SONOMA COUNTY WATER AGENCY

FILE:WC/43-0-25 (& EXP) REGIONAL WATER QUALITY CONTROL BOARD, NORTH COAST REGION
WC/43-0-25 STATE WATER RESOURCES CONTROL BOARD
WC/43-4&5-7(&EXP AGREEMENT BETWEEN NORTH COAST RWQCB & SCWA FOR RWQCB REVIEW OF RUSSIAN RIVER BASIN PLAN (7-904-110-0 OR 2)

December 6, 2001

Matt St. John
California Regional Water Quality Control Board
North Coast Region
5550 Skylane Boulevard, Suite A
Santa Rosa, CA 95403

FAX: 707-523-0135

Dianne Beaulaurier
State Water Resources Control Board
Division of Water Quality
1001 I Street
Sacramento, CA 95814

RE: COMMENTS ON THE NORTH COAST REGION WATER QUALITY CONTROL BOARD 303(D) LIST UPDATE RECOMMENDATIONS

Dear Mr. St. John and Ms. Beaulaurier:

The purpose of this letter is to comment on the North Coast Regional Water Quality Control Board's (Regional Board) 303(d) List Update Recommendations dated November 16, 2001, (303(d) Recommendations).

The Sonoma County Water Agency (Agency) utilizes water from the Russian River to provide drinking water to over 500,000 people in Sonoma and Marin Counties. The Agency also operates nine wastewater treatment plants and provides flood control services in Sonoma County.

The Agency is concerned about the health of the Russian River and is active in promoting a healthy watershed. In 1995, the Agency established the Fisheries Enhancement Program. This program covers a wide range of activities primarily within the Russian River watershed, including habitat surveys, water quality assessments, habitat restoration, fish ladder design, and community creek clean-up events. This program has also sponsored significant research to address long-term issues surrounding fisheries, including the genetic profiling of coho salmon in the Russian River and other coastal watersheds and the monitoring of salmonid populations.

Russian River and Tributaries - Temperature

The Agency believes that the salmonid water temperature criteria used to recommend listing the Russian River and its tributaries as impaired for temperature are not relevant to the salmonids inhabiting the Russian River, and therefore, the Russian River should not be listed for temperature.

The Agency, Regional Board staff, and other governmental agencies have been actively studying appropriate temperature regimes for the Russian River's salmonid population. The Regional Board, under contract with the Agency,[1] has reviewed the Russian River Water Quality Objectives for Protection of Salmonid Species Listed under the Federal Endangered Species Act.[2] Regional Board staff has developed several temperature criteria for a proposed Basin Plan Amendment to the existing narrative objective applied to the Russian River.

The 303(d) Recommendations[3] states that the Regional Board chose not to rely on the narrative temperature objective contained in the Basin Plan, since it was difficult to determine "natural receiving water" temperature, and therefore relied on literature detailing impacts to beneficial uses instead. According to page 13 of the 303(d) Recommendations, the listing recommendation was based on:

(1) A number of maximum weekly average temperature (MWAT) measurements taken in the Russian River exceeded sub-lethal and acute effects on juvenile salmonids proposed by Sullivan and others (14.8 degrees and 17 degrees centigrade respectively, 58.6 degrees and 62.6 degrees Fahrenheit),[4] and
(2) The maximum temperatures measured were also higher than 24 degrees centigrade (75.2 degrees Fahrenheit), and may be lethal for coho.

The literature used to justify the listing of the Russian River is based on temperature tolerances for salmonids in the Pacific Northwest (Washington), not in Northern California. The Regional Board, in its review of Russian River Water Quality Objectives states:

> "Such information (literature) is useful in determining temperature requirements, but generally does not consider adaptations to regional or local temperature regimes. Case in point is the Russian River watershed. This watershed is located near the southern (warm) end of the geographic range where many west coast anadromous salmonid species exist. There is little literature specific to the temperature requirements of the Russian River salmonid species. Most of the research and experimentation regarding salmonid requirements is derived from fish stocks and experimentation in Washington, Canada, and Alaska. These areas have a cooler climate, different geology, a different type of vegetative climax community, different summer flow regimes, etc. than the Russian River watershed. It is likely that fish stocks have adapted to the regional temperature regimes they typically experience. Similarly, Russian River salmonids have probably adapted to their regional temperature regime, which is warmer than that experienced by their northern cousins. Therefore, some caution should be used when applying temperature requirements derived from studies utilizing fish stocks from a cooler environment."[5]

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[1] Regional Board Agreement No. 7-904-110-0, Tasks 5.c.1.a, 5.c.1.b and 5.c.1.e
[2] Regional Water Quality Control Board, North Coast Region, Review of the Russian River Water Quality Objectives for Protection of Salmonid Spruces Listed Under the Federal Endangered Species Act, August 18, 2000.
[3] Regional Water Quality Control Board, North Coast Region, "North Coast Region Water Quality Control Board 303(d) List Update Recommendations," November 16, 2001, page 5.
[4] Sullivan K. et al. 2000. An Analysis of the Effects of Temperature on Salmonids of the Pacific Northwest with Implications for Selecting Temperature Criteria. Sustainable Ecosystem Institute.
[5] Regional Water Quality Control Board, North Coast Region, Review of the Russian River Water Quality Objectives for Protection of Salmonid Spruces Listed Under the Federal Endangered Species Act, August 18, 2000, p. 25.

Agency fisheries biologists have observed apparently healthy juvenile steelhead inhabiting Russian River basin tributaries where the average daily temperature routinely exceeded the above stated criteria. Agency fisheries biologists have also observed adult steelhead and Chinook salmon migrating through the mainstem Russian River at temperatures in excess of 70 degrees Fahrenheit. Much of the work to develop appropriate temperature criteria, including criteria proposed in the Regional Board's review of Russian River Water Quality Objectives, looks at temperature regimes during four key life stages of salmonids: upstream migration, spawning and incubation (sometimes considered separately), rearing and seaward migration. The literature used on the 303(d) Recommendations uses and overall temperature criteria, and then uses summertime MWAT data from the mainstem of the Russian River to justify the listing. However, during summer, salmonids are more likely to be located in the tributaries than the mainstem. Fish surveys conducted by Agency biologists show that the lower Russian River is used by salmonids primarily for migration rather than as spawning and rearing habitat. Although small numbers of juvenile steelhead have been captured as far down as the Mirabel Dam, these fish survived average weekly water temperatures in excess of 70 degrees Fahrenheit for several consecutive weeks. In addition, age and growth analysis demonstrated that these fish were larger at age compared to juvenile steelhead rearing in colder tributaries. Coho salmon rear only in tributaries; therefore, summertime temperatures in the mainstem do not affect them.

The Agency, to ensure its activities comply with the Clean Water Act and Endangered Species Act, is providing funding to allow the Regional Board to prepare and submit for consideration a Basin Plan amendment for temperature for approval in 2002. Meanwhile, the Agency and other governmental agencies, including the National Marine Fisheries Service and the Department of Fish and Game, are working to develop appropriate temperature criteria for the Russian River and its tributaries that are protective of salmonids. For these reasons, the Agency is recommending that the Russian River be removed from the proposed 303(d) list for temperature. After appropriate temperature criteria are adopted into the Basin Plan and legally required pollution control mechanisms and best management practices are developed and applied, the Regional Board should assess if a 303(d) listing for temperature in the Russian River is appropriate, as contemplated by the Clean Water Act. If necessary, the Russian River could be included in the watch list since available information is insufficient to determine if there is impairment

Russian River – Pathogens

The 303(d) Recommendations proposes listing Monte Rio Beach for pathogens. The boundary for the proposed listing is the Russian River from the confluence of Fife Creek to Dutch Bill Creek. This boundary extends significantly upstream of Monte Rio Beach, past Vacation Beach and almost to Johnson's Beach, which was also monitored by the Department of Health Services (DHS) for pathogens. Except for this last year, pathogens at Monte Rio Beach met the Basin Plan's water quality objective for bacteria for three years. The Agency recommends that the Russian River be listed on the watch list, rather than the 303(d) list, for pathogens, and the upstream boundary be adjusted downstream to include only Monte Rio Beach. The Agency also recommends that any listing be limited to summertime, based on the current data and seasonal use of the Russian River for contact recreation.

Laguna de Santa Rosa – Dissolved Oxygen (DO) and Nutrients

The 303(d) Recommendations proposes to list the Laguna de Santa Rosa for dissolved oxygen and nutrients. However, Regional Board staff is uncertain what is causing the low dissolved oxygen levels. The Regional Board's prioritization of basin planning issues lists consideration of revisions to the water quality objectives for dissolved oxygen and nutrients as a high priority, however staff time has not been allotted to complete this task by 2004. The Regional Board, in its review of Russian River water quality objectives for protection of salmonid species recommends that site-specific objectives for nutrients be developed.[6] The Agency is providing funding for Regional Board staff to prepare and submit for Regional Board consideration, a Basin Plan amendment for DO in 2002 and begin working on an amendment for nutrients after aluminum, temperature, DO, and sediment amendments are underway. The Agency recommends that the Laguna de Santa Rosa be included on the watch list only for dissolved oxygen and nutrients.

We apologize for the late comments on the 303(d) Recommendations. We ask that the Agency be added to the distribution list for 303(d) list correspondence so that our comments can be made in a more timely manner in the future. We thank you for your consideration of our suggestions.

Sincerely,

Pamela Jeane for

Randy D. Poole, P.E.
General Manager/Chief Engineer

c Debbie Webster, Pam Jeane, Renee Webber, Sean White, Shawn Chase, Jane Christensen, Amy Harris, Michelle Tattersall, Janet Melander

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[6] Regional Water Quality Control Board, North Coast Region, Review of the Russian River Water Quality Objectives for Protection of Salmonid Spruces Listed Under the Federal Endangered Species Act, August 18, 2000, p. 78.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
NORTH COAST REGION
Interoffice Communication

TO: File - Russian River Monitoring **DATE:** December 6, 1994

FROM: Theresa Wistrom

SUBJECT: Russian River Bacterial Levels

This memorandum serves to summarize the results of monitoring the Russian River for bacteria, from 1986 through 1994. It is an update to an Interoffice Communication of August 26, 1986 and to the discussion included in the "Interim Staff Report regarding Russian River Water Quality Monitoring" of January 27, 1993, pages 13 & 14, both of which are attached. In addition to summarizing the results of recent bacteriological monitoring on the Russian River, this memorandum will discuss two issues: 1) the determination of compliance to the Basin Plan bacterial objectives, and 2) impacts on the public health.

Monitoring

As in the past, Regional Board focus for monitoring has been during the summer months, the period of peak use for body contact recreation, and the period during which there is most interest regarding the impact of bacterial levels in the Russian River on the public health. Regional Board staff conducted limited monitoring to "spot-check" compliance to the numerical Basin Plan objective - the monitoring was not systematic, nor did it provide a thorough baseline for evaluation. The Sonoma County Health Department conducted more thorough monitoring of major bathing areas along the lower Russian River. The results of both Regional Board and Sonoma County Health Department bacteriological monitoring are included in files labelled "Bacteriological Data for Russian River, 1986- ," located in my cubicle.

Basin Plan Objective

The Basin Plan includes both narrative and numerical objectives for bacteria. The narrative objective is that the bacteriological quality of the Russian River not exceed natural background levels. The numerical objectives are: 1) that the median concentration of fecal coliform, based on a minimum of not less than five samples for any 30-day period, exceed 50/100 ml, and 2) that not more than ten percent of total samples taken during any 30-day period exceed 400/100 ml.

Implementation of the Narrative Objective - Natural Background Levels

The Basin Plan prohibits the discharge of waste, and thus the discharge of bacteria, to the Russian River and its tributaries during the period May 15 through September 30. The Regional Board and the health departments of Mendocino County and Sonoma County have enforced this prohibition the extent possible through waste discharge orders and septic tank ordinances. Regional Board waste discharge orders prohibit the municipalities and industries located on the Russian River watershed from discharging during the period May 15 through September 30, and require the dischargers to report on compliance to the prohibition. Between 1986 and 1994, no incidences of non-authorized discharges of waste by dischargers under Regional Board waste discharge orders to the seasonal waste discharge prohibition were reported or known to occur. However, malfunctioning septic systems, which may result in discharge to the Russian River, probably continue to occur. Whenever such discharges are identified, the health departments can and do initiate proceedings requiring repair, then if necessary, abatement. To attempt to identify and control malfunctioning septic systems affecting water quality and public health, the Mendocino County and Sonoma County health departments have in the past and continue to conduct areawide pollution prevention studies along the Russian River watershed. One such study currently underway is in the Forestville-Mirabel Heights area in Sonoma County. In addition, the Regional Board is attempting to develop a monitoring effort utilizing EPA Region IX laboratory services, to assess the impacts of Spring runoff and infiltration to the Russian River from the Fitch Mountain area upstream of Healdsburg Memorial Beach.

Nonpoint sources of pollution which may introduce bacteria to the river, which include urban and agricultrual runoff during storm events, are more difficult to assess and control. Regional Board efforts to minimize such impacts include: 1)

implementation of storm water pollution prevention measures as required in the federal Clean Water Act for industries and major municipal dischargers; and 2) active administration of grant funds for nonpoint source management programs under Clean Water Act Section 319(h) in the Russian River watershed. Most recently, on September 22, 1994, the Regional Board assigned a high priority ranking to a combination of two projects by the Sotoyome-Santa Rosa Resource Conservation District and Rancho Cotate High School involving Laguna De Santa Rosa animal waste projects and other lower Russian River tributary nonpoint source issues, and requested a total grant funding of $290,000 for the projects.

Compliance to the Numerical Objective - Median Fecal Coliform MPN of 50/100 ml

Measurements to assess compliance to the numerical objective taken along the Russian River are summarized below as well as in Tables 1-13 and Figures 1-3.

LOCATION	DESCRIPTION	YEARS SAMPLED	COMPLIANCE
Talmage Cloverdale Geyserville	Undisturbed areas. Not major swimming areas.	1992	"Spot check" sampling indicated compliance.
Del Rio Woods	Location of a summer dam. Receives moderate use for swimming.	1989	One of six sampling sets exceeded the objective. There was no difference in the results from above or below the summer dam.
Camp Rose	Water backs up when summer dam at Healdsburg Memorial Beach is in place. Not a major swimming area.	1994	"Spot-Check" sampling indicated compliance.
Healdsburg Memorial Beach	Location of a summer dam. Major swimming area.	1986-94	Exceedances of the objective occurred consistently at several locations; of 122 sampling sets, 88 (72%) exceeded the objective. Results of an intenstive sampling of the "Kids' Area" in August and September 1994 indicated exceedance of the objective in 9 of 9 (100%) of the sampling sets. See Figure 1.
Burke's Beach Hilton Park Odd Fellows Midway Beach	No summer dams. Receive moderate use for swimming.	1992-94	Exceedance of the objective occurred in 1 of 19 (5.2%) sampling sets at Burke's Beach, 10 of 21 (47.6%) at Hilton Park, 0 of 3 sampling sets at Odd Fellows, and 7 of 21 (33.3%) sampling sets at Midway Beach.
Johnson's Beach	Location of a summer dam. Major swimming area.	1986-94	Exceedance of the objective occurred in 37 of 85 (44%) of the sampling sets. There were no observable differences in bacterial levels in the upstream, swim area, and downstream locations sampled. Levels observed in May and June appear generally higher than other months. See Figure 2.
Monte Rio Beach	Location of a summer dam. Receives moderate to heavy use for swimming.	1992-94	Exceedance of the objective occurred in 18 of 24 (75%) of the sampling sets. See Figure 3.
Casini Ranch	No summer dam. Water backs up when mouth of Russian River is blocked. Not a major swimming area.	1992-94	Exceedance of the objective occurred in 9 of 25 (35%) of the sampling sets, all of which occurred from July 1992 to July 1993. Sampling sets between August 1993 through August 1994 indicated compliance with the objective.

Compliance to the Numerical Objective - 10% of samples taken within a 30-day period not to exceed Fecal Coliform MPN of 400/100 ml

The monitoring did not specifically check for compliance to this objective. However, fecal coliform bacterial levels exceeding 400/100 ml. occurred at the following locations and frequencies.

LOCATION	OCCURRENCE OF SAMPLES WITH FECAL COLIFORM LEVELS GREATER THAN 400/100 ml.
Healdsburg Memorial Beach	6.6%
Hilton Park	One
Odd Fellows	One
Midway Beach	One
Johnson's Beach	1.8%
Casini Ranch	31% between July 1992 and July 1993 None from August 1993 to August 1994

Public Health

The Statewide Conference of Directors of Environmental Health developed fecal coliform standards for freshwater recreation in 1973. The standards describe "recommended" and "action" levels of 50/100 ml and 200/100 ml respectively. The recommendations call for "investigations to commence into the causes" when the recommended level is exceeded, and the application of public warning or restrictions when the action level is exceeded. Federal criteria for full body contact are different than the statewide standards. Prior to 1986, they called for a log mean of not less than five samples over a 30-day period not to exceed a fecal coliform concentration of 200 per 100 ml, and not more than 10% of total samples over a 30-day period to exceed 400/100 ml. The EPA developed new criteria in 1986, which called for measurements of E. coli and enterococci rather than fecal coliform bacteria, based on findings nationwide of better correlation to swimming-associated gasteroenteritis at both marine and freshwater bathing beaches. The State, however, has not adopted the new criteria for E. coli and enterococcus.

Based on recommendations from the State Department of Health Services, the Sonoma County Department of Public Health has chosen to continue sample bathing areas along the Russian River for fecal coliform bacteria and not for E. coli or enterococci. Results in the area of most concern, Healdsburg Memorial Beach, indicated the need for increased sampling, which was subsequently implemented by the Sonoma County Health Department, and no further action.

Conclusions

Spot checks for background levels of fecal coliform bacteria indicated compliance with Basin Plan objectives in areas along the Russian River which are not heavily used or influenced by summer dams. However, the numerical objective of 50/100 ml fecal coliform bacteria was exceeded at times (ranging from 44% to 75% of sampling sets) in high-use bathing areas, and in areas with summer dams along the Russian River (Healdsburg Memorial Beach, Johnson's Beach, and Monte Rio Beach. These bathing areas received increased monitoring for public health purposes. Assessment of the results by Sonoma County Health Department, based on guidance provided by the State Department of Health Services, indicated that no action with respect to public warning or restriction was warranted.

Figure 1. Fecal Coliform MPN/100 ml at Healdsburg Memorial Beach

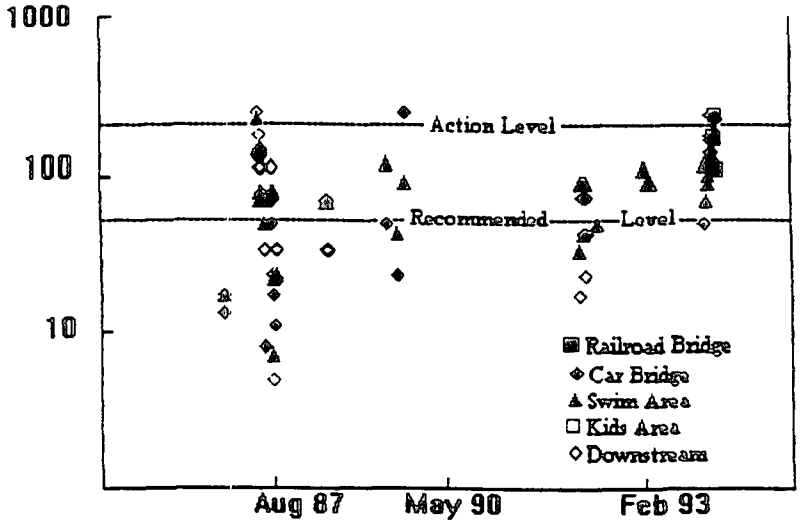

Figure 2. Median Fecal Coliform MPN/100 ml at Johnson's Beach

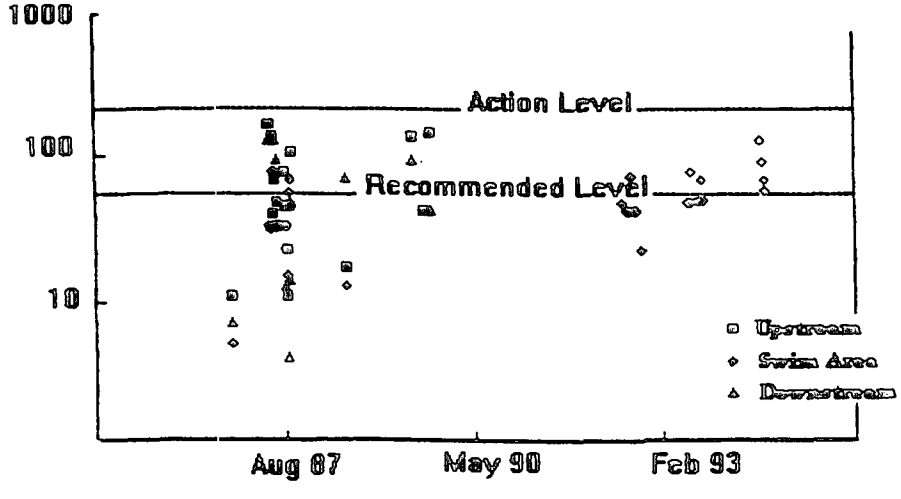

Figure 3. Median Fecal Coliform MPN/100 ml at Monte Rio Beach

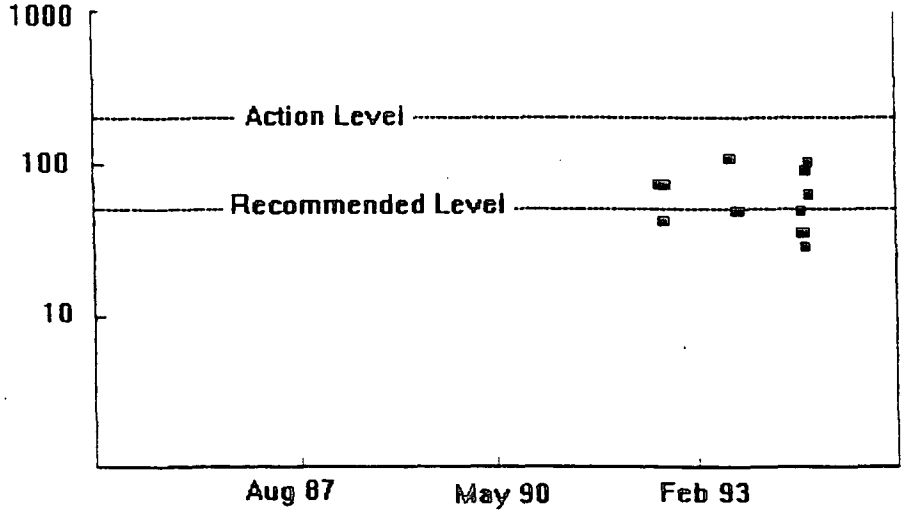

Table 1. Talmage

Date	Median Fecal Coliform MPN/100ml.
30-Jun-92	21.5
13-Oct-92	46

Table 2. Cloverdale

Date	Median Fecal Coliform MPN/100ml.
13-Oct-92	23

Table 3. Geyserville

Date	Median Fecal Coliform MPN/100ml.
13-Oct-92	5

Table 4. Del Rio Woods

Date	Median Fecal Coliform MPN/100ml.	
	Upstream	Downstream
12-Jun-89	170	33
07-Aug-89	9	23
18-Sep-89	23	9

Table 5. Camp Rose

Date	Median Fecal Coliform MPN/100 ml.
30-Jun-94	33

Table 6. Healdsburg Memorial Beach

Date	Median Fecal Coliform MPN/100 ml.				
	Upstream Railroad Bridge	Upstream Car Bridge	Swim Area	Kids' Area	Downstream
28-Oct-86		13	17		17
19-May-87		130	220		240
27-May-87		130	70		170
02-Jun-87		140	79		110
09-Jun-87		140	70		110
17-Jun-87		130	70		79
22-Jun-87		8	70		33
30-Jun-87		8	49		33
11-Aug-87		70	79		110
12-Aug-87		49	22		23
19-Aug-87		17	7		5
26-Aug-87		11	79		11
01-Sep-87		22	23		33
23-Jun-88		70	69		33
30-Jun-88		70	69		33
12-Jun-89		49	120		
07-Aug-89		23	43		
18-Sep-89		240	93		
30-Jun-92			33		17
20-Jul-92			93		
27-Jul-92		75	93		43
27-Jul-92			43		
03-Aug-92		43	93		23
10-Aug-92		75			23
17-Aug-92		75			
24-Aug-92		75			43
13-Oct-92			49		
13-Jul-93			110		
20-Jul-93			110		
27-Jul-93			<110		
03-Aug-93			92		
10-Aug-93			92		
17-Aug-92			92		
24-Aug-93			92		
31-Aug-93			92		
30-Jun-94		49	120		
05-Jul-94			71		
12-Jul-94			71		
19-Jul-94			92		
20-Jul-94			106		
26-Jul-94			120		
27-Jul-94			140		
29-Jul-94		230	120		
01-Aug-94		170	120		161
03-Aug-94		110	120		140
05-Aug-94	<110		120		161
08-Aug-94		110	140	>230	140
15-Aug-94	110	110	140	>225	161
17-Aug-94	170	110	120	>230	161
22-Aug-94	230	<110	190	>225	161
24-Aug-94	<110			>230	161
26-Aug-94		110		>225	<140
29-Aug-94			190	>220	<165
31-Aug-94		110		165	220
02-Sep-94		110		110	220

Table 7. Burkes Beach

Date	Median Fecal Coliform MPN/100 ml.
27-Jul-92	23
03-Aug-92	23
10-Aug-92	23
17-Aug-92	23
24-Aug-92	23
31-Aug-92	23
08-Sep-92	43
14-Sep-92	23
13-Jul-93	110
05-Jul-94	22
12-Jul-94	22
19-Jul-94	22
20-Jul-94	16
26-Jul-94	16
01-Aug-94	16
08-Aug-94	16
15-Aug-94	16
22-Aug-94	22
29-Aug-94	22

Table 8. Hilton Park

Date	Median Fecal Coliform MPN/100 ml.
27-Jul-92	75
03-Aug-92	75
10-Aug-92	75
17-Aug-92	75
24-Aug-92	43
31-Aug-92	43
08-Sep-92	93
14-Sep-92	93
13-Jul-93	100
20-Jul-93	100
27-Jul-93	<110
03-Aug-93	<110
10-Aug-93	36
17-Aug-93	36
24-Aug-93	36
31-Aug-93	22
20-Jul-94	51
26-Jul-94	51
01-Aug-94	31
08-Aug-94	11
15-Aug-94	11
22-Aug-94	11
29-Aug-94	22

Table 9. Odd Fellows

Date	Median Fecal Coliform MPN/100 ml.
30-Jun-92	13
13-Oct-92	23
30-Jun-94	33

Table 10. Midway Beach

Date	Median Fecal Coliform MPN/100 ml.
27-Jul-92	93
03-Aug-92	93
17-Aug-92	93
24-Aug-92	43
31-Aug-92	23
08-Sep-92	23
14-Sep-92	23
13-Jul-93	110
20-Jul-93	<110
27-Jul-93	<110
03-Aug-93	92
10-Aug-93	92
17-Aug-93	22
24-Aug-93	22
31-Aug-93	22
05-Jul-94	51
12-Jul-94	36
19-Jul-94	36
20-Jul-94	29
26-Jul-94	29
01-Aug-94	29
08-Aug-94	29
15-Aug-94	29

Table 11. Johnsons Beach

Date	Median Fecal Coliform MPN/100 ml.		
	Upstream	Swim Area	Downstream
28-Oct-86	11	5	7
19-May-87	170	33	130
27-May-87	170	31	130
02-Jun-87	40	79	130
09-Jun-87	140	79	130
17-Jun-87	70	79	130
22-Jun-87	49	32	95
30-Jun-87	33	32	49
11-Aug-87	46	33	13
12-Aug-87	79	23	
19-Aug-87	11	33	11
26-Aug-87	23	15	4
01-Sep-87	46	57	14
08-Sep-87	110	70	49
23-Jun-88	17	13	72
30-Jun-88	17	13	72
12-Jun-89	140		95
07-Aug-89	43		43
18-Sep-89	150		43
30-Jun-92		49	
27-Jul-92		43	
03-Aug-92		43	
10-Aug-92		43	
17-Aug-92		75	
24-Aug-92		75	
31-Aug-92		43	
08-Sep-92		43	
14-Sep-92		43	
13-Oct-92		23	
10-Jun-93		49	
15-Jun-93		49	
17-Jun-93		49	
23-Jun-93		49	
28-Jun-93		49	
29-Jun-93		80	
13-Jul-93		<110	
20-Jul-93		<110	
27-Jul-93		<73	
03-Aug-93		51	
10-Aug-93		51	
17-Aug-93		51	
24-Aug-93		69	
31-Aug-93		51	
30-Jun-94		130	
05-Jul-94		92	
12-Jul-94		92	
19-Jul-94		69	
20-Jul-94		60	
26-Jul-94		51	
01-Aug-94		51	
08-Aug-94		44	
15-Aug-94		44	
22-Aug-94		22	
29-Aug-94		22	

Table 12. Monte Rio Beach

Date	Median Fecal Coliform MPN/100 ml.
27-Jul-92	75
03-Aug-92	75
10-Aug-92	75
17-Aug-92	43
24-Aug-92	75
31-Aug-92	43
08-Sep-92	75
14-Sep-92	75
13-Jul-93	110
20-Jul-93	110
27-Jul-93	110
03-Aug-93	<110
10-Aug-93	51
17-Aug-93	51
24-Aug-93	51
31-Aug-93	51
30-Jun-94	51
05-Jul-94	36
12-Jul-94	36
19-Jul-94	36
20-Jul-94	29
26-Jul-94	92
01-Aug-94	92
08-Aug-94	106
15-Aug-94	64

Table 13. Casini Ranch

Date	Median Fecal Coliform MPN/100 ml.
27-Jul-92	460
03-Aug-92	210
10-Aug-92	460
17-Aug-92	210
24-Aug-92	210
31-Aug-92	150
08-Sep-92	9
14-Sep-92	9
13-Jul-93	110
20-Jul-93	110
27-Jul-93	110
03-Aug-93	<110
10-Aug-93	36
17-Aug-93	36
24-Aug-93	36
31-Aug-93	22
05-Jul-94	22
12-Jul-94	11
19-Jul-94	11
20-Jul-94	16
26-Jul-94	16
01-Aug-94	28
08-Aug-94	28
15-Aug-94	<28
22-Aug-94	29
29-Aug-94	<11

INTERIM STAFF REPORT

regarding

RUSSIAN RIVER WATER QUALITY MONITORING

by

North Coast Regional Water Quality Control Board
5550 Skylane Boulevard
Santa Rosa, California 95403

January 27, 1993

Pages 13 & 14:

B. BACTERIOLOGICAL

Prior to and including 1976, fecal coliform levels in the Russian River, from Alexander Valley to Duncans Mills, consistently exceeded the Basin Plan's water quality objective for body contact recreation (fecal coliform MPN/100 ml of 50 or less for a median of five samples taken within a 30-day period). From 1985 to 1991, the objective was met in the Russian River with few exceptions. However, the results of more intensive monitoring of popular swimming areas in the lower Russian River by the Sonoma County Health Department during the peak of the recreational season in 1992 revealed exceedances of the Basin Plan objective for bacteria. The data suggests that the higher bacterial levels were localized to the most popular swimming areas, and are the result of high public use. These results raise concerns from both a water quality and public health perspective. This area of concern needs to be monitored closely early on in the next recreational season.

Increased levels of fecal coliform bacteria in surface waters can and do result from malfunctioning individual wastewater disposal systems.

Malfunctioning individual wastewater disposal systems are abated through the Sonoma County and Mendocino County Health Departments. In addition, the discharge of wastewater from existing or new individual systems utilizing subsurface disposal have been prohibited in areas of Sonoma and Mendocino Counties which have known problems with on-site wastewater disposal. Waiver prohibition areas have also been established by the local health departments in areas where geographical conditions may threaten or result in health hazards or water quality impairment.

California Regional Water Quality Control Board
North Coast Region

Interoffice Communication

TO: Ben Kor
Bob Tancreto
Luis Rivera

DATE: August 26, 1986

FROM: Ron Church

SUBJECT: North Coastal Basin (1B) Water Quality Control Plan (Basin Plan) Bacteriological Objectives and Bacterial Concentrations in the Russian River

The Regional Board's public report of July 15, 1986 (which see) on amending the Basin Plan clearly identified "water contact recreation" and "intense recreational use" as being among the highest possible uses of the Russian River. Also, the report reflected the theme that it is imperative to protect those high uses through maintaining or enhancing water quality.

The Basin Plan, as presently written, includes bacteriological objectives to protect water contact recreation. There is one encompassing, narrative objective based on the nondegradation (of water quality) principle and a second specific, numerical one. The objectives are quoted below:

(i) The bacteriological quality of waters of the North Coast Region shall not be degraded beyond natural background levels.

(ii) . . . In no case shall coliform concentrations in waters of the North Coast Region exceed the following:

In waters designated for contact recreation (Rec 1), the median fecal coliform concentration based on a minimum of not less than five samples for any 30-day period shall not exceed 50/100 ml, nor shall more than ten percent of total samples during any 30-day period exceed 400/100 ml.[1, 2]

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[1] California Department of Public Health, Bureau of Sanitary Engineers. 1973. Memorandum report on fecal coliform standards for freshwater recreation. April 1973. 10 pp + attached tables.

"The recommended level is an attainable level of assured safe water quality based on all available data. Where the recommended level is exceeded, investigation should commence into the causes." (Italics added.)

"The action level is a level of water quality which approaches that which may be undesirable for water contact recreation. It is the level above which public warning or restrictions should be applied." (Italics added.)

The numerical fecal coliform objective is relatively stringent and specific as far as water contact recreation indicator levels are concerned. It probably can be attained in the Russian River (main stem) through continued good water quality control and waste management.

Between 1973 and 1978, the Regional Board either independently conducted or cooperated with other agencies in water quality studies[3] to support its regulatory functions in the Russian River system. Based on those studies, it appears that the fecal coliform objective was generally met beginning in the spring of 1975 and continued during successive low-flow seasons[4] through the summer of 1978. These observations have since been repeated at some sampling stations in 1985. Table 1 illustrates this rather wide-spread attainment of the 50 MPN/100 ml objective in the watershed; approximately 88 river-miles are involved, ranging from Lake Mendocino near Ukiah to Duncan Mills near the Pacific Ocean. Figure 1 shows the sampling station network and some general geographic features of the Russian River basin.

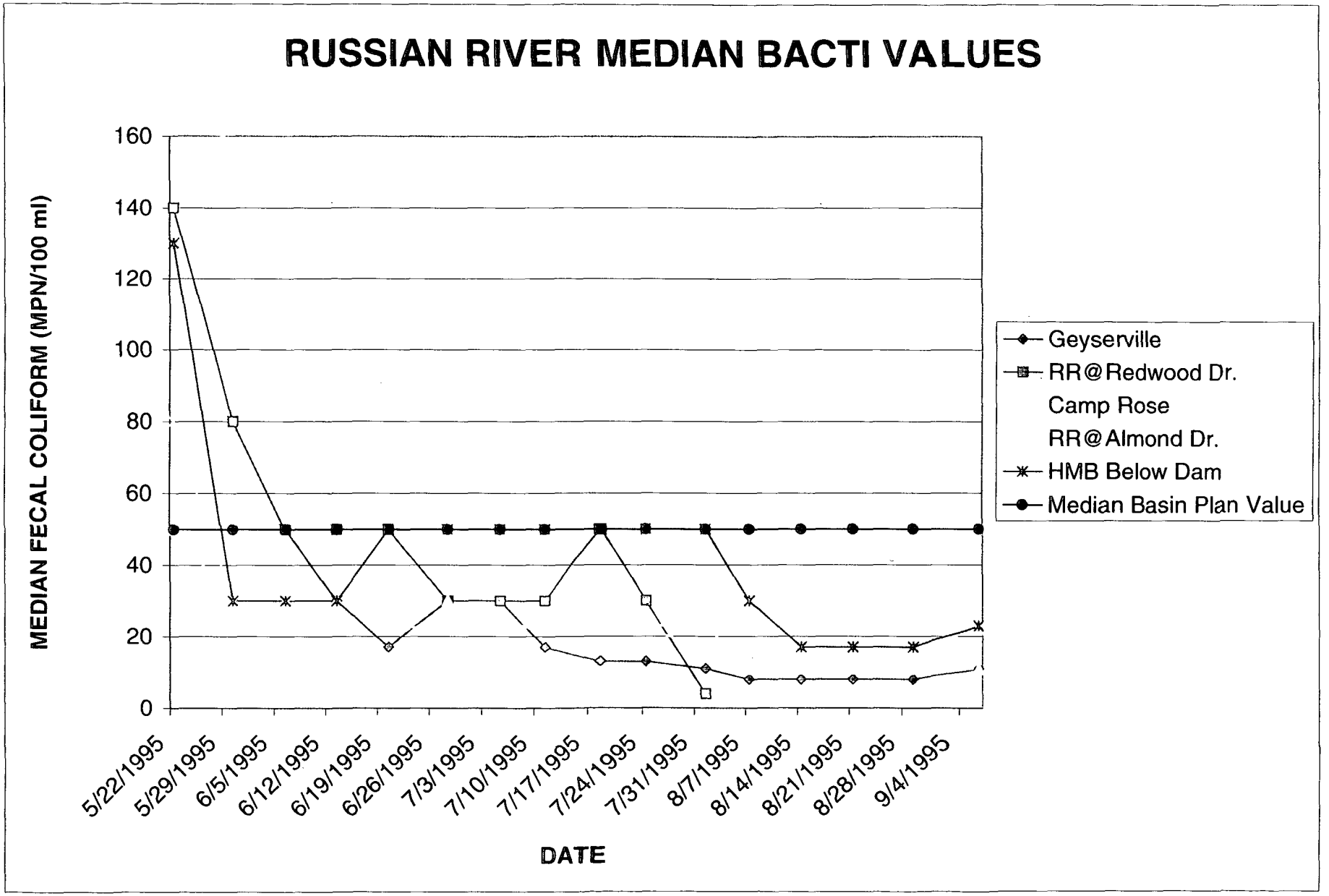
Fecal coliform conditions in Mark West Creek near Mirable Heights (Xs all the way across in Table 1) warrant special notice; the objective was not met there. The Mark West Creek site is very near the creek's confluence with the Russian River. Mark West Creek carries the entire flow of Laguna de Santa Rosa, which meanders through a peneplain with many potential sources of fecal coliforms from urban and rural runoff. (Laguna de Santa Rosa is also the immediate receiving water for a regional wastewater treatment plant when surface water discharges are permitted.) Mark West Creek and Laguna de Santa Rosa are protected by the bacterial objectives, at least the narrative one about not exceeding natural background levels. However, lower Mark West Creek and Laguna de Santa Rosa waters may never meet either coliform objective in the summertime[5] (or anytime) unless land use practices change significantly — and perhaps not even then. Nevertheless, the Russian River downstream of its confluence with Mark West Creek evidently can meet the fecal coliform objective (probably mainly by dilution). (See Figure 2)

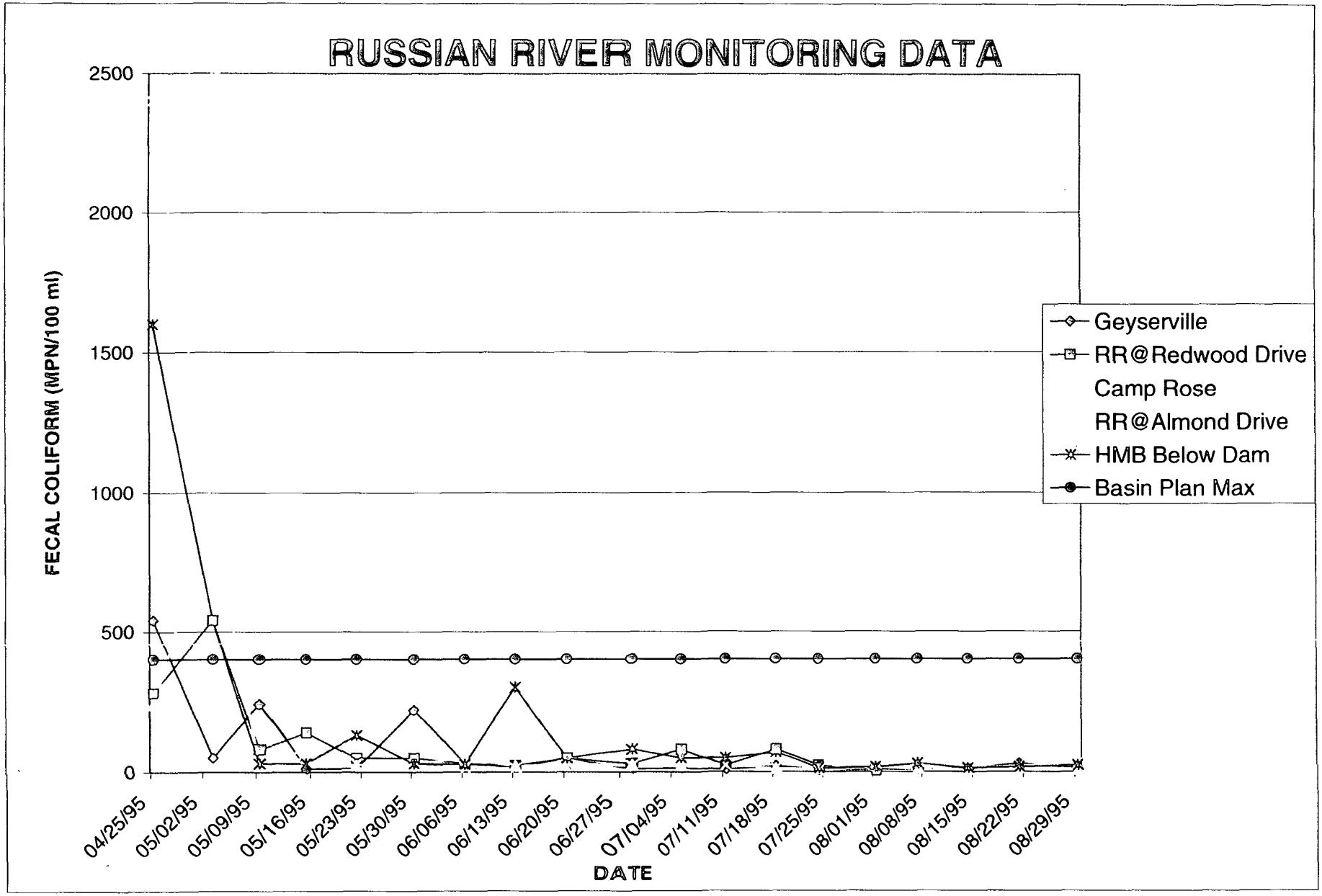
These standards were developed by the Bureau for the Statewide Conference of Directors of Environmental Health; they were recommended by the Bureau for trial application. The numerical fecal coliform "recommended" and "action" levels of 50/100 ml and 200/100 ml, respectively, are not presently officially adopted criteria of the Bureau of the Department of Health [Services]. Nevertheless, the standards are considered valid and applicable to the Russian River because they were formulated by experts using the best available information.

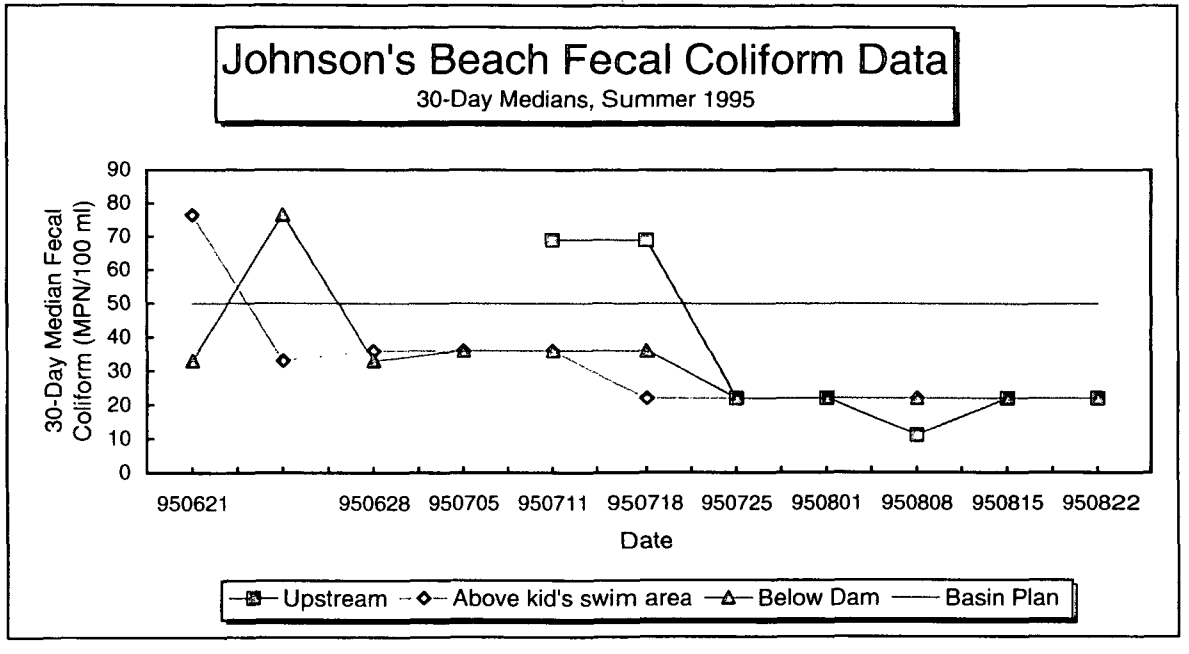
2 The concentrations are in terms of MPN/100 ml of water.

