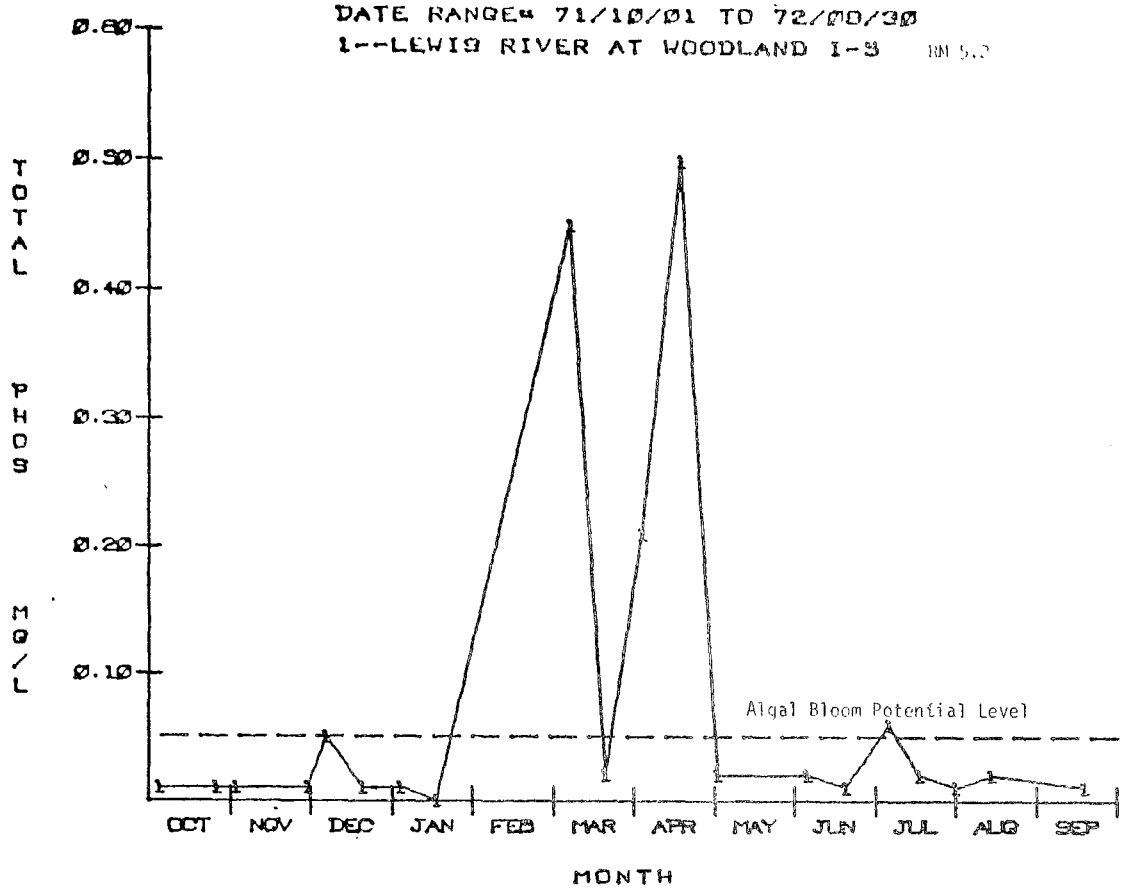
DATE RANGE= 71/10/01 TO 72/09/30
1--LEWIS RIVER AT WOODLAND I-5 RM 5.2



LOWER COLUMBIA BASIN

DATE RANGE= 71/10/01 TO 72/09/30

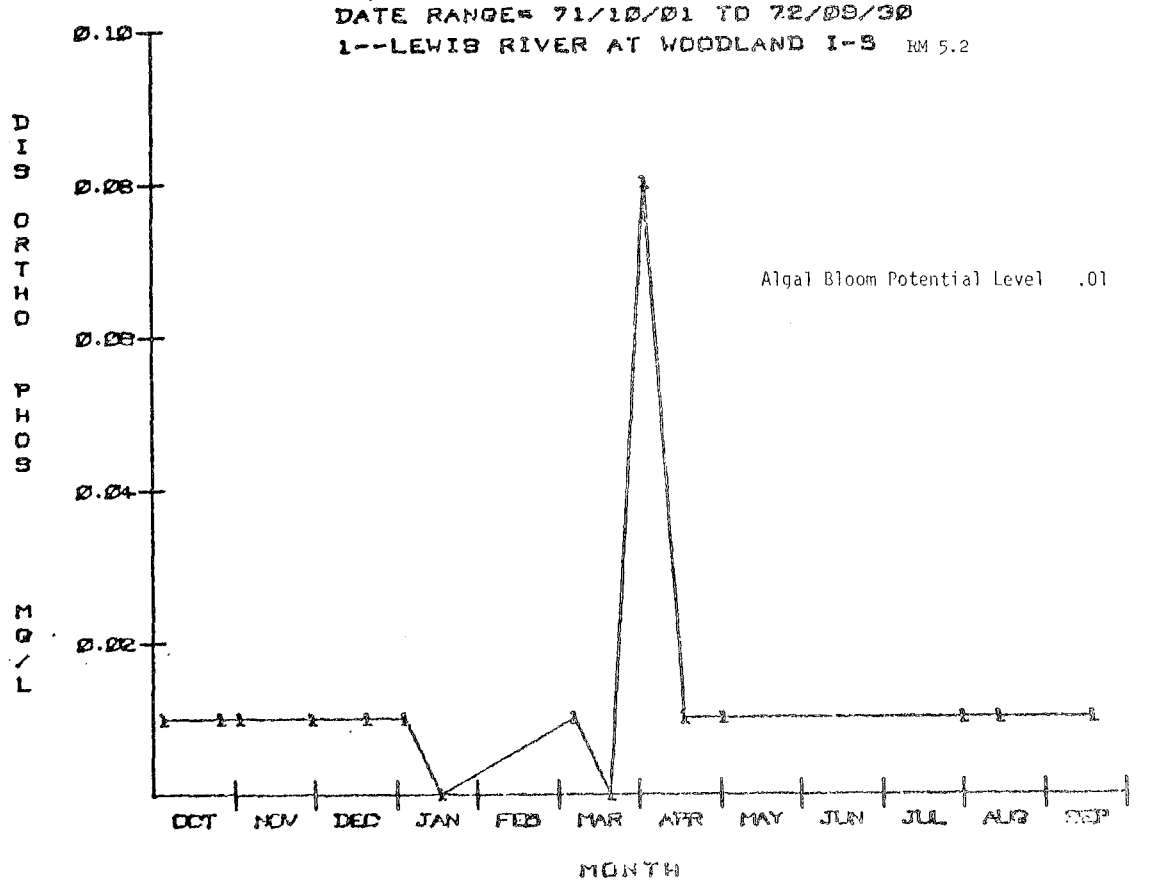
1--LEWIS RIVER AT WOODLAND I-5 RM 5.2



LOWER COLUMBIA BASIN

DATE RANGE= 71/10/01 TO 72/09/30

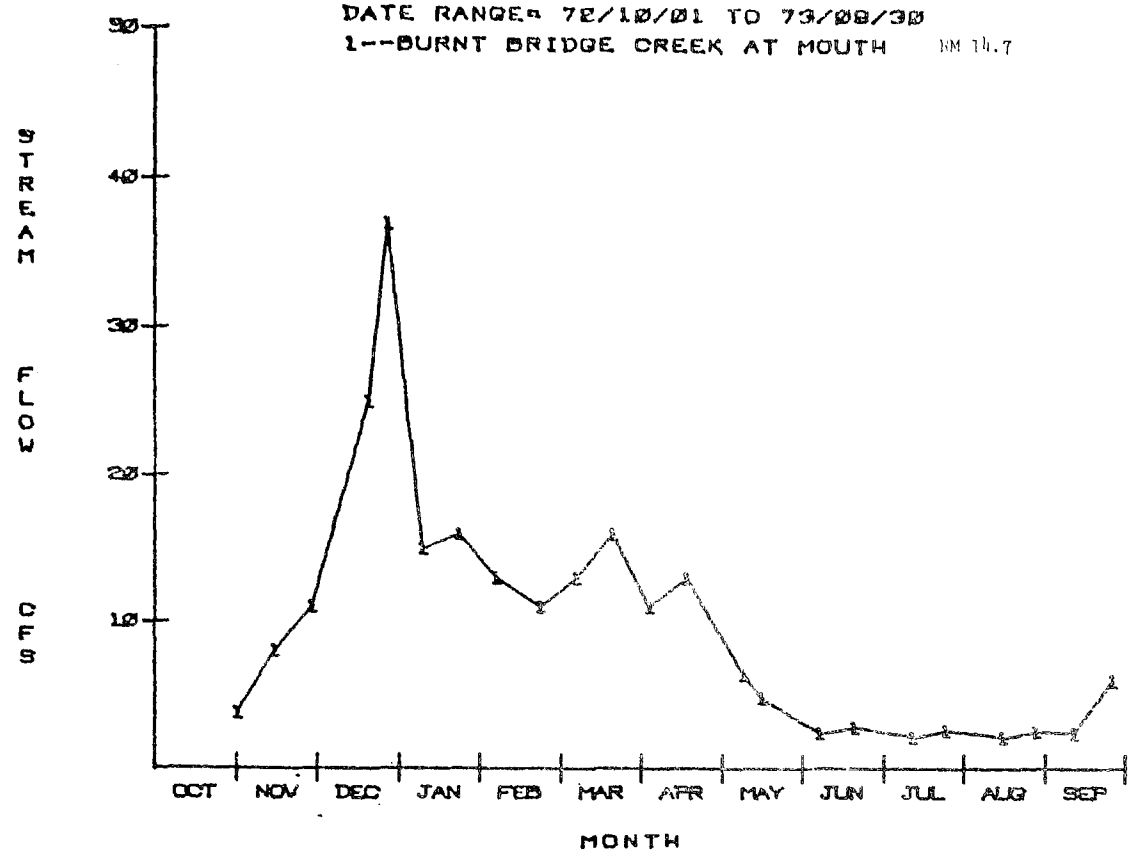
1--LEWIS RIVER AT WOODLAND I-5 RM 5.2



BURNT BRIDGE CREEK

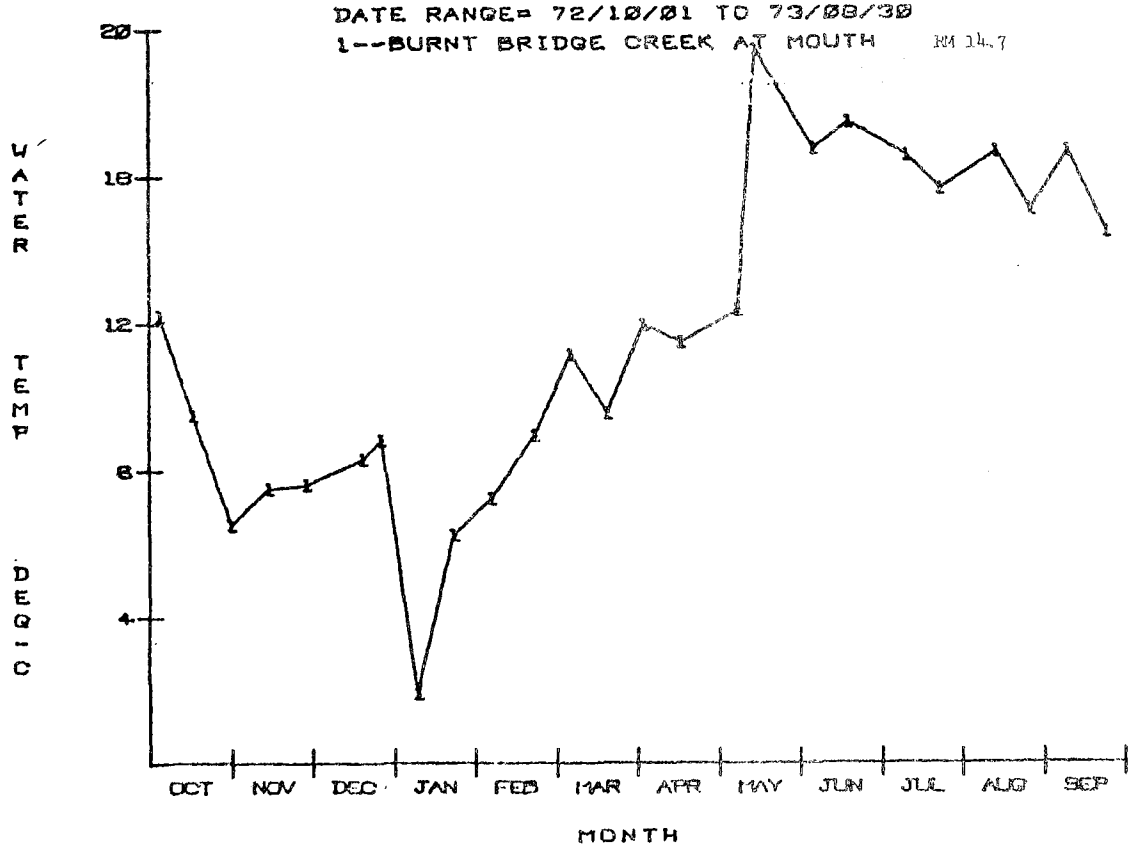
LOWER COLUMBIA BASIN

DATE RANGE= 72/10/01 TO 73/08/30
1--BURNT BRIDGE CREEK AT MOUTH RM 14.7



LOWER COLUMBIA BASIN

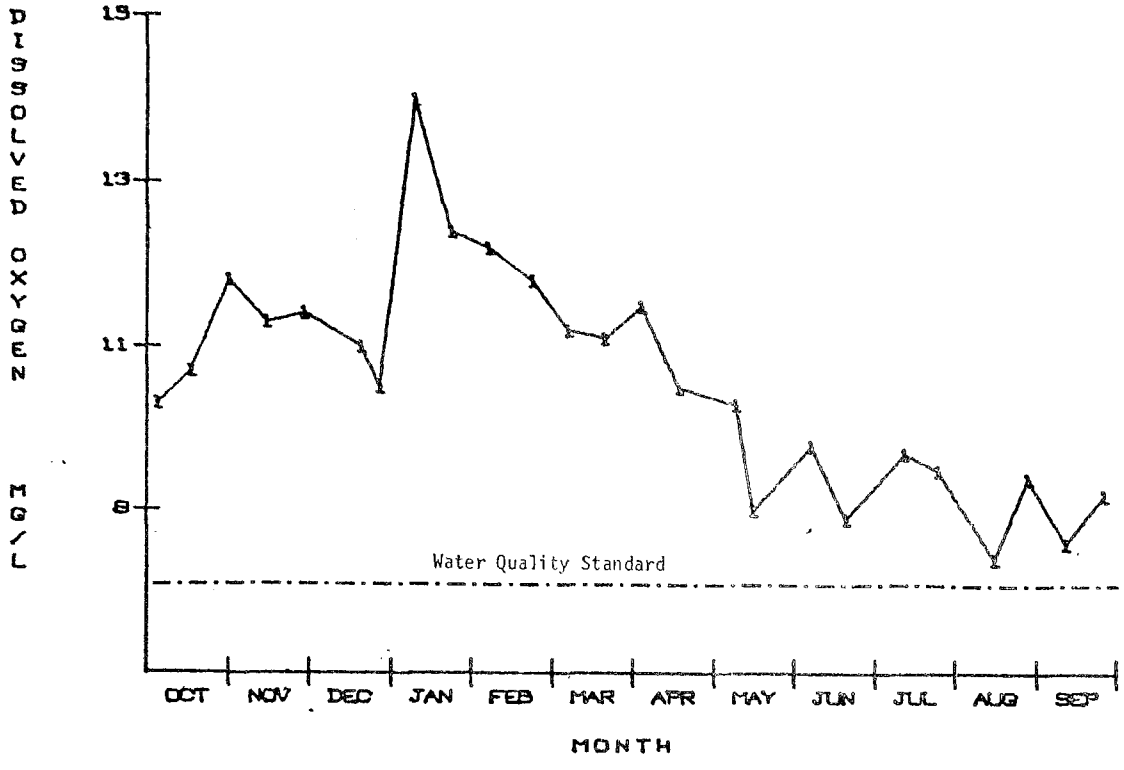
DATE RANGE= 72/10/01 TO 73/08/30
1--BURNT BRIDGE CREEK AT MOUTH RM 14.7



LOWER COLUMBIA BASIN

DATE RANGE= 72/10/01 TO 73/08/30

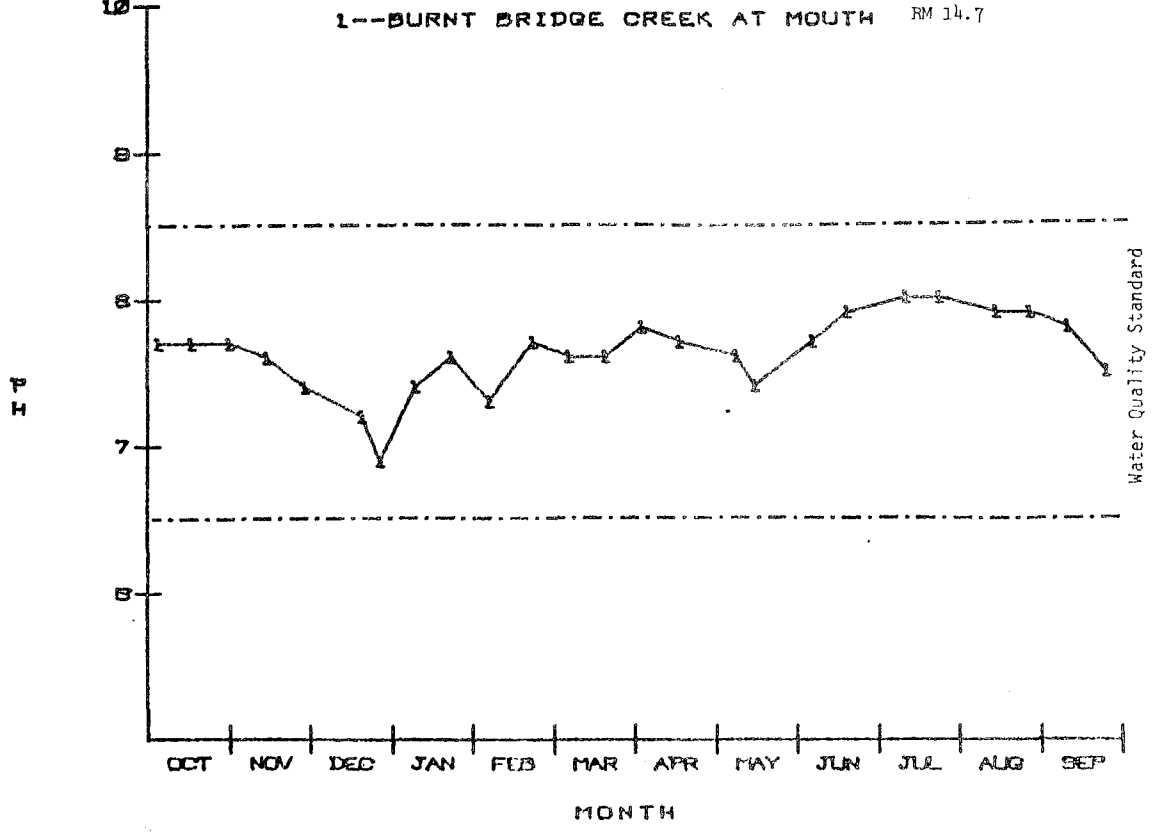
1--BURNT BRIDGE CREEK AT MOUTH RM 14.7



LOWER COLUMBIA BASIN

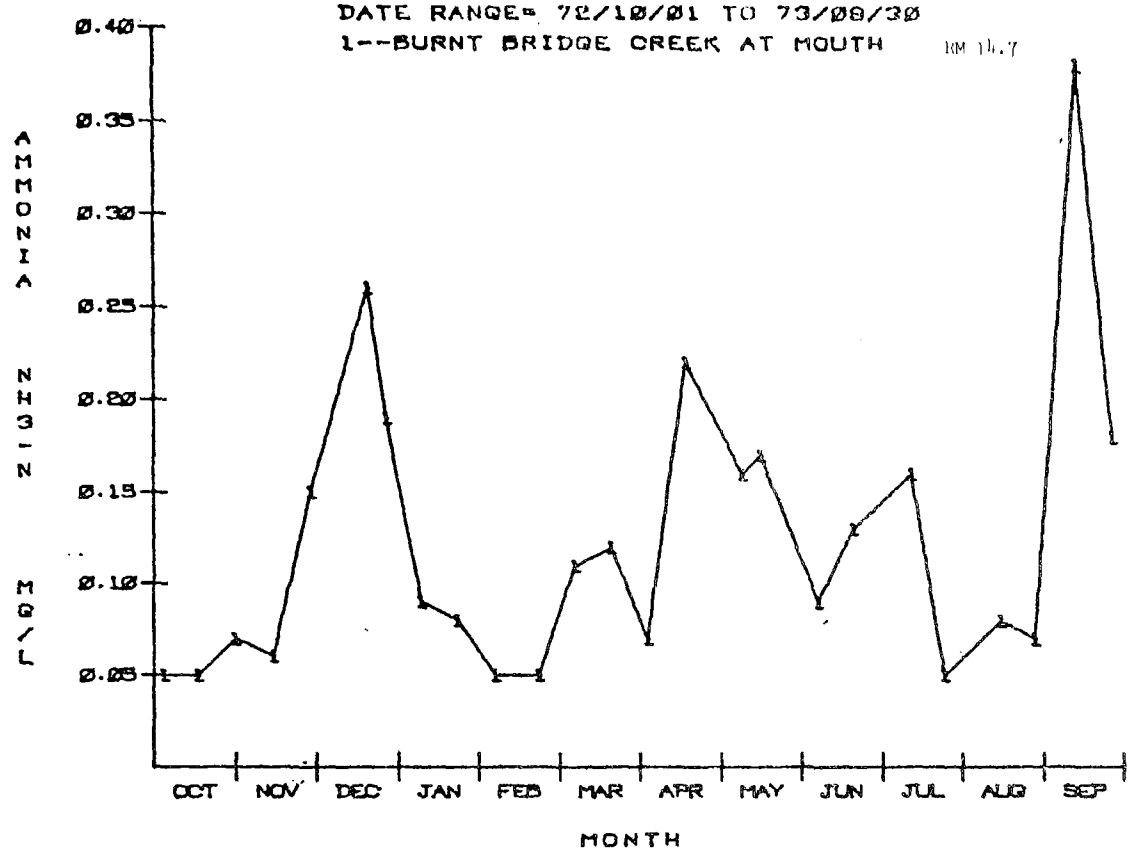
DATE RANGE= 72/10/01 TO 73/08/30

1--BURNT BRIDGE CREEK AT MOUTH RM 14.7



LOWER COLUMBIA BASIN

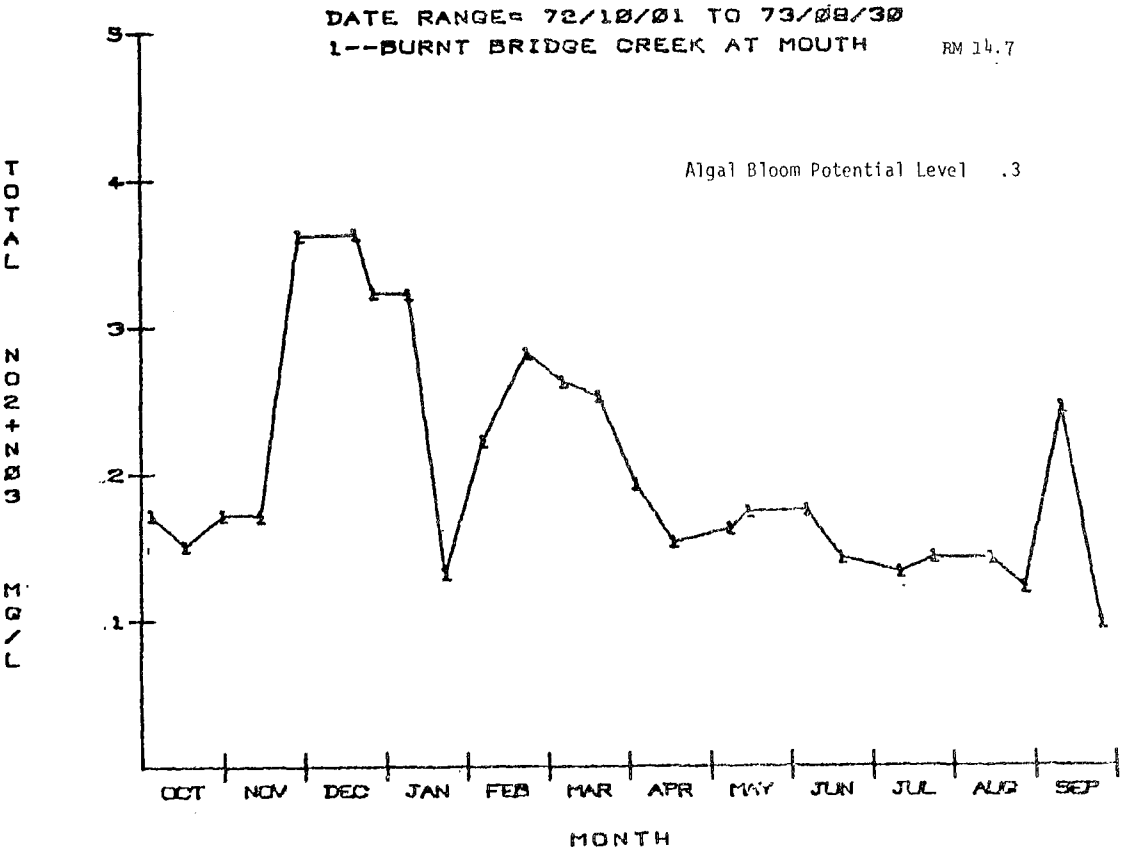
DATE RANGE= 72/10/01 TO 73/09/30
1--BURNT BRIDGE CREEK AT MOUTH RM 14.7



LOWER COLUMBIA BASIN

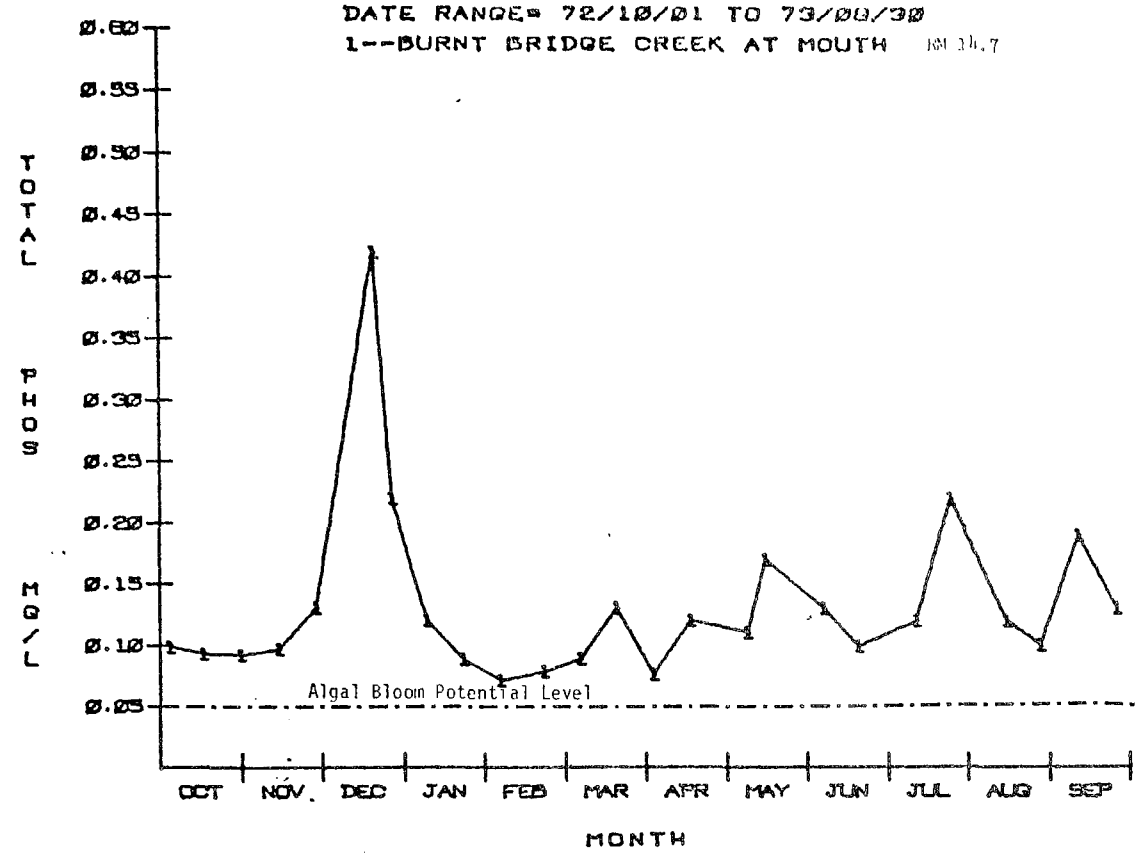
DATE RANGE= 72/10/01 TO 73/09/30
1--BURNT BRIDGE CREEK AT MOUTH RM 14.7

Algal Bloom Potential Level .3



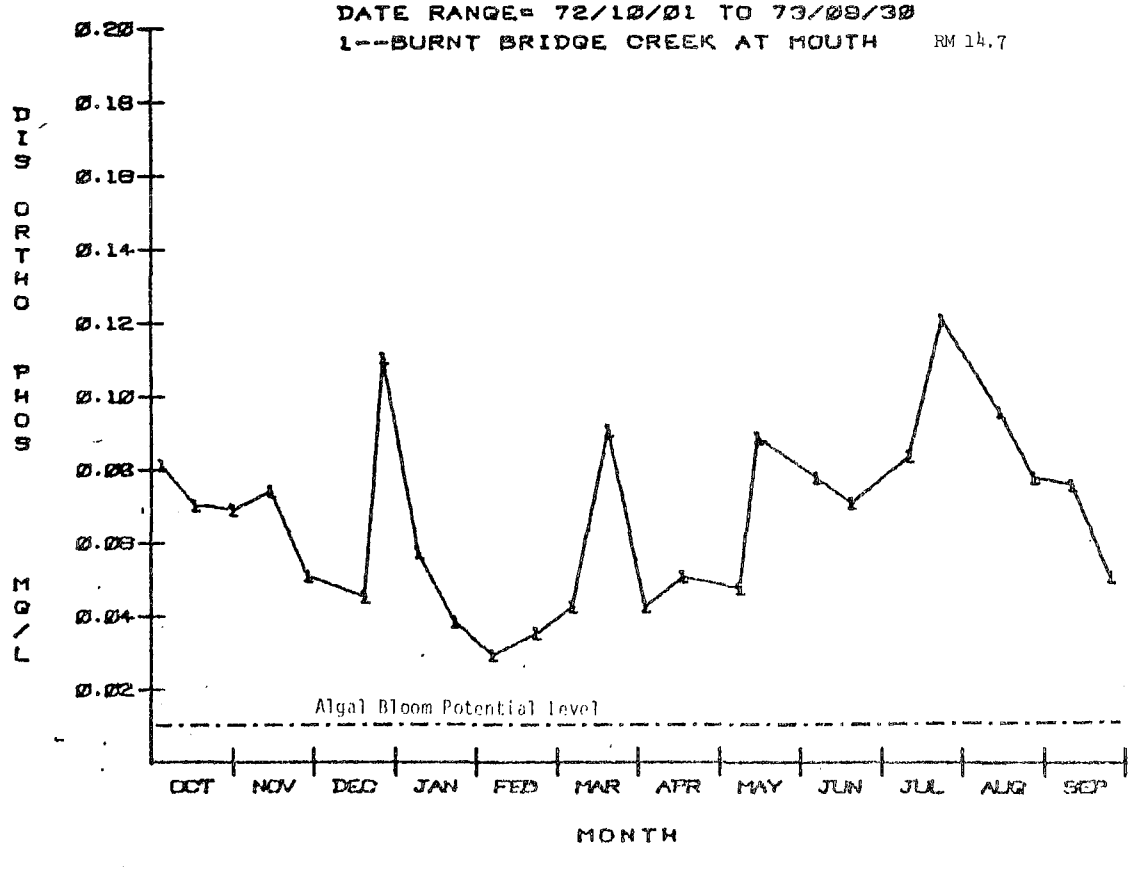
LOWER COLUMBIA BASIN

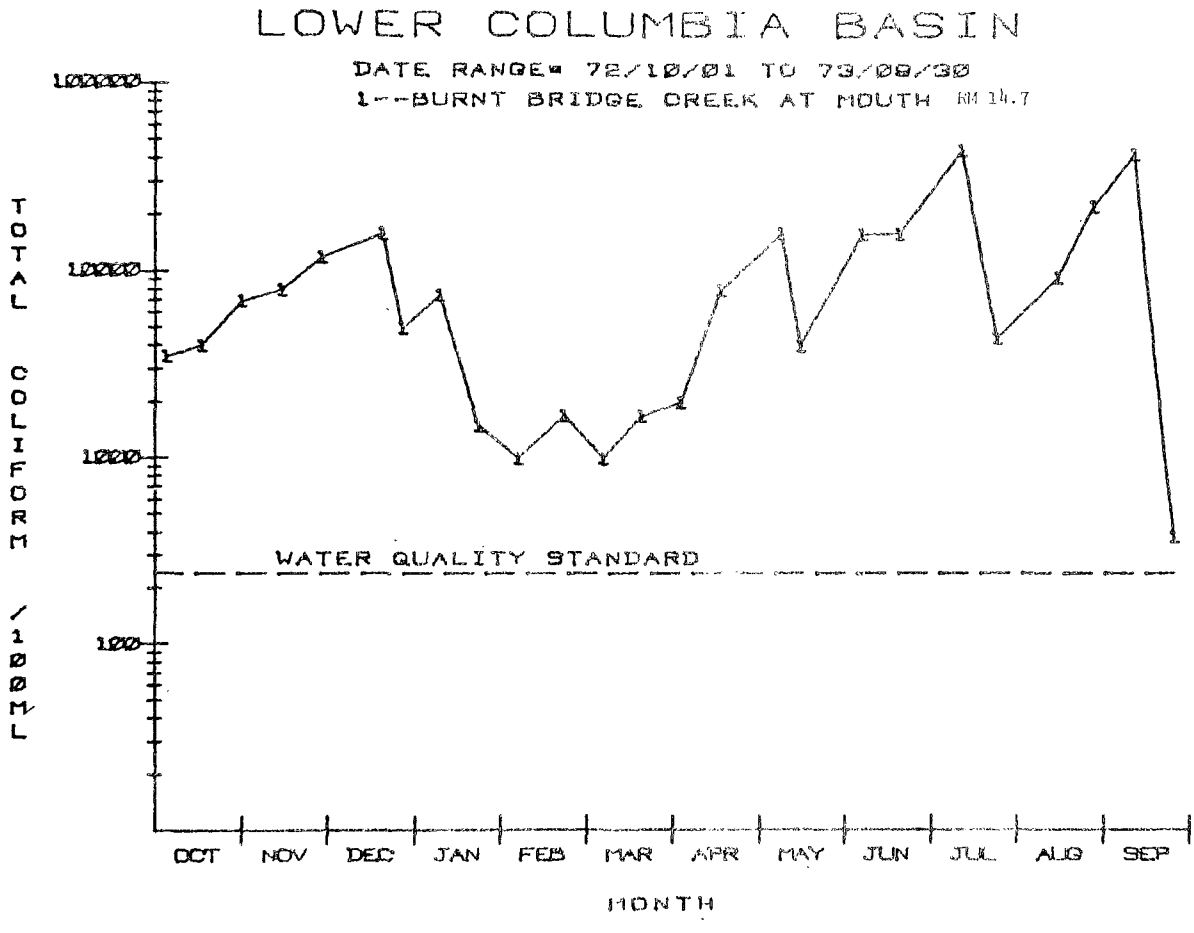
DATE RANGE= 72/10/01 TO 73/09/30
1--BURNT BRIDGE CREEK AT MOUTH RM 14.7



LOWER COLUMBIA BASIN

DATE RANGE= 72/10/01 TO 73/09/30
1--BURNT BRIDGE CREEK AT MOUTH RM 14.7

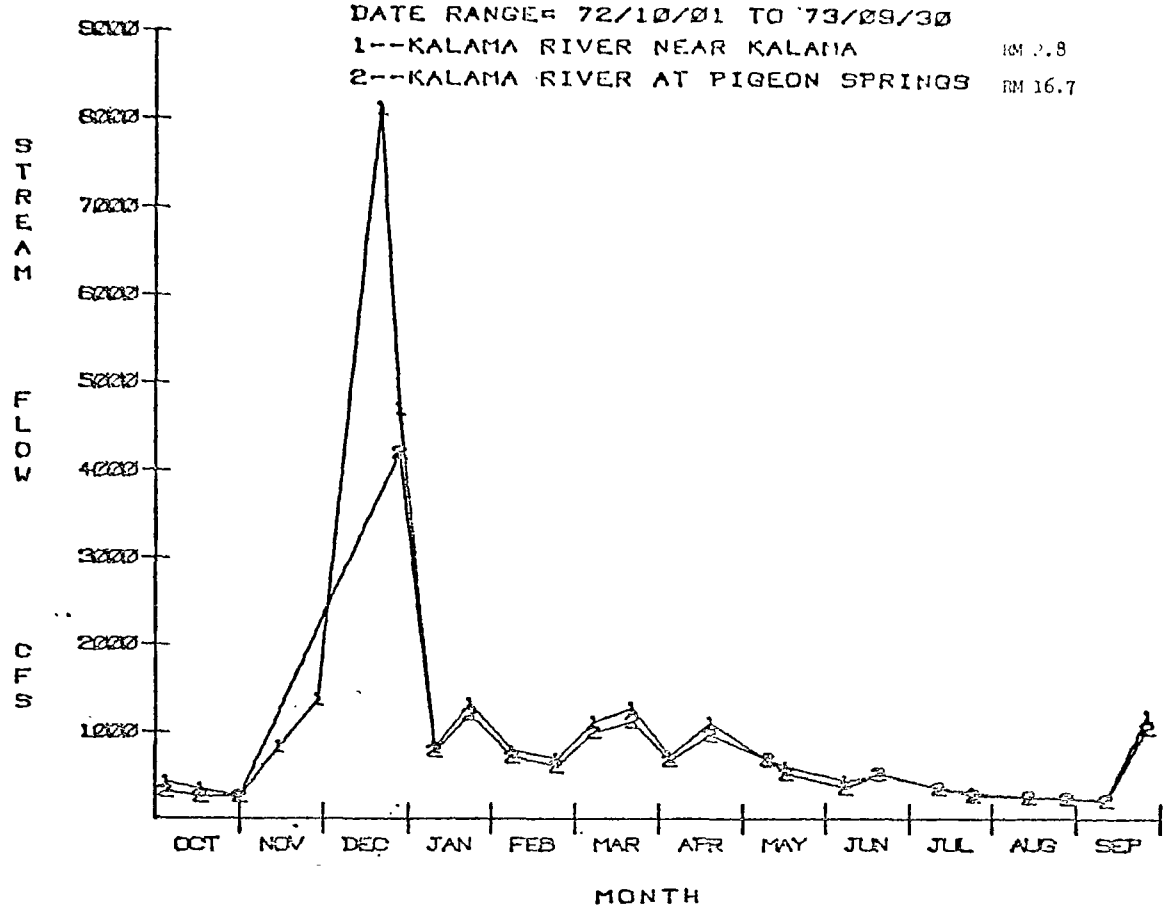



LOWER COLUMBIA BASIN
DATE RANGE= 72/10/01 TO 73/09/30
1--BURNT BRIDGE CREEK AT MOUTH RM 14.7
TOTAL COLIFORM /100ML
1000000
100000
10000
1000
WATER QUALITY STANDARD
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
MONTH

KALAMA RIVER

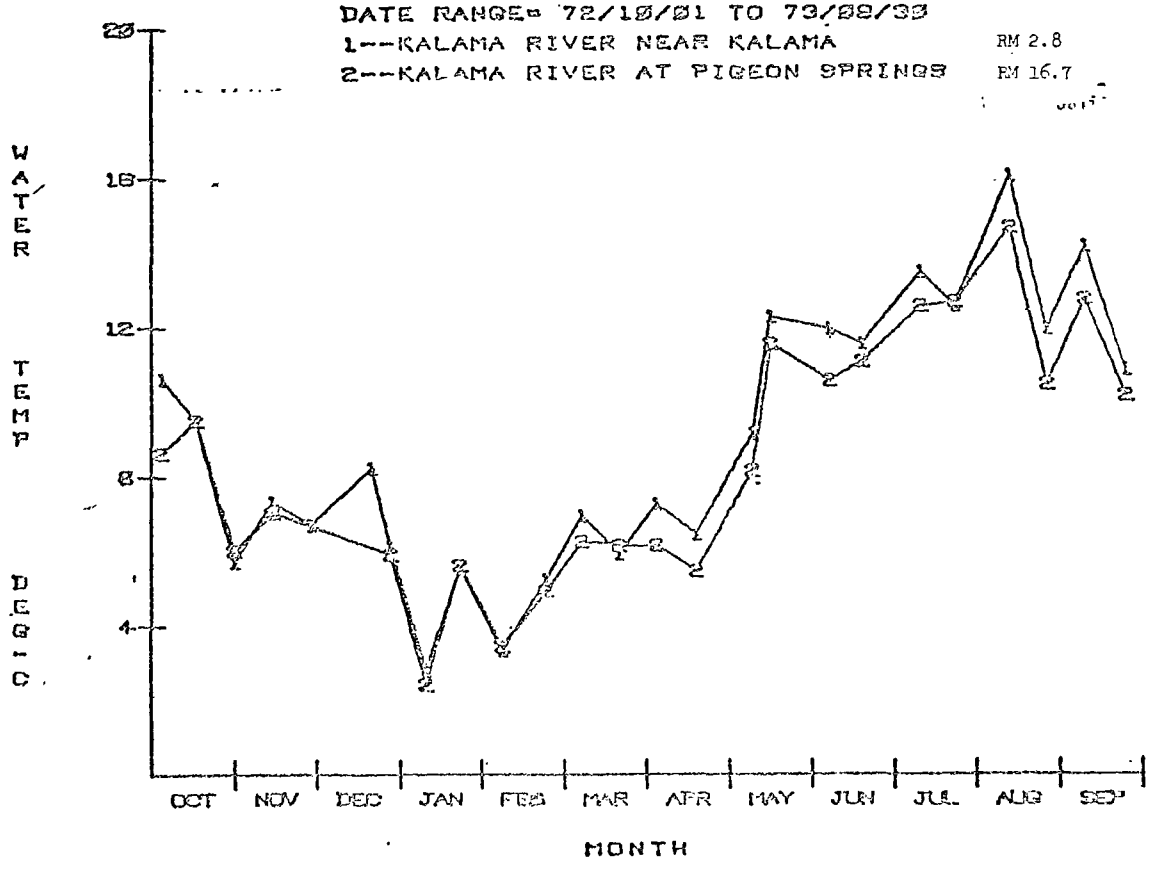
LOWER COLUMBIA BASIN

DATE RANGE= 72/10/01 TO 73/09/30
1--KALAMA RIVER NEAR KALAMA RM 2.8
2--KALAMA RIVER AT PIGEON SPRINGS RM 16.7



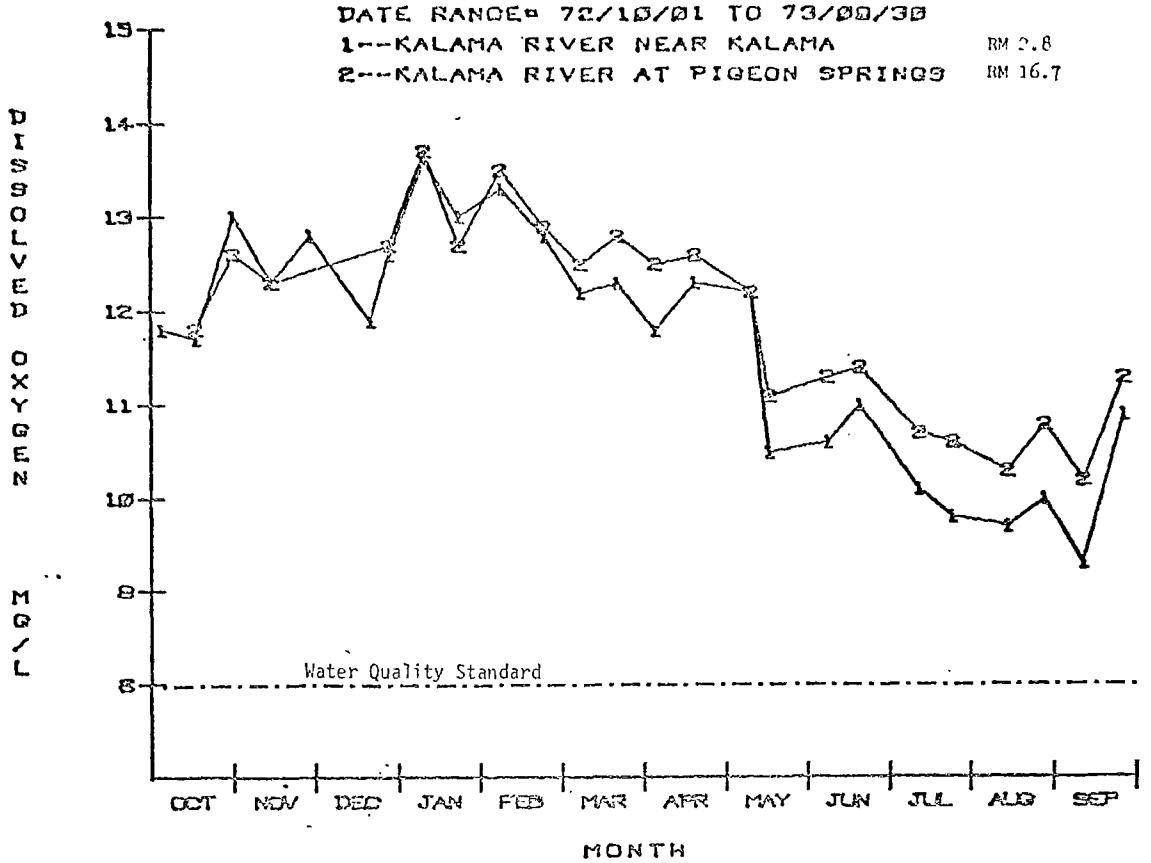
LOWER COLUMBIA BASIN

DATE RANGE= 72/10/01 TO 73/09/30
1--KALAMA RIVER NEAR KALAMA RM 2.8
2--KALAMA RIVER AT PIGEON SPRINGS RM 16.7



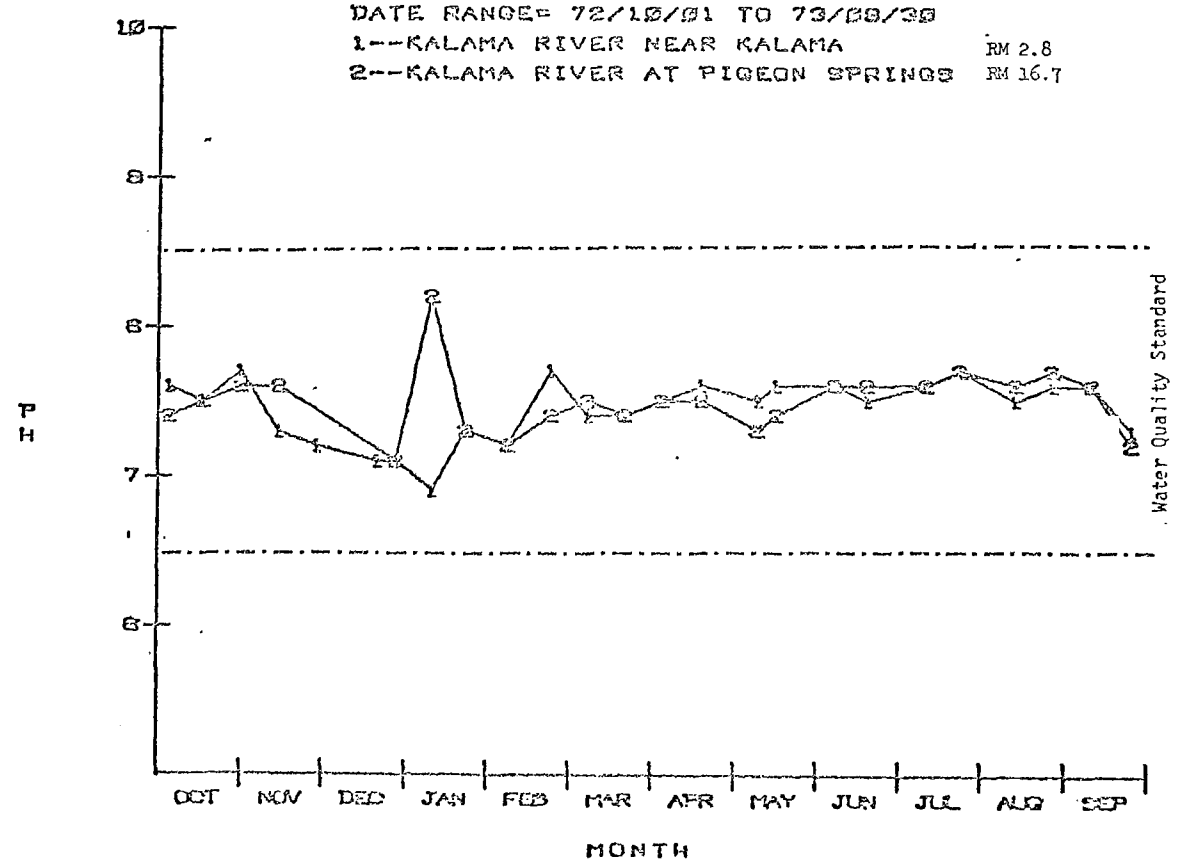
LOWER COLUMBIA BASIN

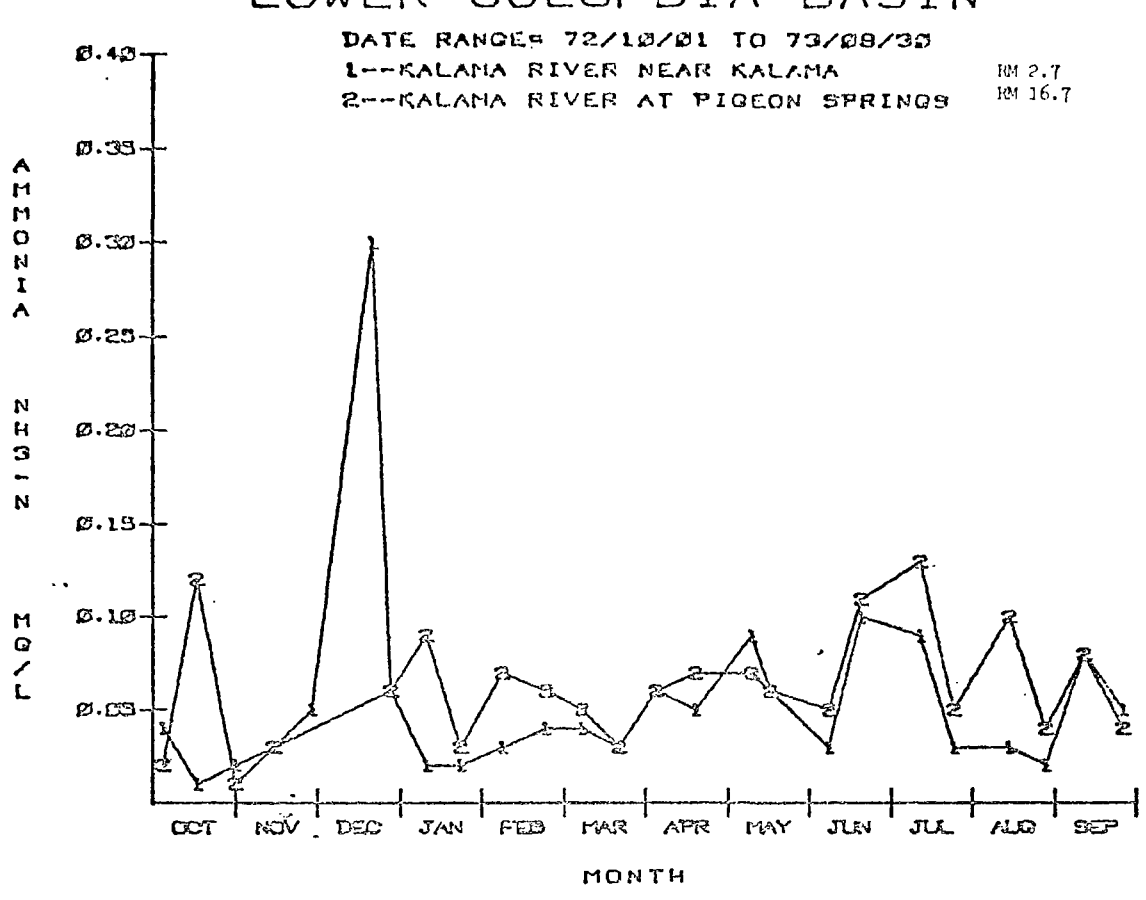
DATE RANGE= 72/10/01 TO 73/09/30
1--KALAMA RIVER NEAR KALAMA RM 2.8
2--KALAMA RIVER AT PIGEON SPRINGS RM 16.7

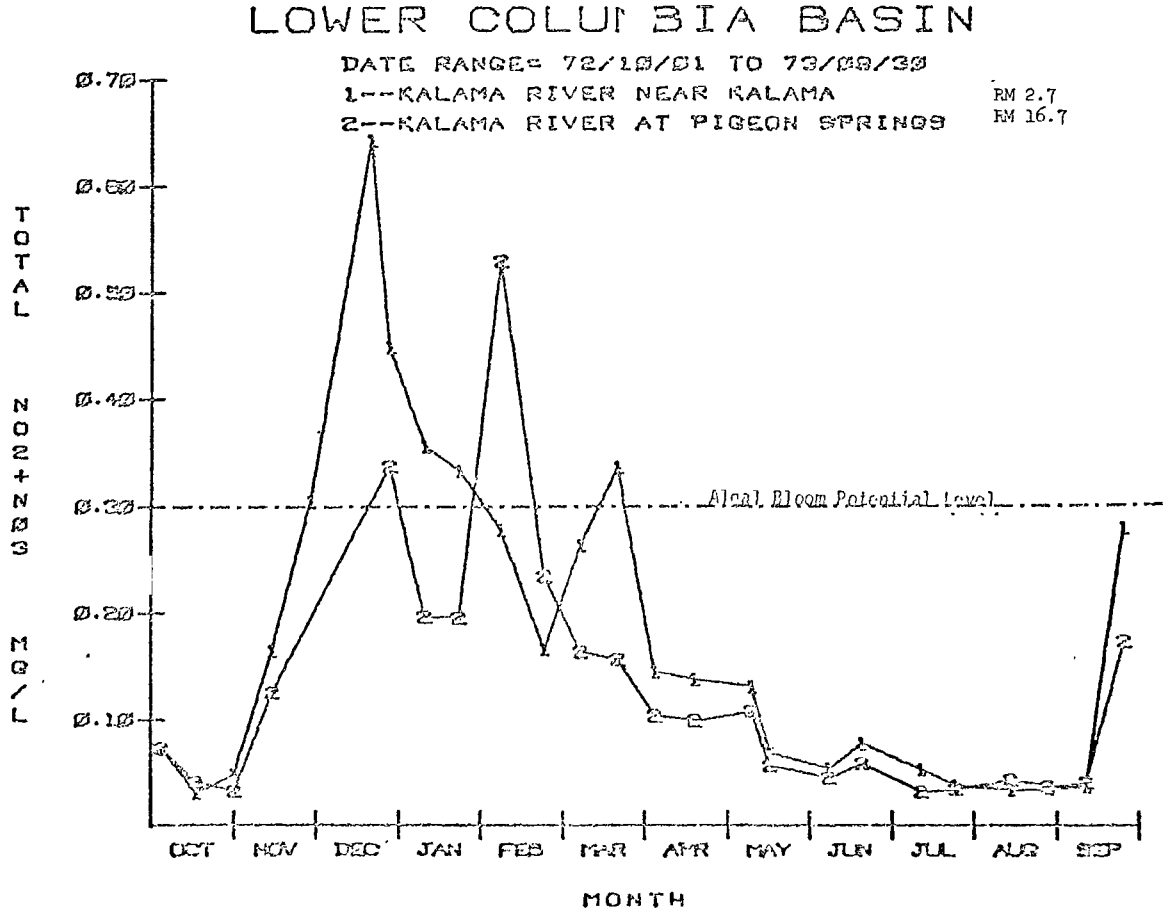


LOWER COLUMBIA BASIN

DATE RANGE= 72/10/01 TO 73/09/30
1--KALAMA RIVER NEAR KALAMA RM 2.8
2--KALAMA RIVER AT PIGEON SPRINGS RM 16.7

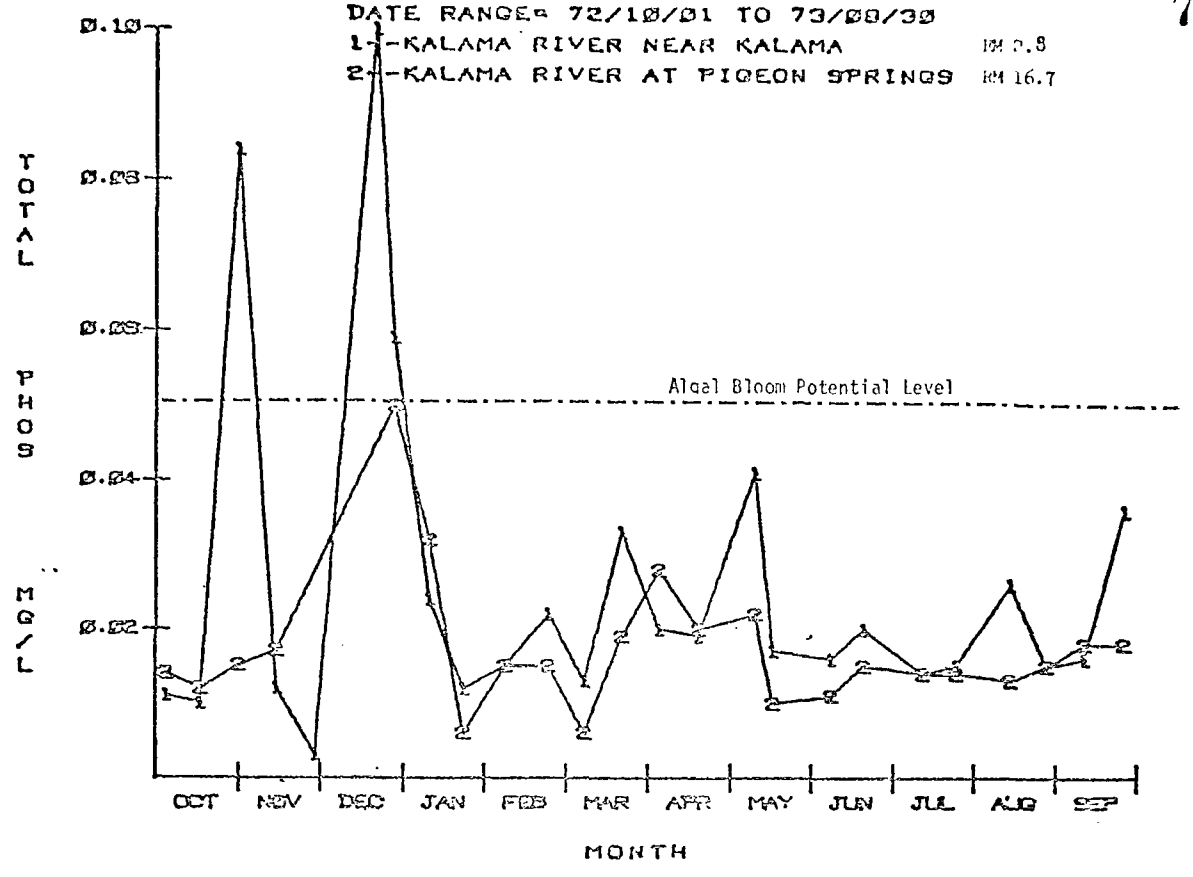



LOWER COLUMBIA BASIN
DATE RANGE= 72/10/01 TO 73/08/30
1--KALAMA RIVER NEAR KALAMA RM 2.7
2--KALAMA RIVER AT PIGEON SPRINGS RM 16.7
AMMONIA NH3-N MG/L
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP
MONTH


LOWER COLUMBIA BASIN
DATE RANGE= 72/10/01 TO 73/08/30
1--KALAMA RIVER NEAR KALAMA RM 2.7
2--KALAMA RIVER AT PIGEON SPRINGS RM 16.7
TOTAL NO2+NO3 MG/L
0.70
0.60
0.50
0.40
0.30
0.20
0.10
Algal Bloom Potential Level
OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP
MONTH