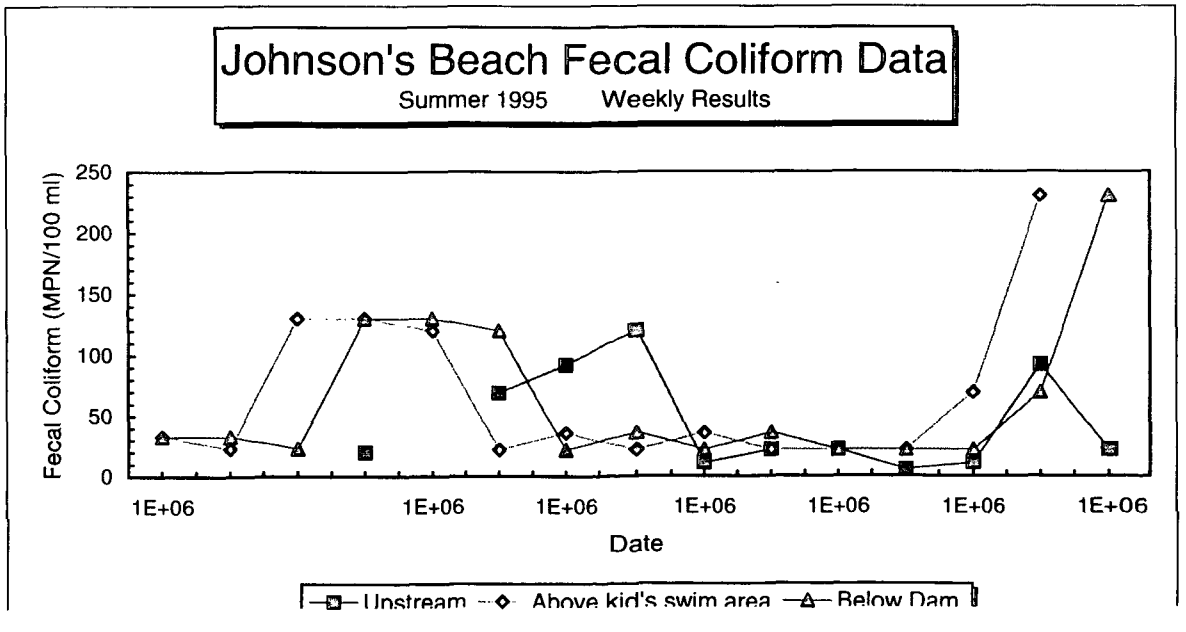
3 That work is reported in Sylvester, M.A., and R. L. Church. 1984. A water quality study of the Russian River basin during the low-flow seasons, 1973-78, Sonoma and Mendocino Counties, California. U.S. Geological Survey, Water-Resources Investigations Report 83-4174. VIII + 106 pp.

4 Low-flow seasons here mean May 15-September 30, which are in the Russian River area generally recognized as the main water contact recreation season.


RUSSIAN RIVER MEDIAN BACTI VALUES
MEDIAN FECAL COLIFORM (MPN/100 ml)
160
140
120
100
80
60
40
20
0
5/22/1995
5/29/1995
6/5/1995
6/12/1995
6/19/1995
6/26/1995
7/3/1995
7/10/1995
7/17/1995
7/24/1995
7/31/1995
8/7/1995
8/14/1995
8/21/1995
8/28/1995
9/4/1995
DATE
Geyserville
RR@Redwood Dr.
Camp Rose
RR@Almond Dr.
HMB Below Dam
Median Basin Plan Value

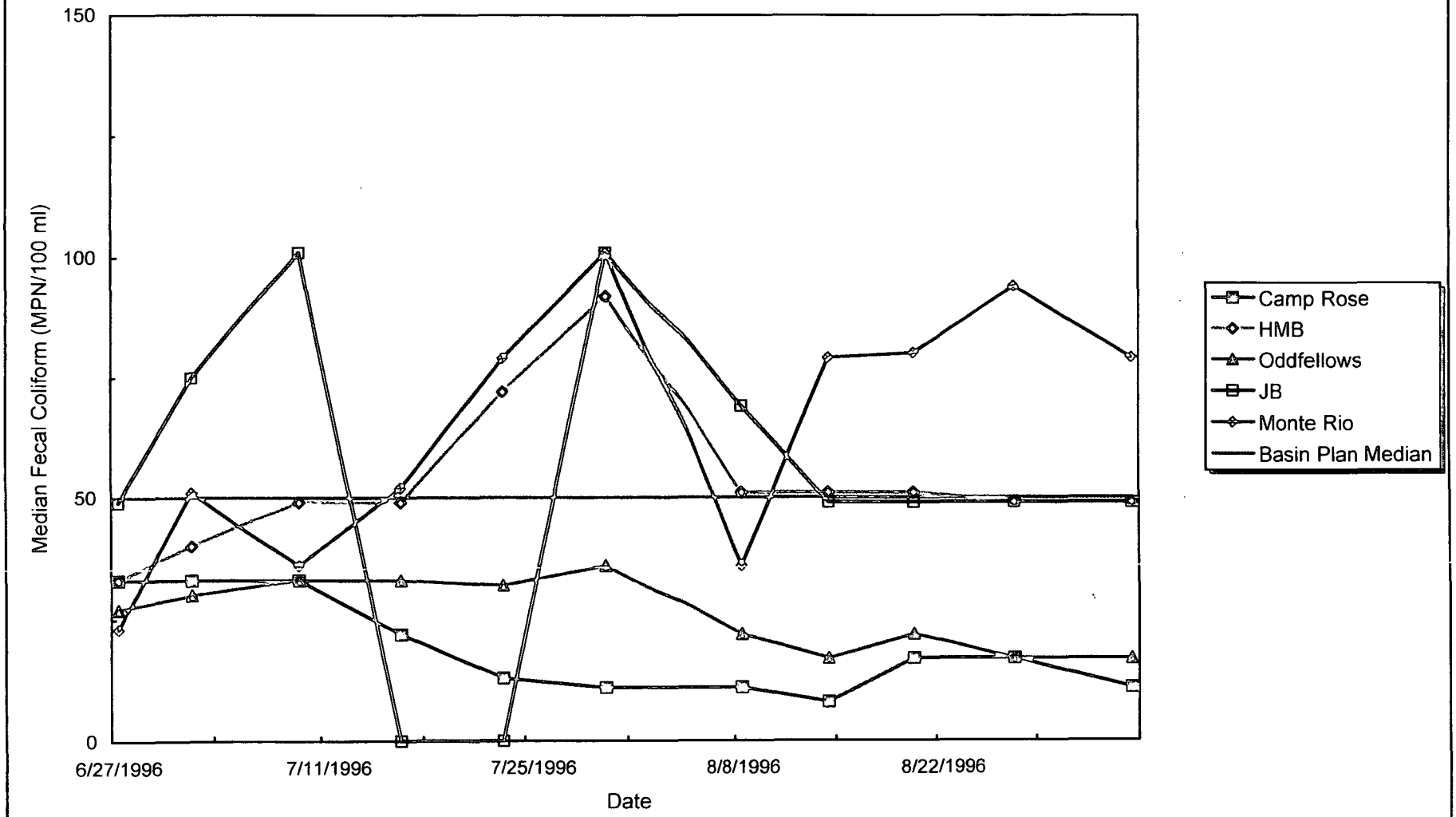

RUSSIAN RIVER MONITORING DATA
FECAL COLIFORM (MPN/100 ml)
2500
2000
1500
1000
500
0
04/25/95
05/02/95
05/09/95
05/16/95
05/23/95
05/30/95
06/06/95
06/13/95
06/20/95
06/27/95
07/04/95
07/11/95
07/18/95
07/25/95
08/01/95
08/08/95
08/15/95
08/22/95
08/29/95
DATE
Geyserville
RR@Redwood Drive
Camp Rose
RR@Almond Drive
HMB Below Dam
Basin Plan Max

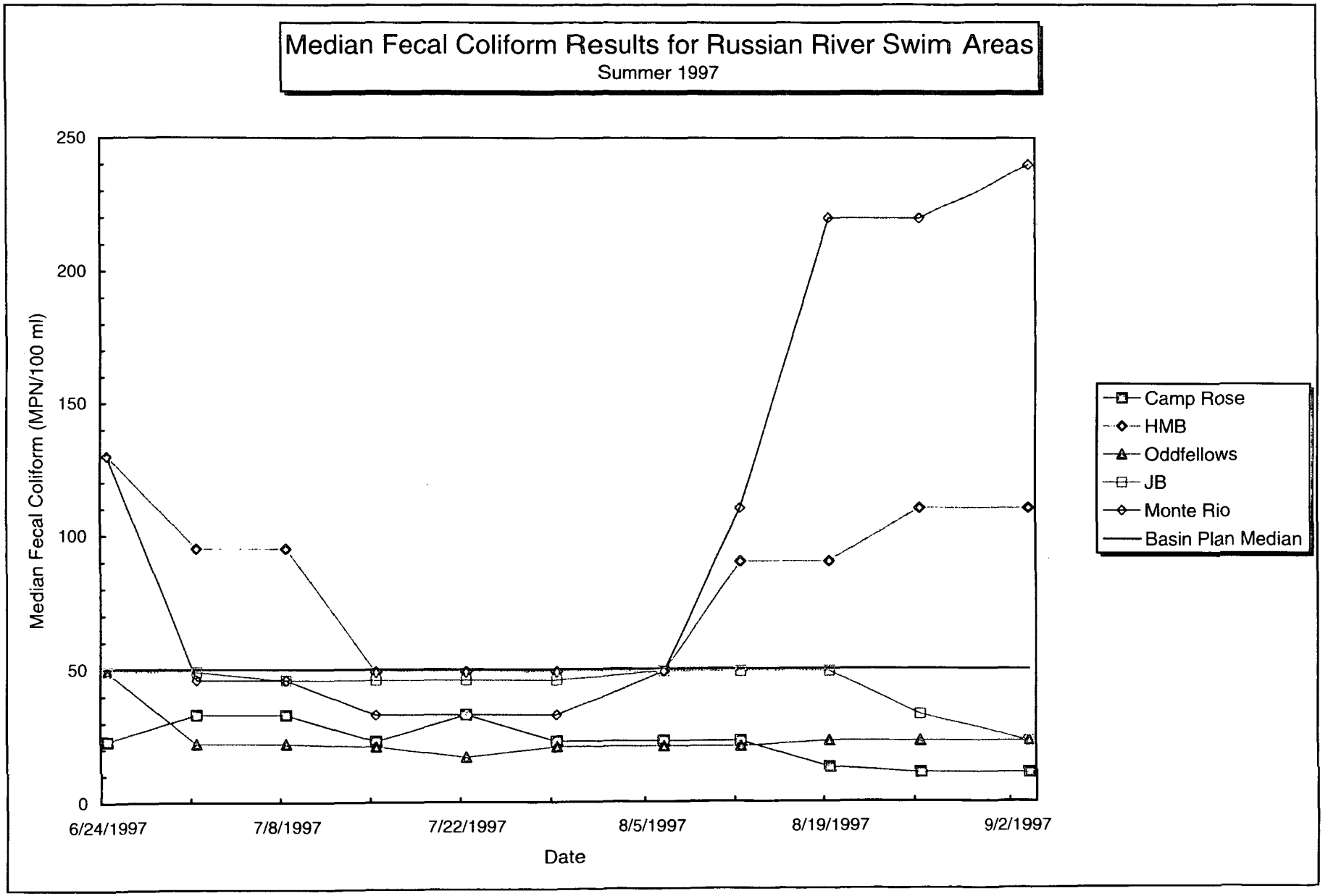

Johnson's Beach Fecal Coliform Data
30-Day Medians, Summer 1995
30-Day Median Fecal Coliform (MPN/100 ml)
90
80
70
60
50
40
30
20
10
0
950621
950628
950705
950711
950718
950725
950801
950808
950815
950822
Date
Upstream
Above kid's swim area
Below Dam
Basin Plan


Johnson's Beach Fecal Coliform Data
Summer 1995 Weekly Results
Fecal Coliform (MPN/100 ml)
250
200
150
100
50
0
1E+06
1E+06
1E+06
1E+06
1E+06
1E+06
1E+06
Date
Upstream
Above kid's swim area
Below Dam

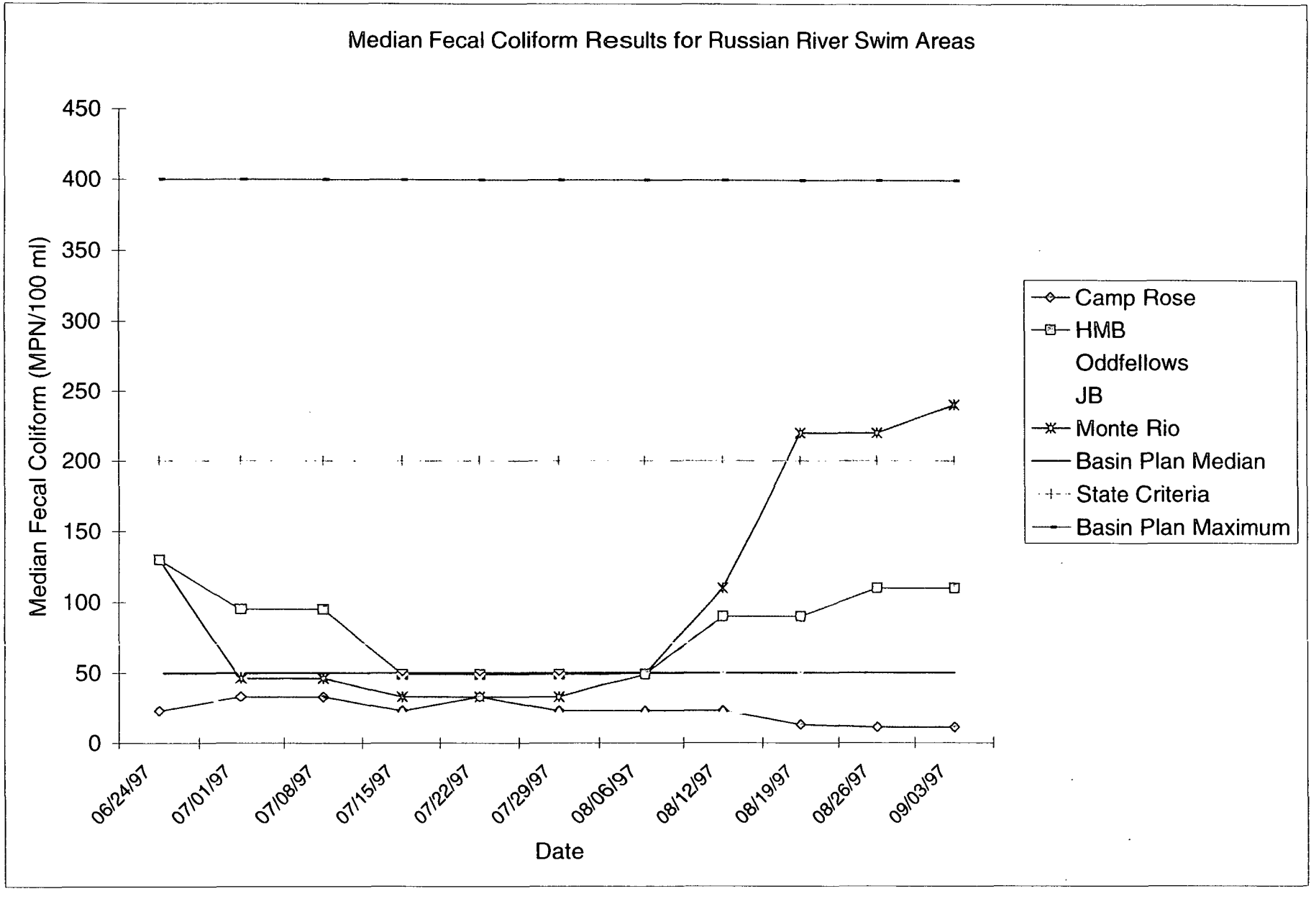
Median Fecal Coliform Results for Russian River Swim Areas

Summer, 1996



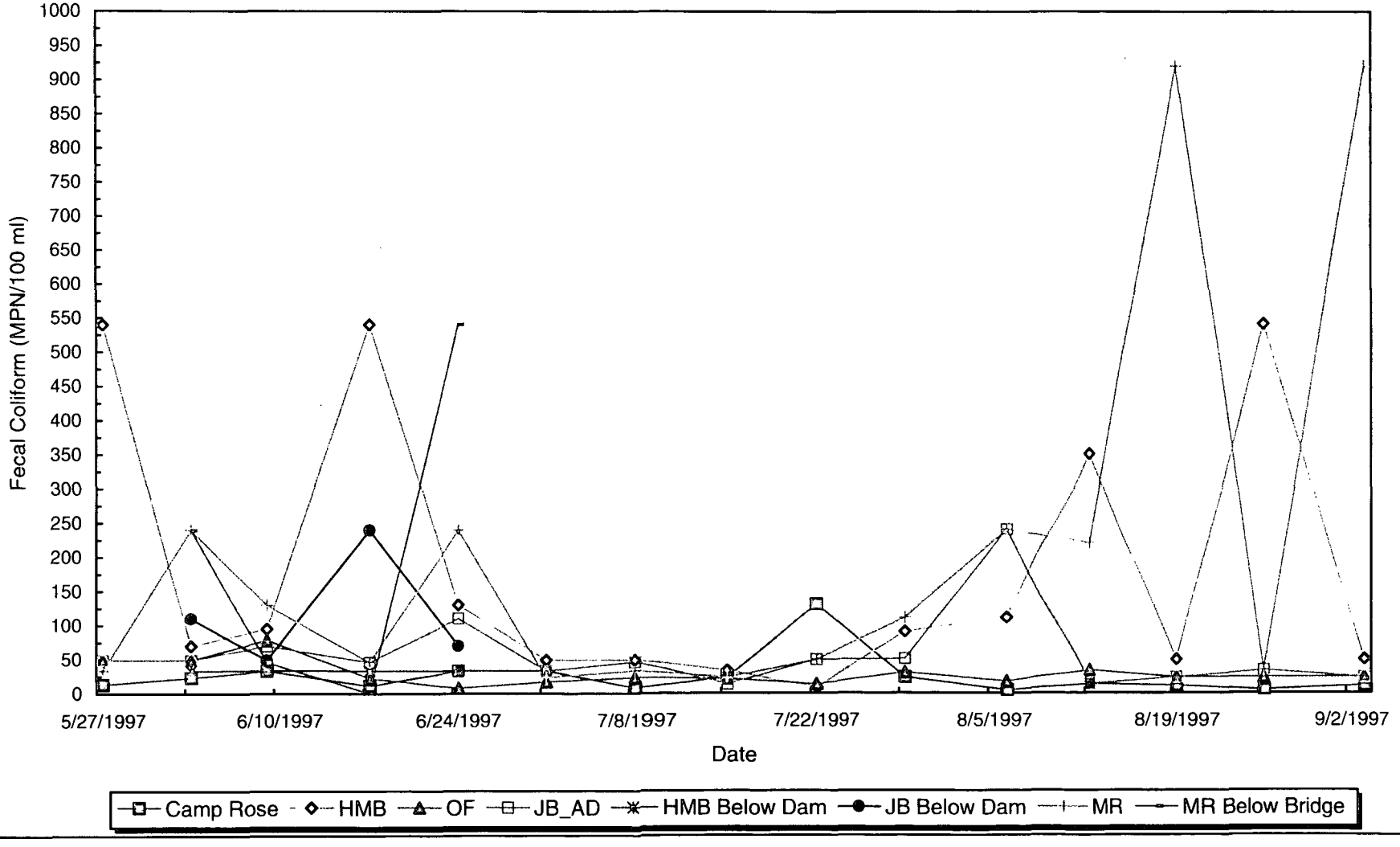

Median Fecal Coliform Results for Russian River Swim Areas
Summer 1997
Median Fecal Coliform (MPN/100 ml)
250
200
150
100
50
0
6/24/1997
7/8/1997
7/22/1997
8/5/1997
8/19/1997
9/2/1997
Date
Camp Rose
HMB
Oddfellows
JB
Monte Rio
Basin Plan Median

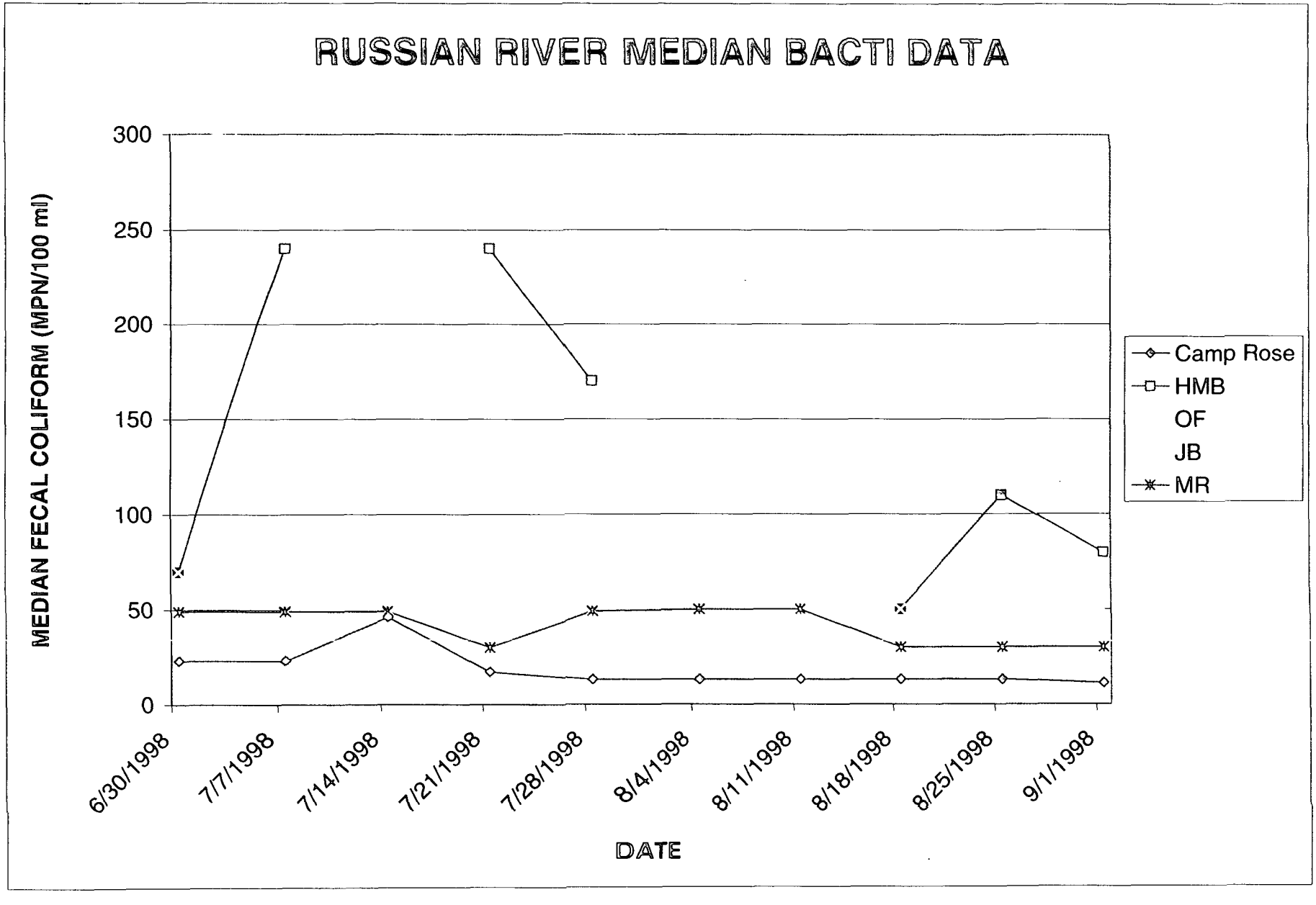
Graphs CHART 4

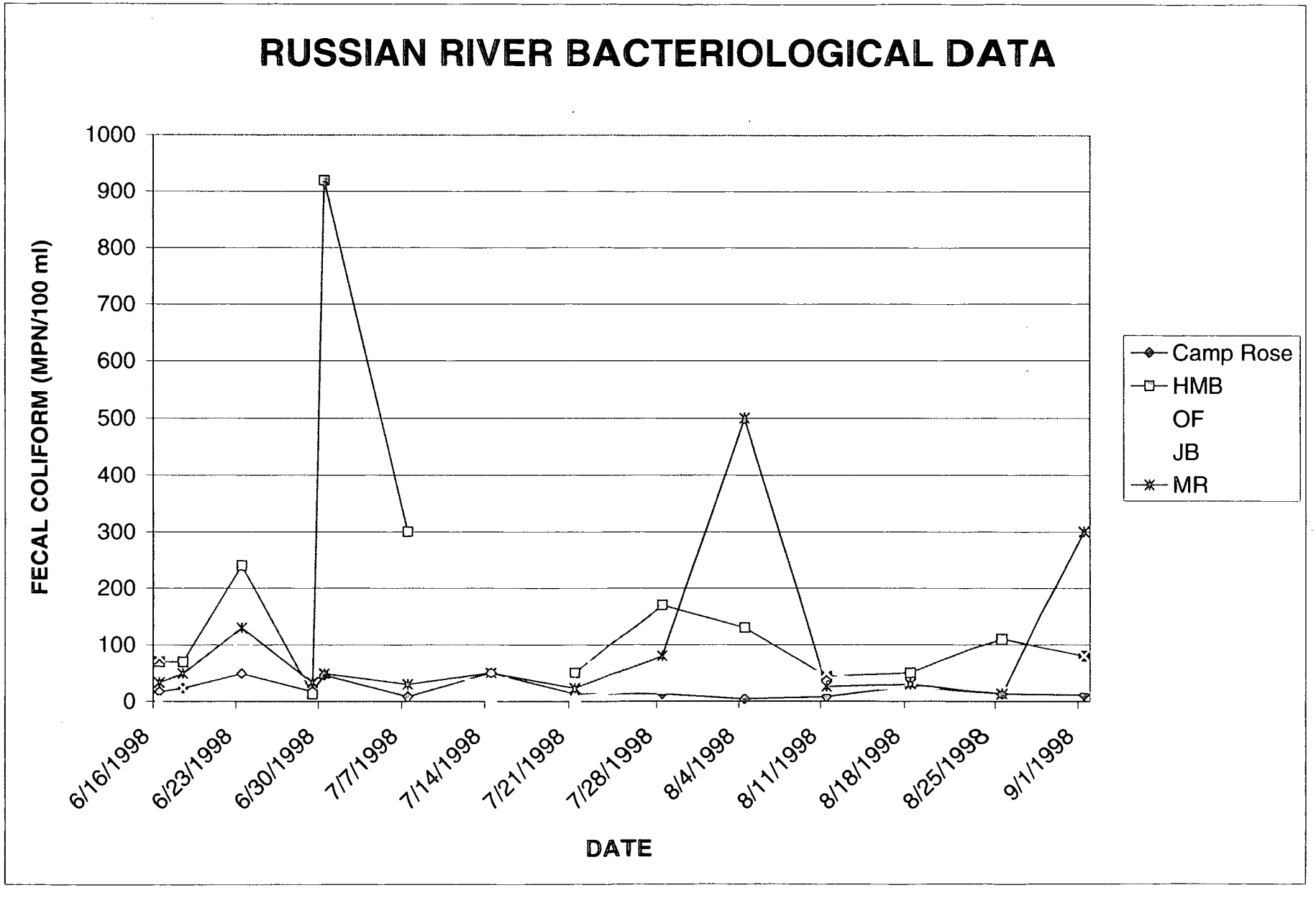


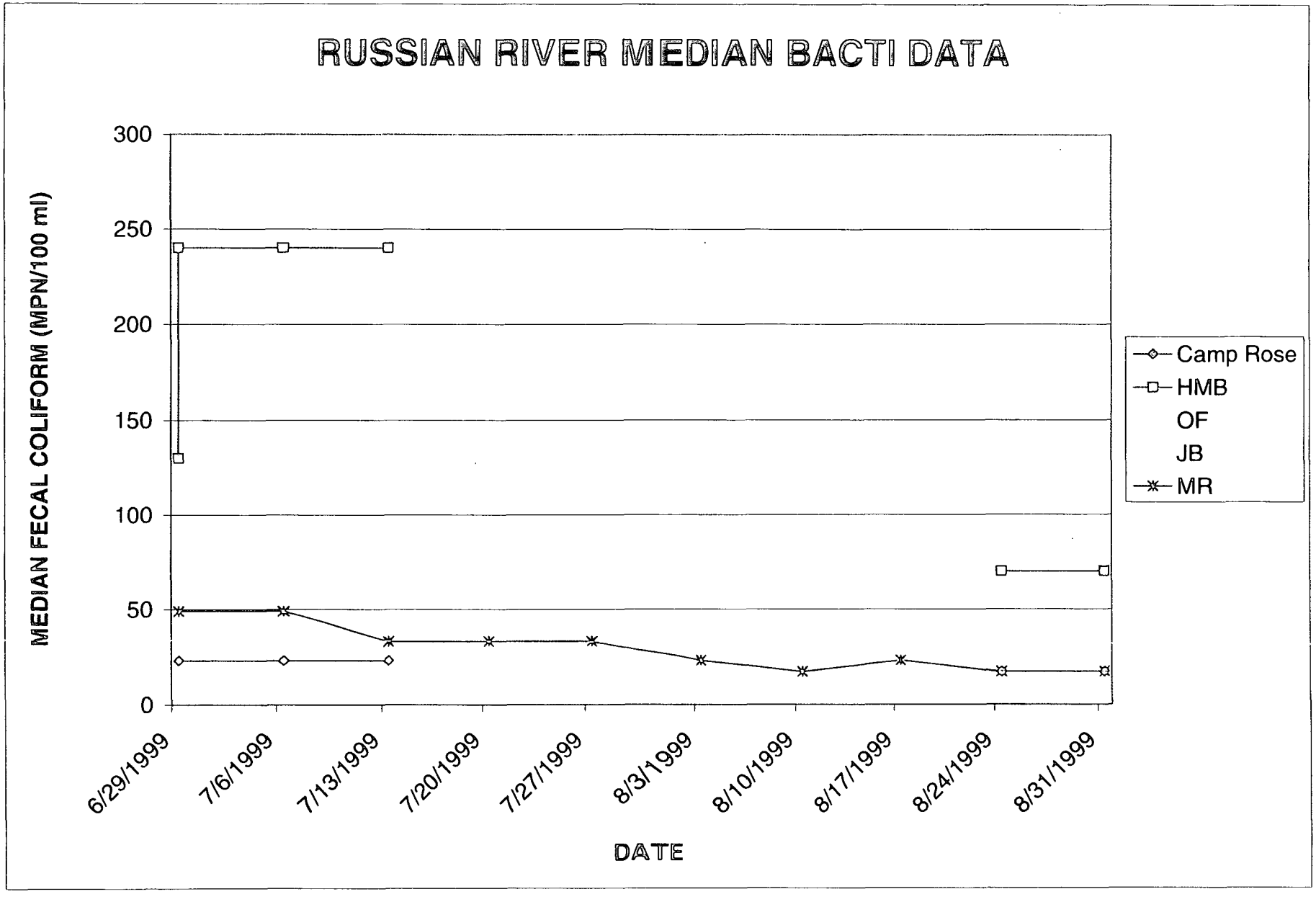
Fecal Coliform Results for Russian River Swim Areas

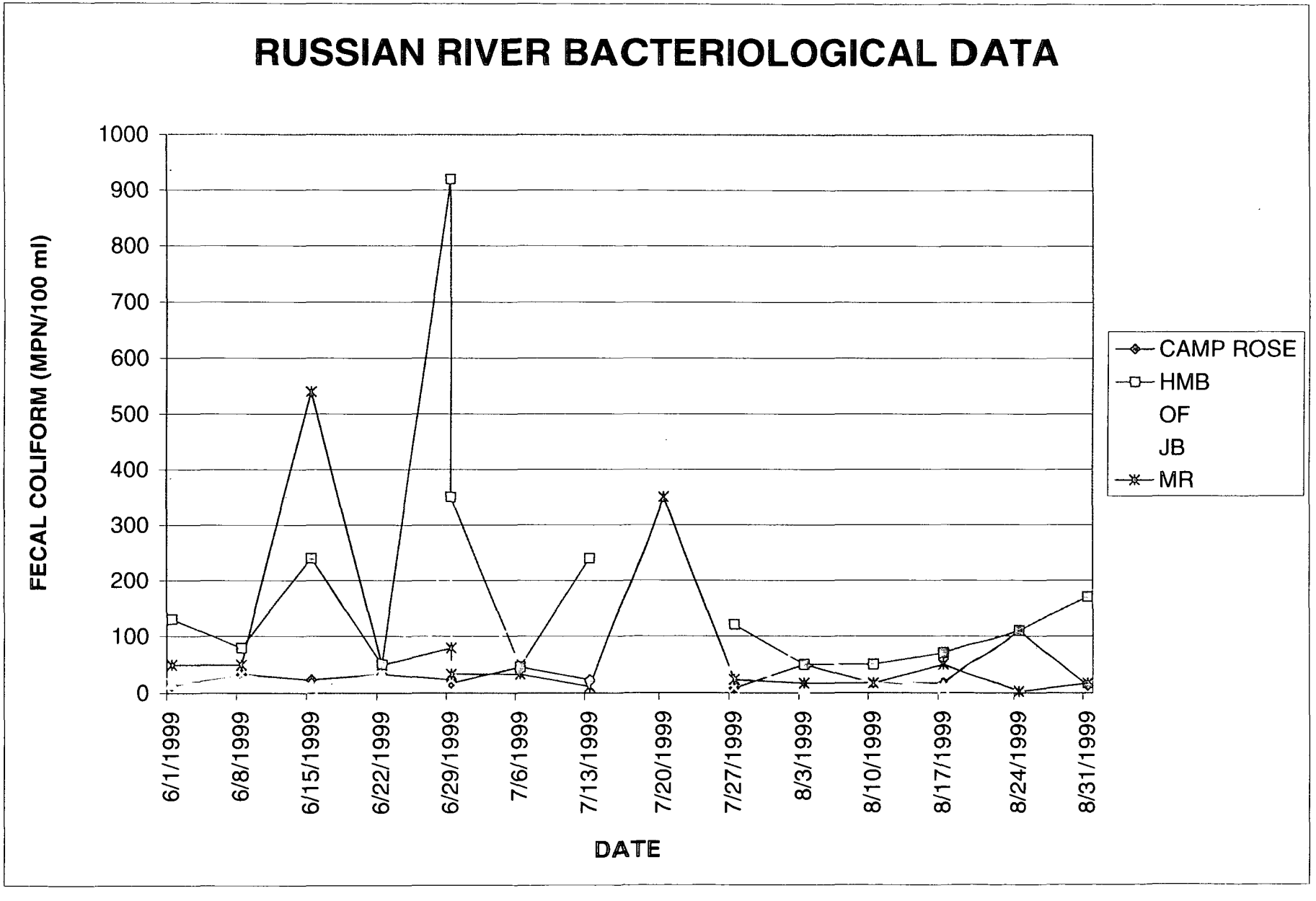
Daily Values, Summer 1997

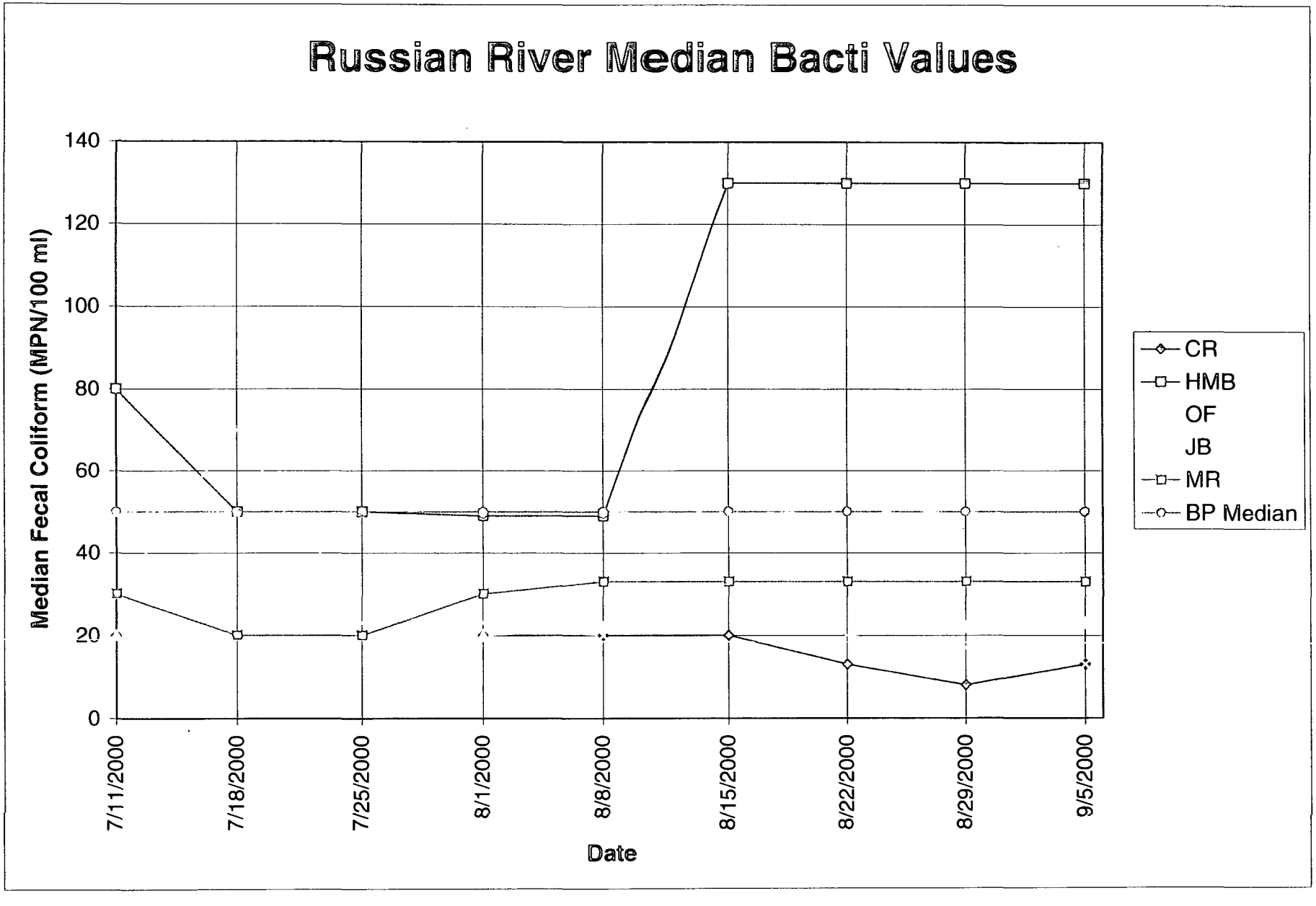



RUSSIAN RIVER MEDIAN BACTI DATA
MEDIAN FECAL COLIFORM (MPN/100 ml)
300
250
200
150
100
50
0
6/30/1998
7/7/1998
7/14/1998
7/21/1998
7/28/1998
8/4/1998
8/11/1998
8/18/1998
8/25/1998
9/1/1998
DATE
Camp Rose
HMB
OF
JB
MR

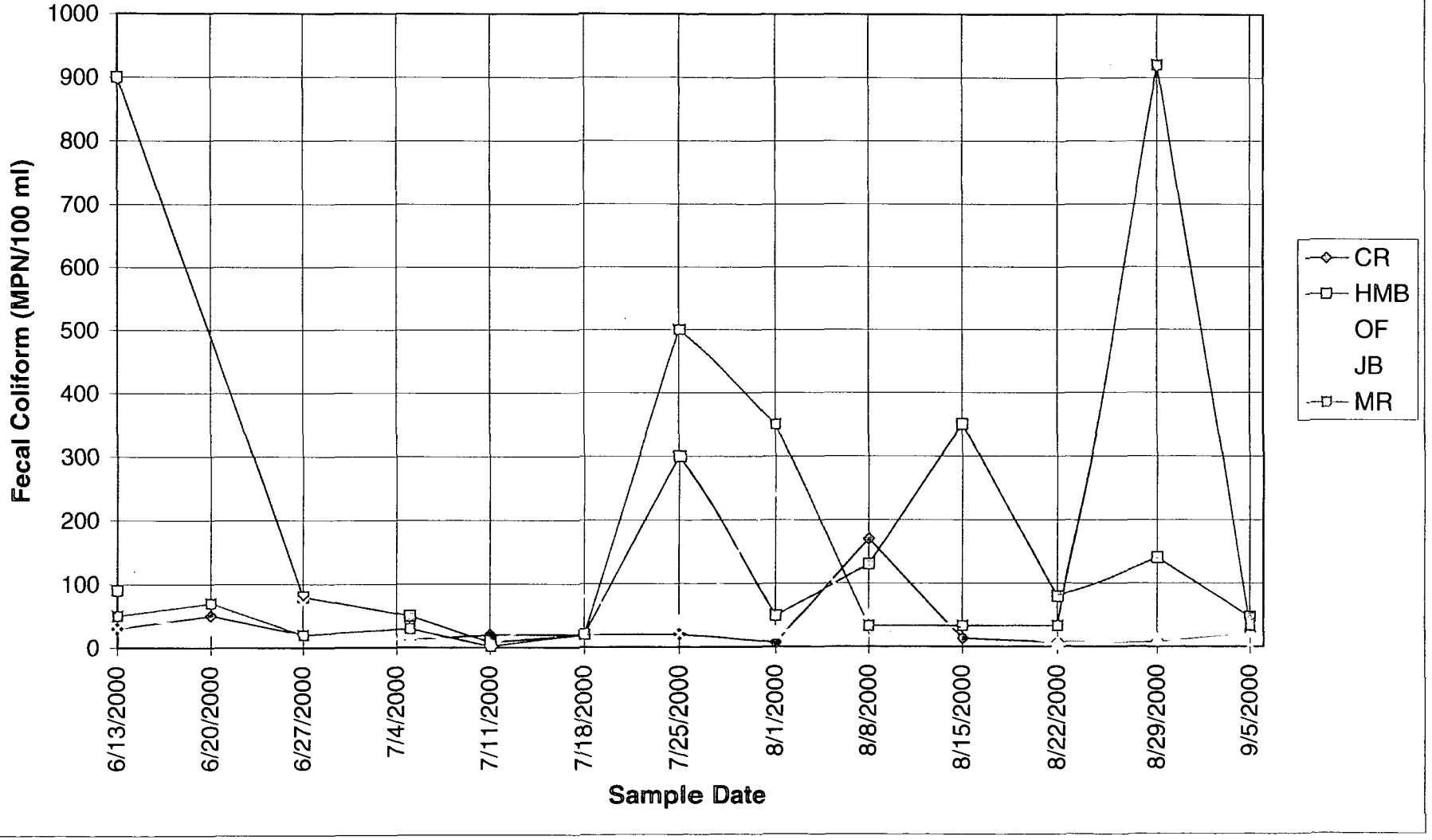

RUSSIAN RIVER BACTERIOLOGICAL DATA
FECAL COLIFORM (MPN/100 ml)
1000
900
800
700
600
500
400
300
200
100
0
6/16/1998
6/23/1998
6/30/1998
7/7/1998
7/14/1998
7/21/1998
7/28/1998
8/4/1998
8/11/1998
8/18/1998
8/25/1998
9/1/1998
DATE
Camp Rose
HMB
OF
JB
MR

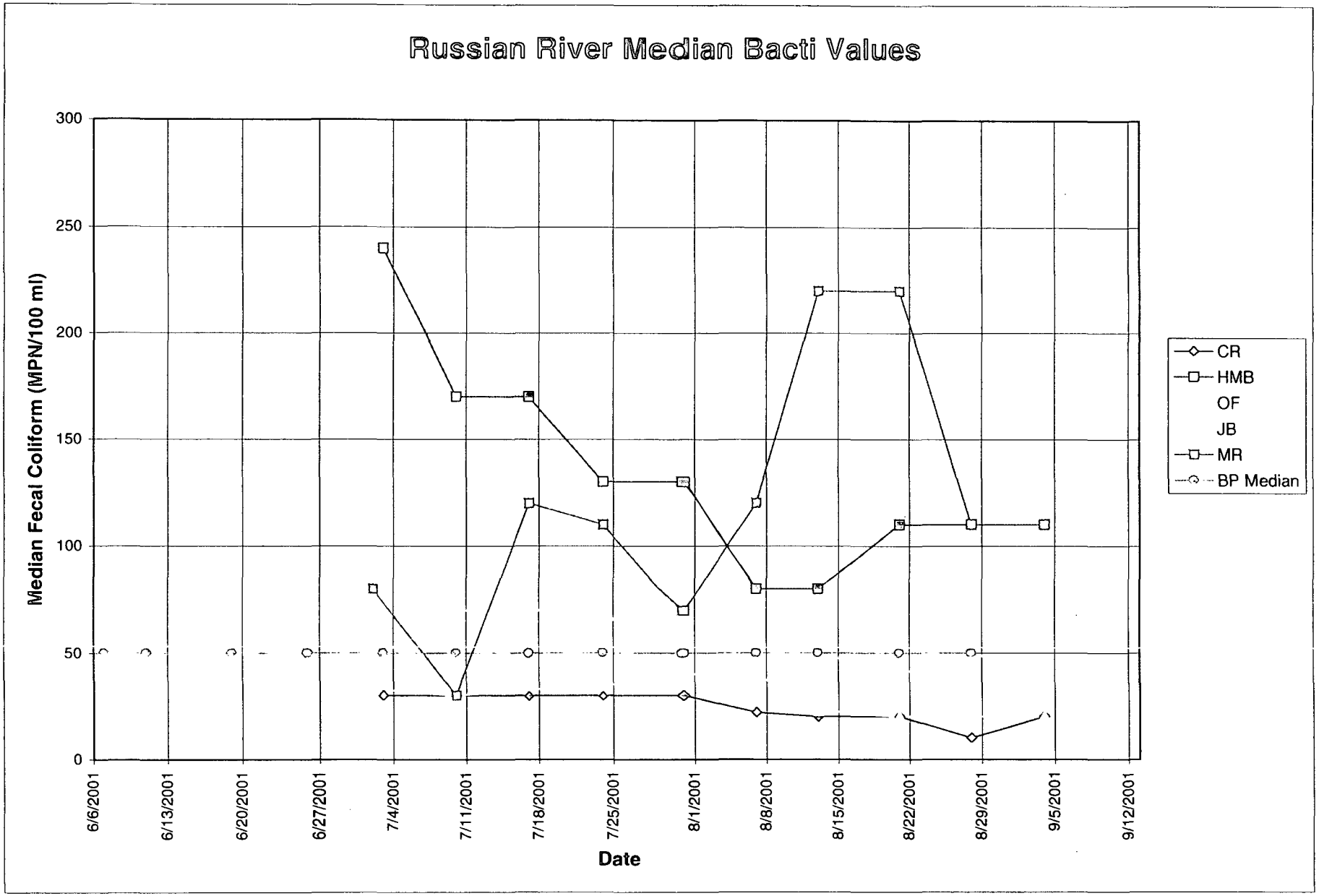

RUSSIAN RIVER MEDIAN BACTI DATA
MEDIAN FECAL COLIFORM (MPN/100 ml)
300
250
200
150
100
50
0
6/29/1999
7/6/1999
7/13/1999
7/20/1999
7/27/1999
8/3/1999
8/10/1999
8/17/1999
8/24/1999
8/31/1999
DATE
Camp Rose
HMB
OF
JB
MR