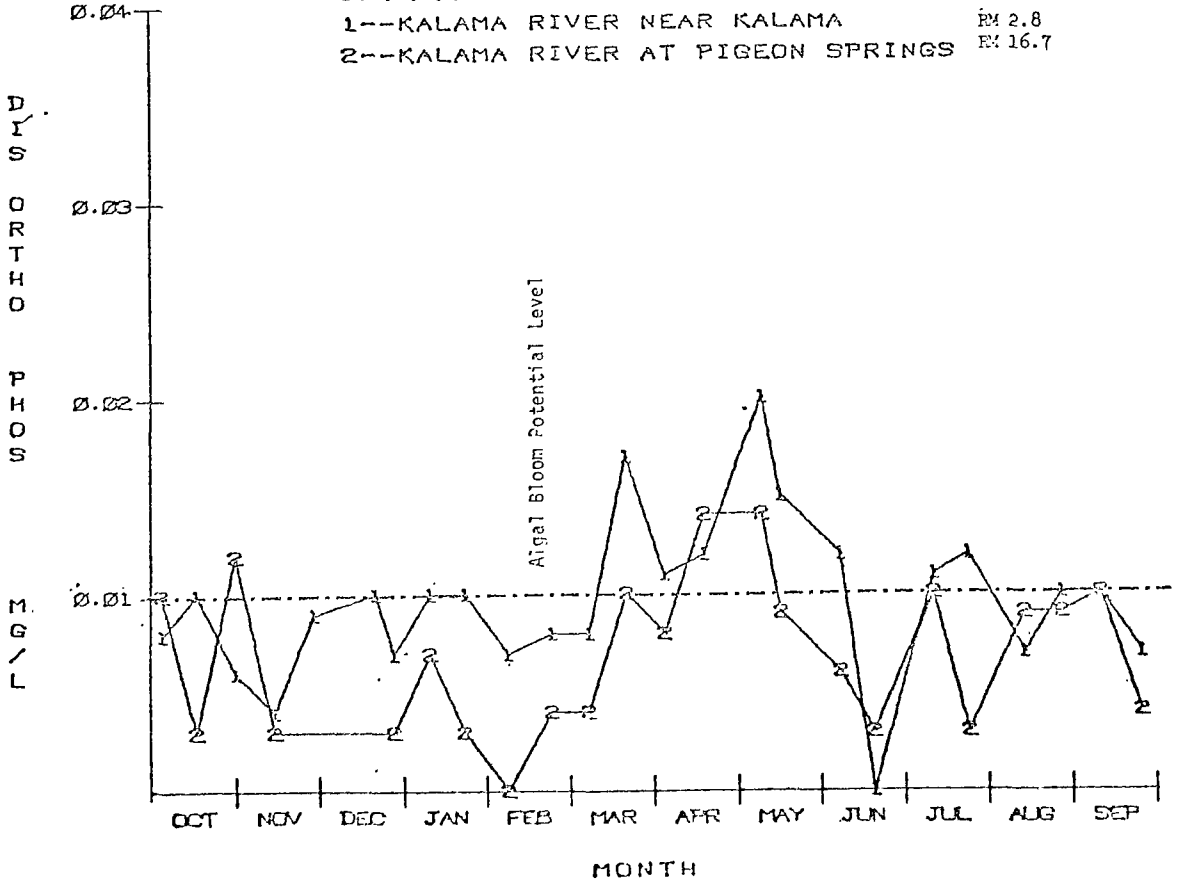
LOWER COLUMBIA BASIN

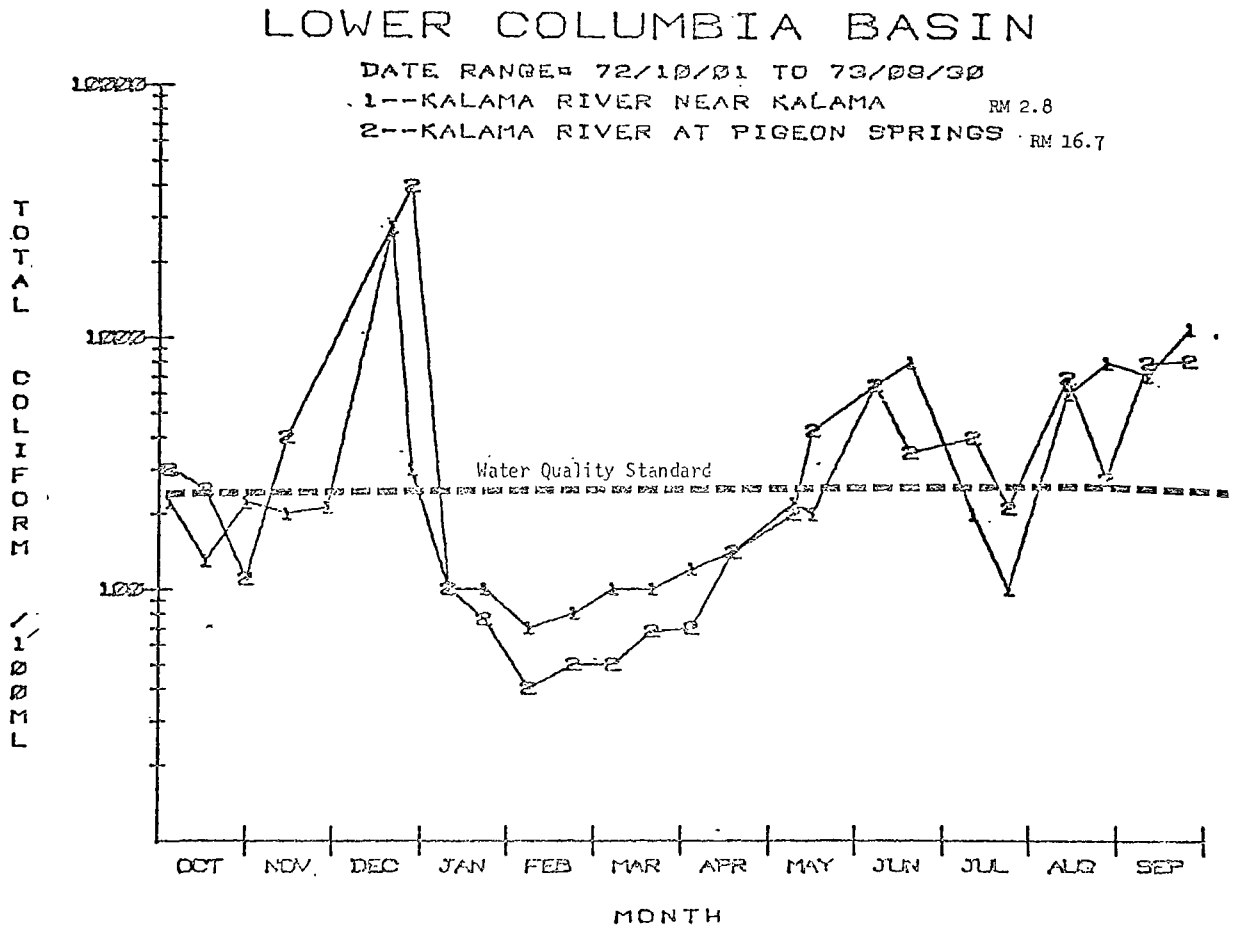
DATE RANGE= 72/10/01 TO 73/09/30
1--KALAMA RIVER NEAR KALAMA RM 2.8
2--KALAMA RIVER AT PIGEON SPRINGS RM 16.7



LOWER COLUMBIA BASIN

DATE RANGE= 72/10/01 TO 73/09/30
1--KALAMA RIVER NEAR KALAMA RM 2.8
2--KALAMA RIVER AT PIGEON SPRINGS RM 16.7




LOWER COLUMBIA BASIN
DATE RANGE= 72/10/01 TO 73/09/30
1--KALAMA RIVER NEAR KALAMA RM 2.8
2--KALAMA RIVER AT PIGEON SPRINGS RM 16.7
TOTAL COLIFORM /100ML
Water Quality Standard
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
MONTH

MIDDLE COLUMBIA

MIDDLE COLUMBIA

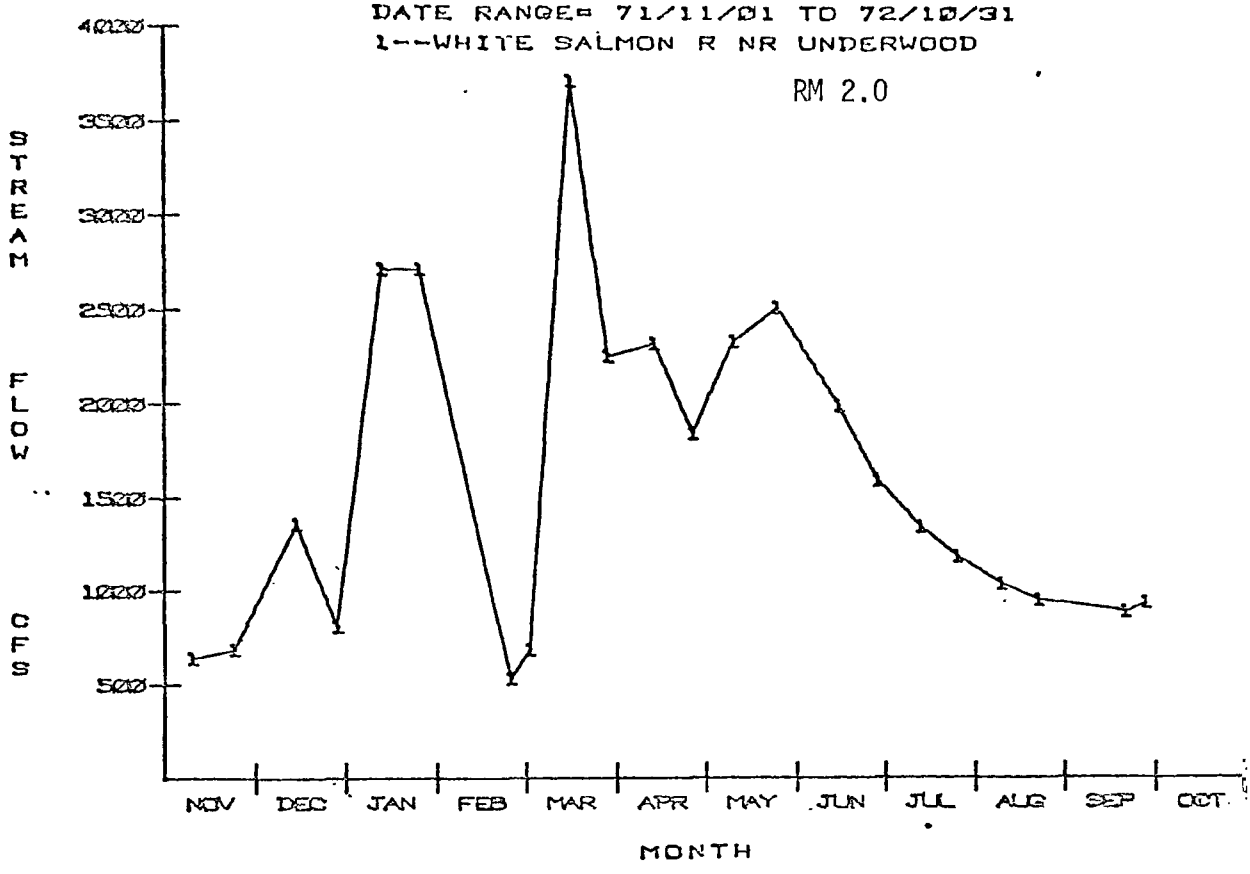
Segment Name	Segment Number	Class
Klickitat River	14-30-01	EFF

WHITE SALMON RIVER

LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--WHITE SALMON R NR UNDERWOOD

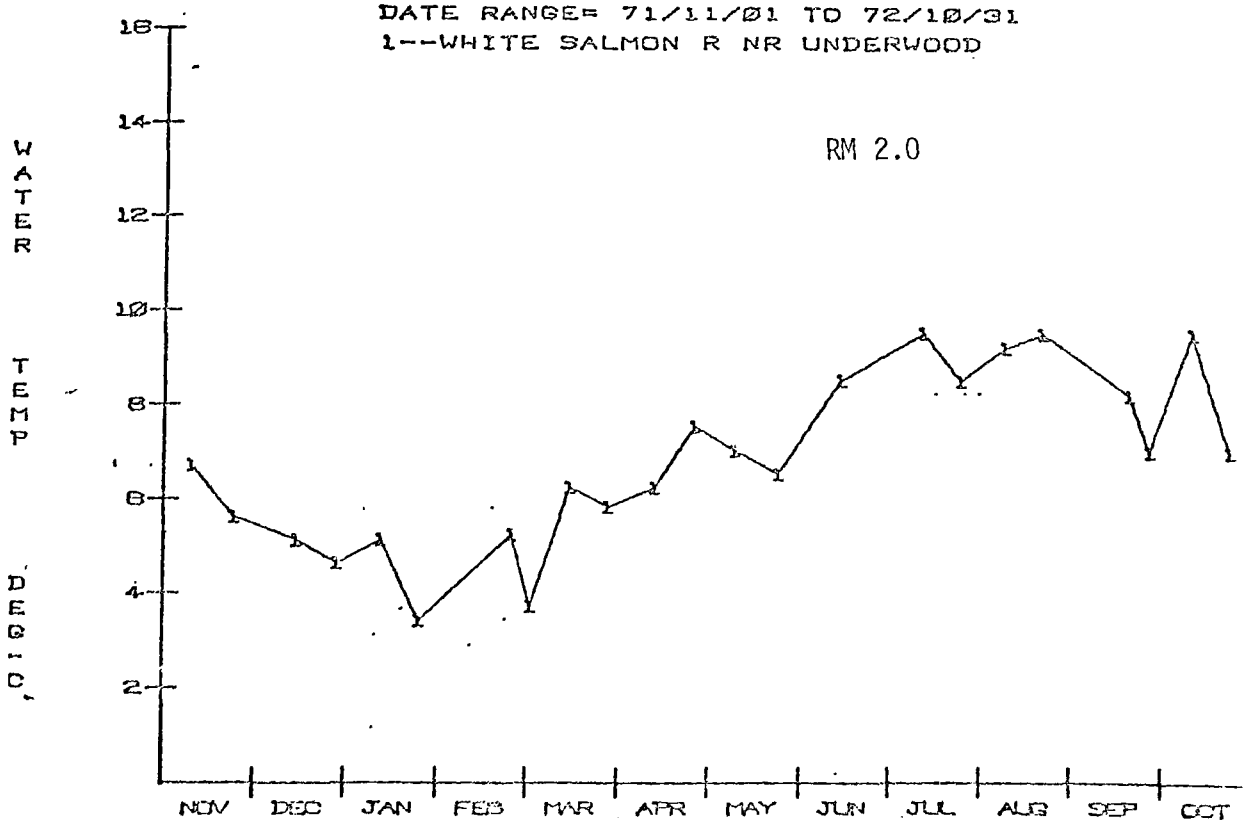
RM 2.0



LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--WHITE SALMON R NR UNDERWOOD

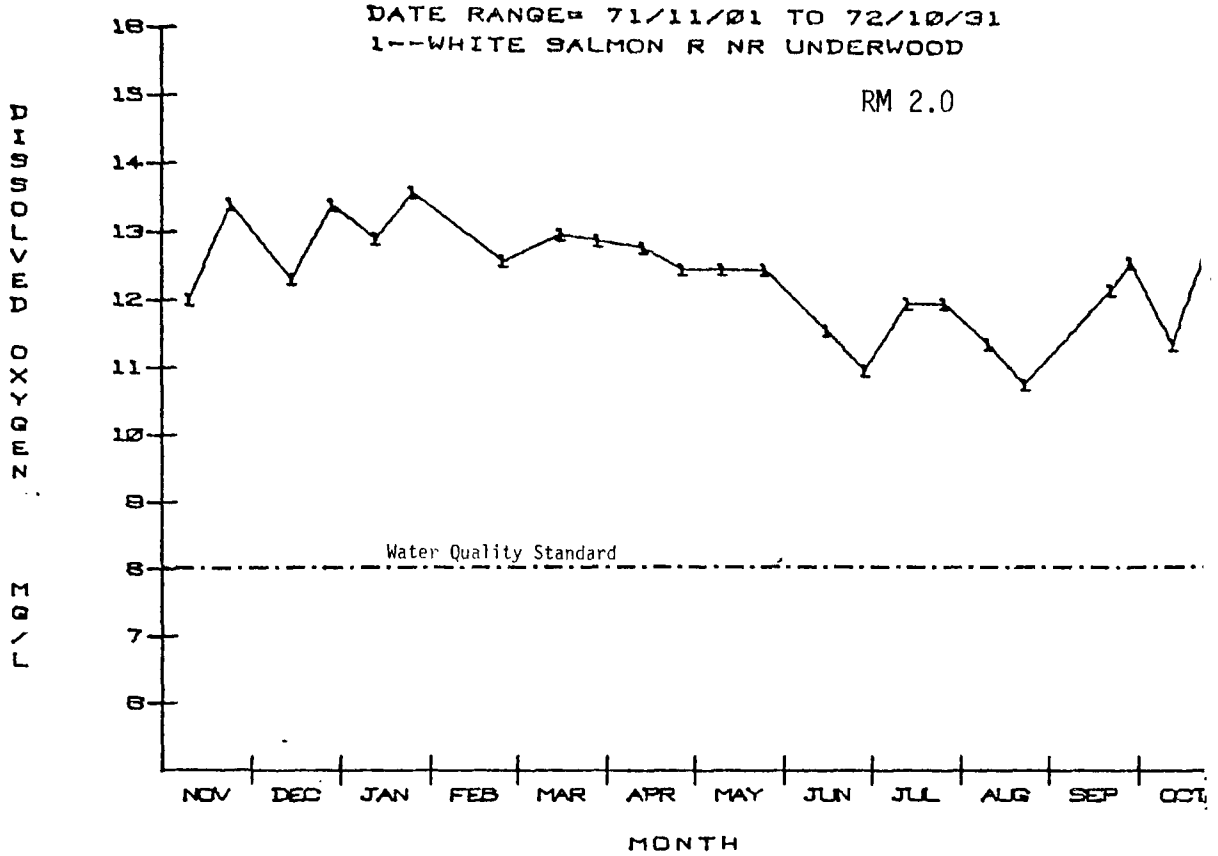
RM 2.0



LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--WHITE SALMON R NR UNDERWOOD

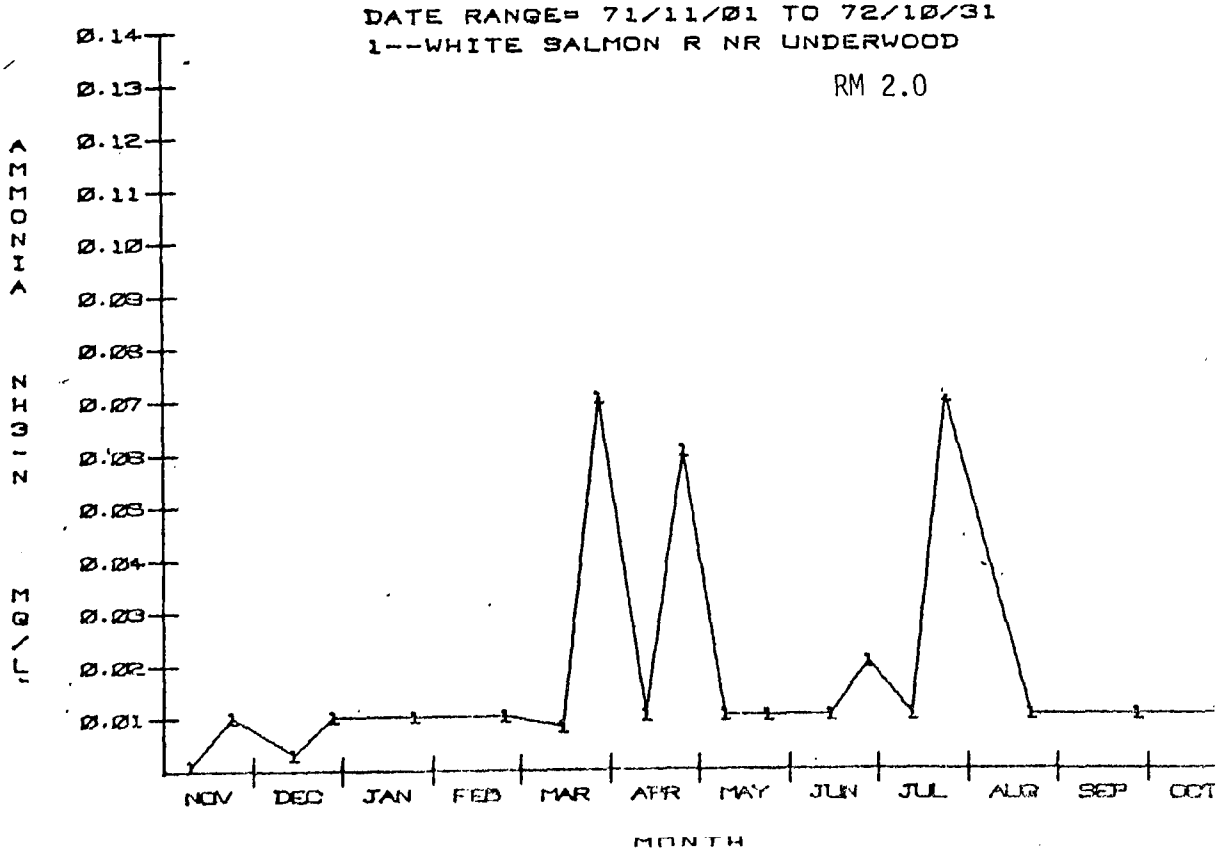
RM 2.0

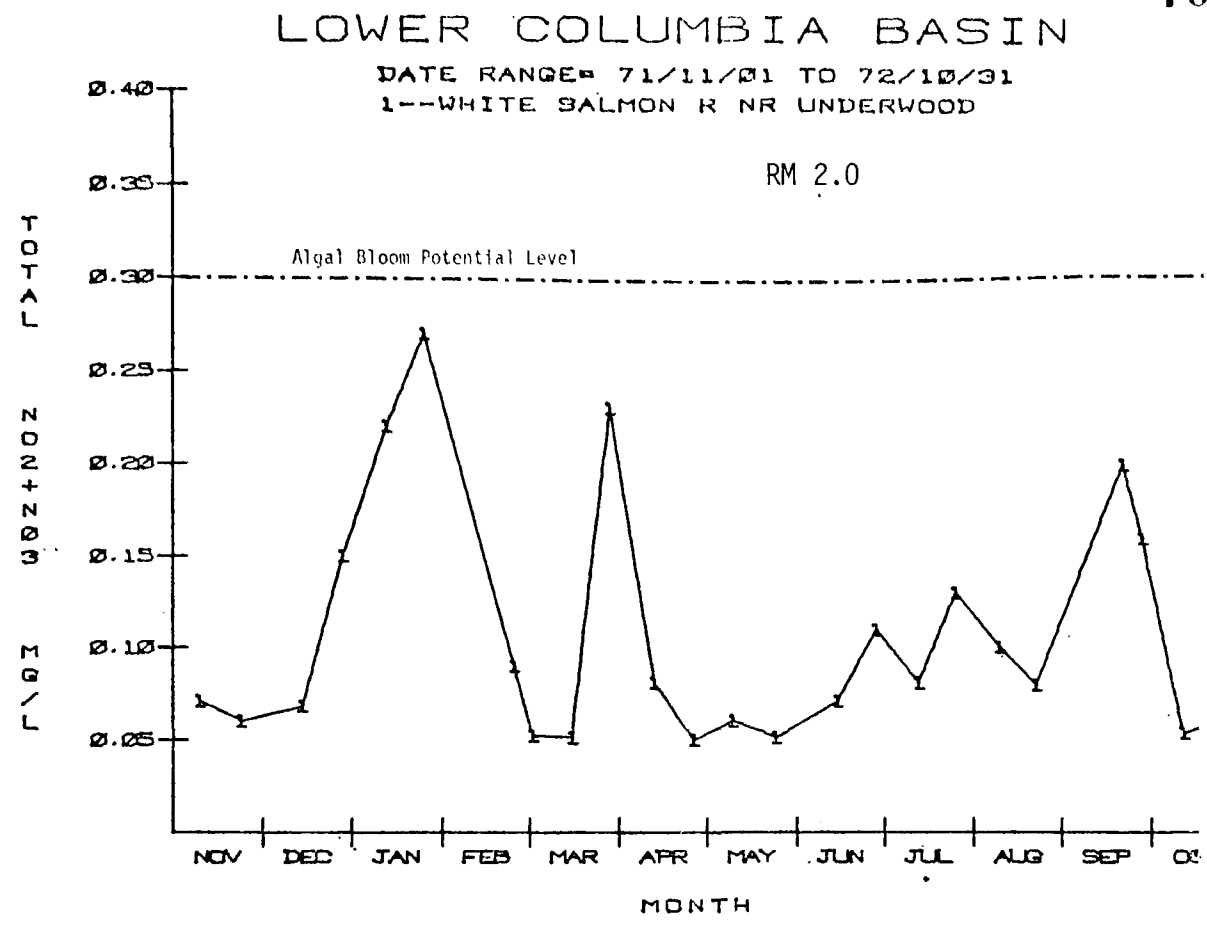


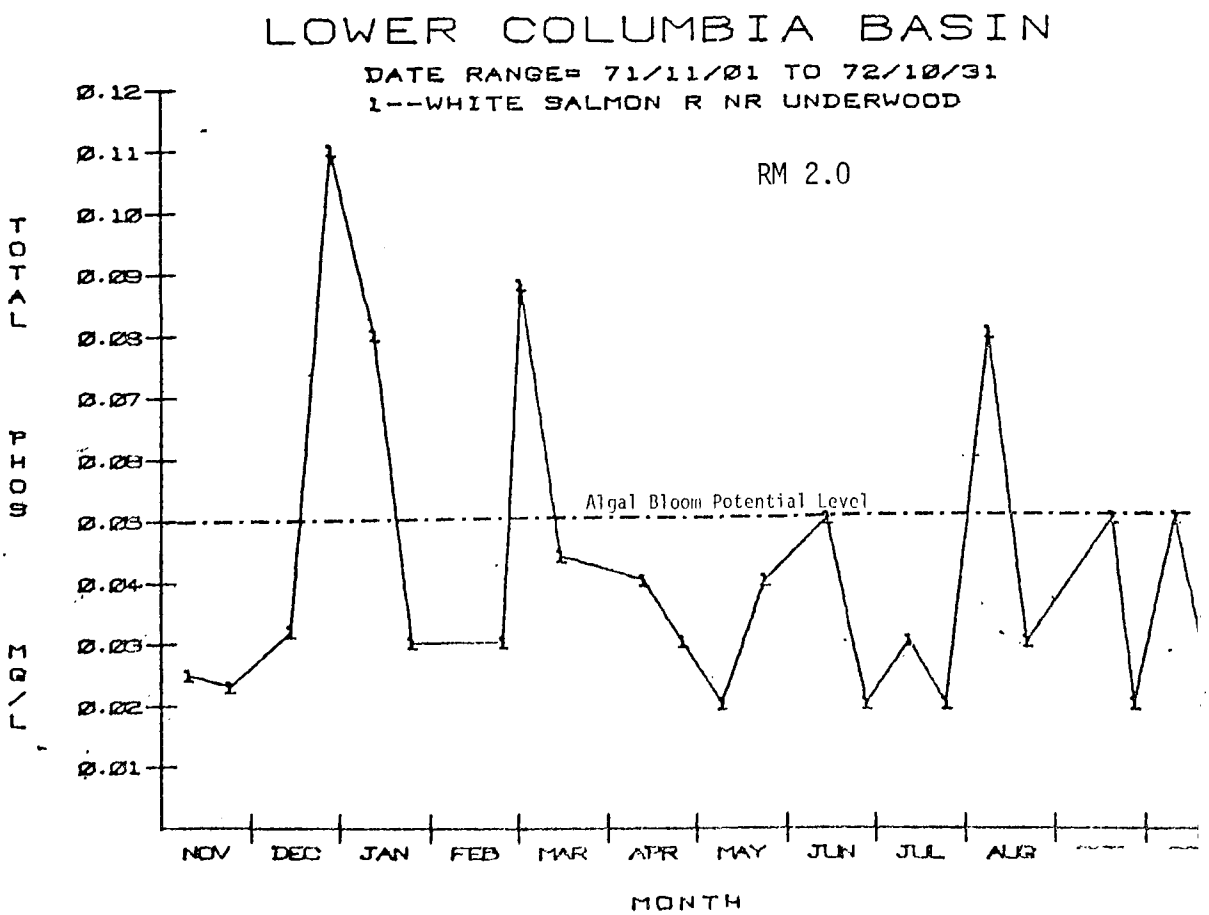
LOWER COLUMBIA BASIN

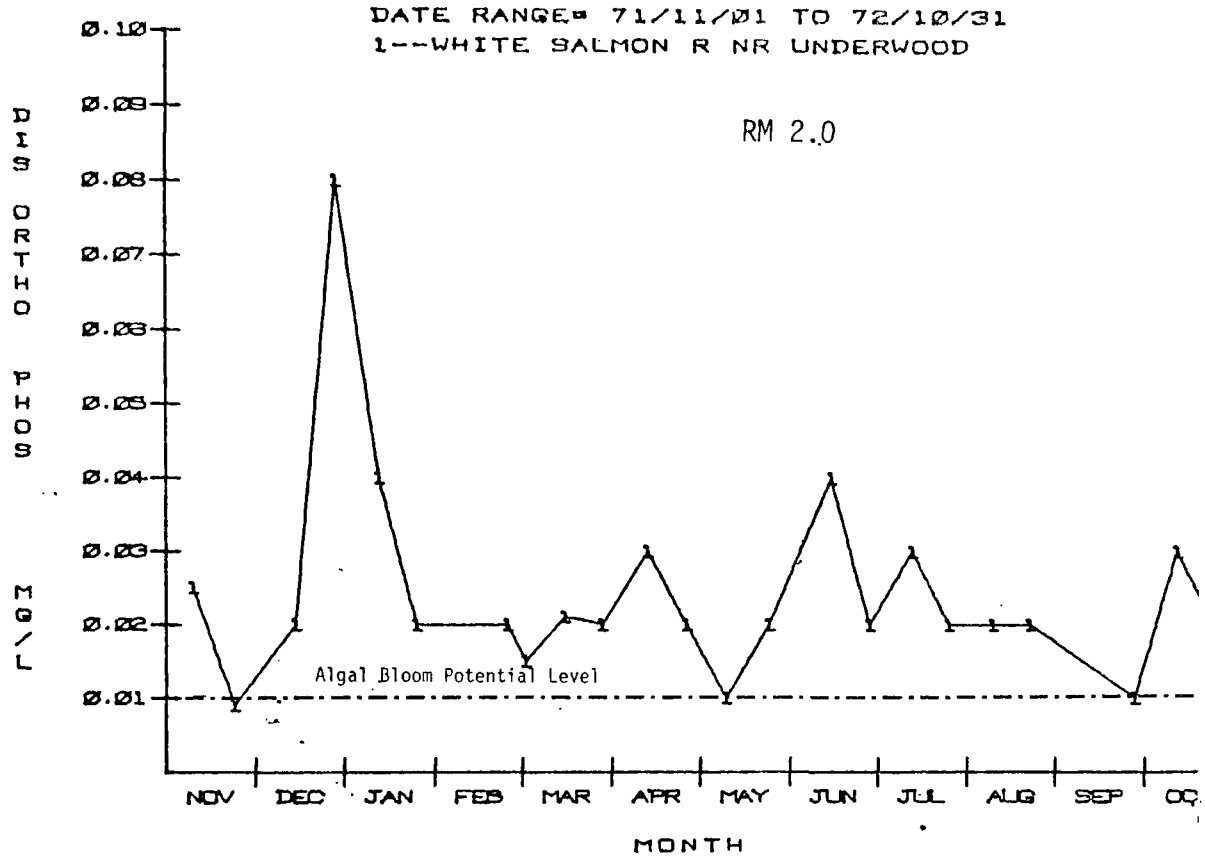
DATE RANGE= 71/11/01 TO 72/10/31
1--WHITE SALMON R NR UNDERWOOD

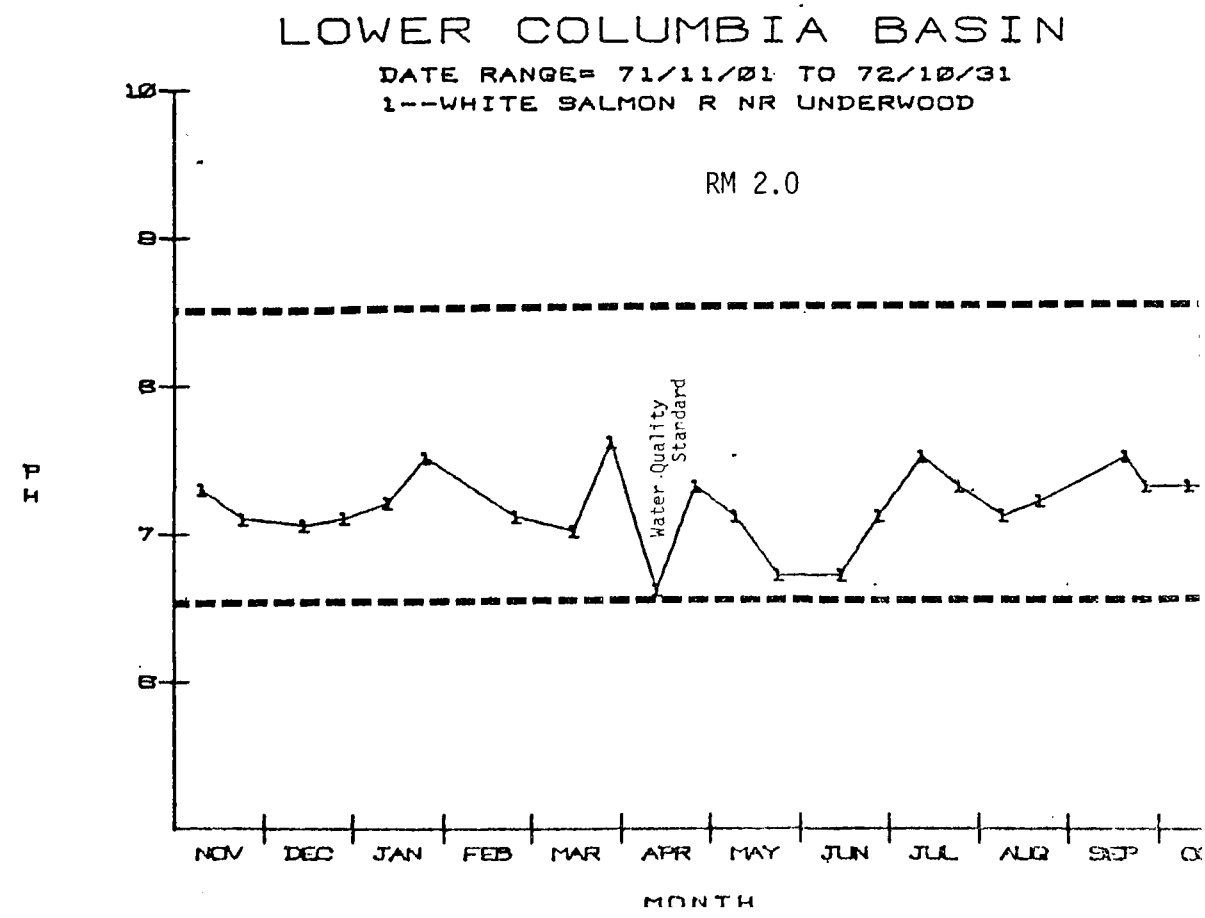
RM 2.0

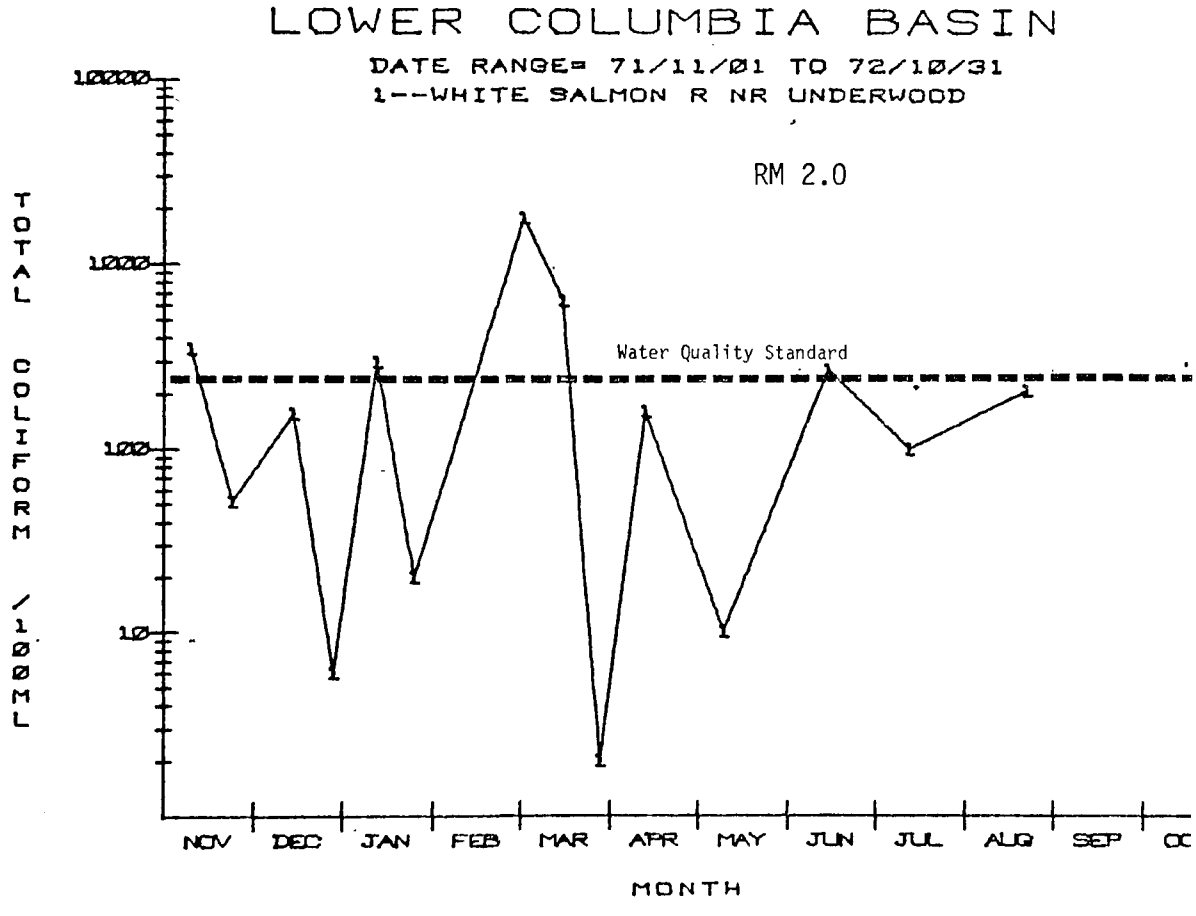



LOWER COLUMBIA BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--WHITE SALMON R NR UNDERWOOD
RM 2.0
Algal Bloom Potential Level
TOTAL NO2+NO3 MG/L
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
MONTH


LOWER COLUMBIA BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--WHITE SALMON R NR UNDERWOOD
RM 2.0
Algal Bloom Potential Level
TOTAL PHOS MG/L
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
MONTH


LOWER COLUMBIA BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--WHITE SALMON R NR UNDERWOOD
RM 2.0
DIS ORTHO PHOS MG/L
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
Algal Bloom Potential Level
NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OC
MONTH

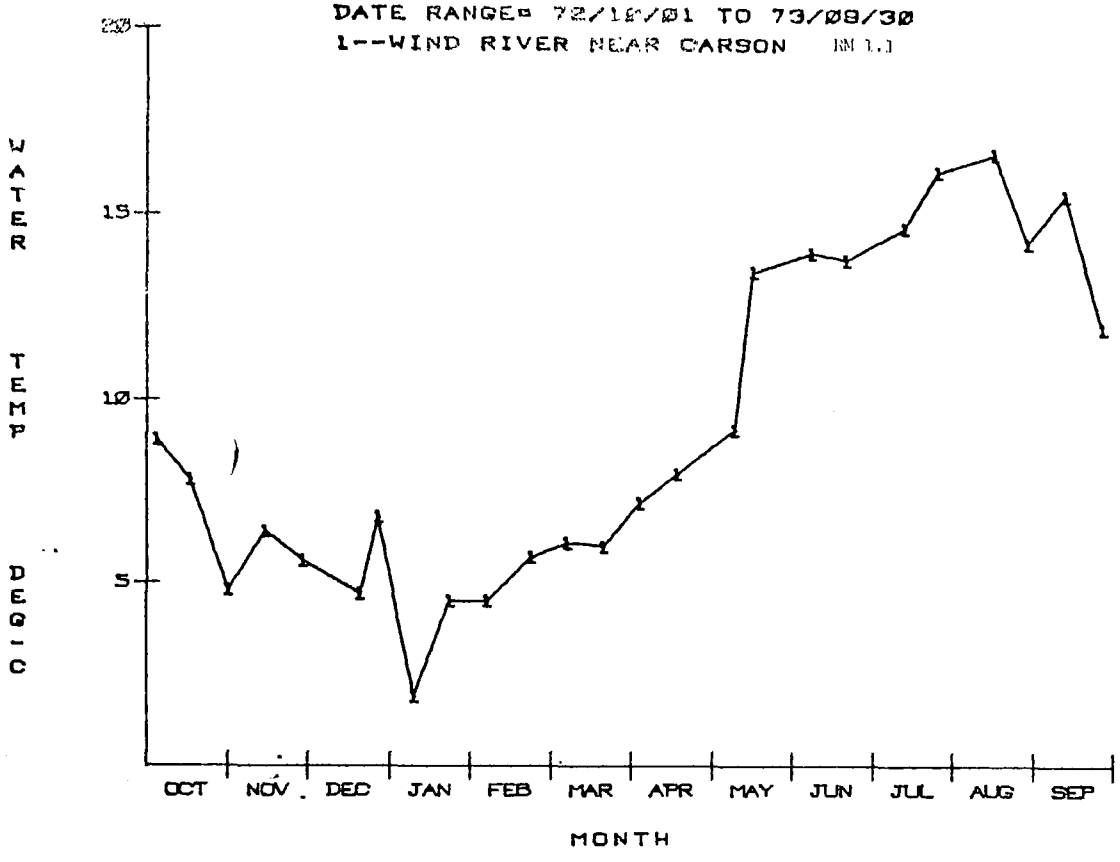

LOWER COLUMBIA BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--WHITE SALMON R NR UNDERWOOD
RM 2.0
PH
10
9
8
7
6
Water Quality Standard
NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OC
MONTH


LOWER COLUMBIA BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--WHITE SALMON R NR UNDERWOOD
RM 2.0
Water Quality Standard
TOTAL COLIFORM /100ML
10000
1000
100
10
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OC
MONTH

WIND RIVER

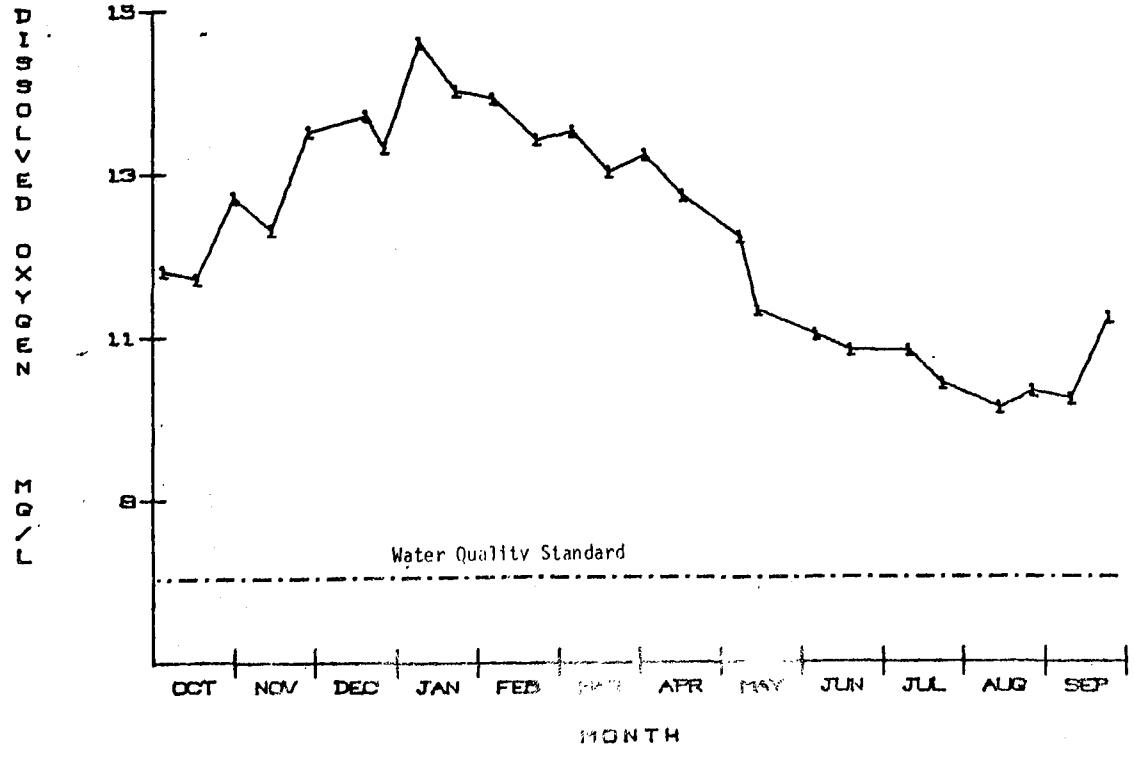
LOWER COLUMBIA BASIN

DATE RANGE= 72/10/01 TO 73/09/30
1--WIND RIVER NEAR CARSON RM 1.1



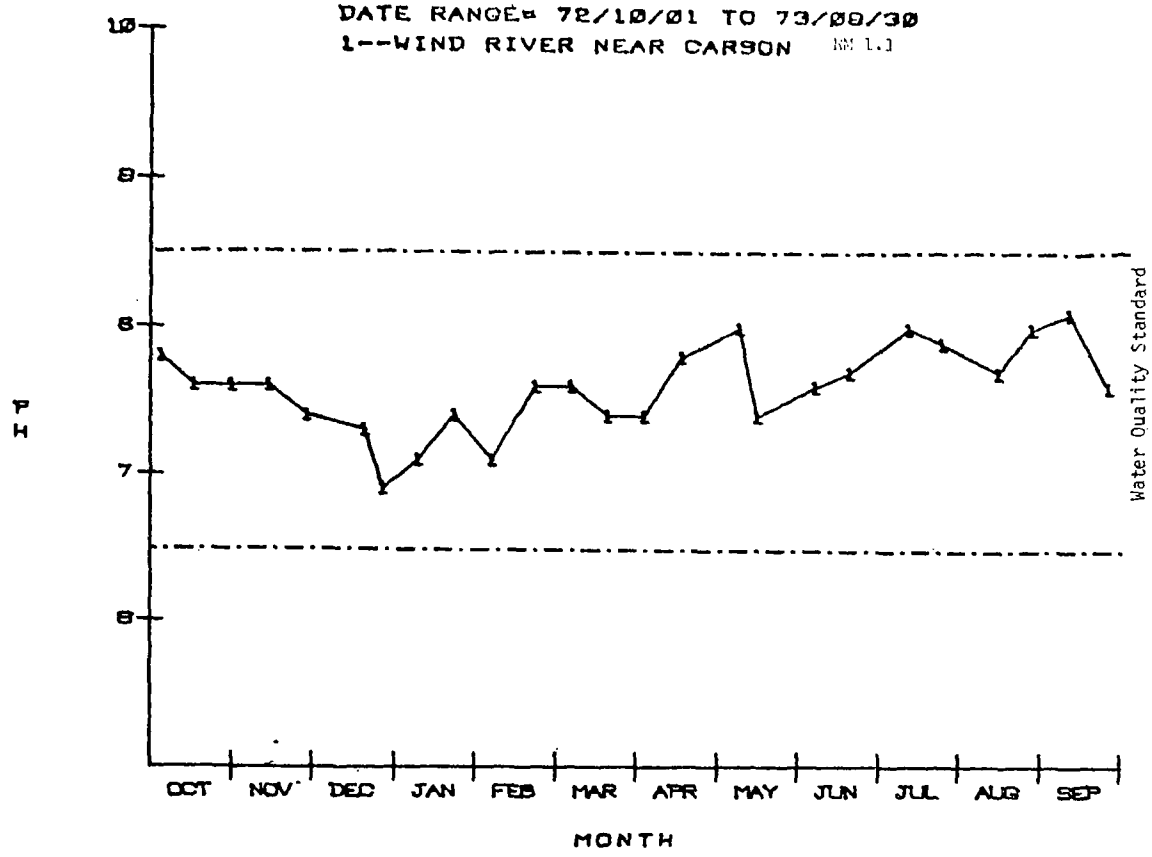
LOWER COLUMBIA BASIN

DATE RANGE= 72/10/01 TO 73/09/30
1--WIND RIVER NEAR CARSON RM 1.1



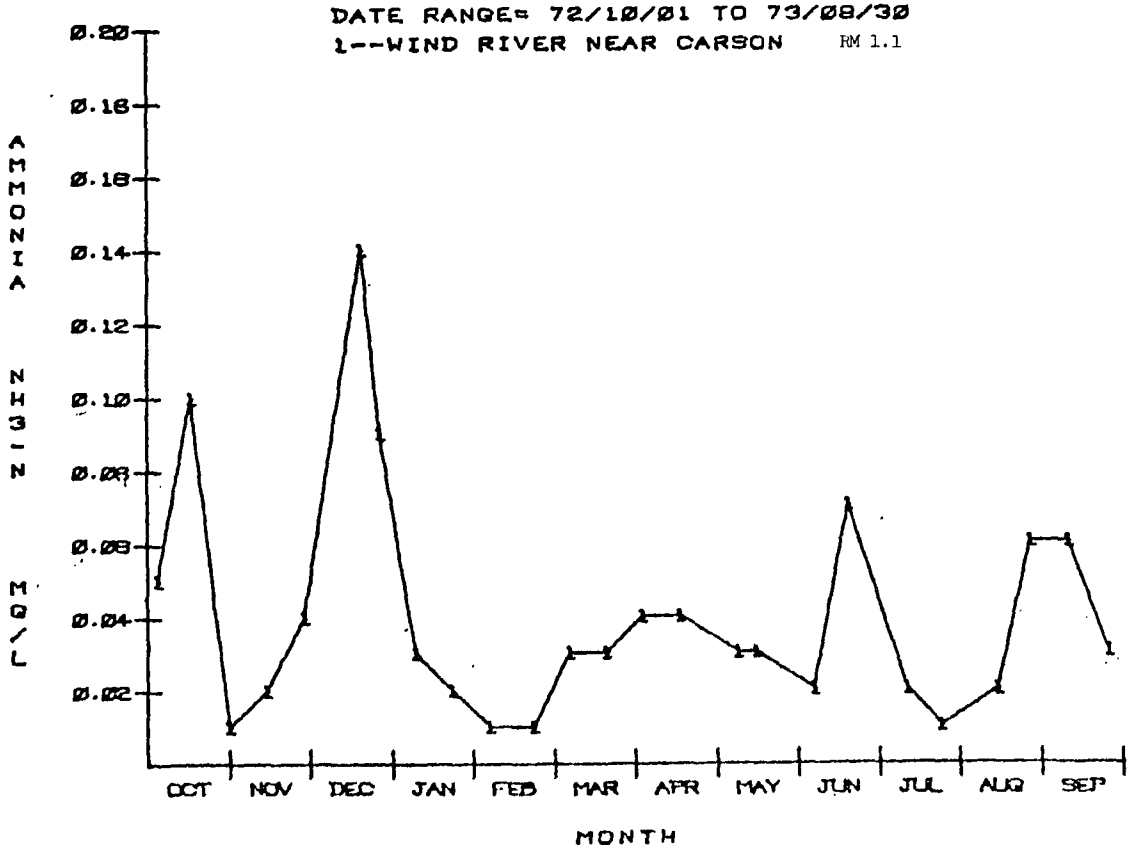
LOWER COLUMBIA BASIN

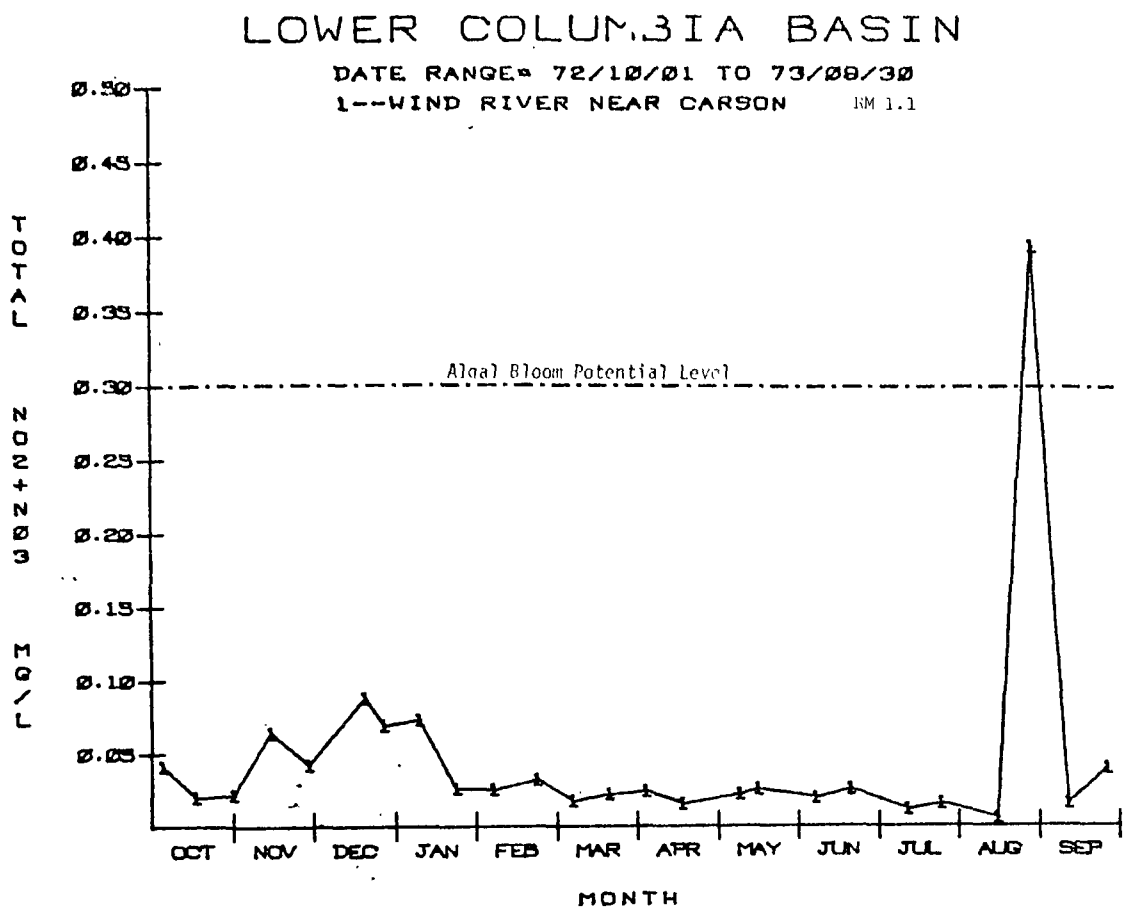
DATE RANGE= 72/10/01 TO 73/09/30
1--WIND RIVER NEAR CARSON RM 1.1

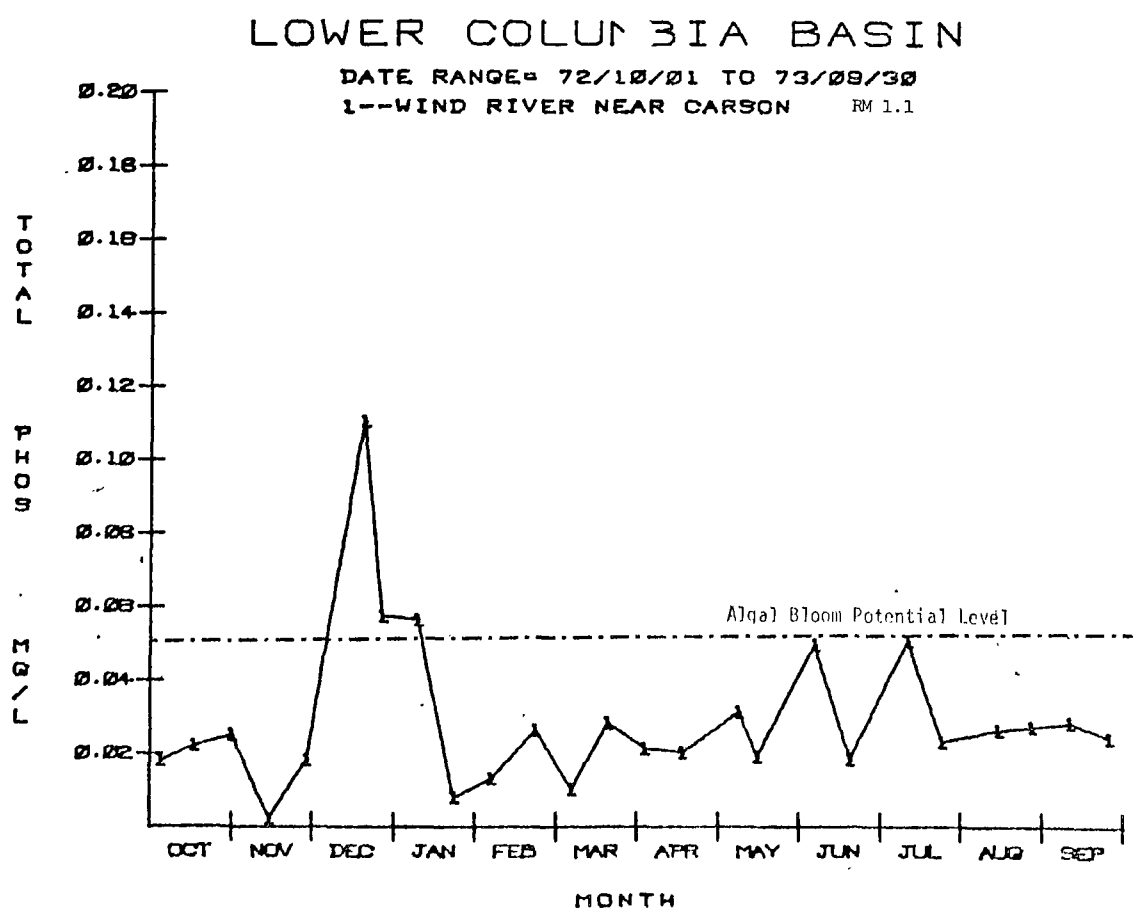


LOWER COLUMBIA BASIN

DATE RANGE= 72/10/01 TO 73/09/30
1--WIND RIVER NEAR CARSON RM 1.1

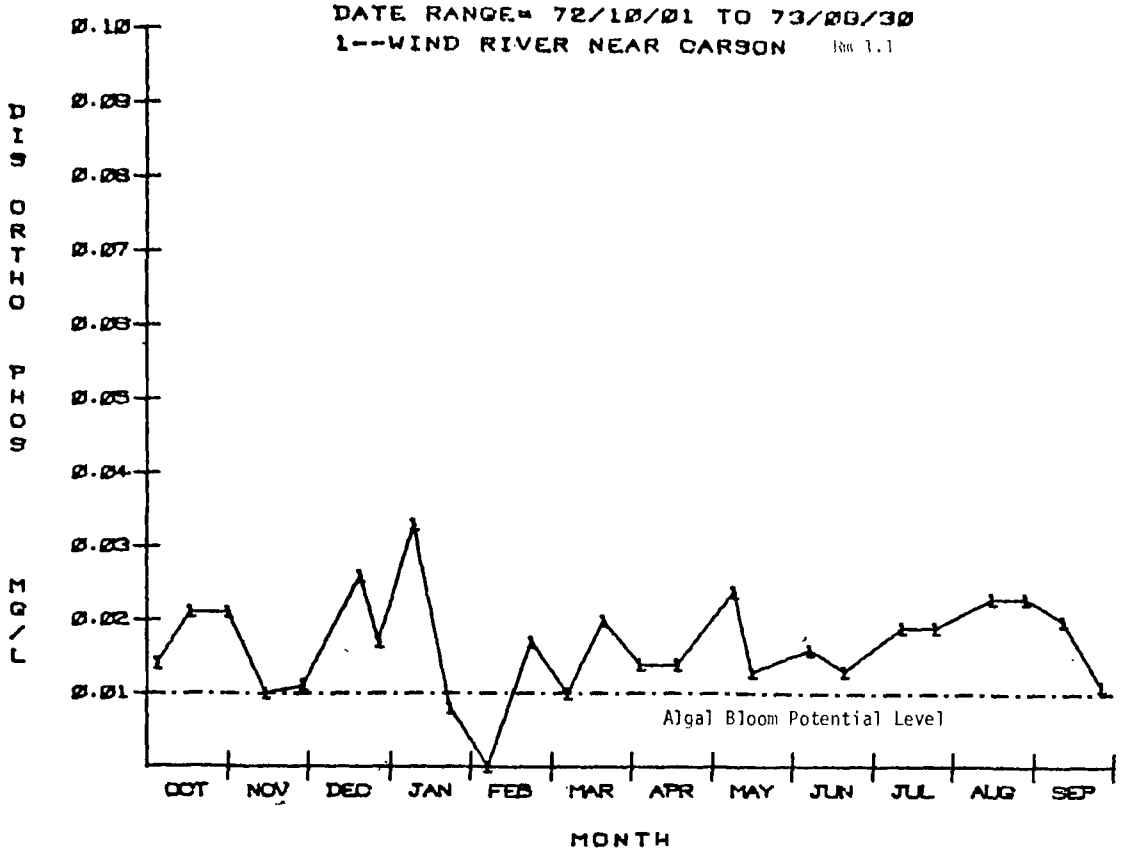



LOWER COLUMBIA BASIN
DATE RANGE= 72/10/01 TO 73/09/30
1--WIND RIVER NEAR CARSON RM 1.1
TOTAL NO2+NO3 MG/L
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
Algal Bloom Potential Level
OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP
MONTH


LOWER COLUMBIA BASIN
DATE RANGE= 72/10/01 TO 73/09/30
1--WIND RIVER NEAR CARSON RM 1.1
TOTAL PHOS MG/L
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
Algal Bloom Potential Level
OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP
MONTH

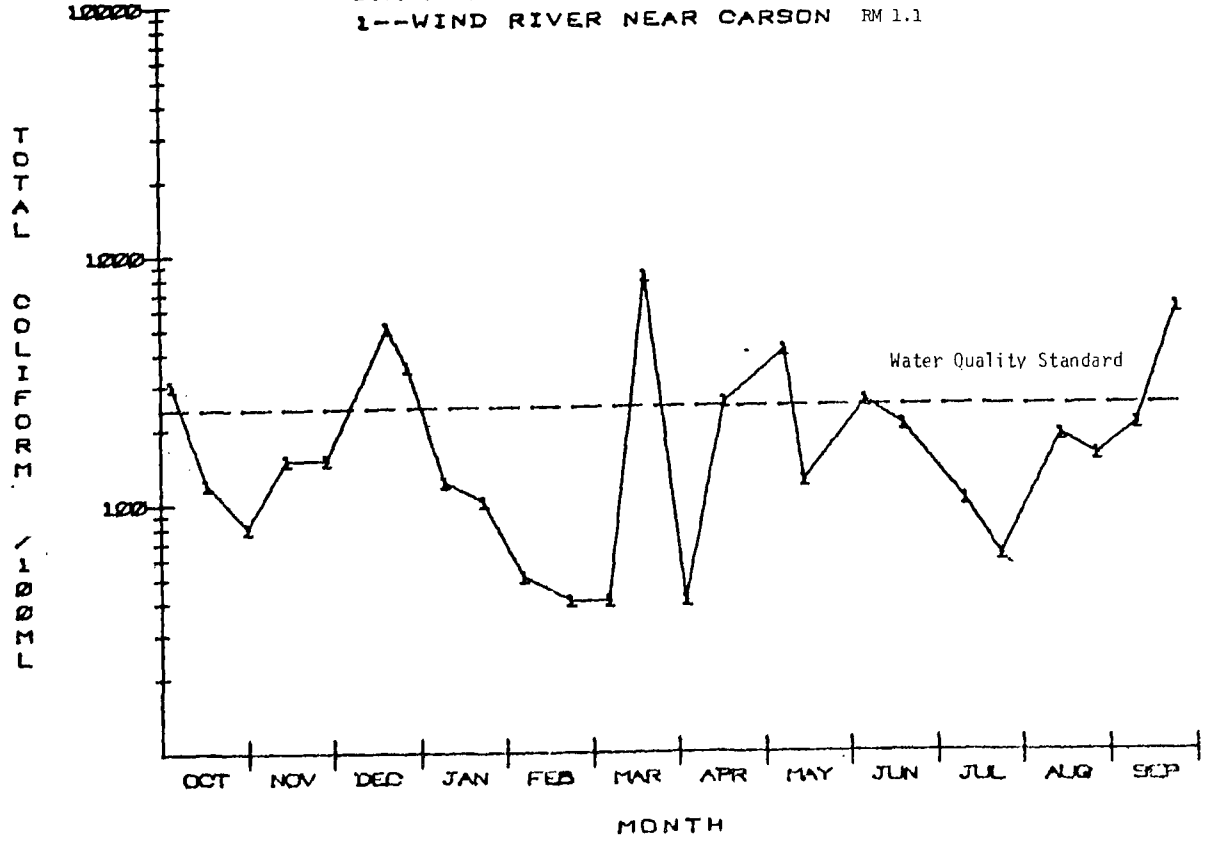
LOWER COLUMBIA BASIN

DATE RANGE= 72/10/01 TO 73/09/30
1--WIND RIVER NEAR CARSON RM 1.1



LOWER COLUMBIA BASIN

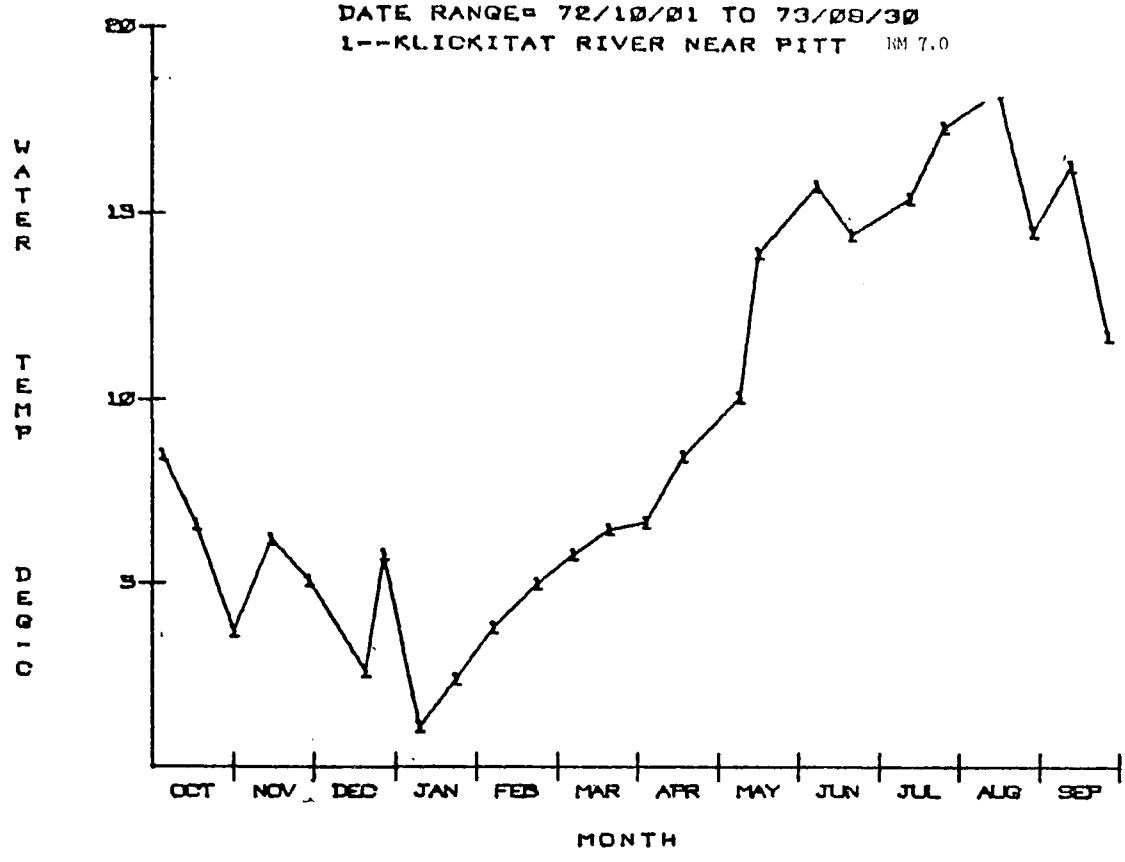
DATE RANGE= 72/10/01 TO 73/09/30
1--WIND RIVER NEAR CARSON RM 1.1



KLICKITAT RIVER

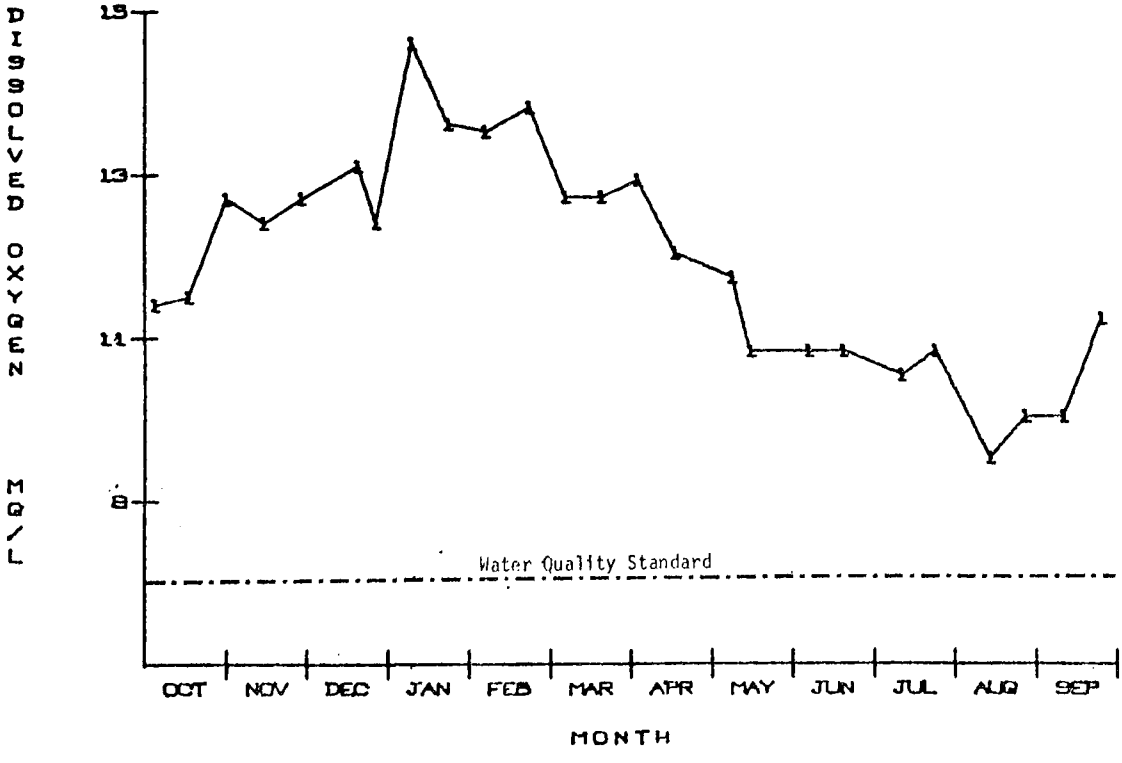
LOWER COLUMBIA BASIN

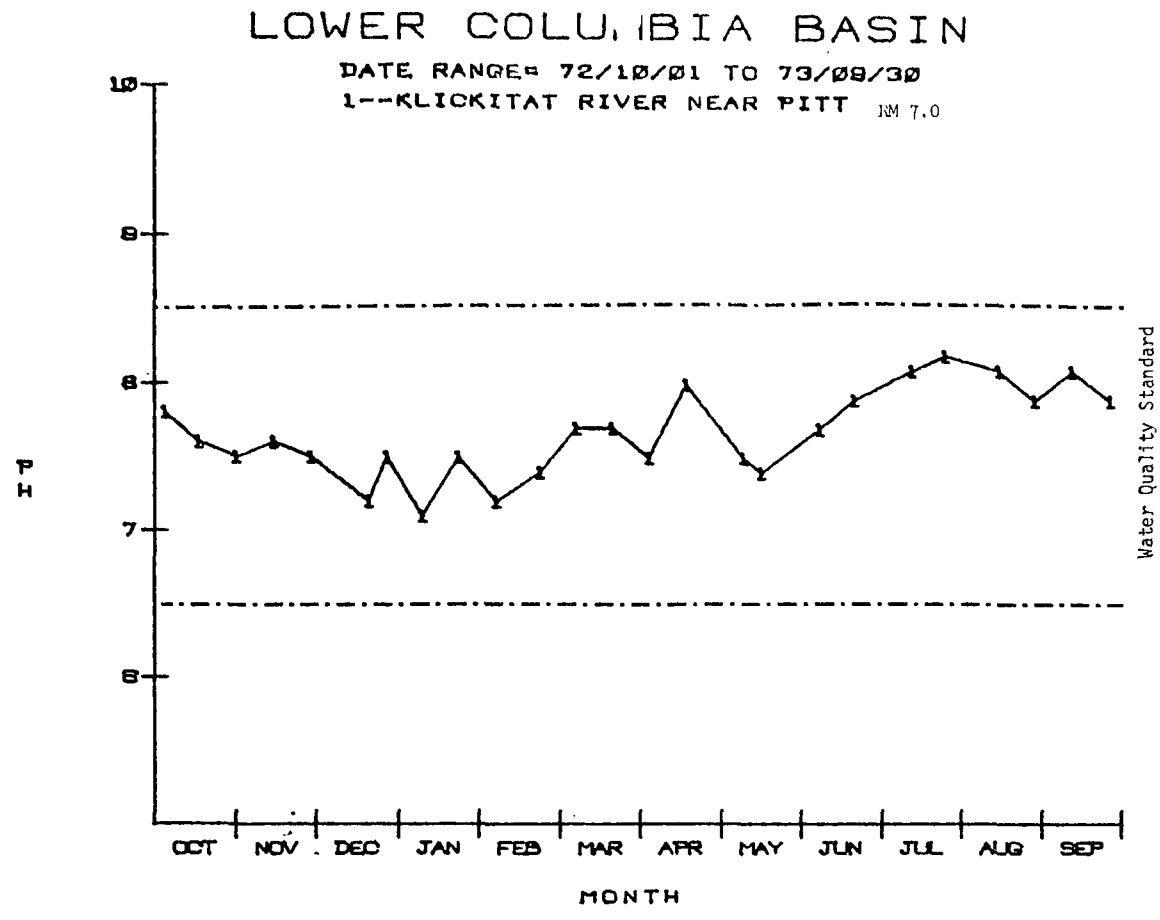
DATE RANGE= 72/10/01 TO 73/09/30
1--KLICKITAT RIVER NEAR PITT RM 7.0

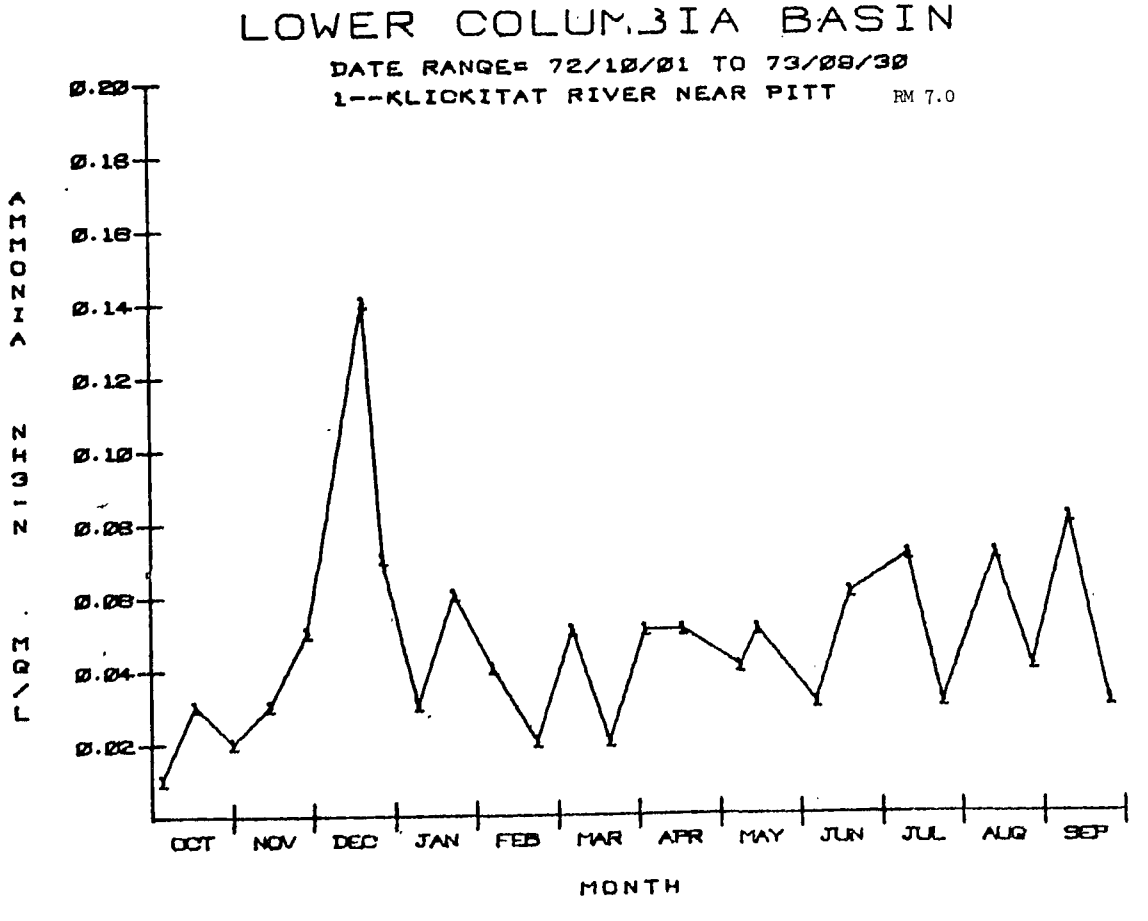


LOWER COLUMBIA BASIN

DATE RANGE= 72/10/01 TO 73/09/30
1--KLICKITAT RIVER NEAR PITT RM 7.0

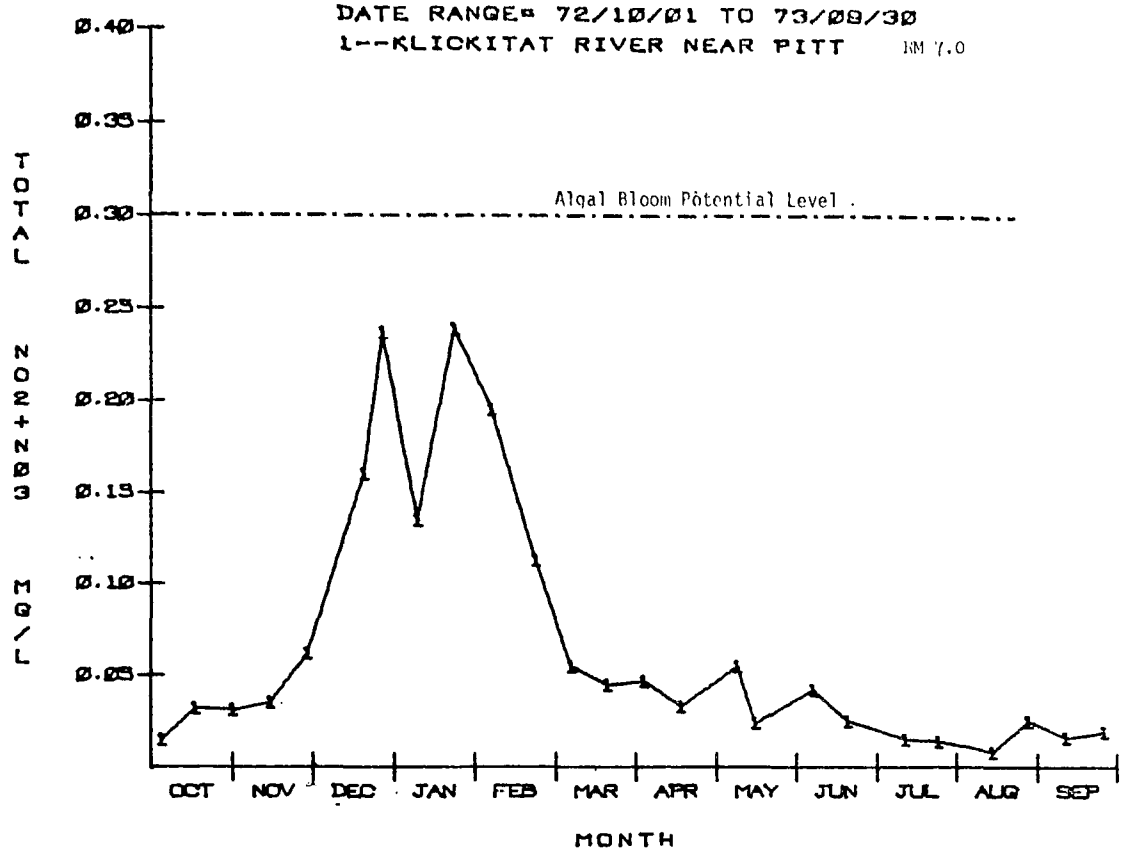



LOWER COLUMBIA BASIN
DATE RANGE= 72/10/01 TO 73/09/30
1--KLICKITAT RIVER NEAR PITT RM 7.0
10
9
8
7
6
PH
Water Quality Standard
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
MONTH


LOWER COLUMBIA BASIN
DATE RANGE= 72/10/01 TO 73/09/30
1--KLICKITAT RIVER NEAR PITT RM 7.0
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
AMMONIA NH3-N MG/L
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
MONTH

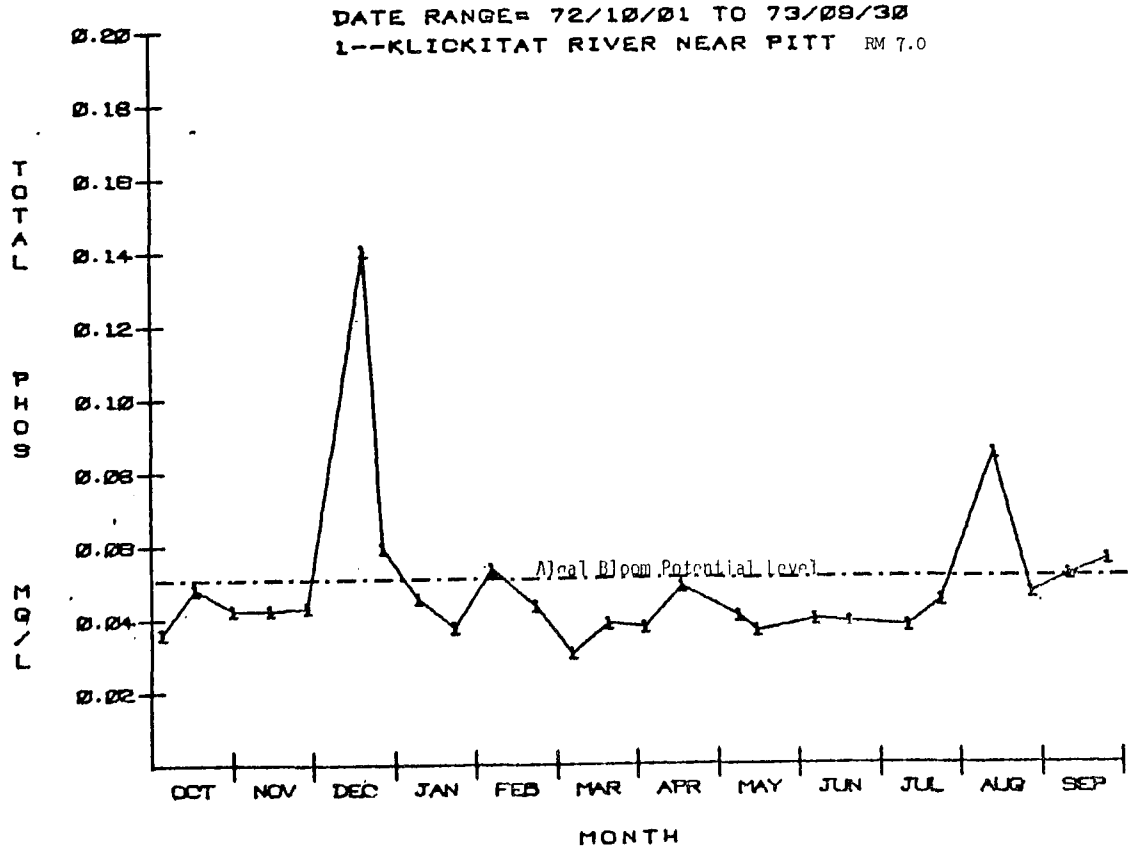
LOWER COLUMBIA BASIN

DATE RANGE= 72/10/01 TO 73/09/30
1--KLICKITAT RIVER NEAR PITT RM 7.0



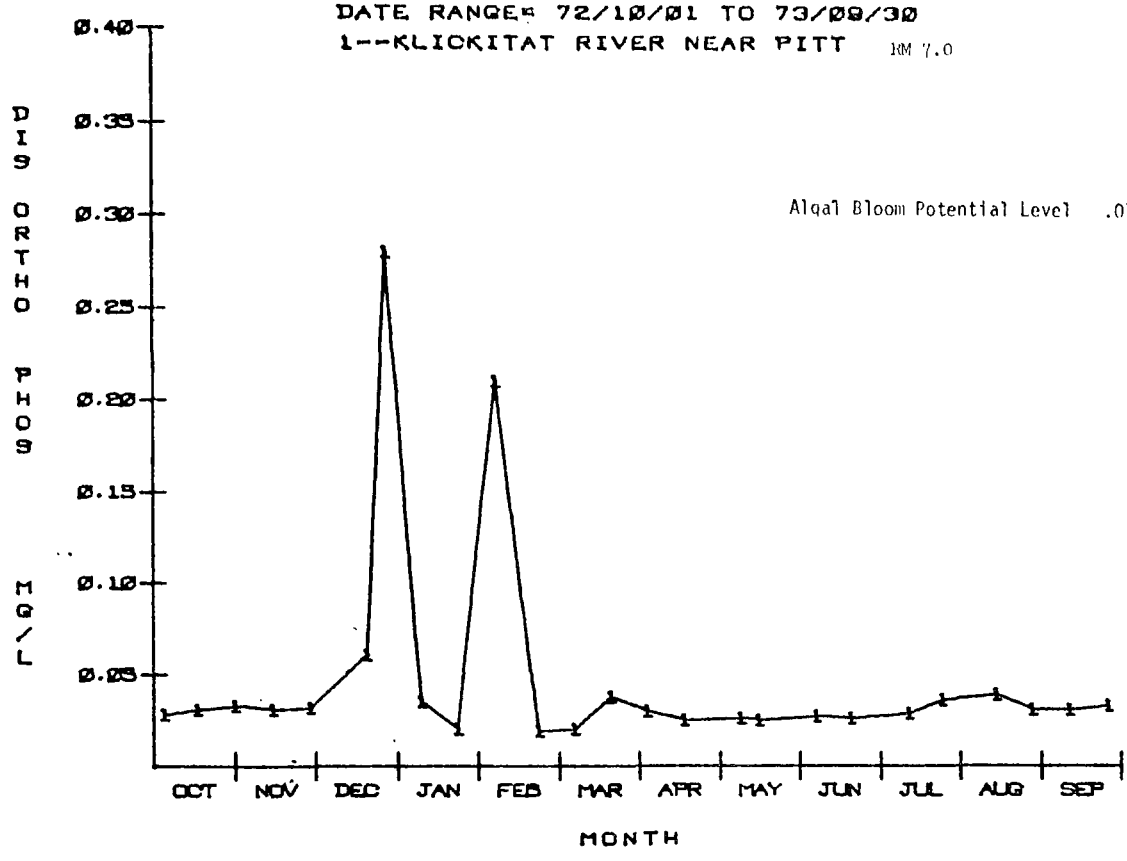
LOWER COLUMBIA BASIN

DATE RANGE= 72/10/01 TO 73/09/30
1--KLICKITAT RIVER NEAR PITT RM 7.0



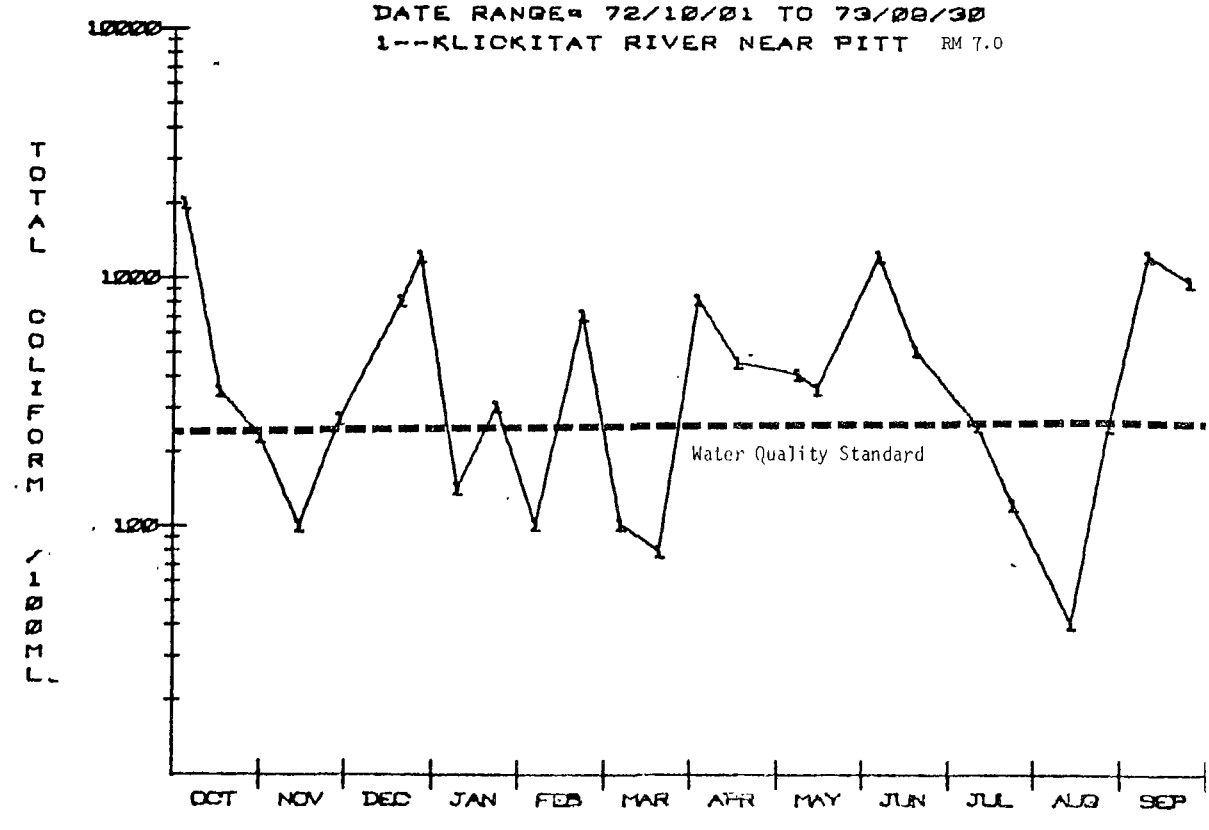
LOWER COLUMBIA BASIN

DATE RANGE= 72/10/01 TO 73/09/30
1--KLICKITAT RIVER NEAR PITT RM 7.0



LOWER COLUMBIA BASIN

DATE RANGE= 72/10/01 TO 73/09/30
1--KLICKITAT RIVER NEAR PITT RM 7.0



Data is compiled from ODEQ data and are median values.

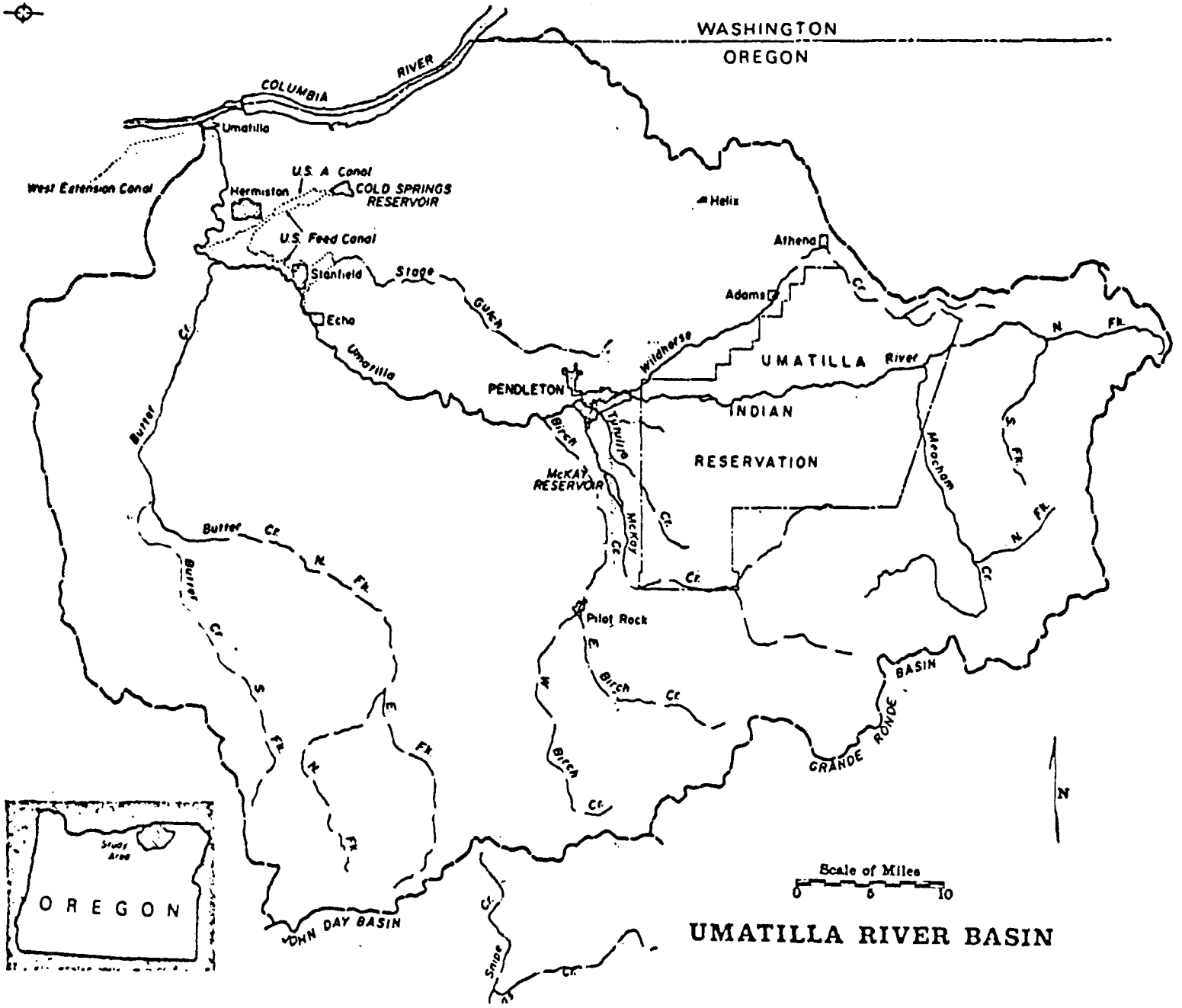
UMATILLA RIVER

JOHN DAY RIVER

DESCHUTES RIVER

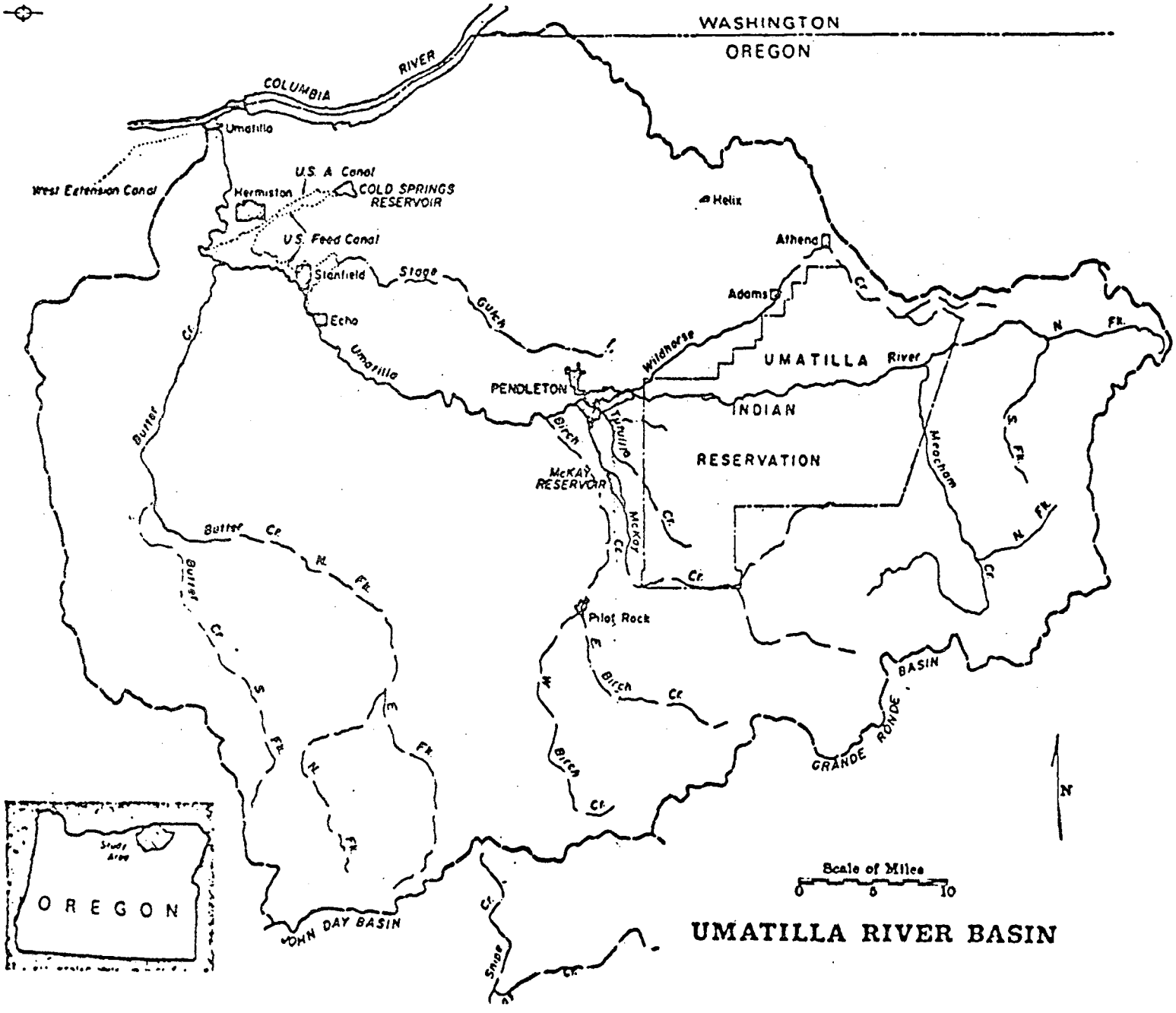
HOOD RIVER

SANDY RIVER



UMATILLA RIVER BASIN

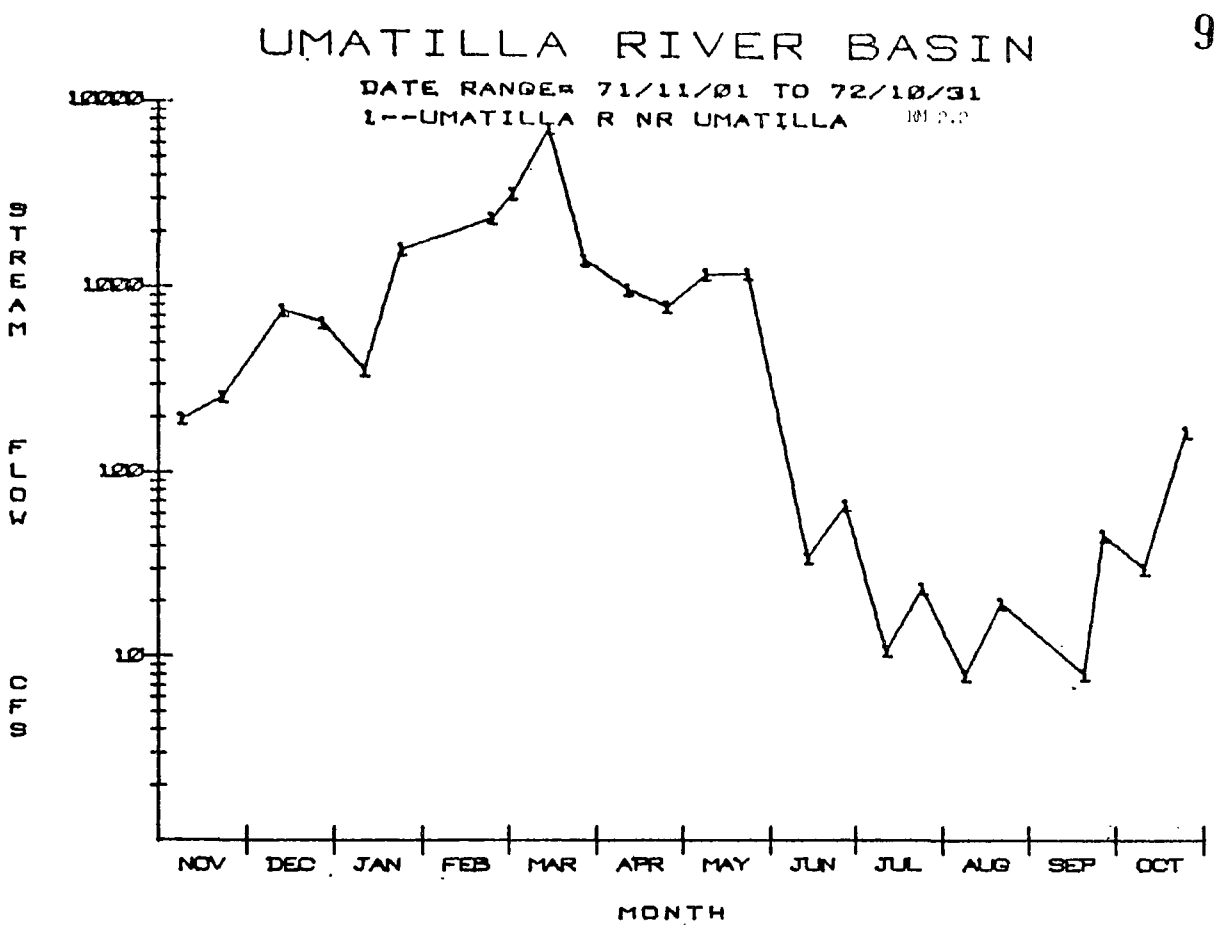
UMATILLA RIVER

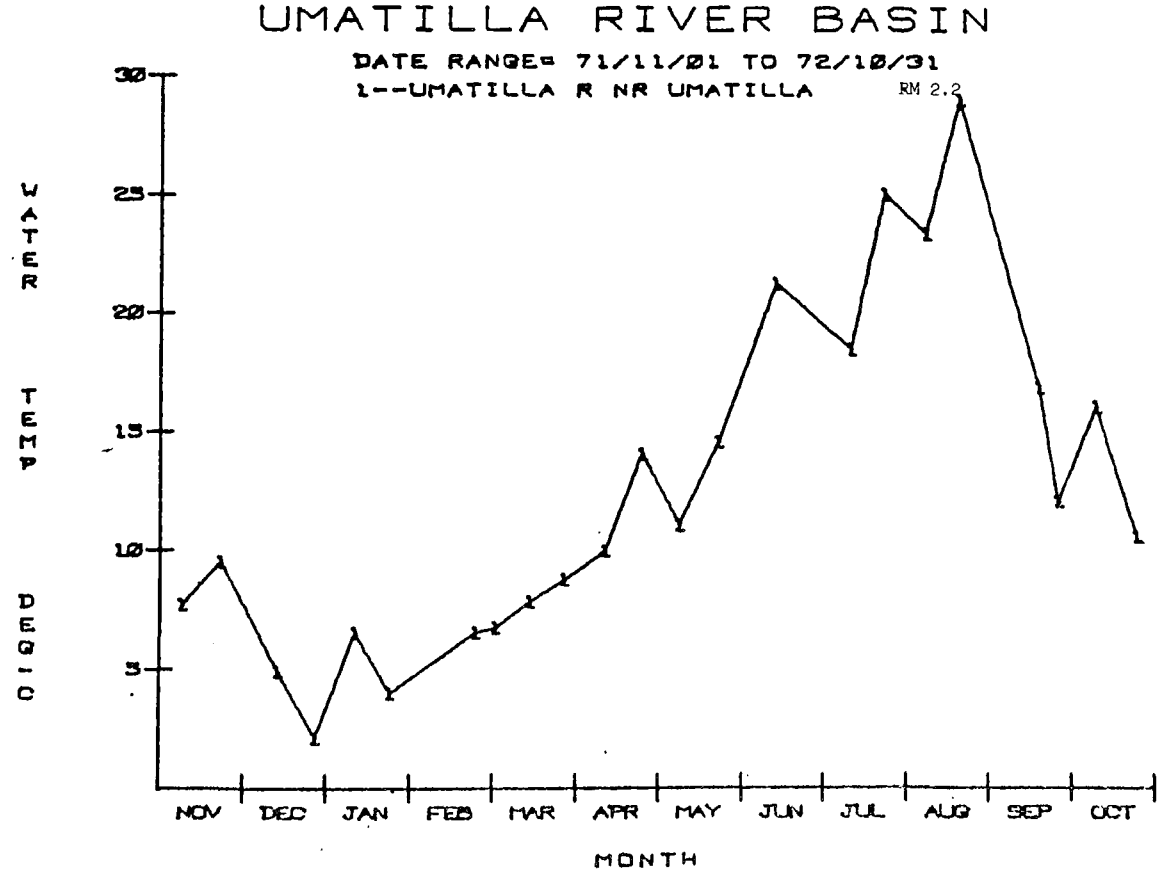


UMATILLA RIVER BASIN

MINOR BASIN DESIGNATION

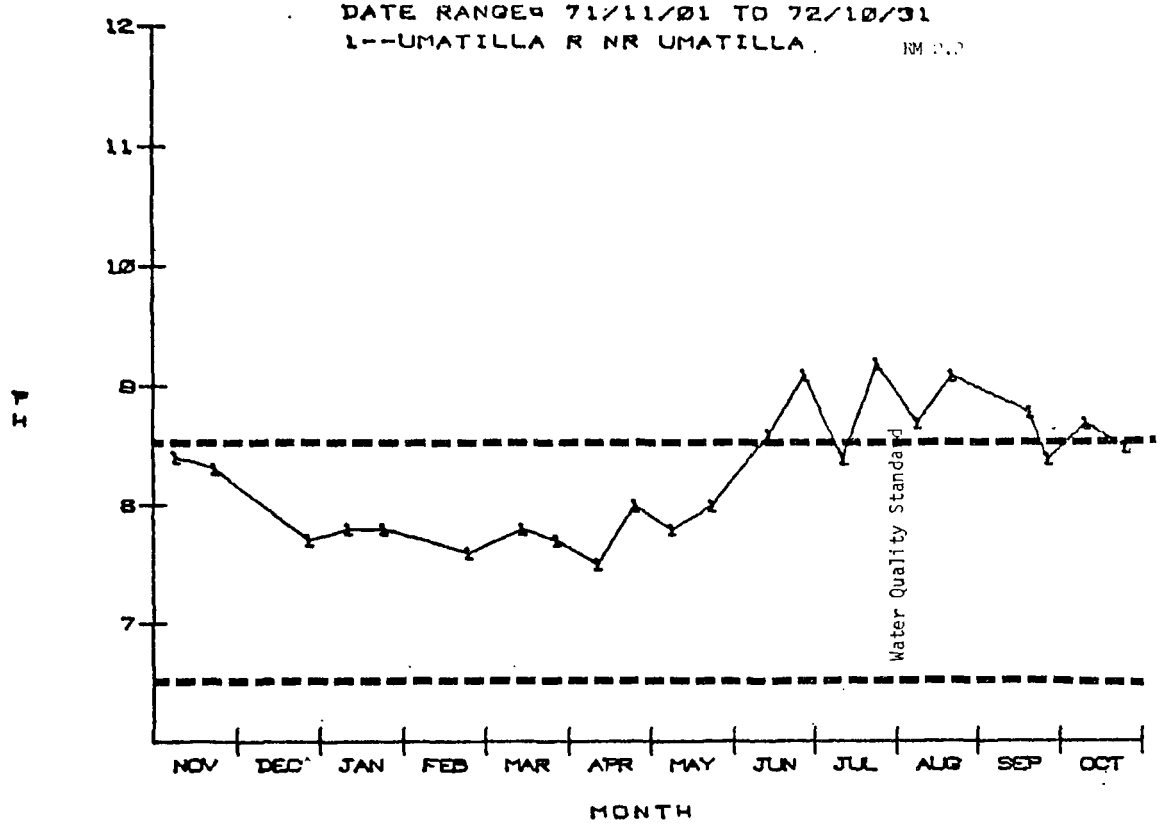
The state of Oregon has defined the Umatilla River as a single water quality limited segment.


UMATILLA RIVER BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--UMATILLA R NR UMATILLA RM 2.2
STREAM FLOW CFS
10000
1000
100
10
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
MONTH


UMATILLA RIVER BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--UMATILLA R NR UMATILLA RM 2.2
WATER TEMP DEG C
30
25
20
15
10
5
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
MONTH

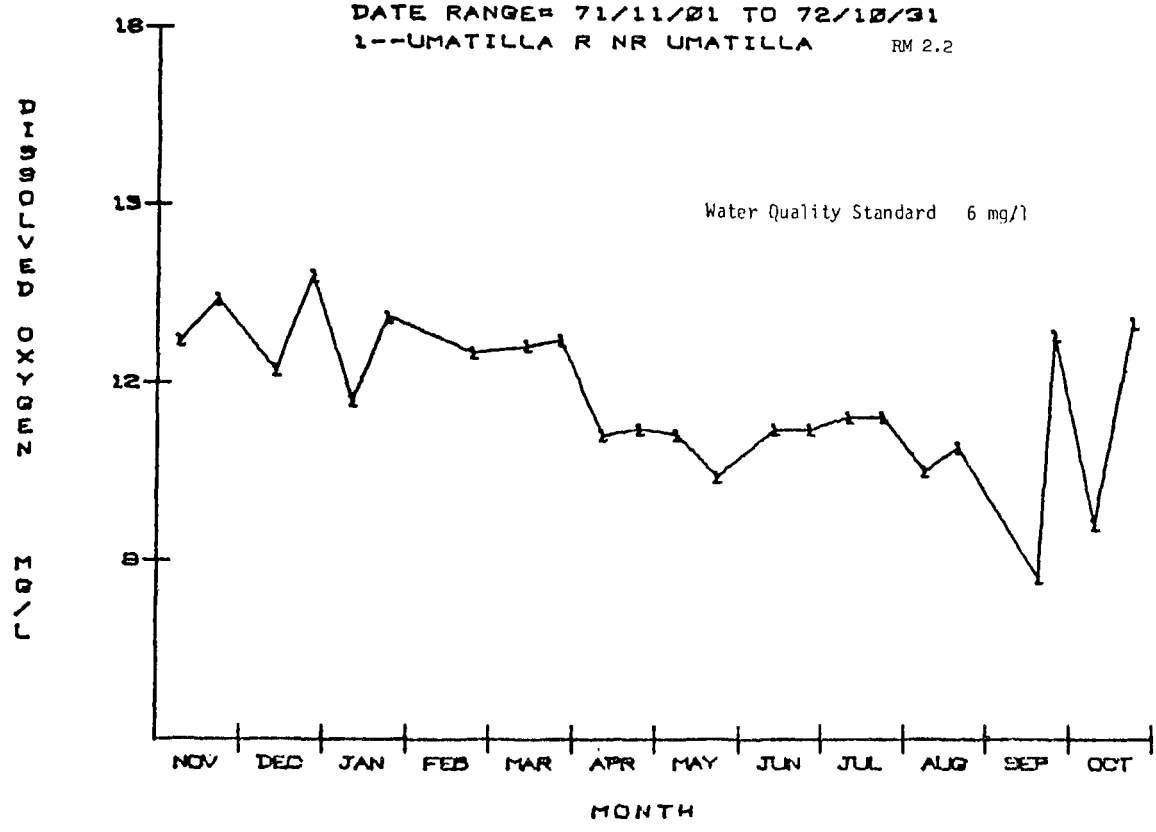
UMATILLA RIVER BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--UMATILLA R NR UMATILLA RM 2.2



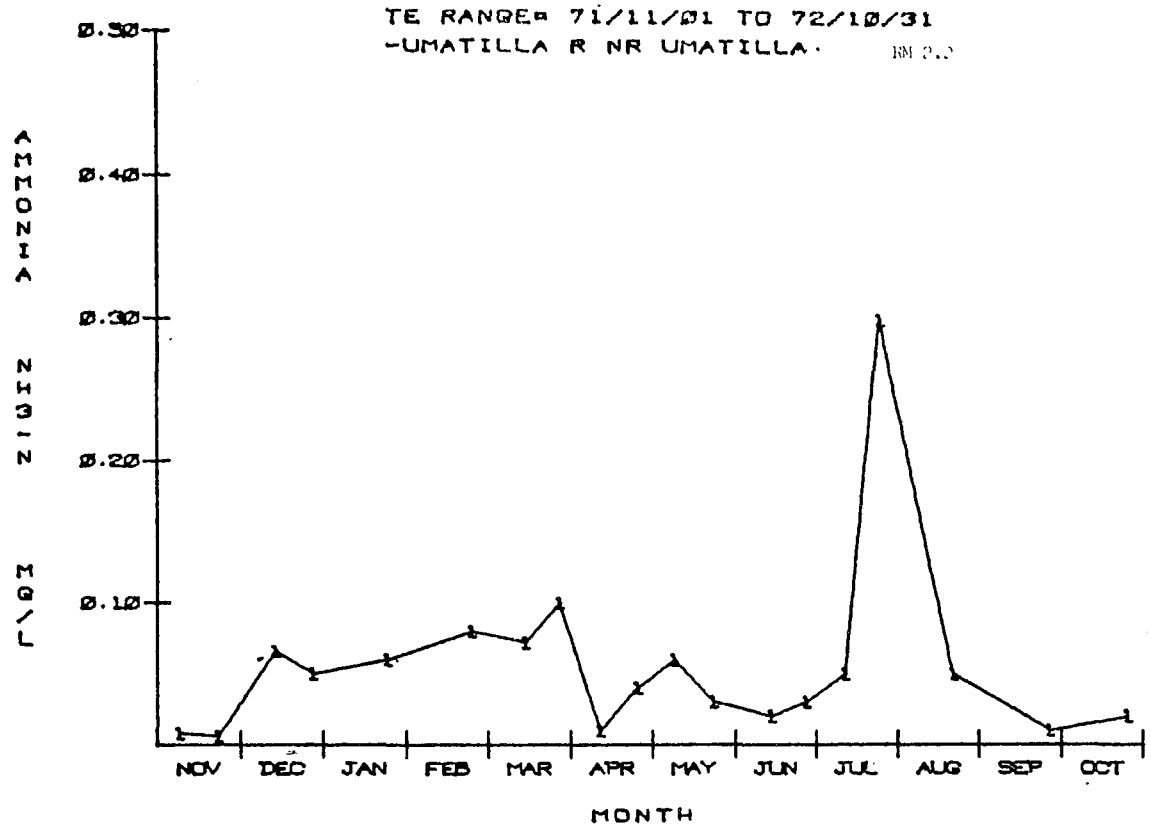
UMATILLA RIVER BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--UMATILLA R NR UMATILLA RM 2.2



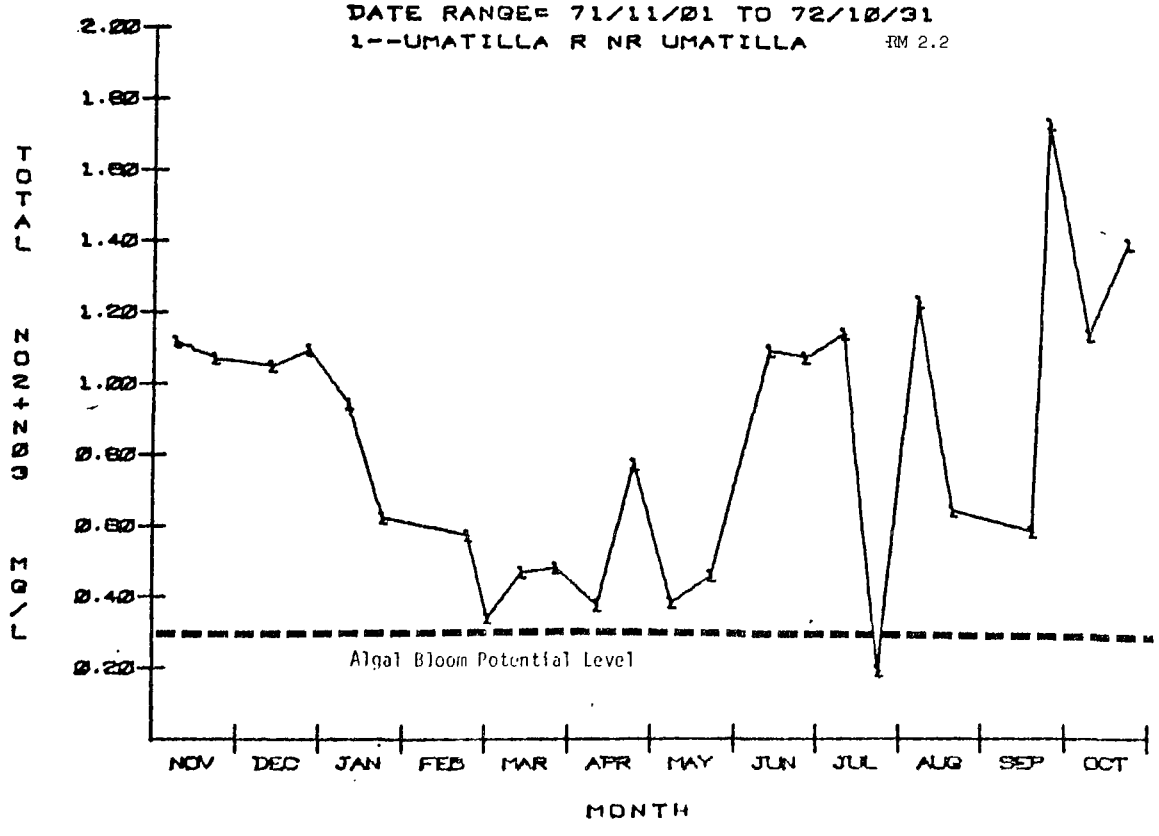
UMATILLA RIVER BASIN

TE RANGE= 71/11/01 TO 72/10/31
-UMATILLA R NR UMATILLA· RM 2.2



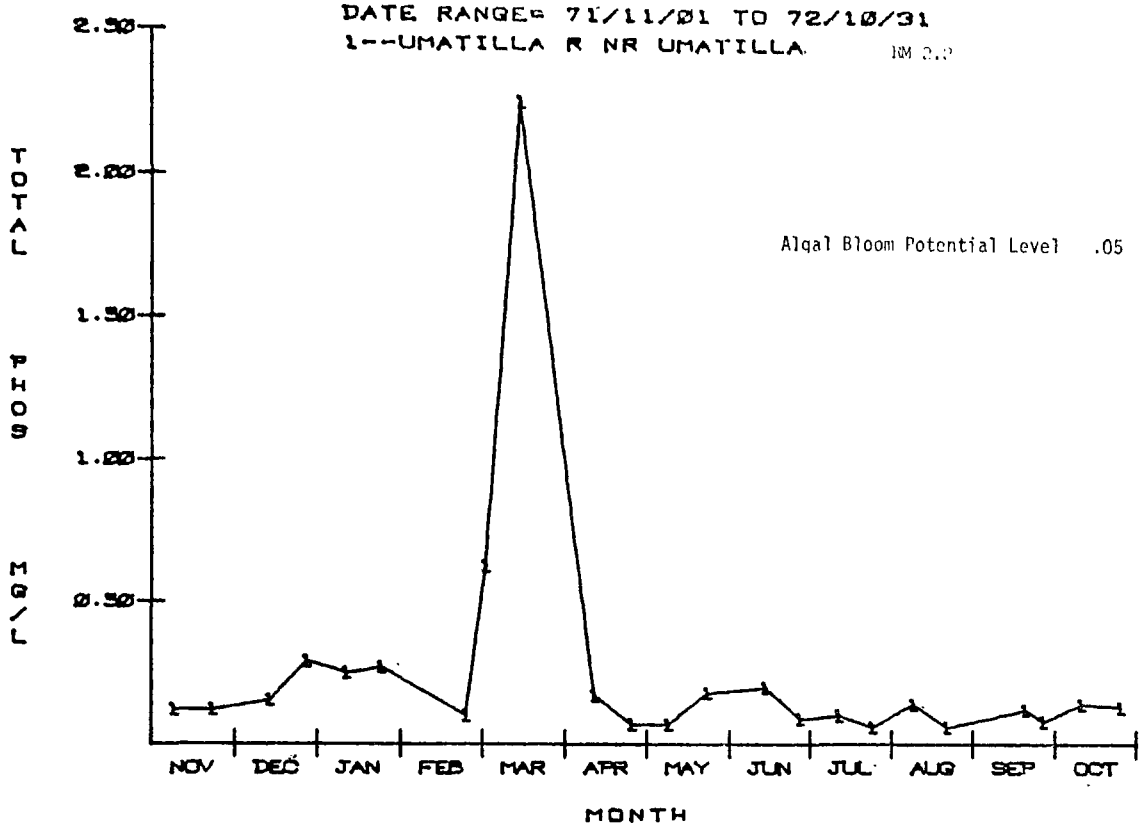
UMATILLA RIVER BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--UMATILLA R NR UMATILLA RM 2.2



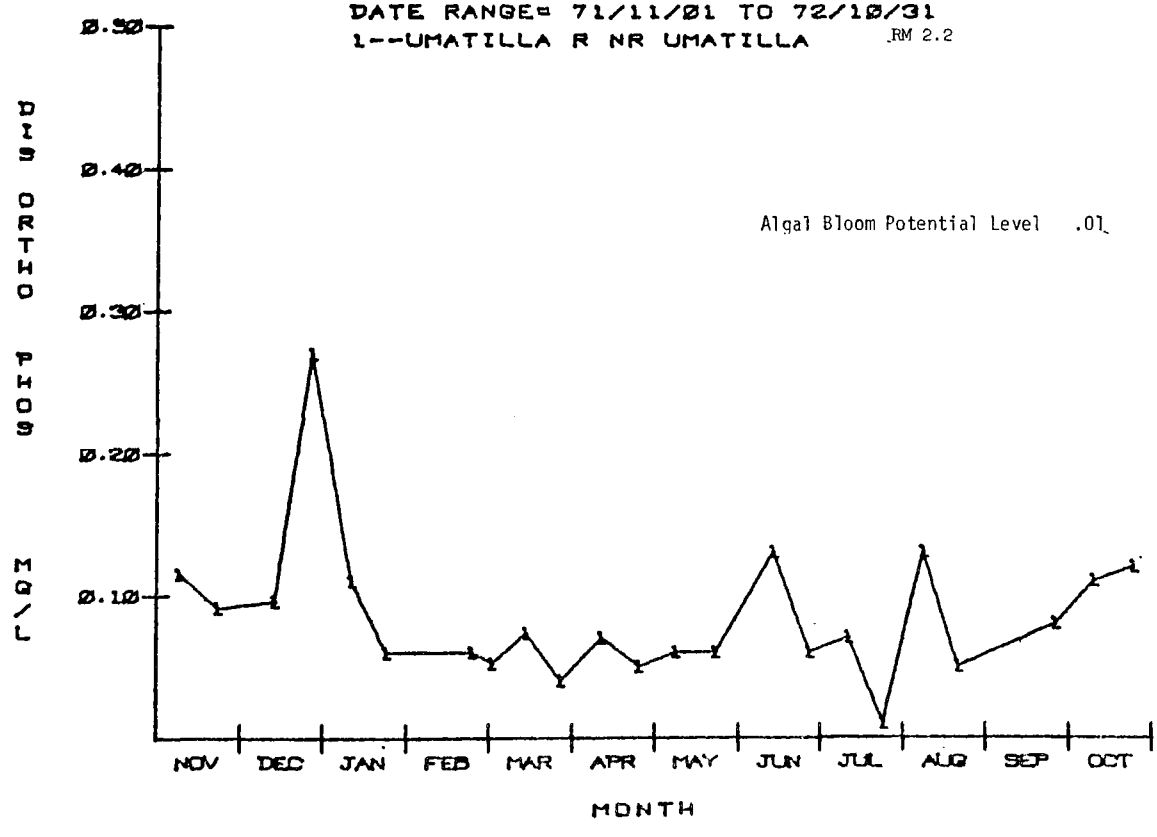
UMATILLA RIVER BASIN

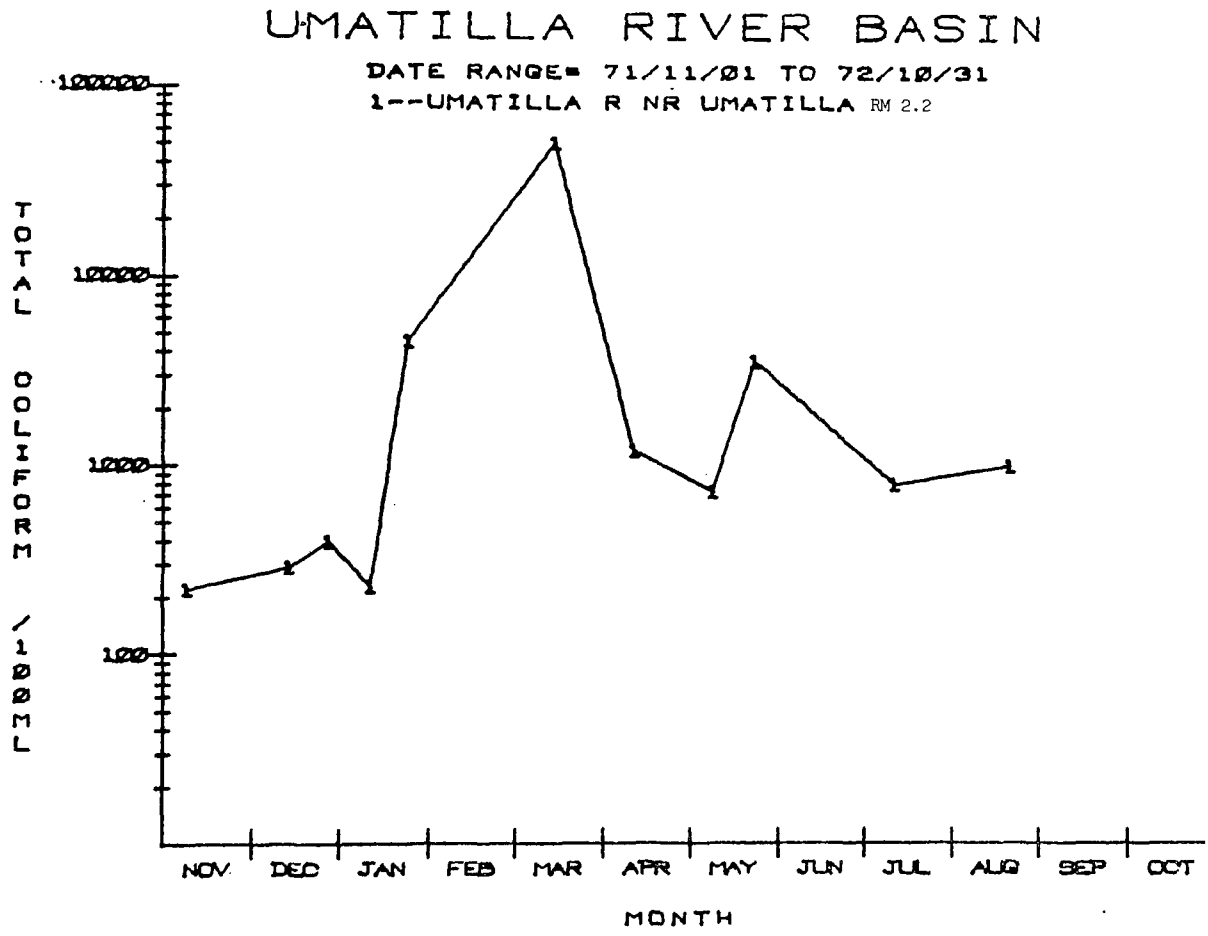
DATE RANGE= 71/11/01 TO 72/10/31
1--UMATILLA R NR UMATILLA RM 2.2



UMATILLA RIVER BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--UMATILLA R NR UMATILLA RM 2.2