RUSSIAN RIVER BACTERIOLOGICAL DATA
FECAL COLIFORM (MPN/100 ml)
1000
900
800
700
600
500
400
300
200
100
0
6/1/1999
6/8/1999
6/15/1999
6/22/1999
6/29/1999
7/6/1999
7/13/1999
7/20/1999
7/27/1999
8/3/1999
8/10/1999
8/17/1999
8/24/1999
8/31/1999
DATE
CAMP ROSE
HMB
OF
JB
MR

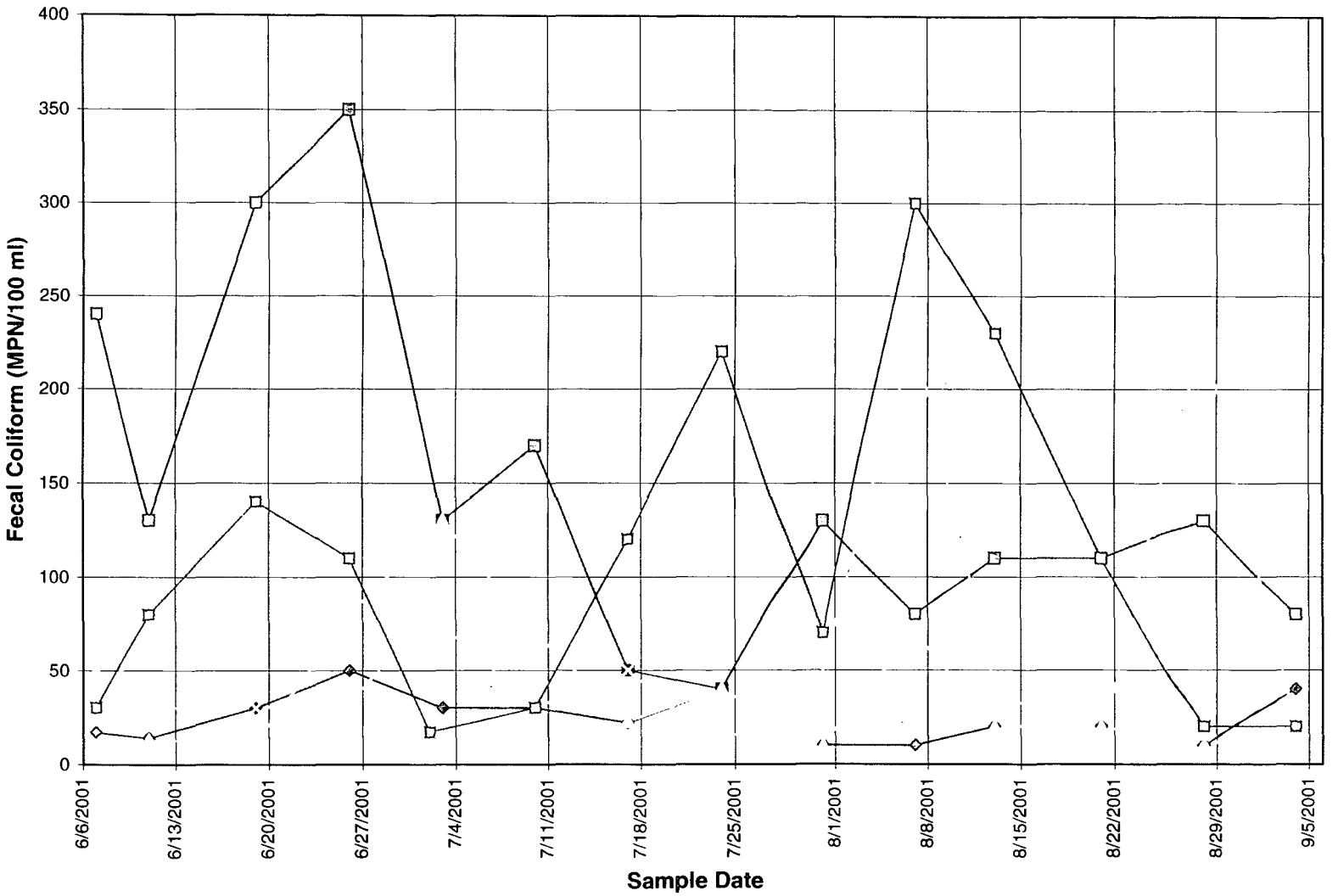

Russian River Median Bacti Values
Median Fecal Coliform (MPN/100 ml)
140
120
100
80
60
40
20
0
7/11/2000
7/18/2000
7/25/2000
8/1/2000
8/8/2000
8/15/2000
8/22/2000
8/29/2000
9/5/2000
Date
CR
HMB
OF
JB
MR
BP Median

Russian River Bacteriological Data




Russian River Median Bacti Values
Median Fecal Coliform (MPN/100 ml)
300
250
200
150
100
50
0
6/6/2001
6/13/2001
6/20/2001
6/27/2001
7/4/2001
7/11/2001
7/18/2001
7/25/2001
8/1/2001
8/8/2001
8/15/2001
8/22/2001
8/29/2001
9/5/2001
9/12/2001
Date
CR
HMB
OF
JB
MR
BP Median

Russian River Bacteriological Data



Redwood Creek

Exceedances

MWAT

2002 303(d) List Update
Reference #136, 137, 138, 139

	14.8	15	15.6	17	18	19	Max Yearly 24
Estuary (2)	2		2	2	2	2	0
Prairie Creek (1)	0	→	→	→	→	→	
Prairie Creek (2)	2	2	0	→	→	→	
Bridge Creek (6)	6	6	4	0	→	→	x
RC above Prairie (4)	4	4	4	2	1	0	1
RC abv Tom McD (4)	4	4	4	4	4	4	1
Coyote Creek (1)	1	1	1	0	→	→	
Lupton Creek (2)	2	1	0	→	→	→	
Panther Creek (3)	0	→	→	→	→	→	
Beaver Creek (2)	2	2	2	0	→	→	
Mill Creek (3)	2	2	2	0	→	→	
Molasses Creek (2)	2	2	2	1	→	→	
Minor Creek Trib (1)	1	0	0	→	→	→	
Minor Creek (2)	2	2	2	0	→	→	
Sweathouse Crk (1)	1	1	1	0	→	→	
Upper Lacks Crk (1)	1	1	1	0	→	→	
Minor Creek (1)	1		1	1	0	→	
Panther Creek (2)	0	→	→	→	→	→	
Lacks Creek (4)	4		4	4	4	1	0 ← 4
Minor Creek (4)	4		4	4	3	0	1
RC abv Minon Crk (2)	2		2	2	2	0	→
RC abv Lacks Crk (2)	2		2	2	2	2	3 ←
High Prairie Creek (1)	0	→	→	→	→	→	
Minon Creek (1)	1		1	0	→	→	
Upper Minon Creek (1)	0	→	→	→	→	→	
Upper High Prairie Crk (1)	0	→	→	→	→	→	
RC above Lupton (2)	2		2	2	2	2	2
Larry Dam Creek (2)	0	→	→	→	→	→	
Moon Cr. (1)	1	→	→	→	→	→	1 ← ?
Lake Prairie Crk (4)	3	2	0	→	→	→	
Pardee Crk (4)	0	→	→	→	→	→	
Station Totals: 31	23/31	22/31	18/30	10/30	4/30	6/30	

Redwood Creek NCWAP
Temperature data for EMDS model submitted by the North Coast Regional Water Quality Control Board

File ID	Data type	Method	Site	Stream Name	Site Location		Sample Date	MWAT		MWMT	24hr Max	Explanation
121	FSP	FSP Protocol	3012	Estuary	408866	4571569	1997	68	20.0	69	70	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	3012	Estuary	408866	4571569	1998	66	19.1	68	68	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	3015	Prairie Creek	413776	4577324	1997	57	13.9	59	61	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	3016	Prairie Creek	413935	4577756	1997	60	15.8	63	63	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	3016	Prairie Creek	413935	4577756	1998	60	15.5	62	63	All numbers calculated from raw FSP data.
434	Parks Data	FSP Protocol	PRA99W	Prairie Creek			1999	59	15.0	60	61	All numbers calculated from raw RNSP data.
434	Parks Data	FSP Protocol	PRW01W	Prairie Creek	413935	4577756	2001	59	15.0	60	61	
434	Parks Data	FSP Protocol	Ldc00w	Larry Dam Creek	415144	4575518	2000	57	13.6	58	58	All numbers calculated from raw RNSP data.
434	Parks Data	FSP Protocol	LDC01W	Larry Dam Creek	415144	4575518	2001	56	13.3	57	58	
216	Thesis	Thermistor	Little Lost Man	Little Lost Man	416056	4571050	1974	57	13.9			Max weekly **surface** water temp. (specific site locations are estimates from a map)
216	Thesis	Thermistor	Little Lost Man	Little Lost Man	416056	4571050	1974	57	13.9			Max weekly **intragravel** water temp. (specific site locations are estimates from a map)
216	Thesis	Thermistor	Lost Man	Lost Man	416753	4576041	1974	64	17.8			Max weekly **surface** water temp. (specific site locations are estimates from a map)
216	Thesis	Thermistor	Lost Man	Lost Man	416753	4576041	1974	61	16.1			Max weekly **intragravel** water temp. (specific site locations are estimates from a map)
434	Parks Data	FSP Protocol	LMC01W	Lost Man			2001	58	14.5	61	61	
121	FSP	FSP Protocol	3013	RedCrk upstm Prairie Creek	413516	4571833	1997	67	19.6	75	76	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	3013	RedCrk upstm Prairie Creek	413516	4571833	1998	62	16.9	66	70	All numbers calculated from raw FSP data.
434	Parks Data	FSP Protocol	RWLOW99W	Lower Redwood Creek (upstm of Prairie Crk)	413516	4571833	1999	64	17.9	70	71	All numbers calculated from raw RNSP data.
434	Parks Data	FSP Protocol	RWLOW01W	Lower Redwood Creek (upstm of Prairie Crk)	413516	4571833	2001	65	18.1	71	72	
434	Parks Data	FSP Protocol	TMCD01W	Tom McDonald Creek			2001	58	14.3	60	60	
121	FSP	FSP Protocol	3014	RedCrk upstm Tom McD Crk	415927	4561544	1997	69	20.8	74	75	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	3014	RedCrk upstm Tom McD Crk	415927	4561544	1998	70	21.0	74	76	All numbers calculated from raw FSP data.
434	Parks Data	FSP Protocol	RWTTG99W	RedCrk upstm of Tom McD Crk	415927	4561544	1999	67	19.7	71	73	All numbers calculated from raw RNSP data.
434	Parks Data	FSP Protocol	RWTTG01W	RedCrk upstm of Tom McD Crk	415927	4561544	2001	69	20.8	74	76	
121	FSP	FSP Protocol	3002	Bridge Creek	416791	4559983	1996	60	15.3	63	63	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	3002	Bridge Creek	416791	4559983	1997	61	16.0	66	67	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	3002	Bridge Creek	416791	4559983	1998	60	15.6	64	64	All numbers calculated from raw FSP data.
434	Parks Data	FSP Protocol	BRI99W	Bridge Creek	416791	4559983	1999	61	15.8	64	65	All numbers calculated from raw RNSP data.
434	Parks Data	FSP Protocol	BRI00w	Bridge Creek	416791	4559983	2000	60	15.8	64	65	All numbers calculated from raw RNSP data.
434	Parks Data	FSP Protocol	BRI01W	Bridge Creek	416791	4559983	2001	60	15.5	64	65	
121	FSP	FSP Protocol	824	Coyote Creek	423142	4551896	1994	61	16.0	62	63	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	984	Panther Creek (mouth)	423808	4548714	1998	58	14.6	60	61	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	2019	Panther Creek	422602	4547249	1994	56	13.1	56	56	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	2019	Panther Creek	422602	4547249	1995	57	14.2	59	59	All numbers calculated from raw FSP data.
216	Thesis	Thermistor	Panther	Panther	423675	4548648	1974	66	18.9			Max weekly **surface** water temp. (specific site locations are estimates from a map)
216	Thesis	Thermistor	Panther	Panther	423675	4548648	1974	64	17.8			Max weekly **intragravel** water temp. (specific site locations are estimates from a map)
121	FSP	FSP Protocol	3004	Lacks Creek	427310	4545679	1997	67	19.3	72	73	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	3004	Lacks Creek	427310	4545679	1998	66	18.7	70	72	All numbers calculated from raw FSP data.
434	Parks Data	FSP Protocol	LAC99W	Lacks Creek	427310	4545679	1999	65	18.2	69	76	All numbers calculated from raw RNSP data.
434	Parks Data	FSP Protocol	LAC00w	Lacks Creek	427310	4545679	2000	66	19.1	71	72	All numbers calculated from raw RNSP data.
434	Parks Data	FSP Protocol	LAC01W	Lacks Creek	427310	4545679	2001	66	18.9	71	73	
121	FSP	FSP Protocol	1144	Upper Lacks Creek	432267	4541797	1998	61	15.9	64	65	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	3011	RedCrk upstm Lacks Creek	426703	4545594	1997	72	21.9	78	80	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	3011	RedCrk upstm Lacks Creek	426703	4545594	1998	72	22.3	78	80	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	1118	Beaver Creek	427191	4541121	1997	61	16.3	64	65	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	1118	Beaver Creek	427191	4541121	1998	62	16.9	64	66	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	1119	Mill Creek	427908	4539141	1997	60	15.8	62	63	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	1119	Mill Creek	427908	4539141	1998	61	16.1	63	64	All numbers calculated from raw FSP data.
434	Parks Data	FSP Protocol	MILLC01W	Mill Creek	427908	4539141	2001	58	14.4	61	62	
121	FSP	FSP Protocol	1120	Molasses Creek	428175	4538546	1997	62	16.8	65	67	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	1120	Molasses Creek	428175	4538546	1998	63	17.3	68	70	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	1121	Moon Creek			1998	68	19.9	75	79	All numbers calculated from raw FSP data.

Redwood Creek NCWAP
Temperature data for EMDS model submitted by the North Coast Regional Water Quality Control Board

121	FSP	FSP Protocol	1123	Minor Creek Trib	431444	4534960	1998	**59**	**14.9**	61	63	All numbers calculated from raw FSP data. (specific site locations are estimates from a map)
121	FSP	FSP Protocol	1124	Upper Minor Creek	433253	4535469	1997	60	**15.7**	63	64	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	1124	Upper Minor Creek	433253	4535469	1998	**61**	**16.1**	63	63	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	3006	Minor Creek	429786	4534543	1997	65	**18.4**	72	74	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	3006	Minor Creek	429786	4534543	1998	**65**	**18.5**	71	73	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	1145	Minor Creek (same site)	429944	4534630	1998	64	**18.0**	67	69	All numbers calculated from raw FSP data.
434	Parks Data	FSP Protocol	min01w	Minor Creek	429786	4534543	2001	64	**17.8**	68	70	
121	FSP	FSP Protocol	1125	Sweathouse Creek	430820	4531428	1998	**62**	**16.9**	64	65	All numbers calculated from raw FSP data. (specific site locations are estimates from a map)
121	FSP	FSP Protocol	957	Lupton Creek	430265	4528430	1997	59	**14.9**	61	62	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	957	Lupton Creek	430265	4528430	1998	**59**	**15.2**	61	62	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	3008	RedCrk Ab. Lupton Creek	431489	4528492	1997	71	**21.4**	78	80	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	3008	RedCrk Ab. Lupton Creek	431489	4528492	1998	**71**	**21.8**	77	79	All numbers calculated from raw FSP data.
434	Parks-USGS	FSP Protocol	USGS-OKN	RedCrk at O'Kane gaging stn	417203	4528121	1976		**-17.8**		70	Seasonal Max values only
434	Parks-USGS	FSP Protocol	USGS-OKN	RedCrk at O'Kane gaging stn	417203	4528121	1977		**-17.8**		93	Seasonal Max values only
434	Parks Data	FSP Protocol	RWOKN99W	RedCrk at O'Kane gaging stn	417203	4528121	1999	68	**20.1**	74	78	All numbers calculated from raw RNSP data.
434	Parks Data	FSP Protocol	RWOKN01W	RedCrk at O'Kane gaging stn	417203	4528121	2001	70	**21.0**	75	77	
121	FSP	FSP Protocol	608	High Prairie Creek	431269	4519461	1998	**56**	**13.1**	56	57	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	614	Upper High Prairie Creek	431232	4519889	1998	**56**	**13.2**	57	57	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	3007	Red Crk upstm of Minon Creek	437036	4517219	1997	65	**18.3**	68	70	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	3007	Red Crk upstm of Minon Creek	437036	4517219	1998	**65**	**18.1**	68	69	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	611	Minon Creek (mnstm)	437704	4517885	1998	**62**	**16.8**	63	65	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	612	Minon Creek (trib)			1998	**54**	**12.3**	56	57	All numbers calculated from raw FSP data.
121	FSP	FSP Protocol	613	Upper Minon Creek	438975	4518287	1998	**54**	**12.3**	55	57	All numbers calculated from raw FSP data.
39	Simpson	FSP Protocol	5041901	Lake Prairie Crk. Ab. Washout on Lake P. Rd.	435590	4516262	1996	59	**14.8**	59	59	Data from Simpson Timber Co. timber harvest plan. (specific site locations are estimates from a map)
39	Simpson	FSP Protocol	5041901	Lake Prairie Crk. Ab. Washout on Lake P. Rd.	435590	4516262	1997	60	**15.4**	64	65	Data from Simpson Timber Co. timber harvest plan. (specific site locations are estimates from a map)
39	Simpson	FSP Protocol	5041901	Lake Prairie Crk. Ab. Washout on Lake P. Rd.	435590	4516262	1998	**60**	**15.6**	63	64	Data from Simpson Timber Co. timber harvest plan. (specific site locations are estimates from a map)
39	Simpson	FSP Protocol	5041901	Lake Prairie Crk. Ab. Washout on Lake P. Rd.	435590	4516262	1999	57	**14.1**	61	63	Data from Simpson Timber Co. timber harvest plan. (specific site locations are estimates from a map)
39	Simpson	FSP Protocol	5043201	Pardee Crk at end of SPI 490 Rd.	436741	4513857	1996	**58**	**14.4**	59	59	Data from Simpson Timber Co. timber harvest plan. (specific site locations are estimates from a map)
39	Simpson	FSP Protocol	5043201	Pardee Crk at end of SPI 490 Rd.	436741	4513857	1997	57	**13.6**	57	59	Data from Simpson Timber Co. timber harvest plan. (specific site locations are estimates from a map)
39	Simpson	FSP Protocol	5043201	Pardee Crk at end of SPI 490 Rd.	436741	4513857	1998	57	**14.1**	59	59	Data from Simpson Timber Co. timber harvest plan. (specific site locations are estimates from a map)
39	Simpson	FSP Protocol	5043201	Pardee Crk at end of SPI 490 Rd.	436741	4513857	1999	54	**12.2**	55	58	Data from Simpson Timber Co. timber harvest plan. (specific site locations are estimates from a map)

2002 303d List Update
Ref. # 134
D. Lelan
M. St John

GUALALA REDWOODS, INC.

39951 Old Stage Rd.
P.O. Box 197
Gualala, CA 95445
Telephone (707) 884-3521
Fax (707) 884-1942

September 26, 2001

Mr. Matt St. John
North Coast Regional Water Quality Control Board
5550 Skylane Blvd., Suite A
Santa Rosa, CA 95430

Dear Mr. St. John,

I noticed in your September 10, 2001 letter concerning 2002 303(d) List Update Recommendations that you are recommending the Gualala River be listed for temperature. It is my opinion that it would be a mistake to list the Gualala River for temperature.

I believe Gualala Redwoods, Inc. (GRI) (GRI. 2001a) provided most of the information used to recommend listing. We also provided a report (GRI. 2001b), which compared our temperatures to temperatures in Humboldt Redwoods Stare Park. Although the large streams have relatively high temperatures they are in line with other streams of that size on the north coast, including streams in Humboldt Redwoods State Park (GRI, 2001b). The smaller tributaries on our property have excellent temperatures for fish. The reports also included information on adjacent canopy cover and riparian condition. Canopy cover in the riparian zone on our property averaged 85% with a minimum of 63%. It has been found that in stands reduced to 50% canopy in a 75' riparian zone, no elevation of water temperature was detectable (James, 2001). It is most likely that current temperatures are similar to historical temperatures. It is doubtful that anything more can be done to reduce water temperatures. In fact, current forest practice rules will assure canopy retention at levels well above those shown to have any effect on water temperature.

I urge you to do a more through review of the information provided to your staff. I believe you may wish to revise your decision to recommend listing the Gualala for temperature.

Sincerely,

Henry Alden
Gualala Redwoods, Inc.

James, C. 2001. Expert witness report of Cajun James, Ph.D. Candidate. University of California at Berkeley, CA.

GRI. 2001a. Stream report. Gualala Redwoods Inc., Gualala, CA. [May, 2001 unpublished report]

GRI. 2001b. Stream monitoring program. Gualala Redwoods Inc., Gualala, CA. [May 2001 unpublished report]

MENDOCINO
REDWOOD COMPANY, LLC

32600 Holquist Lane · P.O. Box 489 · Fort Bragg · CA · 95437 · (707)962-2800 · Fax (707)964-8828

North Coast Regional Water Quality Control Board
Mr. Matt St. John
5550 Skylane Boulevard, Suite A
Santa Rosa, CA 95403

2002 303(d) List Update
Reference # 109

October 1, 2001

Dear Mr. St. John:

Mendocino Redwood Company, LLC (MRC) requests that Greenwood Creek be removed from recommendation for the federal Clean Water Act 303(d) List for sediment and the 303(d) "Watch List" for temperature. We make this request based on the following reasons: 1) MRC voluntarily manages its lands with high standards for protection of watershed and aquatic values without the necessity of TMDL standards, 2) stream channel morphology and stream gravel measurements do not suggest sediment impaired conditions, 3) the turbidity information and drinking water concerns raise questions about the quality of the well adjacent to Greenwood Creek but do little to suggest sediment impairment of the watershed, and 4) stream temperature levels in the last 2 years 1999 and 2000, as observed near the outlet of the watershed, are not at levels of concern for coho salmon and steelhead trout.

1) Mendocino Redwood Company, LLC has voluntarily set a high standard of stewardship for management of the forest resources of its ownership including Greenwood Creek. The goals of this stewardship is to restore the forest by improving the number and size of redwood and Douglas fir trees, improving terrestrial wildlife habitat and improving the habitat for aquatic organisms (a copy of the MRC management plan and Option A are enclosed).

MRC's strategy related to water quality and aquatic habitat issues involve two components. First, policies and management guidelines have been developed to protect aquatic resources across the ownership. This guidelines include: a) increased tree and canopy retention and soil protection along streams, b) adapting the Weaver and Hagans, Handbook for Forest and Ranch Roads (1994) as the standard for road maintenance, construction and abandonment, c) eliminating the use of traditional clear-cut harvest and moving toward uneven-aged management using predominately selective harvest techniques (see aerial photographs enclosed), and d) use of a shallow landslide hazard model to determine harvest and road construction prohibitions to reduce sediment inputs from landslides. In addition to the property wide policies MRC develops site-specific management practices developed through a watershed analysis process. This process includes a 100% road inventory identifying sediment sources and a prioritization for treatment. The watershed analysis examines the hazards for mass wasting, road surface and

fluvial erosion and riparian conditions in relation to affected resources of fish habitat and water quality. From this comprehensive watershed analysis land management prescriptions, restoration opportunities and monitoring is prescribed specific to individual watersheds.

MRC is in the process of completing watershed analysis on 70% of its ownership, covering approximately 160,000 acres, by the end of this year. MRC made the 303(d) listed watersheds as its priority for watershed analysis, however, analysis on Greenwood Creek has begun. Fieldwork on a road inventory for Greenwood Creek is almost complete with a final product expected in 2002. Stream monitoring stations have been established on Greenwood Creek and the watershed analysis is expected to be completed in 2002-2003. In the interim MRC has made considerable improvements to the watershed and its management. These include:

i) 1 temporary crossing changed to permanent bridge.
ii) 1 temporary bridge crossing will be changed to permanent bridge.
iii) Approximately 15 culverts armored with rip rap.
iv) Approximately 30+ rocked fords installed instead of culverts.
v) One watercourse diversion proposed to alleviate an erosional problem.
vi) Two culverts removed and ¾ mile road abandoned.
vii) Approximately 10 miles of roads constructed on or near ridge tops to convert from tractor logging to cable logging.
viii) One watercourse diversion completed to alleviate an erosional problem.
ix) Approximately 2 miles of road rocked to control erosion.
x) Continuous inspections of roads during winter period.
xi) Five culverts upgraded to pass 100-year floods.
xii) Approximately 15 miles of road re-shaped with rolling dips installed.
xiii) Three slide prone areas rip rapped to help control sliding.
xiv) No harvesting within Watercourse and Lake Protection Zone to help with water temperature.
xv) No harvesting on mapped slide areas.

MRC has voluntarily set high standards and practices for the management of aquatic resources on its ownership including Greenwood Creek. These high standards and practices including watershed analysis and monitoring will address sediment associated management issues in the watershed making the listing of Greenwood Creek on the 303(d) list and the development of a Total Maximum Daily Load unnecessary.

2) In September 2001 MRC conducted stream channel observations to determine the current condition of the stream channels, proportion of fine sediment in the bed and the quality of the spawning gravel. In addition to these observations the stream segments were monumented and established as long-term monitoring locations. The full write-up and data collected is enclosed.

The results of steam channel observations suggest a stable stream channel with a well armored bed with low shear stress along the channel margins. Despite this channel morphology a pool:riffle morphology is evident. Sediment samples show a low percentage of fine sediment in the bed and permeability observations at pool tail-outs are moderately good. These observations do not in my opinion support a listing of Greenwood Creek as a sediment-impaired watershed.

3) MRC is sympathetic with the concerns of The Elk County Water District about the quality of their drinking water. The Elk County Water District has claimed the need for a filtering system to handle the turbidity pollution of Greenwood Creek. However, background levels of turbidity in the Coast Range range from 20-234 NTUs in unmanaged watersheds as observed at Caspar Creek. These turbidity values, even in unmanaged watersheds are well above the 1 NTU standard suggested for drinking water.

It is unclear how much effect turbidity levels in the Elk County Water District well are affected by Greenwood Creek turbidity. There does not appear to be a correlation between both data sets. When turbidity levels are at the lowest in Greenwood Creek in the summer months (typically < 1 NTU), well turbidity is often above drinking standards (often greater than 5 NTUs). When storm flow turbidity is at its highest in Greenwood Creek the well often does not show corresponding high turbidity levels. It is these inconsistencies that suggest that there could be other factors affecting well turbidity.

Investigation of the daily turbidity information from the Elk County Water District (see L-P memo dated Dec. 10, 1997 enclosed) found that each turbidity reading above a range expected in unmanaged watersheds corresponded with an extreme storm event, typically greater than a 5 year return interval. It is during these storms that there is greater erosion and accessibility to sediment sources from high flood waters creating greater turbidity in managed or unmanaged watersheds.

4) When reviewing the stream temperature statistics from stream temperature monitoring done by MRC maximum weekly average temperature (MWAT) values hover around the 16-17 degree celsius (Table 3). The lower stream temperature monitoring location (84-1) in Greenwood Creek has shown a significant decline in temperature in the last 2 years. These water temperature values would not be of concern for steelhead trout or coho salmon. The upper stream temperature monitoring location (84-3) shows MWAT values higher than the lower site. The MWAT values at site 84-3 are at levels that are likely adequate for steelhead trout, but may be high for coho salmon. However, no recent information suggests that coho salmon use this upper portion of the watershed.

It is interesting that stream temperatures at the outlet of the Greenwood Creek watershed are lower than upstream. This is contrary to the usual physical process of water heating and transfer. Typically as water is heated there is little opportunity for heat loss in streams except through conduction and evaporation, which is usually minimal on a summer day as water travels downstream. Therefore the likely reason for lower stream temperatures are cool tributaries flowing into Greenwood Creek that lower water temperatures through dilution as the water travels downstream. Timber harvest practices are similar upstream and downstream in Greenwood Creek, so change in canopy probably does not account for the higher stream temperatures upstream (see aerial photographs enclosed). The likely source for higher stream temperatures upstream is higher air temperatures, as air temperature increases stream temperature increases as well. The farther that Greenwood Creek is from the coast the higher the summer daytime temperatures. MRC would like the Regional Water Quality Control Board to consider this when evaluating Greenwood Creek as a stream to watch for potential 303(d) listing.

Table 3. Summary of Stream Temperature Data from Mendocino Redwood Company Property in Greenwood Creek (see enclosed for locations).

Greenwood Creek Historical Temperature Data			Celsius		
Site ID	**Site Description**	**Year**	**MAX**	**MWAT**	**MWMT**
84-1	Lower@ property line	1992	20.0	17.0	19.2
84-1		1993	20.0	17.0	18.7
84-1		1995	20.8	17.1	19.4
84-1		1997	21.2	17.7	20.4
84-1		1999	19.8	15.7	18.7
84-1		2000	17.8	14.6	16.9
84-1		2001	**	**	**
84-3	Upper@ Maple Basin	1994	18.5	16.4	18.2
84-3		1995	20.6	17.7	19.3
84-3		1997	19.1	17.2	18.3
84-3		1999	20.4	16.7	19.0
84-3		2000	20.3	17.4	19.7
84-3		2001	**	**	**
** Probes not retrieved yet					

To conclude, MRC has submitted a considerable bit of information that suggests that Greenwood Creek is not a candidate for listing for sediment impairment on the Clean Water Act 303(d) list and removed from the "watch list" for temperature. Besides the technical observations submitted to you MRC is voluntarily managing its ownership with a high degree of stewardship attempting to improve aquatic habitat and water quality. MRC has provided a high level of cooperation in current and past interactions with the Regional Water Quality Control Board supplying monitoring data, access to MRC lands or other information requests. Given MRC's open policy with your agency a reasonable approach toward any concern the Regional Water Quality Control Board has about water quality issues on Greenwood Creek can be resolved in a voluntary and cooperative manner, without the need for a 303(d) listing.

Sincerely,

Christopher G. Surfleet

Christopher G. Surfleet
Hydrologist

Enclosures:

Aerial photographs of Greenwood Creek, 2000.
1997 memo, by Chris Surfleet on Greenwood Creek Turbidity
Stream channel observations for Greenwood Creek 2001
MRC memo on status of coho salmon in Greenwood Creek and supporting literature
Summary of 1997-2000 MRC stream temperature data for Greenwood Elk and Alder Creeks.
Mendocino Redwood Company, Option A
Mendocino Redwood Company Management Plan and Policies

MENDOCINO
REDWOOD COMPANY, LLC

Memorandum

date: October 1, 2001

from: John Andersen, Chris Surfleet

subject: **Greenwood Creek Coho Salmon**

A number of fish species are known to be found in the Greenwood Creek watershed. These include steelhead, sculpin, three spine stickleback, river lamprey, and pacific lamprey. The presence of coho salmon in the Greenwood Creek watershed is unclear. Mendocino Redwood Company has review nine sources of information to see what information is available concerning this species.

The first source used is titled Coho Salmon Habitat Impacts, Qualitative Assessment Technique for Registered Professional Foresters, prepared by the California Department of Fish and Game (CDFG) for the Board of Forestry (BOF), November 1994. Page 8 of this document discusses a list of streams historically known to produce coho salmon. This list is contained in Table 1 of the CDFG's petition to the BOF to list the coho salmon as a sensitive species. MRC contacted Marty Berback of CDFG in Sacramento to obtain this list. This list includes Greenwood Creek as a stream historically known to produce coho salmon, based on a literature review of a 1988 study by Hassler, Sullivan, and Stem titled Distribution of Coho Salmon in California, Annual Report to CDFG, Arcata CA, 24 pp. This report relied on a literature review by Sharon Griffin who consulted one of the sources listed below as to the presence of coho salmon. She apparently consulted the 1966 DFG Stream Survey of Greenwood Creek that stated no coho salmon were observed during the survey. It appears that she had inadvertently added coho salmon as a species found in Greenwood Creek. The survey stated the only species observed were steelhead and rainbow trout. A copy of the 1966 survey is enclosed.

The second source was a stream survey conducted by CDFG on April 13, 1966. The survey form resulted in the following information:

- Fish present: steelhead and rainbow trout.
- Remarks: "Continue to manage as a spawning and nursery for steelhead. A good place to stock with the fish from Fish Reserve.".

- Location of survey: Survey station at the mouth of Greenwood Creek, then the surveyor drove two miles up the creek and walked an additional two miles up the creek.. Name of the surveyor is not given.

During the course of looking for information regarding the anadromous fisheries barrier in Greenwood Creek, MRC found a DFG Fish Survey for Greenwood Creek that occurred on April 14, 1966. Apparently, DFG had visited the lower portion of Greenwood Creek on April 13, then drove to the headwaters on April 14, 1966. The report for both days (enclosed) states that Greenwood Creek is used by steelhead, native trout, and silver salmon while the report for the first day states steelhead and rainbow trout use Greenwood Creek.

The third source of information came from a paper titled Adult and Juvenile Anadromous Salmonid Migration Timing in California Streams, by Linda Fukushima and E.W. (Joe) Lesh, CDFG, Eureka, CA. July, 1998. The purpose of this paper is as follows:
"To aid planners in preparing for oil spills, monthly arrival times of spawning runs of adult anadromous salmonids and months when smolts outmigrate to the ocean at tidal inlets of California streams were compiled (Appendix 1). Only streams that empty directly into the ocean or Humboldt, San Francisco, or San Pablo bays are presented. The data were compiled from various publications and from interviews conducted with field biologists having personal knowledge of individual streams. Historical observations were included in cases where recent surveys have not been done or were inconclusive about the presence of salmonids. These data can be used by resource managers who are reviewing projects that may effect water flow in the lower parts of coastal streams, or near tidal inlets, when migrating salmonids, adults, or smolts may be present."

On page 139 in Appendix 1 of this report, the only salmonid listed as being present in Greenwood Creek is steelhead.

The fourth source of information is from a weekly newspaper article titled Down To Earth, A Mendocino County Life, by Maurice W. Tindall, 1978. This was an article written by Mr..Tindall for the Anderson Valley Advertiser, Boonville, CA. Many of his articles focused on fishing the many streams of the Mendocino Coast, dating back to 1898 when he was three years old. Here are some excerpts from his articles:

"There were two smaller streams on the Coast that were fine trout fishing but very tough access. Both were steelhead streams, but hook-bills (coho) didn't seem to run in them. One was Greenwood Creek right at the town (Elk now), and the mill was there at the mouth of the Creek. The Creek ran far back to its source on Signal Mountain.

"No hook-bills ever ran in Greenwood Creek that I know of. There was a high falls near the middle that the fish couldn't get over, but there was good fishing above them, and who can tell how fish first got there. Below the Falls, the fish were rainbows, but above there the fish were heavierest and had noticeable white tips on their fins."

The fifth source of information is from a draft Mendocino Redwood Company fish survey titled Summary of Fish Index Site Monitoring in Watersheds Within Mendocino Redwood Company's Ownership in Mendocino and Sonoma Counties: 1987-1996, prepared by Mendocino Redwood Company, May 1999. This study was conducted in response to the lack of information available on trends in juvenile salmonid densities in watersheds within the ownership of Louisiana-Pacific Corporation (now Mendocino Redwood Company). Data was collected from electrofishing sites starting in 1986 to develop baseline data of the salmonid densities, to observe changes over time, and to document distribution of fish species throughout the various watersheds. The Greenwood Creek watershed was sampled in 1990, 1992, 1993, and 1994. Various tables in this report show the fish species found in Greenwood Creek during these years. The species found include steelhead, sculpin, three spine stickleback, and the pacific lamprey. No coho salmon were found.

The sixth source is from a study titled Fish Distribution for Watersheds in Louisiana-Pacific's Coastal Mendocino/Sonoma Management Unit, 1994-96, Prepared by Wildlife & Fisheries Science Group, Louisiana-Pacific Corporation, December 1997. This study used electroshocking at nine different locations throughout the upper and lower Greenwood Creek to determine fish distribution and species. The results of this study are already on file at Water Quality. The only species found during this study were steelhead, sculpin, roach, and stickleback. No coho salmon were found. As a side note, this study is quoted in a National Marine Fisheries Service (NMFS) study as confirming current coho salmon populations in Greenwood Creek. The name of the NMFS study is Historical and Current Presence-Absence of Coho Salmon in the Central California Coast Evolutionarily Significant Unit, April 1999. MRC contacted the author of this report numerous times to discuss the discrepancy in the data. The author said all the information was in boxes and he would eventually dig it up. When MRC contacted him numerous times after that, he did not return phone calls. MRC then contacted the biologist who conducted the 1994-96 study. He confirmed that no coho salmon were found in Greenwood Creek at that time. The NMFS study also listed a source of data confirming historical presence of coho salmon. That source was, again, the Hassler study that was also a literature review.

A seventh source of information is the recently released Aquatic Species Distribution for Watersheds on Mendocino Redwood Company Forestlands, 2000. The primary objective of this study was to repeat the three year project (1994-96) conducted by LP. Secondarily, effort was made to install stations further up watersheds to determine how far anadromous fisheries are found. Thirdly, it was hoped that any major changes in the distribution of fish species could be detected from the historical data or future watershed assessment efforts. In Greenwood Creek this study looked at 10 sites in the upper and lower watersheds. Fish species present were determined through electrofishing at each site. Steelhead were found throughout the watershed but coho salmon were not found. See Section V for the complete report with detailed methodologies and results.

The eighth source of information is a personal communication with Wendy Jones, a retired DFG employee. During his career, which spanned over 40 years on the

Mendocino coast, he never knew coho salmon to be present in the Greenwood Creek watershed.

A ninth source of information is the report produced by Larry Brown and Peter Moyle titled Status of Coho Salmon in California, a report to the NMFS from the Dept. of Wildlife and Fisheries Biology, University of California, Davis. This report states that coho salmon have not been recently observed in Greenwood Creek. However, it does claim that Greenwood Creek has historically had coho salmon. The documentation for this claim was the literature review by Hassler (1988). A document that is discussed above.

Other sources of information have been brought forward by local concerned citizens regarding the presence of this species in the watershed. One of the sources is the withdrawn Sustained Yield Plan written by Louisiana-Pacific, the prior owner of MRC's forestlands. This document states that coho salmon are present in the Watershed Assessment Area for Greenwood Creek, which includes not only Greenwood Creek but other watercourses which flow directly into the Pacific Ocean. Because of the data that has been collected recently in Greenwood Creek, it was assumed that the writers of the SYP were referring to other watercourses other than Greenwood Creek. However, the SYP does state at one point that coho salmon are present in the upper and lower Greenwood Creek watershed. The RPF reviewed their sources and found that during the construction of the SYP, no one went to Greenwood Creek to sample the fish populations or distributions. The SYP conducted a literature review whereby they relied on the Hassler literature review. Hassler's literature review is discussed above.

Another source of information discussed by local concerned citizens is a publication titled Reminiscences of the Town with Two Names: Greenwood Also Known As Elk. According to members of the public, this publication discusses the presence of coho salmon in Greenwood Creek in the 1920s and 30s.

To sum this issue up, there is disconfirming evidence and confirming evidence as to the presence of coho salmon in Greenwood Creek. However, it is clear the coho have not been present in Greenwood Creek in recent times.

Stream Channel Observations and Monitoring for Greenwood Creek
September, 2001

As part of Mendocino Redwood Company's (MRC) watershed analysis protocol, long-term channel monitoring reaches were established in the Greenwood Creek Watershed Analysis Unit in September 2001. These reaches are monumented so that future surveys can be conducted at the exact same location of the stream. Thalweg profiles and cross-sections are surveyed from established benchmarks. In this manner, physical changes can be recognized over long periods of time. MRC currently has two long-term monitoring reaches in the mainstem of Greenwood Creek. One of these reaches starts at the lower property line in the Greenwood Commons area. The second reach is located higher in the watershed in the Maple Basin area. See map 1.

Methods

The stream monitoring segment for thalweg profile and cross-section surveys start at known reference points along the channel and continue upstream 20-30 bankfull channel widths in length. Cross section surveys were taken approximately every 5-8 bankfull channel widths along the segment. Benchmarks (a bolt in concrete) that mark the upstream and downstream ends of the monitoring segment were permanently monumented for future surveys. The beginning benchmark was given an arbitrary elevation of 100' and the rest of the profile was referenced to this. Benchmarks (nail in a tree) were also established for each cross-section and the elevation corresponded to the thalweg survey elevations. Distances and azimuths from these benchmarks to the start of a thalweg or a cross-section survey were recorded. By doing this it is possible to begin and end surveys in the exact same spot year after year. These also provide a place of "known" elevation that should not change over time. This will presumably increase accuracy and confidence in comparability of data between years.

Thalweg Profile

Working upstream, the thalweg depth (elevation) and distance along the stream was surveyed. The thalweg is the deepest point of the flowing channel, excluding any detached or "dead end" scours and/or side channels. These areas were excluded in the thalweg profile. Distance was measured in the surveys by stretching measuring tapes along the channel and then reading distance during the survey. In the absence of visually apparent changes in the channel profile, thalweg measurements were taken every 15-20 feet up the center tape.

As specific landmarks were encountered along the reach, (e.g. tributary channels, particularly large pieces of woody debris, permanent survey stakes, armored bend, or other features of interest) the recorder made note of their location and size. Where a channel split into two components, the surveyor decided which is the main channel and then continued moving upstream (making measurements) along that channel.

Cross Sections and D50

Approximately every 5-8 bankfull channel widths along the thalweg profile, the location for a cross section survey was monumented and recorded in the thalweg profile survey notes. The cross sections are placed in riffles in relatively straight reaches of channel. Cross sections were surveyed from above the bankfull channel margins on both banks. At least 3-4 cross sections were surveyed along each monitoring reach.

Cross-section rebar pins were established at both ends of the cross-section well above the bankfull channel margin to monument the cross-section location. The elevation and the distance from the left bank pin was measured at least every five feet or at any visually apparent topographic change along the cross section. At each cross section a pebble count was conducted, to determine the D50 of the cross section, by measuring 100 randomly selected pebbles along the transect.

Permeability

The stream gravel permeability was conducted using a stand-pipe as discussed in Terhune (1958) and Barnard and McBain (1994), an electric pump was used to create the water suction in the stand-pipe. The permeability measurements were taken at a depth of 25 centimeters the maximum depth of coho and steelhead spawning. A total of 26 permeability measurements were taken in each monitoring segment. The measurements were evenly distributed among all pool tail-outs in the segments, with any additional measurements taken in tail-outs behind the deepest pools. The measurement location in each tail-out was randomly selected from a 12-point grid in the tail-out. At each measurement location 5 permeability repetitions were taken with the median of these observations representing the permeability of the measurement location.

Bulk Gravel Samples

In the upper stream segment of Greenwood Creek two bulk gravel samples were taken of the stream bed. The lower segment of Greenwood Creek did not have bulk samples taken due to the large substrate size that precluded sampling. A 12 inch diameter sample was taken to a depth of 12 inches using a metal cylinder (known as a "McNeil" sampler). The samples were taken in pool tail-outs at the head of a riffle, the typical spawning location for salmonids. The first sample was taken in a location that was representative of gravel present in tail-outs in the segment. The second sample was taken in the pool tail-out that appeared as the best spawning location in the segment. This approach provided an indication of the spawning gravel quality throughout the segment and the quality at the best site in the segment. After the bulk gravel samples were collected the gravel was dried and sieved through 7 different size-class screens (50, 25, 12.5, 6.3, 4.75, 2.36, 0.85 mm). The weight of each gravel size class was determined for each of the bulk gravel samples using a commercial quality scale.

Data Analysis

Cross-sections were graphed in Excel and D50 values were displayed on the chart. A computer program (Longpro) developed by the USGS for Redwood National Park was used to analyze the thalweg profiles. This program converted the surveys into standardized data sets, and calculated the distribution, mean and standard deviation of

residual water depths. This method results in the ability to statistically evaluate changes in the thalweg profile over time.