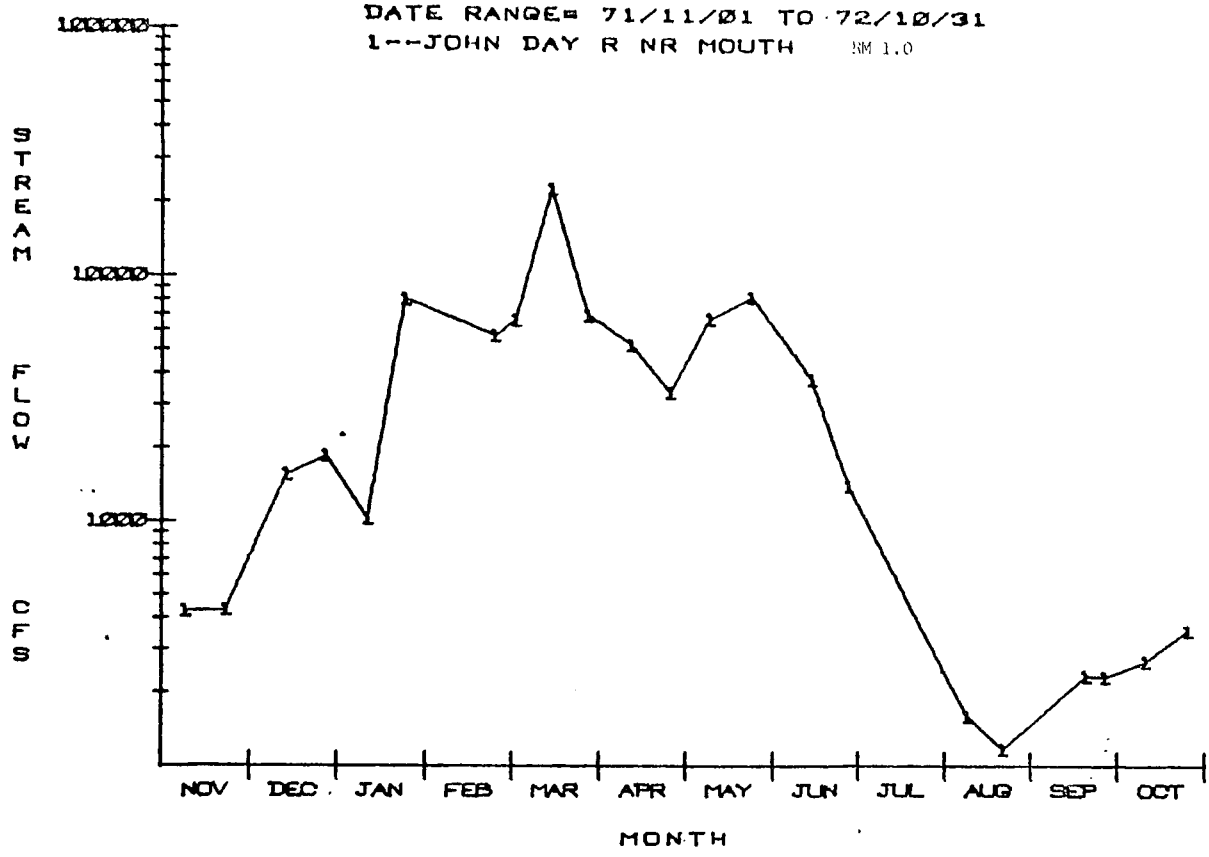



UMATILLA RIVER BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--UMATILLA R NR UMATILLA RM 2.2
TOTAL COLIFORM /100ML
1000000
100000
10000
1000
100
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
MONTH

JOHN DAY RIVER

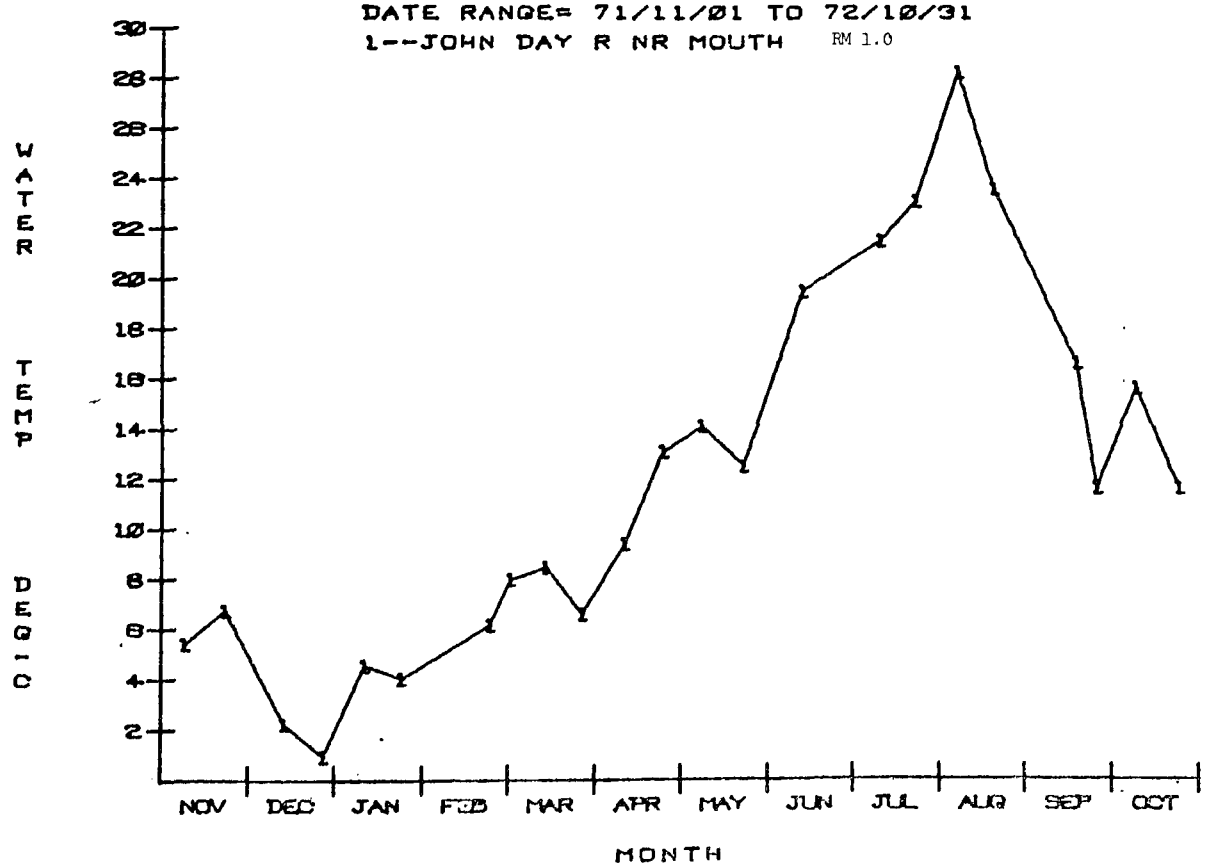
LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--JOHN DAY R NR MOUTH RM 1.0



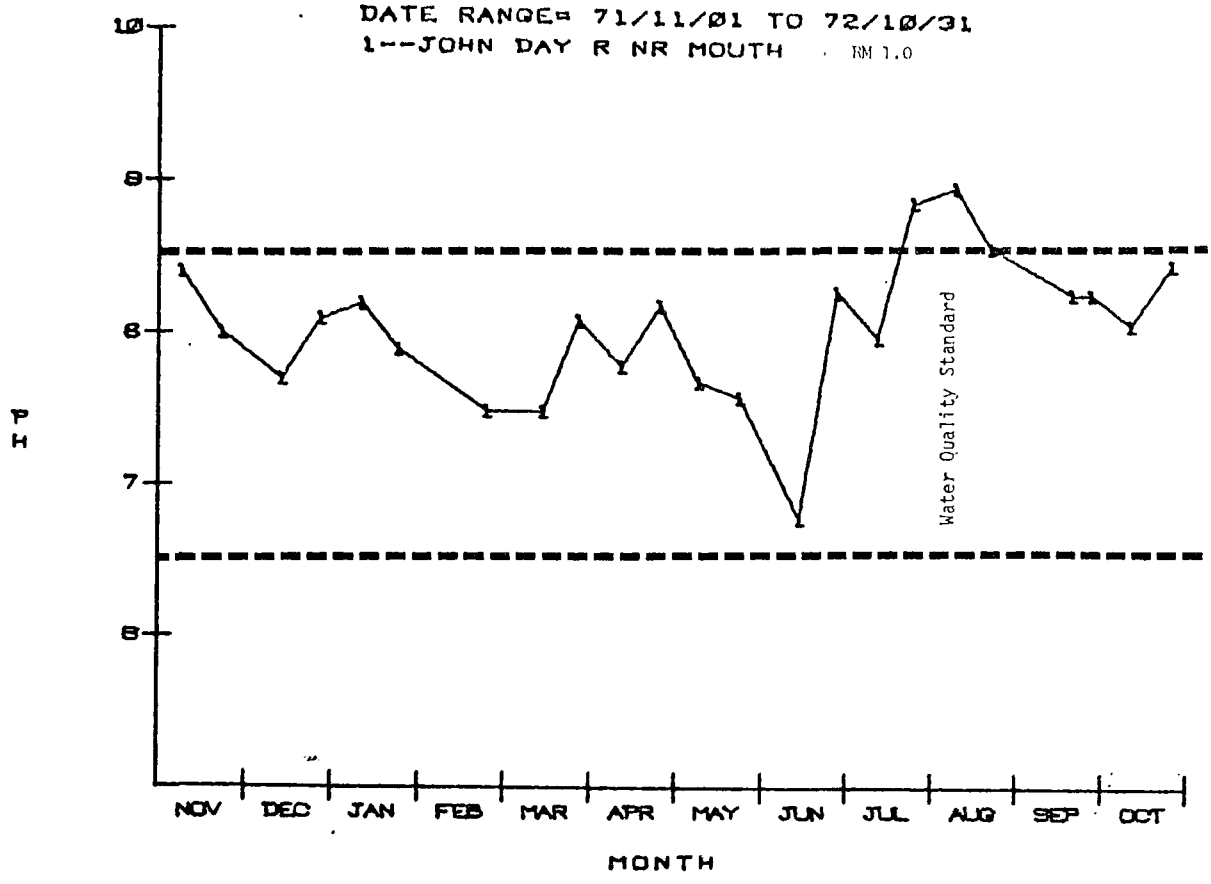
LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--JOHN DAY R NR MOUTH RM 1.0



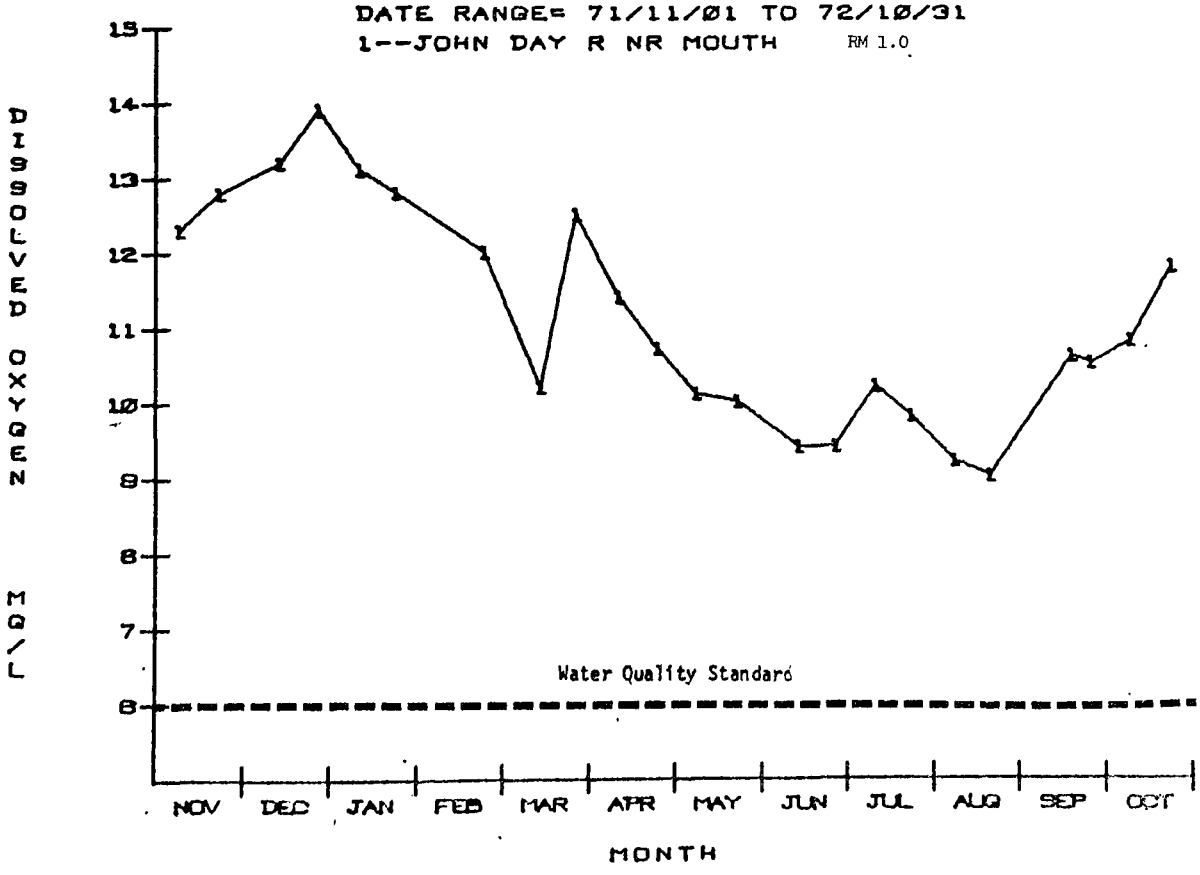
LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--JOHN DAY R NR MOUTH RM 1.0



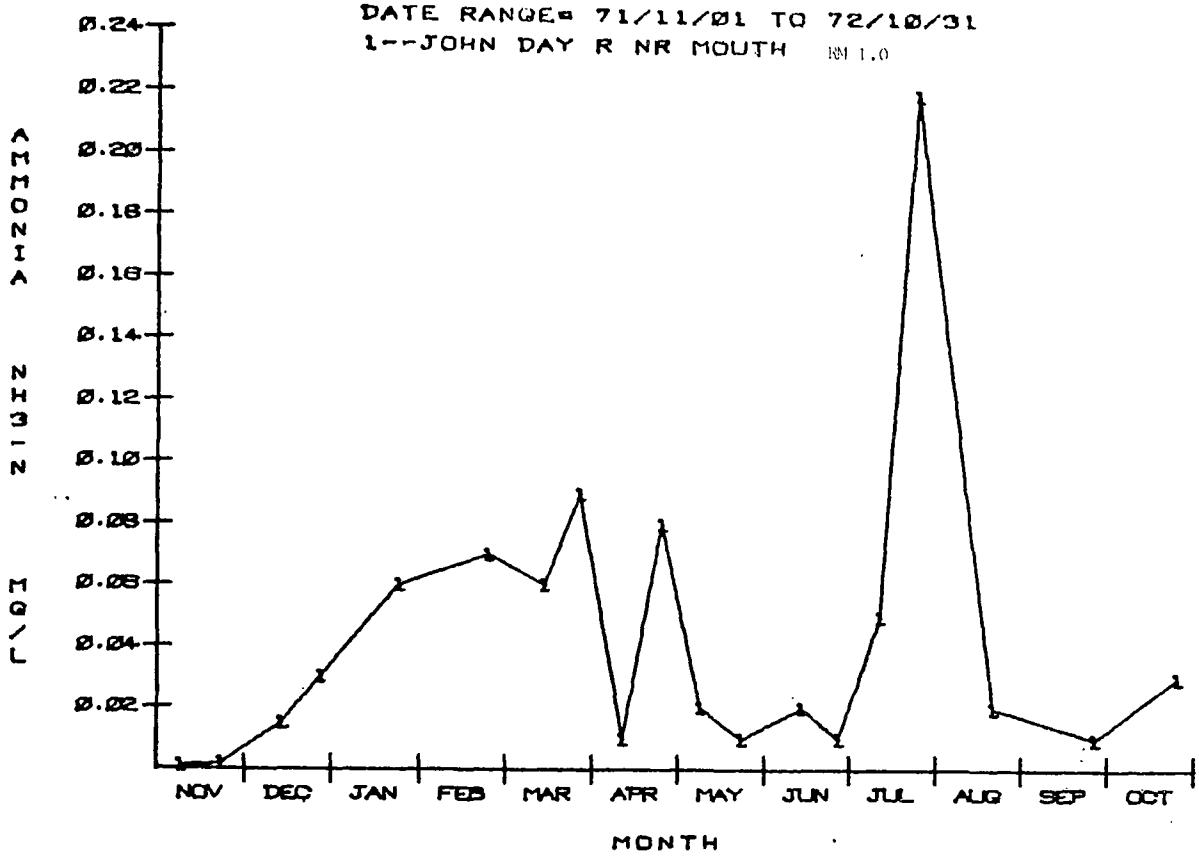
LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--JOHN DAY R NR MOUTH RM 1.0



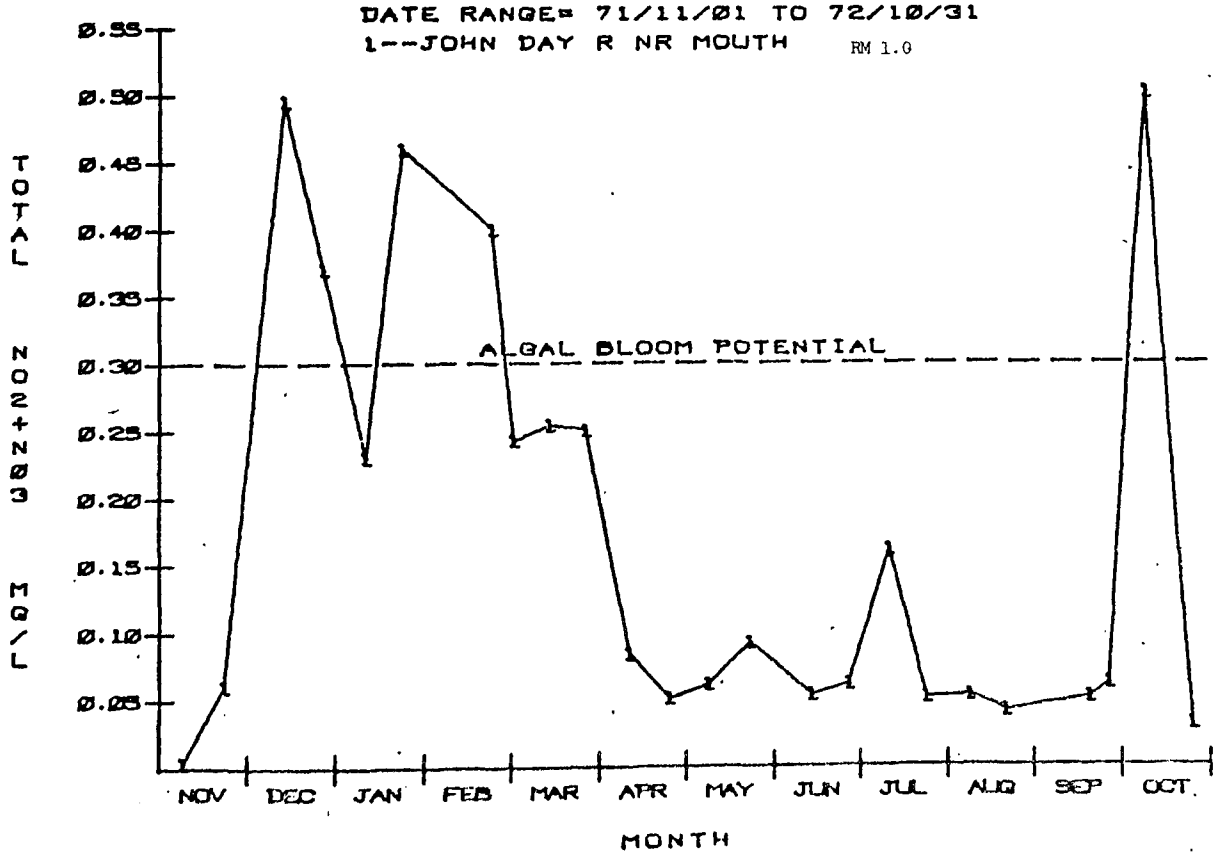
LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--JOHN DAY R NR MOUTH RM 1.0



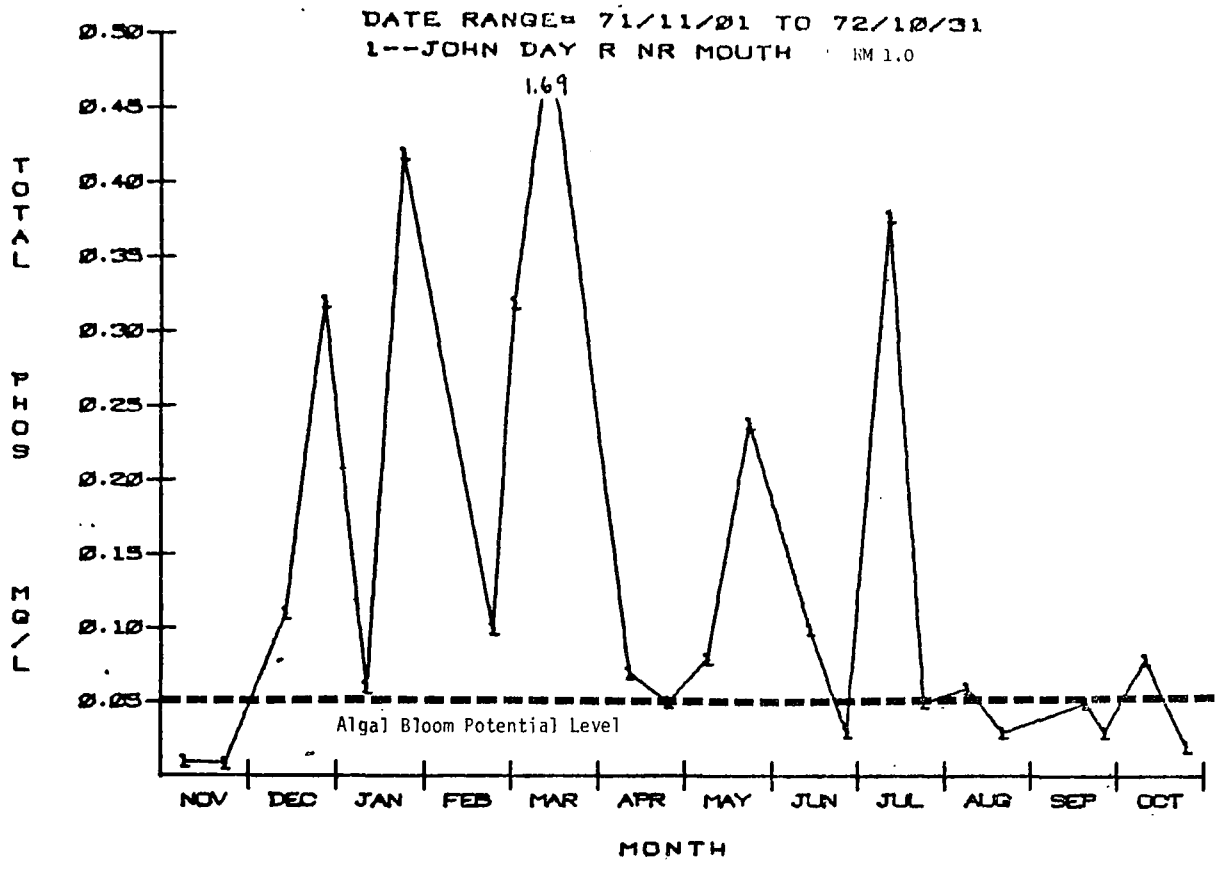
LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--JOHN DAY R NR MOUTH RM 1.0



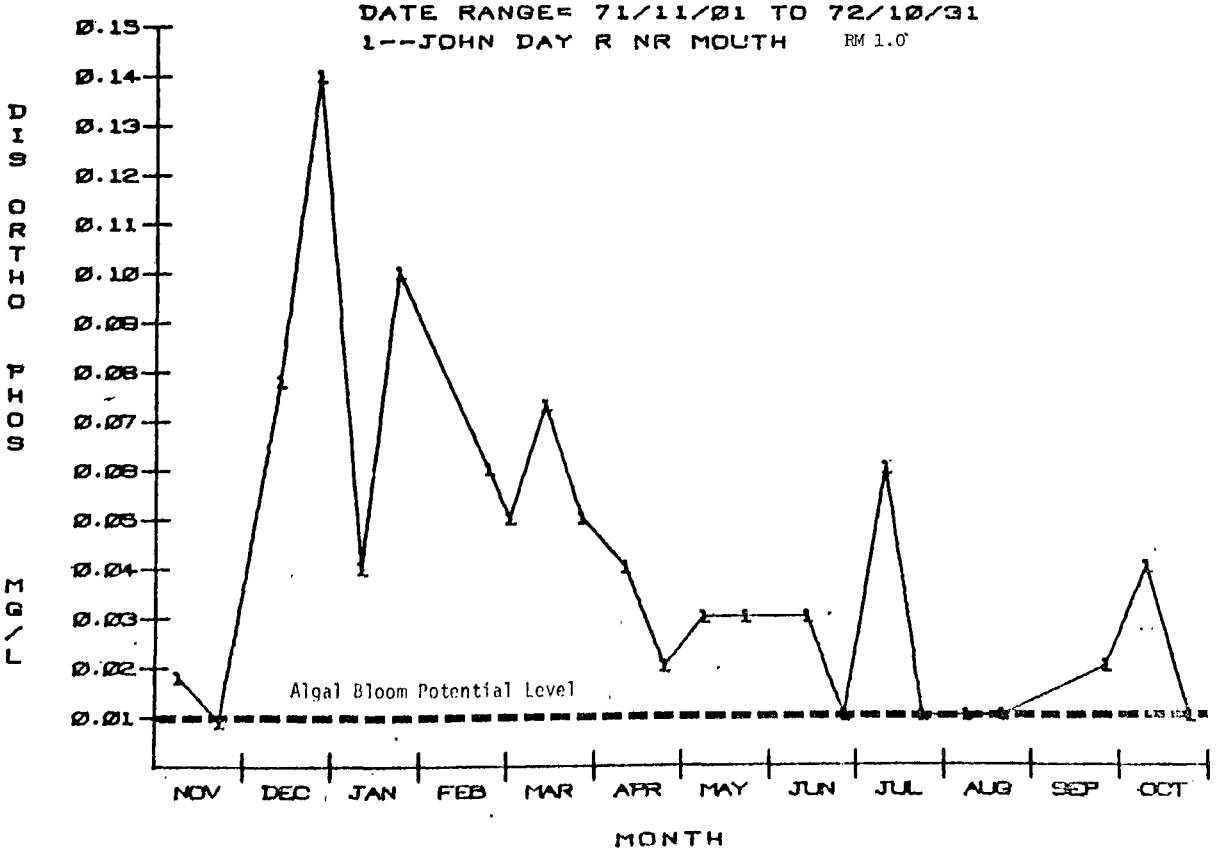
LOWER COLUMBIA BASIN

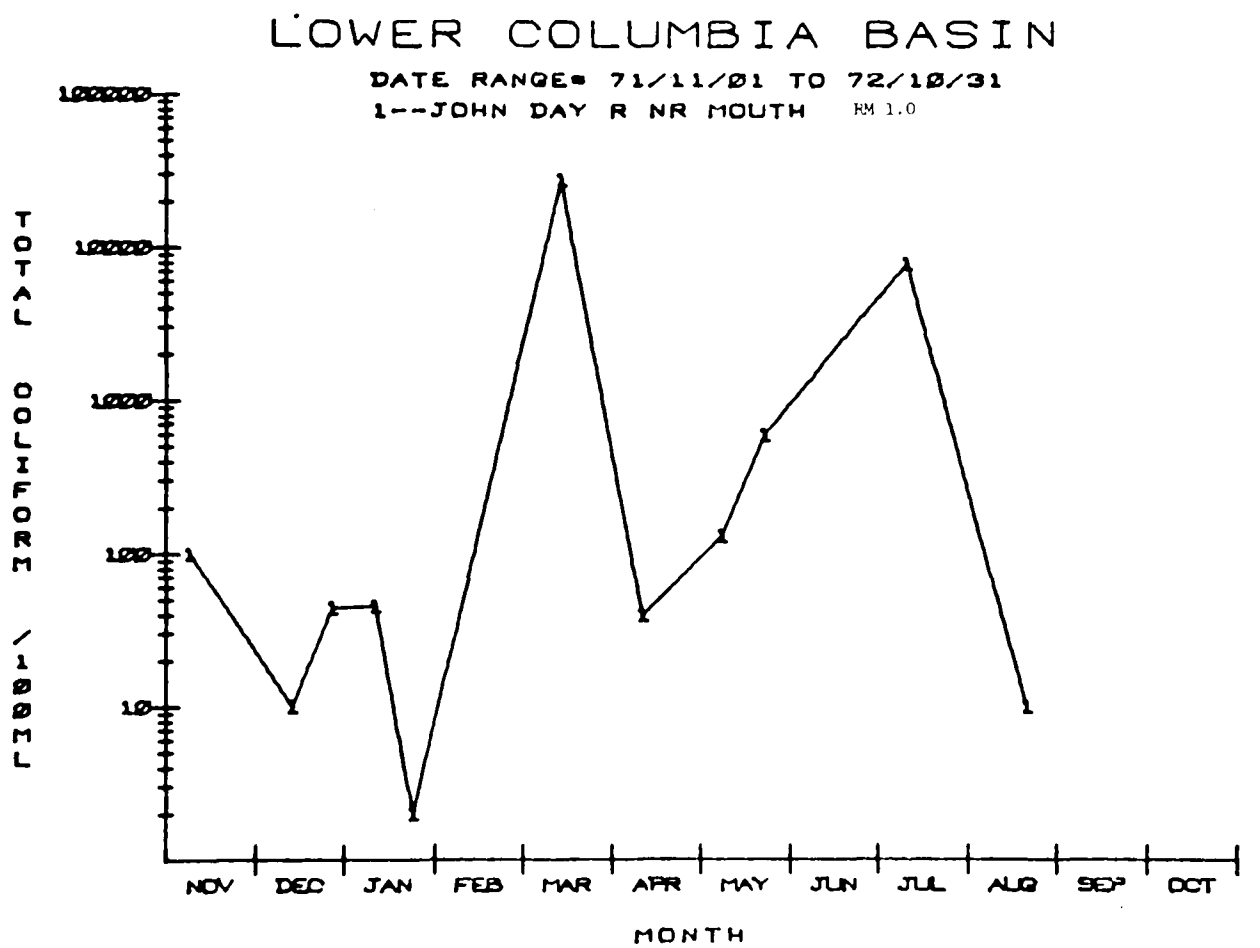
DATE RANGE= 71/11/01 TO 72/10/31
1--JOHN DAY R NR MOUTH RM 1.0



LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--JOHN DAY R NR MOUTH RM 1.0

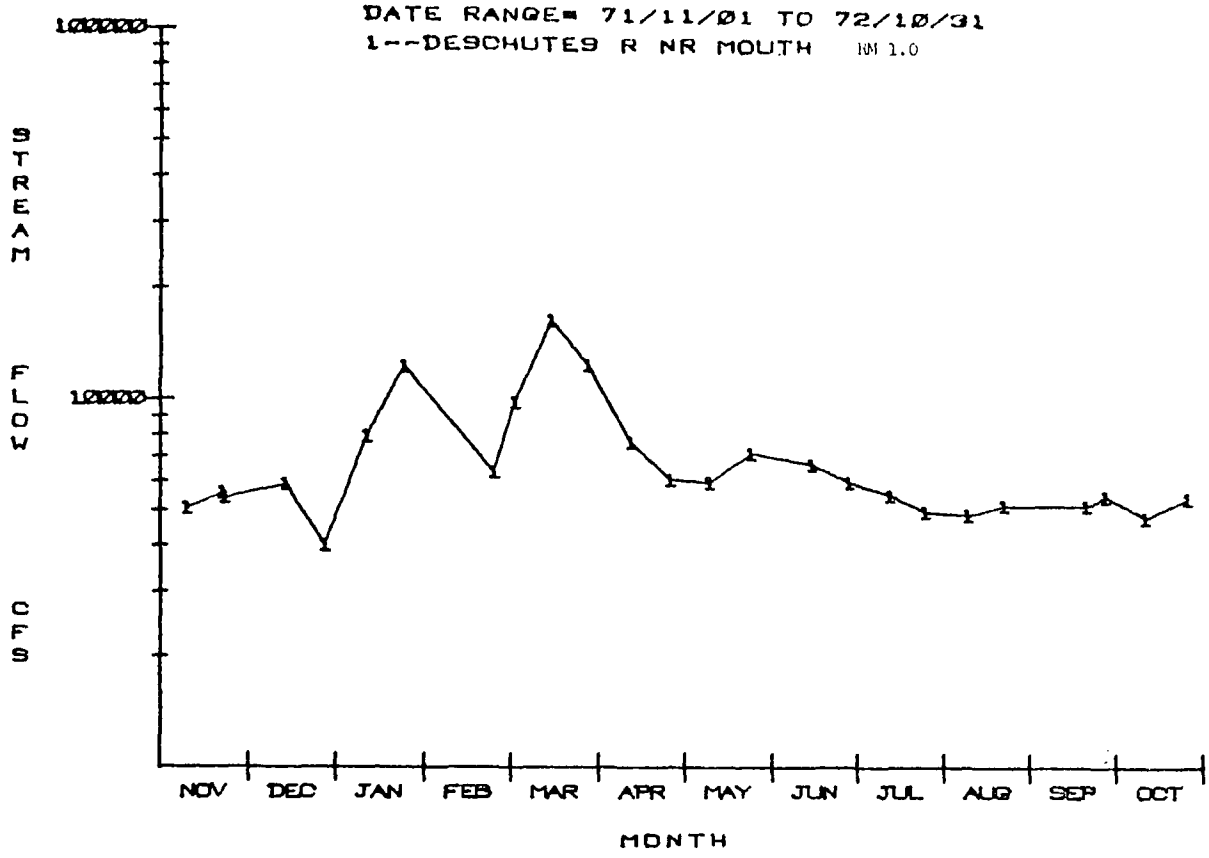



LOWER COLUMBIA BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--JOHN DAY R NR MOUTH RM 1.0
TOTAL COLIFORM /100ML
1000000
100000
10000
1000
100
10
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
MONTH

DESCHUTES RIVER

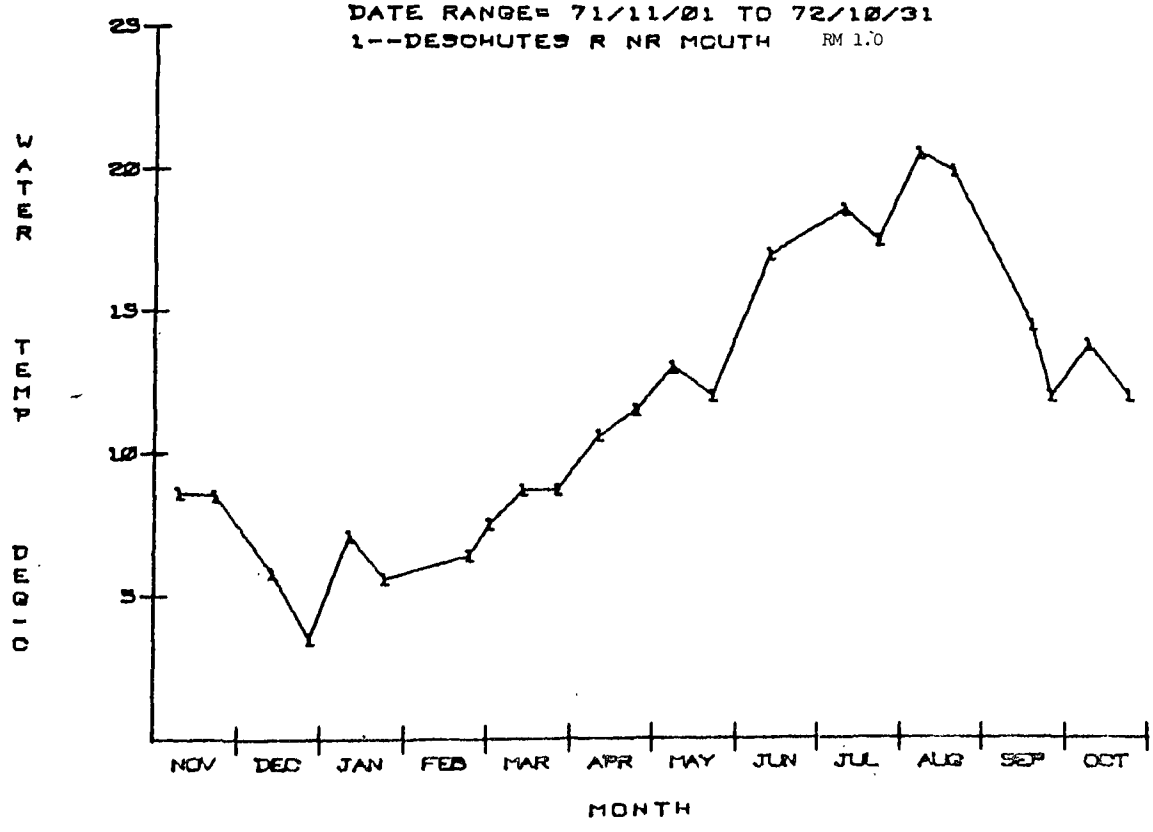
LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--DESCHUTES R NR MOUTH RM 1.0



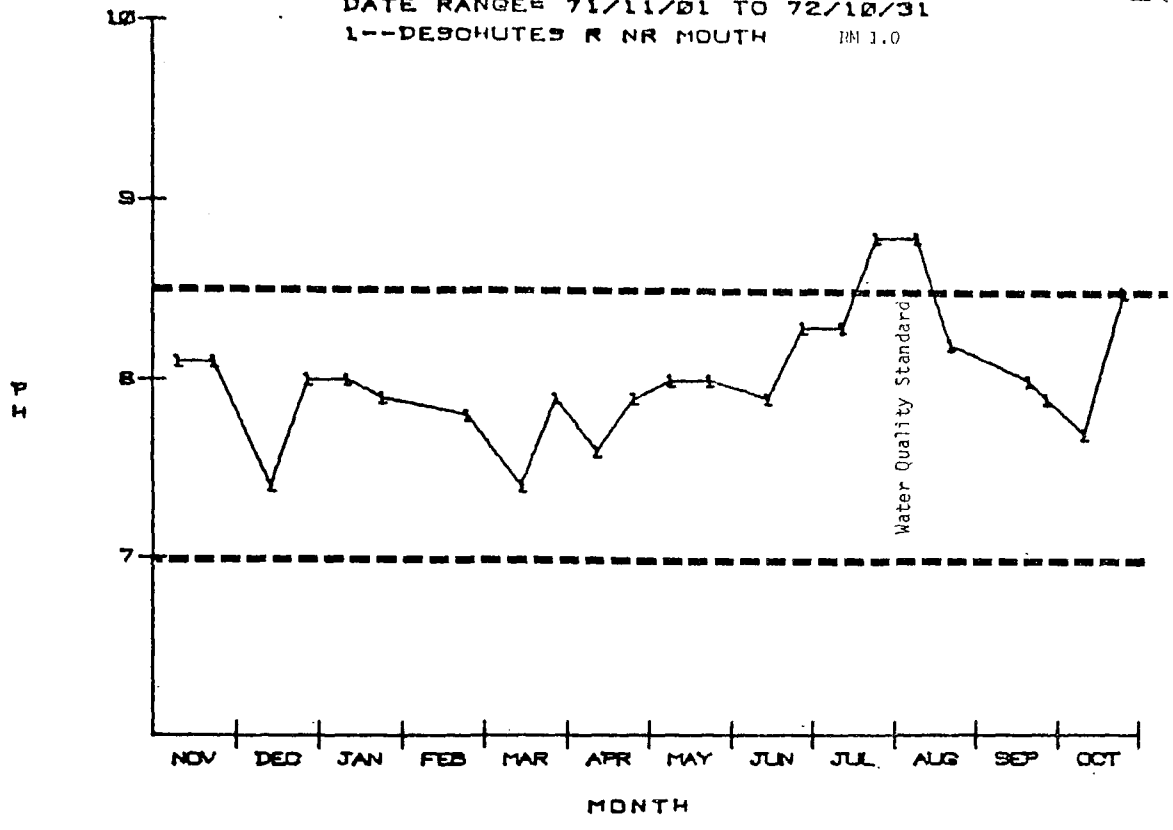
LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--DESCHUTES R NR MOUTH RM 1.0



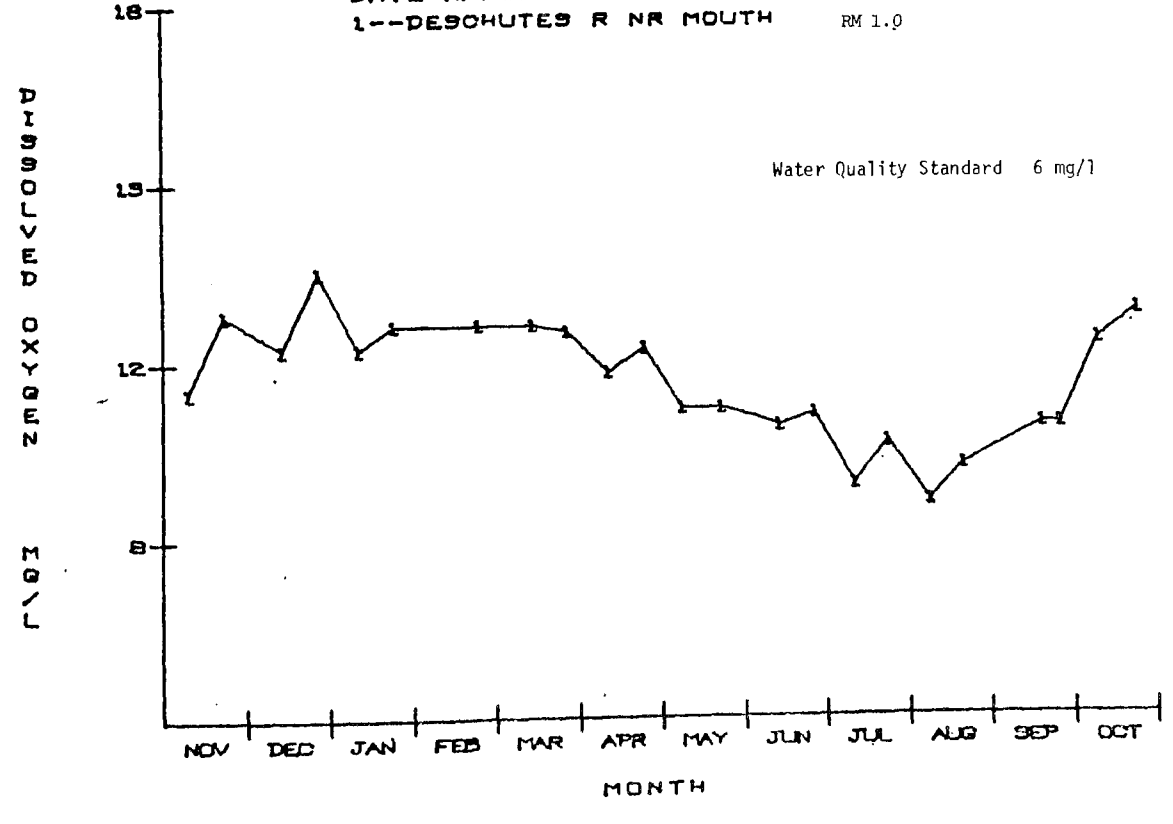
LOWER COLUMBIA BASIN

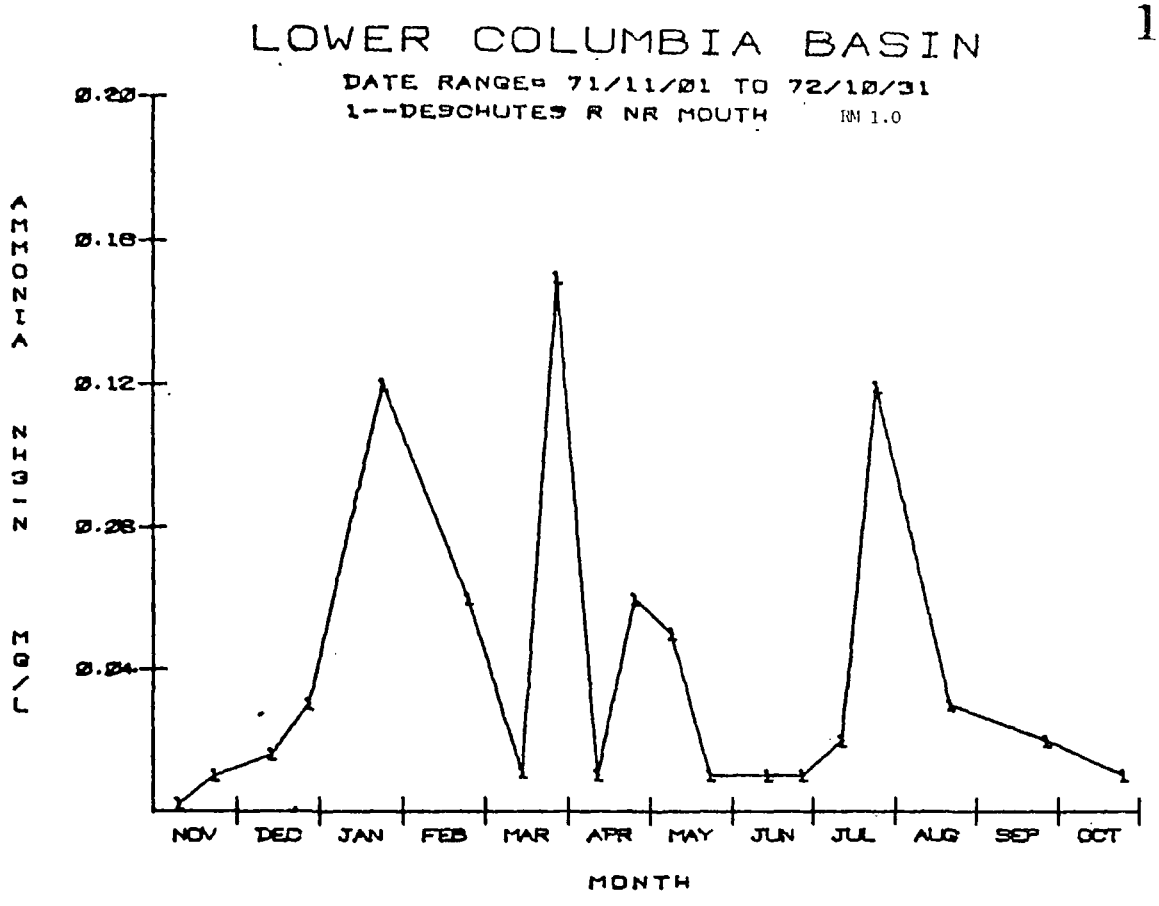
DATE RANGE= 71/11/01 TO 72/10/31
1--DESCHUTES R NR MOUTH RM 1.0

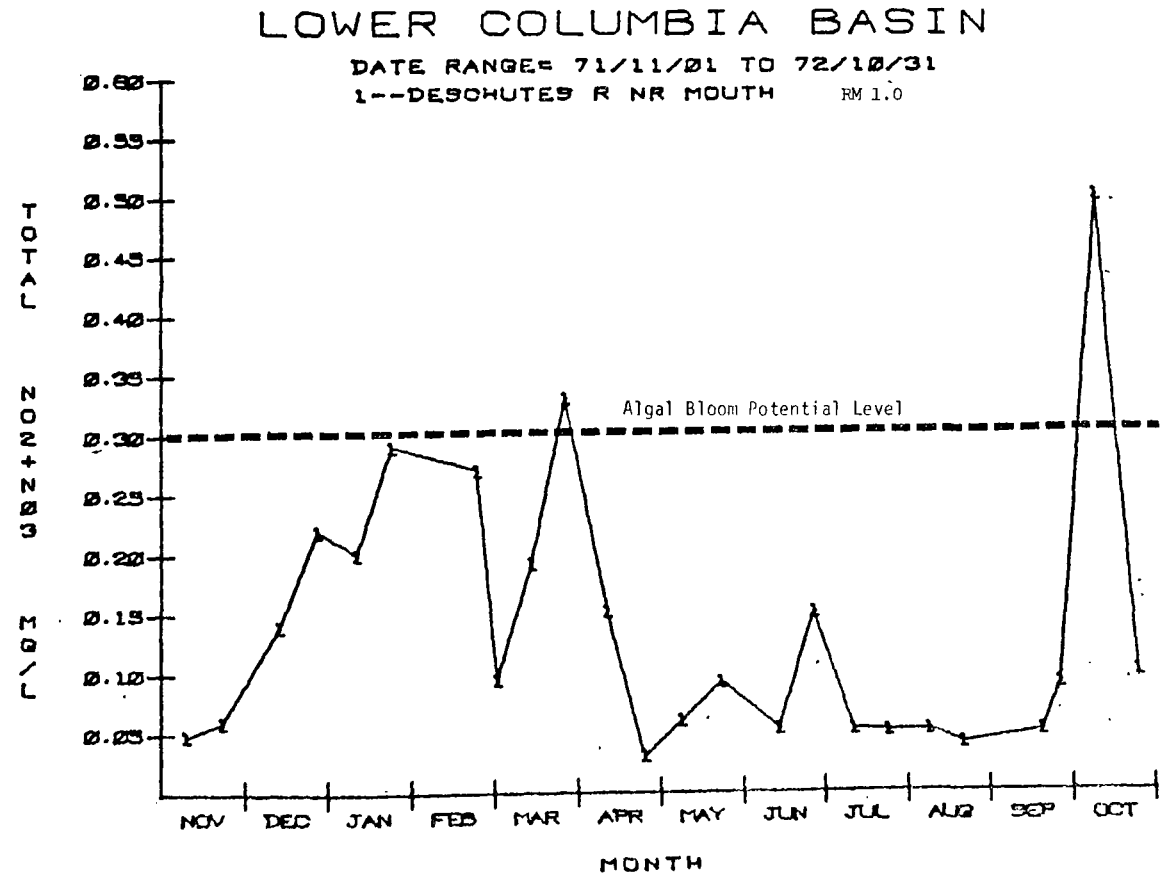


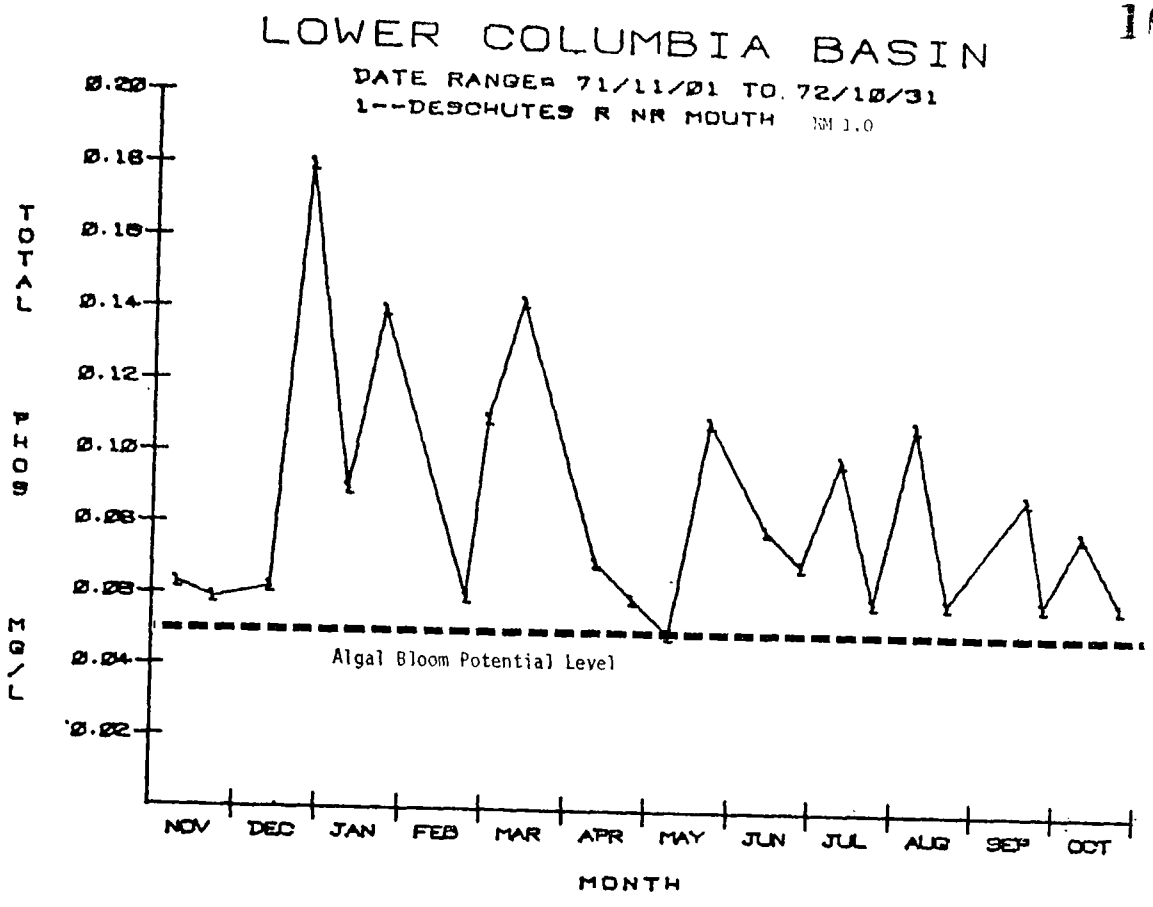
LOWER COLUMBIA BASIN

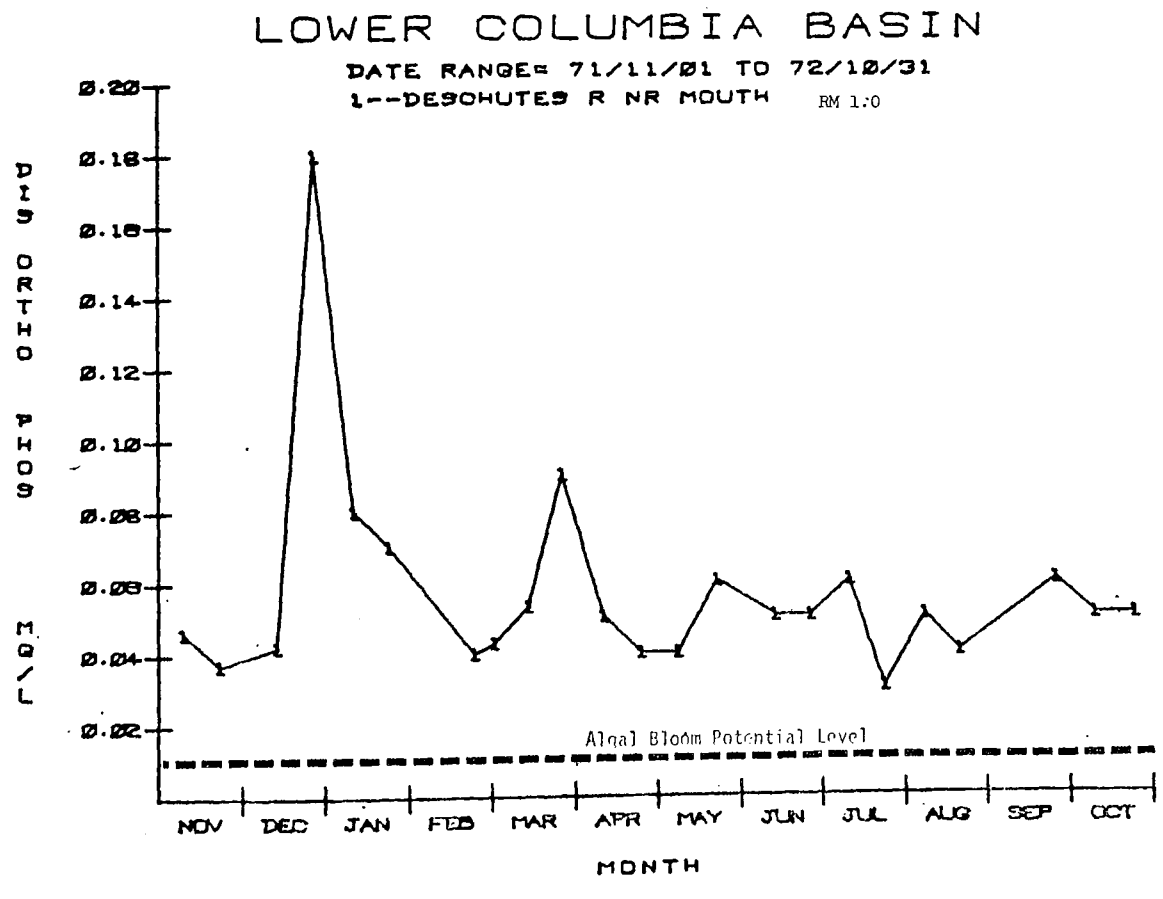
DATE RANGE= 71/11/01 TO 72/10/31
1--DESCHUTES R NR MOUTH RM 1.0

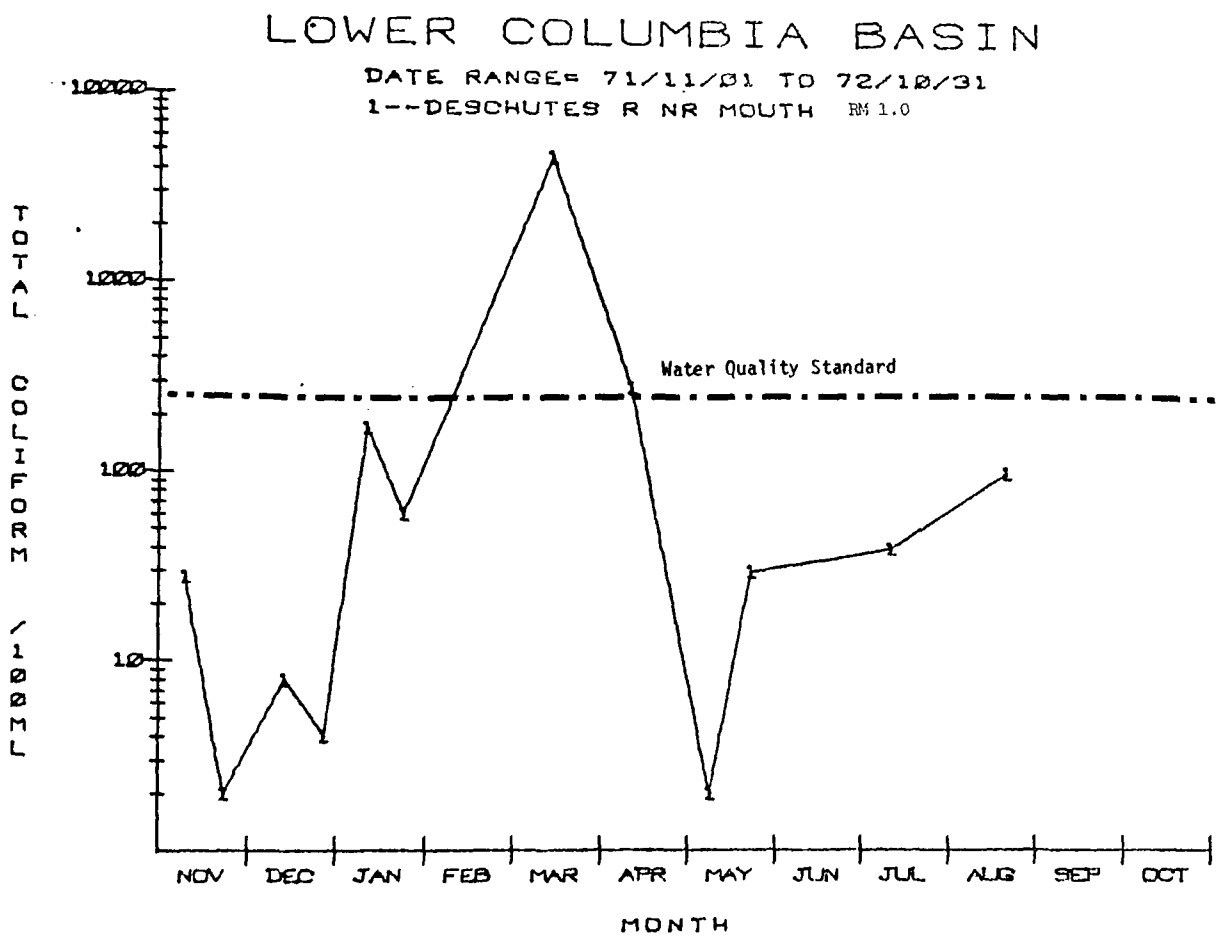



LOWER COLUMBIA BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--DESCHUTES R NR MOUTH RM 1.0
AMMONIA NH3-N MG/L
0.20
0.16
0.12
0.08
0.04
NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT
MONTH


LOWER COLUMBIA BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--DESCHUTES R NR MOUTH RM 1.0
TOTAL NO2+NO3 MG/L
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
Algal Bloom Potential Level
NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT
MONTH


LOWER COLUMBIA BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--DESCHUTES R NR MOUTH RM 1.0
TOTAL PHOS MG/L
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
Algal Bloom Potential Level
NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT
MONTH

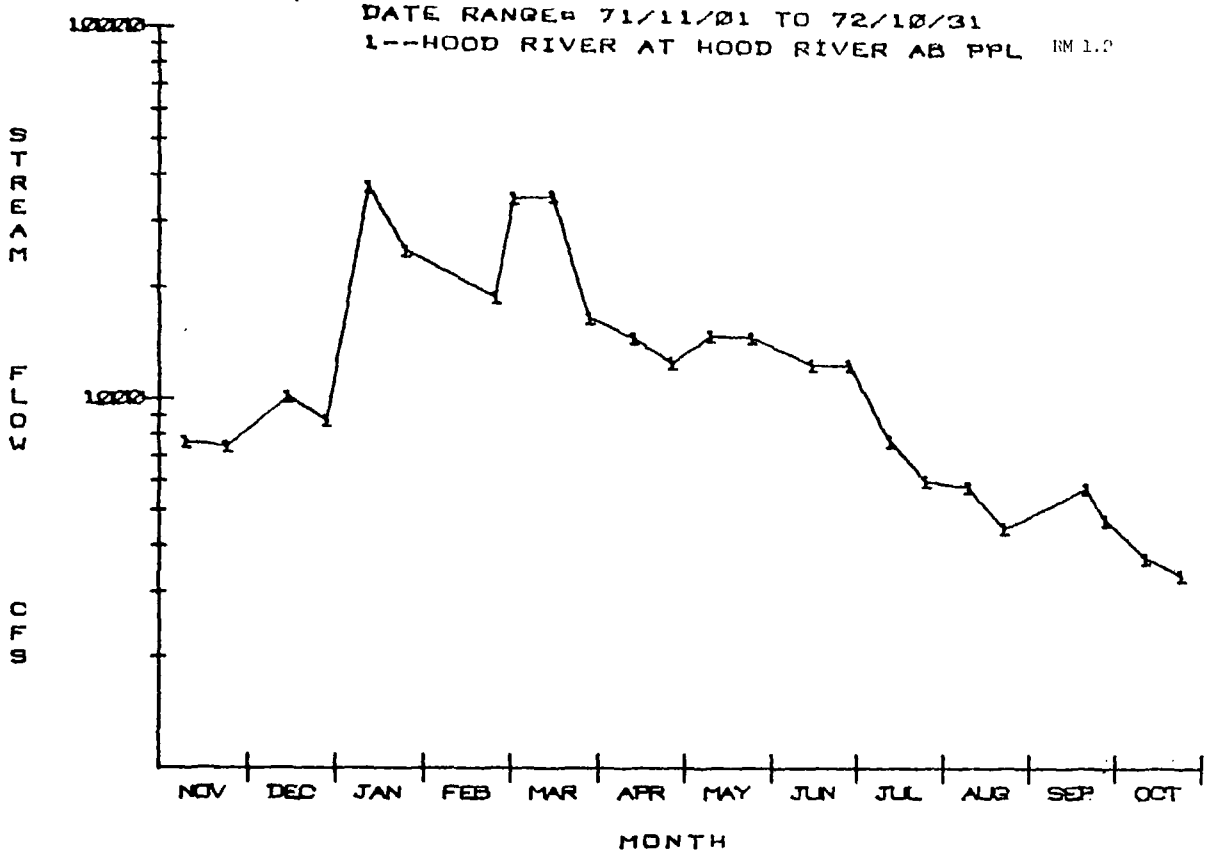

LOWER COLUMBIA BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--DESCHUTES R NR MOUTH RM 1.0
DIS ORTHO PHOS MG/L
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
Algal Bloom Potential Level
NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT
MONTH


LOWER COLUMBIA BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--DESCHUTES R NR MOUTH RM 1.0
TOTAL COLIFORM /100ML
10000
1000
100
10
Water Quality Standard
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
MONTH