The median permeability measurement for each permeability site in the monitoring segment was used as representative of the site. To characterize the entire monitoring segment the natural log of the mean of the median permeability measurements was determined. The natural log of the permeability is used because of a relationship developed from data from Tagart (1976) and McCuddin (1977) (Stillwater Sciences, 2000) was used to estimate survival to emergence from permeability data. This relationship equates the natural log of permeability to fry survival ($r^2 = 0.85$, $p<10^{-7}$). This index needs further improvements, but is currently all we have for interpreting permeability information and biological implications. This relationship is:

Survival = -0.82530 + 0.14882 * ln permeability

It is important to understand that the use of this survival relationship is only an index of spawning gravel quality in the segment. The permeability measurements are taken randomly in pool tail-outs and are not indicative of where a salmon may select to spawn. Furthermore, spawning salmon have been shown to improve permeability in gravel where a redd was developed by 30% to 70% (MRC, 2000). Therefore the survival percentage developed is only indicative of the quality of potential spawning habitat and not as an absolute number.

From the sieved bulk gravel samples the fredle index, geometric mean and percent fine particles less than sieve size classes were determined. The survival index for steelhead trout was calculated from the bulk gravel samples using the method described in Tappel and Bjorn (1983).

Results and Conclusion

The stream channels in both the upper and lower Greenwood Creeks would be classified as Bc4 (Rosgen, 1996) and pool:riffle morphology (Montgomery and Buffington, 1993). These channels have high width to depth ratios, but are only moderately entrenched (ratio of bankfull channel to floodprone channel of 1.4 –2.2) and have well armored beds as indicated by the high D84 of the pebble counts (Table 1 and attached data). The slope gradient on these segments are less than 2 percent that makes the channel more responsive to sediment inputs given the likelihood of lower stream power. However the stream channels are highly confined within canyon walls making sediment transport potential and stream power higher particularly for fine sediment. The moderate entrenchment allows ample room for floodwaters, with lower shear stress along the channel margins lowering bank erosion risk making these channels very stable, despite their high confinement.

Table 1. Channel Dimensions and Bed Size Classes for Representative Cross Sections of Upper and Lower Greenwood Creek, 2001.

Segment	Bankfull Mean Depth (ft)	Bankfull Width (ft)	Floodprone Width (ft)	Entrenchment Ratio	Bed D50 (mm)	Bed D84 (mm)
Upper Greenwood	3.0	35	50	1.4	38	105
Lower Greenwood	3.5	49	75	1.5	48	250

Spawning gravel quality as indicated by permeability and bulk gravel observations appears to be good in Greenwood Creek as indicated from samples from upper Greenwood Creek (Table 2 and attached data). Percent fines less than 0.85 mm were 5% and <1% for the representative tail-out and high quality tail-out samples respectively. The survival percentage calculated by the Tappel and Bjorn (1983) equations indicates 83% survival to emergence ratio for the representative tail-out and 100% survival to emergence ratio for the high quality tail-out samples.

The stream gravel permeability in the segment in upper Greenwood Creek was moderate, with a mean permeability across the segment of 5.059 cm/hr. Typically permeability readings of 10,000 cm/hr are very good, with permeability readings less than 1000 cm/hr as very poor. The observations in upper Greenwood Creek are in the middle of this range. Using the survival relationship developed from Tagart (1976) and McCuddin (1977) this represents a survival percentage of 44%, with a standard error of +/- 32%. This survival relationship is only an index of spawning gravel quality in the segment. The permeability measurements are taken randomly in pool tail-outs and are not indicative of where a salmon may select to spawn. Furthermore, spawning salmon have been shown to improve permeability in gravel where a redd was developed by 30% to 70% (MRC, 2000). Therefore the survival percentage developed is only indicative of the quality of potential spawning habitat and not as an absolute number.

Table 2. Observations of Bulk Gravel and Permeability Measurements for Upper Greenwood Creek Stream Segment, 2001.

Site	Percent <0.85mm	Geometric Mean (mm)	Fredle Index	Survival Percent (Tappel and Bjorn)	Permeability (cm/hr)
Representative tail-out	5%	6.8	0.6	83%	-
High Quality Tail-out	<1%	9.6	5.3	100%	-
Entire Segment	-	-	-	-	5.059

Many of the observations of the channel monitoring segments cannot be interpreted until subsequent years of data are collected. The parameters in the

monitoring segments will be repeated in subsequent years and will provide the basis for interpretations on changes to the stream channel and corresponding aquatic habitat over time.

Literature Cited

Barnard, K. and S. McBain. 1994. Standpipe to determine permeability, dissolved oxygen, and vertical particle size distribution in salmonid spawning gravels. Fish Habitat Relationships Tech. Bull. No. 15. USDA- Forest Service. Six Rivers National Forest. Eureka. CA. 12 p.

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Montgomery, D. and J. Montgomery. 1993. Channel classification, prediction of channel response, and assessment of channel condition. Washington State Timber/Fish/Wildlife report TFW-SH10-93-002. Washington.

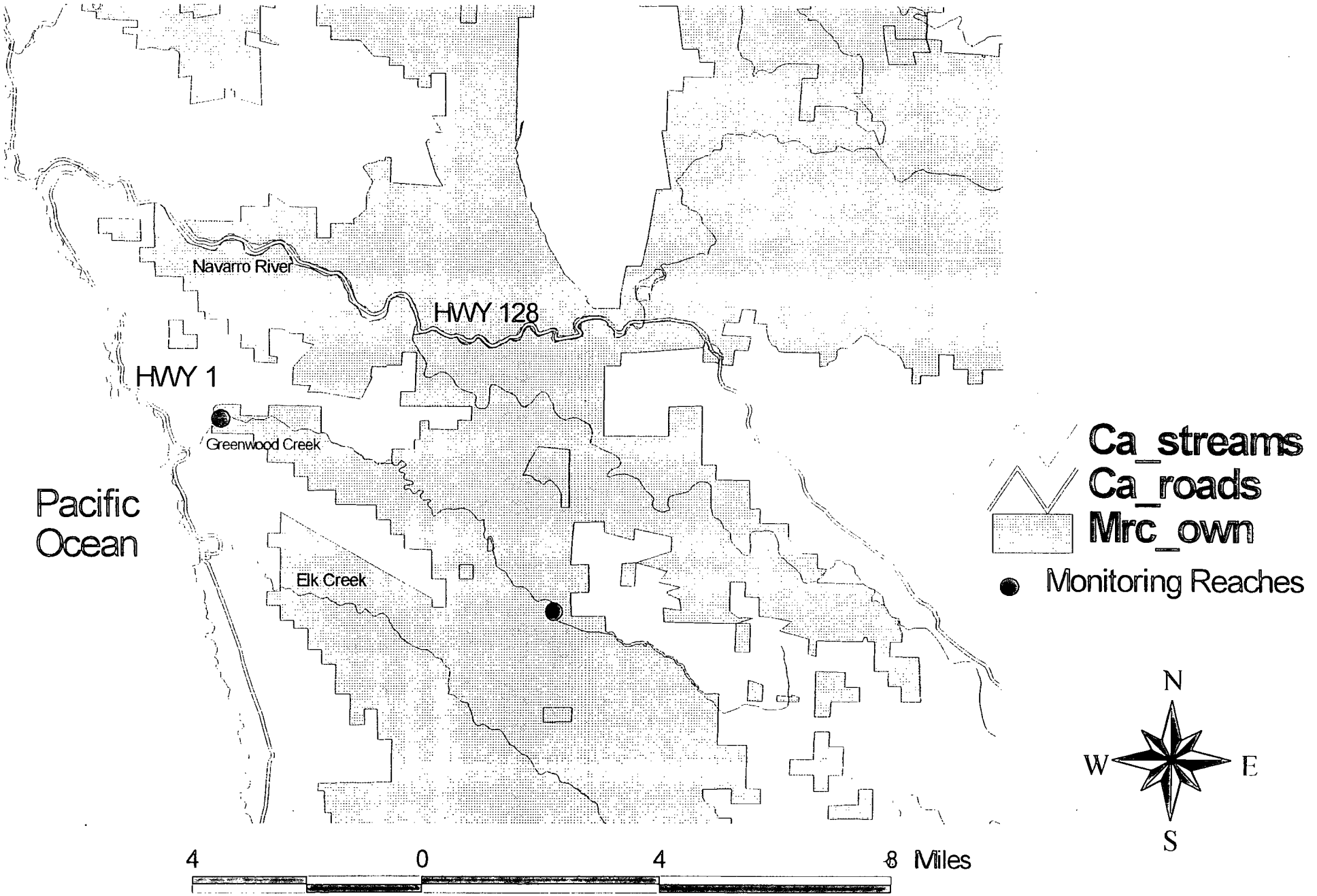
Rosgen. D. 1996. Applied river morphology. Wildland Hydrology, Pagosa Springs. CO.

Tagart, J.V. 1976. The survival from egg deposition to emergence of coho salmon in the Clearwater River, Jefferson County, Washington. M.S. Thesis, University of Washigton.

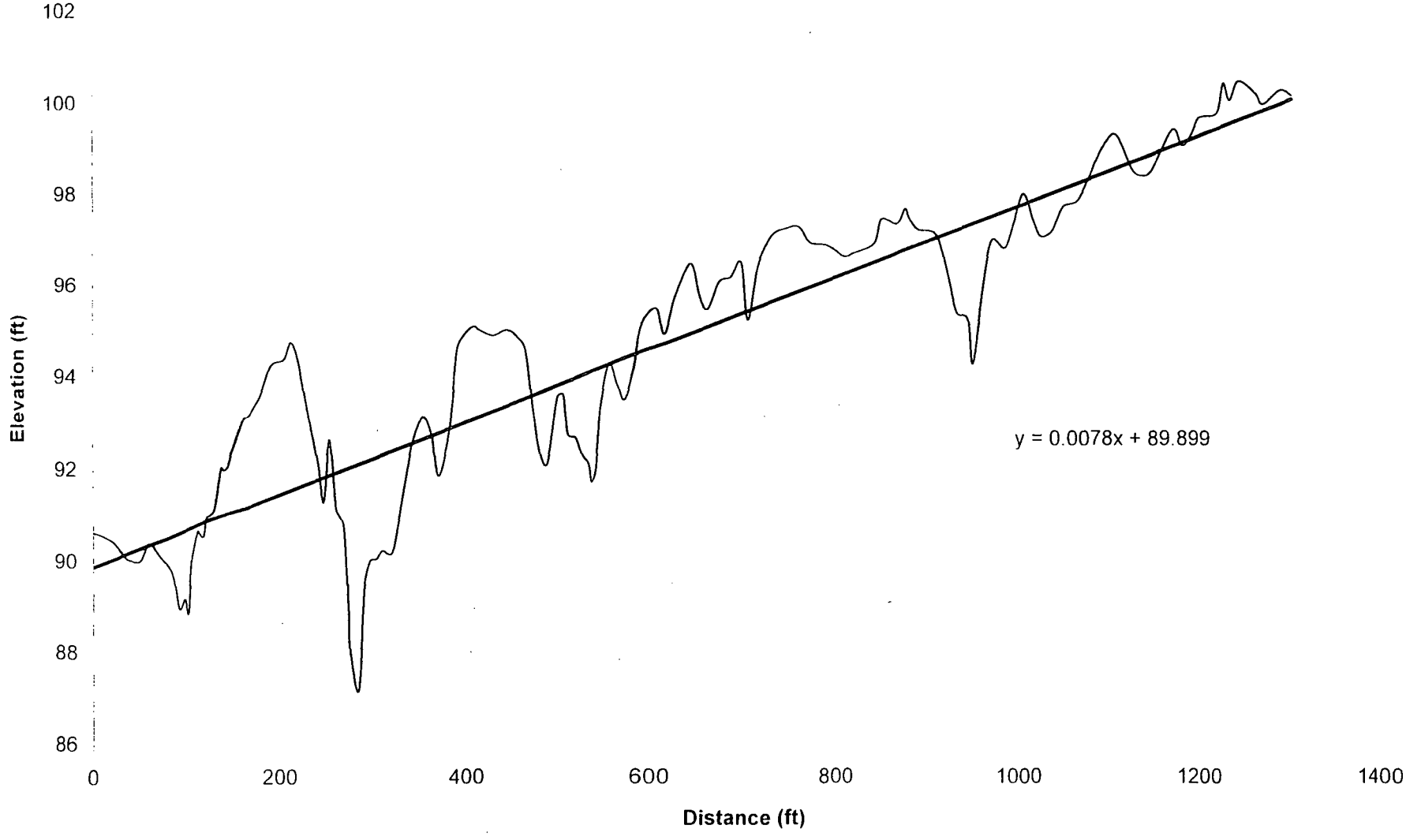
Tappel, P.D. and T.C. Bjorn. 1983. A new method of relating size of spawning gravel to salmonid embryo survival. North American Journal of Fisheries Management 3: 123-135.

Terhune. L. D. B. 1958. The Mark IV groundwater standpipe for measuring seepage through salmon spawning gravel. Fish Res. Bd. Canada, 15(5), pp. 1027-1063.

Greenwood Creek Long-term Channel Monitoring Reaches



Upper Greenwood Creek Thalweg Profile 9-21-01



Sep 26, 2001 - 9:22 a.m.
Report File: E:\ISAAC\GREENW~1\UPPERG~1\UPGRNTHS.TXT

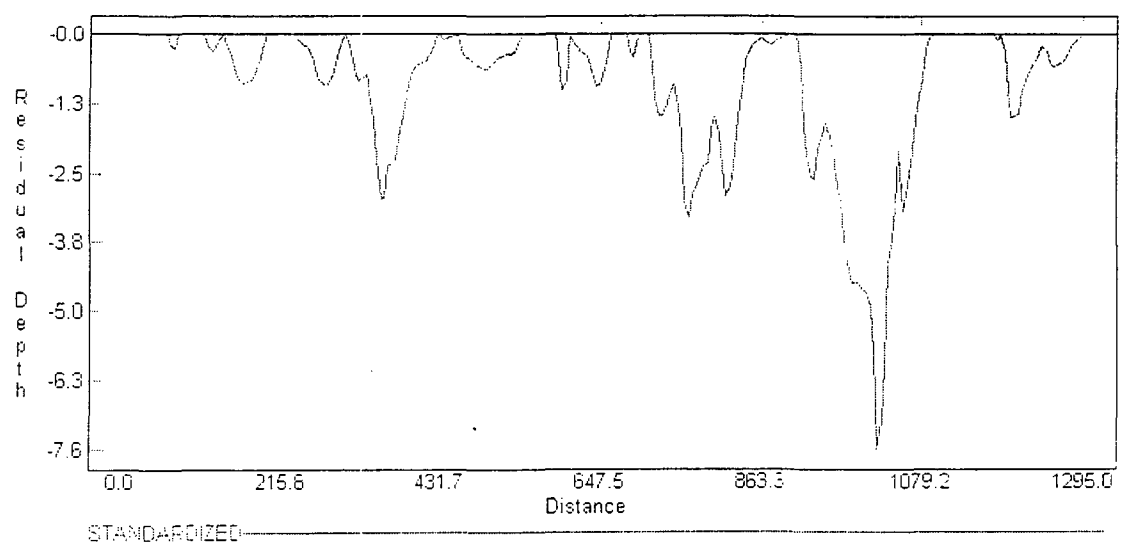
Long Profile Data File: E:\ISAAC\GREENW~1\UPPERG~1\UPGRNTHA.LPR
River Name:
Notes: Original Data file: E:\ISAAC\GREENW~1\UPPERG~1\UPGRNTHA.TXT
Measurement Units: U.S.

Top Elevation:	100.52
Bottom Elevation:	87.20
Reach Length:	1295.00

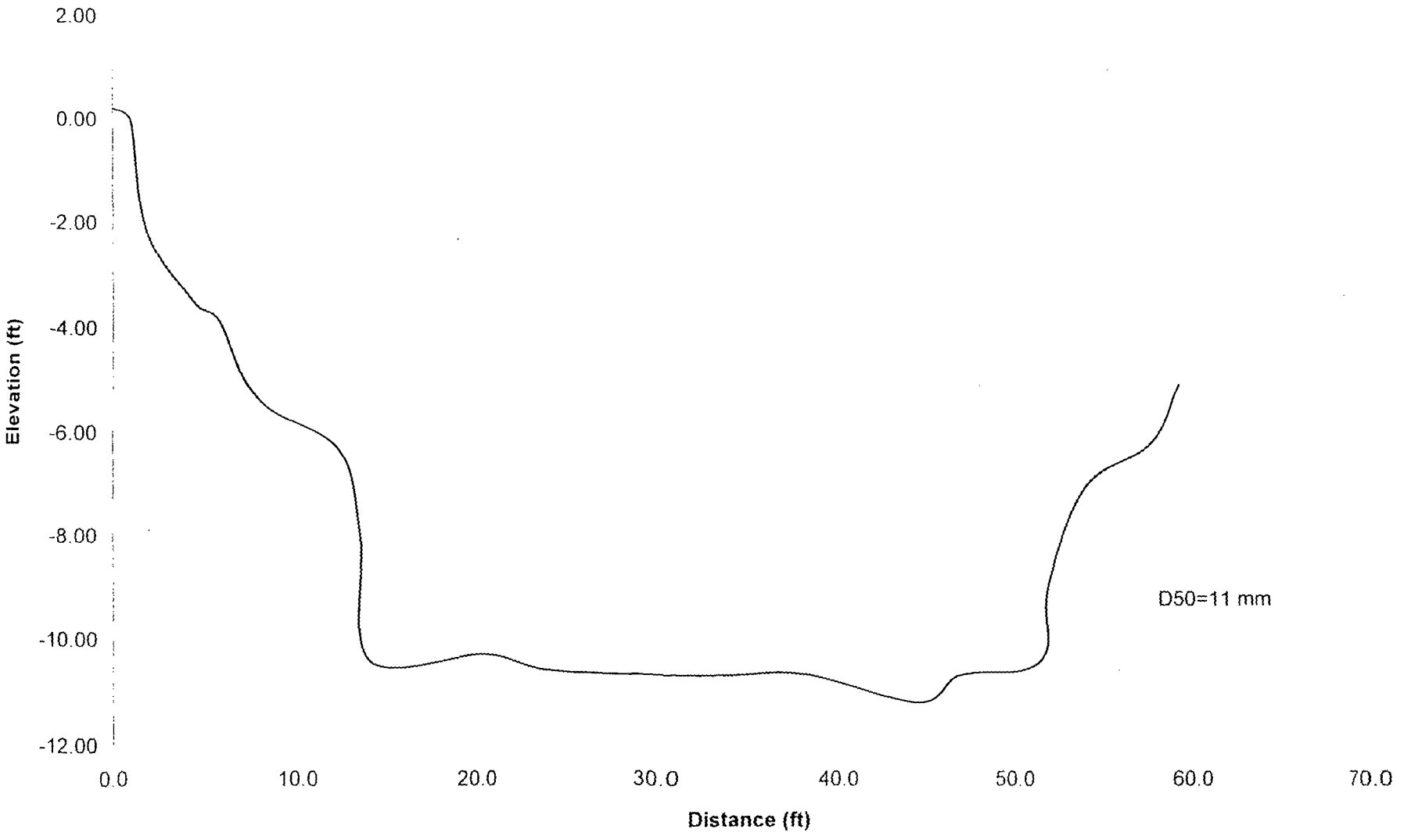
Standardized Statistics:
Number of data points in raw data: 133
Number of data points in Standardized data: 259

Reach Step Distance: 5.00

Max Residual Depth:	7.56
Mean Residual Depth:	0.91
Standard Deviation:	1.32



Upper Greenwood Creek Cross-section #1 9-24-01



D50(mm) = 11

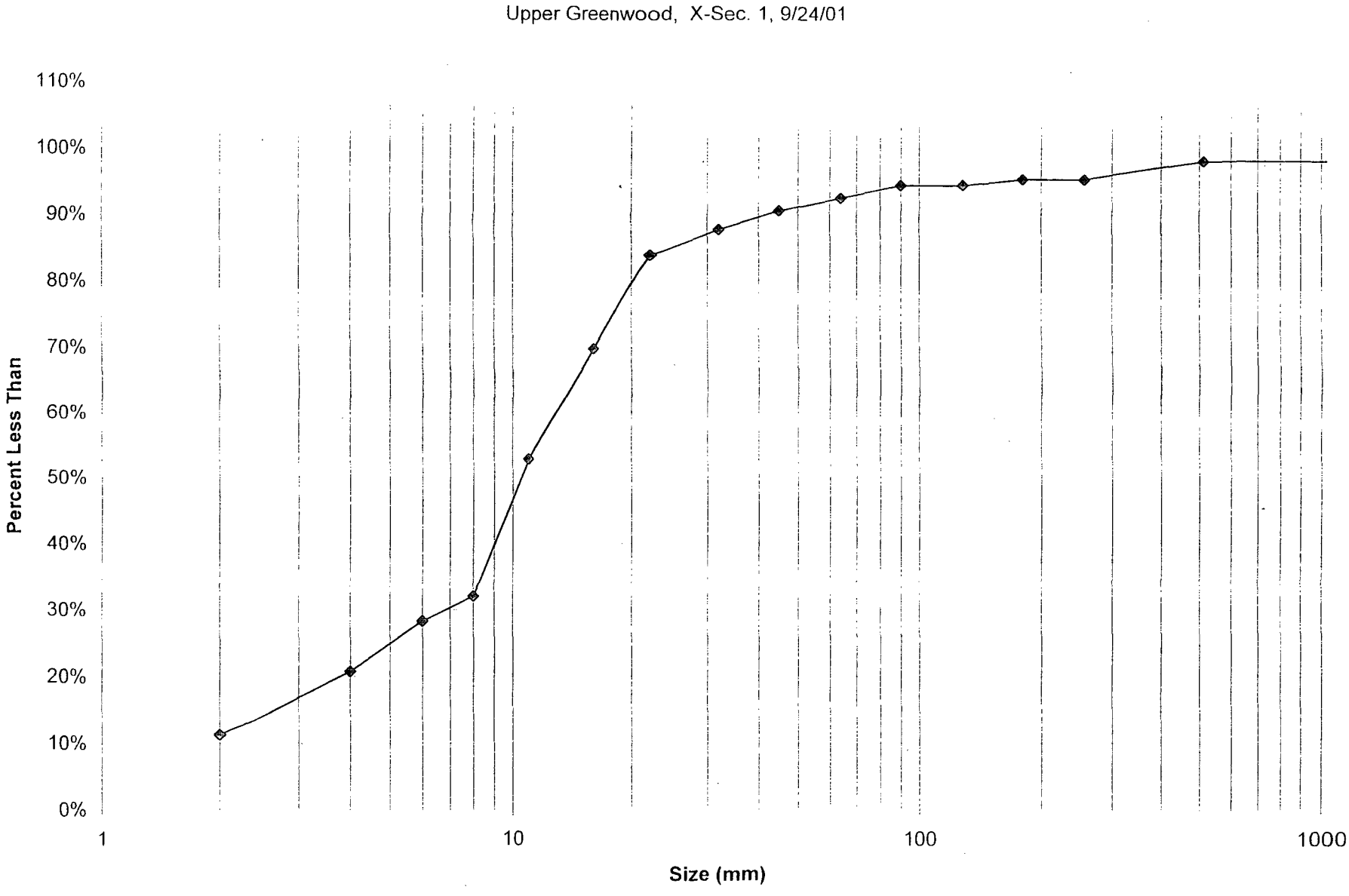
Pebble Count Form

Watershed: Upper Greenwood Date: 9/24/01

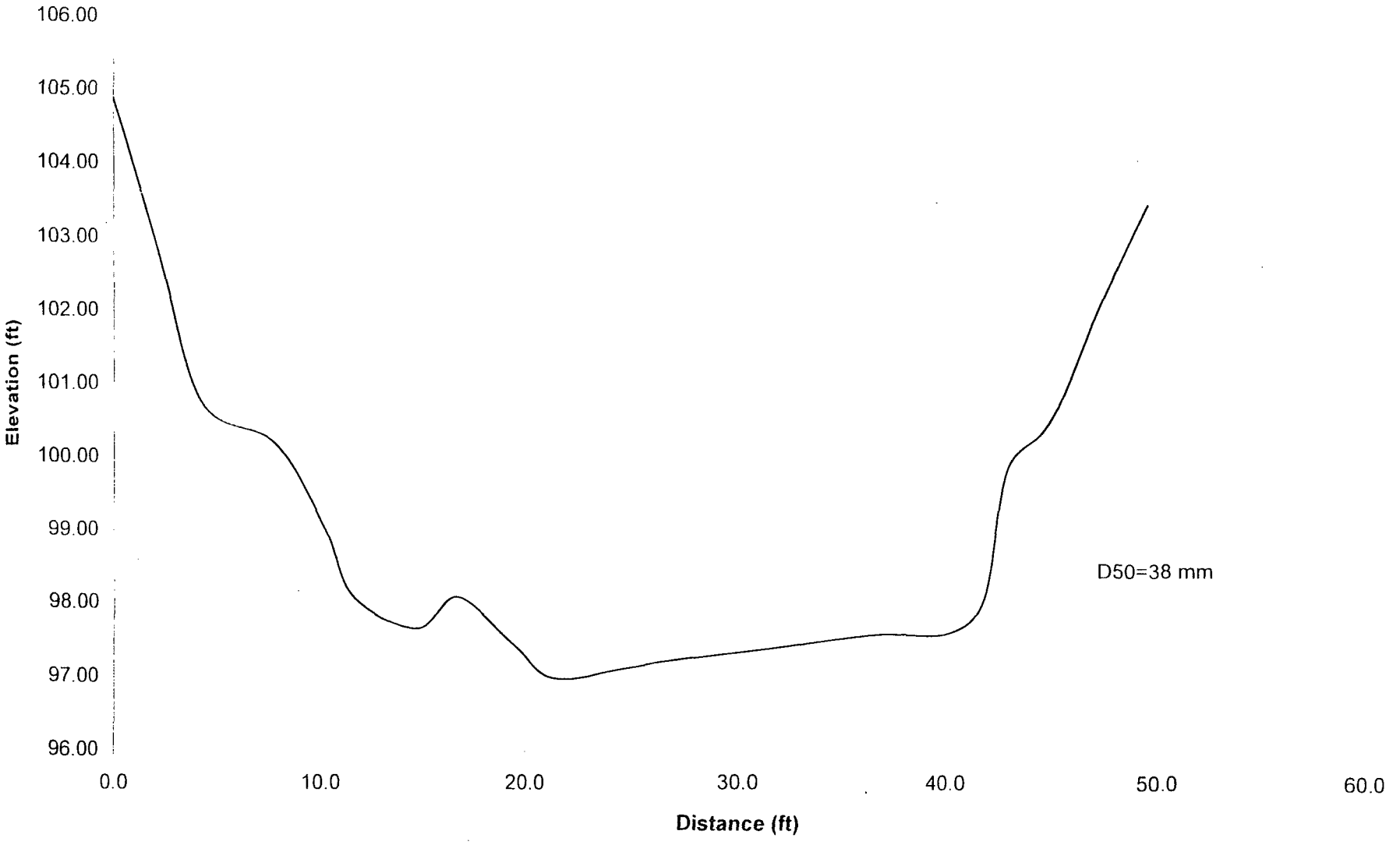
Stream Segment #: _____

Location: X-section #1

Substrate Size Class (mm)		Talley	Number
Sand	<2	𝍸 𝍸 ||	12
Very Fine Gravel	2-4	𝍸 𝍸	10
Fine Gravel	5-6	𝍸 |||	8
Fine Gravel	7-8	||||	4
Medium Gravel	9-11	𝍸 𝍸 𝍸 𝍸 ||	22
Medium Gravel	12-16	𝍸 𝍸 𝍸 |||	18
Coarse Gravel	17-22	𝍸 𝍸 𝍸	15
Coarse Gravel	23-32	||||	4
Very Coarse Gravel	33-45	|||	3
Very Coarse Gravel	46-64	||	2
Small Cobble	65-90	||	2
Medium Cobble	91-128		
Large Cobble	129-180	|	1
Very Large Cobble	181-256		
Small Boulder	257-512	|||	3
Medium Boulder	513-1024		
Large Boulder	1025-2048	|	1
Very Large Boulder	2049-4096	|	1


Upper Greenwood, X-Sec. 1, 9/24/01
110%
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percent Less Than
1
10
100
1000
Size (mm)

Upper Greenwood Creek Cross-section #2 9-24-01



D50 (mm) = ~~39~~ 38

Pebble Count Form

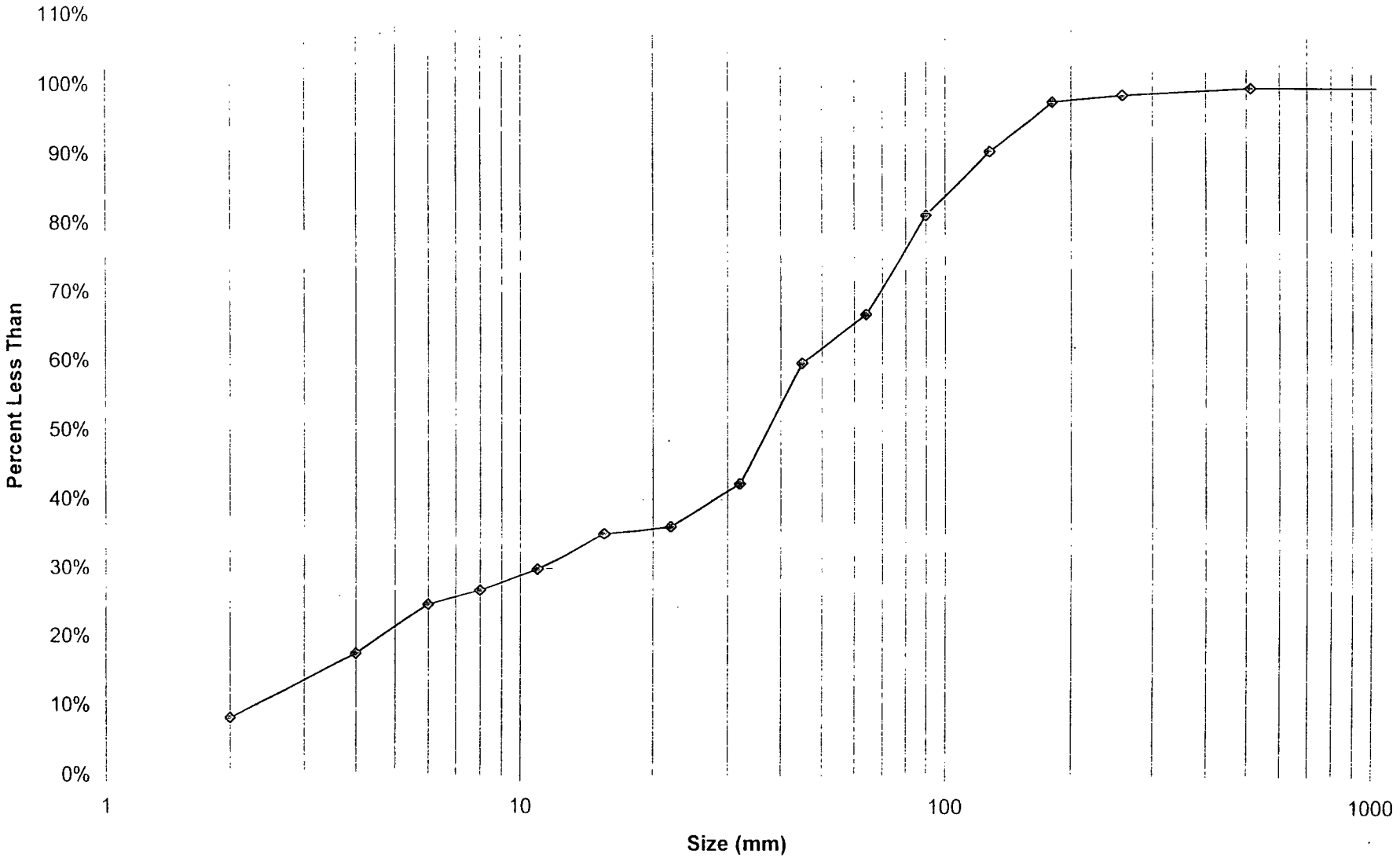
Watershed: Upper Greenwood Date: 9-24-01

Stream Segment #: _____

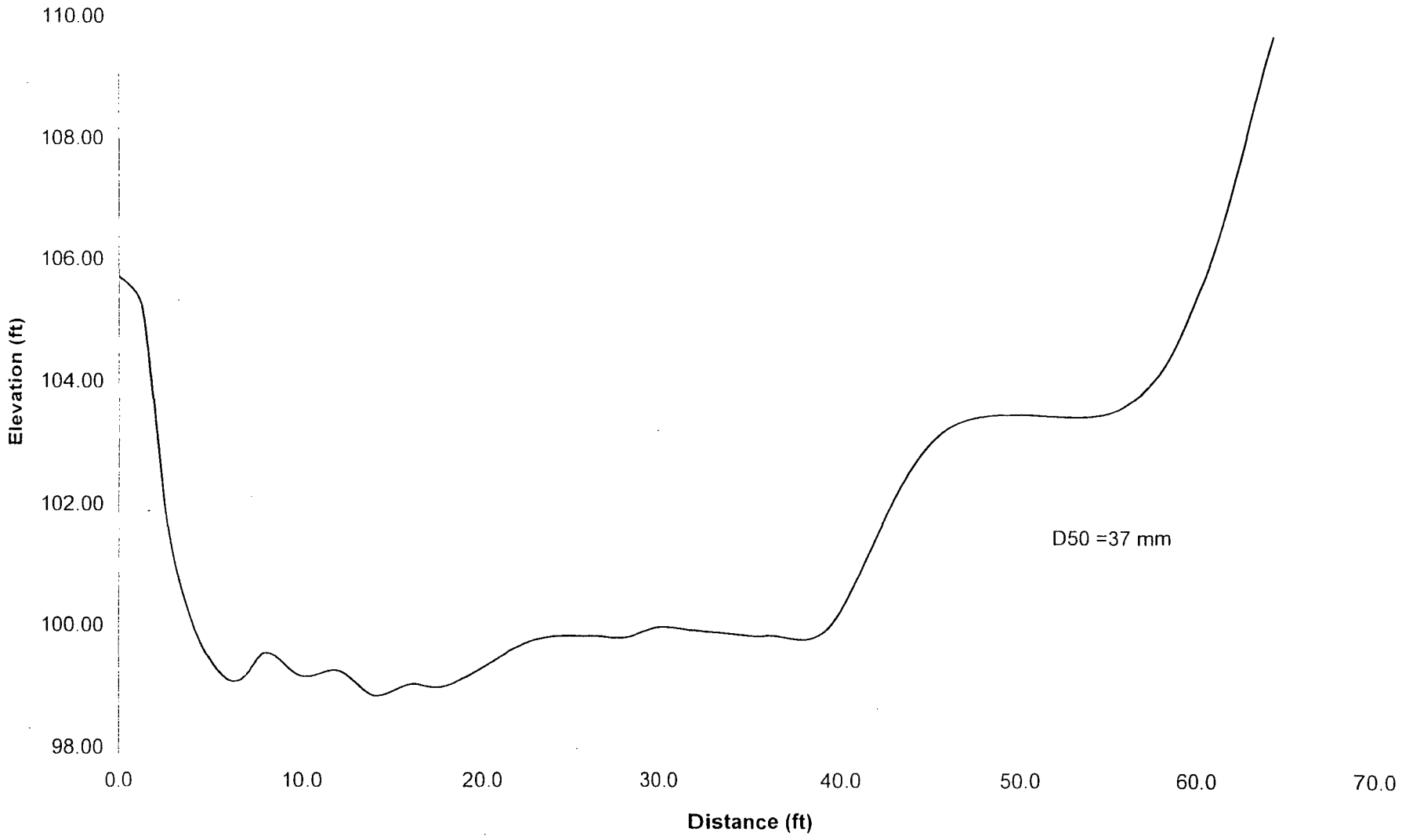
Location: X-section #2

Substrate Size Class (mm)		Talley	Number
Sand	<2	~~HH~~ III	8
Very Fine Gravel	2-4	~~HH~~ IIII	9
Fine Gravel	5-6	~~HH~~ II	7
Fine Gravel	7-8	II	2
Medium Gravel	9-11	III	3
Medium Gravel	12-16	~~HH~~	5
Coarse Gravel	17-22	I	1
Coarse Gravel	23-32	~~HH~~ I	6
Very Coarse Gravel	33-45	~~HH~~ ~~HH~~ ~~HH~~ II	17
Very Coarse Gravel	46-64	~~HH~~ II	7
Small Cobble	65-90	~~HH~~ ~~HH~~ IIII	14
Medium Cobble	91-128	~~HH~~ II II	9
Large Cobble	129-180	~~HH~~ II	7
Very Large Cobble	181-256	I	1
Small Boulder	257-512	I	1
Medium Boulder	513-1024		1
Large Boulder	1025-2048		
Very Large Boulder	2049-4096		

Upper Greenwood, X-Sec. 2, 9/24/01



Upper Greenwood Creek Cross-section #3 9-24-01



D50(mm) = 37

Pebble Count Form

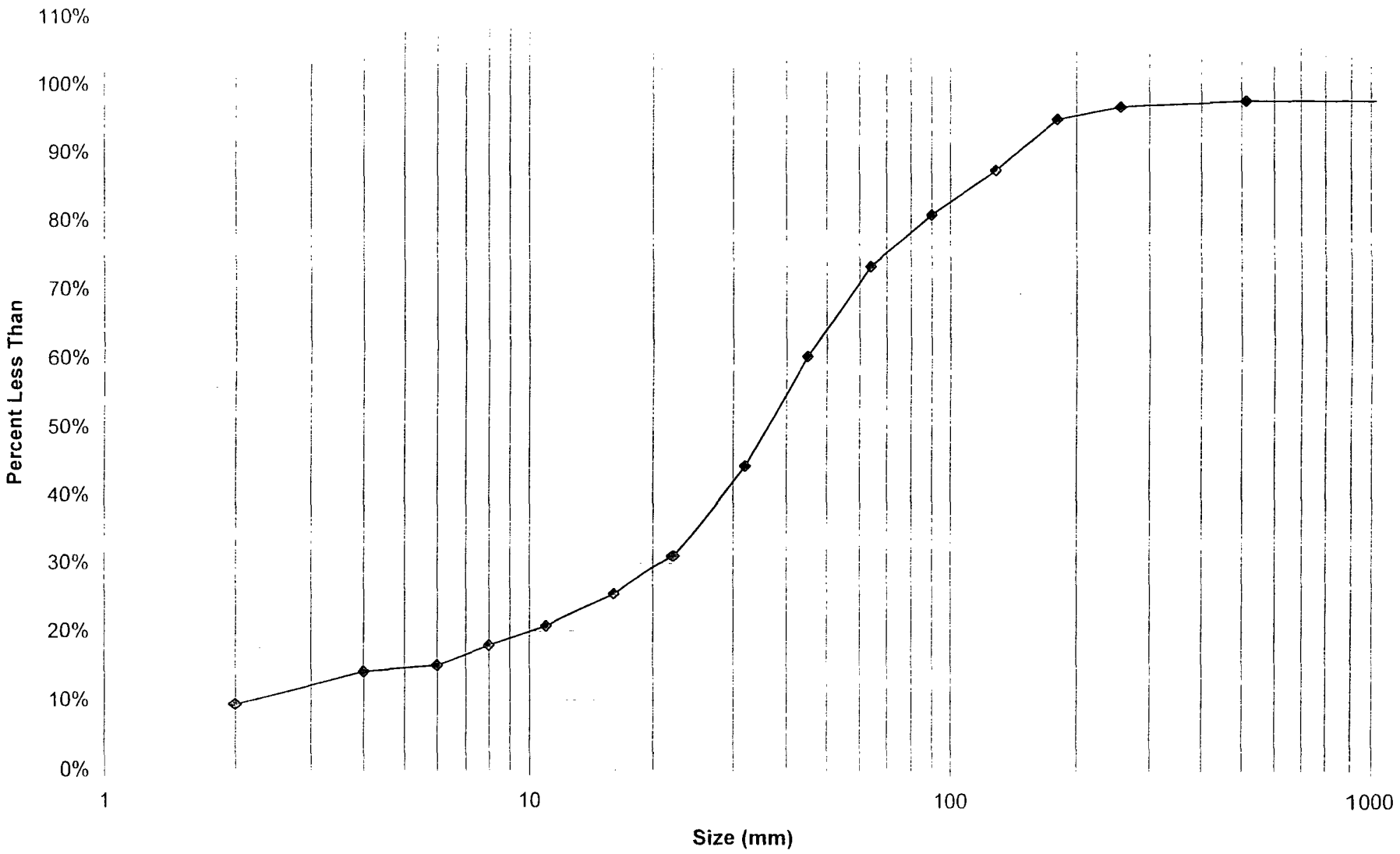
Watershed: Upper Greenwood Date: 9-24-01

Stream Segment #: _____

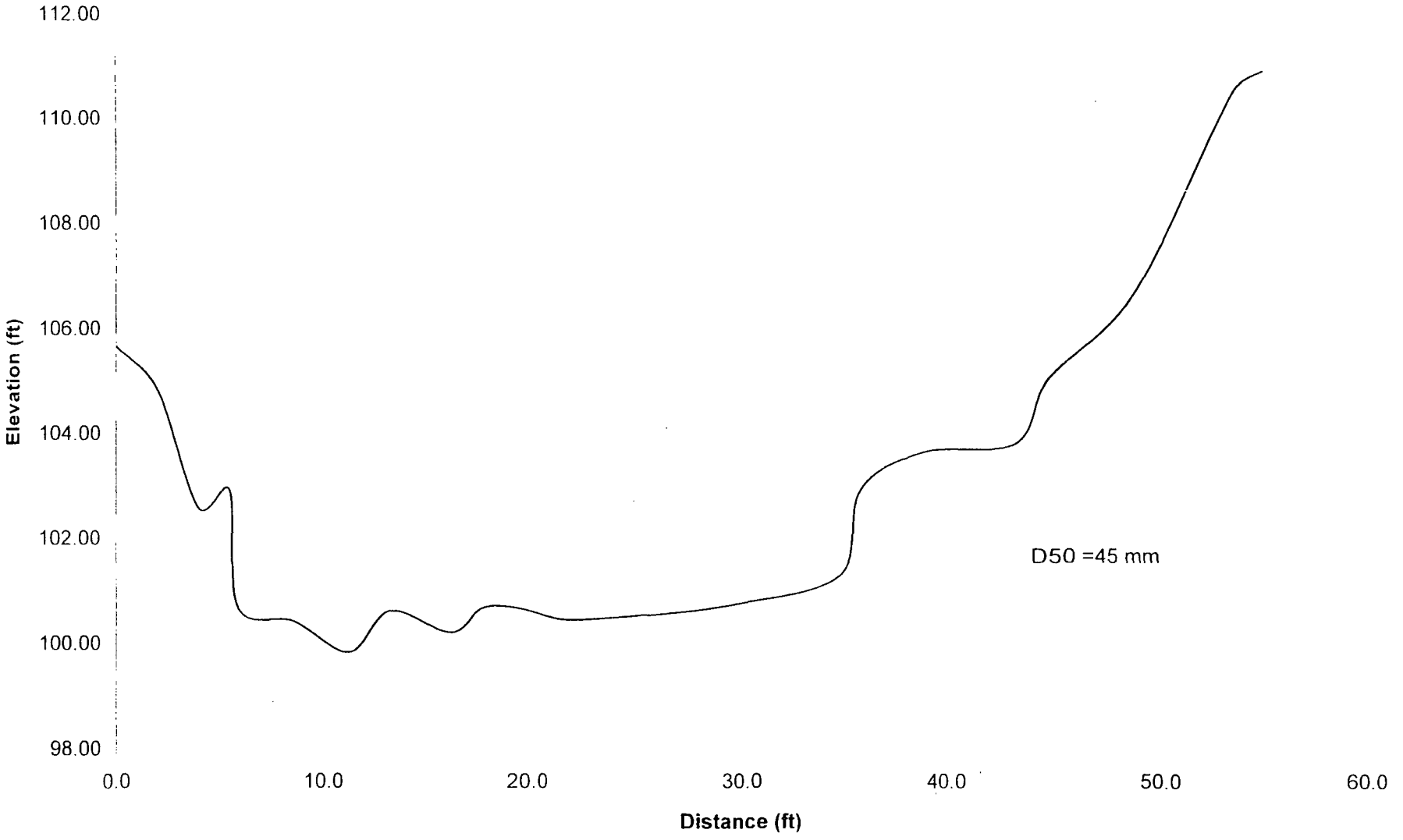
Location: X-section #3

Substrate Size Class (mm)		Talley	Number
Sand	<2	𝍸 𝍸	10
Very Fine Gravel	2-4	𝍸	5
Fine Gravel	5-6	I	1
Fine Gravel	7-8	III	3
Medium Gravel	9-11	III	3
Medium Gravel	12-16	𝍸	5
Coarse Gravel	17-22	𝍸 I	6
Coarse Gravel	23-32	𝍸 𝍸 IIII	14
Very Coarse Gravel	33-45	𝍸 𝍸 𝍸 II	17
Very Coarse Gravel	46-64	𝍸 𝍸 IIII	14
Small Cobble	65-90	𝍸 III	8
Medium Cobble	91-128	𝍸 II	7
Large Cobble	129-180	𝍸 III	8
Very Large Cobble	181-256	II	2
Small Boulder	257-512	I	1
Medium Boulder	513-1024		
Large Boulder	1025-2048	I	1
Very Large Boulder	2049-4096	I	1

Upper Greenwood, X-Sec. 3, 9/24/01



Upper Greenwood Creek Cross-section #4 9-21-01



D50(mm) = 45

Pebble Count Form

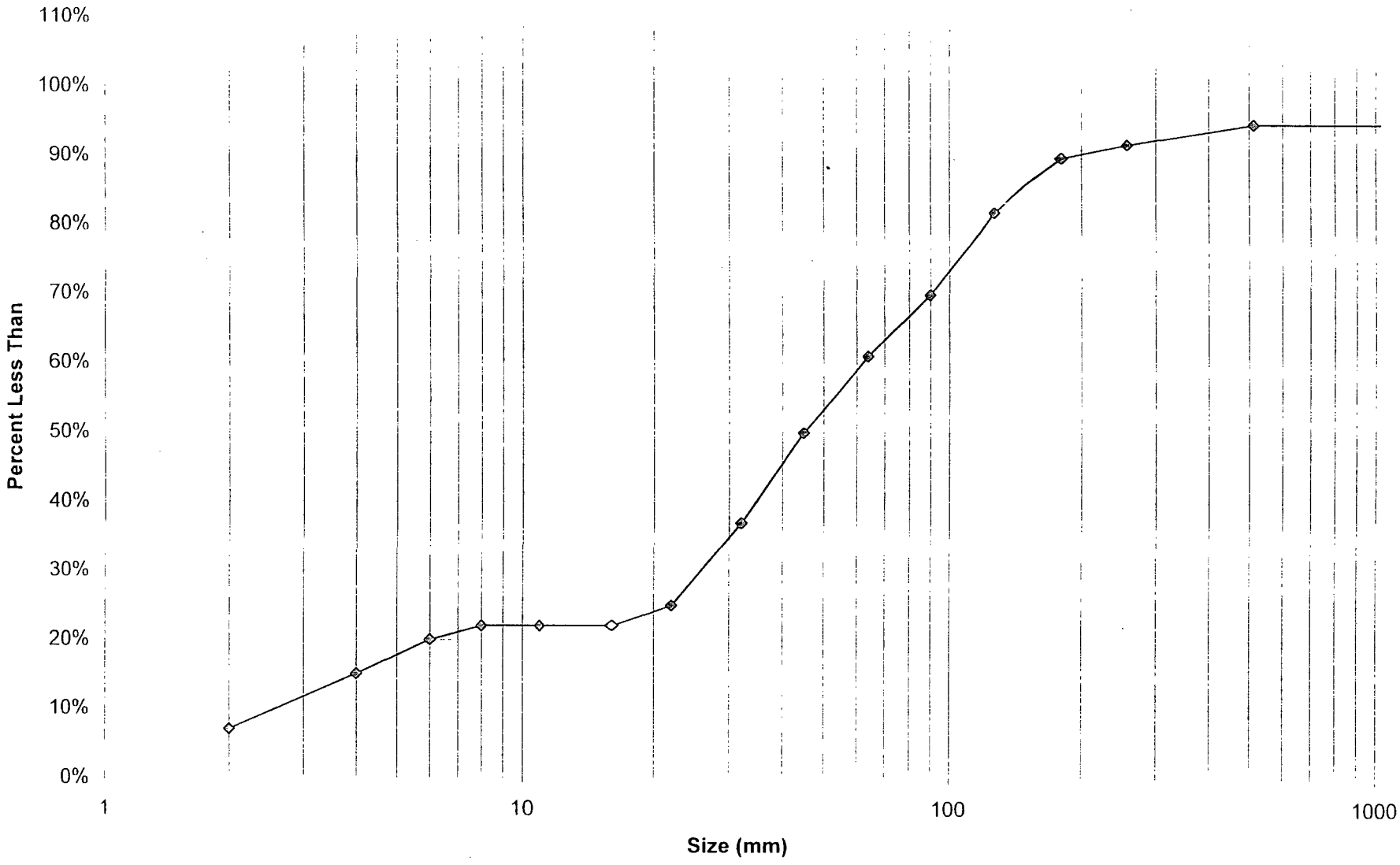
Watershed: Upper Greenwood Date: 9.21.01

Stream Segment #: _____

Location: N. Sec. 4 @ E.O.S.

Substrate Size Class (mm)		Talley	Number
Sand	<2	||| ||	7
Very Fine Gravel	2-4	|||| |||	8
Fine Gravel	5-6	||||	5
Fine Gravel	7-8	||	2
Medium Gravel	9-11		
Medium Gravel	12-16		
Coarse Gravel	17-22	|||	3
Coarse Gravel	23-32	|||| |||| ||	12
Very Coarse Gravel	33-45	|||| |||| |||	13
Very Coarse Gravel	46-64	|||| ||||		11
Small Cobble	65-90	|||| |||||	9
Medium Cobble	91-128	|||| |||| ||	12
Large Cobble	129-180	|||| |||	8
Very Large Cobble	181-256	||	2
Small Boulder	257-512	|||	3
Medium Boulder	513-1024		
Large Boulder	1025-2048	|||	3
Very Large Boulder	2049-4096	||	2

Upper Greenwood, X-Sec. 4, 9/21/01



PERMEABILITY TEMPLATE

Mendocino Redwood Company, LLC

SITE: Upper Greenwood
Site #:
Date: 9/20 01
Crew: NL DE
Sample Location: LT Channel Reach
NOTES:

Ambient Weather

ENTER DATA HERE — FOR SECOND MRC PERMEABILITY PUMP

Sample Water Temperature (C)	SAMPLE	REP	START GAGE READING (cm)	END GAGE READING (cm)	TIME (sec)	STAGE CHANGE (cm)	INFLOW (ml/s)	UNADJ. PERM. (cm/hr)	Vis. Corr.	ADJ. PERM. (cm/hr)	NOTES
11.5	1	1	0.0	1.7	30.1	1.7	3.7 ml/s	270 cm/hr	0.98	265 cm/hr	Talout #1, Site #1
11.5		1	0.0	1.2	29.9	1.2	2.6 ml/s	175 cm/hr	0.98	172 cm/hr	Talout #1, Site #1
11.5		3	0.0	1.3	30.1	1.3	2.8 ml/s	185 cm/hr	0.98	181 cm/hr	Talout #1, Site #1
11.5		4	0.0	1.2	30.3	1.2	2.6 ml/s	175 cm/hr	0.98	172 cm/hr	Talout #1, Site #1
11.5		5	0.0	1.4	30.0	1.4	3.0 ml/s	195 cm/hr	0.98	191 cm/hr	Talout #1, Site #1
11.5	2	1	0.0	0.1	30.0	0.1	0.2 ml/s	1 cm/hr	0.98	1 cm/hr	Talout #1, Site #3
11.5		2	0.0	0.1	30.0	0.1	0.2 ml/s	1 cm/hr	0.98	1 cm/hr	Talout #1, Site #3
11.5		3	0.0	0.1	30.0	0.1	0.2 ml/s	1 cm/hr	0.98	1 cm/hr	Talout #1, Site #3
11.5		4	0.0	0.1	30.0	0.1	0.2 ml/s	1 cm/hr	0.98	1 cm/hr	Talout #1, Site #3
11.5		5	0.0	0.1	30.0	0.1	0.2 ml/s	1 cm/hr	0.98	1 cm/hr	Talout #1, Site #3
11.5	3	1	0.0	1.2	30.0	1.2	2.6 ml/s	175 cm/hr	0.98	172 cm/hr	Talout #1, Site # 7
11.5		2	0.0	1.2	30.4	1.2	2.6 ml/s	175 cm/hr	0.98	172 cm/hr	Talout #1, Site # 7
11.5		3	0.0	1.1	30.0	1.1	2.4 ml/s	160 cm/hr	0.98	157 cm/hr	Talout #1, Site # 7
11.5		4	0.0	1.2	30.1	1.2	2.6 ml/s	175 cm/hr	0.98	172 cm/hr	Talout #1, Site # 7
11.5		5	0.0	1.5	30.1	1.5	3.2 ml/s	220 cm/hr	0.98	216 cm/hr	Talout #1, Site # 7
11.5	4	1	0.0	4.3	30.1	4.3	9.2 ml/s	825 cm/hr	0.98	809 cm/hr	Talout #2, Site #4
11.5		2	0.0	5.2	30.0	5.2	11.2 ml/s	1,120 cm/hr	0.98	1,098 cm/hr	Talout #2, Site #4
11.5		3	0.0	5.7	30.1	5.7	12.3 ml/s	1,230 cm/hr	0.98	1,205 cm/hr	Talout #2, Site #4
11.5		4	0.0	5.6	30.1	5.6	12.0 ml/s	1,200 cm/hr	0.98	1,176 cm/hr	Talout #2, Site #4
11.5		5	0.0	3.1	30.1	3.1	6.7 ml/s	575 cm/hr	0.98	564 cm/hr	Talout #2, Site #4
11.5	5	1	0.0	12.6	30.7	12.6	24.9 ml/s	2,590 cm/hr	0.98	2,538 cm/hr	Talout #2, Site #8
11.5		2	0.0	12.8	30.1	12.8	27.5 ml/s	2,850 cm/hr	0.98	2,793 cm/hr	Talout #2, Site #8
11.5		3	0.0	13.7	30.0	13.7	29.5 ml/s	3,050 cm/hr	0.98	2,989 cm/hr	Talout #2, Site #8
11.5		4	0.0	14.0	30.2	14.0	30.0 ml/s	3,100 cm/hr	0.98	3,038 cm/hr	Talout #2, Site #8
11.5		5	0.0	14.9	30.0	14.9	32.1 ml/s	3,620 cm/hr	0.98	3,548 cm/hr	Talout #2, Site #8
11.5	6	1	0.0	14.0	30.1	14.0	45.1 ml/s	5,620 cm/hr	0.98	5,508 cm/hr	Talout #2, Site #12
11.5		2	0.0	15.0	30.2	15.0	48.0 ml/s	6,000 cm/hr	0.98	5,880 cm/hr	Talout #2, Site #12
11.5		3	0.0	15.7	18.9	15.7	51.0 ml/s	7,100 cm/hr	0.98	6,958 cm/hr	Talout #2, Site #12
11.5		4	0.0	15.4	30.0	15.4	49.8 ml/s	6,740 cm/hr	0.98	6,605 cm/hr	Talout #2, Site #12
11.5		5	0.0	15.6	30.1	15.6	50.2 ml/s	6,860 cm/hr	0.98	6,723 cm/hr	Talout #2, Site #12
12	7	1	0.0	0.1	30.0	0.1	0.2 ml/s	1 cm/hr	0.97	1 cm/hr	Talout #3, Site #2
12		2	0.0	0.1	30.0	0.1	0.2 ml/s	1 cm/hr	0.97	1 cm/hr	Talout #3, Site #2
12		3	0.0	0.1	30.0	0.1	0.2 ml/s	1 cm/hr	0.97	1 cm/hr	Talout #3, Site #2
12		4	0.0	0.1	30.0	0.1	0.2 ml/s	1 cm/hr	0.97	1 cm/hr	Talout #3, Site #2
12		5	0.0	0.1	30.0	0.1	0.2 ml/s	1 cm/hr	0.97	1 cm/hr	Talout #3, Site #2
12	8	1	0.0	2.9	29.5	2.9	6.4 ml/s	540 cm/hr	0.97	521 cm/hr	Talout #3, Site #5
12		2	0.0	2.8	29.9	2.8	6.1 ml/s	505 cm/hr	0.97	487 cm/hr	Talout #3, Site #5
12		3	0.0	3.0	29.8	3.0	6.5 ml/s	550 cm/hr	0.97	531 cm/hr	Talout #3, Site #5
12		4	0.0	3.5	29.7	3.5	7.6 ml/s	665 cm/hr	0.97	642 cm/hr	Talout #3, Site #5
12		5	0.0	3.3	29.9	3.3	7.1 ml/s	605 cm/hr	0.97	584 cm/hr	Talout #3, Site #5
12	9	1	0.0	0.4	30.0	0.4	0.9 ml/s	1 cm/hr	0.97	1 cm/hr	Talout #3, Site #6
12		2	0.0	1.2	30.3	1.2	2.6 ml/s	175 cm/hr	0.97	169 cm/hr	Talout #3, Site #6
12		3	0.0	1.3	29.9	1.3	2.8 ml/s	185 cm/hr	0.97	179 cm/hr	Talout #3, Site #6
12		4	0.0	1.4	29.9	1.4	3.0 ml/s	195 cm/hr	0.97	188 cm/hr	Talout #3, Site #6
12		5	0.0	1.1	30.1	1.1	2.4 ml/s	160 cm/hr	0.97	154 cm/hr	Talout #3, Site #6
12	10	1	0.0	1.6	30.1	1.6	3.4 ml/s	240 cm/hr	0.97	232 cm/hr	Talout #3, Site #11
12		2	0.0	1.9	29.9	1.9	4.1 ml/s	305 cm/hr	0.97	294 cm/hr	Talout #3, Site #11
12		3	0.0	2.0	30.1	2.0	4.3 ml/s	320 cm/hr	0.97	309 cm/hr	Talout #3, Site #11
12		4	0.0	1.8	29.9	1.8	3.9 ml/s	285 cm/hr	0.97	275 cm/hr	Talout #3, Site #11
12		5	0.0	2.2	30.0	2.2	4.7 ml/s	360 cm/hr	0.97	347 cm/hr	Talout #3, Site #11
13	11	1	0.0	8.5	30.0	8.5	18.3 ml/s	1,830 cm/hr	0.95	1,729 cm/hr	Talout #4, Site #1
13		2	0.0	9.9	30.2	9.9	21.2 ml/s	2,220 cm/hr	0.95	2,098 cm/hr	Talout #4, Site #1
13		3	0.0	10.1	29.2	10.1	22.4 ml/s	2,340 cm/hr	0.95	2,211 cm/hr	Talout #4, Site #1
13		4	0.0	10.4	30.1	10.4	22.4 ml/s	2,340 cm/hr	0.95	2,211 cm/hr	Talout #4, Site #1
13		5	0.0	11.3	30.3	11.3	24.1 ml/s	2,510 cm/hr	0.95	2,372 cm/hr	Talout #4, Site #1
13	12	1	0.0	6.8	29.7	6.8	14.8 ml/s	1,480 cm/hr	0.95	1,399 cm/hr	Talout #4, Site #4
13		2	0.0	7.1	29.9	7.1	15.4 ml/s	1,540 cm/hr	0.95	1,455 cm/hr	Talout #4, Site #4
13		3	0.0	7.4	30.1	7.4	15.9 ml/s	1,590 cm/hr	0.95	1,503 cm/hr	Talout #4, Site #4
13		4	0.0	8.2	29.9	8.2	17.7 ml/s	1,770 cm/hr	0.95	1,673 cm/hr	Talout #4, Site #4
13		5	0.0	8.9	29.9	8.9	19.3 ml/s	1,940 cm/hr	0.95	1,833 cm/hr	Talout #4, Site #4
13	13	1	0.0	15.6	14.8	15.6	68.2 ml/s	13,300 cm/hr	0.95	12,569 cm/hr	Talout #4, Site #5
13		2	0.0	16.5	14.5	16.5	72.1 ml/s	15,270 cm/hr	0.95	14,430 cm/hr	Talout #4, Site #5
13		3	0.0	16.4	15.1	16.4	70.3 ml/s	14,160 cm/hr	0.95	13,400 cm/hr	Talout #4, Site #5
13		4	0.0	18.1	14.9	18.1	78.6 ml/s	19,880 cm/hr	0.95	18,787 cm/hr	Talout #4, Site #5
13		5	0.0	17.2	14.9	17.2	75.1 ml/s	17,370 cm/hr	0.95	16,415 cm/hr	Talout #4, Site #5
13	14	1	0.0	12.8	29.9	12.8	27.7 ml/s	2,870 cm/hr	0.95	2,712 cm/hr	Talout #4, Site #12
13		2	0.0	12.8	30.0	12.8	27.6 ml/s	2,860 cm/hr	0.95	2,703 cm/hr	Talout #4, Site #12
13		3	0.0	15.0	29.9	15.0	32.5 ml/s	3,700 cm/hr	0.95	3,497 cm/hr	Talout #4, Site #12
13		4	0.0	14.7	29.8	14.7	31.9 ml/s	3,580 cm/hr	0.95	3,383 cm/hr	Talout #4, Site #12
13		5	0.0	16.0	30.7	16.0	34.4 ml/s	4,080 cm/hr	0.95	3,856 cm/hr	Talout #4, Site #12
12	15	1	0.0	8.8	15.0	8.8	38.0 ml/s	4,700 cm/hr	0.97	4,536 cm/hr	Talout #5, Site #4
12		2	0.0	8.9	15.2	8.9	37.9 ml/s	4,690 cm/hr	0.97	4,526 cm/hr	Talout #5, Site #4
12		3	0.0	9.1	15.2	9.1	38.7 ml/s	4,770 cm/hr	0.97	4,603 cm/hr	Talout #5, Site #4
12		4	0.0	8.6	15.0	8.6	37.1 ml/s	4,610 cm/hr	0.97	4,449 cm/hr	Talout #5, Site #4
12		5	0.0	9.2	14.9	9.2	39.9 ml/s	4,890 cm/hr	0.97	4,719 cm/hr	Talout #5, Site #4
12	16	1	0.0	15.4	15.0	15.4	66.4 ml/s	12,580 cm/hr	0.97	12,140 cm/hr	Talout #5, Site #6
12		2	0.0	16.5	15.1	16.5	72.4 ml/s	15,460 cm/hr	0.97	14,938 cm/hr	Talout #5, Site #6
12		3	0.0	17.4	15.1	17.4	74.6 ml/s	17,020 cm/hr	0.97	16,424 cm/hr	Talout #5, Site #6
12		4	0.0	17.5	15.1	17.5	76.3 ml/s	18,210 cm/hr	0.97	17,573 cm/hr	Talout #5, Site #6
12		5	0.0	18.5	15.1	18.5	79.3 ml/s	20,440 cm/hr	0.97	19,725 cm/hr	Talout #5, Site #6
12	17	1	0.0	17.3	15.0	17.3	74.6 ml/s	17,020 cm/hr	0.97	16,424 cm/hr	Talout #5, Site #8
12		2	0.0	20.3	17.6	20.3	74.6 ml/s	17,020 cm/hr	0.97	16,424 cm/hr	Talout #5, Site #8
12		3	0.0	17.9	14.9	17.9	77.7 ml/s	19,190 cm/hr	0.97	18,518 cm/hr	Talout #5, Site #8
12		4	0.0	24.0	20.8	24.0	74.7 ml/s	17,090 cm/hr	0.97	16,492 cm/hr	Talout #5, Site #8
12		5	0.0	19.6	15.2	19.6	79.2 ml/s	20,360 cm/hr	0.97	19,647 cm/hr	Talout #5, Site #8
12	18	1	0.0	14.8	10.0	14.8	95.8 ml/s	42,800 cm/hr	0.97	41,302 cm/hr	Talout #5, Site #11
12		2	0.0	14.3	10.1	14.3	91.6 ml/s	37,800 cm/hr	0.97	36,477 cm/hr	Talout #5, Site #11
12		3	0.0	15.5	9.4	15.5	106.7 ml/s	83,500 cm/hr	0.97	80,578 cm/hr	Talout #5, Site #11
12		4	0.0	14.9	9.9	14.9	97.4 ml/s	44,400 cm/hr	0.97	42,846 cm/hr	Talout #5, Site #11
12		5	0.0	15.2	10.0	15.2	98.3 ml/s	45,300 cm/hr	0.97	43,715 cm/hr	Talout #5, Site #11
13	19	1	0.0	9.2	29.8	9.2	20.0 ml/s	2,020 cm/hr	0.95	1,908 cm/hr	Talout #6, Site #1
13		2	0.0	13.8	29.9	13.8	29.9 ml/s	3,090 cm/hr	0.95	2,929 cm/hr	Talout #6, Site #1
13		3	0.0	16.1	30.0	16.1	34.7 ml/s	4,140 cm/hr	0.95	3,912 cm/hr	Talout #6, Site #1
13		4	0.0	20.7	30.0	20.7	44.6 ml/s	5,620 cm/hr	0.95	5,311 cm/hr	Talout #6, Site #1
13		5	0.0	20.0	29.9	20.0	43.3 ml/s	5,460 cm/hr	0.95	5,160 cm/hr	Talout #6, Site #1
13	20	1	0.0	4.4	30.0	4.4	9.5 ml/s	950 cm/hr	0.95	903 cm/hr	Talout #6, Site #4
13		2	0.0	4.8	29.9	4.8	10.4 ml/s	950 cm/hr	0.95	898 cm/hr	Talout #6, Site #4
13		3	0.0	5.4	30.2	5.4	11.6 ml/s	1,160 cm/hr	0.95	1,096 cm/hr	Talout #6, Site #4

OUTPUT DATA HERE

	STUDY SITE	Upper Greenwood
	DATE	09/20/01
	SITE LOCATION	LT Channel Reach
ENTIRE SEGMENT	SURVIVAL PERCENT	44%
	STANDARD ERROR SURVIAL PERCENT	32%
	Mean of Sites' Median Permeability (cm/hr)	5,059 cm/hr
	STANDARD ERROR (of sites medians)	2208.47513
	Ln(MEAN of Median) PERMEABILITIES	8.5

SAMPLE 1	MEDIAN PERMEABILITY (cm/hr)	181 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	5 cm/hr	
	MEAN PERMEABILITY (cm/hr)	196	
	STANDARD DEVIATION	39	
	SURVIVAL PERCENT	0	-4%
SAMPLE 2	MEDIAN PERMEABILITY (cm/hr)	1 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	0 cm/hr	
	MEAN PERMEABILITY (cm/hr)	1	
	STANDARD DEVIATION	0	
	SURVIVAL PERCENT	0	-82%
SAMPLE 3	MEDIAN PERMEABILITY (cm/hr)	172 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	5 cm/hr	
	MEAN PERMEABILITY (cm/hr)	177	
	STANDARD DEVIATION	22	
	SURVIVAL PERCENT	0	-5%
SAMPLE 4	MEDIAN PERMEABILITY (cm/hr)	1,098 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	7 cm/hr	
	MEAN PERMEABILITY (cm/hr)	970	
	STANDARD DEVIATION	276	
	SURVIVAL PERCENT	0.22650114	23%
SAMPLE 5	MEDIAN PERMEABILITY (cm/hr)	2,989 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	8 cm/hr	
	MEAN PERMEABILITY (cm/hr)	2981	
	STANDARD DEVIATION	373	
	SURVIVAL PERCENT	0.375580918	38%
SAMPLE 6	MEDIAN PERMEABILITY (cm/hr)	6 605 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	9 cm/hr	
	MEAN PERMEABILITY (cm/hr)	6335	
	STANDARD DEVIATION	613	
	SURVIVAL PERCENT	0.493575096	49%
SAMPLE 7	MEDIAN PERMEABILITY (cm/hr)	1 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	0 cm/hr	
	MEAN PERMEABILITY (cm/hr)	1	
	STANDARD DEVIATION	0	
	SURVIVAL PERCENT	0	-82%
SAMPLE 8	MEDIAN PERMEABILITY (cm/hr)	531 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	6 cm/hr	
	MEAN PERMEABILITY (cm/hr)	553	
	STANDARD DEVIATION	61	
	SURVIVAL PERCENT	0.118377259	12%
SAMPLE 9	MEDIAN PERMEABILITY (cm/hr)	169 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	5 cm/hr	
	MEAN PERMEABILITY (cm/hr)	136	
	STANDARD DEVIATION	78	
	SURVIVAL PERCENT	-6%	
SAMPLE 10	MEDIAN PERMEABILITY (cm/hr)	294 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	6 cm/hr	
	MEAN PERMEABILITY (cm/hr)	291	
	STANDARD DEVIATION	43	
	SURVIVAL PERCENT	0.030637915	3%
SAMPLE 11	MEDIAN PERMEABILITY (cm/hr)	2,211 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	8 cm/hr	
	MEAN PERMEABILITY (cm/hr)	2124	
	STANDARD DEVIATION	241	
	SURVIVAL PERCENT	0.330735789	33%
SAMPLE 12	MEDIAN PERMEABILITY (cm/hr)	1,503 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	7 cm/hr	
	MEAN PERMEABILITY (cm/hr)	1572	
	STANDARD DEVIATION	178	
	SURVIVAL PERCENT	0.273233088	27%
SAMPLE 13	MEDIAN PERMEABILITY (cm/hr)	14,430 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	10 cm/hr	
	MEAN PERMEABILITY (cm/hr)	15120	
	STANDARD DEVIATION	2503	
	SURVIVAL PERCENT	0.609864538	61%
SAMPLE 14	MEDIAN PERMEABILITY (cm/hr)	3,383 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	8 cm/hr	
	MEAN PERMEABILITY (cm/hr)	3230	
	STANDARD DEVIATION	508	
	SURVIVAL PERCENT	0.394011567	39%
SAMPLE 15	MEDIAN PERMEABILITY (cm/hr)	4,536 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	8 cm/hr	
	MEAN PERMEABILITY (cm/hr)	4566	
	STANDARD DEVIATION	101	
	SURVIVAL PERCENT	0.43763416	44%
SAMPLE 16	MEDIAN PERMEABILITY (cm/hr)	16,424 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	10 cm/hr	
	MEAN PERMEABILITY (cm/hr)	16160	
	STANDARD DEVIATION	2847	
	SURVIVAL PERCENT	0.629126828	63%
SAMPLE 17	MEDIAN PERMEABILITY (cm/hr)	16,492 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	10 cm/hr	
	MEAN PERMEABILITY (cm/hr)	17501	
	STANDARD DEVIATION	1498	
	SURVIVAL PERCENT	0.6297376	63%
SAMPLE 18	MEDIAN PERMEABILITY (cm/hr)	42,846 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	11 cm/hr	
	MEAN PERMEABILITY (cm/hr)	48983	
	STANDARD DEVIATION	17882	
	SURVIVAL PERCENT	0.771813348	77%
SAMPLE 19	MEDIAN PERMEABILITY (cm/hr)	3,912 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	8 cm/hr	
	MEAN PERMEABILITY (cm/hr)	3842	
	STANDARD DEVIATION	1457	
	SURVIVAL PERCENT	0.415638569	42%
SAMPLE 20	MEDIAN PERMEABILITY (cm/hr)	803 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	7 cm/hr	
	MEAN PERMEABILITY (cm/hr)	832	

13		4	0.0	3.6	30.1	3.6	7.7 m/s	675 cm/hr	0.95	638 cm/hr	Talout #6, Ste #4
13		5	0.0	4.0	30.0	4.0	8.6 m/s	765 cm/hr	0.95	723 cm/hr	Talout #6, Ste #4
13	21	1	0.0	5.1	20.0	5.1	16.5 m/s	1,650 cm/hr	0.95	1,559 cm/hr	Talout #6, Ste #8
13		2	0.0	5.7	19.9	5.7	18.5 m/s	1,850 cm/hr	0.95	1,748 cm/hr	Talout #6, Ste #8
13		3	0.0	5.7	20.1	5.7	18.3 m/s	1,830 cm/hr	0.95	1,729 cm/hr	Talout #6, Ste #8
13		4	0.0	5.6	20.1	5.6	18.0 m/s	1,800 cm/hr	0.95	1,701 cm/hr	Talout #6, Ste #8
13		5	0.0	6.2	20.1	6.2	20.0 m/s	2,020 cm/hr	0.95	1,909 cm/hr	Talout #6, Ste #8
13	22	1	0.0	10.5	20.7	10.5	32.8 m/s	3,760 cm/hr	0.95	3,553 cm/hr	Talout #6, Ste #10
13		2	0.0	14.5	20.1	14.5	46.7 m/s	5,840 cm/hr	0.95	5,519 cm/hr	Talout #6, Ste #10
13		3	0.0	15.9	20.1	15.8	51.2 m/s	7,160 cm/hr	0.95	6,766 cm/hr	Talout #6, Ste #10
13		4	0.0	17.2	20.2	17.2	55.1 m/s	8,650 cm/hr	0.95	8,174 cm/hr	Talout #6, Ste #10
13		5	0.0	18.1	20.0	18.1	58.6 m/s	9,880 cm/hr	0.95	9,337 cm/hr	Talout #6, Ste #10
14	23	1	0.0	0.1	30.0	0.1	0.2 m/s	1 cm/hr	0.93	1 cm/hr	Talout #7, Ste #2
14		2	0.0	0.1	30.0	0.1	0.2 m/s	1 cm/hr	0.93	1 cm/hr	Talout #7, Ste #2
14		3	0.0	0.1	30.0	0.1	0.2 m/s	1 cm/hr	0.93	1 cm/hr	Talout #7, Ste #2
14		4	0.0	0.1	30.0	0.1	0.2 m/s	1 cm/hr	0.93	1 cm/hr	Talout #7, Ste #2
14		5	0.0	0.1	30.0	0.1	0.2 m/s	1 cm/hr	0.93	1 cm/hr	Talout #7, Ste #2
14	24	1	0.0	5.4	19.8	5.4	17.6 m/s	1,760 cm/hr	0.93	1,628 cm/hr	Talout #7, Ste #7
14		2	0.0	7.0	20.1	7.0	22.5 m/s	2,350 cm/hr	0.93	2,174 cm/hr	Talout #7, Ste #7
14		3	0.0	7.4	20.9	7.4	22.9 m/s	2,390 cm/hr	0.93	2,211 cm/hr	Talout #7, Ste #7
14		4	0.0	7.5	20.1	7.5	24.1 m/s	2,510 cm/hr	0.93	2,322 cm/hr	Talout #7, Ste #7
14		5	0.0	7.5	20.1	7.5	24.1 m/s	2,510 cm/hr	0.93	2,322 cm/hr	Talout #7, Ste #7
14	25	1	0.0	1.6	29.9	1.6	3.5 m/s	250 cm/hr	0.93	231 cm/hr	Talout #7, Ste #9
14		2	0.0	1.8	30.3	1.8	3.8 m/s	280 cm/hr	0.93	259 cm/hr	Talout #7, Ste #9
14		3	0.0	2.0	29.8	2.0	4.3 m/s	320 cm/hr	0.93	296 cm/hr	Talout #7, Ste #9
14		4	0.0	1.7	30.0	1.7	3.7 m/s	270 cm/hr	0.93	250 cm/hr	Talout #7, Ste #9
14		5	0.0	2.2	30.2	2.2	4.7 m/s	360 cm/hr	0.93	333 cm/hr	Talout #7, Ste #9
14	26	1	0.0	9.4	30.2	9.4	20.1 m/s	2,070 cm/hr	0.93	1,915 cm/hr	Talout #7, Ste #11
14		2	0.0	9.5	29.9	9.5	20.6 m/s	2,160 cm/hr	0.93	1,998 cm/hr	Talout #7, Ste #11
14		3	0.0	9.4	30.1	9.4	20.2 m/s	2,100 cm/hr	0.93	1,943 cm/hr	Talout #7, Ste #11
14		4	0.0	9.4	29.2	9.4	20.8 m/s	2,180 cm/hr	0.93	2,017 cm/hr	Talout #7, Ste #11
14		5	0.0	9.5	30.0	9.5	20.5 m/s	2,150 cm/hr	0.93	1,989 cm/hr	Talout #7, Ste #11

	STANDARD DEVIATION	176	
	SURVIVAL PERCENT	0.180040387	18%
SAMPLE 21	MEDIAN PERMEABILITY (cm/hr)	1,729 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	7 cm/hr	
	MEAN PERMEABILITY (cm/hr)	1729	
	STANDARD DEVIATION	125	
	SURVIVAL PERCENT	0.294153088	29%
SAMPLE 22	MEDIAN PERMEABILITY (cm/hr)	6,766 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	9 cm/hr	
	MEAN PERMEABILITY (cm/hr)	6670	
	STANDARD DEVIATION	2260	
	SURVIVAL PERCENT	0.497158799	50%
SAMPLE 23	MEDIAN PERMEABILITY (cm/hr)	1 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	0 cm/hr	
	MEAN PERMEABILITY (cm/hr)	1	
	STANDARD DEVIATION	0	
	SURVIVAL PERCENT	0	83%
SAMPLE 24	MEDIAN PERMEABILITY (cm/hr)	2,211 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	8 cm/hr	
	MEAN PERMEABILITY (cm/hr)	2131	
	STANDARD DEVIATION	289	
	SURVIVAL PERCENT	0.330698772	33%
SAMPLE 25	MEDIAN PERMEABILITY (cm/hr)	259 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	6 cm/hr	
	MEAN PERMEABILITY (cm/hr)	274	
	STANDARD DEVIATION	41	
	SURVIVAL PERCENT	0.011611584	1%
SAMPLE 26	MEDIAN PERMEABILITY (cm/hr)	1,989 cm/hr	
	MEDIAN ln PERMEABILITY (cm/hr)	8 cm/hr	
	MEAN PERMEABILITY (cm/hr)	1972	
	STANDARD DEVIATION	42	
	SURVIVAL PERCENT	0.314950876	31%

McNeil Data Entry Sheet

All data entry is done in yellow boxes.
Enter the name or designator of sample location.
Enter the weight in lbs. and oz. for each size class.
Enter the date the McNeil sample was taken (preferrably day/mo.yr but yr. at the minimum)
Enter Permeability of site if known.
This workbook allows the entry of 100 McNeil samples
Go to Tally Sheet for tabular results.
(if two depths were sampled, the two depths need to be consecutive in the entryto be combined in the ta

Data Set Name: **Upper Greenwood**

#				Perm if Ap
1	**Name:**	**Bottom Tailout**	**Date of Sample:**	**9/20/01**

Size (mm)	lbs	oz
>50.8	25	7
>25.4	9	1
>12.5	7	11.5
>6.3	6	7
>4.75	2	6
>2.36	6	12
>0/85	6	0
<0.85	3	5

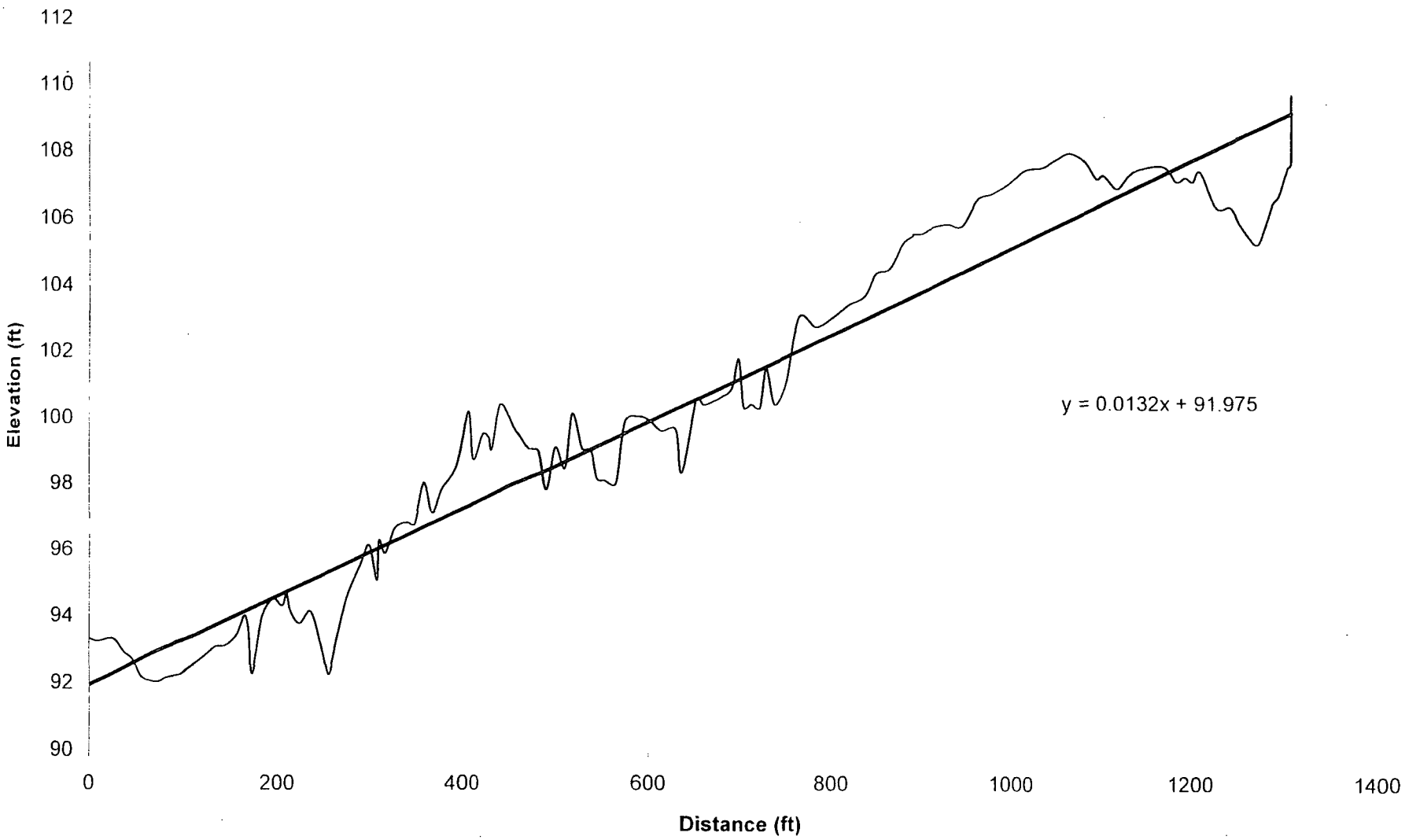
				Perm if Ap
2	**Name:**	**Upper Tailout**	**Date of Sample:**	**9/20/01**

Size (mm)	lbs	oz
>50.8	0	8
>25.4	10	15
>12.5	30	1
>6.3	10	14
>4.75	0	9
>2.36	0	4
>0/85	0	1
<0.85	0	2

Upper Greenwood

#	Name	Date	%>50.8 mm	%<50.8 mm	%<25.4 mm	%<12.5 mm	%<6.3 mm	%<4.75 mm	%<2.36 mm	%<0.85 mm	d84	d75	d25	d16	Geometric Mean (Dg)	D75/D25 (Sc)	Fredle Index (Dg/Sc)	TB Index
1	Bottom Tailout	37154	100%	62%	49%	37%	27%	24%	14%	5%	40.1	34.1	3.1	1.2	6.8	11.1	0.6	83
2	Upper Tailout	37154	100%	99%	79%	22%	2%	1%	0%	0%	15.9	12.1	6.6	5.8	9.6	1.8	5.3	100

Lower Greenwood Creek Thalweg Profile 9-24-01



Sep 27, 2001 - 7:28 a.m.
Report File: E:\ISAAC\STREAM~1\2001\GREENW~1\LOWERG~1\LOGRNTHS.TXT

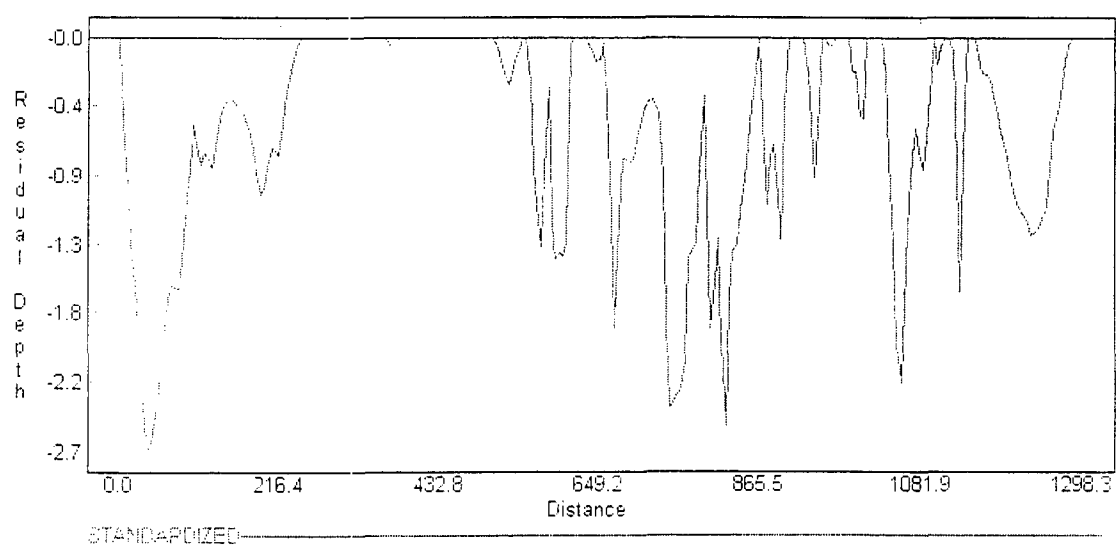
Long Profile Data File:
E:\ISAAC\STREAM~1\2001\GREENW~1\LOWERG~1\LOGRNTHA.LPR
River Name:
Notes: Original Data file:
E:\ISAAC\STREAM~1\2001\GREENW~1\LOWERG~1\LOGRNTHA.TXT
Measurement Units: U.S.