HOOD RIVER

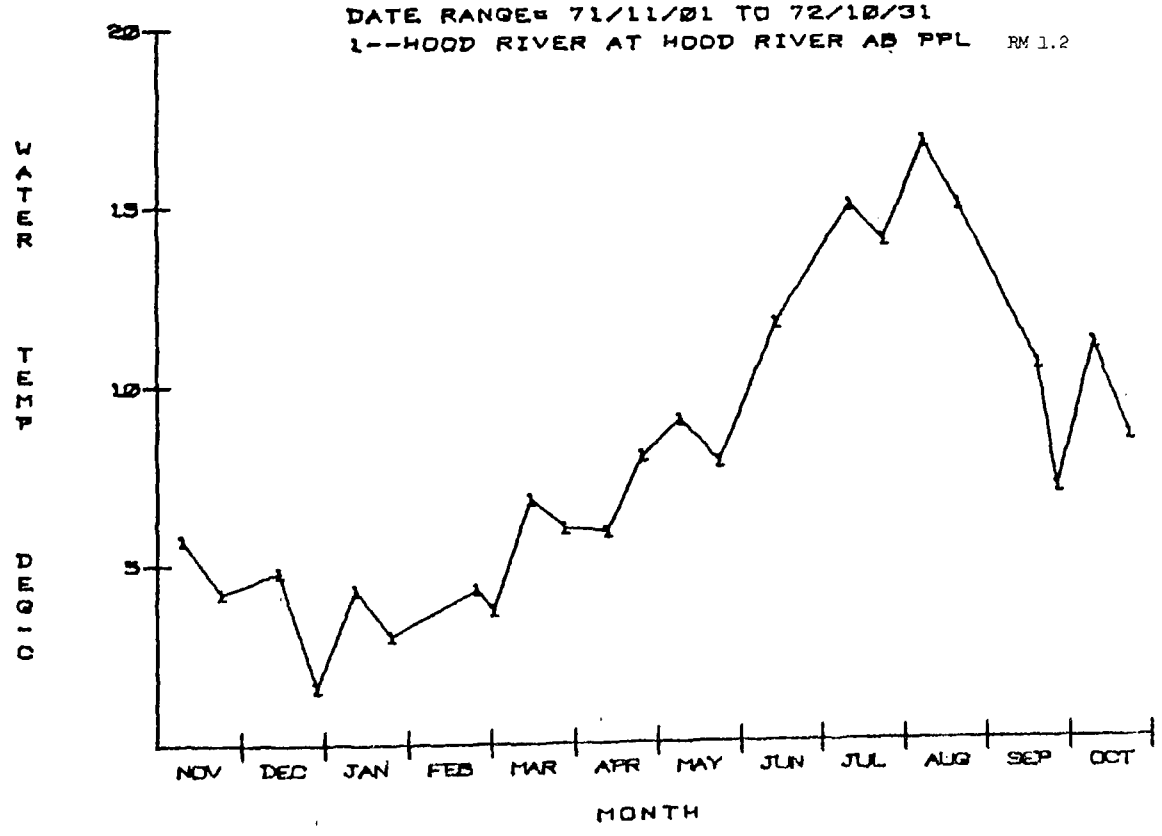
LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--HOOD RIVER AT HOOD RIVER AB PPL RM 1.2



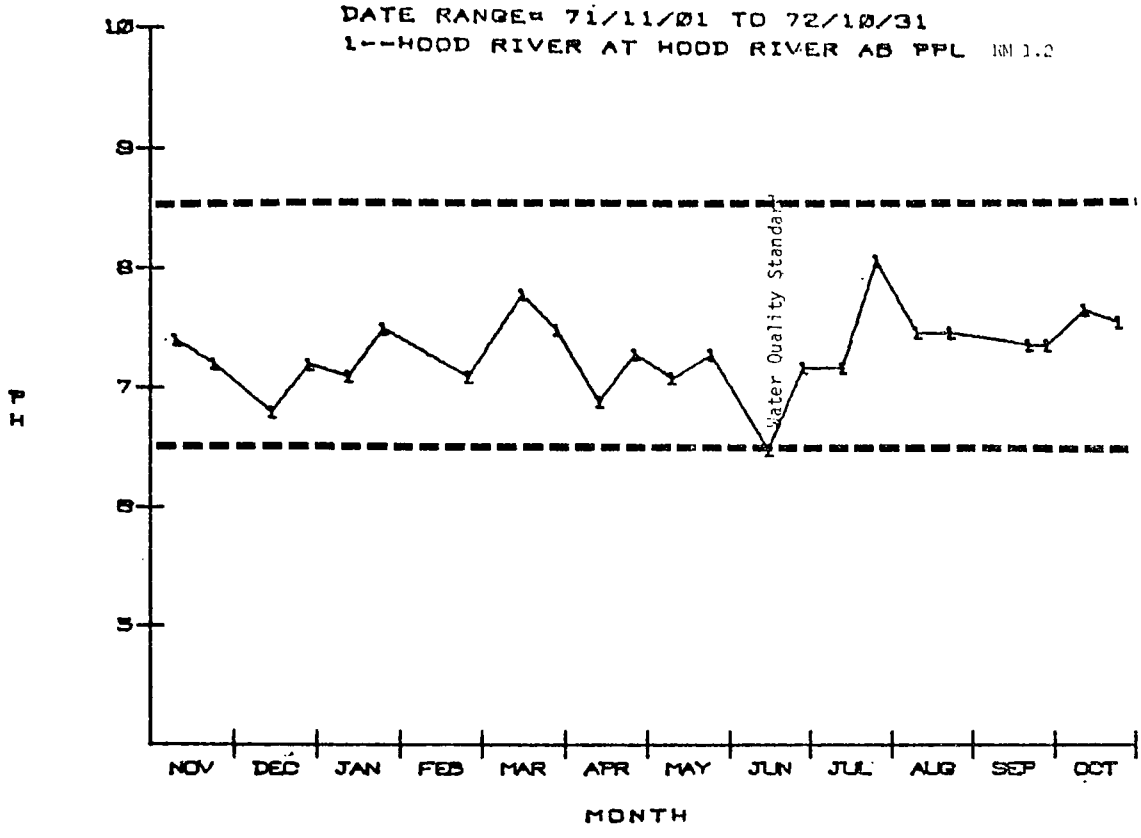
LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--HOOD RIVER AT HOOD RIVER AB PPL RM 1.2



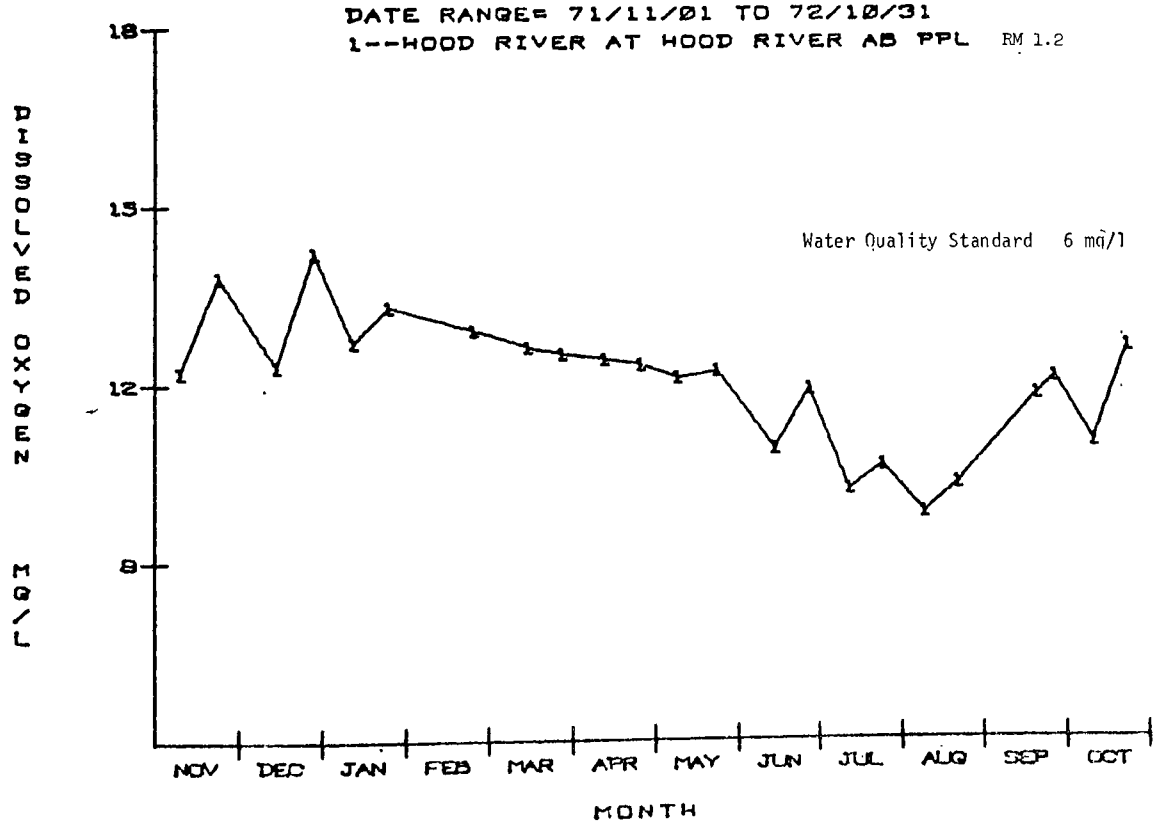
LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--HOOD RIVER AT HOOD RIVER AB PPL RM 1.2



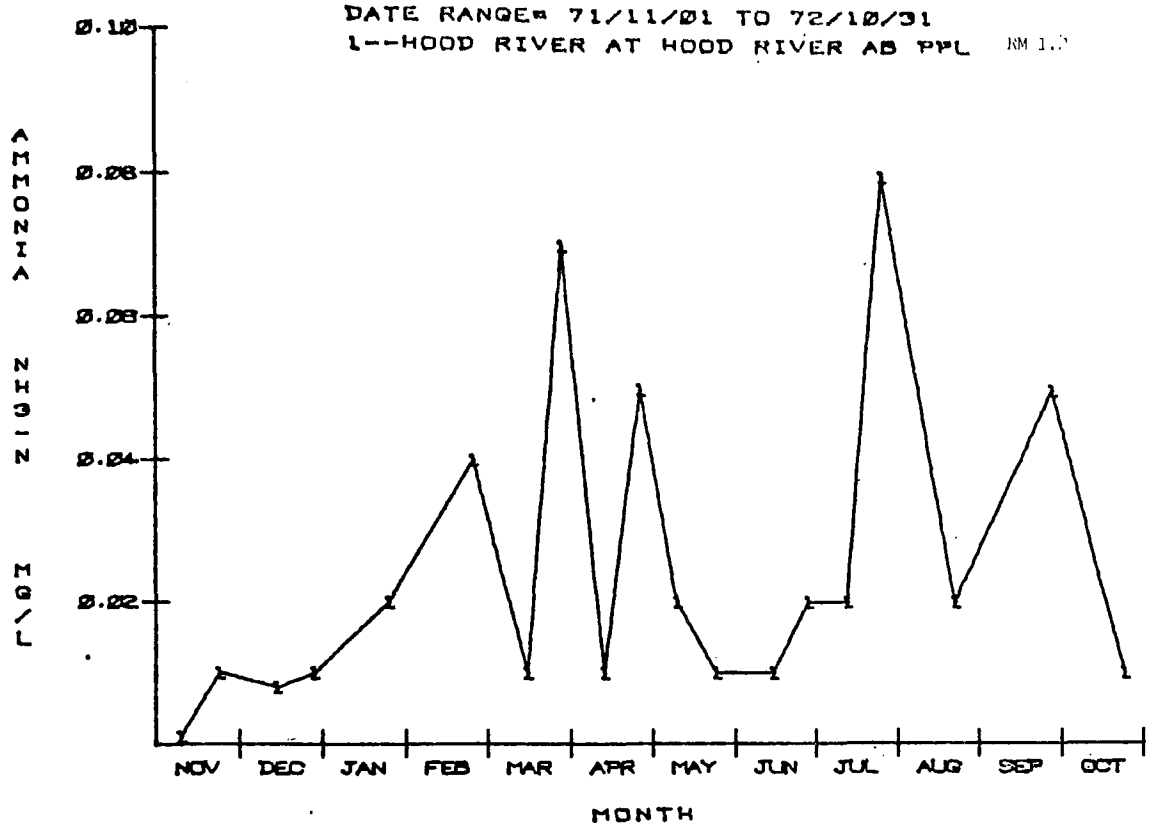
LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--HOOD RIVER AT HOOD RIVER AB PPL RM 1.2



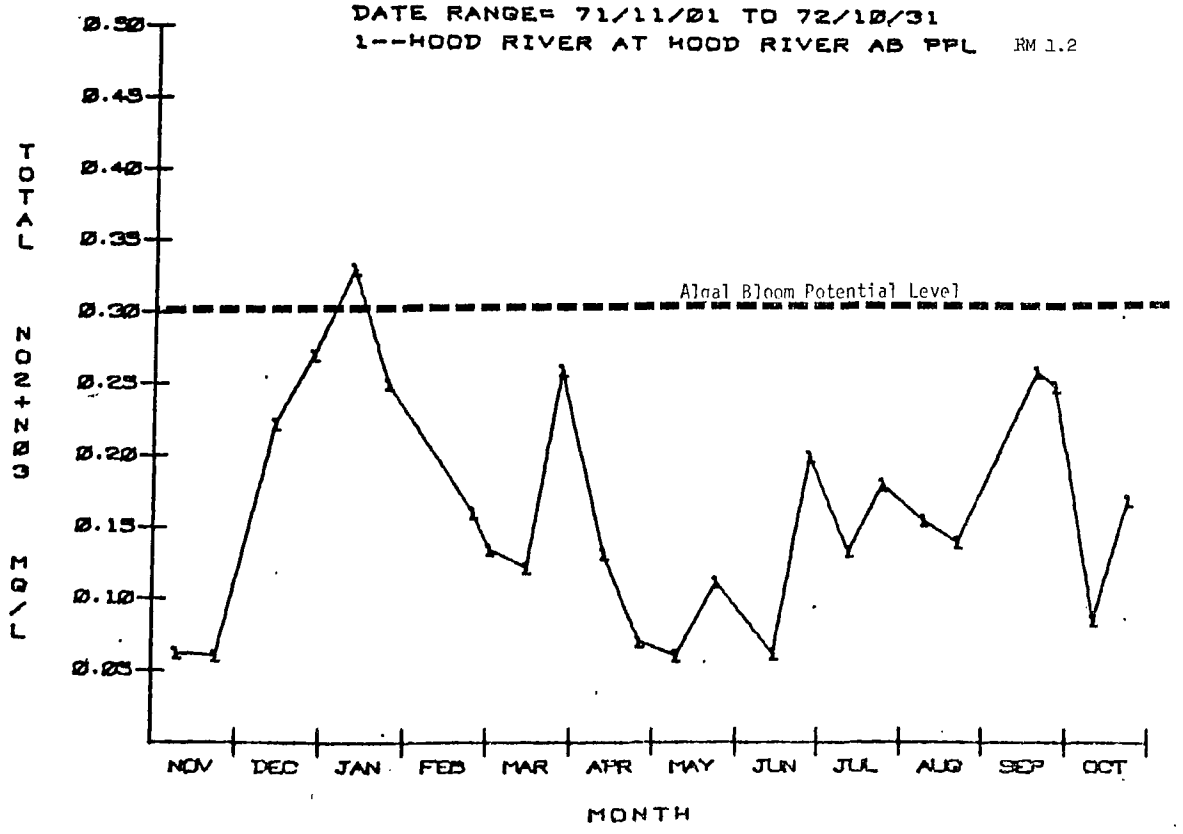
LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--HOOD RIVER AT HOOD RIVER AB PPL RM 1.2



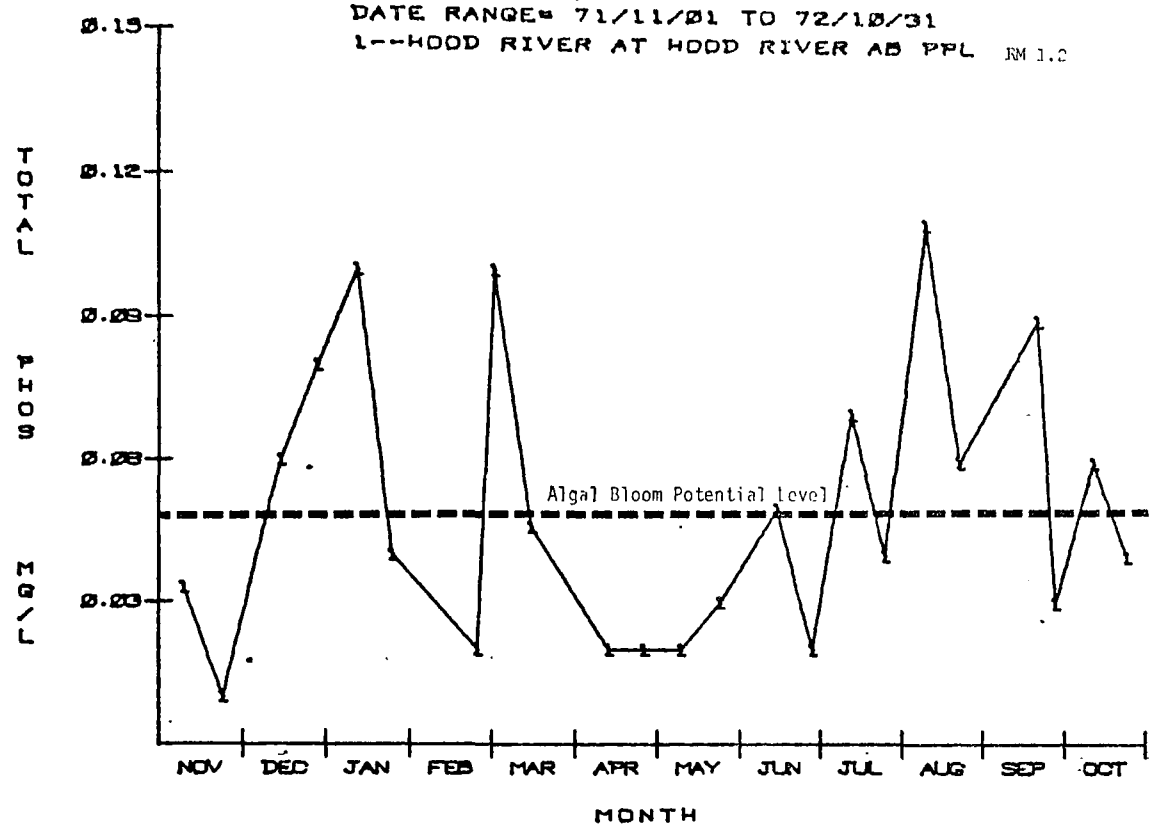
LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--HOOD RIVER AT HOOD RIVER AB PPL RM 1.2



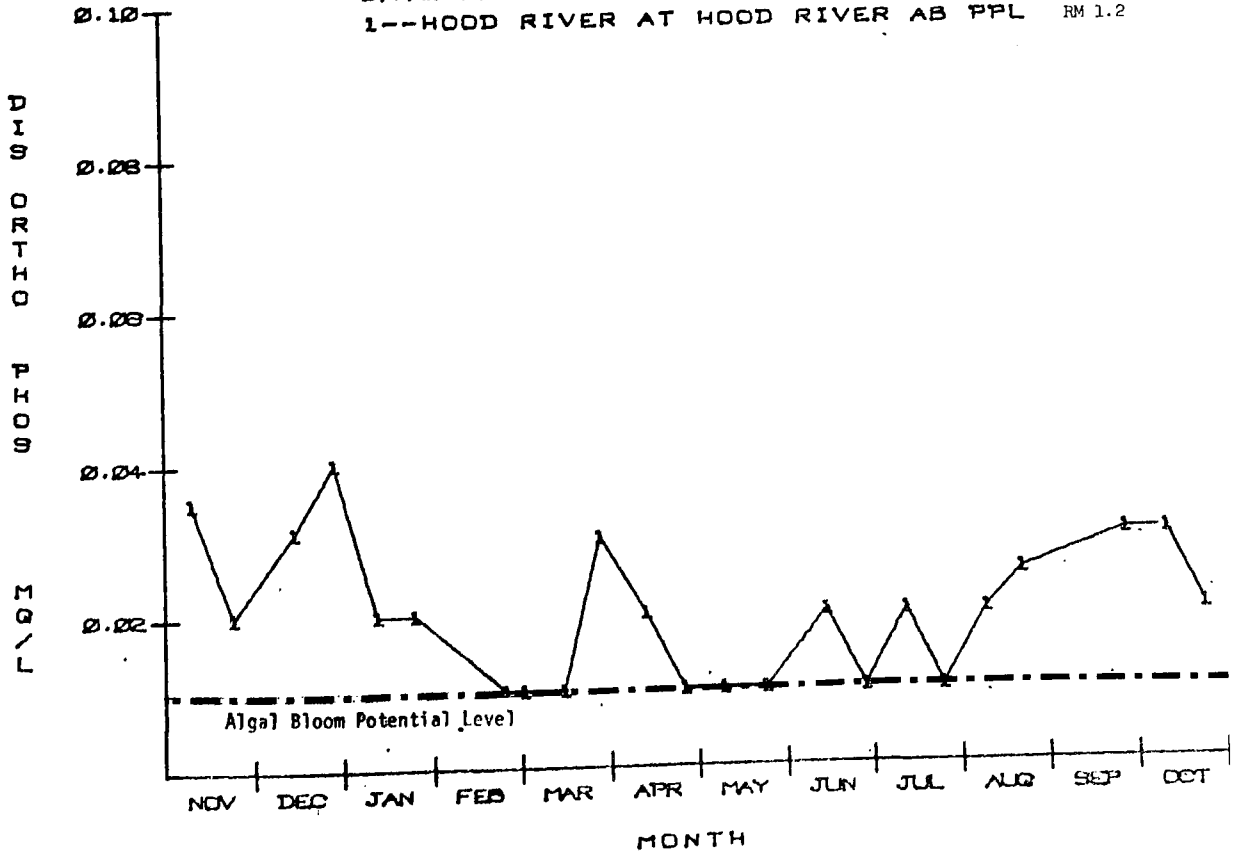
LOWER COLUMBIA BASIN

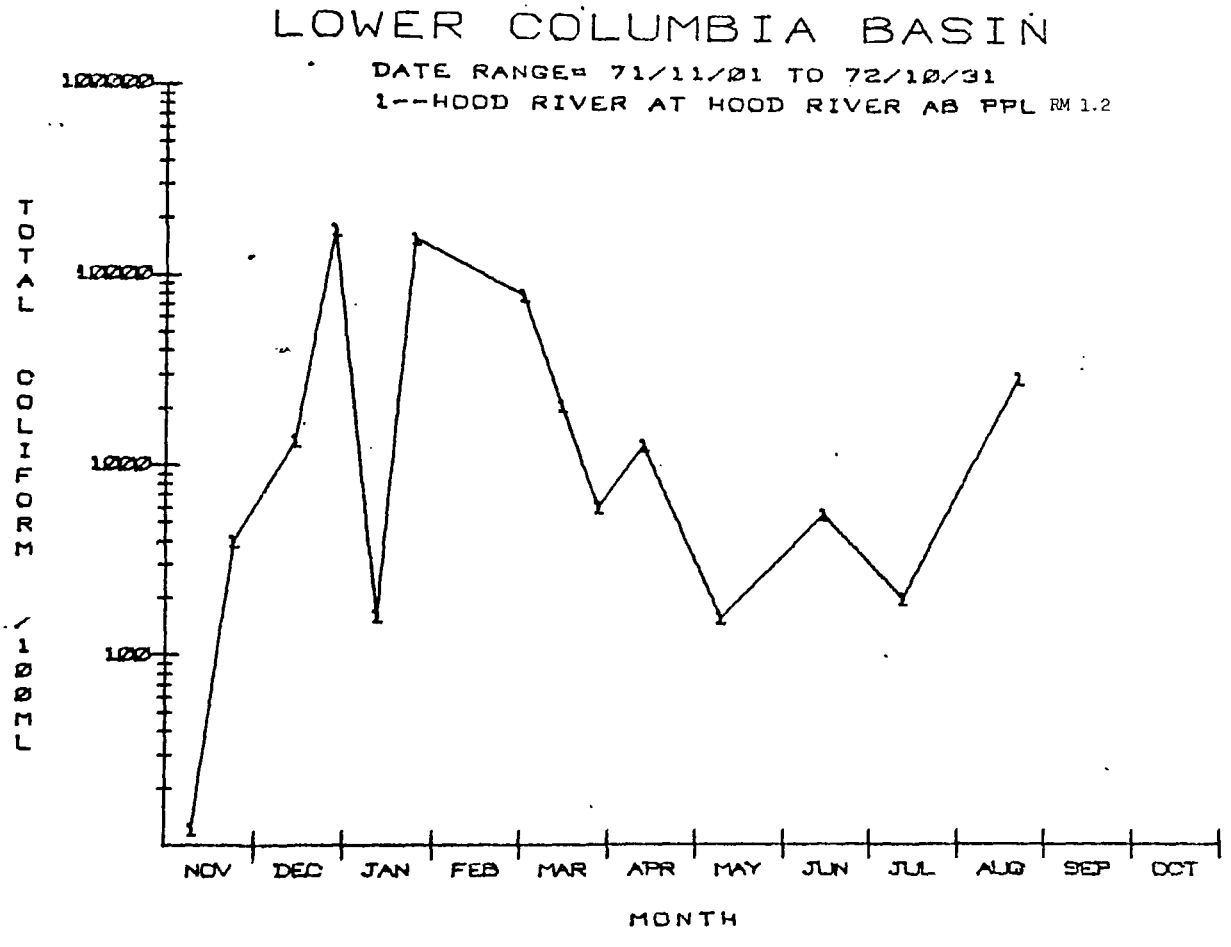
DATE RANGE= 71/11/01 TO 72/10/31
1--HOOD RIVER AT HOOD RIVER AB PPL RM 1.2



LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--HOOD RIVER AT HOOD RIVER AB PPL RM 1.2

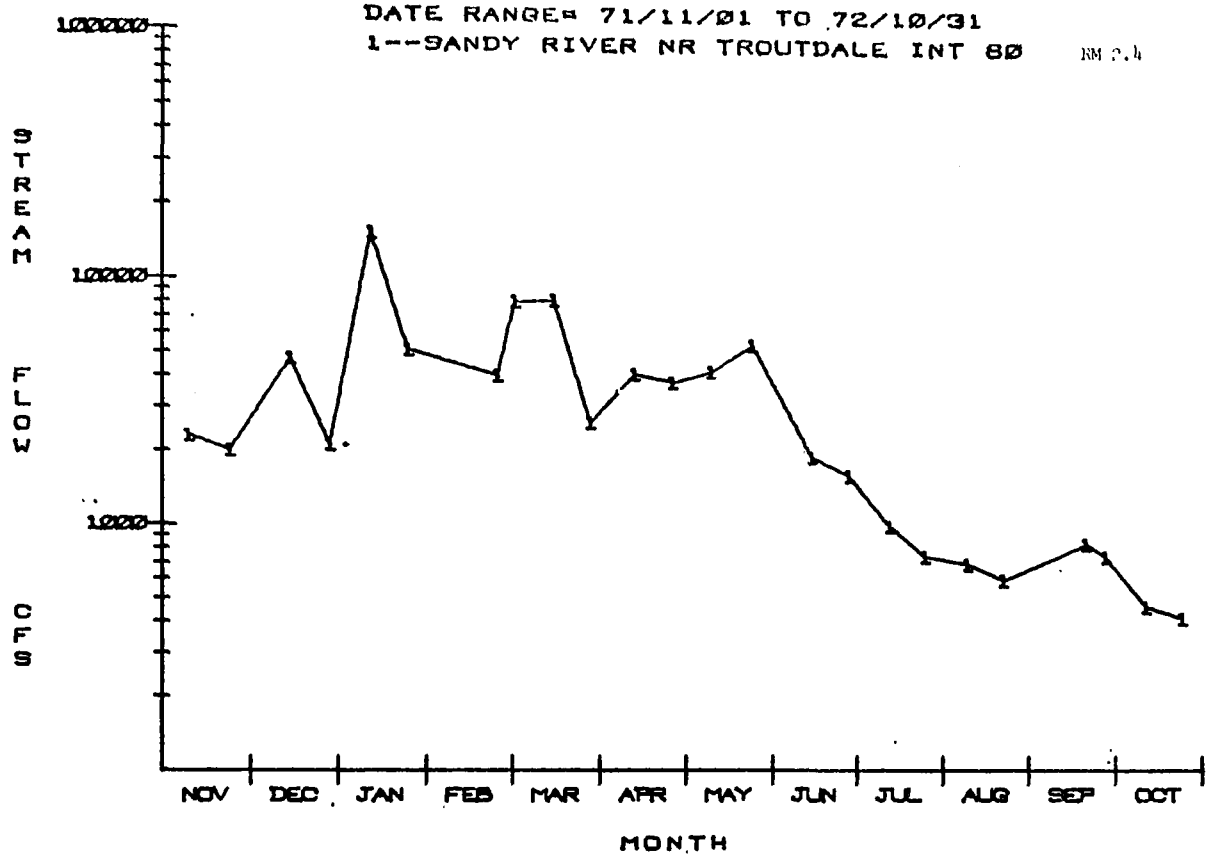



LOWER COLUMBIA BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--HOOD RIVER AT HOOD RIVER AB PPL RM 1.2
TOTAL COLIFORM /100ML
1000000
100000
10000
1000
100
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
MONTH

SANDY RIVER

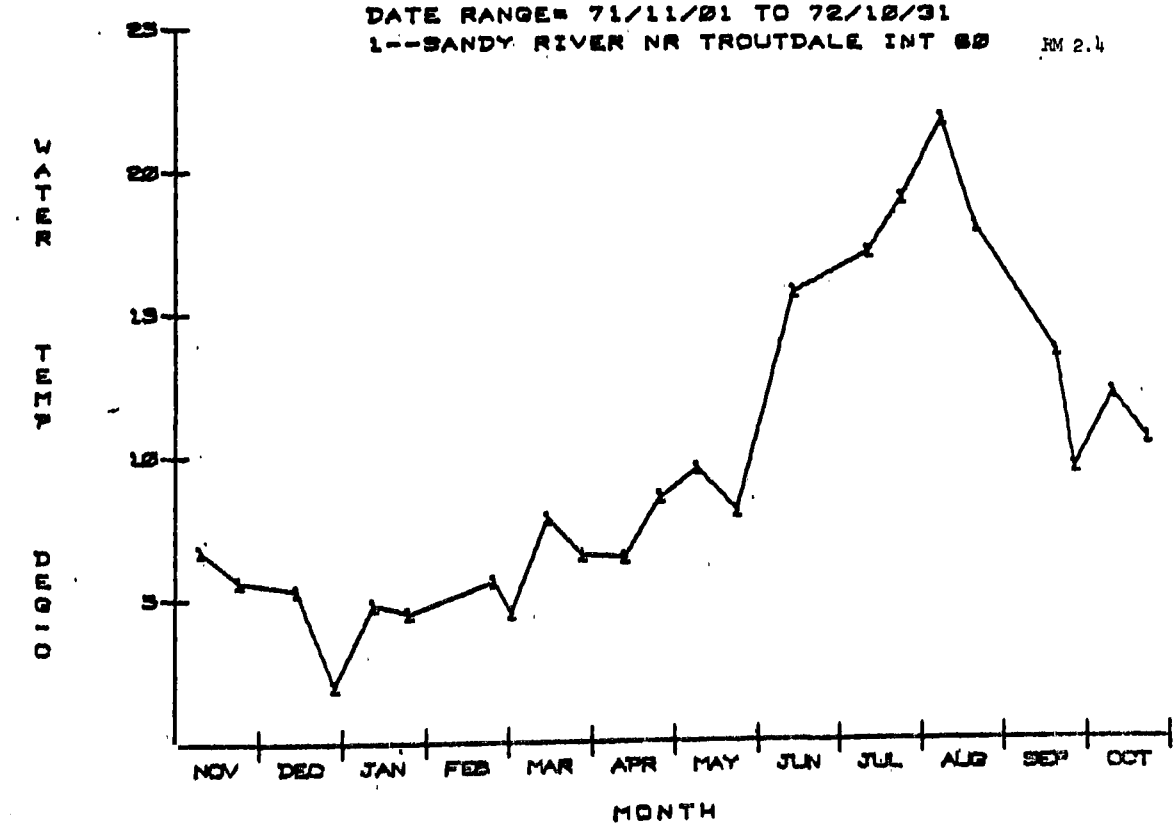
LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--SANDY RIVER NR TROUTDALE INT 80 RM 2.4



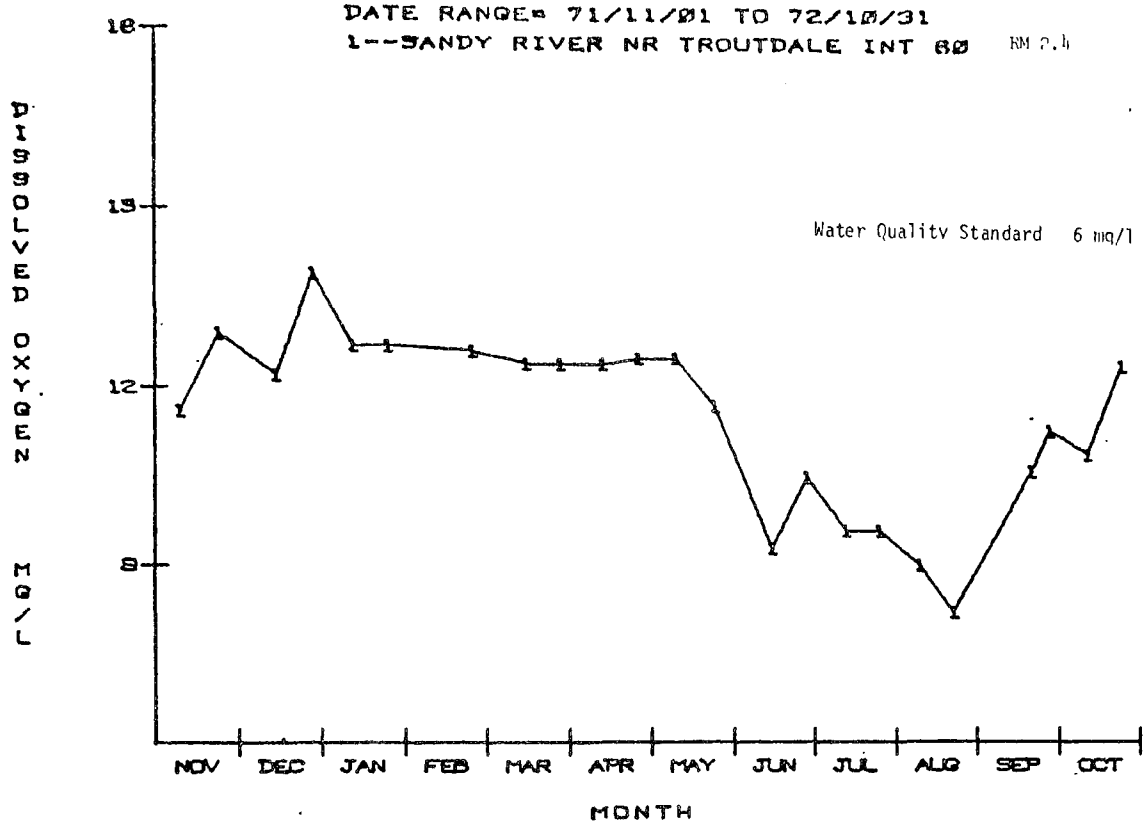
LOWER COLUMBIA BASIN

DATE RANGE= 71/11/01 TO 72/10/31
1--SANDY RIVER NR TROUTDALE INT 80 RM 2.4



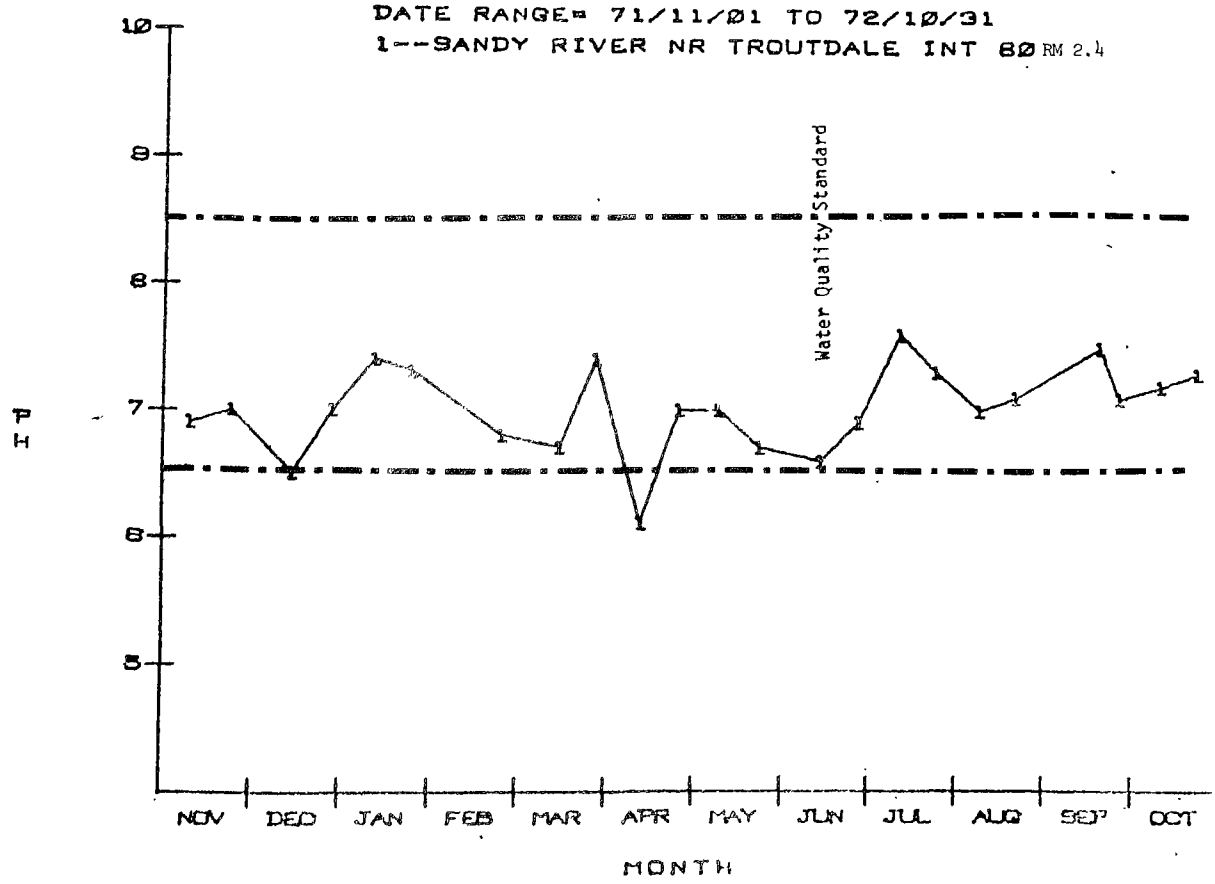
LOWER COLUMBIA BASIN

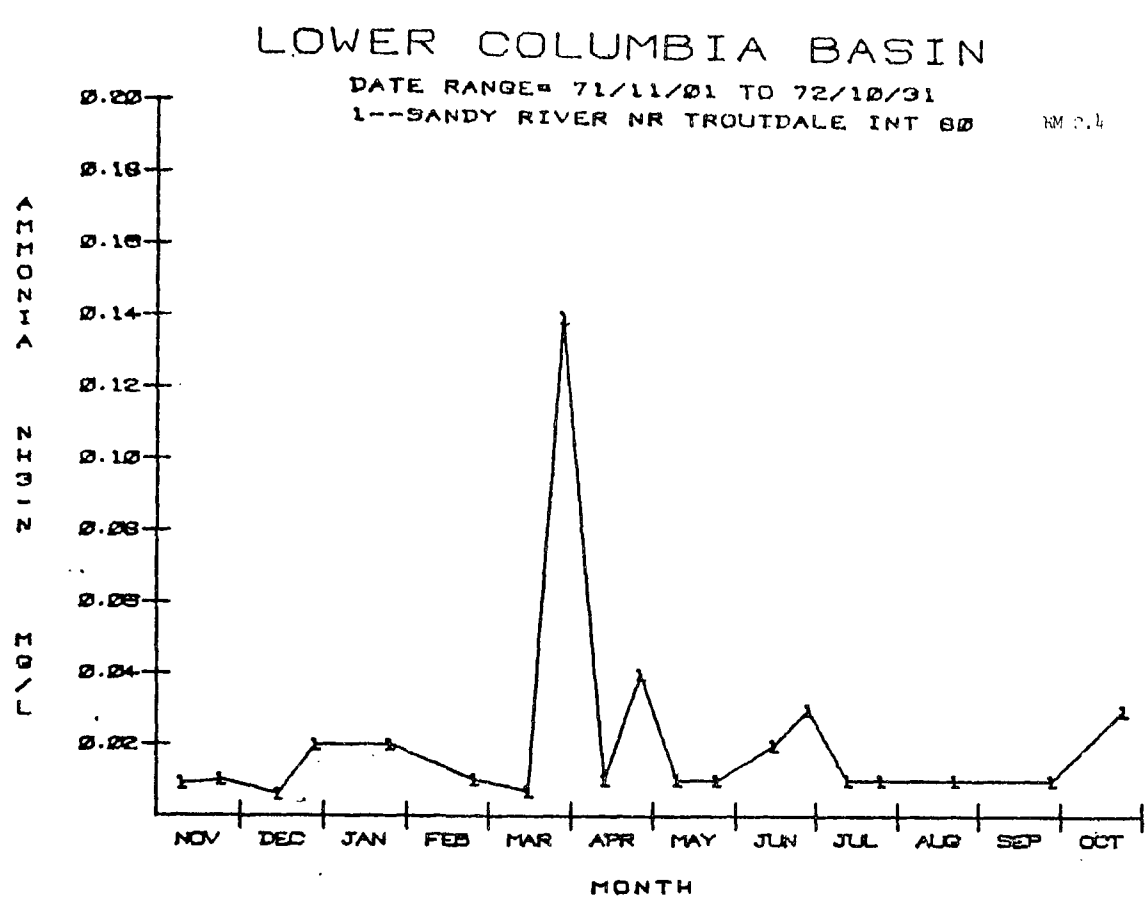
DATE RANGE= 71/11/01 TO 72/10/31
1--SANDY RIVER NR TROUTDALE INT 80 RM 2.4

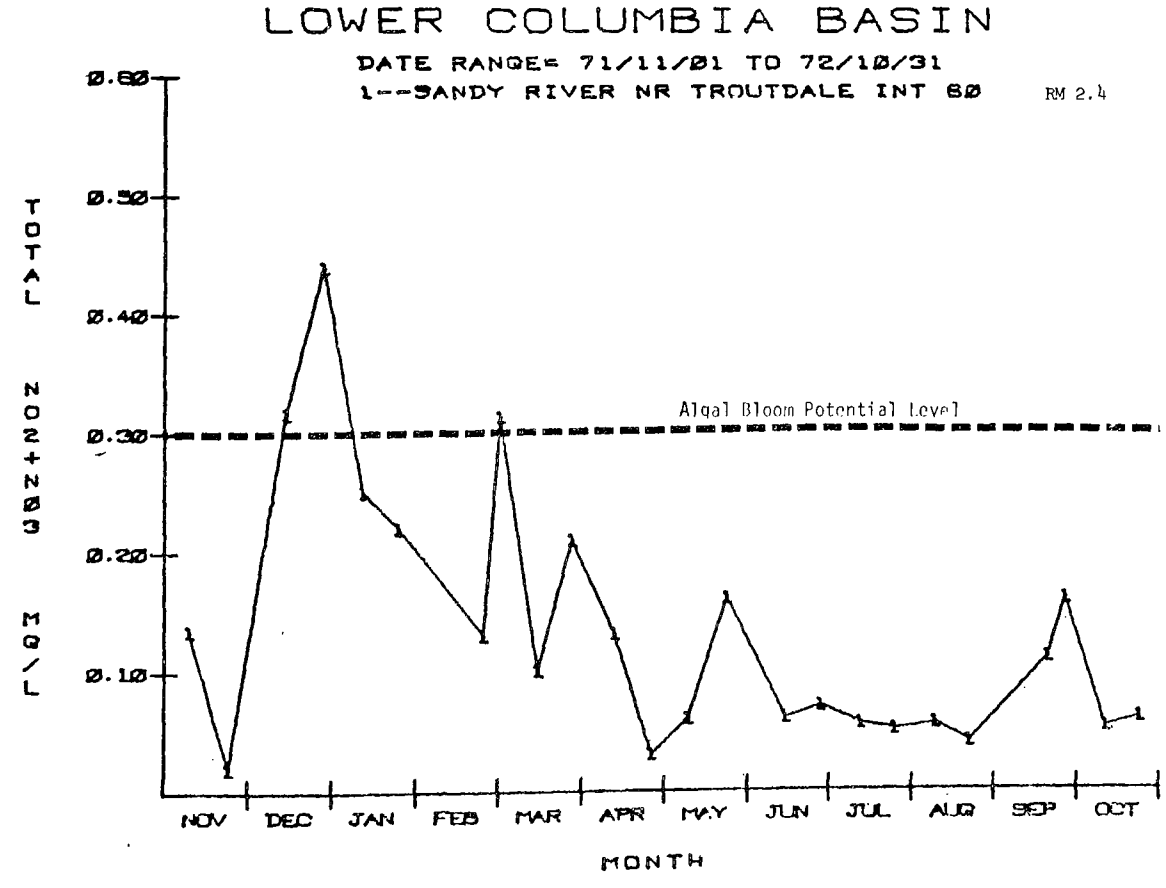


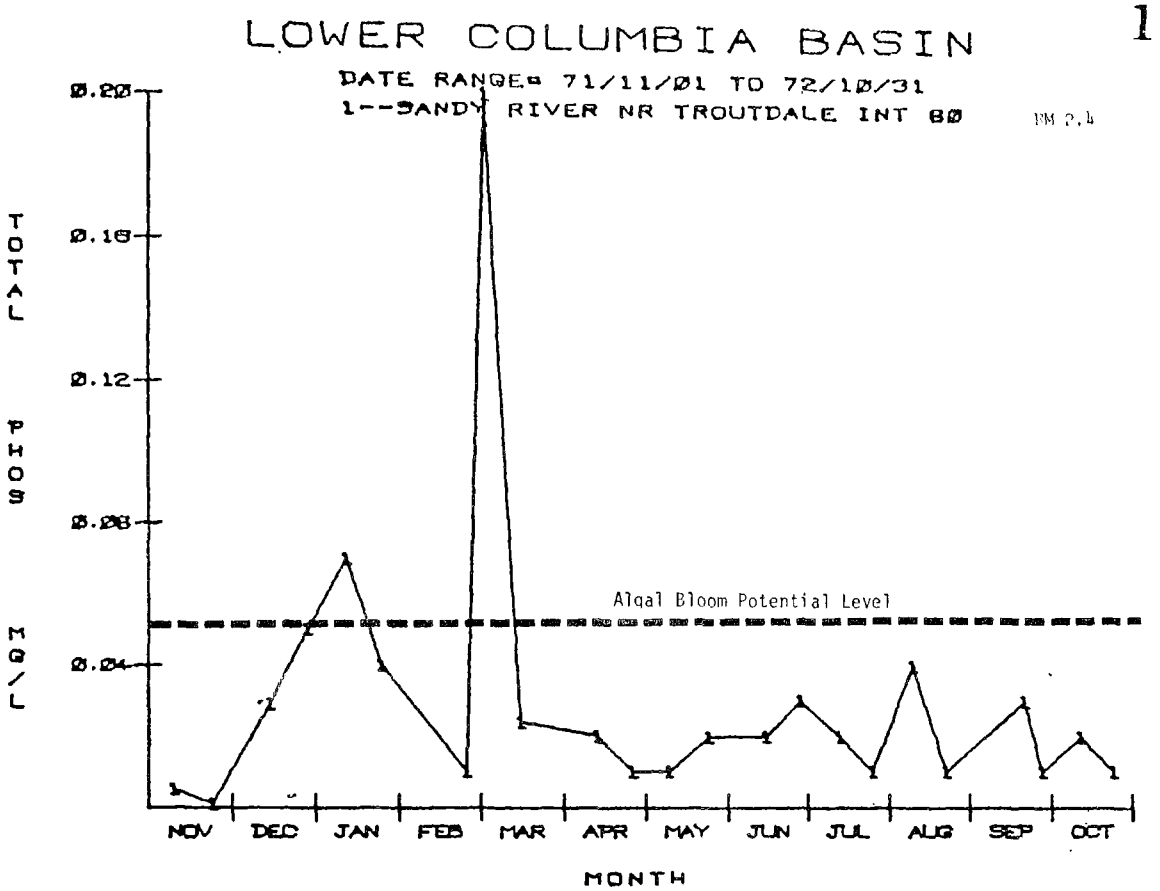
LOWER COLUMBIA BASIN

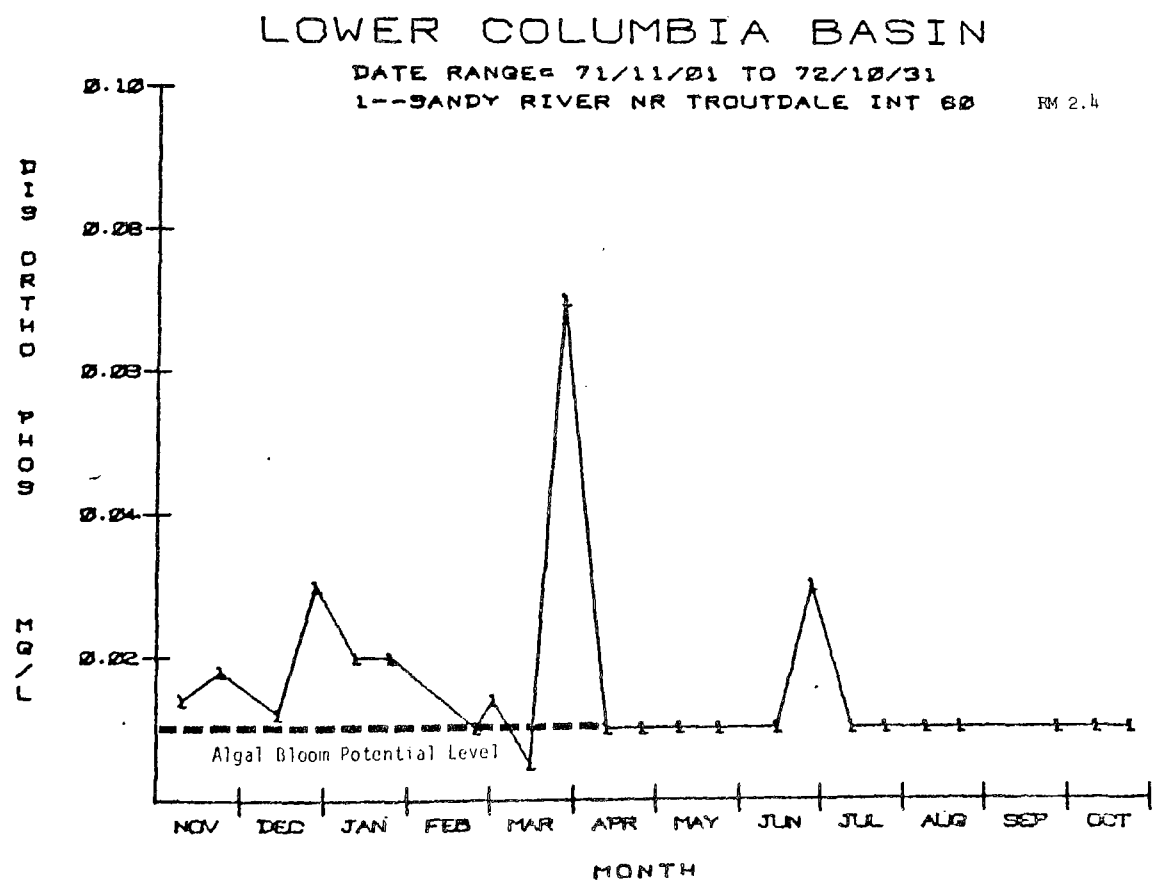
DATE RANGE= 71/11/01 TO 72/10/31
1--SANDY RIVER NR TROUTDALE INT 80 RM 2.4

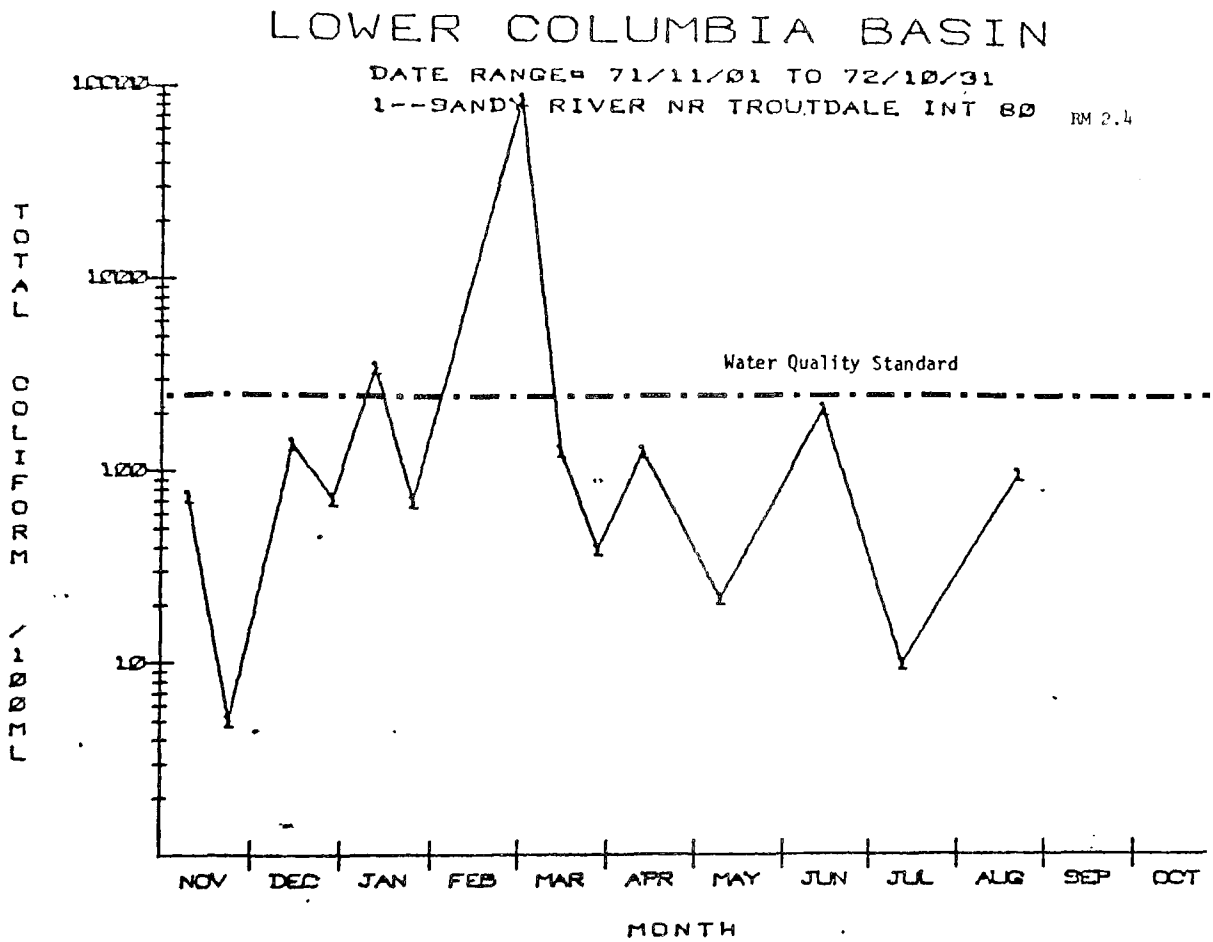



LOWER COLUMBIA BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--SANDY RIVER NR TROUTDALE INT 60
RM 2.4
AMMONIA NH3-N MG/L
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
MONTH


LOWER COLUMBIA BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--SANDY RIVER NR TROUTDALE INT 60
RM 2.4
TOTAL NO2+NO3 MG/L
0.60
0.50
0.40
0.30
0.20
0.10
Algal Bloom Potential Level
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
MONTH


LOWER COLUMBIA BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--SANDY RIVER NR TROUTDALE INT 80
RM 2.4
TOTAL PHOS MG/L
0.20
0.16
0.12
0.08
0.04
Algal Bloom Potential Level
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
MONTH


LOWER COLUMBIA BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--SANDY RIVER NR TROUTDALE INT 80
RM 2.4
DIS ORTHO PHOS MG/L
0.10
0.08
0.06
0.04
0.02
Algal Bloom Potential Level
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
MONTH


LOWER COLUMBIA BASIN
DATE RANGE= 71/11/01 TO 72/10/31
1--SANDY RIVER NR TROUTDALE INT 80
RM 2.4
Water Quality Standard
TOTAL COLIFORM /100ML
10000
1000
100
10
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
MONTH

SOURCE PROFILE

LOWER COLUMBIA BASIN PROFILE

Municipal Point Source Loadings

Municipality	Receiving Waters	River Mile	FLOW MGD	BOD_5 lb/day	BOD_5 % basin	Sus. Solids lbs/day	Sus. Solids % basin	NO_3 lbs/day	NO_3 % basin	T. Phos. lbs/day	T. Phos. % basin
MAINSTEM COLUMBIA											
Warrenton	Columbia River	3.3	.45	22.5	*	66.6	1.1	36.9	.6	13.3	.4
Astoria	" "	13.7	1.1	1870	4.8			271.3	4.2	105.4	3.5
Cathlamet	" "	39.5									
Cowlitz Co.	" "	66.0	8.1	1377	3.5			1997	31.0	776	25.5
Beacon Hill S.D.	" "	66.0		187	.5			23.1	.3	10.5	.4
Longview,West	" "	66.0	4.5	5040	12.9	2325	37.4	6.7	.1	285.0	9.4
Longview, East	" "	66.0	2.1	858	2.2	473	7.6	863	13.4	310.0	10.2
Rainier	" "	67.4	.18	281.6	.7			29.9	.5	10.6	.3
Kalama	" "	75.0	.08	107	.3	69	1.0	26.6	.4	9.6	.3
St. Helens	" "	86.0	1.5	660	1.7			121.6	1.9	47.2	1.6
Vancouver, East	" "	106.5	5.8	13968	35.9			961	14.9	345.5	11.3
Vancouver, West	" "	106.5	1.2	16.8	*			25.2	.4	9.8	.3
Gresham	" "	118.0	.17	30.6	.1			26.7	.4	10.4	.3
Camas	" "	120.0	2.4	96	.2	1712	27.5	98.6	1.5	35.4	1.2
Washougal	" "	127.7	.45	94	.2	221	3.6	24.0	.4	35.0	1.2
Stevenson	" "	150.5	1.2	16.8	*			25.2	.4	9.8	.3
Hood River	" "	169.4	1.5	996	2.6	19.6	.3	133.2	2.1	47.8	1.6
White Salmon	"	170.0	.17	189.2	.5			40.7	.6	14.7	.5
The Dalles	" "	189.3	2.2	2096	5.4			308.3	4.8	110.8	3.6
Kennewick	"	328.4	4.5	6849	17.6			380	5.9	137.0	4.5

* Insignificant contribution to Basin

LOWER COLUMBIA BASIN PROFILE

Municipal Point Source Loadings

Municipality	Receiving Waters	River Mile	FLOW MGD	BOD_5 lb/day	BOD_5 % basin	Sus. Solids lbs/day	Sus. Solids % basin	NO_3 lbs/day	NO_3 % basin	T. Phos. lbs/day	T. Phos. % basin
WASHINGTON											
COWLITZ COLUMBIA											
Castle Rock	Cowlitz River	68/16.1	.14	65	.16	69	1.1	.07	*	15.4	.5
Kelso	Coweeman River	68/1.3/3.0	1.0	1150	2.9	758	12.8	.83	*	185.0	6.1
Morton	Tilton River	68/57.7/19	.2	37	.1	42	.7	28.0	.4	11.0	.4
Mossyrock	Lake Mayfield	68/65	.01	9.6	*	3.8	.1	13.6	.2	5.3	.2
Vader	Olequa Creek	68/25/3.0	.04	2.6	*	13.6	.2	8.3	.1	3.3	.1
LEWIS											
La Center	E. Fork Lewis R.	87/3.5/3.3	.05	19	*	29	.5	3.1	*	1.0	*
Woodland	Lewis	87/6.6	.11	105	.27	119	1.9	37.6	.6	13.5	.5
MIDDLE COLUMBIA											
Goldendale	L. Klicktat	180/3.6/15	.23	36.4	.1	46	.7	61.8	1.0	24.0	.8
WALLA WALLA											
College Place	Mill Creek	313.5/33.6/10	.5	195	.5			105	1.6	38	1.2
Walla Walla	Mill Creek	313.5/33.6/8	7.0	1641	4.2			551	8.5	214.1	7.0
Dayton	Touchet	313.5/21.6/53	.5	342	.9			74	1.1	27.0	.9
Waistburg	Coppei Creek	313.5/21.6/45	.14	131	.34			28	.4	10.0	.3
OREGON											
Pendleton	Umatilla River	288/53.8	8.9	2080	5.0			388	5.0	139.7	2.2
Prineville	Crooked River	204/113/47	.39	185	.5			88	1.4	34.2	1.1
Scappose	Multnomah Ch.	87/10	.15	239	.6	242	3.9	37	.6	;32	4.3
Troutdale	Sandy River	120/31.6	.19	14.7	*	9.8	.2	12.6	.2	4.9	.2

* Insignificant contribution to Basin

LOWER COLUMBIA BASIN PROFILE

Industrial Point Source Loadings

Industry	Receiving Waters	River Mile	FLOW MGD	BOD_5 lb/day	BOD_5 % basin	Sus. Solids lbs/day	Sus. Solids % basin	NO_3 lbs/day	NO_3 % basin	T. Phos. lbs/day	T. Phos. % basin
MAINSTEM COLUMBIA											
Crown Zellerbach	Columbia River	41.5	2.0	617	.1	417	1.5				
Reynolds Metal	" "	63.1	14.1	551	.1			188	5.0	352	26.2
Reynolds Metal	" "	63.2	2.2	332	*			2.0	*	6	.4
Weyerhauser	" "	66.0	14.0	168	*			.03	*	.73	*
Weyerhauser	" "	66.0	98.5	181000	34.1						
Longview Fibre	" "	68.1	61.4	107000	20.2			431	12.1	245	18.2
Kalama Chemical	" "	75.0		6041	1.1	541	2.0	12	.3		
Virginia Chemical	" "	75.0	1.0	125	*			6.7	*	2.5	*
Reichold Chemical Co.	" "	86.0	21.0	700	.1			44	.1	9.0	.7
International Paper Co.	" "	87.0	.2			115	.4			.8	*
Great Western Malting	" "	105.1	6.0	2404	.5			2.6	*	37.5	2.8
Diamond Fruit Growers	" "	106.5	1.2	260	*			5.3	*	1.3	*
United Grain Co.	" "	106.5		2900	.5	1210	4.5				
FMC	" "	106.5	11.7	486	*	194	.7	158	5.4	55.0	4.1
Aluminum Co. of Amer.	" "	106.5	6.8			453	1.7				
Boise Cascade	" "	106.5	11.0	10500	2.0			164	5.6	29.0	2.2
Del Monte Corp.	" "	106.5	.9	1890	.35	518	1.9	14	.4	3.0	*
Fort Vancouver Plywd	" "	106.5	.6	94	*	1167	4.3	.3	*	.6	*
Reynolds Metal	" "	120.0	3.8	81	*			3.1	*	3.8	*
Crown Zellerbach	" "	120.1	107.0	172030	32.4					418	31.1
Marton Mariett	" "	180.0	.01	.2	*	1.5	*				
Harvey Aluminum	" "	189.0	20.0	1670	.3			25	.7	10	.7
Cherry Growers	" "	189.0	40.0	1369	.3						
Boise Cascade	" "	315.0	11.0	22593	4.3			32.7	.9	42.8	3.2
Chevron Chemical Co.	" "	328.0	10.0	502	.1	167	.6	2218	62.3	38	3.0
Phillips Pacific Chem C.	" "	328.0	28.8	240	*	120	.4	96	2.7	24	2.0
Sandvich Special Metals	" "	328.0	.2	12.2	*	73.9	.3	72.8	2.1	3	*
TRIBUTARIES											
Boise Cascade	Miller Creek	86.0/3.0	25.4	14470	2.7	18079	67.4				
Broughton Lumber Co.	White Salmon	168.5/1.9	6.0			402	1.5	7	.2	6	.4
U.S. Plywood Chmp	Hood River	169.0/5.0	.83	1784	.3	2802	10.4				
Ochoc Lumber Co.	Ochoco Creek	204.0/113/52	5.0	208	*						
Green Giant (Dayton)	Patit Creek	315.5/53.2	1.0	91	*	432	1.6	75	2.1	56.4	4.9
Green Giant (Waistburg)	Touchet River	315.5/53.2	.9	24	*	142	.5			1.0	*