Top Elevation: 109.81
Bottom Elevation: 92.08
Reach Length: 1298.30

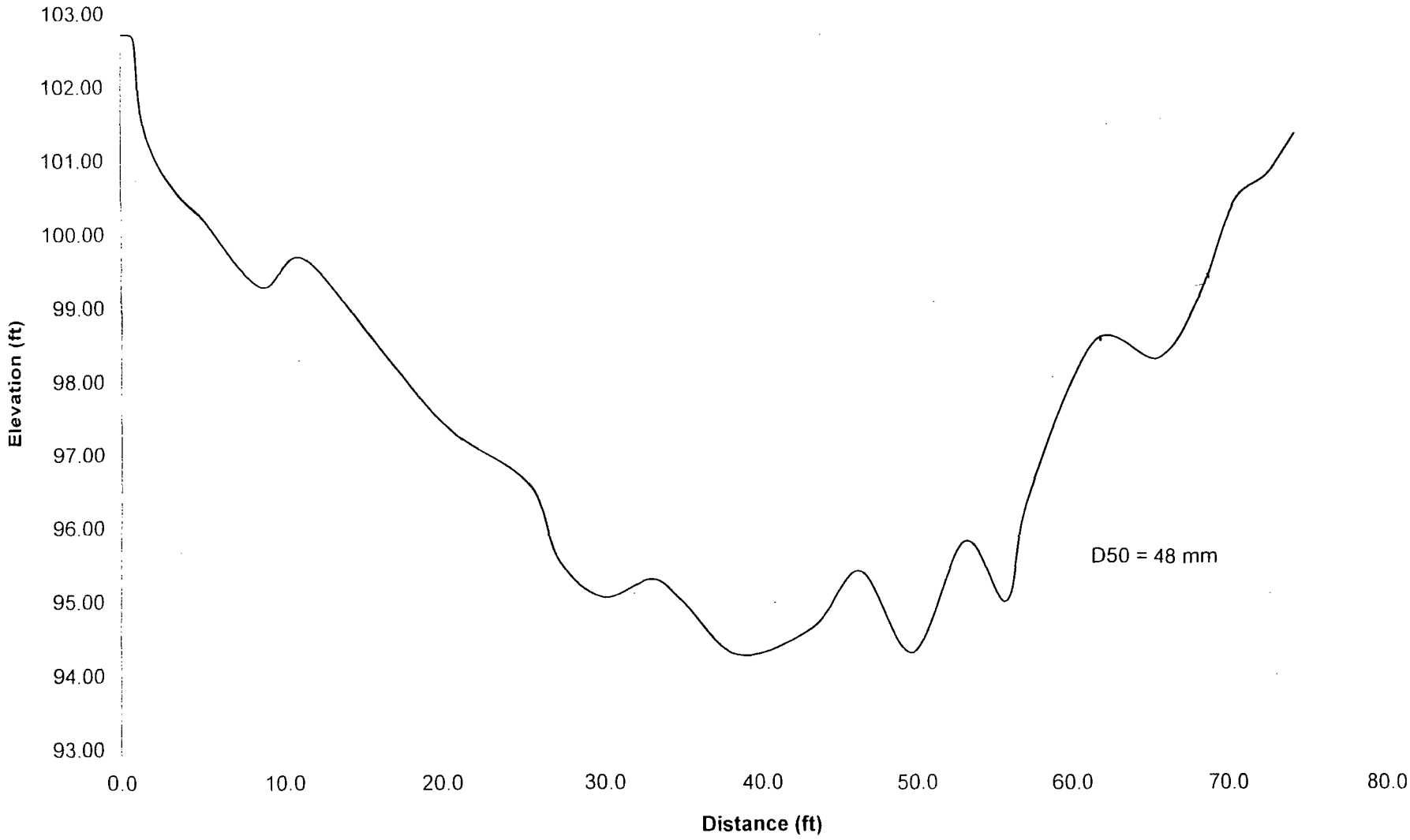
Standardized Statistics:
Number of data points in raw data: 120
Number of data points in Standardized data: 260

Reach Step Distance: 5.00

Max Residual Depth: 2.67
Mean Residual Depth: 0.60
Standard Deviation: 0.68



Lower Greenwood Creek Cross-Section #1 9-24-01



D50 (mm) = 48

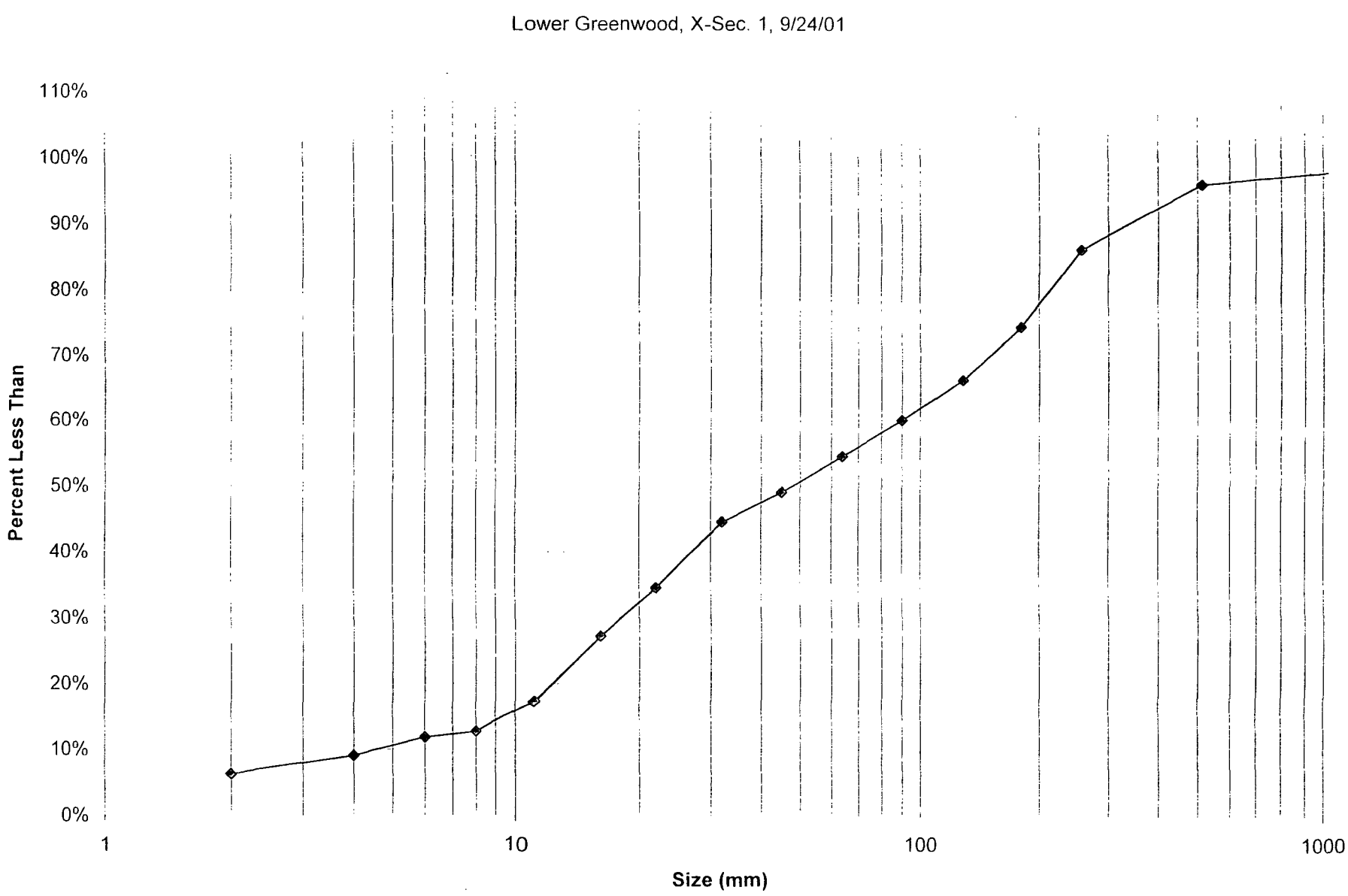
Pebble Count Form

Watershed: Lower Greenwood Date: 9/24/01

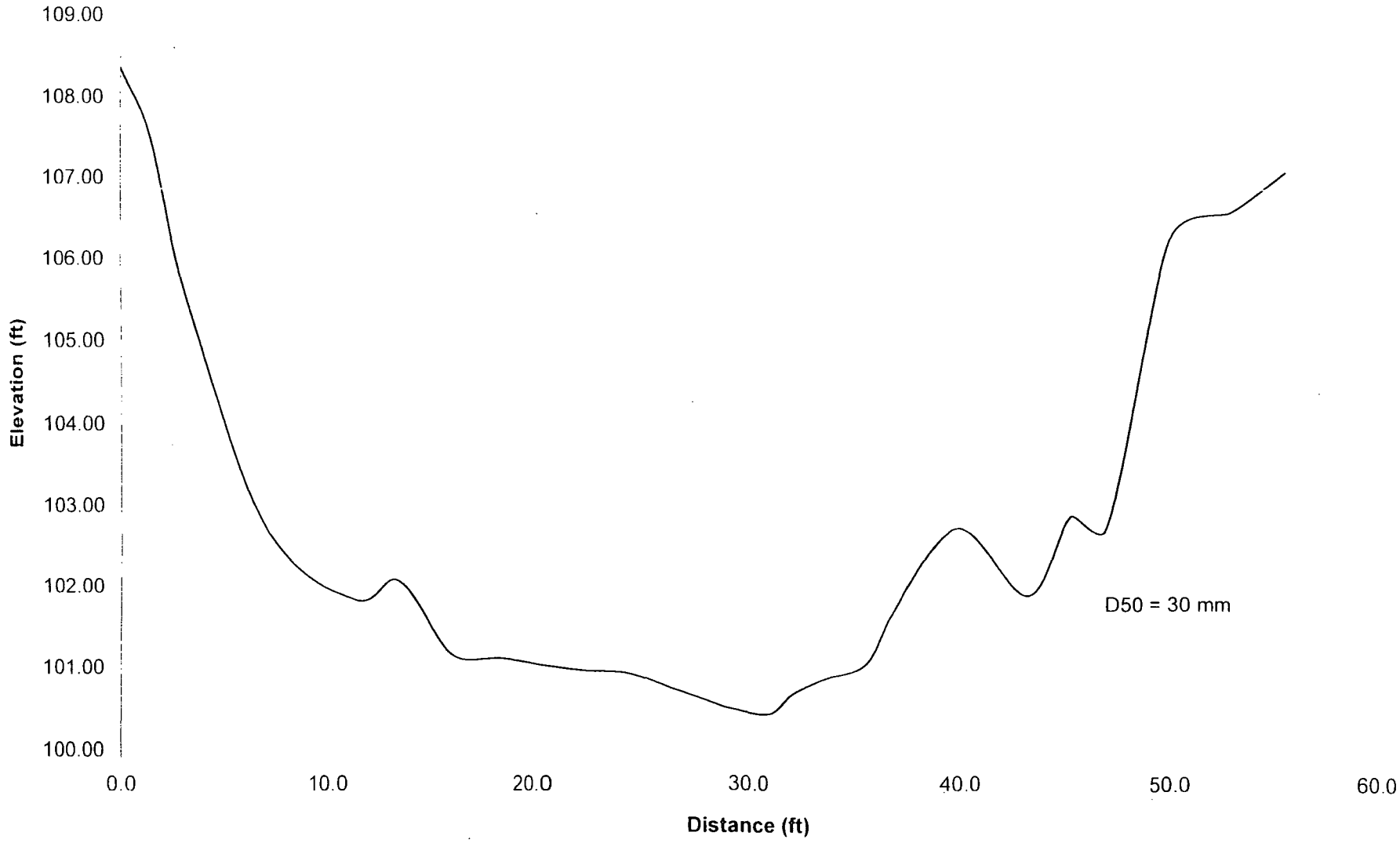
Stream Segment #: _____

Location: X-section # 2

Substrate Size Class (mm)		Talley	Number
Sand	<2	𝍸 ||	7
Very Fine Gravel	2-4	|||	3
Fine Gravel	5-6	|||	3
Fine Gravel	7-8	|	1
Medium Gravel	9-11	𝍸	5
Medium Gravel	12-16	𝍸 𝍸 |	11
Coarse Gravel	17-22	𝍸 |||	8
Coarse Gravel	23-32	𝍸 𝍸 |	11
Very Coarse Gravel	33-45	𝍸	5
Very Coarse Gravel	46-64	𝍸 |	6
Small Cobble	65-90	𝍸 |	6
Medium Cobble	91-128	𝍸 ||	7
Large Cobble	129-180	𝍸 ||||	9
Very Large Cobble	181-256	𝍸 𝍸 |||	13
Small Boulder	257-512	𝍸 𝍸 |	11
Medium Boulder	513-1024	||	2
Large Boulder	1025-2048	||	2
Very Large Boulder	2049-4096		


Lower Greenwood, X-Sec. 1, 9/24/01
110%
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percent Less Than
1
10
100
1000
Size (mm)

Lower Greenwood Creek Cross-section #2 9-24-01



D50 (mm) = 30

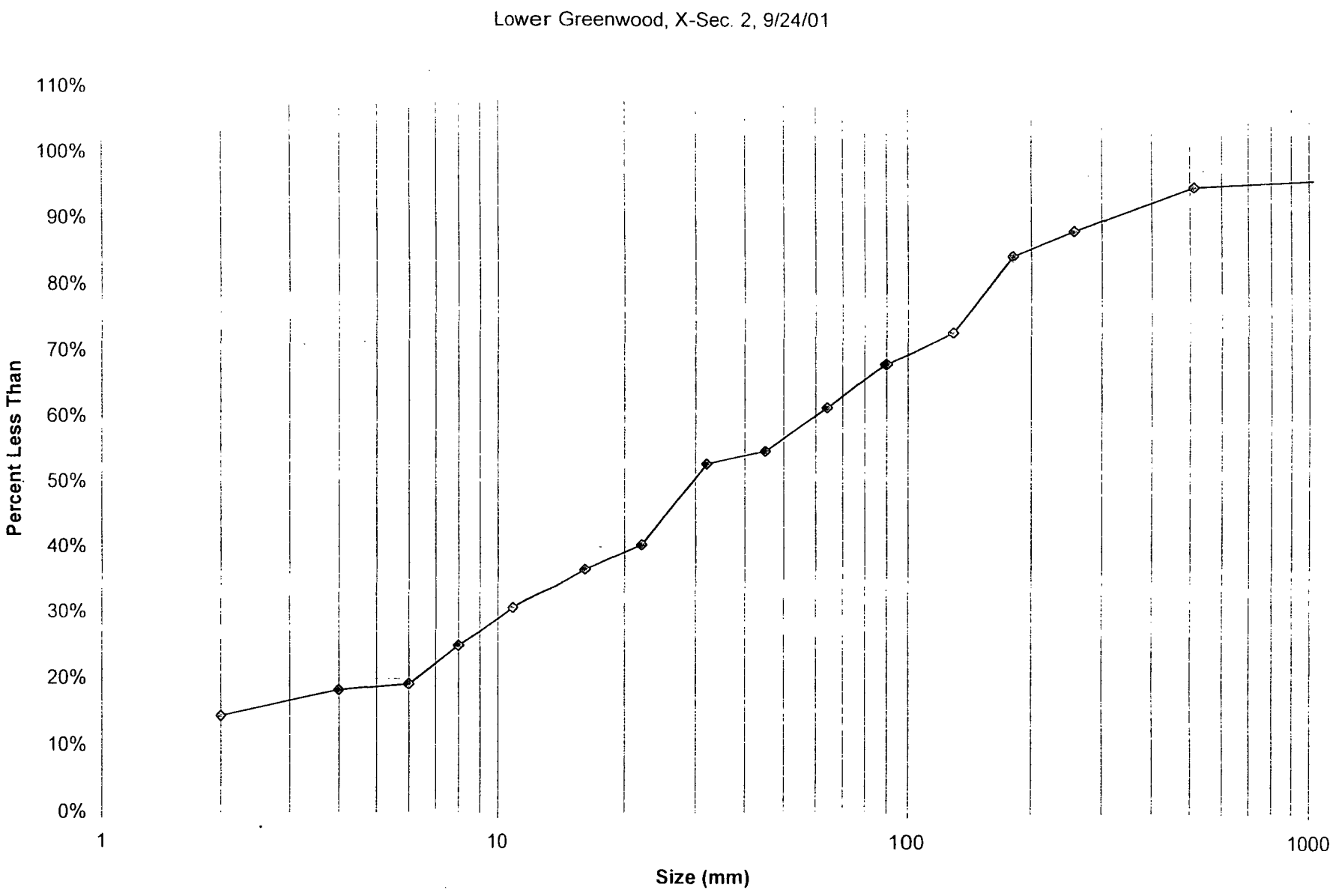
Pebble Count Form

Watershed: Lower Greenwood Date: 9.24.01

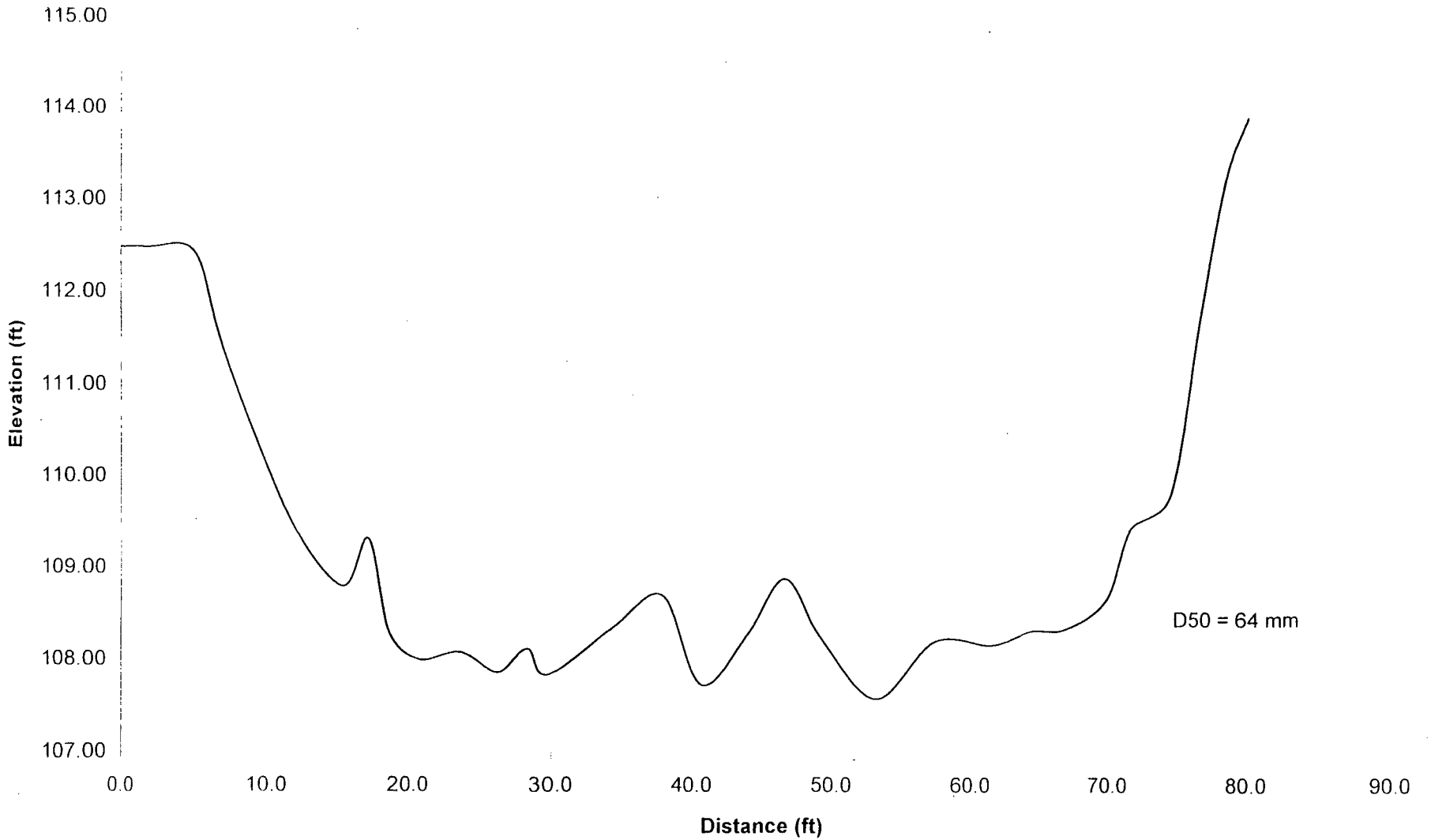
Stream Segment #: _____

Location: X-Sec 2

Substrate Size Class (mm)		Talley	Number
Sand	<2	𝍸 𝍸 𝍸	15
Very Fine Gravel	2-4	𝍸	4
Fine Gravel	5-6	|	1
Fine Gravel	7-8	𝍸 |	6
Medium Gravel	9-11	𝍸 |	6
Medium Gravel	12-16	𝍸 |	6
Coarse Gravel	17-22	𝍸	4
Coarse Gravel	23-32	𝍸 𝍸 |||	13
Very Coarse Gravel	33-45	||	2
Very Coarse Gravel	46-64	𝍸 ||	7
Small Cobble	65-90	𝍸 ||	7
Medium Cobble	91-128	𝍸	5
Large Cobble	129-180	𝍸 𝍸 ||	12
Very Large Cobble	181-256	𝍸	4
Small Boulder	257-512	𝍸 ||	7
Medium Boulder	513-1024	|	1
Large Boulder	1025-2048	|||	3
Very Large Boulder	2049-4096	|	1


Lower Greenwood, X-Sec. 2, 9/24/01
110%
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percent Less Than
1
10
100
1000
Size (mm)

Lower Greenwood Creek Cross-section #3 9-24-01



D50 (mm) = 64

Pebble Count Form

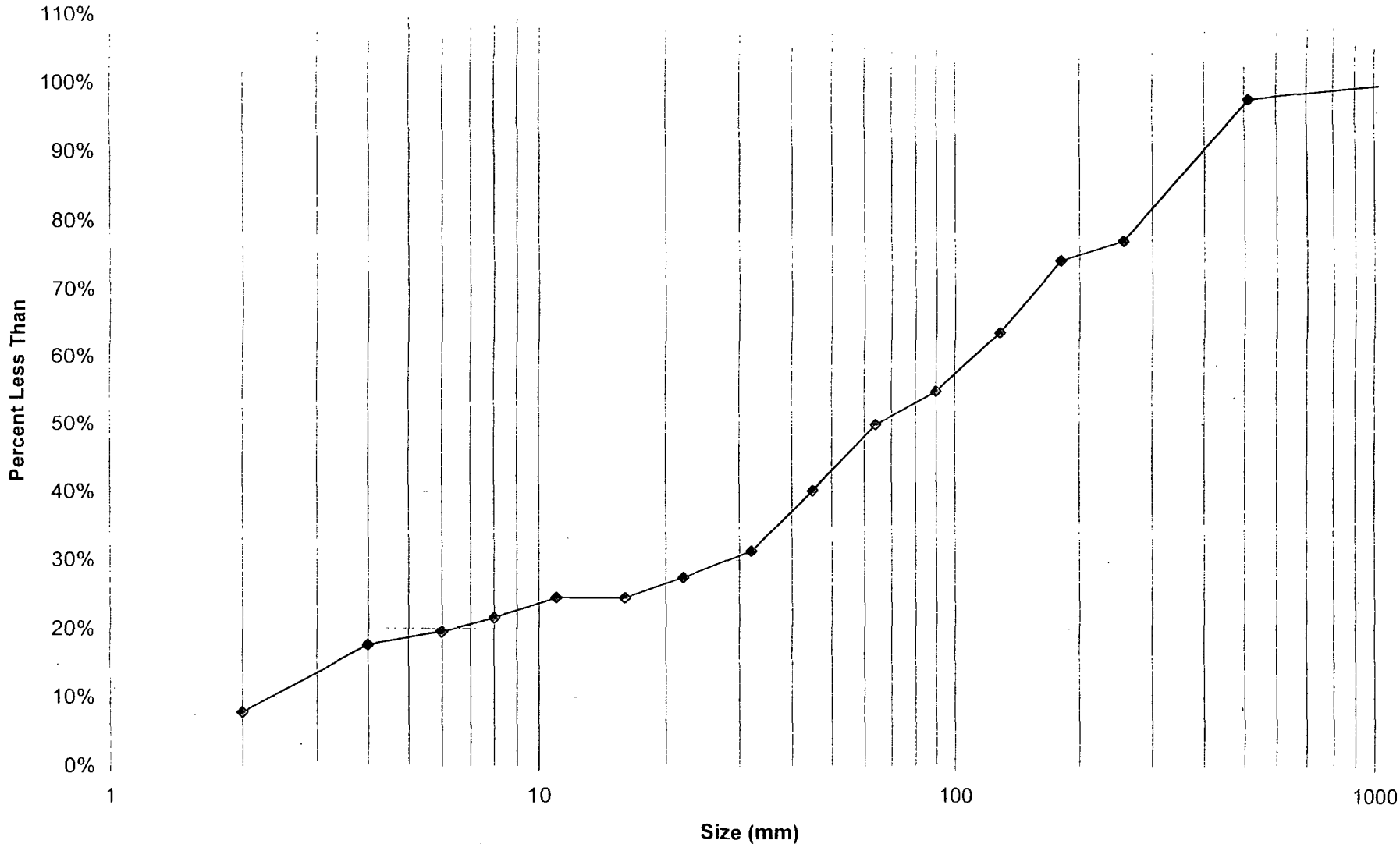
Watershed: Lower Greenwood Crk. Date: 9-24-01

Stream Segment #: _____

Location: X-Section # 3

Substrate Size Class (mm)		Talley	Number
Sand	<2	𝍸 111	8
Very Fine Gravel	2-4	𝍸 𝍸	10
Fine Gravel	5-6	11	2
Fine Gravel	7-8	11	2
Medium Gravel	9-11	111	3
Medium Gravel	12-16		
Coarse Gravel	17-22	111	3
Coarse Gravel	23-32	1111	4
Very Coarse Gravel	33-45	𝍸 1111	9
Very Coarse Gravel	46-64	𝍸 𝍸	10
Small Cobble	65-90	𝍸	5
Medium Cobble	91-128	𝍸 1111	9
Large Cobble	129-180	𝍸 𝍸 1	11
Very Large Cobble	181-256	111	3
Small Boulder	257-512	𝍸 𝍸 𝍸 𝍸 1	21
Medium Boulder	513-1024	11	2
Large Boulder	1025-2048		
Very Large Boulder	2049-4096		

Lower Greenwood, X-Sec. 3, 9/24/01



2002 303(d) List Update
Reference # 110

Redwood Coast Watersheds Alliance

tel (707) 877-3405 fax (707) 877-3887 P.O. Box 90, Elk, CA 95432 pirohuck@mcn.org

October 9, 2001

Matt St. John
NCRWQCB
5550 Skylane Blvd.
Santa Rosa, CA 95403

Dear Mr. St. John:

Recent events, and the crisis in our country, have placed a severe strain on volunteer, non-profit public interest groups, as I'm sure they have on government agencies. Nevertheless, the timber industry has continued to file numerous new timber harvest plans in watersheds that may be affected by the NCRWQCB's 303 (d) listing process. These numerous new logging filings would be difficult to monitor in the best of times. Under the circumstances, our ability to review these plans, compile data and provide you with information is limited.

I want to bring two matters to your attention: 1) The numerous new logging plans that have been filed in Greenwood Creek, which NCRWQCB staff has recommended for 303 (d) listing as an impaired watercourse; 2) The numerous new logging plan filings in other small, separately draining north coast creeks that staff recommended only for a "watch list" of potentially impaired watercourses. 3) Evidence of the on-going, current extirpation of the coho salmon species in these watercourses.

We urge you to review our public comment records (Redwood Coast Watersheds Alliance and Greenwood Watershed Association) for several recent logging plans filings in Greenwood Creek (THP 1-01-241 MEN and THP 1-01-254 MEN) and for Elk Creek (THP 1-01-316 MEN and THP 1-00-363 MEN). We will provide some summary information here.

The pattern that we have seen with the 303 (d) listing process is that the NCRWQCB seems to wait until the coho salmon fishery is gone, and the watercourse is severely impaired, to bring TMDL monitoring and other processes to bear for the protection of these water resources. Ten Mile River and Big River provide prime examples of the inadequacy of this process. The Albion River is another example. Degradation of water resources should be caught much sooner, and available remedies should be greatly accelerated. Success in re-introducing the coho salmon species into watercourses where it has been extirpated has been almost nil. Clearly, we have to stop the process of extirpation before it begins.

Greenwood Creek

I am attaching a map which presents recent timber harvest plan approvals and new filings in the upper Greenwood Creek area alone. It is typical of the failures of the CA Department of Forestry's timber harvest plan review process that no such map is included in the THP filings in this or any other watershed. This map was created by public interest volunteers who can hardly keep up with the THP filings in Greenwood Creek. Three new THPs have now additionally been filed. One of them—THP 1-01-332 MEN—is squeezed between two existing plans in this upper watershed map (between THP 1-99-451 MEN and THP 1-99-227 MEN).

One of the newest filings—THP 1-01-241 MEN—contains at least 25 existing slides adjacent to the main stem of Greenwood Creek, and proposes 18 stream crossings as well as construction of a lengthy midslope road above and near the sliding areas. WQ's Dave Hope inspected this area but we have been unable to obtain his report or recommendations. The CA DMG report for THP 241 described a disaster area of active existing sedimentation of this creek, and yet approved this logging plan—with no cumulative impacts assessment information in the plan.

Another recent filing—THP 1-01-254 MEN—proposes clearcutting and road construction in an area where the Greenwood Creek Watershed Project conducted extensive restoration work to improve fish habitat. THP 254 proposes to use a GCWP flatcar bridge installation over Greenwood Creek for logging operations. THP 254 contains no assessment of the impacts of logging on the stream restoration work or on the extremely endangered fishery.

None of these new logging plans contains cumulative watershed road impact information, water quality monitoring or any of the basics of watershed analysis. The new THP filings in the lower Greenwood Creek watershed—not shown on this map—include one enormous new plan (357 acres), THP 1-01-354 MEN, and an additional smaller plan, THP 1-01-358 MEN, in an area that is already packed full of recent logging plans.

The total list of new THPs in Greenwood Creek by the Mendocino Redwood Company alone now stands at *nineteen* (19) new filings since 1998: THP 1-01-358, THP 1-01-354, THP 1-01-332, THP 1-01-254, THP 1-01-241, THP 1-01-242, THP 1-01-070, THP 1-01-078, THP 1-01-020, THP 1-00-357, THP 1-00-312, THP 1-00-228, THP 1-00-172, THP 1-99-451, THP 1-99-339, THP 1-99-227, THP 1-99-188, THP 1-99-127, and THP 1-95-315 am.#10 (MEN).

We have only been able to map the upper Greenwood Creek area. The lower area is similarly covered with new THPs.

Elk Creek and other north coast creeks

I assure you that we could draw a similar watershed map (to the Greenwood upper watershed map) for many other small creeks that are at risk. In Elk Creek, for instance, the list of current plans is as follows (Mendocino Redwood Company alone): 21 MRC plans (13 filed by MRC, 2 L-P logged by MRC, 6 old L-P probably logged by MRC) –1-01-316, 1-01-239, 1-00-464, 1-00-482, 1-00-483, 1-00-363, 1-00-249, 1-00-159, 1-00-027, 1-99-437, 1-99-163, 1-99-161, 1-99-156, 1-99-141, 1-98-019, 1-97-316, 1-97-156, 1-97-020, 1-96-427, 1-96-209, 1-95-515, 1-97-445 (partial).

In THP 1-00-363 MEN, in Elk Creek, the company proposed to construct over 1.5 miles of new logging road within 500 feet of an existing road. They promised to retire one of the roads after logging operations were concluded, but removed this mitigation from the logging plan at the last moment. In a recent Alder Creek plan, the LTO constructed 2,000 feet of road in the wrong place by "mistake"; CDF permitted the company to amend this "mistake" into the plan. Issues of excessive or impactful road construction, toxic herbicide use, water drafting, "winter operations," inadequately evaluated stream alternations and other water quality issues are given insufficient review. Information is often meager or nil. Inspections are sporadic. Water resources are receiving catastrophically inadequate protections in coastal creeks as well as in major rivers.

One fact stands out in these smaller watersheds: The extirpation of the coho salmon is currently in progress. Impacts to water quality from logging operations is the chief culprit in this extirpation-in-progress. In Elk Creek, for instance, there is virtually no other activity except logging.

Evidence from Louisiana Pacific fish surveys in 1994-96 reveals that the coho salmon were found in only 9 of the 27 watersheds (virtually the entire ownership). Recent evidence indicates that the status of the coho salmon has changed from "present" to "absent" in two of these few remaining coho watersheds (Elk Creek and Greenwood Creek). The Mendocino Redwood Company has failed to disclose evidence from unpublished L-P surveys that show coho salmon presence in Greenwood Creek in 1995, and has furthermore failed to "connect the dots" on the demise of the coho—that is, MRC logging plans fail to contain the various pieces of evidence (such as the L-P surveys) that add up to a picture of *recent* extirpation.

MRC logging plans have also been guilty of containing false information about the coho salmon. For instance, in THP 1-00-357 MEN (predecessor to THP 1-01-254 MEN), asserted that the L-P Sustained Yield Plan statement that coho salmon is present in both upper and lower Greenwood Creek was wrong, and that the coho were actually in an different location—a place called "Cuffey's Point" which has a 140 foot drop-off to the ocean. MRC THPs have been trying to "prove" that there are no coho salmon in Greenwood Creek, and have ignored all evidence to the contrary. MRC's own year 2000 fish surveys found no coho salmon in Greenwood Creek. By ignoring evidence of recent presence of this species—or trying to debunk such evidence --they are falsifying the cumulative impacts assessments in these logging plans.

The north coast creeks that are currently at risk of coho salmon extirpation are Greenwood Creek, Elk Creek, Alder Creek, Mallo Pass Creek, and Schooner Gulch on the south Mendocino coast, and Cottaneva Creek, Hardy Creek, Juan Creek, Howard Creek, DeHaven Creek and Wages Creek, on the north coast.

Placing some of these creeks—with the exception of Greenwood Creek—on a "watch list" is entirely insufficient for the protection of the extremely endangered fisheries and water resources in these areas. It will be decades before these creeks receive any attention—and then it will be too late.

As for Greenwood Creek, which in addition to containing an extremely endangered fishery, also supplies water to the town of Elk, we strongly urge the Board to support this listing, and further to accelerate monitoring and protection, in view of the intense and unsustainable levels of current logging in this watershed. The Board's previous removal of Greenwood Creek from the 303 (d) list and its failure to protect this watercourse must be corrected.

Sincerely,

Mary Pjerrou

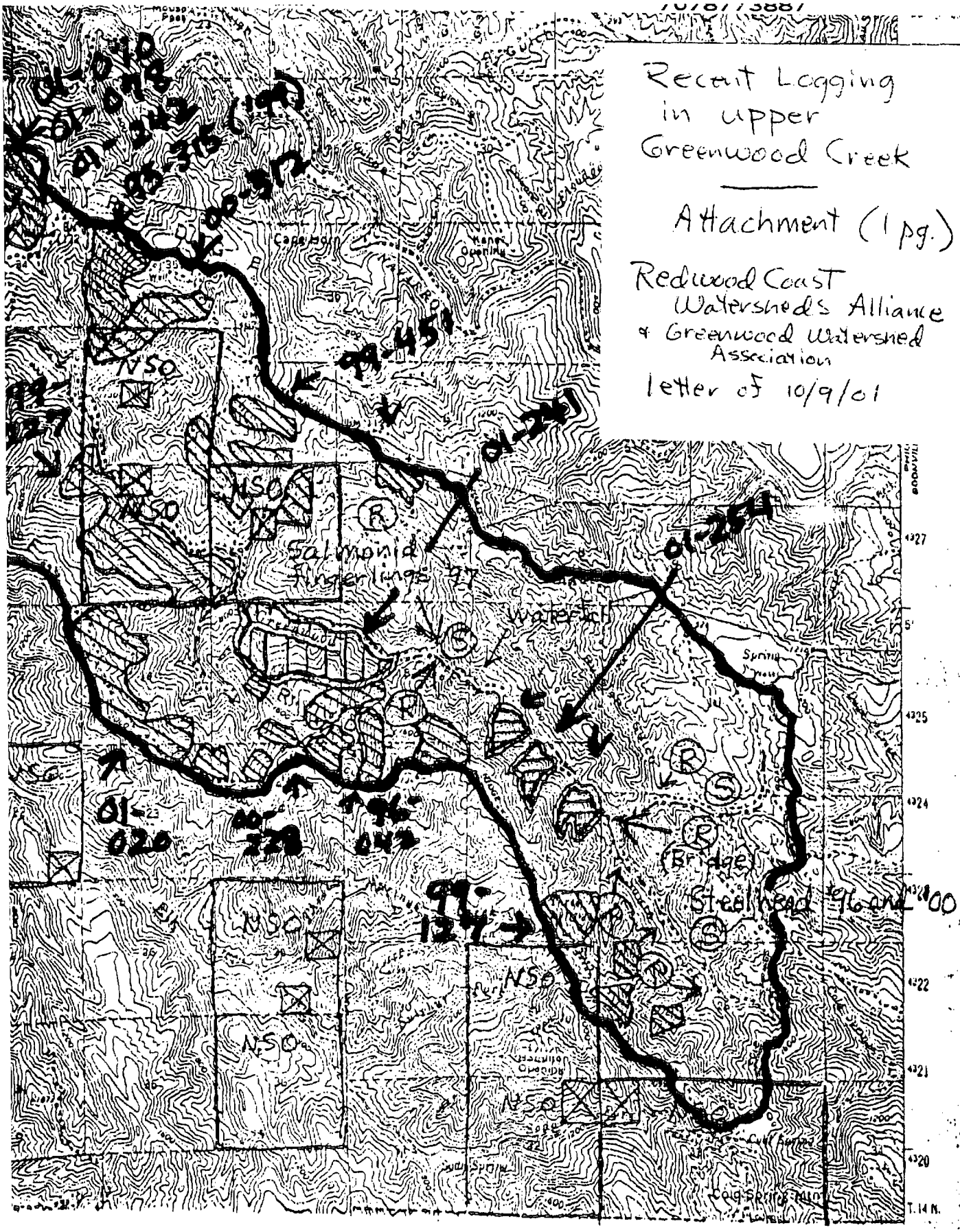
Mary Pjerrou
and on behalf of the Greenwood Watershed Association

enc.: THP map of upper Greenwood Creek watershed (1 pg.)

Recent Logging in upper Greenwood Creek

Attachment (1 pg.)

Redwood Coast Watersheds Alliance & Greenwood Watershed Association letter of 10/9/01



(R) = GCWP restoration work (stream, Fish habitat, roads)

NSO = northern spotted owls (latest data in THPs - 199)

(S) = salmonids

THP 1-01-241

THP 1-01-254 (1-00-357)

Other current MRC plans 1-01-070, 1-01-242, 1-95-315 ('99), 1-00-312, 1-99-451, 1-99-227, 1-01-020 1-00-228, 1-96-042, 1-99-127

Reference # 117

HUMBOLDT BAY MUNICIPAL WATER DISTRICT

828 SEVENTH STREET, P.O. BOX 95 - EUREKA, CALIFORNIA 95502

OFFICE 707-443-5018 ESSEX 707-822-2918

FAX 707-443-5731 707-822-8245

E-MAIL hbmwd@northcoast.com essex@northcoast.com

October 29, 2001

RWQCB
REGION 1
NOV - 2 2001

☐ SAW ☐ CRJ ☑ CLELAND
☐ RLT ☐ JGR ☐ KAD
☐ FCR ☑ RSG ☐

North Coast Regional Water Control Board
Attention: Matt St. John
5550 Skylane Boulevard, Ste. A
Santa Rosa, CA 95403

Dear Mr. St. John:

First, I would like to thank you for the time you spent with me last week discussing TMDL plans, and in particular, the 303(d) listing process. The purpose of this letter is to express our concern regarding the NCRWQCB's recommendation to add the Mad River to the 303(d) List for temperature.

Our first concern is that the temperature data analyzed by the NCRWQCB staff was very limited and is not representative of the entire Mad River. Eight of the eleven data sets were provided by NRM from locations in the lower reaches of the Mad River. We have learned that the NRM data is associated with monitoring conducted for gravel operators on the Mad River. The Army Corps of Engineers required that, as a condition of operation, the gravel operators had to implement a monitoring program to assess impacts to wildlife, including salmon.

We do not believe the temperature data analyzed to date is representative of the entire Mad River. For example, we have completed a very quick analysis of our temperature data for our Ruth Reservoir releases. We attempted to do the analysis as consistently as possible with our understanding of the MWAT protocol used by the NCRWQCB, although it is not in exact accordance.(1) MWATs were calculated first for the period from June 1 to October 1, the sampling window recommended by the draft "Stream Temperature Protocol". For June 1, 2000 through October 1, 2000, the MWAT of the Mad River at Ruth was 16.75°C (on October 1). For June 1, 2001 through September 30, 2001 (end of the dataset), the MWAT was 13.89°C (on September 30). The MWAT for the entire dataset (11/1/99-9/30/01) was 18.9°C on October 10, 2000. There were no temperature measurements above 20° C. Therefore, the resulting MWATs for the District's Ruth data are lower than the NCRWQCB's threshold of 20° C, and are considerably lower than the MWATs used to support the recommendation. We believe different MWAT results and conclusions would apply to the upper reaches of the Mad River.

Furthermore, it stands to reason that water temperature will be affected by ambient air temperature or the degree to which the water surface is shaded. When the Mad River traverses through the deep narrow gorge, it is exposed to less direct sun because the channel is narrower and the canyon walls higher. Also the height of riparian vegetation (trees, etc) in relation to channel width provides for a greater degree of water surface shading. In contrast, when the Mad River flows through the Blue Lake Valley (which is where the NRM data was collected), the water surface is totally exposed to the sun, the height of riparian vegetation in relation to channel width is negligible and provides limited shade of the water surface, and therefore, the temperatures will be higher.

We understand that the selection of sampling sites for the gravel operators was based on past sightings of summer run Steelhead, or areas where rearing juvenile salmonids (mostly steelhead) have been observed. The temperatures measured during the summer are reported to be in the lethal range for Coho but not Steelhead. Coho generally do not use the mainstem of the Mad River to spawn in or rear, rather they utilize Lindsay Creek and other tributaries. Coho primarily use the mainstem for migration. Steelhead and Chinook on the other hand do use the mainstem and have evolved to tolerate higher water temperatures associated with mainstem habitats. Associating high water temperatures that exceed Coho's tolerance would make more sense if the water temperatures were taken in Coho rearing habitat, which is generally acknowledged as being in tributaries such as Lindsay Creek. A small creek channel will often provide much more shading of the water surface and one would expect much lower water temperatures compared to the poorly shaded mainstem.

In conclusion, we do not believe that the NCRWQCB staff has sufficient information to warrant the entire Mad River being added to the 303(d) List for temperature. We believe the listing needs to be further evaluated, or at a minimum, the listing needs to be more limited in location.

We very much appreciate the opportunity to comment. If you have any questions, please call me at (707)443-5018.

Sincerely,

Carol Rische

Carol Rische,
General Manager

Cc: Barry Van Sickle
Aldaron Laird
John Winzler

[1] The District's raw data were not collected according to the draft "Stream Temperature Protocol". Most significantly, the Protocol specifies that figures for each day should be the maximum of measurements taken at least every 96 minutes throughout that day. The District's data are from readings taken once each day. Using this daily temperature data, Maximum Weekly Average Temperatures (MWATs) were calculated according the Draft NCRWQCB NCWAP Version of the "Stream Temperature Protocol", as follows: for each day in the period being examined, the mean of the temperatures for that day and the preceding 6 days was determined; the maximum of this set of 7-day means is the MWAT.

2002 303(d) List Update
Reference # 129

BARNUM & HERMAN

AN ASSOCIATION OF SOLE PRACTITIONERS

POST OFFICE BOX 173
EUREKA, CALIFORNIA 95502
TELEPHONE: (707) 442-6405
FACSIMILE: (707) 442-1507

William F. Barnum
Thomas M. Herman

Linda A. Lucido
Legal Assistant

October 5, 2001

RWQCB
REGION 1

OCT - 9 2001

☐ SAW ☐ CRJ ☑ LELAND
☐ RLT ☐ LGR ☐ KAD
☐ FCR ☑ RSG ☑ ST. JOHN

VIA FACSIMILE: (707)523-0135
AND FIRST CLASS MAIL

Regional Water Board
Attn: Matt St. John
5550 Skylane Blvd., Suite A
Santa Rosa, California 95403

Re: 2002 303(d) List Update Recommendations

Dear Mr. St. John:

In regard to the memorandum to Interested Parties, dated September 10, 2001, transmitting the 2002 303(d) List Update Recommendations of the Regional Water Board Staff, please forward the following comments to the Regional Water Board Staff, members of the Regional Board and the State Water Resources Control Board for their consideration. These comments are submitted on behalf of Barnum Timber Company.

We continue to believe that the available evidence regarding sediment conditions in Redwood Creek does not support a conclusion that the suspended sediment load and suspended sediment discharge rate have been altered so as to cause a nuisance or so as to adversely affect beneficial uses. Absent substantial evidence to support such a conclusion, it will be an abuse of discretion for the State or EPA to continue to list Redwood Creek as an impaired water body under section 303(d) of the Clean Water Act. There simply has been no credible study of Redwood Creek that equates more sediment with less fish or any other malfunction. Redwood Creek experiences huge natural variability in sediment. Based upon the current conditions of the aquatic system and its ability to produce record numbers of salmonids, the most one can say about the effects of even massive inputs of sediment is that it produces only subtle effects on salmonids.

With a few exceptions, the focus on the listing of Redwood Creek for impairment by sediment is on the stored sediment in the river channel. However, the standard for sediment in the Basin Plan, the standard allegedly not being attained so as to justify listing under 303(d), does not address stored sediment. The standard in the Basin Plan addresses suspended sediment load and suspended sediment discharge rate. The distinction is critical. Stored sediment is an essential component of the aquatic ecosystem necessary for anadromous fish and other beneficial uses. Anadromous fish production would be absent without stored

sediment in the river channel. It is essential to the beneficial uses that sediment continue to be eroded into the stream. If the input of stored sediment were somehow stopped, Redwood Creek would be free of stored sediment in thirty-three years (*A Study in Change: Redwood Creek and Salmon,* September, 2000). While the amount of stored sediment is dynamic depending upon a variety of factors, primarily the intensity of storms, it is essential that there be abundant stored sediment for the river system to function properly. Deeming an essential element of the aquatic ecosystem as a pollutant is irrational. Adhering to the notion that stored sediment is a pollutant results in a conclusion that every river in the State is impaired. The fact that there is some area of the river system that has elevated levels of stored sediment does not indicate some abnormality, and certainly does not indicate problems with suspended sediment. Changes in stored sediment are natural. Suspended sediment, the focus of the water quality standard that must be attained, on the other hand, may be more logically considered a water pollutant. Obviously those who prepared the Basin Plan understood this distinction when they limited the water quality standard for sediment to suspended sediment. Again, we believe Redwood Creek can only be listed as impaired for sediment if there is substantial evidence that the system has been altered so as to increase the suspended sediment in the system over natural background levels to the extent that there is evidence of a nuisance or evidence of adverse effects on beneficial uses.

In order to find that the suspended sediment load or suspended sediment discharge rate is substantially over the natural background levels, there must be reliable evidence of what that background level is. While there is much speculation as to what the suspended sediment discharge of Redwood Creek may have been over the historical past, we are not aware of any reliable evidence of what the background levels in fact were. Mere opinion and speculation are not substantial evidence. While studies have attempted to characterize the background levels of suspended sediment through comparisons of managed and unmanaged watersheds in Redwood Creek, these studies are not based upon measurements in the same watersheds before and after management, but rather rely on the assumption that the conditions for sediment production in the watersheds compared is, in fact, comparable. However, there are a wide variety of factors that contribute to suspended sediment discharge such as geology, soil type and slope, any of which may make these assumptions invalid.

Many advocate that changes in sediment levels in Redwood Creek are controllable and that the sediment conditions are largely the results of human activity. However as pointed out in *A Study in Change: Redwood Creek and Salmon,* September, 2000, there are many sources of sediment such as that which results from natural processes. As noted in that study, levels of sediment were very similar before human activities in the watershed had created any significant disturbance to that which resulted from the major storms that occurred from the 1950s through the 1970s. The sediment conditions of today is not dissimilar to that which existed prior to human disturbance.

The listing of Redwood Creek as a 303(d) impaired water body creates substantial economic impacts for landowners in the watershed and results in expenditures of substantial public funds in the development of TMDLs and implementation plans. While it is difficult to quantify the economic burdens placed on landowners by such a listing due to wide variety in the type and timing of management proposals, there is little question that such a listing results

in very significant increased costs of land management. When any landowner proposes to engage in any project in the watershed that is subject to any public permitting process, the environmental review of that project must consider the status of the aquatic system under section 303(d). Representatives of commenting agencies rely upon the fact that the water body is listed for sediment to insist upon additional restrictions on the operations to eliminate the potential for erosion. The kinds of restrictions demanded on a watershed wide basis are likely costing landowners in the hundreds of millions of dollars. Further, the expenditure of public resources on watersheds such as Redwood Creek that are listed as impaired certainly runs into the tens of millions of dollars. The magnitude of the economic impacts of listing decisions justifies extremely close scrutiny of the evidence supporting a listing decision. Before the State of California commits itself to imposing multi million dollar burdens on its landowners and the public coffers, it should be sure that there is a problem which needs to remedied that is evidenced by facts, not assumptions and opinions. We believe there is substantial evidence available to you that demonstrates that Redwood Creek is not now impaired by sediment, either suspended or stored. In fact the evidence shows that Redwood Creek:

1. like all river systems, is naturally dynamic, in a constant state of change;

2. currently has sediment conditions well within the range of historical conditions and not significantly different from the sediment conditions that existed prior to significant timber harvesting occurring in the watershed and prior to the major floods that occurred between the mid 1950s and mid 1970s;

3. currently supports healthy and productive populations of anadromous fish with reproduction levels at or above the carrying capacity of pristine river systems, amongst the highest recorded for West Coast streams; and

4. is now subject to land management techniques that have substantially reduced the input and impacts of human caused sediment.

We were very disappointed to read in the staff recommendation for the 2002 update that in making such a critical determination as to the continued listing of Redwood Creek, the staff has elected to make a recommendation without even having reviewed the materials submitted. The report indicates that the staff plans to continue reviewing the materials submitted so as to incorporate that evidence at some future time for some future update of the list. It is an abuse of discretion to make an administrative determination based upon a partial review of the evidence before the decision maker. The staff's report states:

> "Based on a **partial** review of the information submitted, staff has concluded that there is a continued impairment or threat of impairment of Redwood Creek by sediment." (Emphasis Added)

We believe any decision made by the regional or state boards based upon partial review of the evidence is invalid. We request that the information submitted be thoroughly reviewed and considered in making any determination regarding the listing of Redwood

Creek. The information submitted is the most complete and comprehensive compilation of information on any water body in the State and offers an opportunity for you to make a fully informed decision. Hundreds of thousands of dollars were expended in compiling this information. For the staff to give this information summary partial review is objectionable and insulting. The citizens of this State deserve complete and objective review of all the evidence relating to the condition of Redwood Creek before any recommendation is made that will subject landowners to millions of dollars of unnecessary expense and use of public funds to remedy a problem that may not exist.

De-listing of Redwood Creek is justified for several reasons. The original listing of Redwood Creek was based upon the unsubstantiated assumption that elevated stored sediment levels were harming beneficial uses. The evidence that was the administrative basis of the original listing and the subsequent re-listings of Redwood Creek was very limited and mostly anecdotal. The listing was based primarily on a report from the Humboldt Chapter of the American Fisheries Society and a letter from the U.S. Fish and Wildlife Service. Neither contained any scientific data regarding conditions in Redwood Creek. The American Fisheries Society letter amounted to little more than an opinion poll of the group's members without any specific data regarding sediment conditions in Redwood Creek. Similarly, the Fish and Wildlife Service letter was based solely on the opinions of various federal regulators and contained no data on the sediment conditions in Redwood Creek. A listing based upon faulty data, assumptions and opinion, without quality assurance, is a factor that supports de-listing. Further, there are erosion control measures now being implemented in Redwood Creek through the California Forest Practice Act and Rules and watershed management plans that will result in the protection of beneficial uses. The staff report relies upon the fact that no implementation plan has yet been established for EPA's TMDL as justification for continued listing. This rationale is nonsense. If the listing was improper in the first place, continuing to waste public funds for the development of an implementation plan to remedy a problem that does not exist is fatuous justification.

The staff update recommendations report identifies three sources of materials that were submitted related to Redwood Creek. Comments submitted by Barnum Timber Company urged that Redwood Creek be removed from the 303(d) list. Comments submitted by Terrence Hofstra on behalf of Redwood National and State Parks and Mary Ann Madej on behalf of the U.S.G.S. urged that Redwood Creek remain on the 303(d) list. We have reviewed the materials submitted by Mr. Hofstra and Ms. Madej and offer the following comments related to their input.

In urging that Redwood Creek remain on the 303(d) list, Mr. Hofstra renders his opinion as to whether Redwood Creek is impaired by sediment. He states:

> "While the general channel conditions in Redwood Creek may have greatly improved over past decades, the lower channel reaches in the parks are still sediment impaired."

Mr. Hofstra's opinion on impairment seems again to be inappropriately focused on stored sediment rather than suspended sediment. Suspended sediment by its nature does not

affect channel condition. It is not clear what criteria Mr. Hofstra uses to conclude that the lower channel reaches are impaired. His views on the likelihood that the stored sediment in the river system will likely increase in response to major floods is consistent with the natural dynamic responses of river systems. When large storms occur, there will be increased erosion. When winters are light, there will be less erosion. The simple fact that the amount of stored sediment after a large storm is higher than it was before the storm does not logically lead to the conclusion that the system has been impaired. The volume of stored sediment in Redwood Creek will fluctuate with changing weather as it has for millions of year. The volume of stored sediment is not a proper measure of impairment. The proper measure for the purposes of section 303(d) listing is whether the suspended sediment load or suspended sediment discharge rate has been altered to the extent that some nuisance or adverse effects on beneficial uses has resulted. The beneficial use that has been the basis of the listing of Redwood Creek, anadromous fish production, has been shown to be at levels amongst the highest recorded in the Pacific Northwest (See letter from Donald W. Chapman dated September 21, 2000). If the habitat is impaired, why then is it producing anadromous fish in record numbers? Regardless of the number of adult fish that return to the system to spawn, the quality of the spawning and rearing habitat determines the number of young out-migrating fish. The conditions of the habitat limit the carrying capacity of the stream no matter how many eggs are hatched. It is obvious from the fish data submitted that the carrying capacity of Redwood Creek is amongst the highest in the Pacific Northwest. If the habitat is amongst the best in the Pacific Northwest, how can one consider these conditions to be impaired?

Mr. Hofstra sounds the alarm about future large storms and the sediment that will result. However the ability of a stream to recover from a storm of a given magnitude should take as long as the time between the expected recurrence interval for such a storm. Redwood Creek has demonstrated its ability to recover from large storms well within the expected recurrence interval. The system is functioning properly. The 1964 flood was at least a sixty year recurrence event, yet the impacts of that storm are virtually gone today, in far fewer years than sixty.

The materials submitted by Mr. Hofstra regarding the reversal of suspended sediment trends after the 1997 flood are consistent with increased erosion from heavier storms. After twenty two years without a major storm, one would expect in increase in suspended and bed load sediment. The graph accompanying Mr. Hofstra's comments shows the increase in suspended sediment actually began before the 1997 storm, immediately following the drought of the early 1990s. This response is natural and within the range of dynamic changes all rivers experience. While many seek to attribute any negative change in watershed conditions on human activity in the drainage, particularly the roads on private lands, a trend like that shown in these comments would be expected even in unmanaged watersheds. The data that was submitted on the number and health of the out-migrating salmonids indicates that any trend in suspended sediment and the persistence of stored sediment for more than three decades has not prevented Redwood Creek from producing record numbers of healthy young steelhead and Chinook salmon.

Next, Mr. Hofstra resorts to criticism of *A Study in Change: Redwood Creek and Salmon,* September, 2000. He suggests that the report should be reviewed for scientific

credibility, peer reviewed, before being relied upon. However, if Mr. Hofstra had reviewed the section of the report on Sources and Acknowledgements, he would have known that it was technically reviewed by several preeminent scientists who specialize in fisheries, hydrology and erosion processes. The report does not dismiss the decades of research performed by the Park Service and U.S.G.S., but rather uses that data to show that sediment has not caused harm to beneficial uses. Admittedly the report is not consistent with the gestalt of many who's livelihoods are dependent upon public funding for environmental remediation; however, the report presents an objective scientific view of conditions in Redwood Creek over time and should be thoroughly and objectively considered before this water body is again improperly listed as impaired and public and private funds are squandered in a futile attempt to remedy a problem that does not exist.

Attachment three to Mr. Hofstra's letter contains reports on suspended sediment in Redwood Creek by Randy Klein and Bill Trush. These materials at least appropriately address suspended sediment, the focus of the water quality standard to be attained, rather than stored sediment. The authors compare the number of days that suspended sediment levels are in excess of a theoretical threshold in different watersheds, managed and unmanaged, to attempt to establish a natural background baseline for suspended sediment. The data show more days of suspended sediment levels above the theoretical threshold in the managed watersheds than in the unmanaged watersheds. However, absent are any baseline levels for the managed watersheds before management occurred. The underlying geology, soils and slopes of the watersheds studied are all unique. One cannot conclude that the baseline suspended sediment levels in the managed watersheds before disturbance were similar to those of the unmanaged watersheds as the authors hypothesize. The study shows variability in suspended sediment in different tributaries of Redwood Creek, but does not show that the suspended sediment load or discharge rates have been altered from background levels since any evidence of the background is absent. It is not clear from the study the authors relied upon to set the theoretical threshold whether these referenced studies were conducted in a laboratory or in the wild. As pointed out in *A Study in Change: Redwood Creek and Salmon,* laboratory studies of the effects of fine sediment on salmonids reached conclusions that have not proven applicable in the wild. In fact, studies conducted in Redwood Creek on salmonid emergence from spawning gravels silted in with fine sediment defied the conclusions of the laboratory experiments. It is not clear from these studies whether there are, in fact, adverse effects to salmonids from suspended sediment concentrations in excess of 27 mg/l in Redwood Creek or elsewhere in the wild. The study states that elevated suspended sediment levels impair the ability of the young fish to feed and thus may result in reduced size lowering the chances of successful completion of the reproductive cycle. Other studies cited in *A Study in Change: Redwood Creek and Salmon* note that elevated suspended sediment levels also make if difficult for predators to find the young fish (See Gregory and Levings, 1998). Perhaps, for the fish, the negative effects of increased difficulty in finding food is offset by the positive effects of not being eaten. Additionally, the fish data that were submitted show that the size of fish captured in the rotary screw trap in Redwood Creek did not evidence any impacts from lack of food.

Finally, Mr. Hofstra provided the results of long-term stream bed monitoring data from 58 permanent cross sections in Redwood Creek related to changes in the streambed

geometry. Again, this data relates to stored sediment rather than suspended sediment, the element to be evaluated in determining whether water quality standards are being attained. The study confirms what is undisputed; that more sediment enters the river system in response to large storms than in response to smaller storms. The data also show that the hydraulic powers of Redwood Creek function well to transport stored sediments out of the system well within the recurrence interval of the storms depositing the sediments. This study documents that there is still a wave of sediment in the lower reaches of Redwood Creek that is likely the result of the 1964 flood. Although this elevated sediment wave has persisted for some thirty six years, that flood was at least a sixty year event. The author opines that the sediment wave has impacted salmoind runs for over thirty years. Based upon the fish count data that have been produced from Redwood Creek in recent years, it appears that the impacts the author is referring to may well have been positive for the fish. Stored sediment is an integral part of the riverine ecosystem. Stored sediment levels in Redwood Creek have fluctuated enormously for the millions of years the salmonids have be utilizing and evolving in Redwood Creek. It is erroneous to conclude that simply because some portion of a river has a higher elevation of stored sediment at some point compared to the past that the river is impaired by sediment. Elevated stored sediments have come and gone, time and time again, yet the beneficial uses Redwood Creek continue.

The comments provided by Ms. Madej urging that Redwood Creek continue to be listed as impaired also deserve some comment. The preliminary data from the geology student on landslides in Redwood Creek does not seem to provide any substantial evidence as to the question of whether suspended sediment loads or discharge rates have been altered to the extent of a nuisance or adverse effect. Numbers of landslides have little meaning without some data related to the effect of these landslides on suspended sediment and particularly without any evidence of the natural historical contribution of landslides to suspended sediment in the river system. Ms. Madej offers this preliminary information to illustrate that "it is clear that there are still many unstable areas within Redwood Creek watershed which were activated during a moderate sized storm." It is no surprise that there are many unstable areas within Redwood Creek. The geologic makeup of the Redwood Creek watershed is inherently unstable, has been that way since these marine sediments emerged from the Pacific Ocean, and will remain so. Redwood Creek, along with many other Northcoast rivers, is recognized as amongst the most unstable and erosive watersheds on the continent. Even without any human disturbance in the watershed, there would still be many unstable areas that would be activated by even light storms. It is also no surprise that landslides result in discernable changes in channel morphology. More landslides result from larger storms. More sediment enters the aquatic system in larger storms. The river channel changes more in response to larger storms. These effects are not necessarily adverse as they have been experienced throughout historical time, even without human intervention.

Ms. Madej also provides a study authored by her regarding thalweg profiles of Redwood Creek. Again, it is no surprise that the river channel changes in response to heavy storms. This study concludes that the 1997 storm in Redwood Creek reversed the trend of increasing channel complexity, deepening pools and more improving pool to riffle ratios. The trend Ms. Madej refers to is the changing channel conditions following the 1975 flood. As discussed above, one would expect that after a long period of drought when a relatively large

storm occurs, there will be increased deposits of stored sediment that will affect channel morphology. One cannot simply conclude that because there is some variation in a trend of channel complexity in response to a relatively large storm that the river is thus impaired by sediment. Impairment for the purposes of 303(d) must be established based upon non-attainment of the applicable water quality standard. The applicable standard is suspended sediment, not stored sediment or channel complexity. While many believe that more complex channels provide better habitat for aquatic fauna, habitat that is less than some perceived optimum is not necessarily impaired. It is also significant to note that the study found the same pattern of change in both managed and unmanaged watersheds in response to the same storm.

Ms. Madej also provided a study on erosion from roads that had been rehabilitated in the park. The study involved measurement of erosion rates from treated roads and compared those rates to rates of erosion from untreated roads that were reported in other studies. This study did not measure untreated roads using the same methodology applied in the study to treated roads, but rather relied on reports from other researchers for the comparison. There is no discussion of the sampling techniques used by these other researchers to assure that the methods of measurement provide a valid comparison. Also absent is any data regarding erosion rates from roads located on private lands that have been maintained or reconstructed using contemporary management techniques. Utilization of improved road maintenance and rehabilitation techniques has increased in recent years. These techniques have contributed largely to reduced erosion from timberland and ranch roads in Redwood Creek. The author criticizes a recent study conducted by Dr. Rice (1999) that found erosion rates on untreated logging roads to be less than that found to occur on treated roads in the park. Ironically, the author's major criticism of the Rice study is that the 1997 storm was not a sufficiently large enough storm to give private roads a real test. Yet, in this study she finds that the same storm was sufficient to test the treated roads, and was sufficient enough to track the trends in channel complexity discussed above. Ms. Madej and her colleagues went so far as to publish their criticism of Dr. Rice's study in the Journal of the American Water Resources Association. Dr. Rice's response to their criticism speaks for itself. It is interesting to see that those who's livelihoods are dependent upon continued public funding for remediation of alleged impairment of the environment so readily attack any scientific study which calls into question the perceptions they advocate as to what constitutes an environmental problem.

The available evidence regarding the sediment conditions in Redwood Creek shows that the water quality standard for sediment is being attained. Redwood Creek should not be included on the 303(d) list as there is no evidence that the suspended sediment load or suspended sediment discharge rate has been altered so as to cause a nuisance or adversely affect beneficial uses. Further, even if the water quality standard were focused on stored sediment, which it clearly is not, there is no evidence that the stored sediment in Redwood Creek has been altered so as to cause a nuisance or adversely affect beneficial uses. There is no credible evidence that the natural background baselines of either suspended sediment or stored sediment levels were ever any less than the levels being measured today. Suspended sediment as well as stored sediment levels in Redwood Creek have fluctuated significantly in response to changes in precipitation throughout the history of Redwood Creek. The salmonid populations have similarly responded to this constant state of dynamics and have evolved and

adapted to this state of change. While there is little doubt that human disturbance in the watershed has affected erosion rates, it is apparent that the effects of human activity have been at most subtle. The quantities of sediment in Redwood Creek since the advent of European settlement in the watershed are well within the range of natural variability experienced over historical time. Conditions in Redwood Creek today are such that the habitat is capable of producing salmonids in numbers amongst the highest ever recorded in the Pacific Northwest. To classify a river with these attributes as impaired is inappropriate.

We urge the staff and regional and state boards to seriously reconsider the recommendations of the staff report. The rivers of the Northcoast should no longer be painted with the same broad brush. It is clear that Redwood Creek stands out as a river system that is in a condition as good as can be expected. The effects of human disturbance in the watershed in the past have not rendered the watershed incapable of assimilating sediment through natural hydraulic processes to maintain a healthy and productive aquatic system, and evolution in our understanding of our impacts has been applied to vastly reduce our footprints. Public funds are scarce and should not be expended in an effort to mend what is not broken.

Sincerely,

Thomas M. Herman

TMH:th
cc: Barnum Timber Company

2002 303(d) List Update
Reference # 133

REDWOOD CREEK LANDOWNERS ASSOCIATION

October 8, 2001

Regional Water Board
Attn: Matt St. John
5550 Skylane Boulevard, Ste. A
Santa Rosa, CA 95403

Re: 2002 303(d) List Update Recommendations

Dear Mr. St. John:

The Redwood Creek Landowners Association (RCLA) would like to submit brief comment on the proposed action(s) contained in the noticed recommendations for the update to the Federal Clean Water Act Section 303(d) List of Impaired Water Bodies.

The Association is comprised of ten private landowners ranging from small to large who own and manage tracts in the Redwood Creek drainage basin. Our collective land ownership encompasses more than 80 percent of the privately owned portion of the basin. Some members have managed land in the basin for half a century or longer. Thus, the Redwood Creek landscape and its uses are of vital concern to the organization.

As summarized in the publication our organization sponsored, A Study in Change: Redwood Creek and Salmon, dated September 2000, we believe cyclical sedimentation patterns in Redwood Creek are governed by local geology, tectonics, and climate, but normally shift very quickly Most sediment is deposited during rare dramatic ecological events, but most sediment is transported by continual flows. Primarily due to fewer intense storms in recent years, sediment levels in Redwood Creek have nearly returned to levels that preceded the 1953 to 1975 flooding period. It appears that Redwood Creek has cycled back, as it has in the past, from the changes brought on by the significant storms that began in the 1950s.

As stated in our publication, cooperative efforts between private landowners in Redwood Creek and Redwood National and State Parks are currently addressing potential sediment sources from roads on private lands. Careful, improved erosion control of roads in the basin today has reduced the potential to contribute sediment to stream channels. Additionally, numerous references discuss the fact that while instream habitat conditions in the lower watershed within the park are recovering at a slower rate, most areas in the upper two thirds of the watershed have returned to pre-1964 conditions.

With the above in mind, RCLA would request the water board consider taking the upper two-thirds of the Redwood Creek drainage off the 303(d) list of impaired water bodies.

Thank you for your consideration.

Sincerely,

Redwood Creek Landowners Association

2002 303(d) List Update
Reference # 132

RWQCB
REGION 1

OCT 10 2001

☐ SAW ☐ CRJ ☐ ☐ KAD
☐ RLT ☐ LGR ☐ ☐
☐ FCR ☐ RSG ☐ ☐

CITY OF
SANTA ROSA

OFFICE OF THE CITY MANAGER
100 Santa Rosa Avenue
Post Office Box 1678
Santa Rosa, CA 95402-1678
707-543-3010
Fax: 707-543-3030

October 8, 2001

Matt St. John
Regional Water Quality Control Board
5550 Skylane Blvd., # A
Santa Rosa, CA 95403

Mr. St. John:

Subject: Proposed 303(d) Listing

The purpose of this letter is to communicate the City of Santa Rosa's comments on the Public Review Draft 303(d) List Update Recommendations dated September 10, 2001.

The City of Santa Rosa supports the intent of the 303(d) and TMDL process, which is to identify impaired waters and implement appropriate action to protect beneficial uses. We are concerned that the National Research Council (part of the National Academy of Sciences) recommendations for improving the 303(d) listing process were not considered when preparing the Public Review Draft 303(d) List and that particular recommendations in the Public Review Draft 303(d) List are not consistent with water quality data. Our specific comments are provided below.

Laguna de Santa Rosa – Phosphorus and Dissolved Oxygen

The National Academy of Sciences has provided recommendations for improving the 303(d) listing process. RWQCB's guidelines for listing were developed prior to the recommendations and have not been updated to reflect the recommendations. Following the recommendations led to the conclusion that the proposed listing of the Laguna for dissolved oxygen and phosphorus is not appropriate.

The dissolved oxygen standard for the Laguna is 7 mg/L. The City of Santa Rosa has submitted testimony (attached) indicating that this is not a suitable standard for a waterway that is naturally warm in the summer. The standard is not attainable because 7 mg/L exceeds the saturation level of oxygen at normal summer temperatures. Therefore, listing the Laguna because it does not attain the water quality objective cannot result in compliance with the current standard.

The Public Review Draft 303(d) List implies that dissolved oxygen is degrading or not improving and should, therefore, be listed. Examination of the RWQCB's TMDL Monitoring Data shows that dissolved oxygen at the four compliance monitoring stations in the Laguna was at a minimum during 1996 through 1998, and has been improving at all stations since 1998 (see attached *Comments on Proposed 303(d) listing for Laguna de Santa Rosa* memorandum dated October 5, 2001). Accordingly, dissolved oxygen should be placed on the watch list rather than the 303(d) list while an evaluation of the suitability of the existing standard is conducted.

The Public Review Draft 303(d) List indicates that the Laguna should be listed because it exceeds the EPA criterion for phosphorus and because recent data indicate that the growth of algae in the Laguna is limited by phosphorus. EPA has not established a criterion for phosphorus as a biostimulant (see attached *Comments on Proposed 303(d) listing for Laguna de Santa Rosa* memorandum dated October 5, 2001). Furthermore, the 303(d) listing of the Laguna for phosphorus is not justified because the Board's recent TMDL Monitoring Data continue to support the conclusion that nitrogen, and not phosphorus, limits the growth of plants in Laguna waters.

Santa Rosa Creek - Pathogens

City test data show that summer levels of indicator bacteria in Santa Rosa Creek downtown are above the State Health Department draft guidelines for fresh water beaches. Many other small California urban streams that have been tested for indicator bacteria also show levels above the State draft guidelines. Listing Santa Rosa Creek as impaired for pathogens without testing for levels of indicator bacteria on other urban streams in the North Coast Region may mislead the community into believing that all other streams with human contact have been tested and have levels below the draft guidelines for fresh water beaches.

It is unknown at this time whether the source of pathogens in Santa Rosa Creek is human or non-human so the risk to the human population is unclear. Santa Rosa Creek should be placed on the watch list for pathogens instead of the impaired list to allow agencies to further investigate point sources within the watershed as well as to pursue funding for additional pathogen testing to determine if the sources are human or non-human.

Santa Rosa Creek - Diazinon - Watch List

In November 1999 the City of Santa Rosa conducted tests for diazinon in Matanzas Creek at Hoen Frontage Road, Santa Rosa Creek at Melita Road, Piner Creek at Marlow Road, Peterson Creek west of Fulton Road, and Brush Creek south of Highway 12. The test results were non-detect in all cases. Since there is

no data indicating detectable levels of diazinon in Santa Rosa Creek or its tributaries, it should not be included on the watch list.

Santa Rosa Creek - Copper and Zinc - Watch List

Water quality data from 24 samples collected over four years at two sites on Santa Rosa Creek show no exceedances of any standards for copper and zinc. Santa Rosa Creek should not be included on the watch list for these metals.

In addition, the proposed recommendations state that the City of Santa Rosa performs surface water monitoring on Santa Rosa Creek at Fulton Road. This monitoring is actually performed by the Sonoma County Water Agency.

The Public Review Draft 303(d) List identifies October 8, 2001 as the comment submittal deadline. Since your office was closed on this day, we hope that you will accept these comments as submitted on October 9. Thank you for your consideration.

Sincerely,

ED BRAUNER
Deputy City Manager

Attachment

c: William Massey, Chairman NCRWQCB
Miles Ferris, Utilities Department
Colleen Ferguson, Public Works Department
David W. Smith, Merritt Smith Consulting

2002 303(d) List Update
Reference # 118

MEMORANDUM

Merritt Smith Consulting
Environmental Science and Communication

RWQCB
REGION 1
OCT 10 2001
☐ SAW ☐ CRJ ☐
☐ RLT ☐ LGR ☐ KAD
☐ FCR ☐ RSG ☐

TO: Ed Brauner, Deputy City Manager
Miles Ferris, Utilities Director

FROM: James Roth, Ph.D.
Dave Smith, Ph.D.

DATE: 5 October 2001

SUBJECT: Comments on Proposed 303(d) listing for Laguna de Santa Rosa

The 1990 303(d) listing of the Laguna for ammonia and dissolved oxygen led to a TMDL in 1995 which took the form of a wasteload reduction strategy (WRS) addressed at reduction of nitrogen loading from point and non-point sources. Ammonia-nitrogen interim concentration goals were attained, and the Laguna was removed from the 303(d) list in 1998. Dissolved oxygen (DO) goals continue to fall below the Basin Plan minimum objective of 7 mg/L, and this has prompted the RWQCB staff to propose listing the Laguna for dissolved oxygen and phosphorus. This memorandum provides a summary of a National Academy of Sciences report that recommends changes to the 303(d) listing process that should be followed by RWQCB, and an analysis of data that indicates that the proposed listing of the Laguna for DO and phosphorus is not appropriate.

SUMMARY OF COMMENTS

The National Academy of Sciences has provided recommendations for improving the 303(d) listing process. RWQCB's guidelines for listing were developed prior to the recommendations and have not been updated to reflect the recommendations. Following the recommendations lead to the conclusion that the proposed listing of the Laguna for DO and phosphorus is not appropriate. Examination of the RWQCB's TMDL Monitoring Data shows that DO at the four compliance monitoring stations in the Laguna was at a minimum during 1996 through 1998, and has been improving at all stations since 1998. A lag period between the reduction of nutrient inputs and the reversal of eutrophication is expected. Accordingly, including DO on the watch list rather than the 303(d) list is recommended. The 303(d) listing of the Laguna for phosphorus is not justified because the Board's recent TMDL Monitoring Data continue to support the conclusion that nitrogen, and not phosphorus, limits the growth of plants in Laguna waters.

NRC RECOMMENDATIONS

The National Research Council, the principal operating agency of the National Academy of Sciences, has recently completed a 109-page assessment of the 303d listing and TMDL

approach to water quality management (NRC 2001). Their report outlines recommended changes to the program. The NRC report recommends broad changes to the 303d listing and TMDL process, including the criteria for listing and delisting. One of the recommended changes is that RWQCB should emphasize attainment of designated uses rather than achievement of numerical water quality goals (p.5). Responding to testimony that "many waterbodies have been listed based on limited or completely absent data and poorly conceived analytical techniques for data evaluation," (p.20) the report "reviews the listing process and makes recommendations that will improve the reliability of the listing decision." RWQCB's 303(d) listing approach should be evaluated against the recommendations to identify areas of improvement.

One of the recommendations that has not been implemented by RWQCB is that "before a waterbody is placed on the action (303d) list it is suggested that states conduct a review of the appropriateness of the water quality standard" (p. 90) Recommended is a use attainability analysis (UAA), which "determines if impairment is caused by natural contaminants, nonremovable physical conditions, legacy pollutants, or natural conditions." (p. 92). The current Basin Plan minimum of 7 mg/L DO has not been subjected to such analysis. In fact, the City of Santa Rosa requested in writing on May 20, 1998, that RWQCB conduct just such an evaluation. RWQCB should conduct such an evaluation prior to listing of the Laguna for dissolved oxygen.

DATA ANALYSIS

Dissolved Oxygen

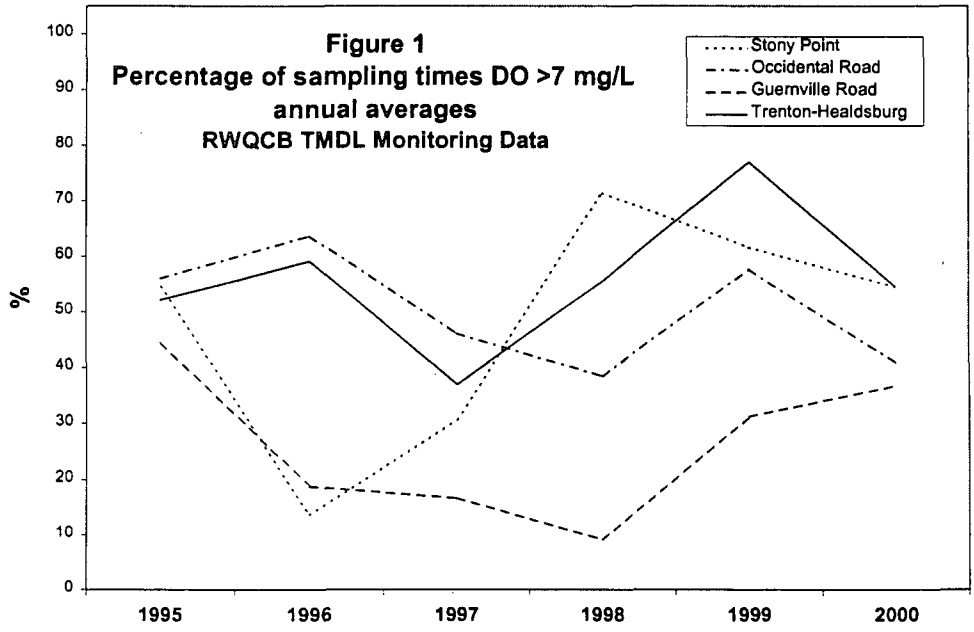
The RWQCB's rationale for recommending adding the Laguna to the 303(d) list for DO is that although nitrogen loading goals have been met since about 1998, Laguna DO objectives are not met. Reference is made to recent data collected in August/September 2001 which indicate that Laguna DO levels are less than the Basin Plan objective of 7 mg/L 90 percent of the time. The implication is given that DO levels in the Laguna have worsened in the most recent period. No reference is made to recent DO data from the RWQCB's own TMDL Monitoring program, although phosphorus data from that program are discussed.

- *Are Laguna DO levels worsening since nitrogen loading has been reduced?*

  The RWQCB's Laguna de Santa Rosa TMDL monitoring program (Reference # 107 in 303(d) List Update Recommendations) began in January 1995, and continued until November 2000. Four compliance monitoring stations were each visited every two weeks throughout the year. One purpose of this program was to determine whether reduced nitrogen loading would result in improvements in Laguna DO levels. The 303(d) List Update Recommendations refer to data collected between 1995 and 1997 and conclude that DO compliance is not being

met. It is appropriate to compare DO data for the whole study period (1995-2000) in order to decide whether DO is worsening. Nitrate loading reductions achieved goals by 1998, but it is to be expected that reductions in Laguna eutrophication might not be immediate. A lag period, perhaps of several years might precede measurable DO improvements.

Based on the TMDL monitoring data, the percentage of times over the year that Laguna DO has attained the Basin Plan goal of 7 mg/L at each station (Figure 1) shows a distinct pattern during the last 6 years. In 1995 DO was above 7 mg/L on about half of the sample dates at all 4 stations. Attainment of the 7 mg/L goal declined at all stations in one or more of the next 3 years, in some cases strikingly (to 14 percent of dates at Stony Point Road in 1996, and to 9 percent of dates in 1998 at Guerneville Road). However, 3 of the 4 stations have increased in the



frequency of attainment since 1998. While none of the stations have achieved the goal of 100 percent attainment, it is encouraging that the Laguna DO is improving (percentages for 2000 are slightly underestimated because no samples were collected after mid-November, so averages did not include as many winter dates when compliance rate is high). There is thus no evidence from these data to support RWQCB staff's implication that Laguna DO is worsening.

Another perspective on recent Laguna DO, based on the same data set is the percentage of sample dates each year when the DO is over 50 percent saturation (Figure 2). Because oxygen is less soluble at higher temperature and the Laguna is a naturally warm waterway in summer, percent saturation provides is more relevant to the suitability of the Laguna as a habitat for native fish and

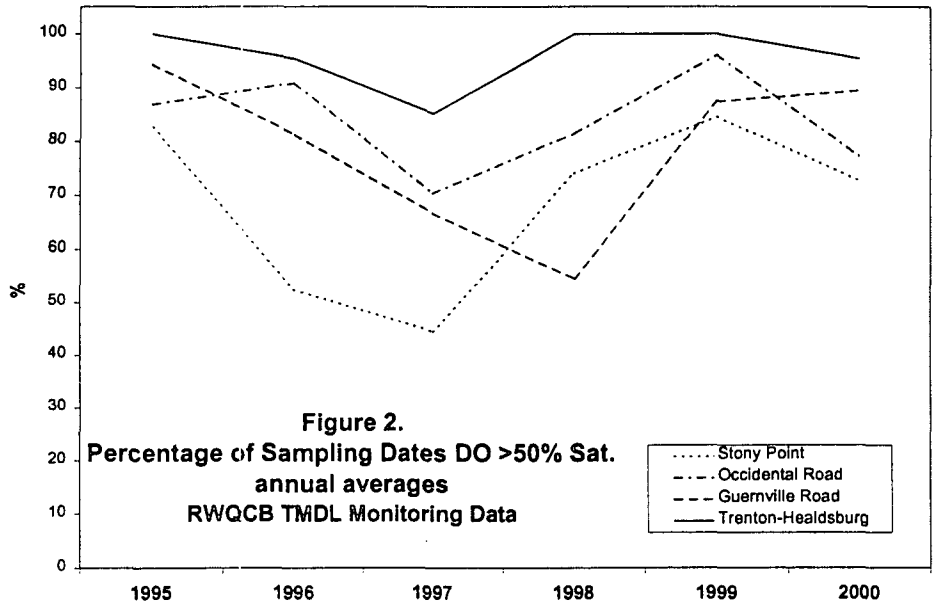


Figure 2.
Percentage of Sampling Dates DO >50% Sat.
annual averages
RWQCB TMDL Monitoring Data

invertebrates than is the absolute concentration of dissolved oxygen. Percent saturation has also improved at all stations since 1998, and percent saturation at all stations was above 50% on at least 70 percent of the sample dates in 2000. (Again the 2000 percentages are probably underestimated due to fewer winter sampling dates.) A lag period between the reduction of nutrient inputs and the reversal of eutrophication is expected, and for this reason including the Laguna on the Watch List for DO, rather than the 303(d) list would be more appropriate than formally listing it.

Another important implication of the inverse relationship between temperature and oxygen solubility is that, due to natural conditions, temperature is sufficiently high that the 7 mg/L standard is frequently unattainable. When temperature is greater than 22 C, oxygen saturation is less than 7 mg/L (the Basin Plan standard). This fact should be considered by RWQCB in their evaluation of 303(d) listing of the Laguna for dissolved oxygen (and when evaluating if the standard of 7 mg/L is appropriate for the Laguna).

- *Do recent data collected in August/September 2001 demonstrate that Laguna DO is worsening?*

  The Regional Water Board's DO data from August/September 2001 (Reference # 108 in 303(d) List Update Recommendations), monitoring conducted under contract by Sonoma County Water Agency) were collected with continuously recording instruments installed near the 4 attainment monitoring stations for periods 2 to 3 days on two occasions in August/September 2001. That 90 percent of the records were below 7 mg/L shows that low DO episodes at certain times and places may be sustained over extended periods. The 303(d) List Update Recommendations assert that this supports the need for 303(d) listing. However, there are several methodological and other differences between these data and data from previous monitoring. It is therefore impossible to determine whether the results represent recent changes in the Laguna DO regime. It is not unusual for DO concentrations in eutrophic streams to exhibit day-night fluctuations (diel DO sag), since photosynthetic inputs exceed DO consumption during daylight, whereas respiratory losses dominate at night.

  The recording instruments were deployed on the stream bottom under water depths ranging from 0.5 to 1.0 meter. The sensors were thus located within a few centimeters of the sediments (Jeff Church, RWQCB, pers. com.) whereas the grab samples in the TMDL monitoring series were collected at the surface. Instruments were placed at concealed sites up to 100 yards of the bridge crossings where the bimonthly samples were collected. Individual records in a continuous series logged every 15 minutes are not statistically independent (consecutive observations are autocorrelated), so the number of records (1792) does not convey the statistical power implied by the expression "n=1792" as used in the Draft Update.

Phosphorus

The RWQCB's rationale for recommending adding the Laguna to the 303(d) list for phosphorus is that phosphorus levels in the Laguna exceed the US EPA criterion of 0.1 mg/L Total P, and since DO levels appear to be worsening despite nitrogen loading reductions, that phosphorus, not nitrogen, must be limiting algal growth in the Laguna.

- *Do Laguna phosphorus concentrations exceed any federal or State water quality standards?*

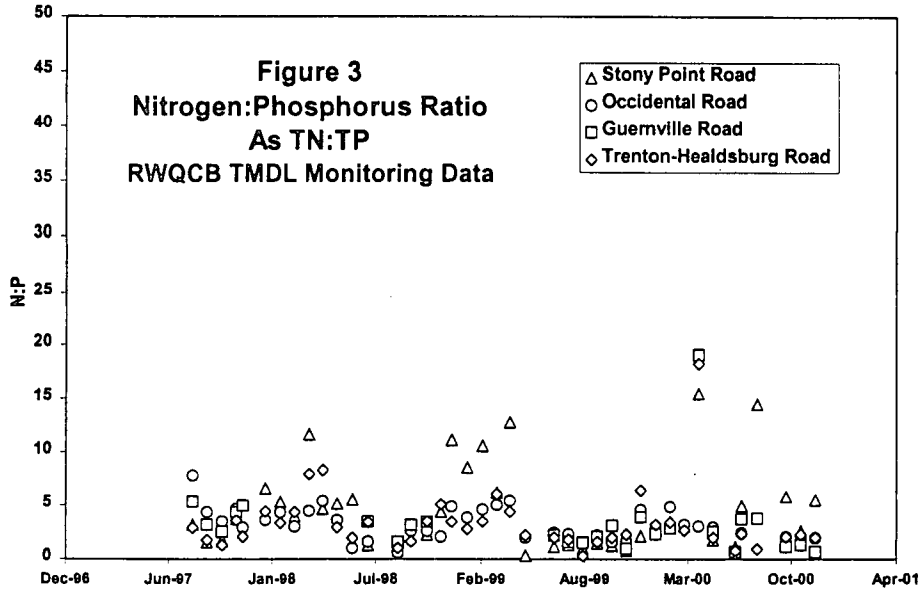
  The Basin Plan issued by the RWQCB does not contain any numerical phosphorus standards. The US EPA has not promulgated any numerical phosphorus standards that address the prevention of eutrophication as described in EPA (2000):

EPA is publishing technical guidance which presents EPA's method for setting nutrient water quality criteria for lakes and reservoirs. The EPA has not previously issued guidance for developing ecoregional nutrient criteria. In addition, current criteria for nutrients do not specifically address the prevention of eutrophication. In 1976, in EPA's publication entitled Quality Criteria for Water (also known as the Red Book), EPA presented ambient water quality criteria for nitrates, nitrites and phosphorus. The criterion for nitrate nitrogen was 10 mg/L for the protection of domestic water supplies. The phosphorus criterion was 0.10 ug/L elemental phosphorus for the protection of marine and estuarine waters. This criterion was based on a conservative estimate to protect against the toxic effects of the bioconcentration of elemental phosphorus to estuarine and marine organisms, and not on the potential to cause eutrophication.

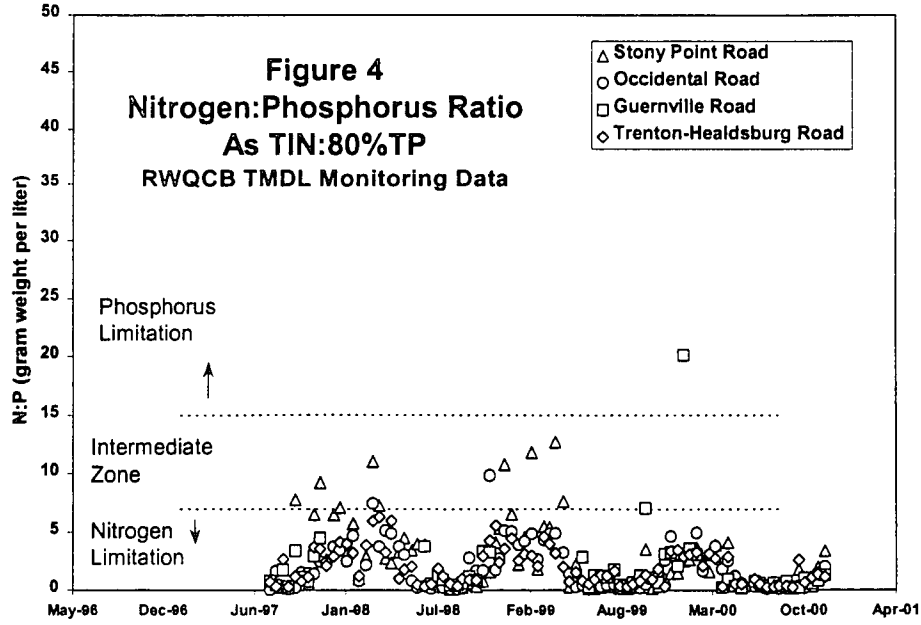
- *Do recent data support the conclusion that algal growth in Laguna waters is phosphorus-limited?*

The 1995 TMDL (RWQCB 1995) identified ammonia and total nitrogen as limiting nutrients in the Laguna. This conclusion was based on a variety of data, including Algal Growth Potential (AGP) tests and analysis of nutrient ratios, collected over several years by several investigators. Nitrogen-to-phosphorus ratios based on recent Laguna measurements continue to indicate that nitrogen is the macronutrient controlling plant growth in the Laguna.

The simple ratio of total nitrogen to total phosphorus (Figure 3) suggests that Laguna waters are nitrogen-limited, but this ratio may not accurately predict the relative importance of each nutrient, because several forms of each element may not be available to plants for growth. Lee et al. (1980) found that for a wide variety of aquatic habitats, a good estimate of the bioavailable phosphorus is given by the sum of the dissolved orthophosphate and 0.2 x the particulate phosphorus in a water sample. The recent phosphorus data collected in the RWQCB's TMDL monitoring series evaluated total phosphorus only, which includes both particulate and dissolved forms. However, both dissolved and total P were measured at Laguna stations by the City of Santa Rosa in their Laguna Monitoring program. Two of their stations (Occidental Road and Stony Point Road) correspond to stations also sampled in the 1995-2000 RWQCB TMDL series. The dissolved orthophosphate averaged 76% of total P in 82 pairs of



determinations made on water from the two stations at all seasons during the years 1993-1999. Using this estimate, the sum of dissolved P and 0.2 x particulate P is estimated by 0.808 x Total P (i.e., 0.76+(0.2x0.24). Accordingly, the N-to-P ratio, calculated as Total Inorganic Nitrogen (TIN) divided by 0.8x Total P (Figure 4), should realistically represent the bioavailable forms of both elements. This figure clearly shows that nitrogen continues to be the macronutrient controlling algal growth in the Laguna. The degree of N-limitation appears to by increasing, not surprising since N inputs have decreased.



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State of California

Memorandum

Flex your POWER

To: Ms. Susan Warner, Executive Officer
North Coast Regional Water Quality
5550 Skylane Boulevard, Suite A
Santa Rosa, CA 95403

Date: November 7, 2001

From: **DONALD B. KOCH, Regional Manager**
Northern California-North Coast Region
Department of Fish and Game
601 Locust Street, Redding CA 96001

Subject: Public Review Draft 303(d) List Update Recommendations

The Department of Fish and Game (DFG) has reviewed the subject document dated September 10, 2001, and has the following comments.

We are encouraged that the North Coast Regional Water Quality Control Board (NCRWQCB) has recognized that the existing numerical temperature objective allowing a 5°F increase is not adequate for protecting beneficial uses of some sensitive species. We commend the NCRWQCB for adopting alternate methods of determining temperature impairment in certain critical streams. This technique has been adopted successfully in other regional boards in California.

DFG staff is available to work with NCRWQCB staff on this important issue. If you have questions or comments, please contact Environmental Scientist Jane Vorpagel at (530) 225-2124.

cc: Ms. Jane Vorpagel
Department of Fish and Game
Redding, CA

THE BUCKEYE CONSERVANCY

January 16, 2002

North Coast Regional Water Quality Control Board
5550 Skylane Blvd., Suite A
Santa Rosa, CA 95403

Re: 303(d) List Update Recommendations

Dear Board Members:

The Buckeye Conservancy is a non-profit organization headquartered in Humboldt County, California. We are an organization of family farm, ranch and timberland owners and resource managers dedicated to the promotion, communication and implementation of ideals and policies that maintain open space and support the ecologic and economic sustainability of natural resources in family ownership. We seek to preserve the historic rural culture and open space in our region. We promote sound resource management practices that contribute to the health of our region's wild lands while supporting a healthy and stable agricultural economy. We promote policies that allow for the passing of family lands to the next generation without the necessity of sale, fragmentation and inappropriate development. We further our interests through supporting sound science, providing educational opportunities, assisting landowners with alternatives to economic incentives to change land use from agriculture and communicating constructive alternatives to unreasonable regulatory restrictions.

We understand that your board will be conducting a workshop in January, 2002, to reconsider your staff's recommendations to the State Water Resources Control Board regarding the 2002 update of the 303(d) list of impaired water bodies. We also understand that at your last board meeting in Eureka, members of the board made inquiries of the staff as to the impact that listing of a water body has on landowners within the watershed. We believe the response you received from your staff did not fairly characterize those impacts. Many of our farm, dairy, ranch and timberland owners own property in watersheds that have been listed and have asked us to write to you to explain the impact of listing from the landowner's perspective. We think it is important for you to understand our perspective as you consider how best to exercise your authority in this very important matter.

P.O. BOX 5607 ◦ EUREKA, CA 95502
TEL 707.764.5112
FAX 707.764.5236

We do not oppose protection of the quality and beneficial uses of water in our region. Quite the contrary, our objectives are furthered through the maintenance of high quality water and aquatic conditions. We support measures necessary to maintain healthy and productive watersheds. However, we do not support imposition of restrictions on land use that are unnecessary. We ask that you carefully consider the evidence available to you regarding any recommendation to list a water body as impaired to be sure that no water body is listed where the listing is not necessary. We ask that you keep in mind that our North Coast rivers are unique. They are located in a region that has relatively warm temperatures and naturally erosive landscapes. North Coast rivers have historically been relatively warm and carried some of the highest sediment loads in the country. The resources dependent upon these rivers have evolved and adapted to these unique conditions, and in many cases are continuing to prosper. Considering the impacts to our members discussed below, we ask that your recommendations for updating the list are limited to those water bodies where there is clear evidence that current conditions are beyond the range of natural, base line, conditions and where water quality standards appropriate for our region are clearly not being met.

On the surface, the listing of a water body does not seem to create significant burdens for landowners in the watershed. Listing simply results in the development of a total maximum daily load (TMDL) that sets limits on the discharge of pollutants to the water body. We all are interested in avoiding pollution of our waters, and most landowners do not consider their activities as contributing to pollution. However, one need not pierce the surface very far to dispel the notion of insignificant impacts to landowners. First, the mere fact that a water body is listed results in a presumption that there is a serious problem in the watershed that is in need of a remedy. Second, after the TMDL is adopted, there must be an implementation plan adopted to achieve the goals of the TMDL. Both the presumption of the need for a remedy and the measures to implement the TMDL affect landowners in the watershed.