* Insignificant contribution to Basin

SUMMARY

SIGNIFICANT INDUSTRIAL & MUNICIPAL DISCHARGERS

Percent contribution to Total Basin

Discharger	BOD_5 lbs/day	Percent %	Sus. S. lbs/day	Percent %	NO_3 lbs/day	Percent %	T. Phos. lbs/day	Percent %
Astoria	1870	.4	-		271	3.4	105	2.9
Longview, West	5040	1.0	2325	8.9	not sig.		285	8.1
Vancouver, East	13968	2.8	-		961	12.0	345	9.8
The Dalles	2096	.4	-		308	3.8	137	3.9
Cowlitz Co.	not sig.		-		1997	25.0	776	22.1
Longview, East	not sig.		473	1.8	863	10.8	310	8.8
Camas	not sig.		1712	6.5	not sig.		not sig.	
Kennewick	6849	1.4	-		380	4.8	137	3.9
Kelso	not sig.		758	2.9	not sig.		185	5.2
Walla Walla	not sig.		-		551	6.9	214	6.1
Weyerhauser	181000	36.9	-		-		-	
Longview Fibre	107000	21.8	-		431	5.4	245	7.0
Crown Zellerbach	172030	35.1	-		-		418	11.9
Boise Cascade	not sig.		18079	69.1	-		-	
US Plywood Chmp.	not sig.		2802	10.7	-		-	
Chevron Chemical	not sig.		-		2218	27.8	not sig.	
Reynolds Metal	not sig.		not sig.		not sig.		352	10.0
TOTAL		100%		100%		100%		100%

Point Source Distribution

	BOD_5	Sus. Solids	NO_3	Total Phos.
Industrial	94%	80%	33%	29%
Municipal	6%	20%	67%	71%

TOTAL PHOSPHORUS

1972 Data

Stations		Quarter No. 1		Quarter No. 2		Quarter No. 3		Quarter No. 4	
Columbia River Tributary	Number	# lbs/day	* %	# lbs/day	* %	# lbs/day	* %	# lbs/day	* %
Snake R.	33A070	19953	16.5	63745	26.7	34615	44.9	4643	28.1
Walla Walla	32A070	-		-		-		-	
Mile 292.0	400081	79263	-	215377	-	130196		33438	
Umatilla R.	403052	796	0.7	20501	8.0	289	0.4	29	0.2
John Day R.	403053	3810	3.1	45071	17.5	-		54	0.3
Mile 215.6	403048	65003		198550		147542		9707	
Deschutes R.	403051	3506	2.9	4411	1.7	2065	2.7	2127	12.9
Mile 191.4	403002	73364		173454		122627		25545	
Klickitat R.	543110	859	0.7	2133	0.8	426	0.6	361	2.3
Hood R.	403050	575	0.5	658	0.3	-		141	0.9
White Salmon R.	543111	416	0.3	420	0.2	310	0.4	237	1.4
Mile 145.3	400008	76460		190132		124313		22028	
Washougal R.	543109	228	0.2	453	0.2	38	0	72	0.4
Sandy R.	403049	1363	1.1	2108	0.8	237	0.3	72	0.4
Willamette R.	403059	83444	68.9	50453	19.6	6354	8.2	4967	30.1
Lewis R.	27C070	781	0.6	25030	9.7	606	0.8	212	1.3
Kalama R.	27B070	458	0.4	7802	3.0	75	0.1	57	0.3
Mile 66.0	25A150	442478		209694		342359		41640	
Mile 53.5	400007	250141		131414		-		-	
Mile 38.9	403010	190742		199166		203049		42146	

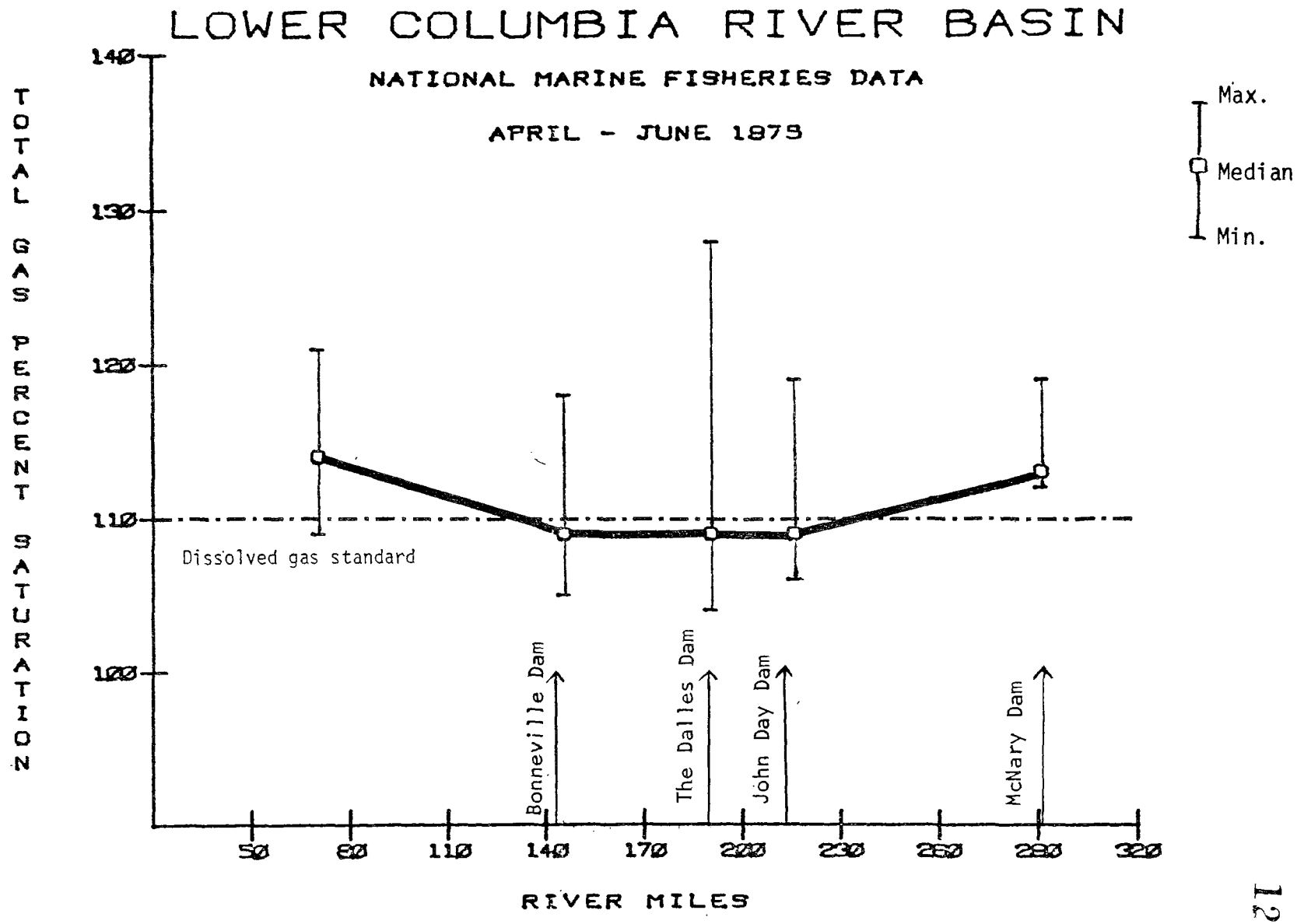
TOTAL NITROGEN

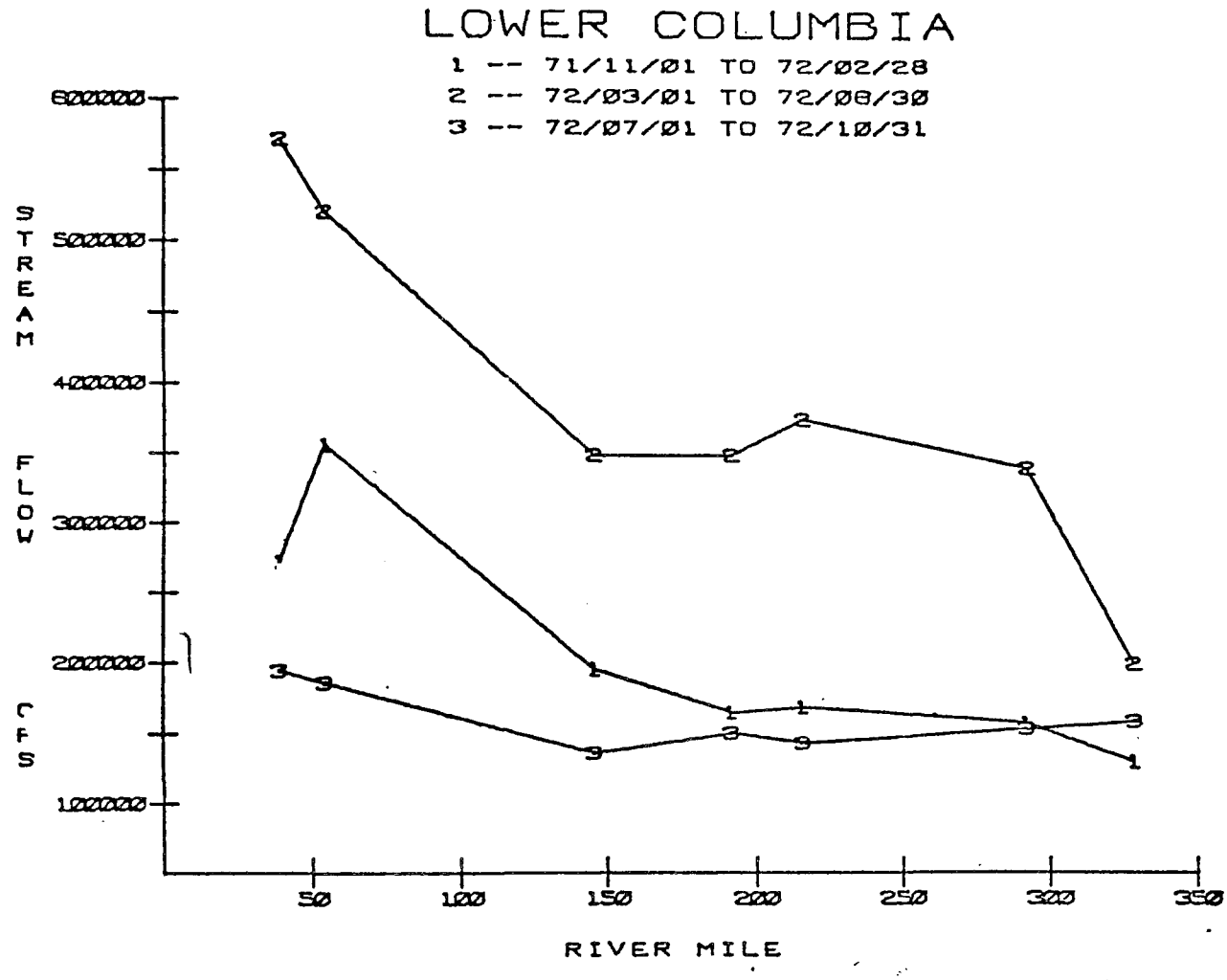
Stations		Quarter No. 1		Quarter No. 2		Quarter No. 3		Quarter No. 4	
Columbia River Tributary	Number	# lbs/day	* %	# lbs/day	* %	# lbs/day	* %	# lbs/day	* %
Snake R.	33A070	221671	25.4	674533	49.7	286947	44.3	85921	36.3
Walla Walla R.	32A070	6902	0.8	-	-	-	-	-	-
Mile 292.0	400081	684247	-	1519979	-	988544	-	233729	-
Umatilla R.	403052	4751	0.5	40765	3.0	2208	0.3	499	0.2
John Day R.	403053	9905	1.1	92585	6.8	13093	2.0	643	0.3
Mile 215.6	403048	470757	-	1384436	-	1379541	-	152192	-
Deschutes R.	403051	15292	1.8	22934	1.7	11334	1.7	14895	6.3
Mile 191.4	403002	529264	-	1227987	-	911419	-	388318	-
Klickitat R.	543110	4645	0.5	7542	0.6	3764	0.6	2082	0.9
Hood R.	403050	4501	0.5	4402	0.3	-	-	1281	0.5
White Salmon R.	543111	3433	0.4	3321	0.2	3245	0.5	3259	1.4
Mile 145.3	400008	520825	-	1164520	-	820633	-	308045	-
Washougal R.	543109	4955	0.6	3701	0.3	631	0.1	1459	0.6
Sandy R.	403049	14115	1.6	9132	0.7	3705	0.6	1793	0.8
Willamette R.	403059	478591	54.8	302072	22.3	79359	12.2	60574	25.6
Lewis R.	27C070	26125	3.0	22871	1.7	7986	1.2	375	0.2
Kalama R.	27B070	6127	0.7	6440	0.5	904	0.1	493	0.2
Mile 66.0	25A150	-	-	1473746	-	685139	-	159430	-
Mile 53.5	400007	1141042	-	1034869	-	-	-	-	-
Mile 38.9	403010	1470459	-	1951441	-	1111528	-	621619	-

* % of total measured tributary loading

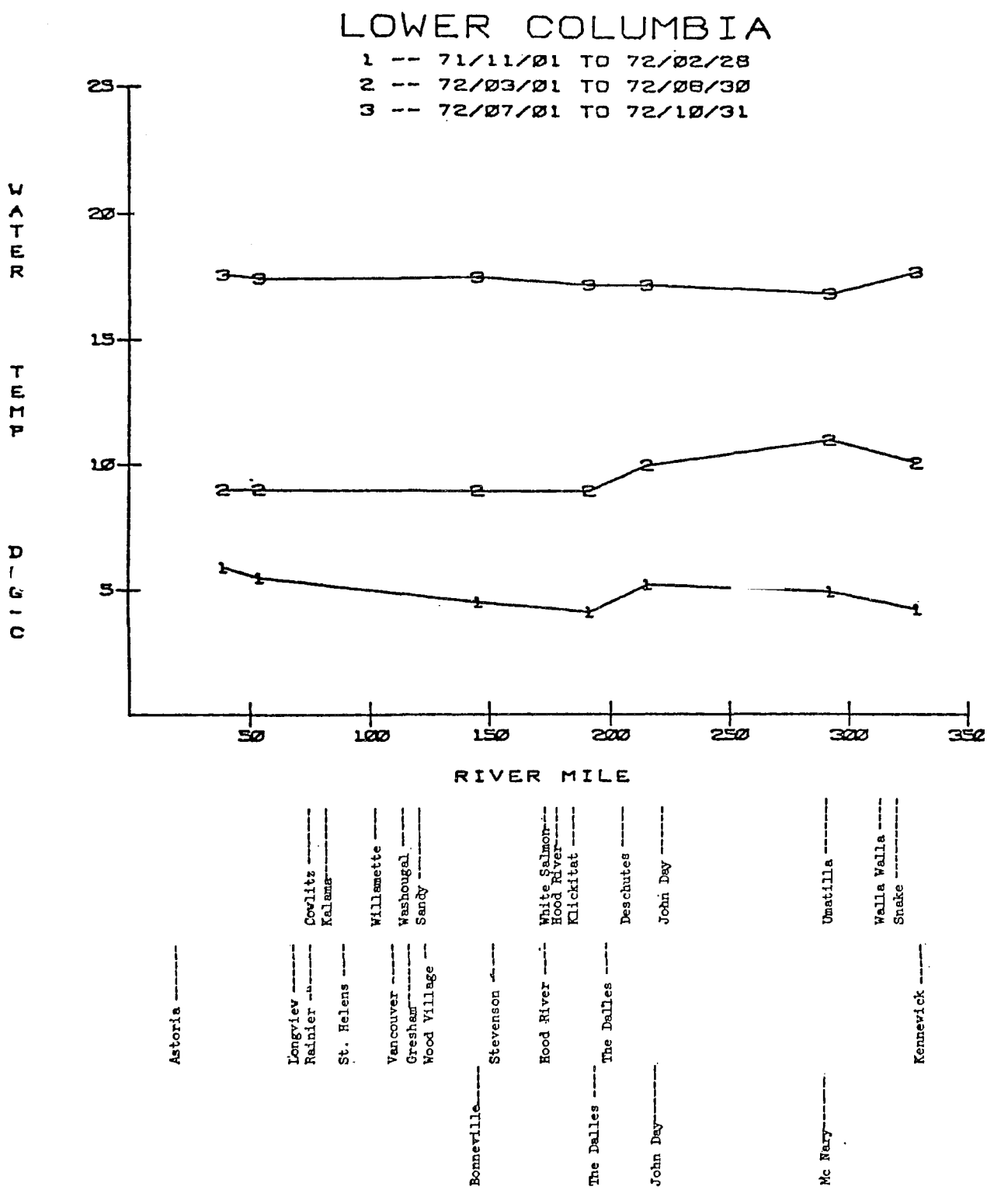
X .4536 - Kg/day

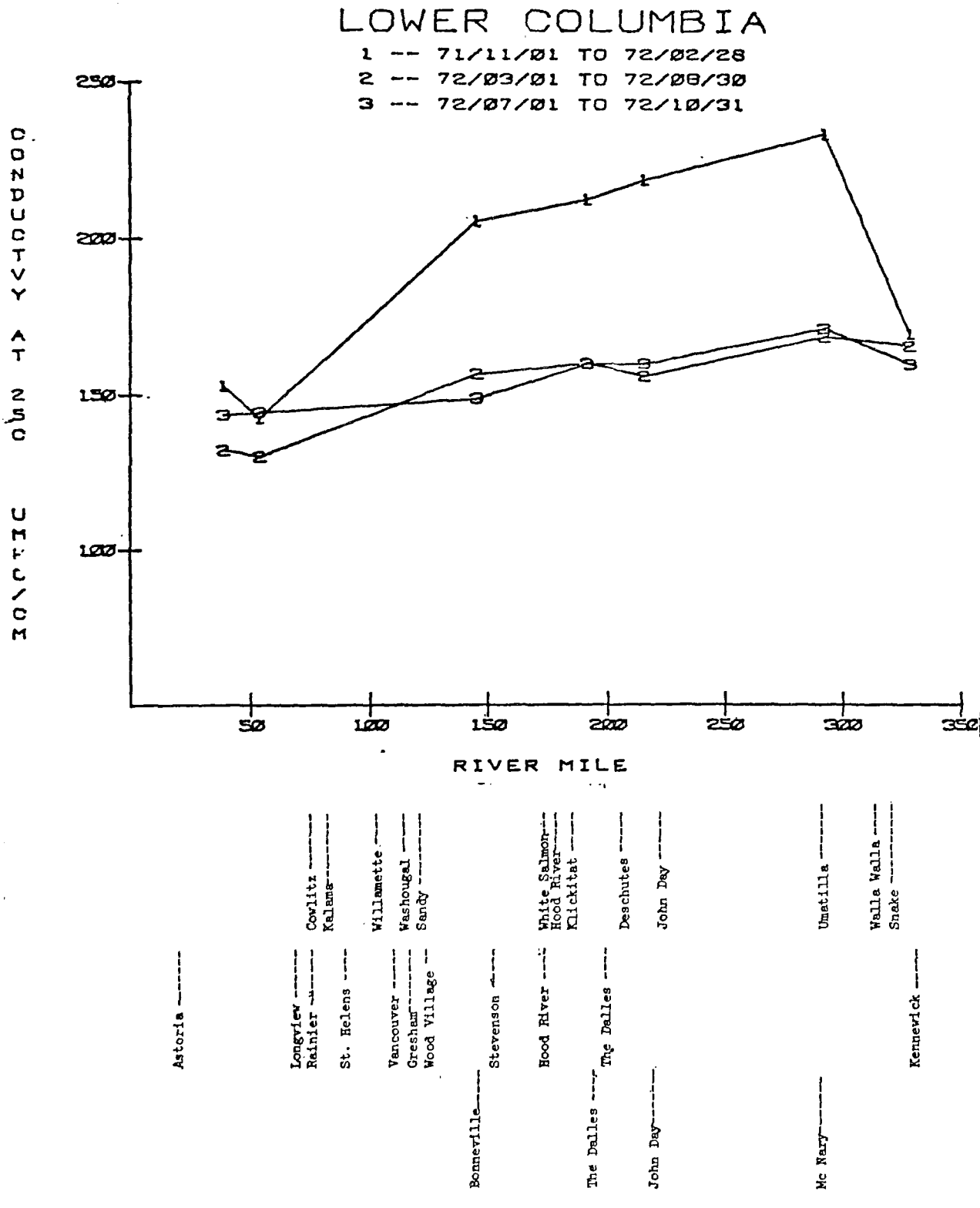
CAUSE-EFFECT ANALYSIS

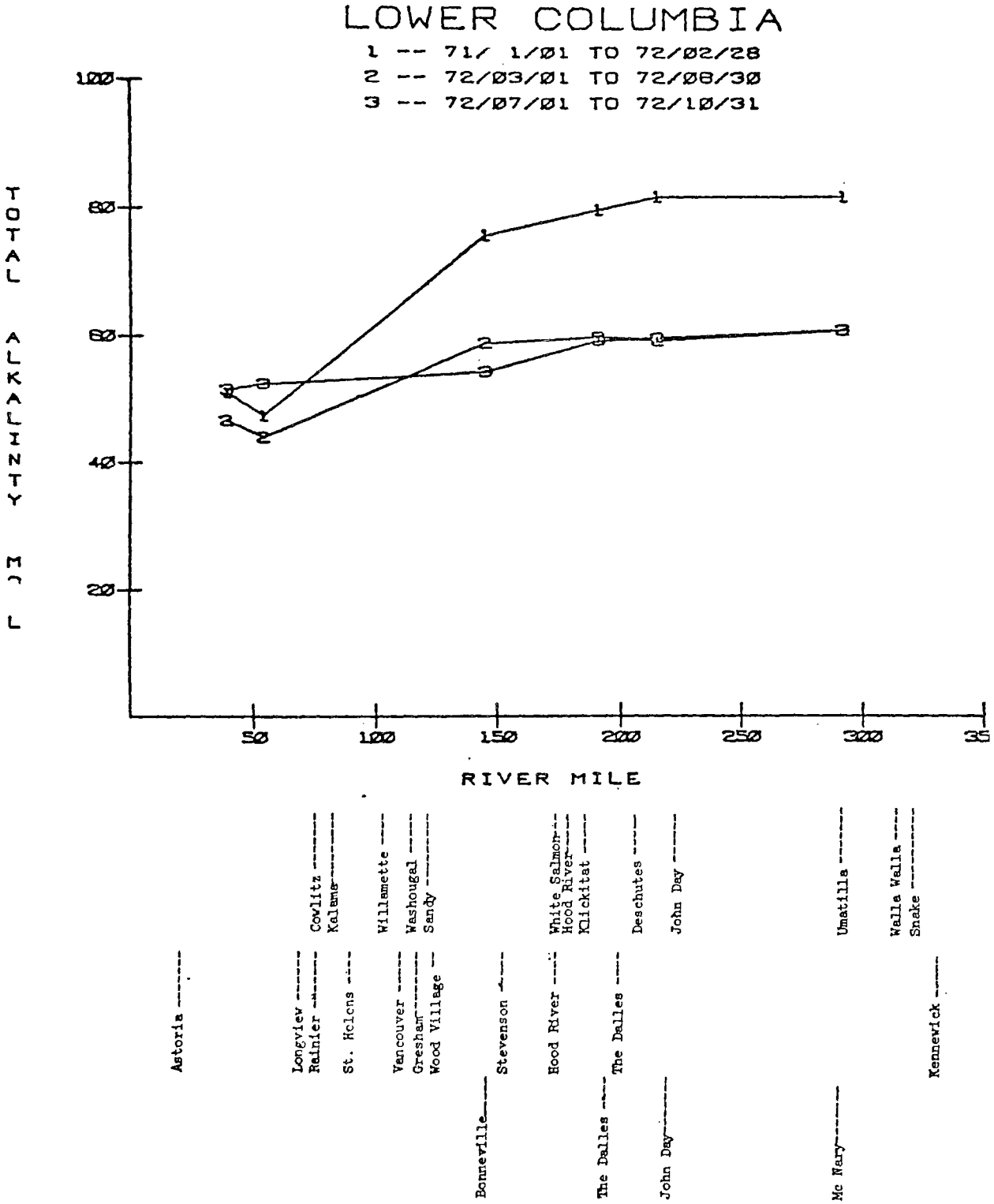

LOWER COLUMBIA RIVER BASIN
NATIONAL MARINE FISHERIES DATA
APRIL - JUNE 1979
TOTAL GAS PERCENT SATURATION
140
130
120
110
100
Dissolved gas standard
Max.
Median
Min.
Bonneville Dam
The Dalles Dam
John Day Dam
McNary Dam
50
80
110
140
170
200
230
260
290
320
RIVER MILES

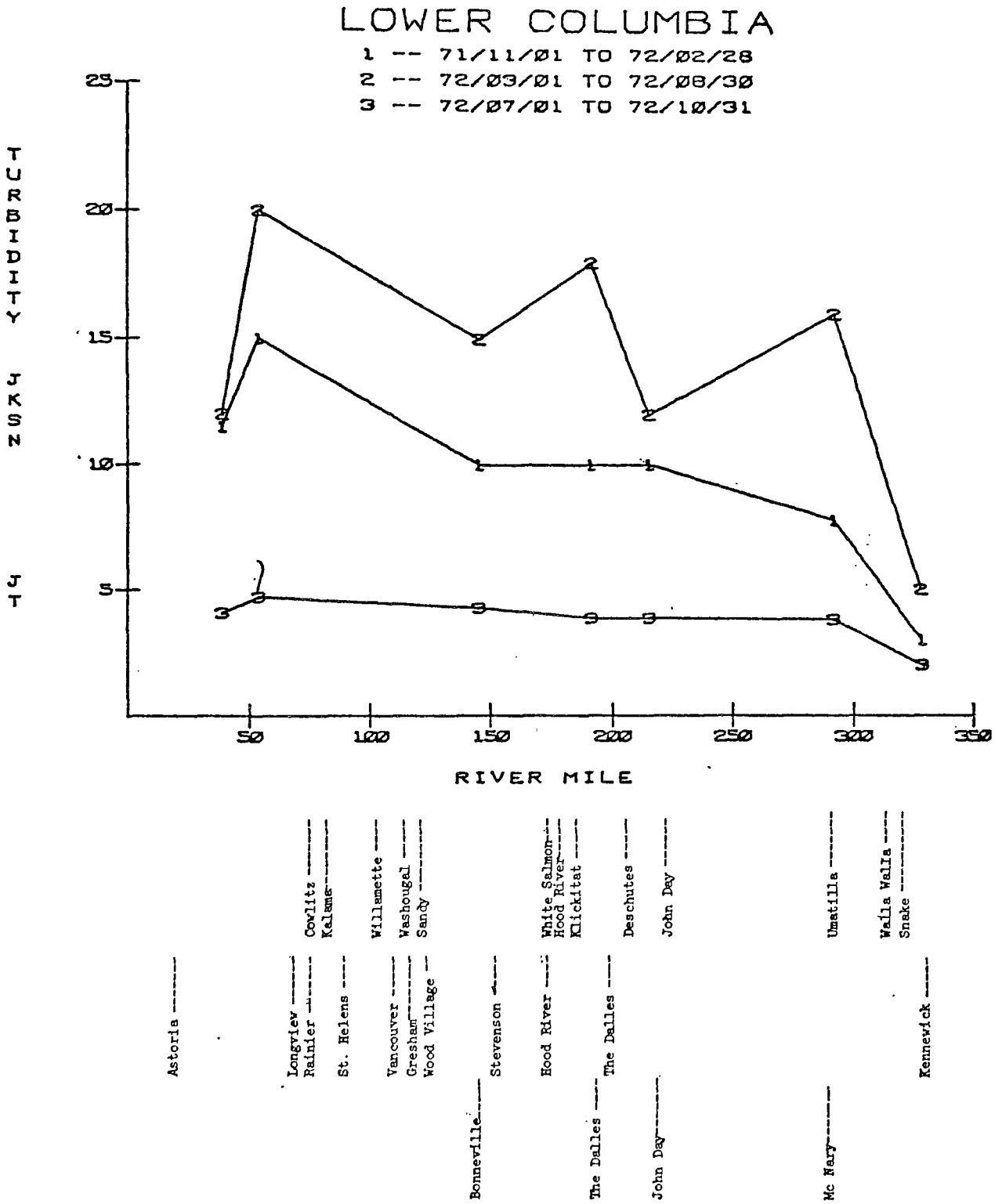


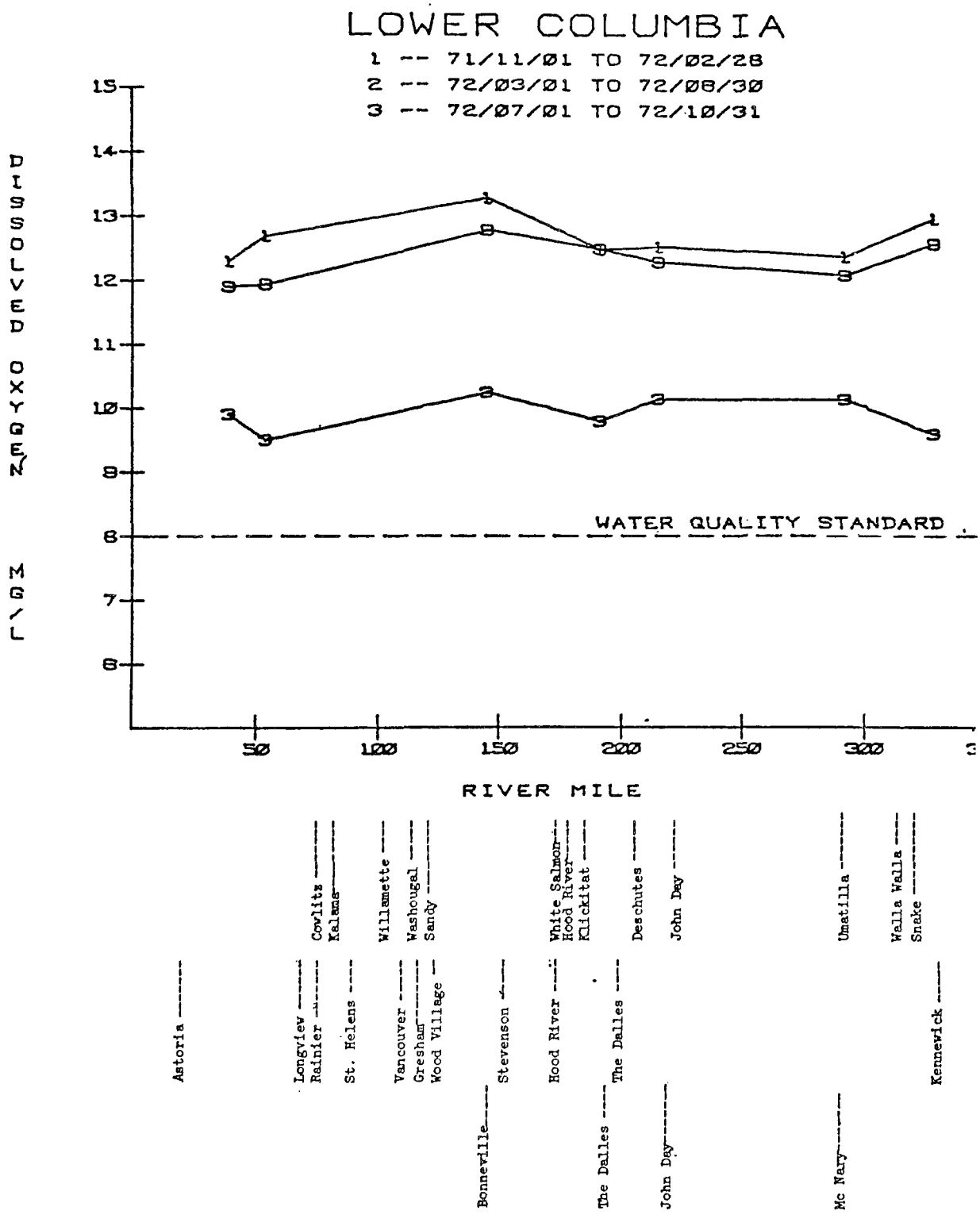
Astoria
Longview
Rainier
Cowlitz
Kalama
St. Helens
Willamette
Vancouver
Washougal
Gresham
Sandy
Wood Village
Bonneville
Stevenson
Hood River
White Salmon
Hood River
Klickitat
The Dalles
The Dalles
Deschutes
John Day
John Day
Mc Nary
Umatilla
Walla Walla
Snake
Kennewick

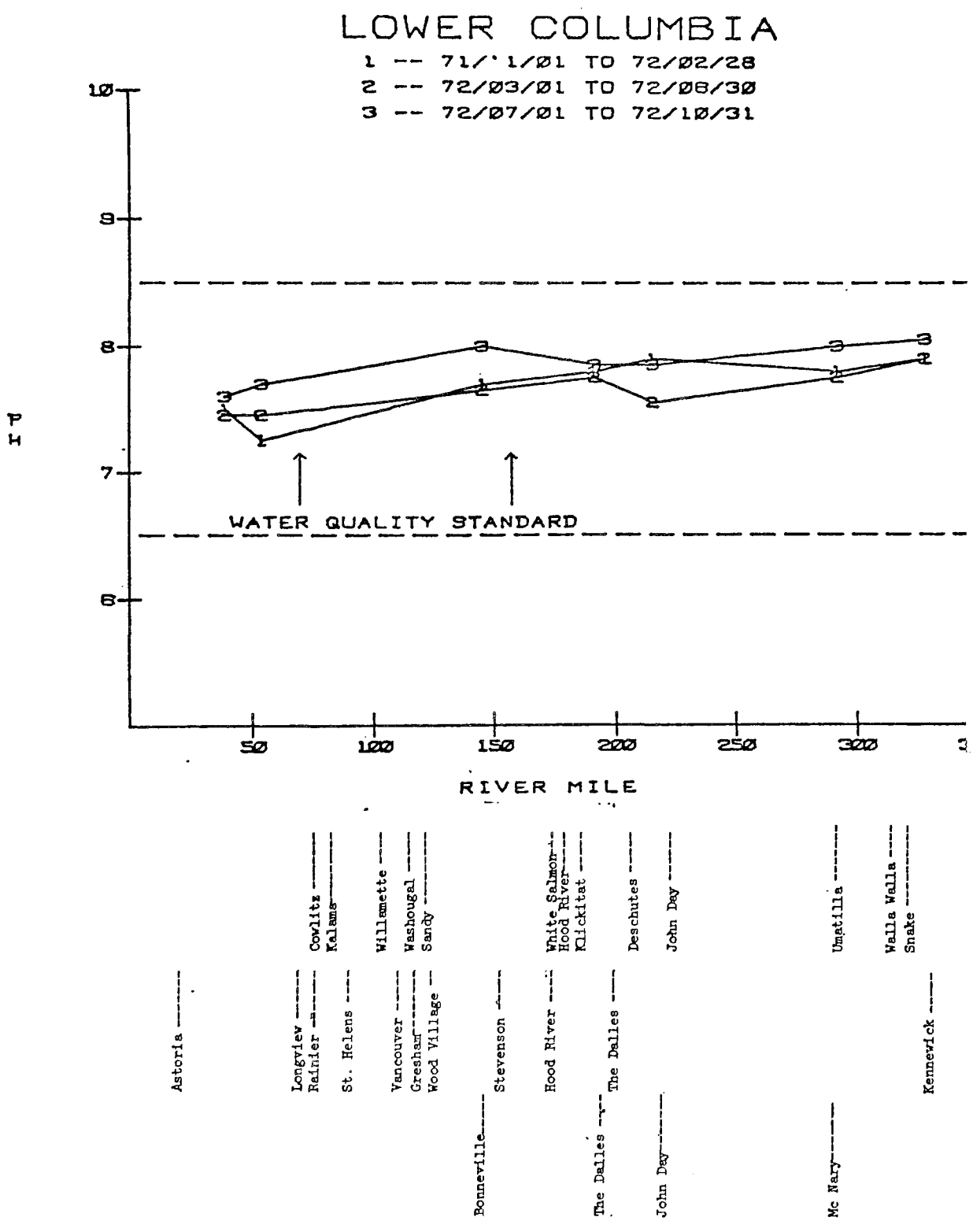

LOWER COLUMBIA
1 -- 71/11/01 TO 72/02/28
2 -- 72/03/01 TO 72/08/30
3 -- 72/07/01 TO 72/10/31
WATER TEMP DEG C
25
20
15
10
5
50
100
150
200
250
300
350
RIVER MILE
Astoria
Longview
Rainier
St. Helens
Vancouver
Gresham
Wood Village
Bonneville
Stevenson
Hood River
The Dalles
John Day
Mc Nary
Kennewick
Cowlitz
Kalama
Willamette
Washougal
Sandy
White Salmon
Hood River
Klickitat
Deschutes
John Day
Umatilla
Walla Walla
Snake

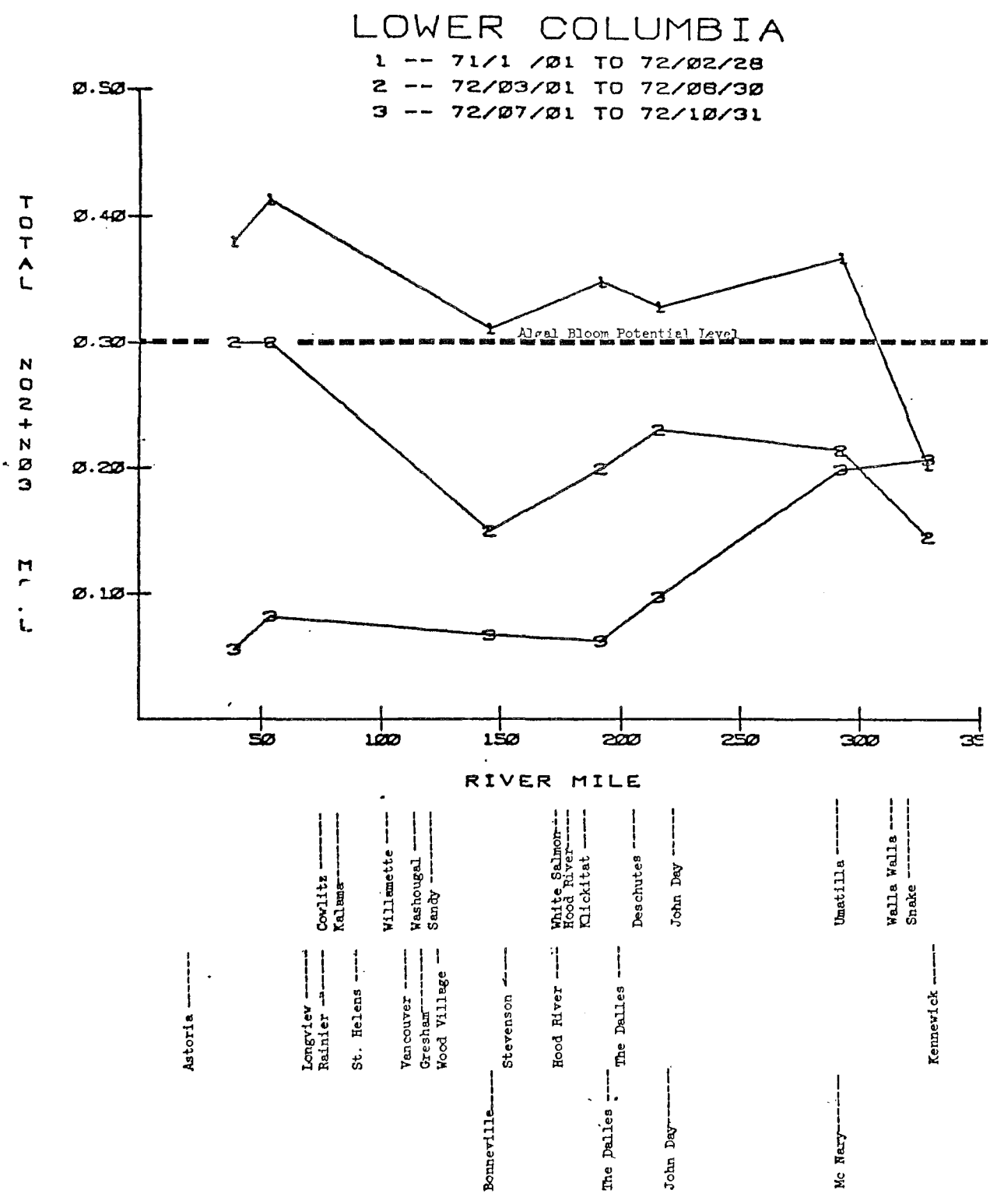

LOWER COLUMBIA
1 -- 71/11/01 TO 72/02/28
2 -- 72/03/01 TO 72/08/30
3 -- 72/07/01 TO 72/10/31
MICROMHOS/CM CONDUCTIVITY AT 25C
250
200
150
100
50
100
150
200
250
300
350
RIVER MILE
Astoria
Longview
Rainier
St. Helens
Vancouver
Gresham
Wood Village
Bonneville
Stevenson
Hood River
The Dalles
John Day
Mc Nary
Coviitz
Kalama
Willamette
Washougal
Sandy
White Salmon
Hood River
Klickitat
Deschutes
John Day
Umatilla
Walla Walla
Snake
Kennewick

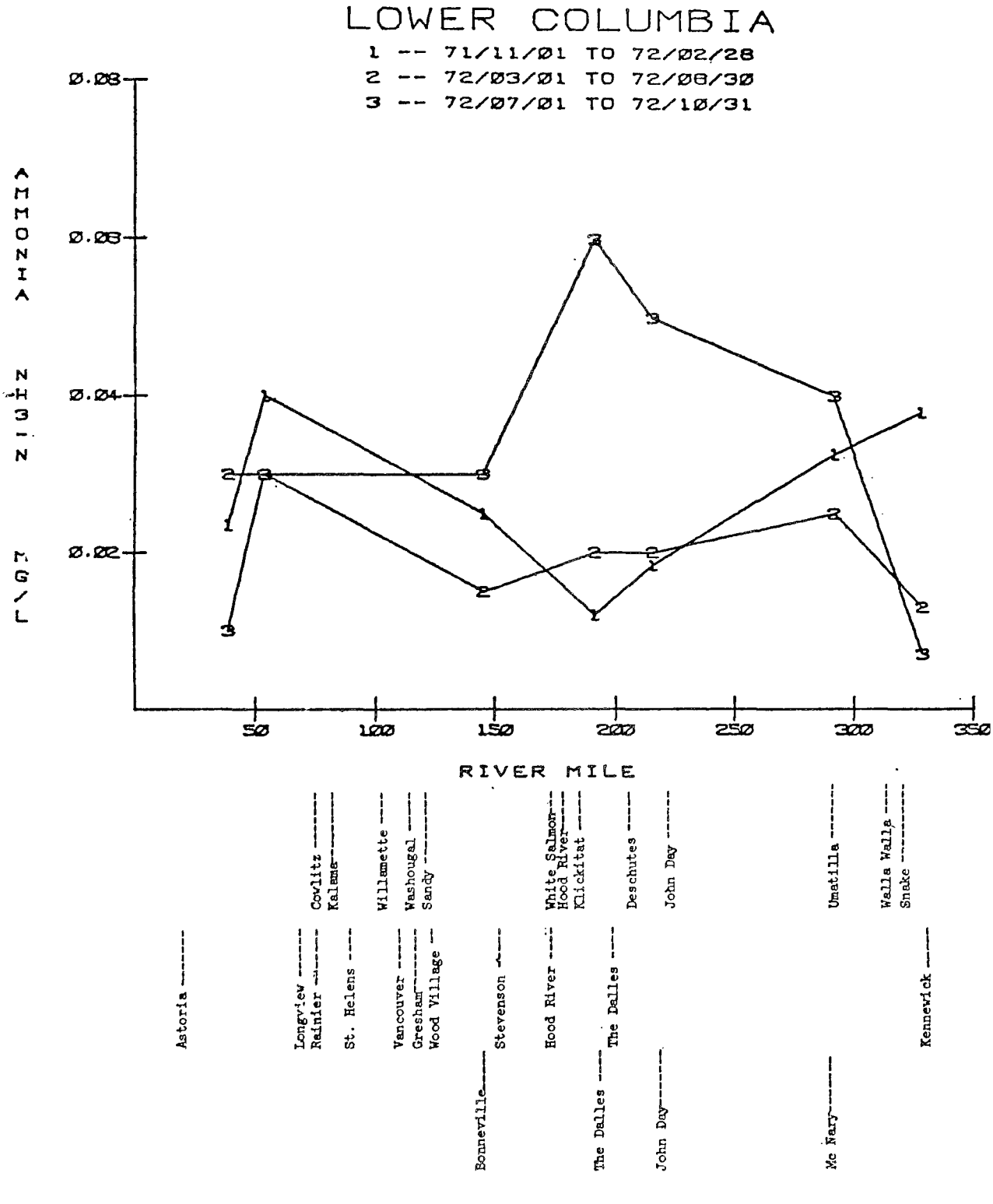

LOWER COLUMBIA
1 -- 71/ 1/01 TO 72/02/28
2 -- 72/03/01 TO 72/08/30
3 -- 72/07/01 TO 72/10/31
TOTAL ATTAINMENT (%)
100
80
60
40
20
50
100
150
200
250
300
35
RIVER MILE
Astoria
Longview
Rainier
St. Helens
Vancouver
Gresham
Wood Village
Bonneville
Stevenson
Hood River
The Dalles
John Day
Mc Nary
Kennewick
Cowlitz
Kalama
Willamette
Washougal
Sandy
White Salmon
Hood River
Klickitat
Deschutes
John Day
Umatilla
Walla Walla
Snake

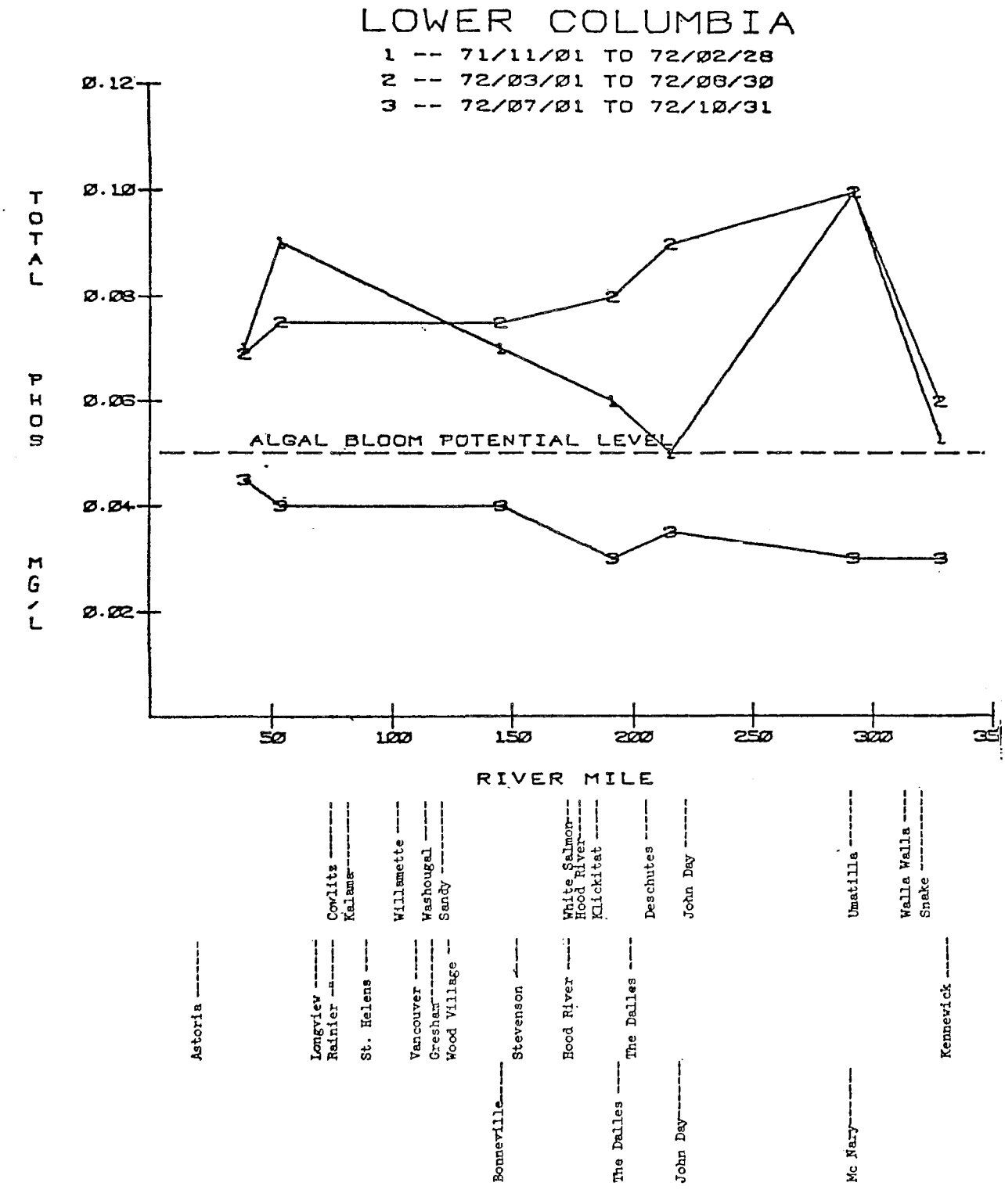

LOWER COLUMBIA
1 -- 71/11/01 TO 72/02/28
2 -- 72/03/01 TO 72/08/30
3 -- 72/07/01 TO 72/10/31
TURBIDITY JTU
25
20
15
10
5
50
100
150
200
250
300
350
RIVER MILE
Astoria
Longview
Rainier
St. Helens
Vancouver
Gresham
Wood Village
Bonneville
Stevenson
Hood River
The Dalles
John Day
Mc Nary
Kennewick
Cowlitz
Kalama
Willamette
Washougal
Sandy
White Salmon
Hood River
Klickitat
Deschutes
John Day
Umatilla
Walla Walla
Snake

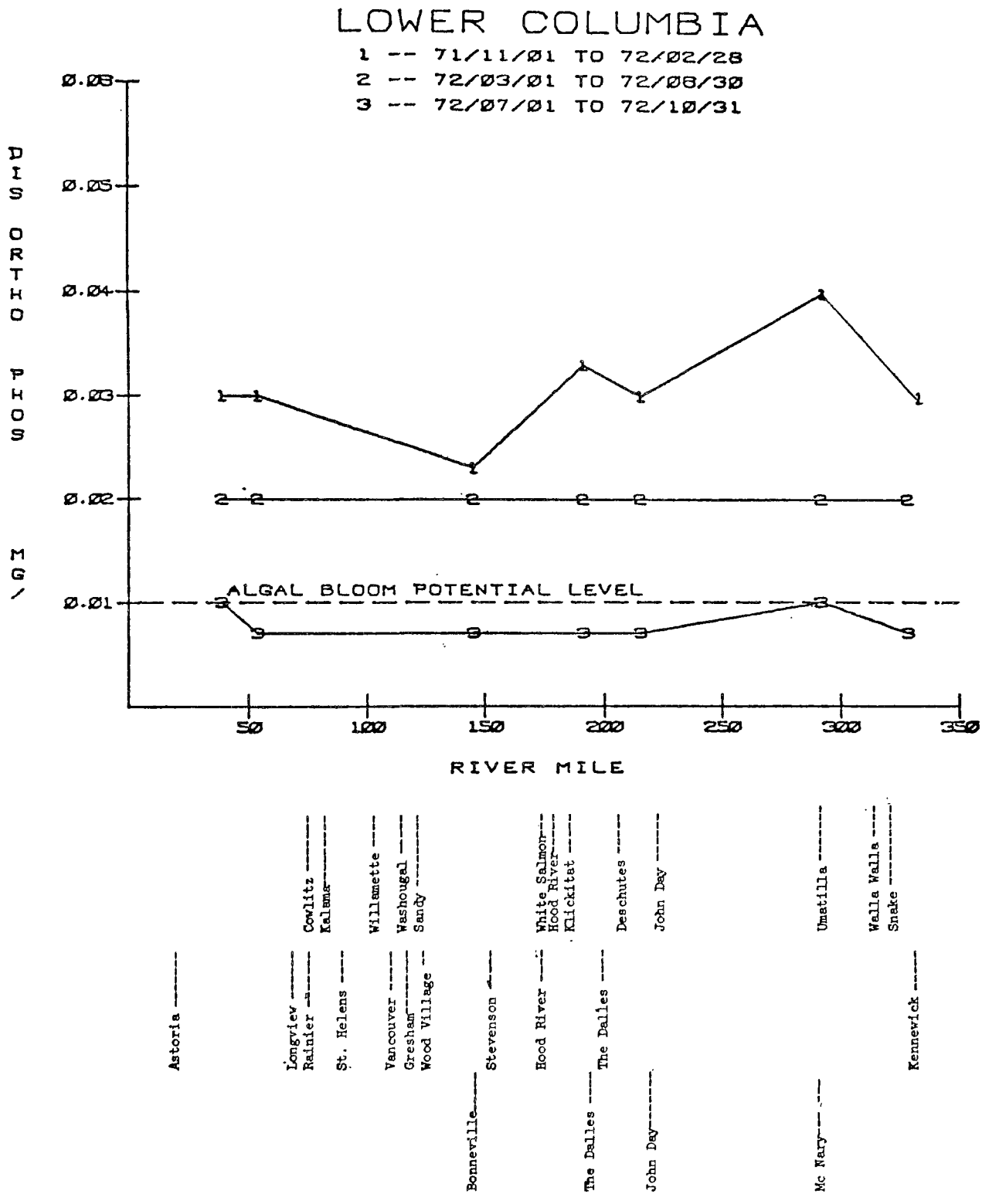

LOWER COLUMBIA
1 -- 71/11/01 TO 72/02/28
2 -- 72/03/01 TO 72/08/30
3 -- 72/07/01 TO 72/10/31
DISSOLVED OXYGEN MG/L
15
14
13
12
11
10
9
8
7
6
WATER QUALITY STANDARD
50
100
150
200
250
300
RIVER MILE
Astoria
Longview
Rainier
St. Helens
Vancouver
Gresham
Wood Village
Bonneville
Stevenson
Hood River
The Dalles
The Dalles
John Day
John Day
Mc Nary
Kennewick
Cowlits
Kalama
Willamette
Washougal
Sandy
White Salmon
Hood River
Klickitat
Deschutes
John Day
Umatilla
Walla Walla
Snake

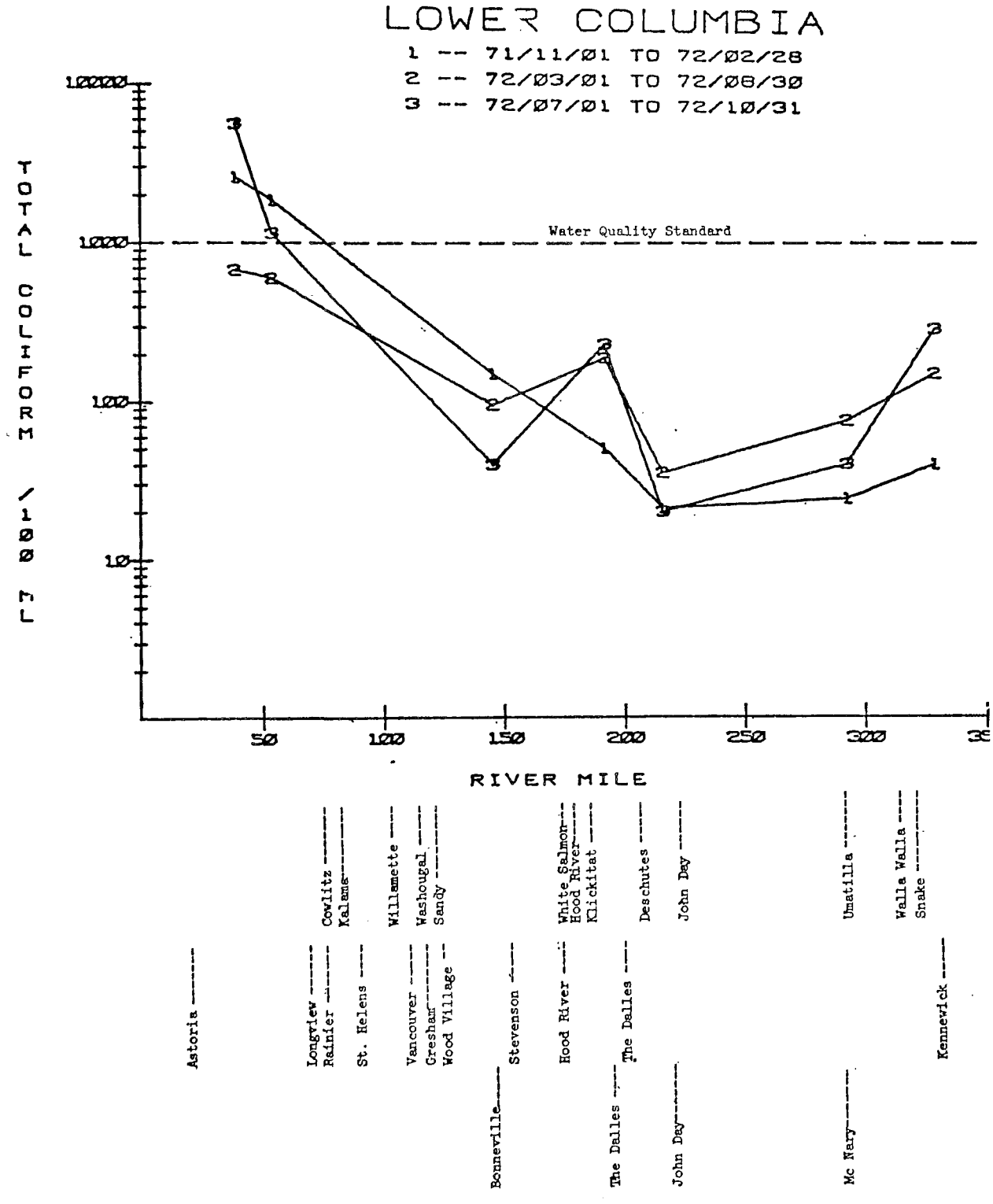

LOWER COLUMBIA
1 -- 71/11/01 TO 72/02/28
2 -- 72/03/01 TO 72/06/30
3 -- 72/07/01 TO 72/10/31
10
9
8
7
6
pH
WATER QUALITY STANDARD
50
100
150
200
250
300
RIVER MILE
Astoria
Longview
Rainier
Kalama
St. Helens
Vancouver
Gresham
Wood Village
Bonneville
Stevenson
Hood River
The Dalles
John Day
Mc Nary
Umatilla
Walla Walla
Snake
Kennewick
Cowlitz
Willamette
Washougal
Sandy
White Salmon
Hood River
Klickitat
Deschutes
John Day

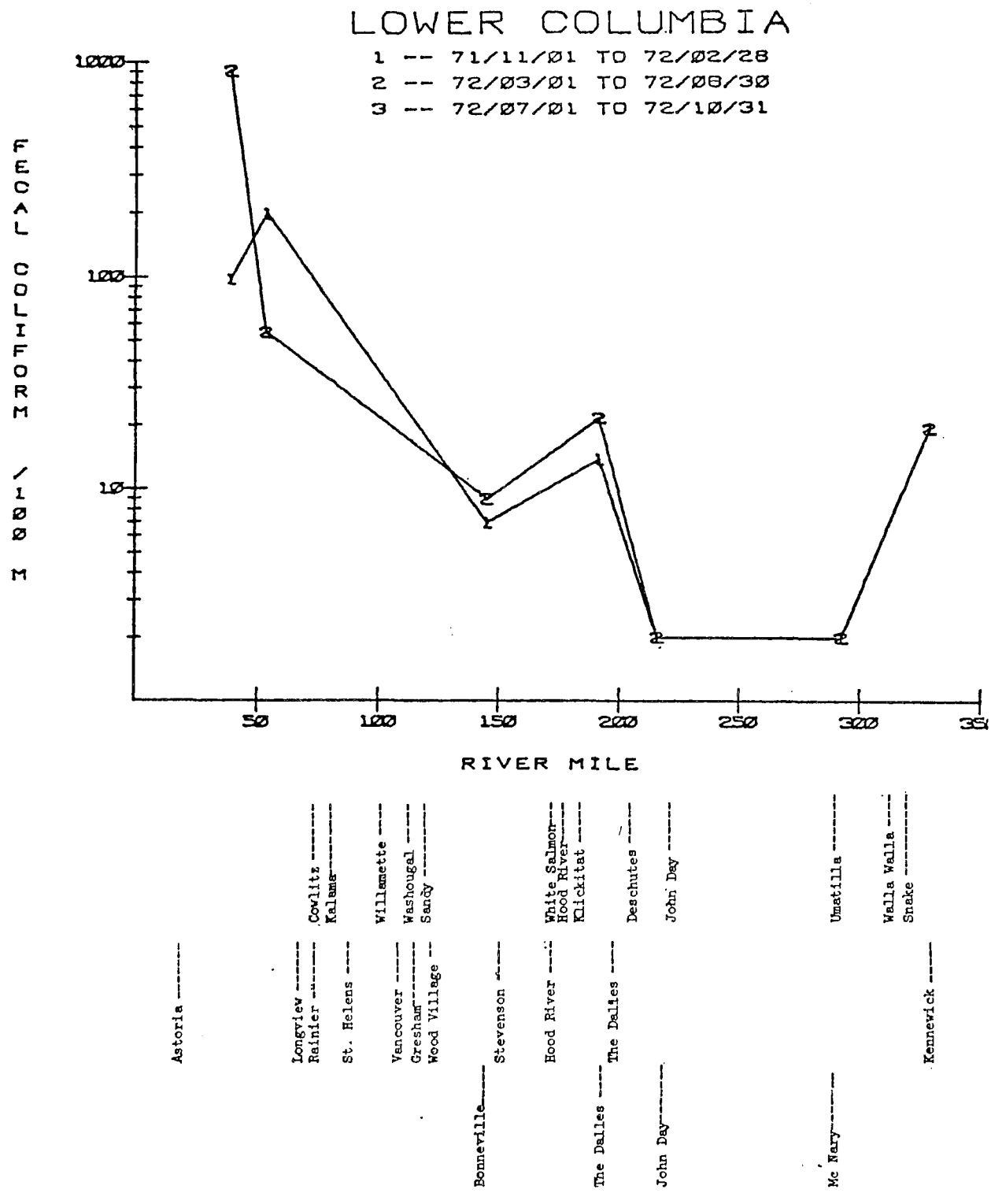

LOWER COLUMBIA
1 -- 71/1 /01 TO 72/02/28
2 -- 72/03/01 TO 72/08/30
3 -- 72/07/01 TO 72/10/31
TOTAL NO2+NO3 MG/L
0.50
0.40
0.30
0.20
0.10
Algal Bloom Potential Level
50
100
150
200
250
300
RIVER MILE
Astoria
Longview
Rainier
St. Helens
Vancouver
Gresham
Wood Village
Bonneville
Stevenson
Hood River
The Dalles
The Dalles
John Day
John Day
Mc Nary
Kennewick
Cowlitz
Kalama
Willamette
Washougal
Sandy
White Salmon
Hood River
Klickitat
Deschutes
John Day
Umatilla
Walla Walla
Snake

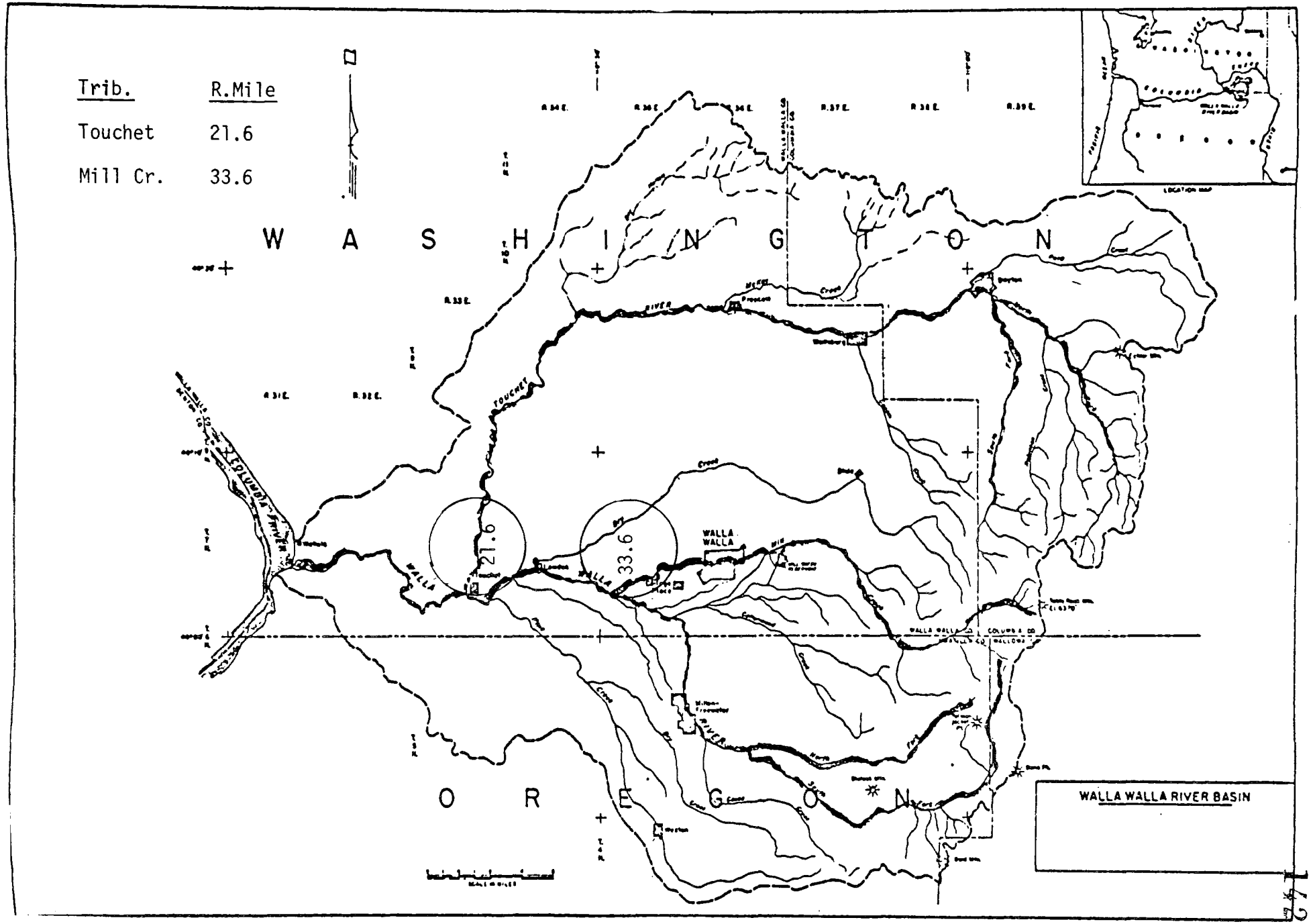

LOWER COLUMBIA
1 -- 71/11/01 TO 72/02/28
2 -- 72/03/01 TO 72/06/30
3 -- 72/07/01 TO 72/10/31
AMMONIA NITROGEN (MG/L)
0.08
0.06
0.04
0.02
50
100
150
200
250
300
350
RIVER MILE
Astoria
Longview
Rainier
St. Helens
Vancouver
Gresham
Wood Village
Bonneville
Stevenson
Hood River
The Dalles
John Day
Mc Nary
Kennewick
Covlitz
Kalama
Willamette
Washougal
Sandy
White Salmon
Hood River
Klickitat
Deschutes
John Day
Umatilla
Walla Walla
Snake


LOWER COLUMBIA
1 -- 71/11/01 TO 72/02/28
2 -- 72/03/01 TO 72/08/30
3 -- 72/07/01 TO 72/10/31
TOTAL PHOS MG/L
0.12
0.10
0.08
0.06
0.04
0.02
ALGAL BLOOM POTENTIAL LEVEL
50
100
150
200
250
300
RIVER MILE
Astoria
Longview
Rainier
St. Helens
Vancouver
Gresham
Wood Village
Bonneville
Stevenson
Hood River
The Dalles
John Day
Mc Nary
Kennewick
Cowlitz
Kalama
Willamette
Washougal
Sandy
White Salmon
Hood River
Klickitat
Deschutes
John Day
Umatilla
Walla Walla
Snake


LOWER COLUMBIA
1 -- 71/11/01 TO 72/02/28
2 -- 72/03/01 TO 72/06/30
3 -- 72/07/01 TO 72/10/31
DIS ORTHO PHOS MG/
Ø.Ø8
Ø.Ø5
Ø.Ø4
Ø.Ø3
Ø.Ø2
Ø.Ø1
ALGAL BLOOM POTENTIAL LEVEL
5Ø
1ØØ
15Ø
2ØØ
25Ø
3ØØ
35Ø
RIVER MILE
Astoria
Longview
Rainier
Cowlitz
Kalama
St. Helens
Willamette
Vancouver
Washougal
Gresham
Sandy
Wood Village
Bonneville
Stevenson
Hood River
White Salmon
Hood River
Klickitat
The Dalles
The Dalles
Deschutes
John Day
John Day
Mc Nary
Umatilla
Walla Walla
Snake
Kennewick


LOWER COLUMBIA
1 -- 71/11/01 TO 72/02/28
2 -- 72/03/01 TO 72/06/30
3 -- 72/07/01 TO 72/10/31
FECAL COLIFORM #/100 ML
100000
10000
1000
100
10
Water Quality Standard
50
100
150
200
250
300
RIVER MILE
Astoria
Longview
Rainier
Cowlitz
Kalama
St. Helens
Willamette
Vancouver
Washougal
Gresham
Sandy
Wood Village
Bonneville
Stevenson
Hood River
White Salmon
Hood River
Klickitat
The Dalles
The Dalles
Deschutes
John Day
John Day
Mc Nary
Umatilla
Walla Walla
Snake
Kennewick


LOWER COLUMBIA
1 -- 71/11/01 TO 72/02/28
2 -- 72/03/01 TO 72/08/30
3 -- 72/07/01 TO 72/10/31
M 001 MROFROOJ CAOEF
10000
1000
100
10
50
100
150
200
250
300
RIVER MILE
Astoria
Longview
Rainier
St. Helens
Vancouver
Gresham
Wood Village
Bonneville
Stevenson
Hood River
The Dalles
John Day
Mc Nary
Kennewick
Covlitz
Kalama
Willamette
Washougal
Sandy
White Salmon
Hood River
Klickitat
Deschutes
John Day
Umatilla
Walla Walla
Snake


Trib.
R.Mile
Touchet
21.6
Mill Cr.
33.6
W A S H I N G T O N
O R E G O N
21.6
33.6
WALLA WALLA
WALLA WALLA RIVER BASIN

WALLA WALLA RIVER

This section consists of four separate parts. They are:

1. Walla Walla river in Washington. Data base is from 1974/01/01 to 1974/12/31.

2. Walla Walla river in Oregon. Data base is from 1973/01/01 to 1974/12/01.

3. Touchet river. Data base is from 1974/01/01 to 1974/12/31.

4. Mill Creek. Data base is from 1974/01/01 to 1974/12/31.

The Washington and Oregon portions of the Walla Walla river cannot be analyized together because of the inadequate data base in Oregon. Therefore they are presented independently of one another.

WALLA WALLA

WALLA WALLA
(Washington Segments)

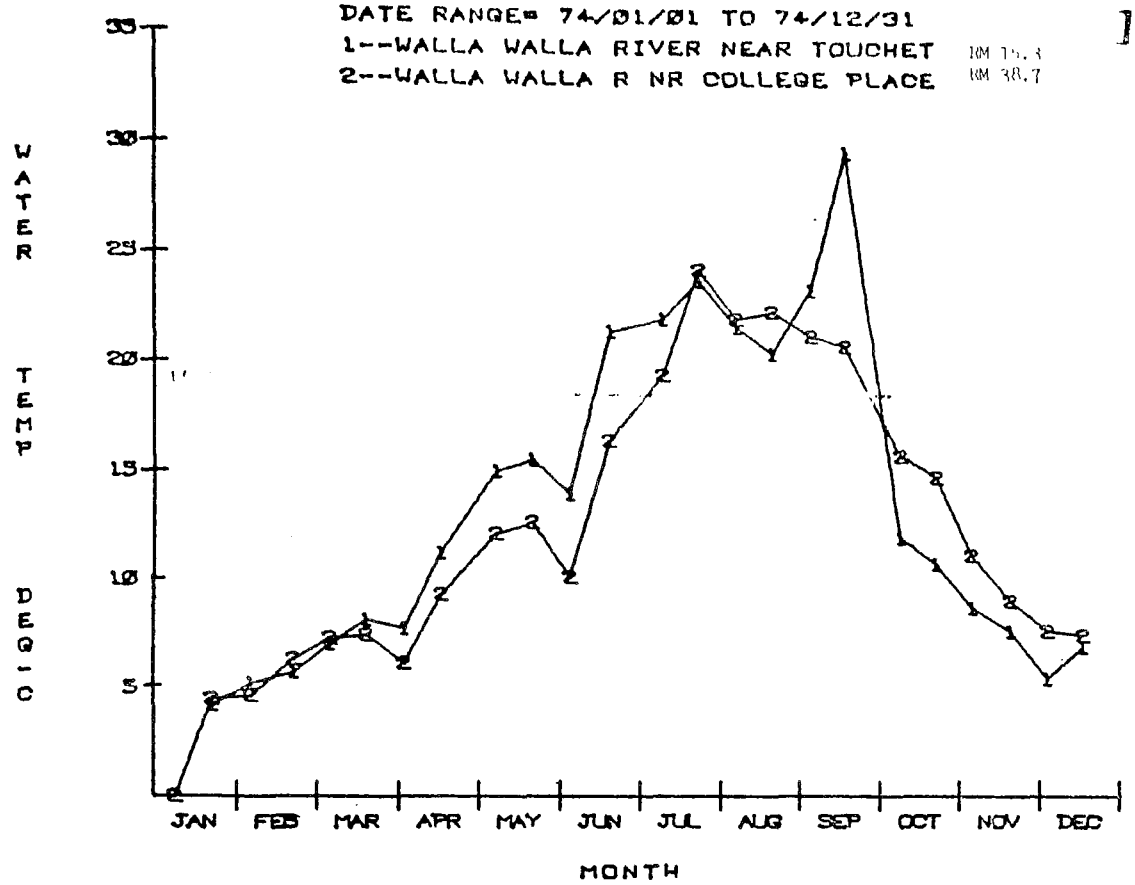
Segment Name	Segment Number	Class
Walla Walla River & Tribs.	15-32-02	WQ-NPS
Touchet River & Tribs.	15-32-03	WQ-NPS
Mill Cr. & Tribs.	15-32-04	WQ-NPS

WALLA WALLA RIVER

(Washington)

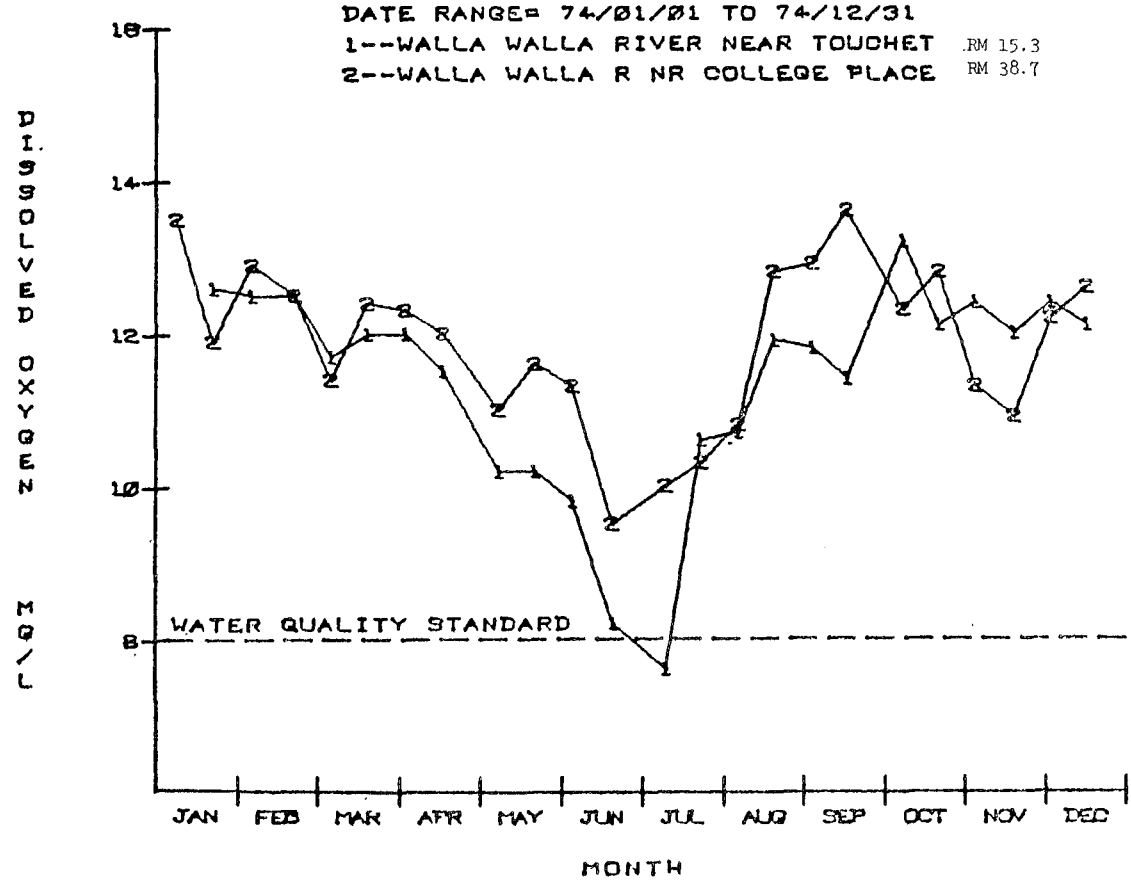
WALLA WAL'LA BASIN

DATE RANGE= 74/01/01 TO 74/12/31
1--WALLA WALLA RIVER NEAR TOUCHET RM 15.3
2--WALLA WALLA R NR COLLEGE PLACE RM 38.7



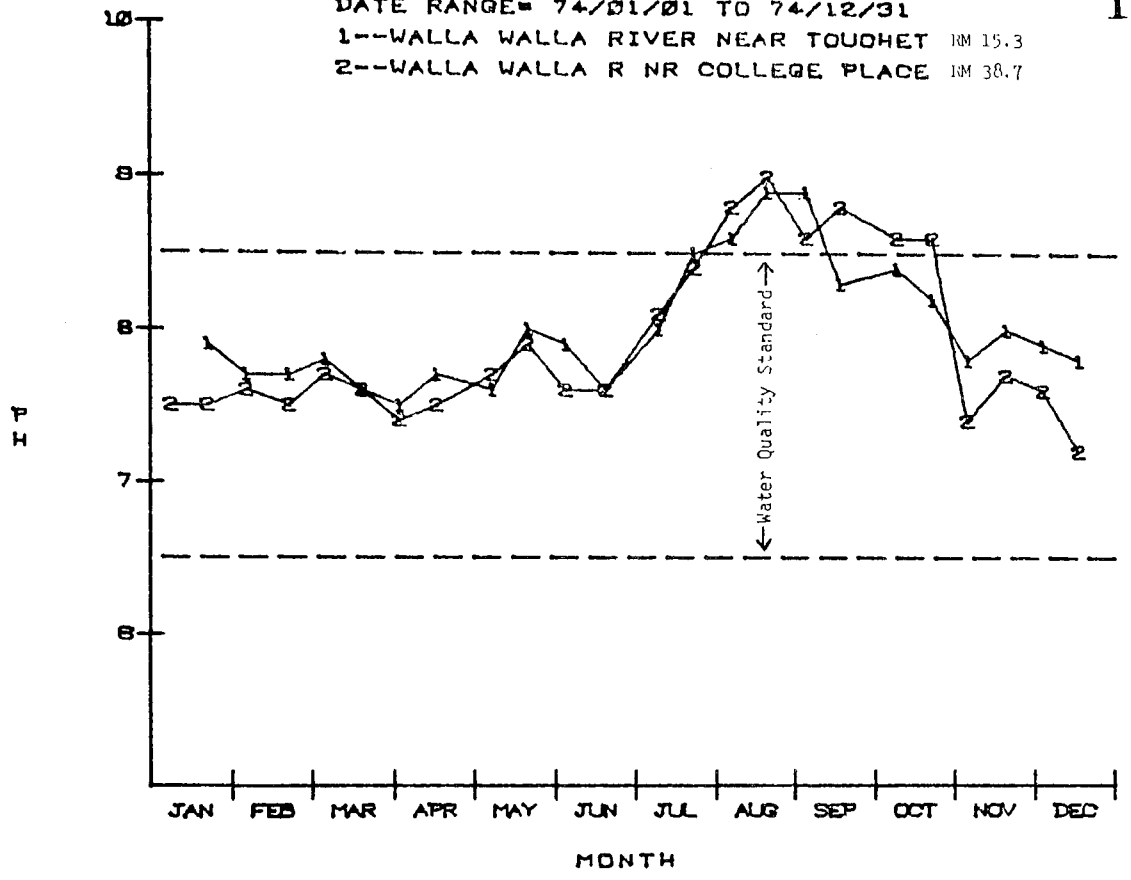
WALLA WALLA BASIN

DATE RANGE= 74/01/01 TO 74/12/31
1--WALLA WALLA RIVER NEAR TOUCHET RM 15.3
2--WALLA WALLA R NR COLLEGE PLACE RM 38.7



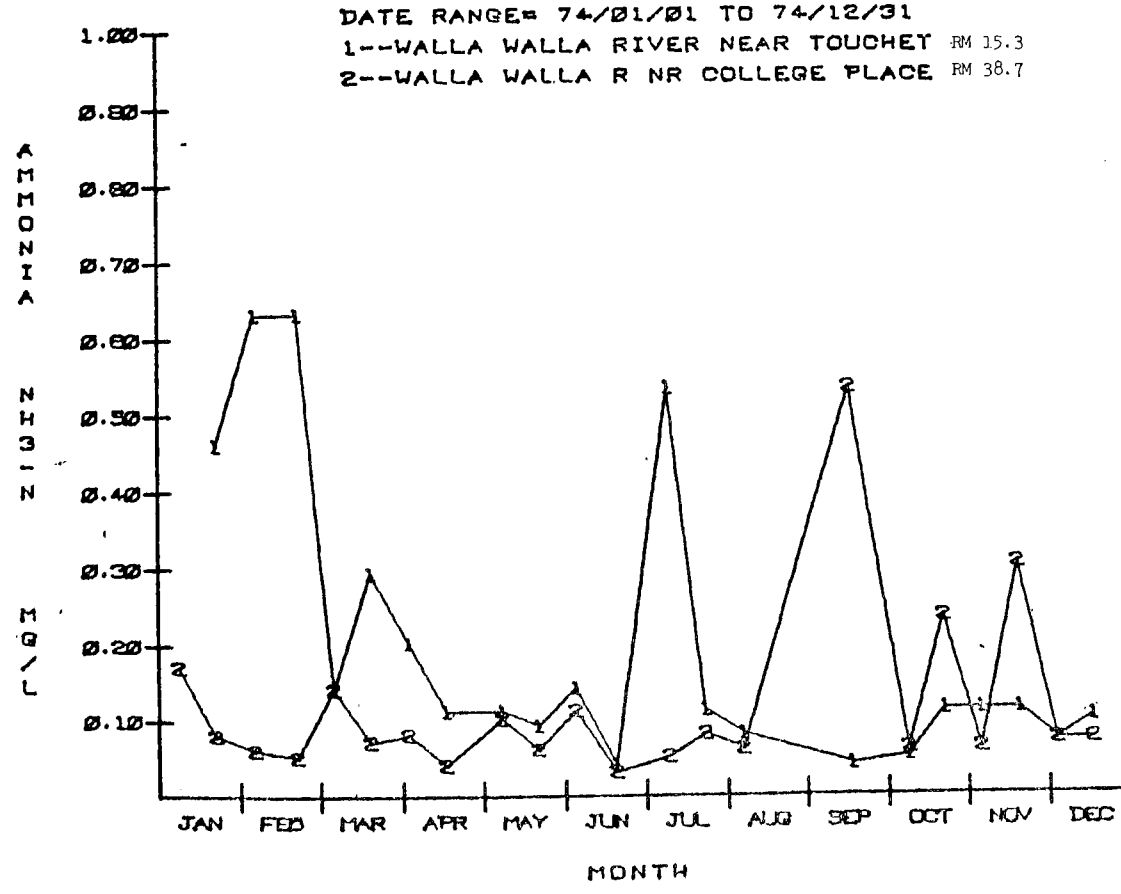
WALLA WALLA BASIN

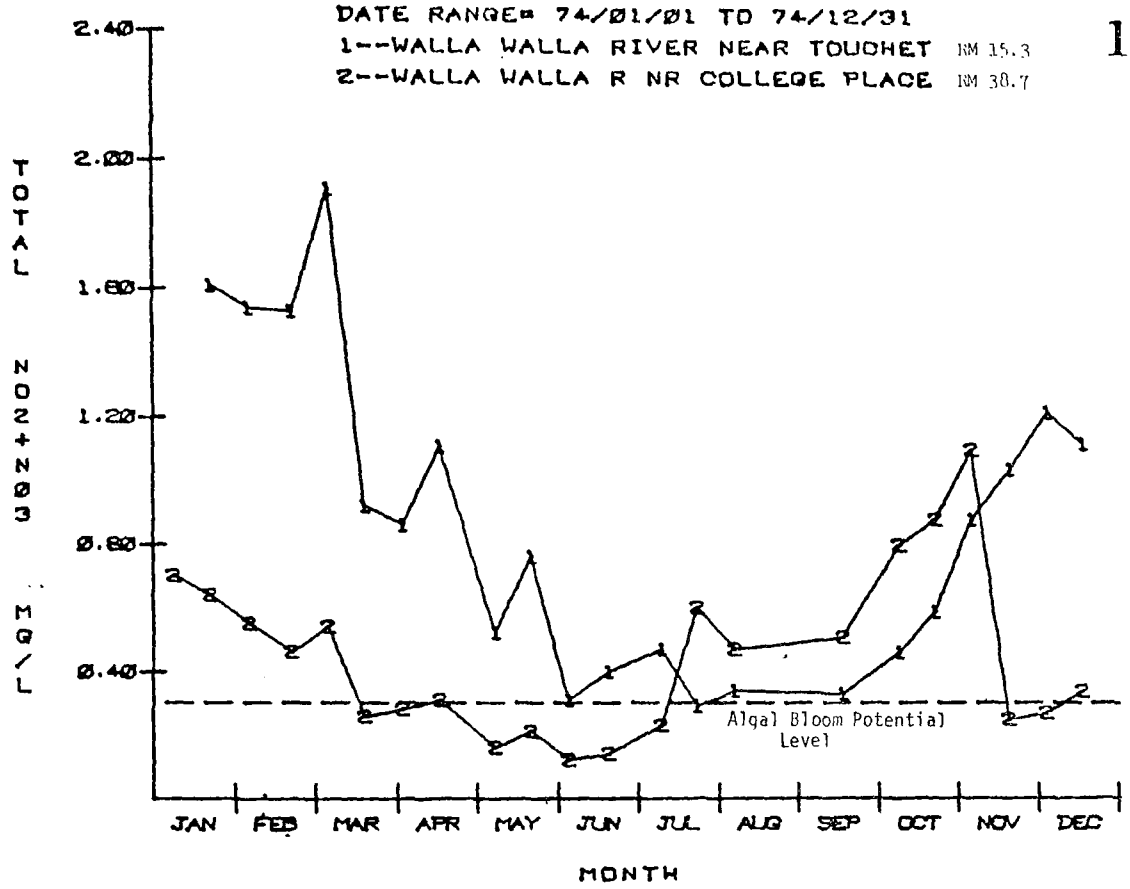
DATE RANGE= 74/01/01 TO 74/12/31
1--WALLA WALLA RIVER NEAR TOUCHET RM 15.3
2--WALLA WALLA R NR COLLEGE PLACE RM 38.7



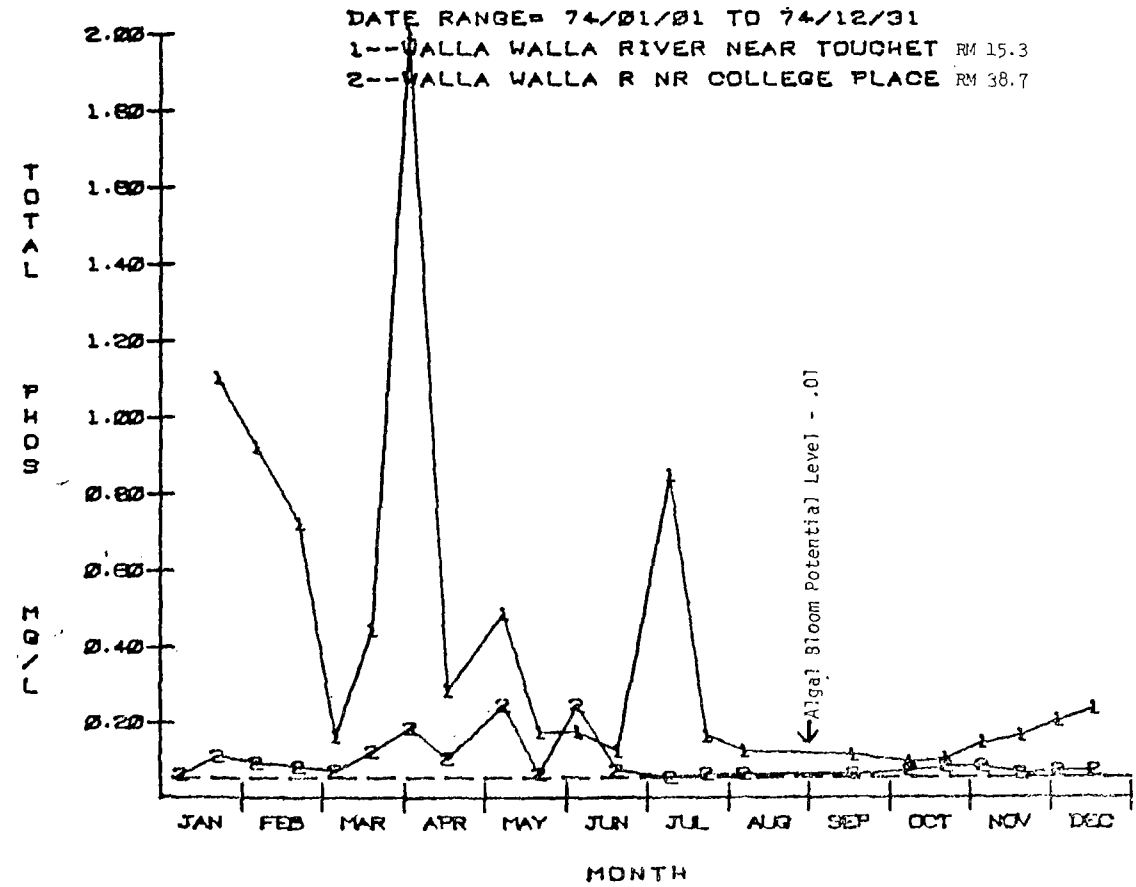
WALLA WALLA BASIN

DATE RANGE= 74/01/01 TO 74/12/31
1--WALLA WALLA RIVER NEAR TOUCHET RM 15.3
2--WALLA WALLA R NR COLLEGE PLACE RM 38.7



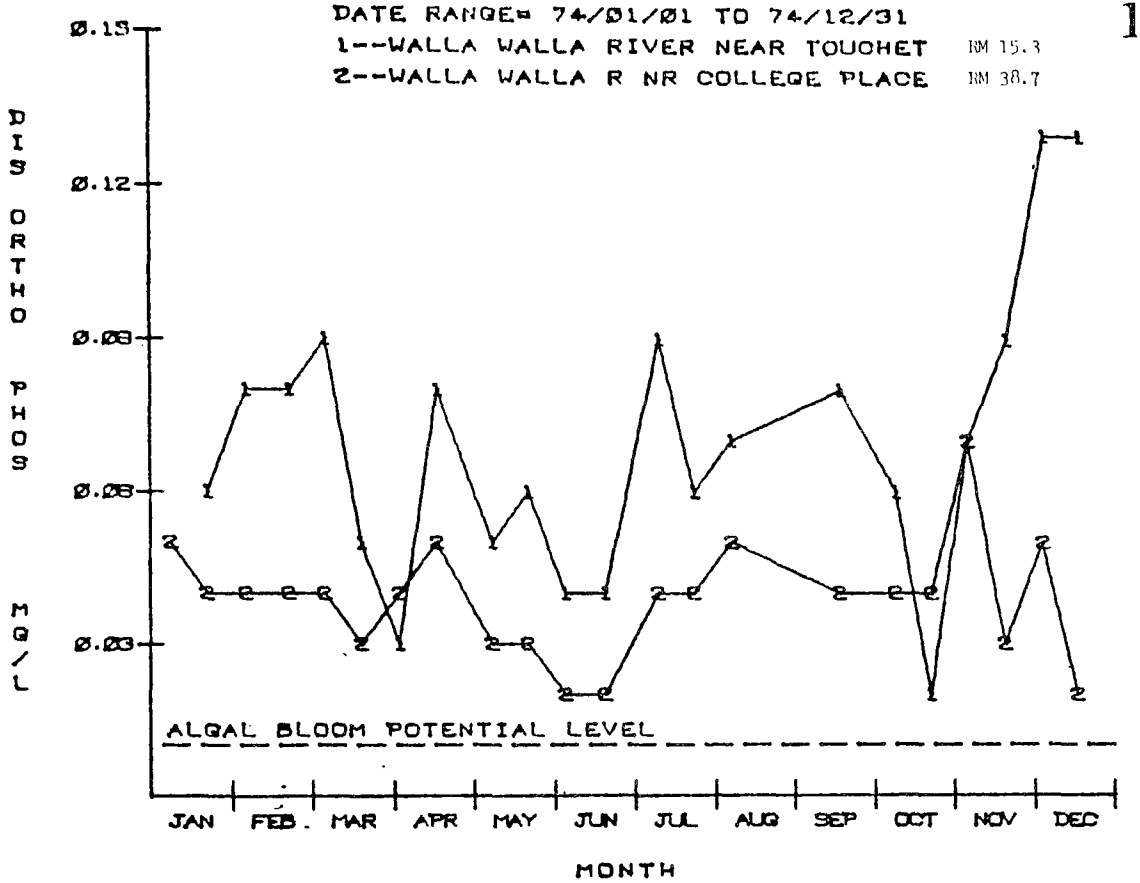


WALLA WA' LA BASIN



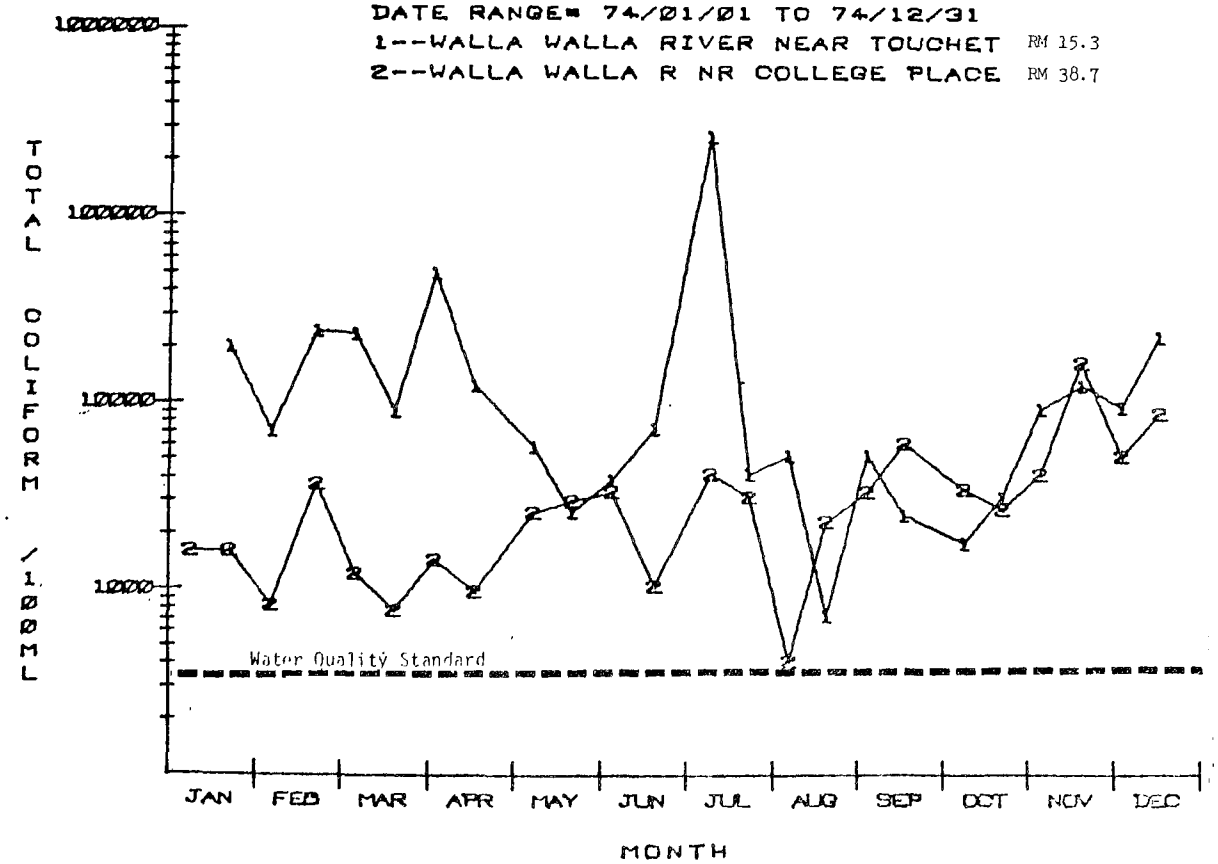
WALLA WAL'LA BASIN

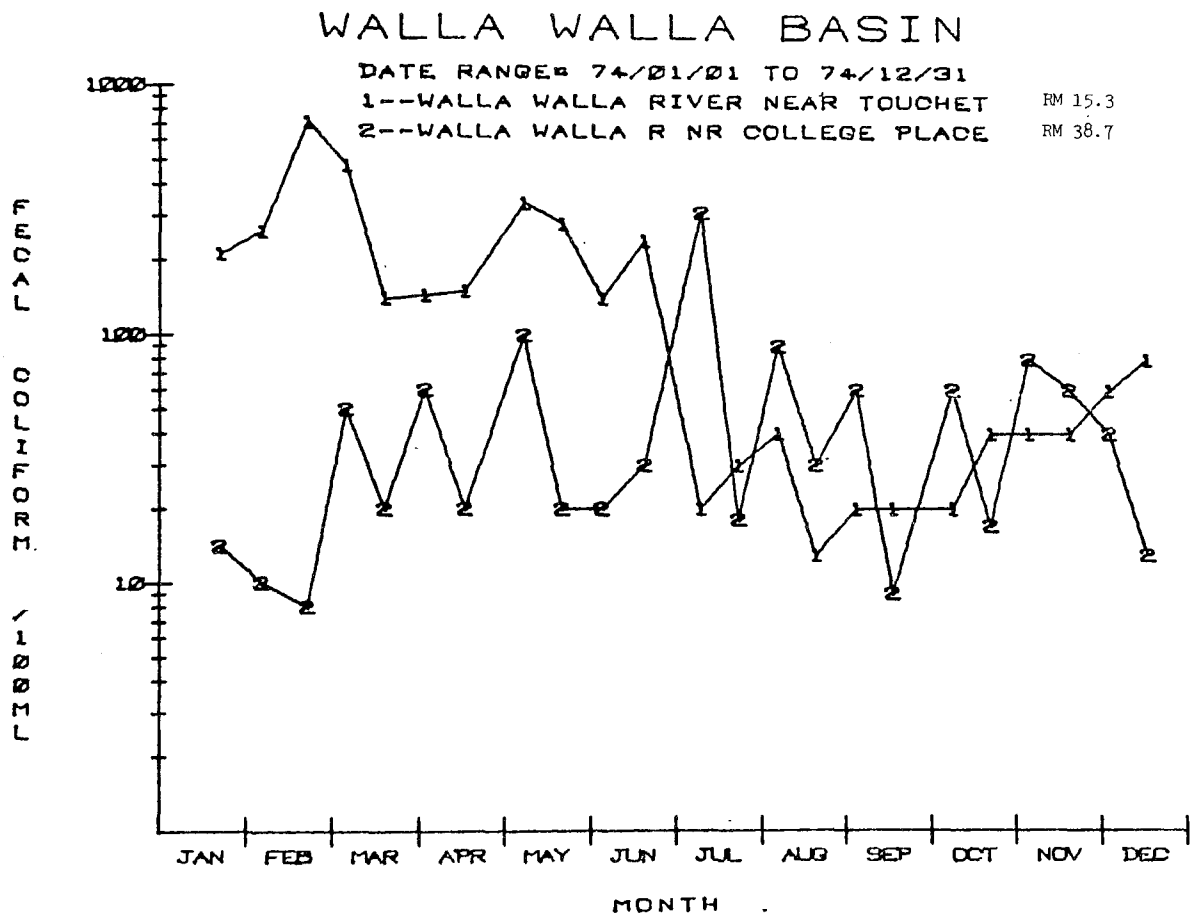
DATE RANGE= 74/01/01 TO 74/12/31
1--WALLA WALLA RIVER NEAR TOUCHET RM 15.3
2--WALLA WALLA R NR COLLEGE PLACE RM 38.7



WALLA WALLA BASIN

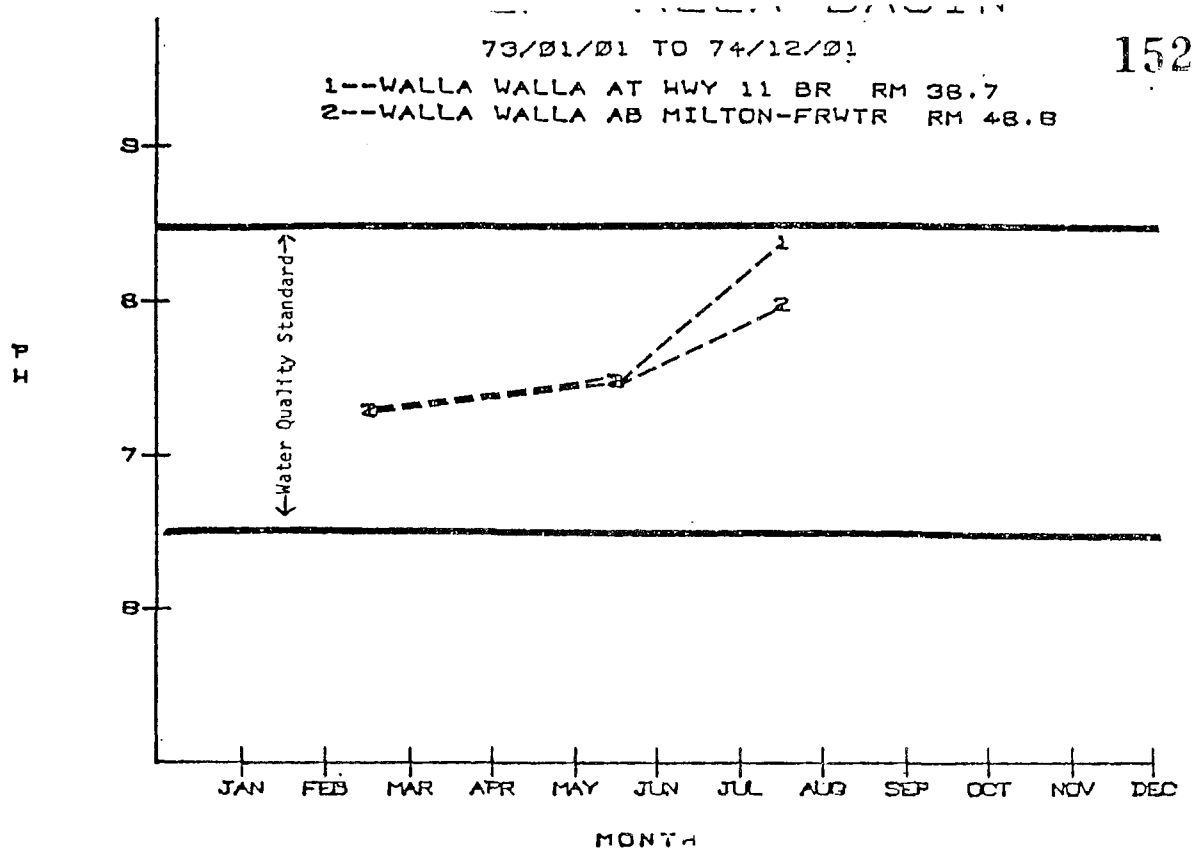
DATE RANGE= 74/01/01 TO 74/12/31
1--WALLA WALLA RIVER NEAR TOUCHET RM 15.3
2--WALLA WALLA R NR COLLEGE PLACE RM 38.7

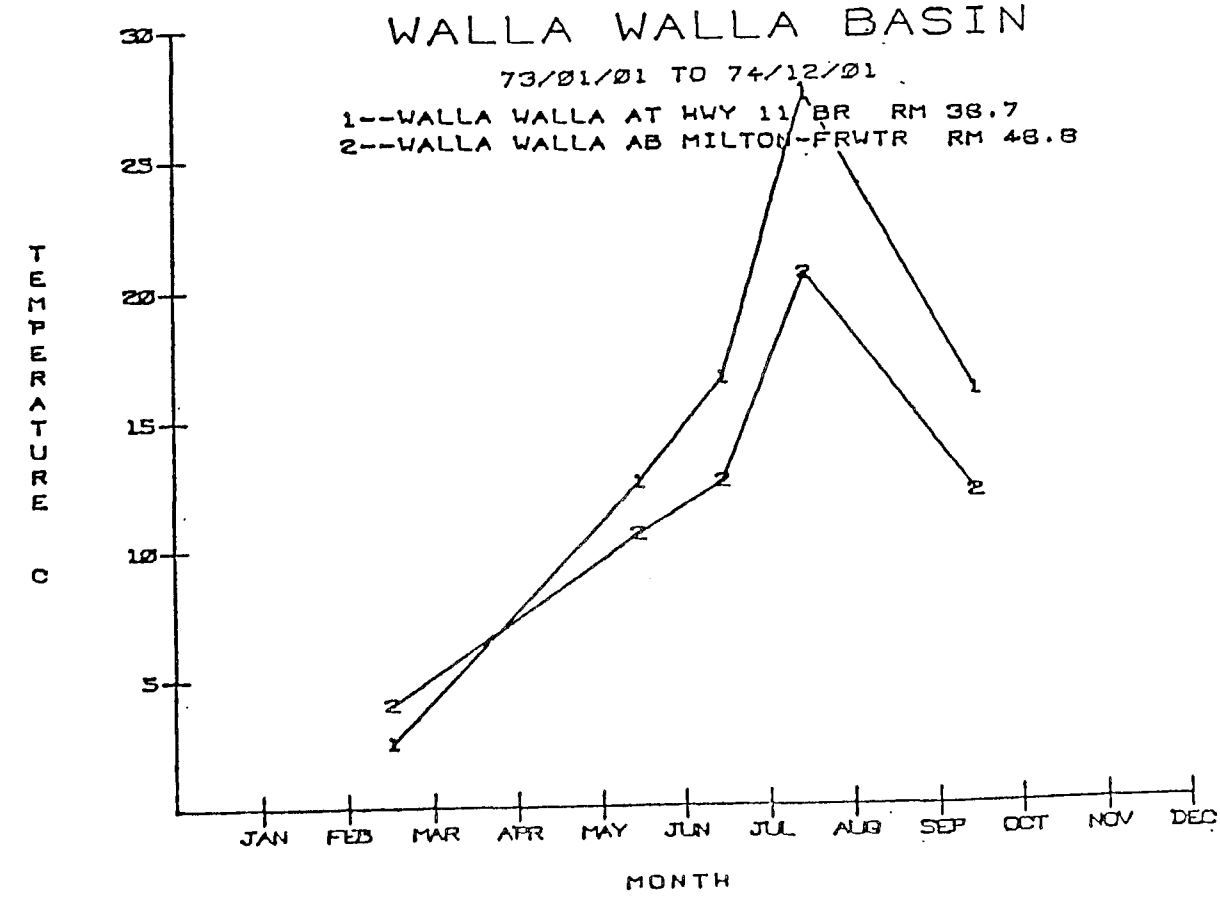


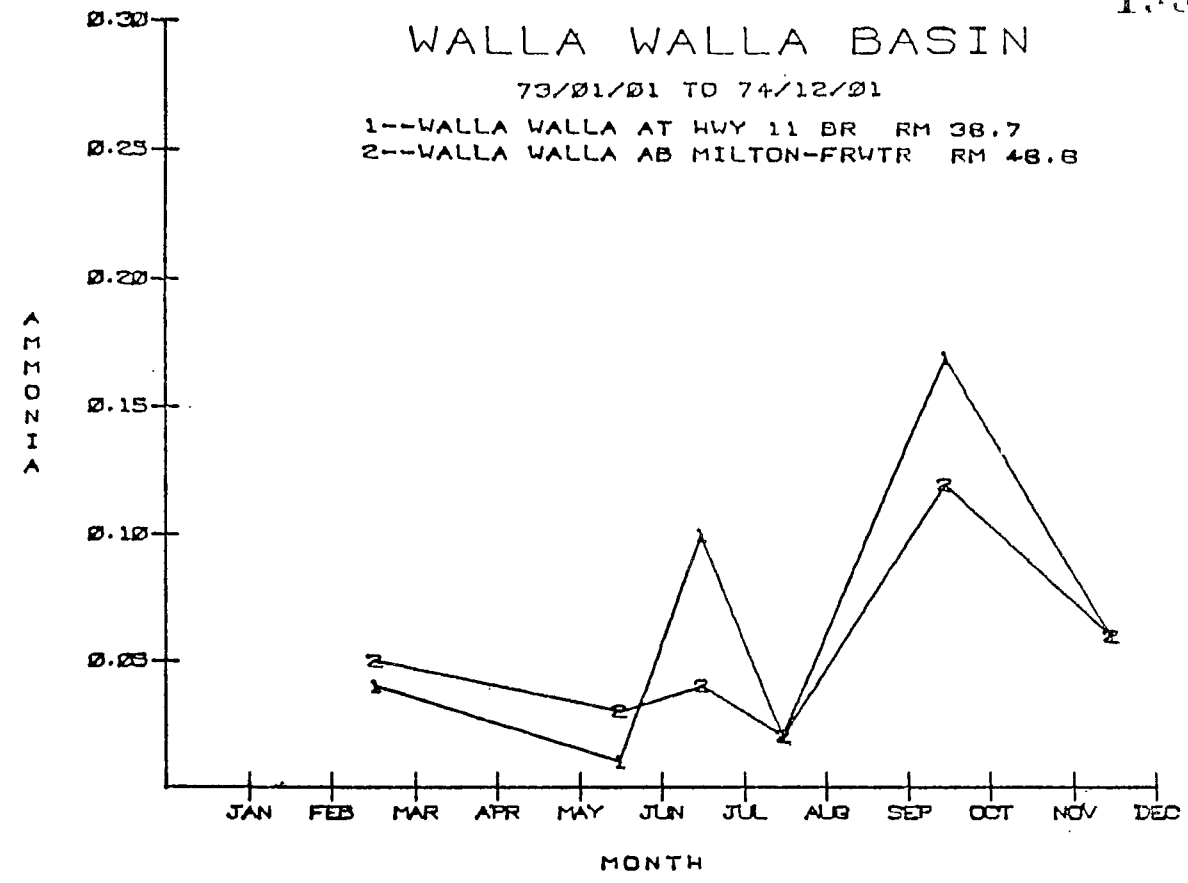

WALLA WALLA BASIN
DATE RANGE= 74/01/01 TO 74/12/31
1--WALLA WALLA RIVER NEAR TOUCHET RM 15.3
2--WALLA WALLA R NR COLLEGE PLACE RM 38.7
FECAL COLIFORM /100ML
1000
100
10
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
MONTH

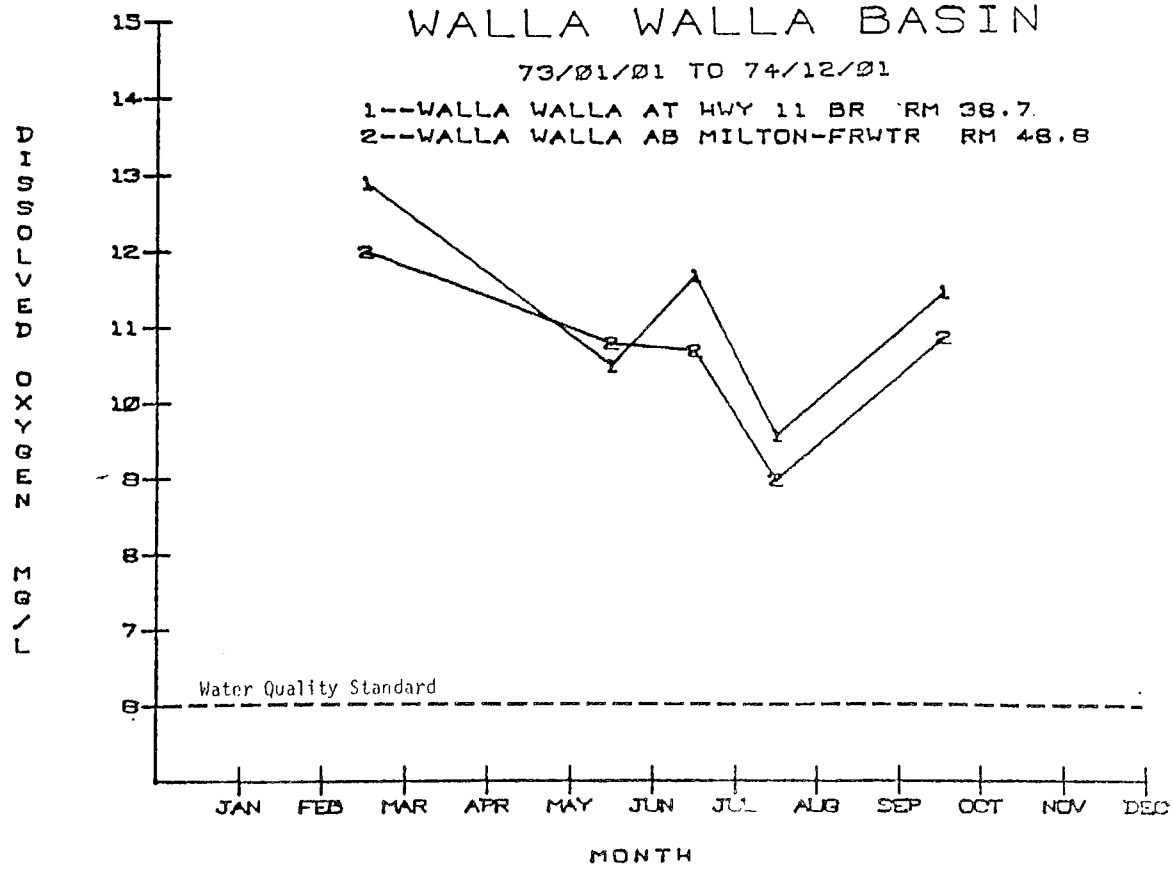
Walla Walla River

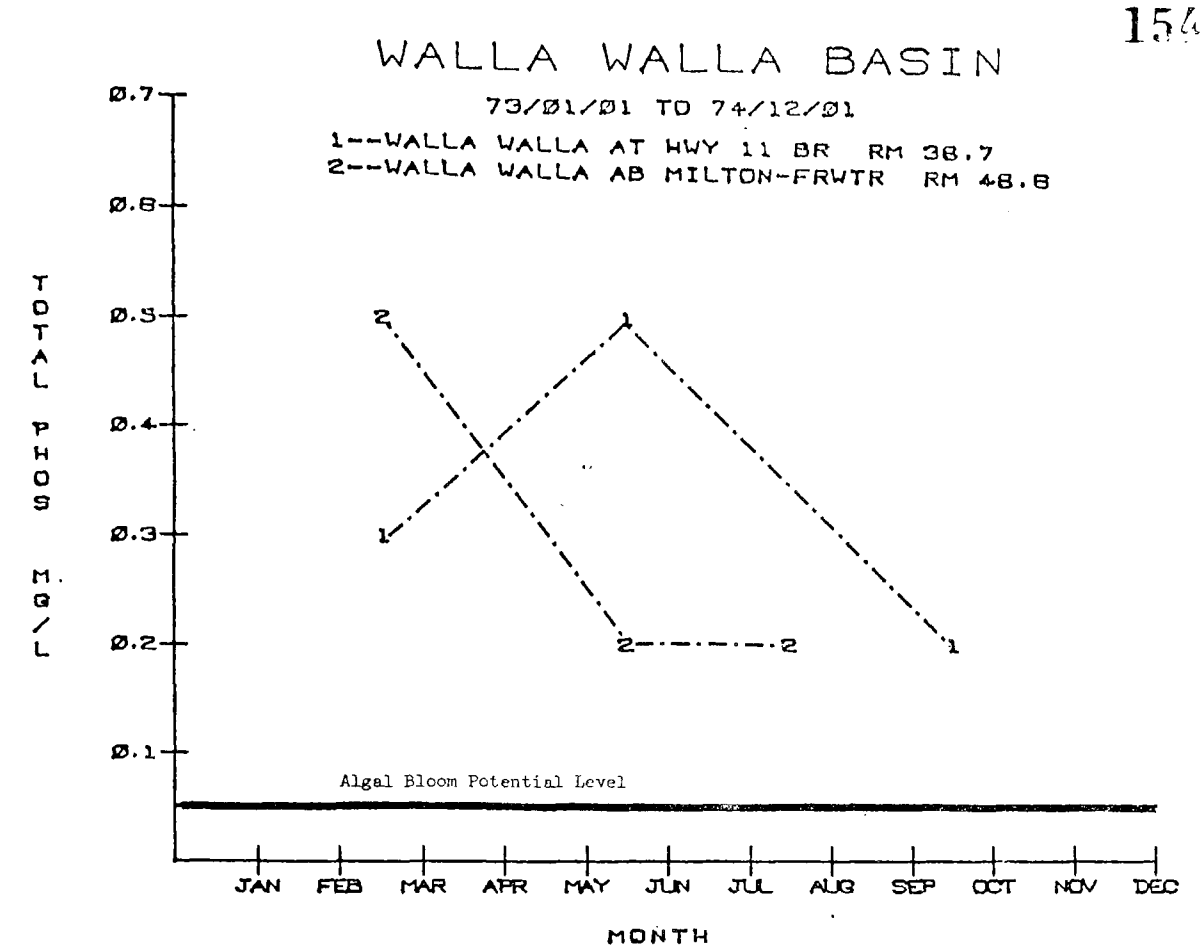
(Oregon)

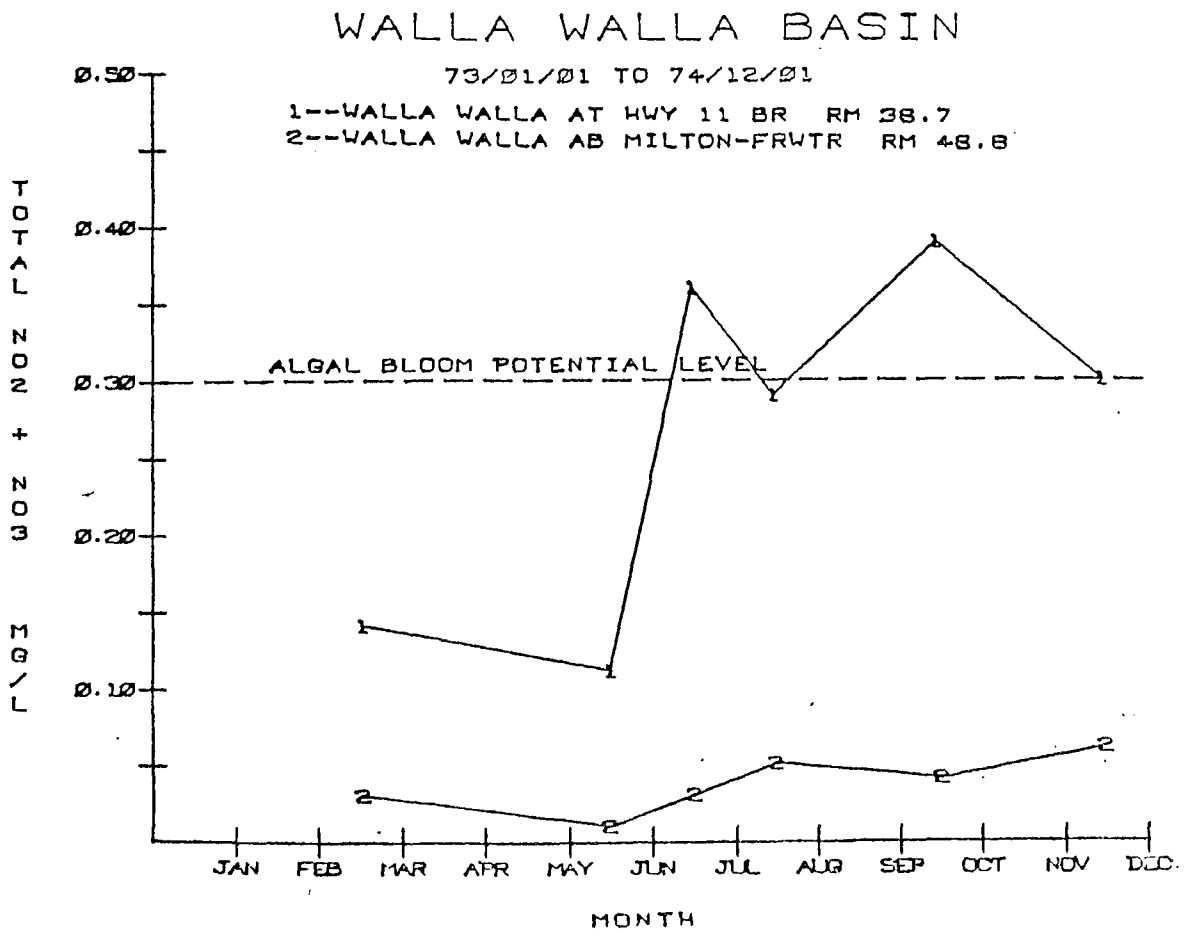

73/01/01 TO 74/12/01
1--WALLA WALLA AT HWY 11 BR RM 38.7
2--WALLA WALLA AB MILTON-FRWTR RM 48.8
9
8
7
6
PH
Water Quality Standard
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
MONTH

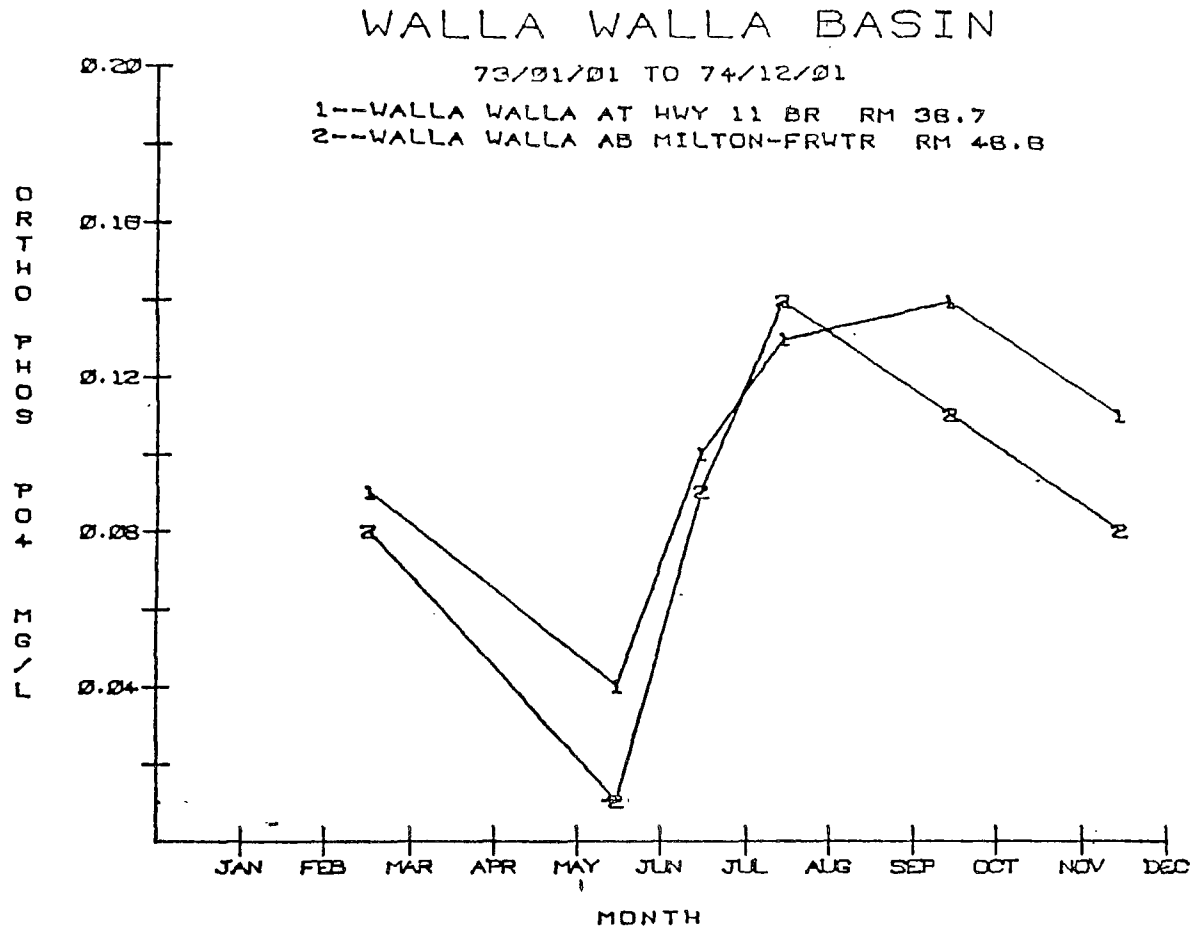

WALLA WALLA BASIN
73/01/01 TO 74/12/01
1--WALLA WALLA AT HWY 11 BR RM 38.7
2--WALLA WALLA AB MILTON-FRWTR RM 48.8
30
25
20
15
10
5
TEMPERATURE C
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
MONTH


WALLA WALLA BASIN
73/01/01 TO 74/12/01
1--WALLA WALLA AT HWY 11 BR RM 38.7
2--WALLA WALLA AB MILTON-FRWTR RM 48.8
AMMONIA
0.30
0.25
0.20
0.15
0.10
0.05
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
MONTH


WALLA WALLA BASIN
73/01/01 TO 74/12/01
1--WALLA WALLA AT HWY 11 BR RM 38.7
2--WALLA WALLA AB MILTON-FRWTR RM 48.8
DISSOLVED OXYGEN MG/L
15
14
13
12
11
10
8
8
7
6
Water Quality Standard
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
MONTH


WALLA WALLA BASIN
73/01/01 TO 74/12/01
1--WALLA WALLA AT HWY 11 BR RM 38.7
2--WALLA WALLA AB MILTON-FRWTR RM 48.8
TOTAL PHOS MG/L
0.7
0.6
0.5
0.4
0.3
0.2
0.1
Algal Bloom Potential Level
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
MONTH

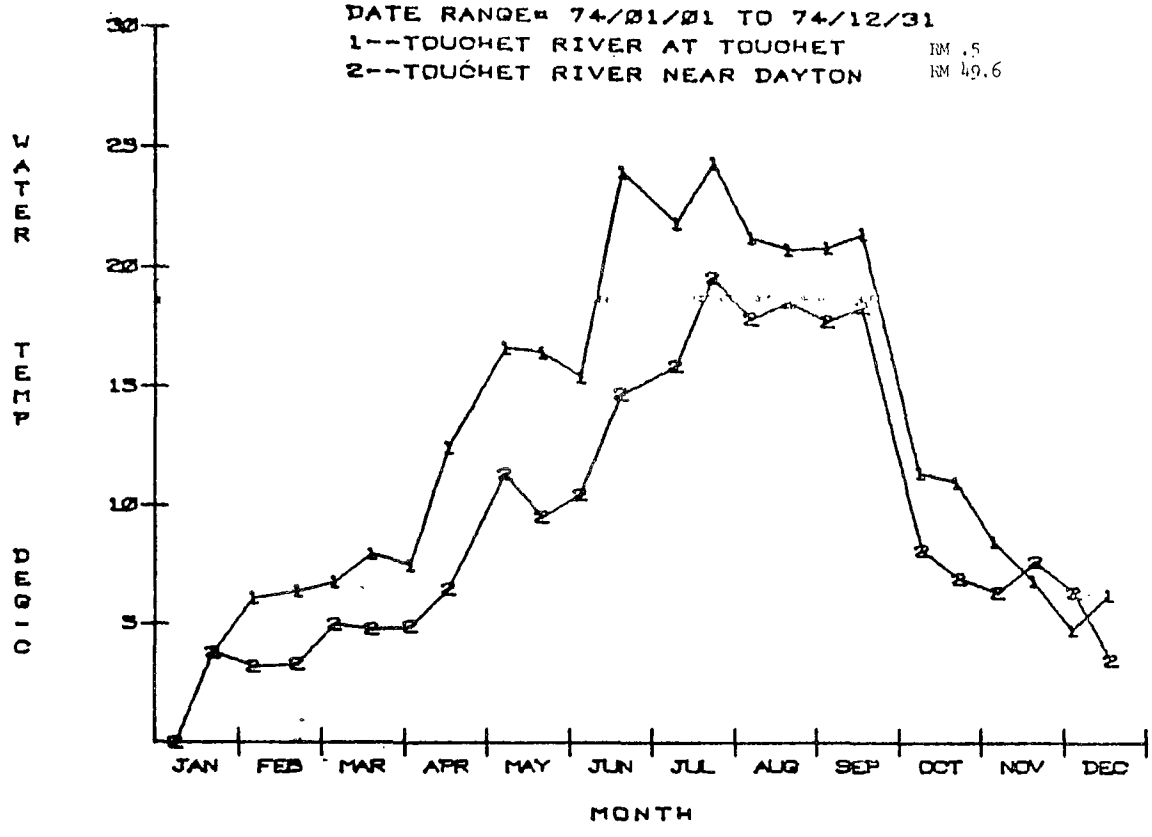

WALLA WALLA BASIN
73/01/01 TO 74/12/01
1--WALLA WALLA AT HWY 11 BR RM 38.7
2--WALLA WALLA AB MILTON-FRWTR RM 48.8
TOTAL NO2 + NO3 MG/L
0.50
0.40
0.30
0.20
0.10
ALGAL BLOOM POTENTIAL LEVEL
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
MONTH


WALLA WALLA BASIN
73/01/01 TO 74/12/01
1--WALLA WALLA AT HWY 11 BR RM 36.7
2--WALLA WALLA AB MILTON-FRWTR RM 48.8
ORTHO PHOS PO4 MG/L
0.20
0.16
0.12
0.08
0.04
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
MONTH

TOUCHET RIVER

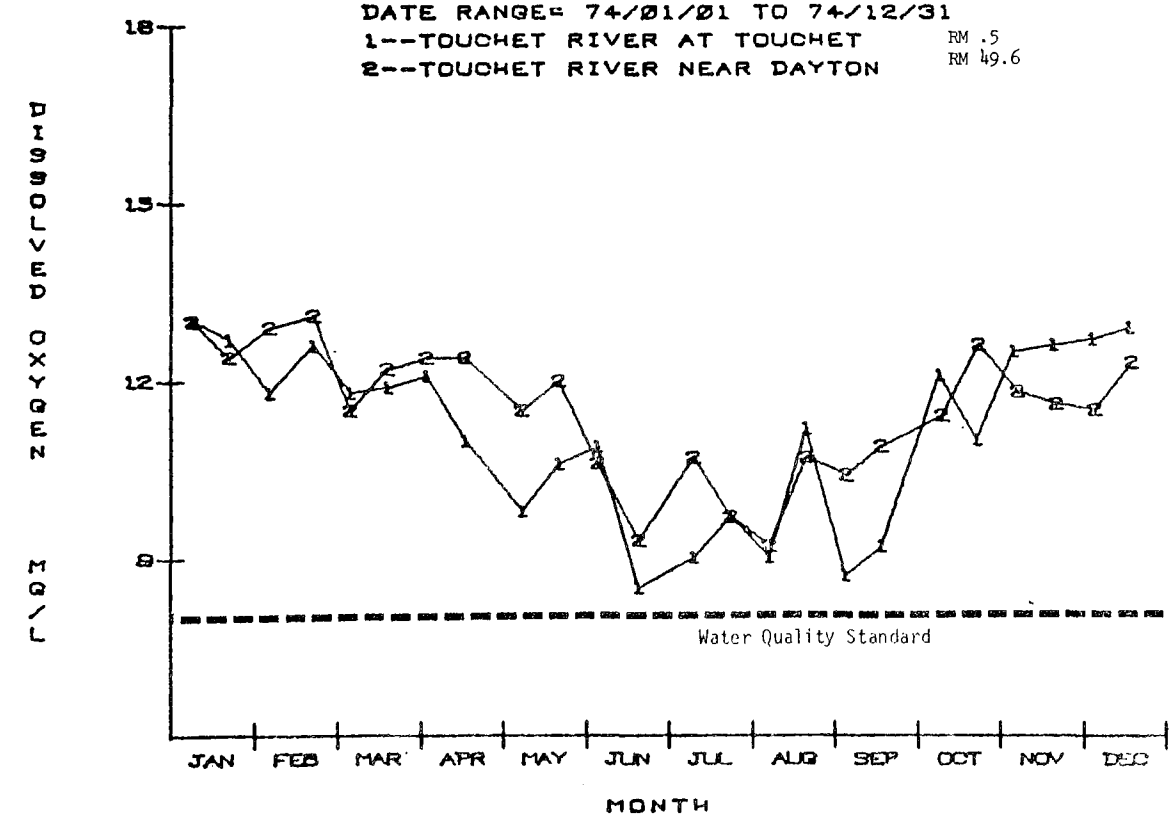
WALLA WALLA BASIN

DATE RANGE= 74/01/01 TO 74/12/31
1--TOUCHET RIVER AT TOUCHET RM .5
2--TOUCHET RIVER NEAR DAYTON RM 49.6



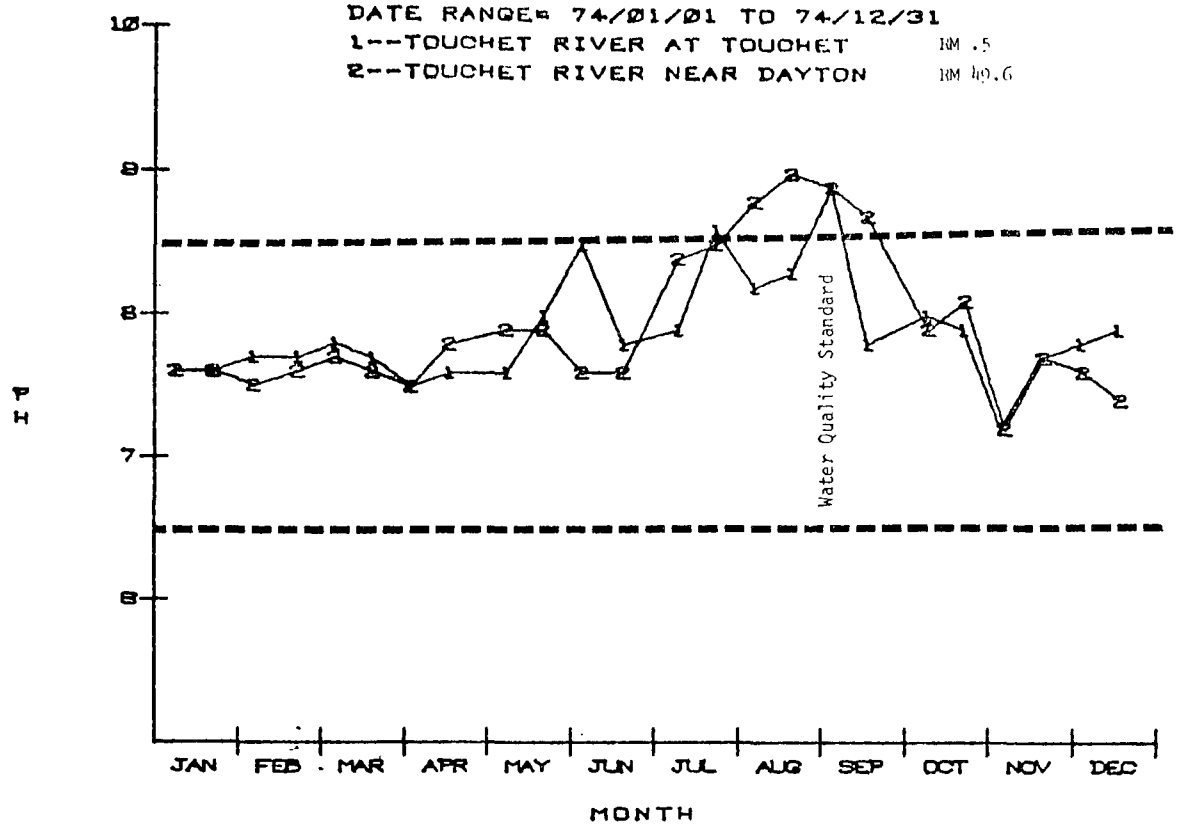
WALLA WALLA BASIN

DATE RANGE= 74/01/01 TO 74/12/31
1--TOUCHET RIVER AT TOUCHET RM .5
2--TOUCHET RIVER NEAR DAYTON RM 49.6



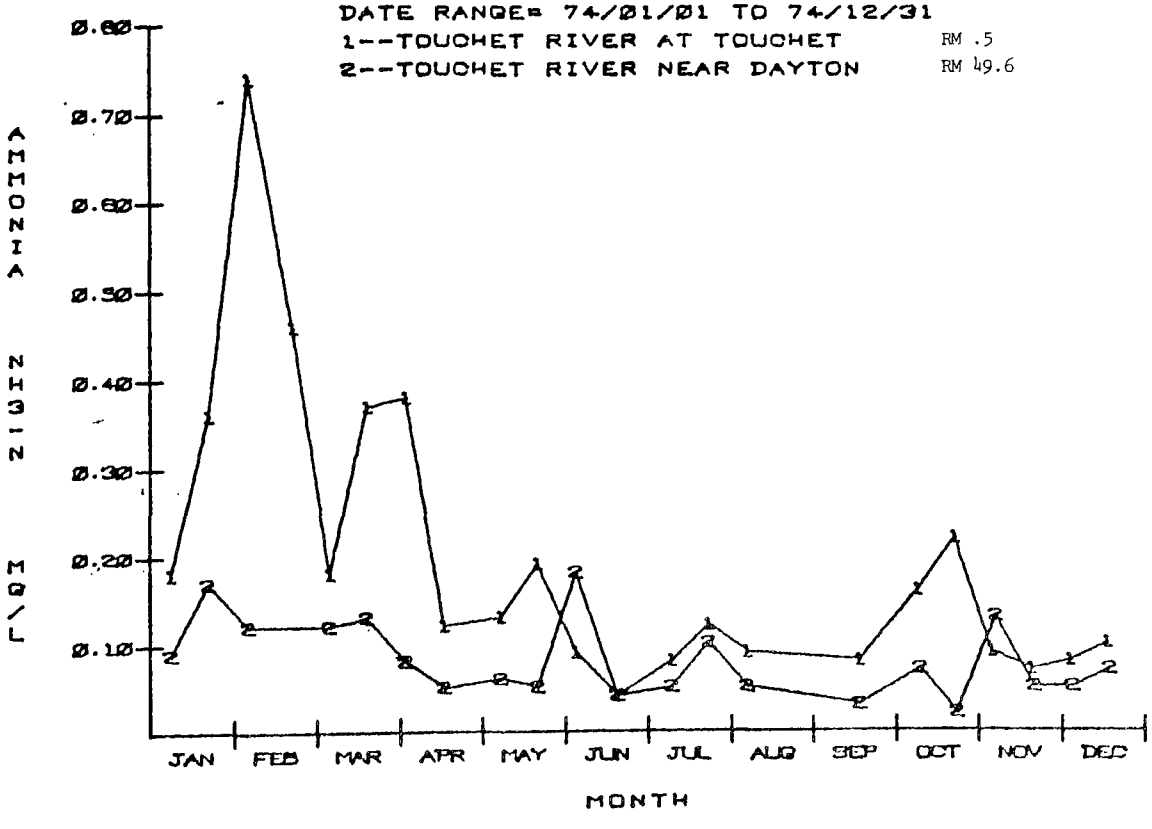
WALLA WALLA BASIN

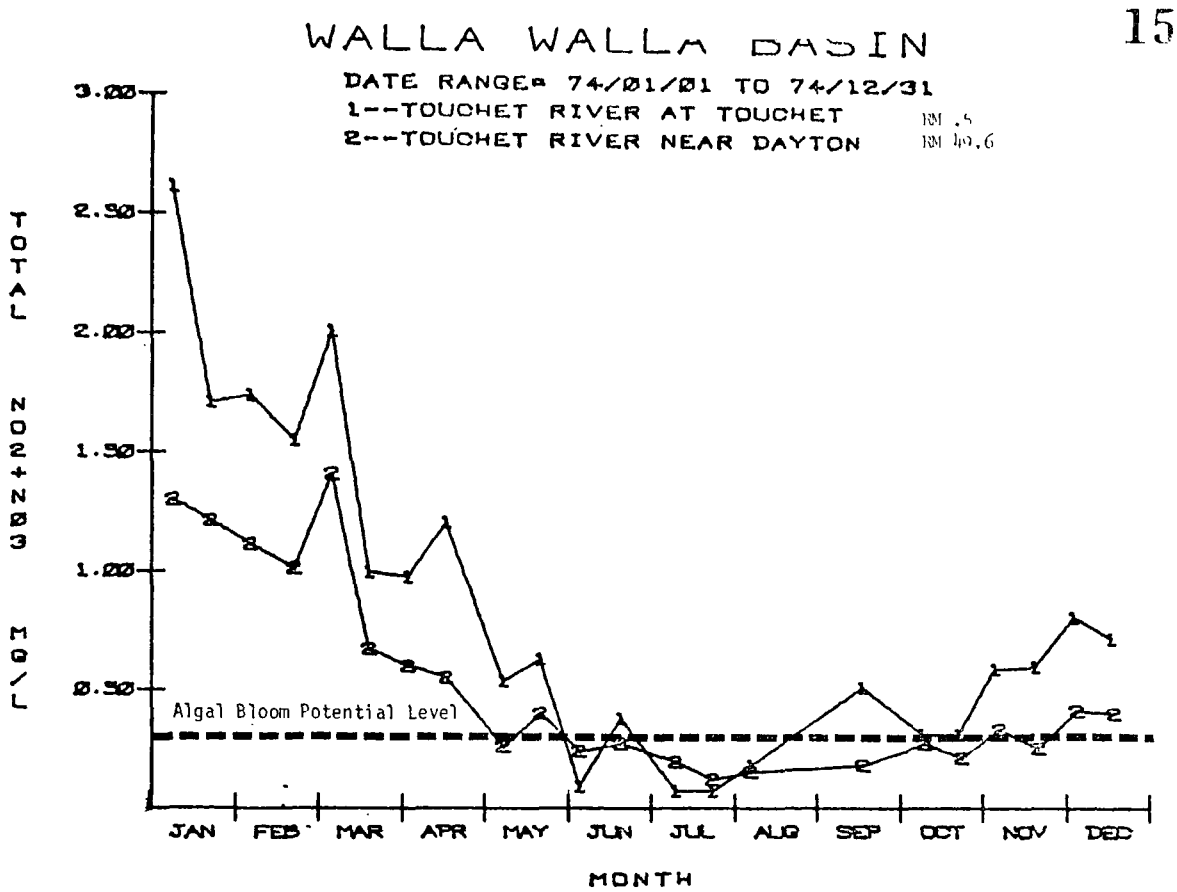
DATE RANGE= 74/01/01 TO 74/12/31
1--TOUCHET RIVER AT TOUCHET RM .5
2--TOUCHET RIVER NEAR DAYTON RM 49.6

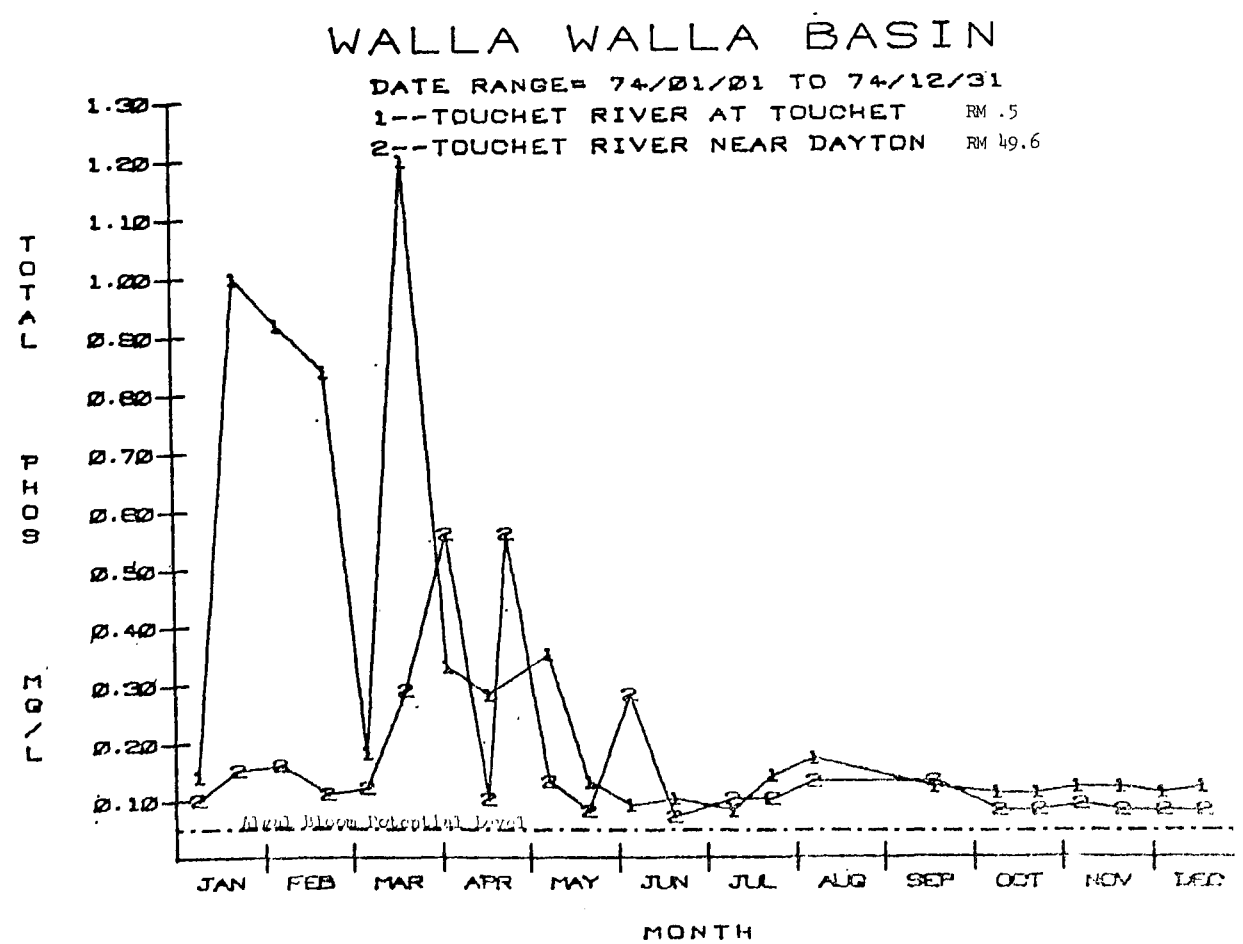


WALLA WALLA BASIN

DATE RANGE= 74/01/01 TO 74/12/31
1--TOUCHET RIVER AT TOUCHET RM .5
2--TOUCHET RIVER NEAR DAYTON RM 49.6

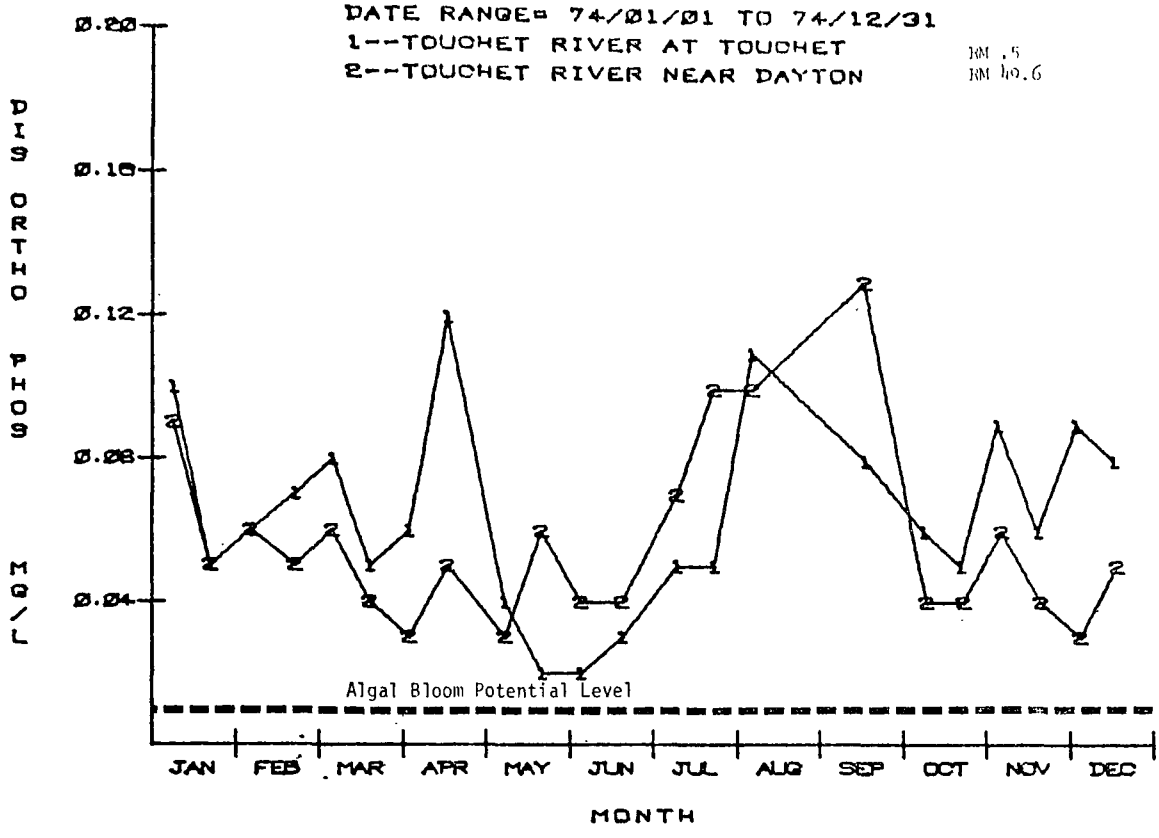



WALLA WALLA BASIN
DATE RANGE= 74/01/01 TO 74/12/31
1--TOUCHET RIVER AT TOUCHET RM .5
2--TOUCHET RIVER NEAR DAYTON RM 49.6
TOTAL NO2+NO3 MG/L
3.00
2.50
2.00
1.50
1.00
0.50
Algal Bloom Potential Level
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
MONTH


WALLA WALLA BASIN
DATE RANGE= 74/01/01 TO 74/12/31
1--TOUCHET RIVER AT TOUCHET RM .5
2--TOUCHET RIVER NEAR DAYTON RM 49.6
TOTAL PHOS MG/L
1.30
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
Algal Bloom Potential Level
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
MONTH

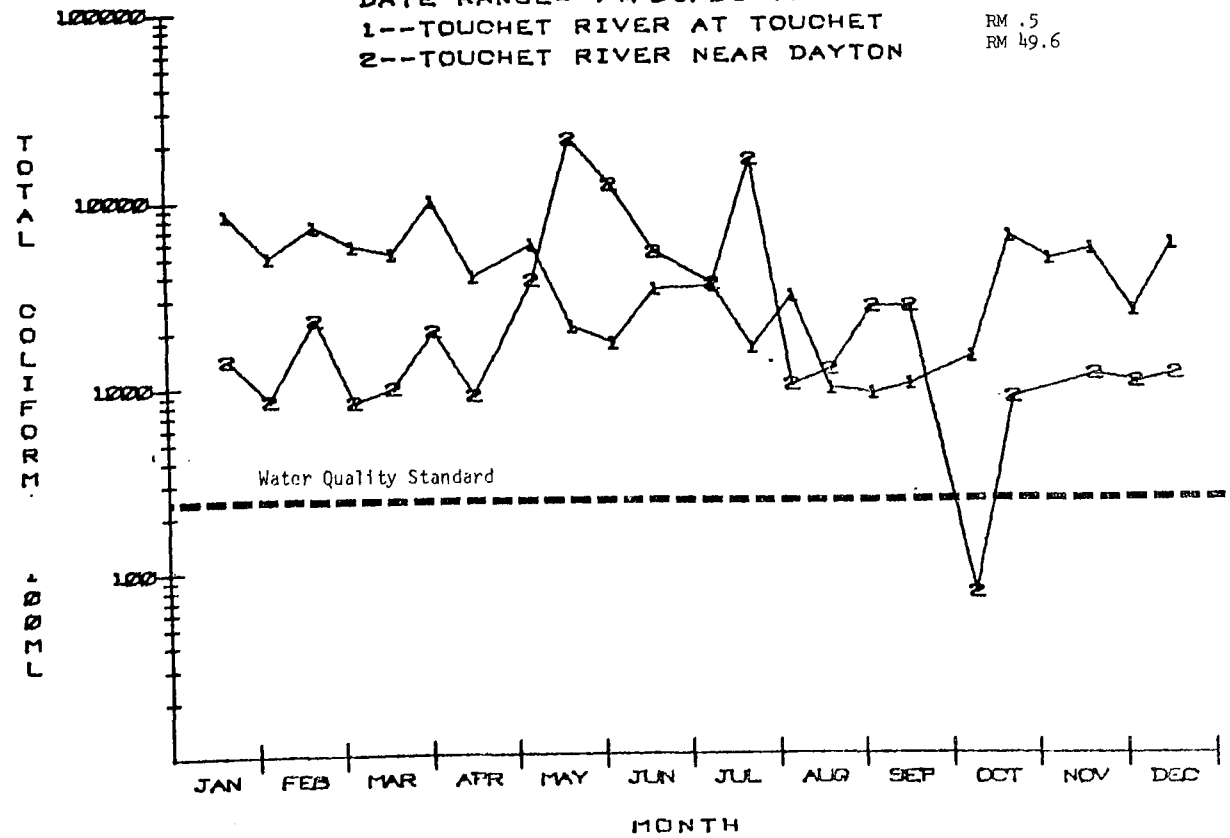
WALLA WALLA BASIN

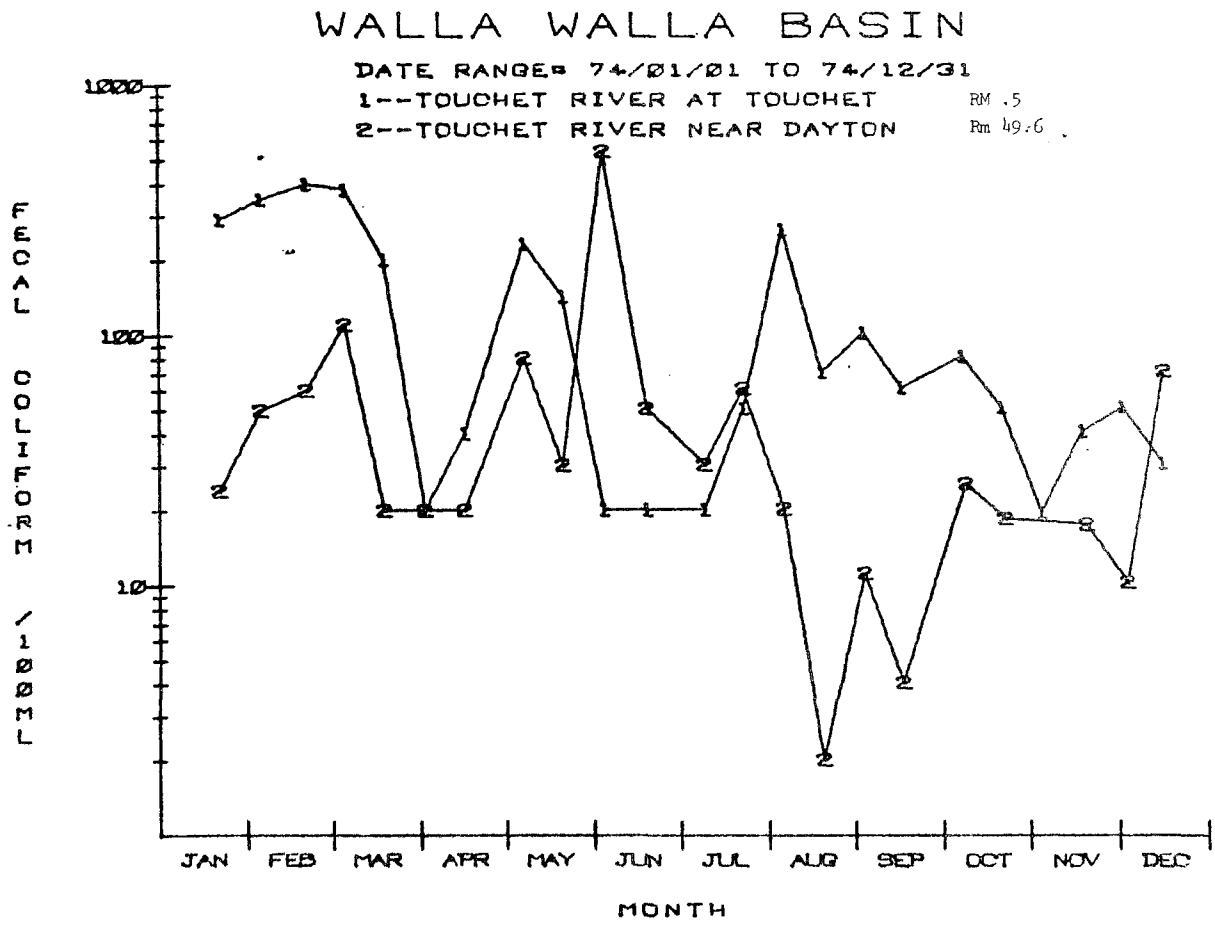
DATE RANGE= 74/01/01 TO 74/12/31
1--TOUCHET RIVER AT TOUCHET RM .5
2--TOUCHET RIVER NEAR DAYTON RM 49.6



WALLA WALLA BASIN

DATE RANGE= 74/01/01 TO 74/12/31
1--TOUCHET RIVER AT TOUCHET RM .5
2--TOUCHET RIVER NEAR DAYTON RM 49.6

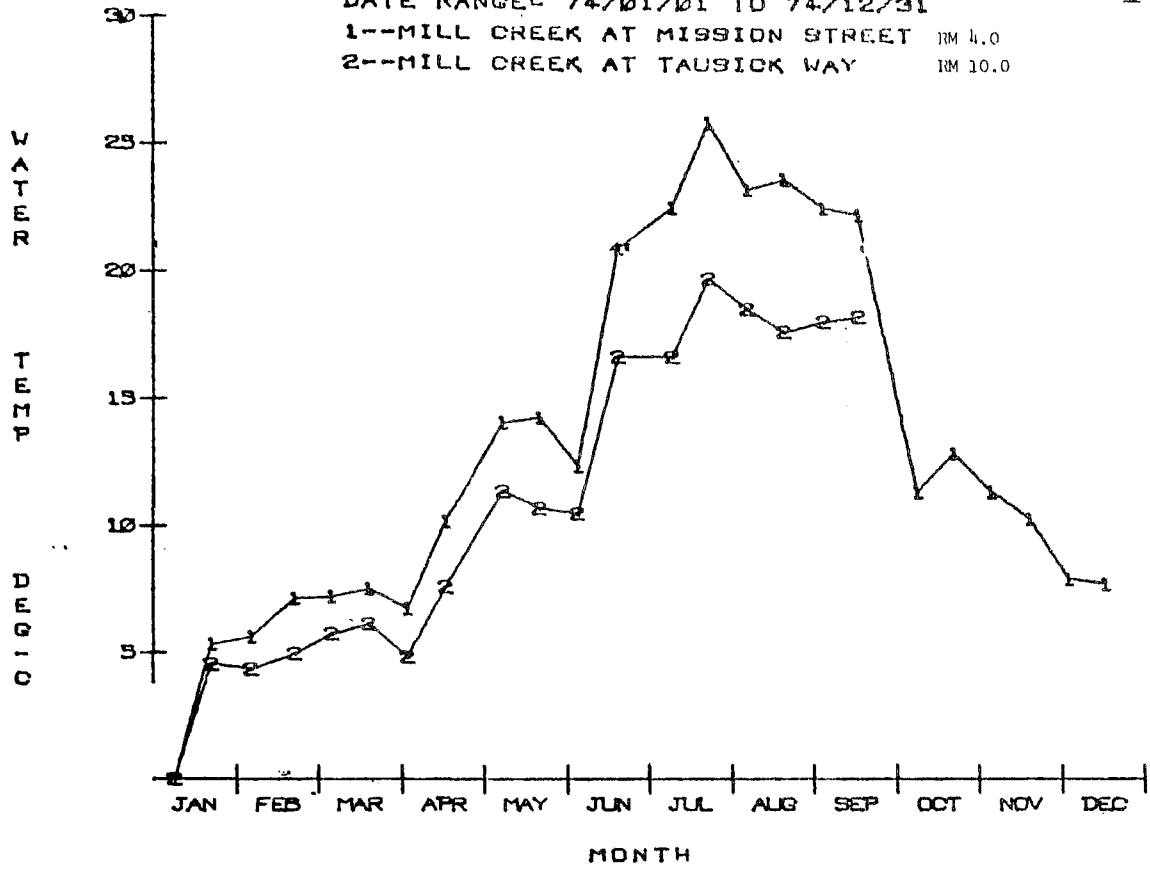



WALLA WALLA BASIN
DATE RANGE= 74/01/01 TO 74/12/31
1--TOUCHET RIVER AT TOUCHET RM .5
2--TOUCHET RIVER NEAR DAYTON Rm 49.6
1000
100
10
FECAL COLIFORM /100ML
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
MONTH

MILL CREEK

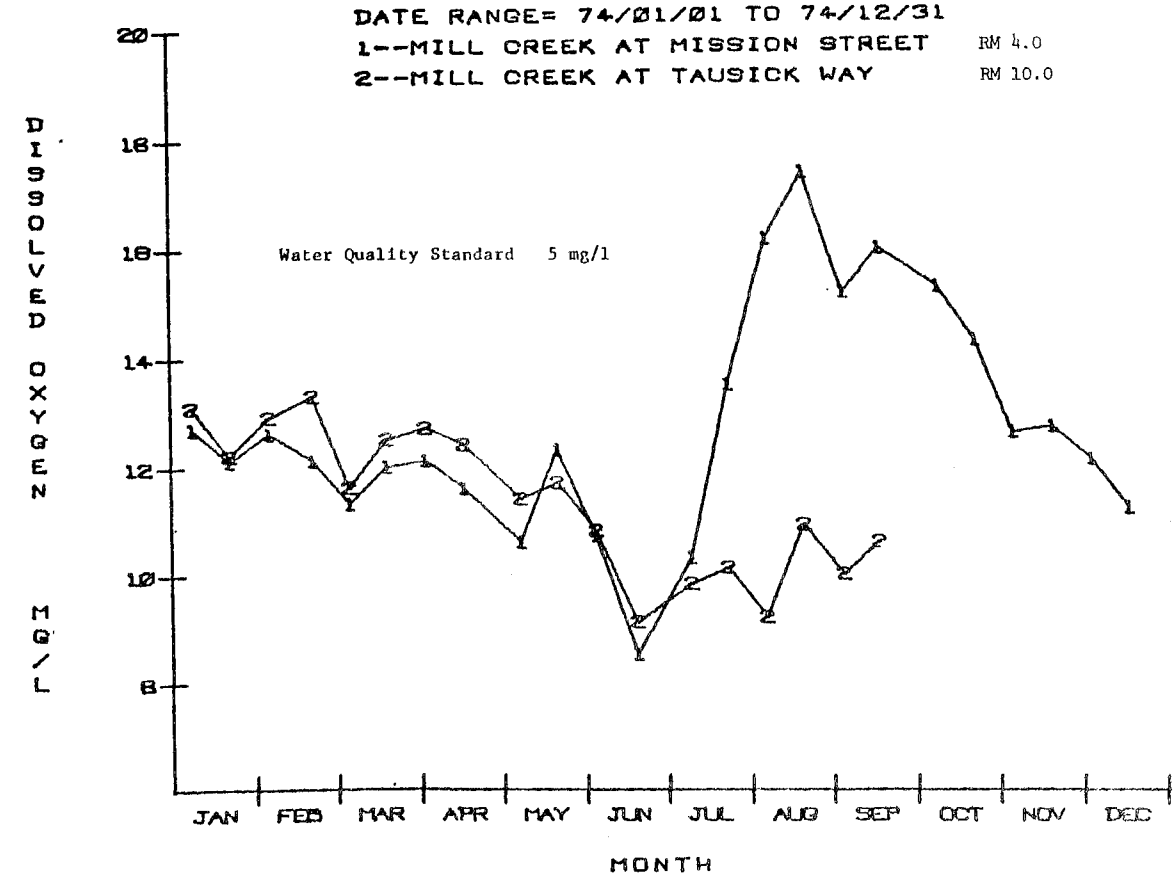
WALLA WALLA BASIN

DATE RANGE= 74/01/01 TO 74/12/31
1--MILL CREEK AT MISSION STREET RM 4.0
2--MILL CREEK AT TAUSICK WAY RM 10.0



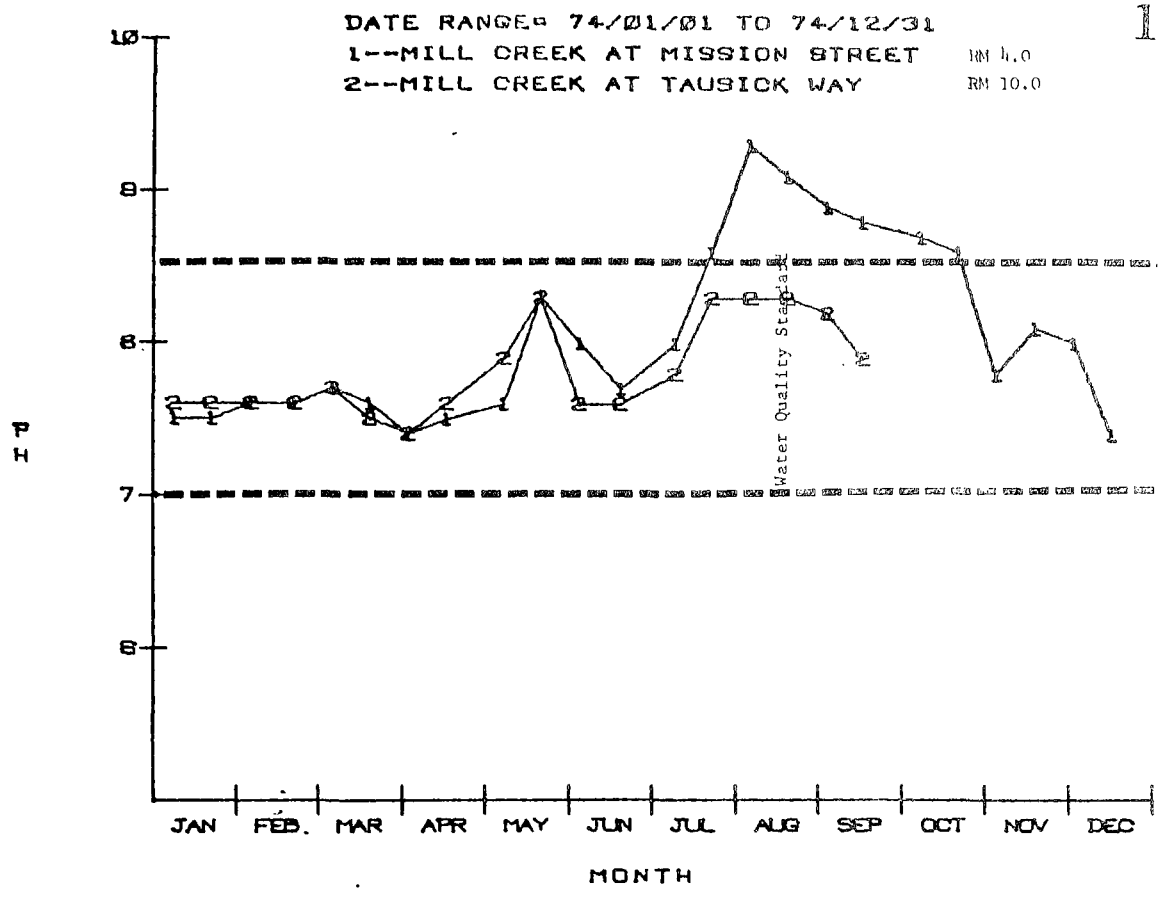
WALLA WALLA BASIN

DATE RANGE= 74/01/01 TO 74/12/31
1--MILL CREEK AT MISSION STREET RM 4.0
2--MILL CREEK AT TAUSICK WAY RM 10.0



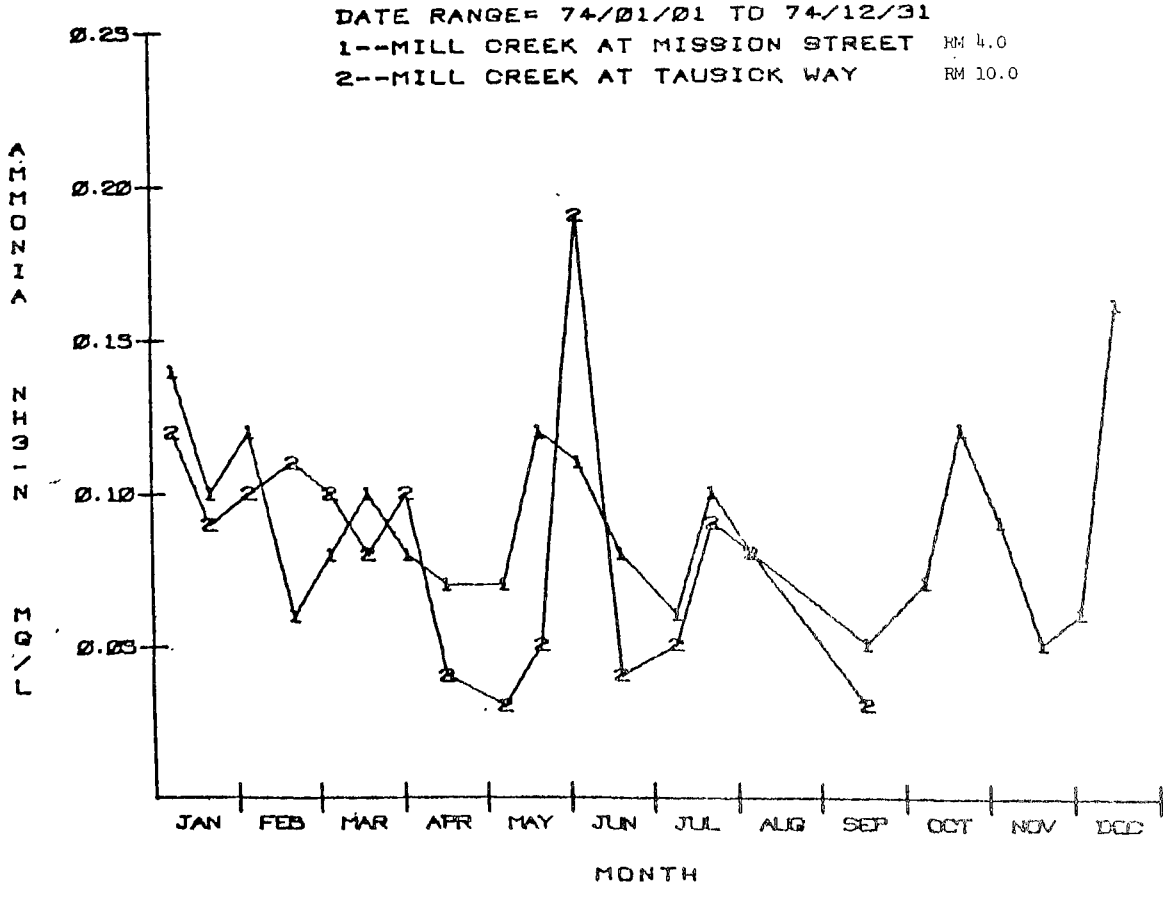
WALLA WALLA BASIN

DATE RANGE= 74/01/01 TO 74/12/31
1--MILL CREEK AT MISSION STREET RM 4.0
2--MILL CREEK AT TAUSICK WAY RM 10.0



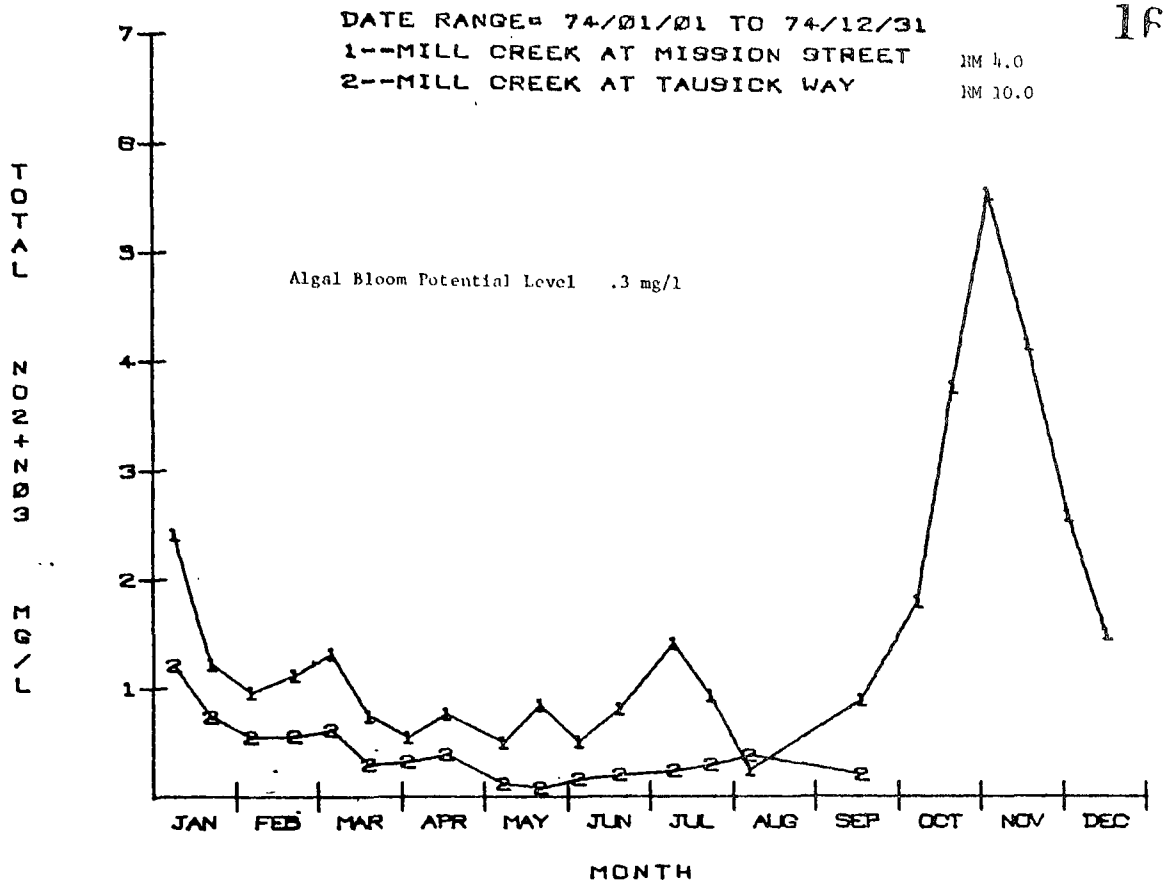
WALLA WA_LA BASIN

DATE RANGE= 74/01/01 TO 74/12/31
1--MILL CREEK AT MISSION STREET RM 4.0
2--MILL CREEK AT TAUSICK WAY RM 10.0



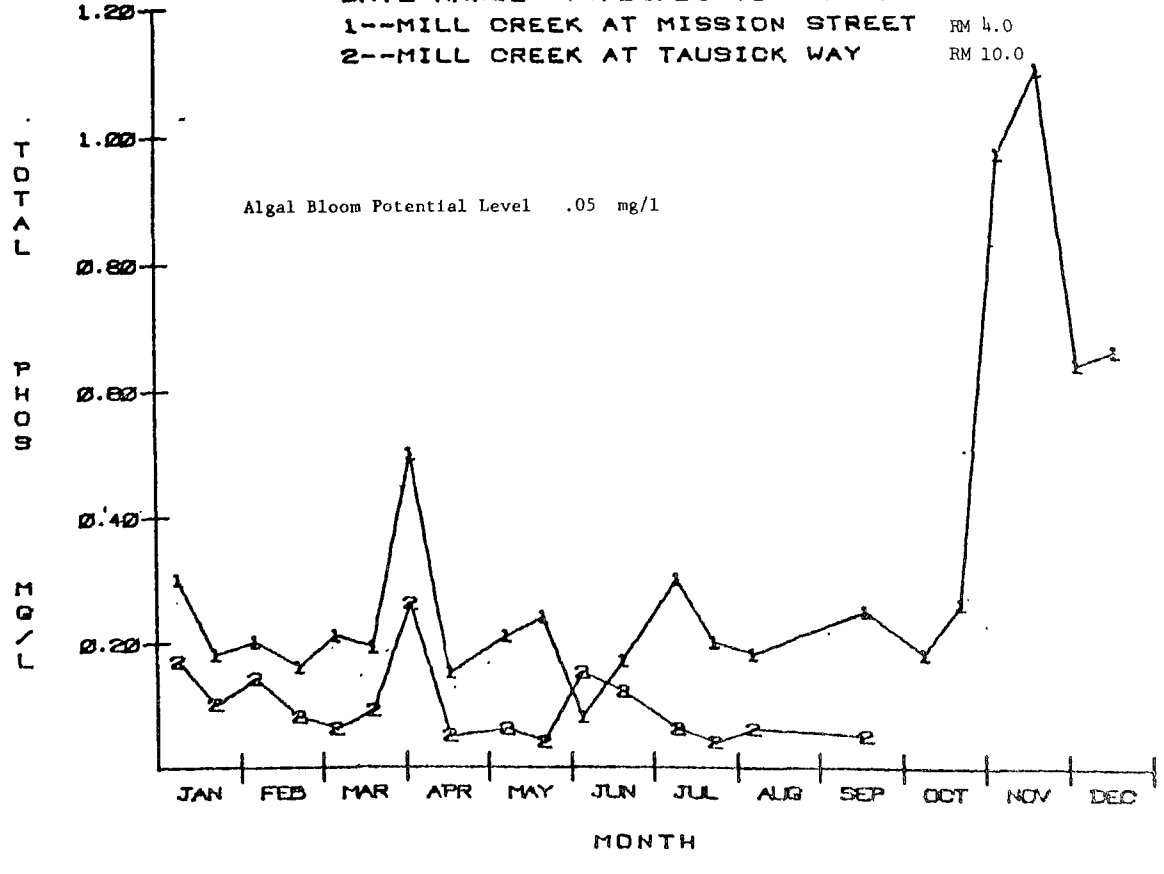
WALLA WALLA BASIN

DATE RANGE= 74/01/01 TO 74/12/31
1--MILL CREEK AT MISSION STREET RM 4.0
2--MILL CREEK AT TAUSICK WAY RM 10.0



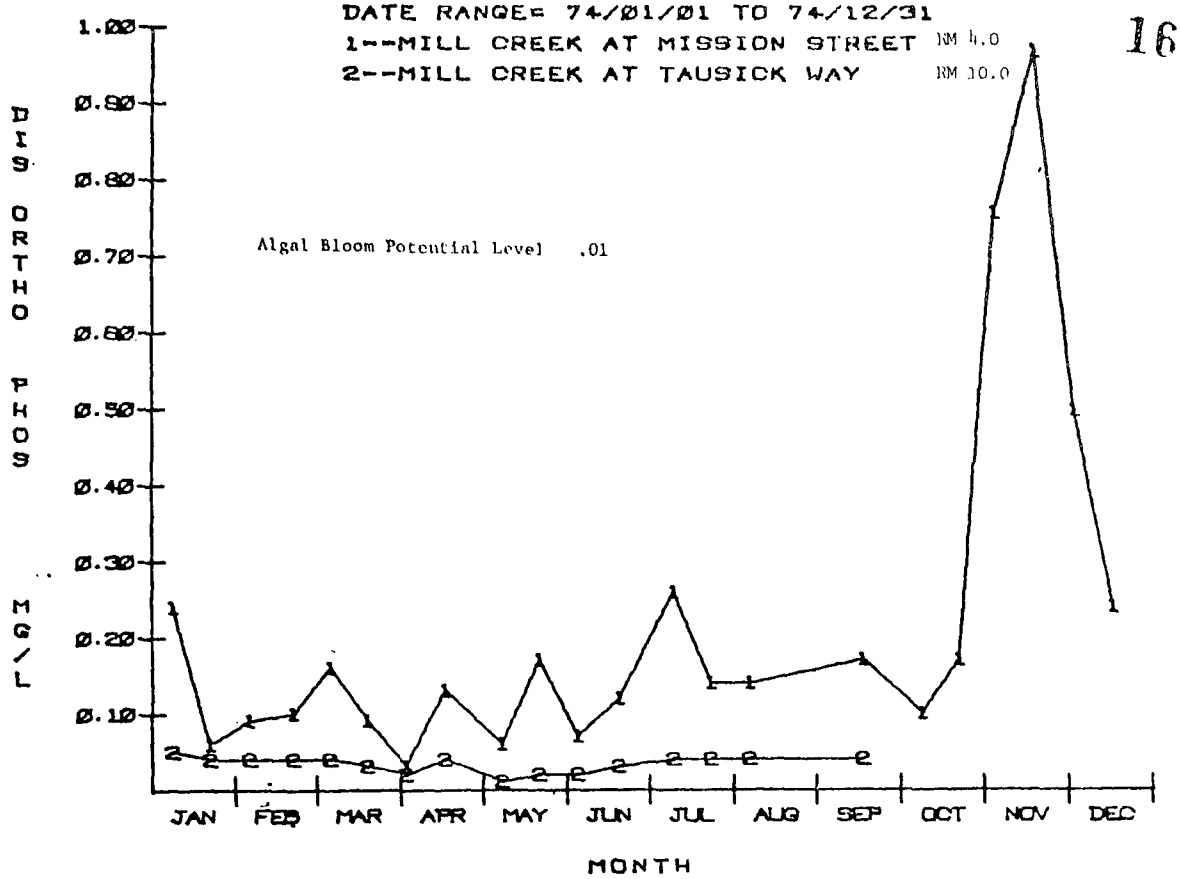
WALLA WALLA BASIN

DATE RANGE= 74/01/01 TO 74/12/31
1--MILL CREEK AT MISSION STREET RM 4.0
2--MILL CREEK AT TAUSICK WAY RM 10.0



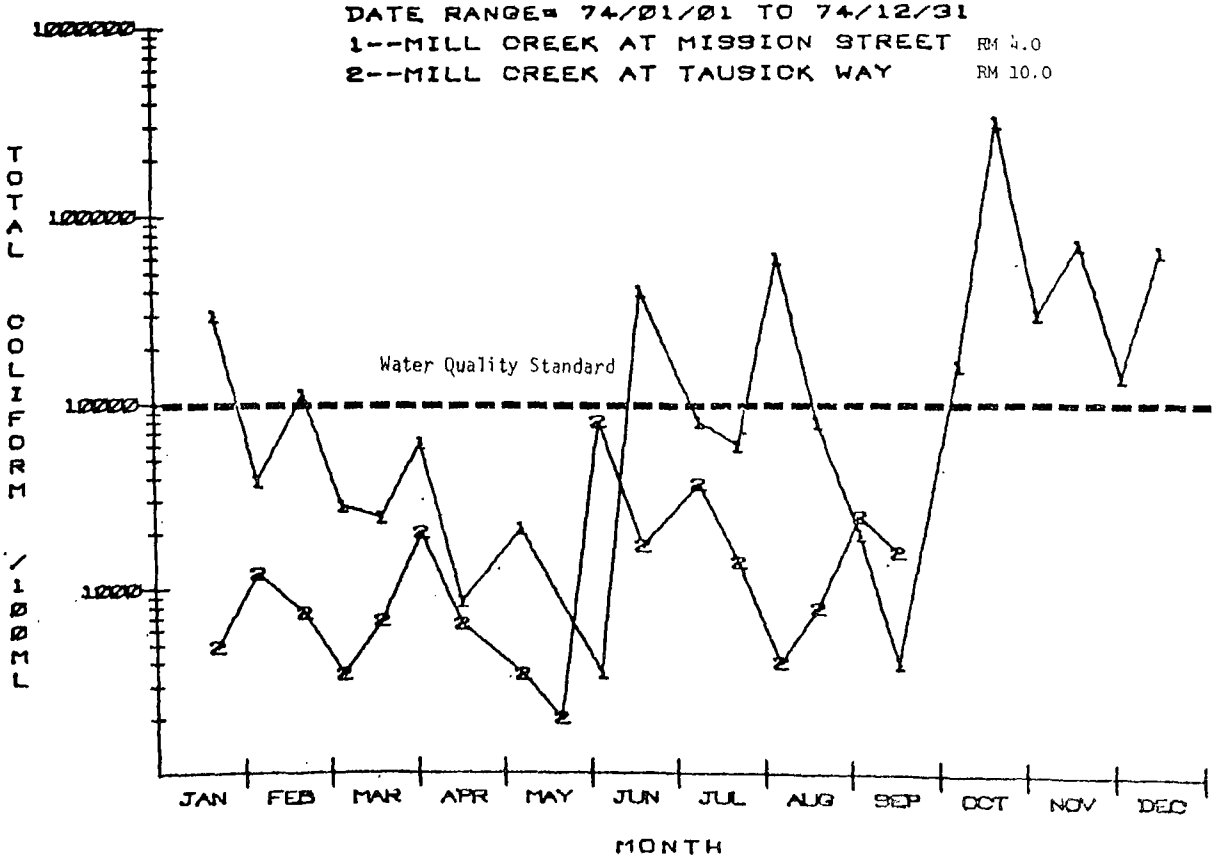
WALLA WALLA BASIN

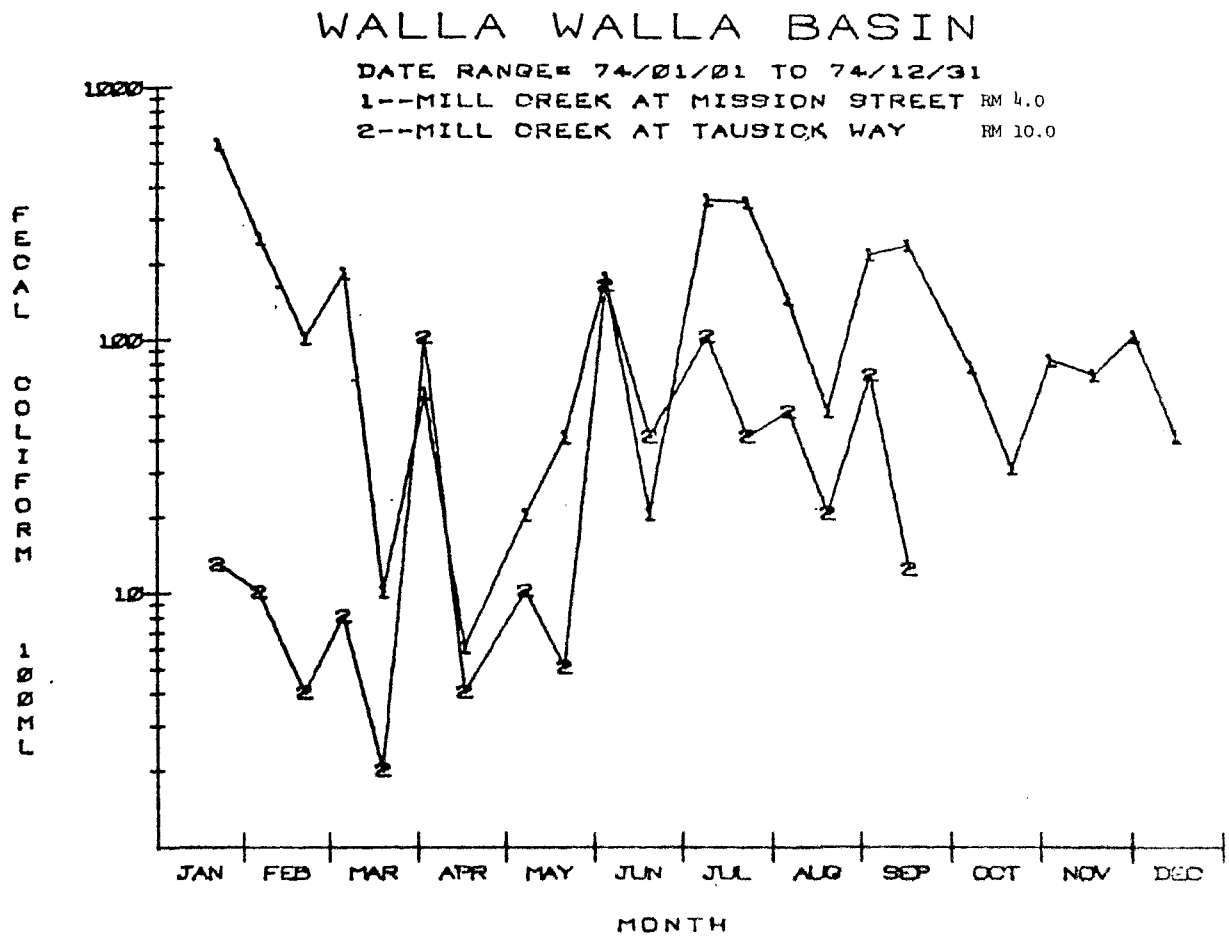
DATE RANGE= 74/01/01 TO 74/12/31
1--MILL CREEK AT MISSION STREET RM 4.0
2--MILL CREEK AT TAUSICK WAY RM 10.0



WALLA WALLA BASIN

DATE RANGE= 74/01/01 TO 74/12/31
1--MILL CREEK AT MISSION STREET RM 4.0
2--MILL CREEK AT TAUSICK WAY RM 10.0




WALLA WALLA BASIN
DATE RANGE= 74/01/01 TO 74/12/31
1--MILL CREEK AT MISSION STREET RM 4.0
2--MILL CREEK AT TAUSICK WAY RM 10.0
FECAL COLIFORM 100ML
1000
100
10
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
MONTH