Our members report to us that since the water bodies draining their watersheds have been on the 303(d) list, they have been subjected to ever increasing restrictions on their agricultural activities even in the absence of a TMDL and an implementation plan. Whenever they apply to conduct any activity that requires an environmental analysis, the presumption attendant to listing is raised by regulators to justify recommendations for additional restrictions on their proposal. This occurs even in cases where the landowner has historically been a good land steward and taken measures to operate their lands in a manner that avoids impacts to the aquatic system. Measures such as restrictions on the removal of forest canopy and obligations to reduce sediment sources beyond the scope of the particular project are very costly; in some cases so costly as to derail the project. While it is difficult to quantify the cost of the additional limitations that are imposed simply due to the presumption that accompanies the listing of a water body, it is clear that over the more than 300,000 acres of family owned agricultural lands represented by our members, the costs from reduced productivity and implementation of required mitigation measures are in the tens of millions of dollars.

While only a few implementation plans have been adopted, it is clear that these plans require many changes in the way agricultural lands are managed. Implementation plans that we have some knowledge about require landowners to retain resource professionals to gather scientific data and develop management plans for controlling pollution or subject themselves to very restrictive "safe harbor" operating methods. The cost for consultants, the cost of modified operations and the cost of

reduced productivity are serious burdens for the family landowner. Here again, we estimate the costs to measure in the tens of millions of dollars.

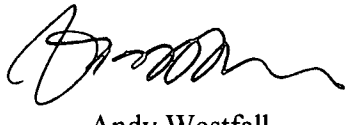
Family owned agricultural operations in California operate on very narrow margins of profit. When the government imposes additional costs, such as those associated with the listing of a water body as impaired, the incentives to maintain these lands for agricultural use are eroded. The costs associated with the listing of one's watershed as impaired added to other government regulatory burdens imposed on agricultural landowners has forced many of our members to consider selling their holdings for other land uses. If the current trend of regulatory burdens in this State continues, we are very concerned that substantial open space in our region may be converted to development or other alternative land uses. Clearly, this is inconsistent with the objectives of our organization and a result that no one wants to see materialize. The impacts to water quality from fragmentation and conversion of our wild lands will be much more serious than exist today.

Further, please keep in mind the burdens to public resources associated with the listing of a water body. The development of TMDLs and implementation plans by your agency certainly does not come cheap. Your limited resources will be spread even thinner if you include watersheds where the evidence does not clearly compel a determination of impairment. With the number of water bodies your staff has recommended for listing, it appears that it will be virtually impossible for you to meet the obligations that go with listing. We ask that you use our tax dollars only where necessary and only where we will get reasonable returns on our investments.

Again, we are not opposed to imposition of measures that are necessary to maintain healthy and productive aquatic systems. We simply ask that such measures only be imposed where they are clearly necessary. We ask that you keep in mind the very serious impacts an unwarranted listing will unnecessarily have on family farm, ranch and timberland owners struggling to sustain their way of life while providing all of us the benefits that derive from the open space their lands offer. Please be careful not to provide negative incentives to those who have worked hard to maintain their lands to contribute to the quality landscapes and culture of our region. Many of our members are on the brink of not being able to economically justify continuance of their operations. Let's not take any of them over the brink unnecessarily. Please take the time to educate yourselves on the evidence available to you and make your determinations in the best interests of us all. The future of our region is dependent upon your actions.

Thank you for considering our concerns. If you have any questions or are interested in meeting our members regarding the impacts of listing please feel free to contact us.

Sincerely,



Andy Westfall
Chairman

AW:llm

✓ cc: State Water Resources Control Board

BARNUM & HERMAN
AN ASSOCIATION OF SOLE PRACTITIONERS

POST OFFICE BOX 173
2103 MYRTLE AVENUE
EUREKA, CALIFORNIA 95502
TELEPHONE: (707) 442-6405
FACSIMILE: (707) 442-1507

William F. Barnum
Thomas M. Herman

January 22, 2002

VIA PERSONAL DELIVERY

North Coast Regional Water Quality Control Board
5550 Skylane Blvd., Suite A
Santa Rosa, California 95403

Re: Reconsideration of 303(d) List Update Recommendations; January 23, 2002, Board Meeting

Dear Members of the Board:

I represent Barnum Timber Company, a landowner in the Redwood Creek watershed in Humboldt County, California. On behalf of Barnum Timber Company, I urge that you seriously consider the evidence presented to your board regarding the conditions of Redwood Creek to assure that Redwood Creek is not unnecessarily retained on the 303(d) list of impaired water bodies. Barnum Timber Company has provided you with an extensive library of information regarding conditions in Redwood Creek that presents compelling evidence that Redwood Creek is in as good a condition today as it has ever been. Sediment and temperature levels are well within the range of historical natural levels, and fish are being produced in record numbers, amongst the highest recorded in Pacific Northwest rivers.

The burdens associated with including any water body on the 303(d) list to both landowners and public agencies are so significant that it is incumbent upon you to assure that only those water bodies where the evidence clearly shows problems with achieving the applicable water quality standards are included on the list. For landowners in listed watersheds, listing results in a presumption that there is a problem in need of a remedy. This presumption results in additional land use restrictions, requirements to retain consultants, and reductions in land productivity. For public agencies, listing requires the development of extensive research and planning for the development of TMDLs and implementation plans. The burdens are such as to warrant your careful scrutiny of any recommendation to list a water body to assure that none get listed unless absolutely necessary.

In the case of Redwood Creek, we believe that continuing to include this water body on the list is inappropriate. Your staff has established criteria and thresholds for evaluation of water bodies that seek the "dream stream" rather than conditions that are reasonably achievable given the range of natural conditions that rivers such as Redwood Creek experience. Examples of inappropriate criteria include a threshold of 14.8 degrees C MWAT (maximum weekly average temperature) as the point at which stream temperature is a concern for anadromous salmonids. Not only is this threshold at the lower end of the range suggested in the literature, it also fails to consider the temperature conditions of northern California. Clearly, the populations of fish spawning in North Coast rivers have evolved and adapted to the temperature conditions of these rivers. It is not reasonable to evaluate California stream

temperatures based upon studies of fish from more northern latitudes. The turbidity threshold is also set at the lower end of the range of values found in the literature and does not reflect conditions on the North Coast where high levels of turbidity have existed historically. The staff report cites literature on percent fines from pristine streams at between 16 and 23%, yet the threshold adopted is 14%. Clearly, a threshold below that measured in watersheds that have not been managed is inappropriate. Based upon this threshold, undisturbed watersheds on the North Coast could be listed as impaired. With regard to V* thresholds, the staff report cites literature that measured over sixty streams in the Franciscan geologic type, the geologic type that predominates the North Coast, and found that V* levels of 0.21 or less represented good stream conditions. However, your staff has adopted a threshold level of 0.15 based upon a single measurement of one stream that was lower than the average. If sixty samples yielded an average of 0.21, one additional sample of 0.09 should not reduce the average to 0.15. A sixth grade math student would immediately see the fallacy in this reasoning. These criteria cannot be met in North Coast rivers like Redwood Creek.

It is apparent that your staff has resolved to set the bar so high as to justify the listing of virtually any water body in the region. They seem determined to simply expand the list in an apparent effort to increase and perpetuate the overreaching of their jurisdiction. It is difficult to imagine that with the drastic changes in land management practices and the investment of hundreds of millions of federal and state tax dollars on watershed rehabilitation in the last decade that not one water body in the North Coast region has improved sufficiently to warrant removal from the list. It seems that your staff views de-listing as a threat to their security. After all, more listed water bodies means more and more staff.

Please consider the work load that faces you and your staff with the volume of TMDLs and implementation plans that will be required if the staff recommendations are accepted as proposed. The number of water bodies recommended for listing is so high that it will be impossible to complete the required work in the next decade if you devoted all of your time to the effort. Clearly, this would detract from your other responsibilities and set your agenda for decades to come. Considering these burdens, you must assure that no water body is listed if the evidence of impairment is not clear and compelling.

Redwood Creek is one such water body. In fact, clear and compelling evidence exists and has been put into the record that Redwood Creek should be removed from the list. The time is now to replace turf building with reason. We ask that you scrutinize the staff report and the available evidence to assure that your energy is focused appropriately on water bodies with real rather than imagined problems.

Sincerely,

Thomas M. Herman

TMH:th

Cc: State Water Resources Control Board
Barnum Timber Company

Rec. 2/5/02

MERRITT SMITH
CONSULTING
ENVIRONMENTAL SCIENCE
AND COMMUNICATION

~~28 January 2001~~
28 January, 2002

Craig J. Wilson
State Water Resources Control Board
1001 I Street
Sacramento, CA 95814

Subject: 303(d) list update recommendations from the North Coast RWQCB

Mr. Wilson:

The City of Santa Rosa is concerned about some of the recommendations for the 303(d) list update that has been provided to you by the North Coast Regional Water Quality Control Board. The attached memorandum, prepared at the request of the City of Santa Rosa and also sent to the NCRWQCB staff, summarizes some of their concerns. We intend to provide you with more information in support of our concerns shortly.

Sincerely,

Marcie Commins, Ph.D.
Merritt Smith Consulting

Memo attached dated Jan. 22, 2002.

760 Market St., Suite 922, San Francisco, CA 94102
fax: (415) 434-9419

3620 Happy Valley Rd., Suite 103, Lafayette, CA 94549
fax: (925) 284-6494

MERRITT SMITH
CONSULTING
ENVIRONMENTAL SCIENCE AND COMMUNICATION

MEMORANDUM

TO: David Leland, NCWQCB
Matt St. John, NCWQCB
Craig J. Wilson, SWRCB

FROM: Marcie Commins, Ph.D.
Dave Smith, Ph.D.

COPIES: Miles Ferris, City of Santa Rosa
Scott Stinebaugh, City of Santa Rosa

DATE: 22 January 2002

SUBJECT: 303(d) List Update Recommendations

The purpose of this memorandum is to summarize the City of Santa Rosa's concerns with regard to the Regional Board staff's 303(d) List Update Recommendations. These concerns were discussed in an 18 January 2002 meeting between David Leland and Matt St. John, NCRWQCB, and Marcie Commins, Merritt Smith Consulting and are presented here at the request of David Leland.

The City of Santa Rosa has three points of disagreement with the Regional Board's 303(d) List Update Recommendations (Staff Recommendations) as follows:

- Placing the Laguna de Santa Rosa and Santa Rosa Creek on the watch list for copper
- Placing Santa Rosa Creek on the watch list for diazinon
- Placing the Laguna de Santa Rosa on the 303(d) List Update for dissolved oxygen and nutrients

LAGUNA AND SANTA ROSA CREEK COPPER

We disagree with the proposed addition of copper to the Watch List for the following reasons:

- The Staff Recommendations states that in surface water monitoring, copper levels did not exceed any of the applicable criteria in surface water or effluent.

- The Staff Recommendations states that one fish tissue sample and one invertebrate sample from the Laguna indicated no exceedance of copper median international standards for fish tissue or EDL-85 for shellfish tissue.

- The recommendation for adding copper to the Watch List appears to be based solely on the results from the draft report NCRWQCB, 1996. The Staff Recommendations states that the results from this report "indicate that chromium, copper, and zinc concentrations in stream sediments may be elevated downstream of the "reference" sites in both the Laguna de Santa Rosa and Santa Rosa Creek." However, the 1996 report states for the 1985-1986 data, copper in the Laguna de Santa Rosa/Mark West Creek "none of the sites was significantly different from one another". The 1996 report also states that for the 1985-1986 data, copper in Santa Rosa Creek "sediment concentrations were essentially the same at all sites in Santa Rosa Creek and the Delta Pond". These data are summarized below.

	Reference Sites (median sediment concentration in mg/Kg)	Downstream Sites (median sediment concentration in mg/Kg)
Santa Rosa Creek	1.9	0.95, 1.1
Laguna de Santa Rosa	1.5	1.1, 1.2, 1.5[a]
Mark West Creek/Laguna	1.1	0.86

[a] The 1.5 value occurred at Stony Point Road which is upstream of the City of Santa Rosa

These data show that the average concentrations of the downstream sites are never higher than the reference sites. The 1996 report also includes figures (no numbers) that show data from single samples collected the Laguna (not Santa Rosa Creek) in 1996. However, without replicate samples, no definitive conclusions can be made (For example in 1995, the concentration of copper in Stony Point Road was higher than the concentration a few miles further downstream at Occidental Road). Therefore, no evidence exists for elevated copper concentrations in the Laguna and Santa Rosa Creek and it should be taken off the Watch List.

The Regional Board staff has indicated that the Watch List will not be used for regulatory purposes and placement of Santa Rosa area streams on the Watch List should have no real impact for the City of Santa Rosa. However, the City of Santa Rosa is concerned about substances being placed on the Watch List when evidence is lacking for the need for the following reasons:

- Potential cost. Placement on the Watch List indicates that further study will be done. The City believes the resources could be better utilized on waterbody/pollutant combinations for which some evidence indicates a problem.

- Misunderstanding. Stakeholders may misinterpret inclusion on the Watch List as indicating a serious problem where none exists. Although the Regional Board considers the Watch List to be non-regulatory and only for internal use to indicate a need to obtain further information, there is no guarantee that the USEPA will use the list in this manner. USEPA may decide to include waterbodies/constituents on the Watch List on the actual 303(d) list. The USEPA has in the past added constituents to the 303(d) list that were not recommended by the SWRCB for inclusion on the list.

SANTA ROSA CREEK DIAZINON.

The Board staff indicated in the 18 January, 2002 meeting that diazinon in the Russian River, Laguna, and Santa Rosa Creek was placed on the Watch List because of the elevated concentrations of diazinon in urban areas of Region 2 and because a citizens group requested that diazinon be placed on the list for these three streams. The Board Staff Recommendations does not provide evidence of elevated diazinon concentrations in Santa Rosa Creek.

- The 1997 study found two of fifty two samples collected in the Russian River with detectable concentrations of pesticides and the concentrations were above that believed to be detrimental to freshwater organisms. Only one of the two detectable samples was for diazinon (the other was dimethoate) and this sample was obtained from the Russian River not Santa Rosa Creek.

- In November, 1999, the City of Santa Rosa monitored for diazinon in Santa Rosa Creek and other creeks in the Santa Rosa area that drain to the Russian River and found no detectable diazinon. The monitoring consisted of one sample in each of 5 creeks and the Santa Rosa Creek site was upstream of most urban influence.

- Unlike some other urban areas in Sonoma County, the City of Santa Rosa has an active pesticide management program which likely results in reduced pesticide concentrations in urban streams.

Therefore, no evidence of elevated diazinon in Santa Rosa Creek exists so Santa Rosa Creek should not be singled out for placement on the Watch List. It is recommended that the Watch List for diazinon be revised to include for all urban streams.

LAGUNA DISSOLVED OXYGEN AND NUTRIENTS

The NCRWQCB is recommending adding dissolved oxygen and nutrients to the 303(d) list update. Nutrients are generally meant to include nitrogen and phosphorus, the main nutrient requirements for photosynthetic aquatic plants. The assumption is made, though has not been verified through empirical studies, that an increase in nutrients in the Laguna has resulted in an increase in algae which in turn has lead to a decrease in dissolved oxygen due to algal respiration.

The basis for recommending phosphate be put on the 303(d) list for the Laguna de Santa Rosa is stated in the Staff Recommendations as "The US EPA phosphate criterion of 0.1 mg/L for phosphorus is not consistently met (for streams or flowing waters not discharging into lakes or reservoirs)."

- The US EPA criterion of 0.1 mg/L for total phosphorus is a toxicity criterion for elemental phosphorus and thus is not relevant to biostimulation or dissolved oxygen levels in the Laguna. Although the Gold Book (US EPA, 1986) references a 1973 paper when it states that "A desired goal" for the prevention of plant nuisances in streams or other flowing waters not discharging directly to lakes or impoundments is 0.1 mg/L total P (Mackenthun, 1973), it states that a number of specific exceptions can occur to reduce the threat of phosphorus as a contributory to eutrophication including the fact that in some waters nutrients other than phosphorus is limiting to plant growth. Recognizing that the response of water bodies to nutrient enrichment differ and thus, no one number can be a suitable nutrient criterion for all locations, the US EPA had developed technical guidance to assist States and Tribes in developing regionally-based numeric criteria (US EPA, 2000). To our knowledge, no phosphate criteria have been developed for Northern California.

- We have submitted evidence to the Regional Board staff (Roth, 2002) indicating that dissolved oxygen levels is improving in the Laguna.

- The City of Santa Rosa has submitted testimony to the Regional Board staff indicating that the Basin Plan objective for dissolved oxygen in the Laguna is not a suitable standard for a waterway that is naturally warm in the summer.

- Although the Regional Board is including phosphate in its 303(d) list recommendations the Staff Recommendations points out that data show that nitrogen is the limiting nutrient in the Laguna. This indicates that phosphate does not control plant growth in the Laguna

- As the Staff Recommendations further states "the cause of the low dissolved oxygen levels is not certain".

Therefore, no evidence exists that reducing phosphorus in the Laguna will result in increased dissolved oxygen concentrations and phosphorus should be removed from the 303(d) list recommendations. Phosphorus should also not be included on the Watch List.

REGIONAL WATER QUALITY CONTROL BOARD
NORTH COAST REGION

Interoffice Communication

To: State Water Resources Control Board **Date:** 2/14/2002
Attn: Laura Sharpe

From: Matt St. John MS

Subject: Transmittal 303(d) List Update References

Provided here are the references that you requested in your January 30, 2002 email. I apologize for the delay in getting these references to you. I am also providing the following for your review:

1. Letter from Department of Fish and Game regarding Region 1's 303(d) List update recommendations.
2. Information on Santa Rosa Creek pathogens presented at our January 23 Board Meeting.
3. Information on Russian River pathogens presented at our January 23 Board Meeting.
4. Information on Laguna de Santa Rosa DO and total phosphorus presented at our January 23 Board Meeting.
5. Information on Russian River temperature presented at our January 23 Board Meeting.
6. Information on Gualala River temperature presented at our January 23 Board Meeting.
7. Information on Big River temperature presented at our January 23 Board Meeting.
8. Information on Ten Mile River temperature presented at our January 23 Board Meeting.
9. Information on Mad River temperature presented at our January 23 Board Meeting.
10. Information on Redwood Creek temperature presented at our January 23 Board Meeting.

State of California

Memorandum

To: Ms. Susan Warner, Executive Officer
North Coast Regional Water Quality
5550 Skylane Boulevard, Suite A
Santa Rosa, CA 95403

Date: November 7, 2001

From: **DONALD B. KOCH, Regional Manager**
Northern California-North Coast Region
Department of Fish and Game
601 Locust Street, Redding CA 96001

Subject: Public Review Draft 303(d) List Update Recommendations

The Department of Fish and Game (DFG) has reviewed the subject document dated September 10, 2001, and has the following comments.

We are encouraged that the North Coast Regional Water Quality Control Board (NCRWQCB) has recognized that the existing numerical temperature objective allowing a 5°F increase is not adequate for protecting beneficial uses of some sensitive species. We commend the NCRWQCB for adopting alternate methods of determining temperature impairment in certain critical streams. This technique has been adopted successfully in other regional boards in California.

DFG staff is available to work with NCRWQCB staff on this important issue. If you have questions or comments, please contact Environmental Scientist Jane Vorpagel at (530) 225-2124.

cc: Ms. Jane Vorpagel
Department of Fish and Game
Redding, CA

Santa Rosa Creek - Pathogens

1979-1980: 30% of fecal coliform samples exceeded DHS limit

Summer/Fall 2001: City monitored 21 sites

- 11 monitoring dates
- Exceedance of DHS limits for one or more indicator organism at one or more site during all monitoring dates

July 10: City posted warning signs along Prince Memorial Greenway

City actions:

- Septic investigations
- Public outreach
- Homeless encampment cleaning

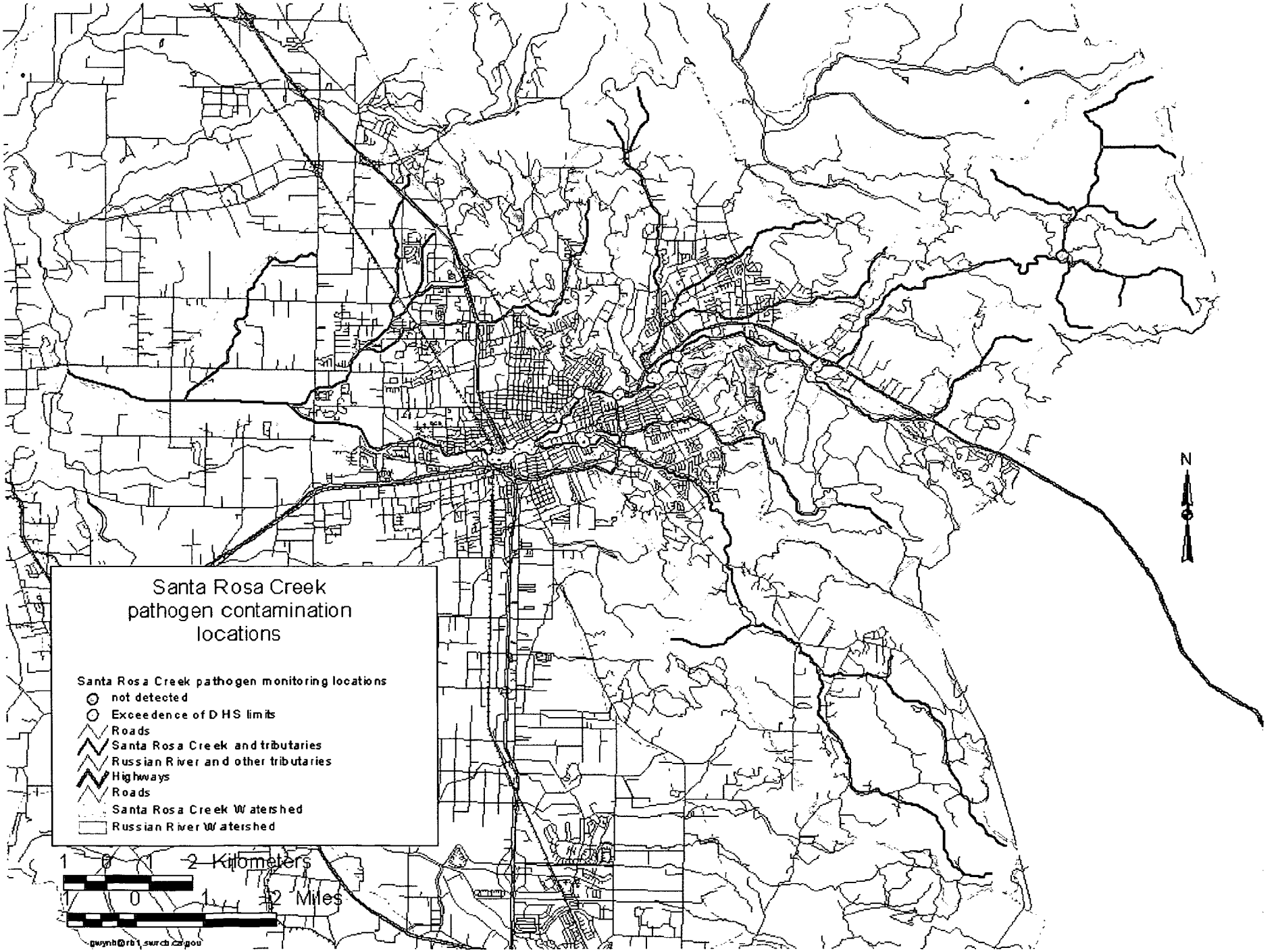
Santa Rosa Creek

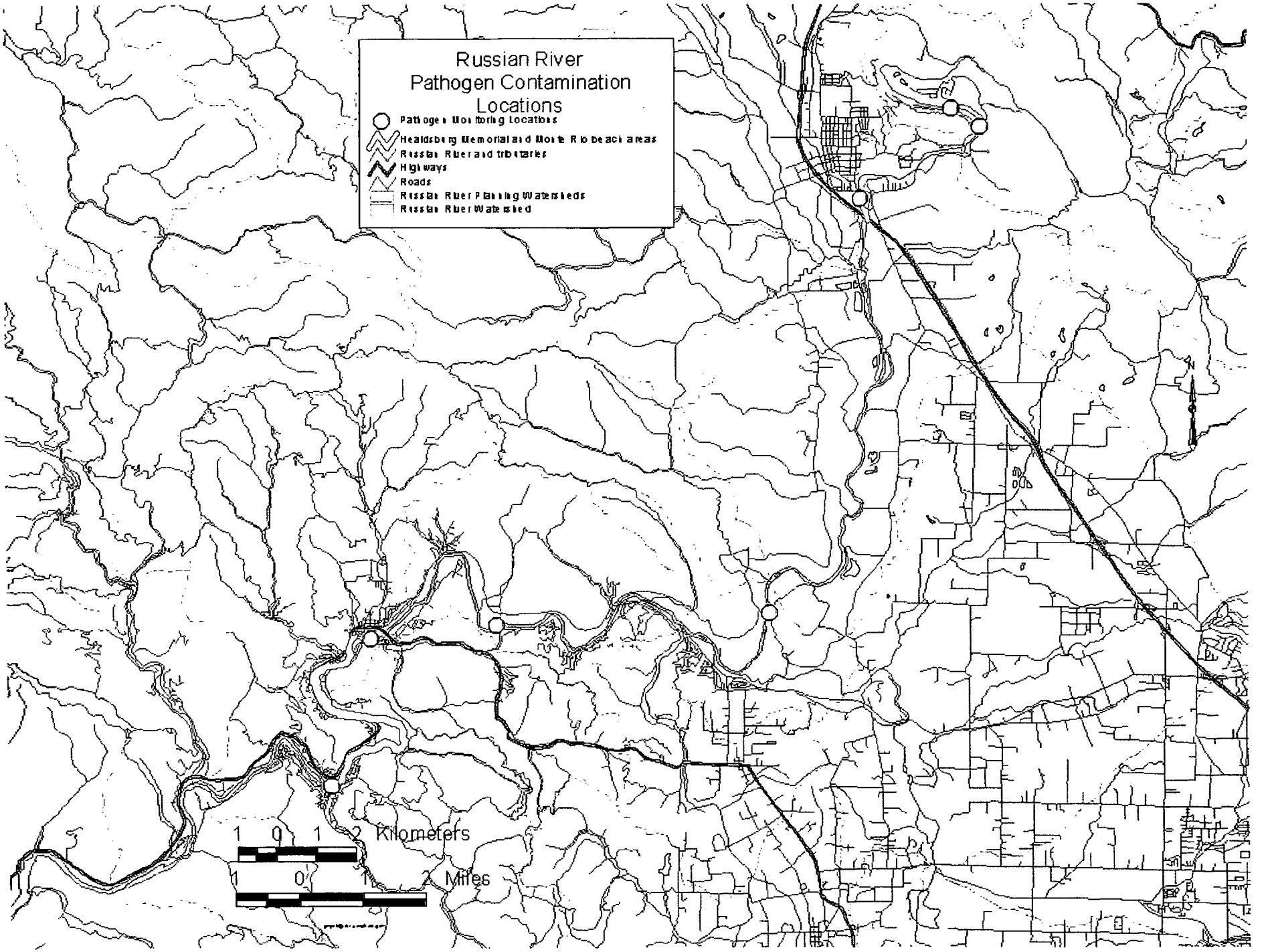
Percentage of Samples Exceeding Department of Health Services Recommended Beach Closure Limits

Pathogen	Fecal Coliform		Total Coliform		Enterococcus		E. Coli	
Criteria	400 MPN/100ml		10,000 MPN/100ml		61 MPN/100ml		235 MPN/100ml	
Date	Percent Exceedences	Exceedences / Total Samples	Percent Exceedences	Exceedences / Total Samples	Percent Exceedences	Exceedences / Total Samples	Percent Exceedences	Exceedences / Total Samples
Jun-79	**60%**	3 / 5	0%	0 / 5	na	na	na	na
Aug-79	20%	1 / 5	0%	0 / 5	na	na	na	na
Apr-80	0%	0 / 5	0%	0 / 5	na	na	na	na
May-80	40%	2 / 5	0%	0 / 5	na	na	na	na
6/28/2001	na	na	**100%**	3 / 3	**100%**	3 / 3	**100%**	3 / 3
7/3/2001	**100%**	3 / 3	**100%**	3 / 3	na	na	na	na
7/5/2001	na	na	**100%**	3 / 3	**100%**	3 / 3	**100%**	3 / 3
7/10/2001	na	na	**58.30%**	7 / 12	**100%**	12 / 12	**50%**	6 / 12
7/24/2001	33.30%	1 / 3	**66.70%**	2 / 3	**66.70%**	2 / 3	33.30%	1 / 3
7/27/2001	33.30%	1 / 3	0%	0 / 3	**100%**	3 / 3	0%	0 / 3
8/23/2001	25%	1 / 4	25%	1 / 4	25%	1 / 4	25%	1 / 4
9/13/2001	**100%**	1 / 1	0%	0 / 1	**100%**	1 / 1	**100%**	1 / 1
9/27/2001	**50%**	2 / 4	40%	2 / 5	**60%**	3 / 5	40%	2 / 5
10/11/2001	**50%**	1 / 2	0%	0 / 2	**100%**	2 / 2	**100%**	2 / 2
10/25/2001	na	na	0%	0 / 1	**100%**	1 / 1	**100%**	1 / 1

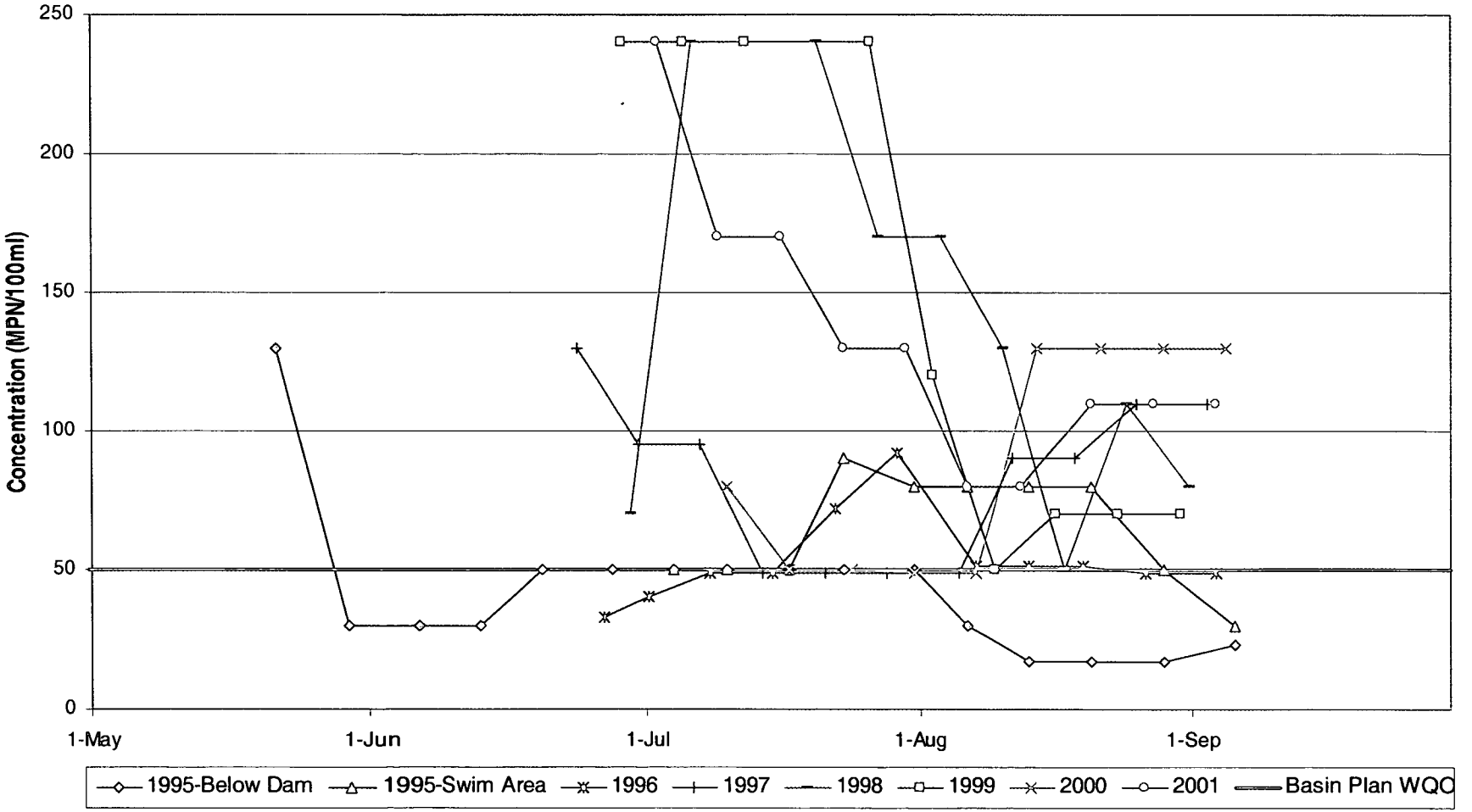
na : Not Available

Source: 1979 And 1980 data: RWQCB monitoring data
2001 data: City of Santa Rosa monitoring data


Santa Rosa Creek
pathogen contamination
locations
Santa Rosa Creek pathogen monitoring locations
not detected
Exceedence of DHS limits
Roads
Santa Rosa Creek and tributaries
Russian River and other tributaries
Highways
Roads
Santa Rosa Creek Watershed
Russian River Watershed
1 0 1 2 Kilometers
1 0 1 2 Miles
N


Russian River
Pathogen Contamination
Locations
Pathogen Monitoring Locations
Healdsburg Memorial and Monte Rio beach areas
Russian River and tributaries
Highways
Roads
Russian River Planning Watersheds
Russian River Watershed
1 0 1 2 Kilometers
1 0 1 2 Miles

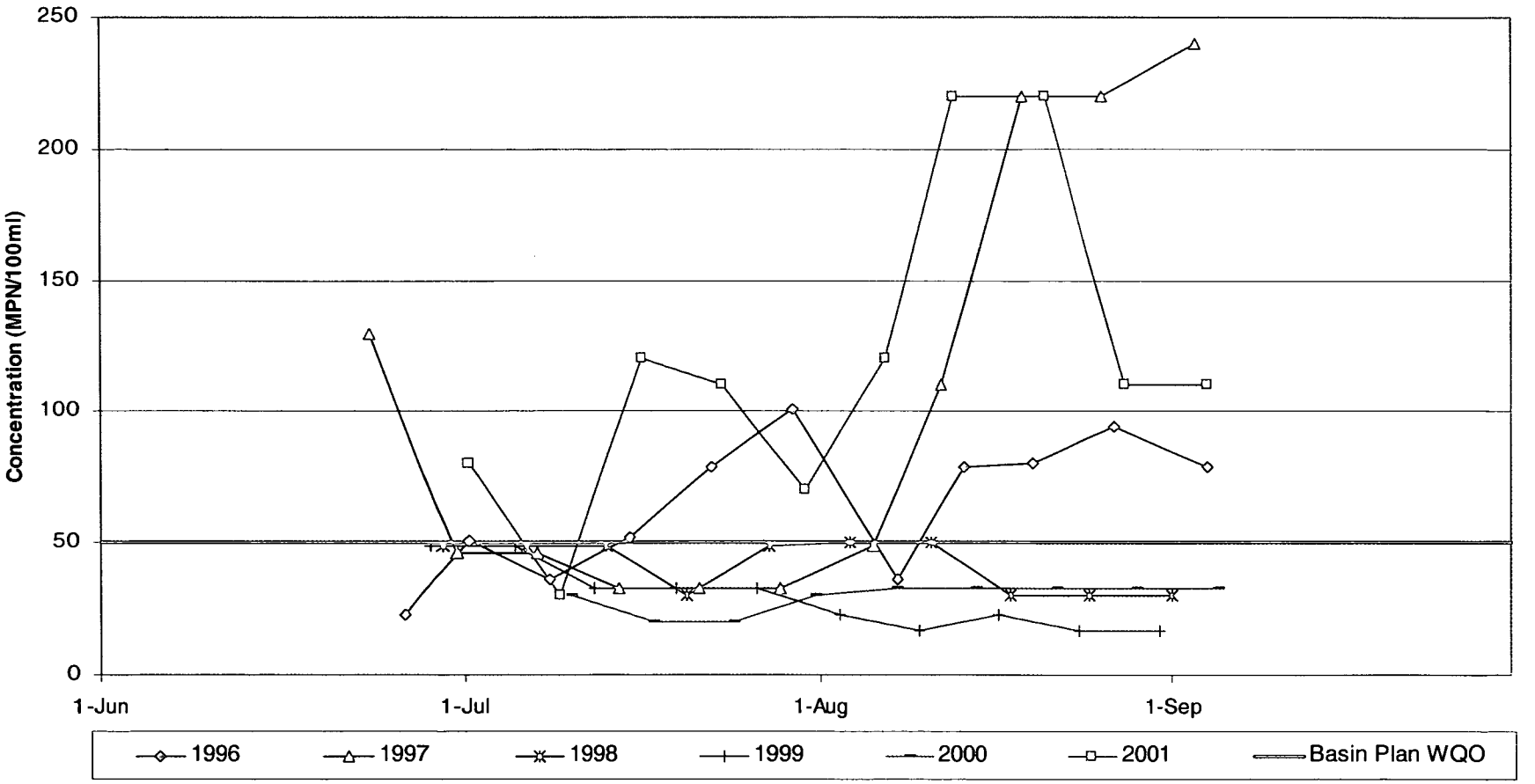
Healdsburg Memorial Beach
Median Fecal Coliform Concentrations



Not Shown: 1986 - 1994: 72% of sample sets (n=122) exceeded Basin Plan objective.

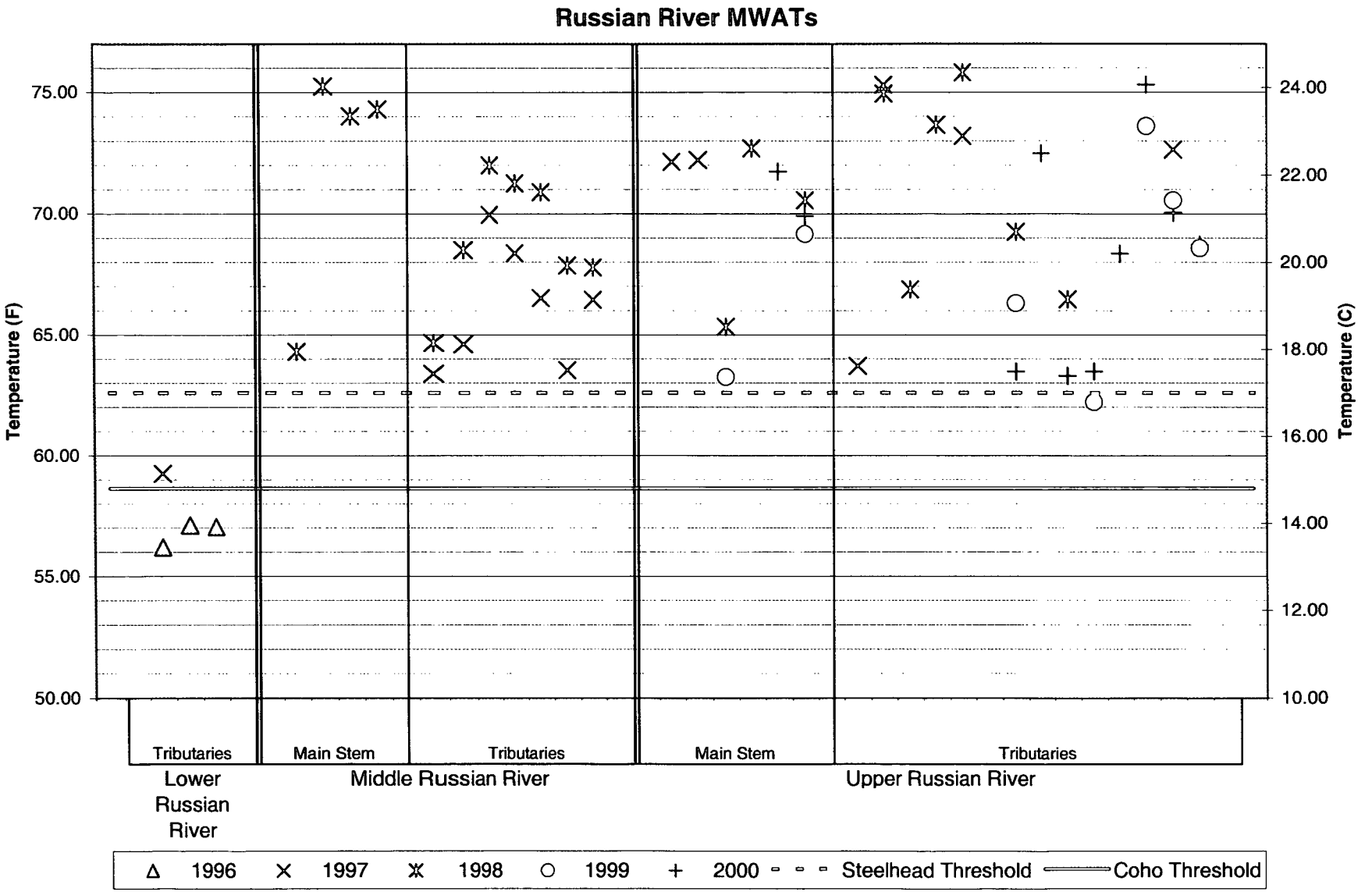
Source: RWQCB Monitoring Data

Monte Rio
Median Fecal Coliform Concentrations



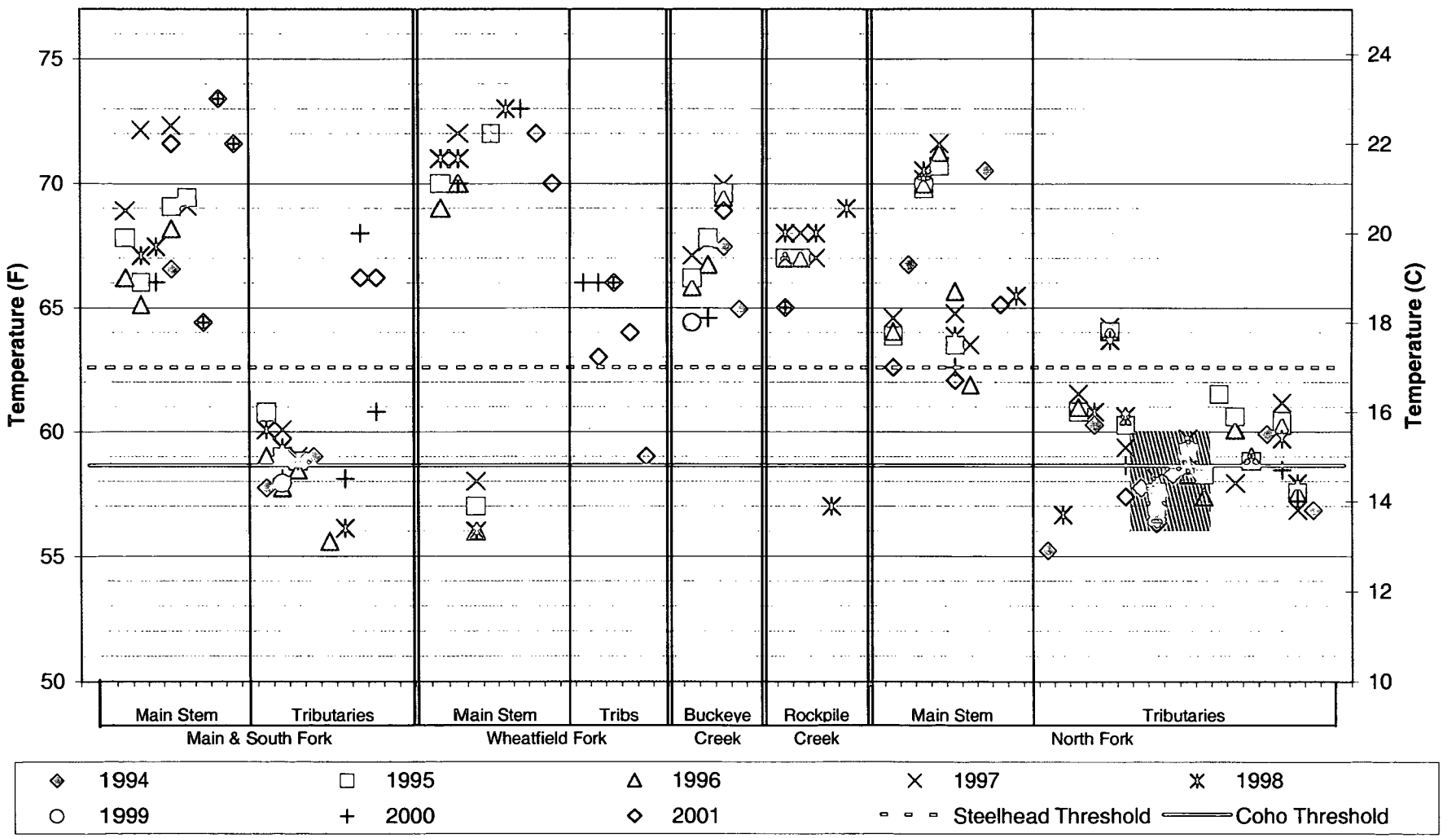
Not Shown: 1992 - 1994: 75% of sample sets (n=24) exceeded the Basin Plan objective.

Source: RWQCB Monitoring Data



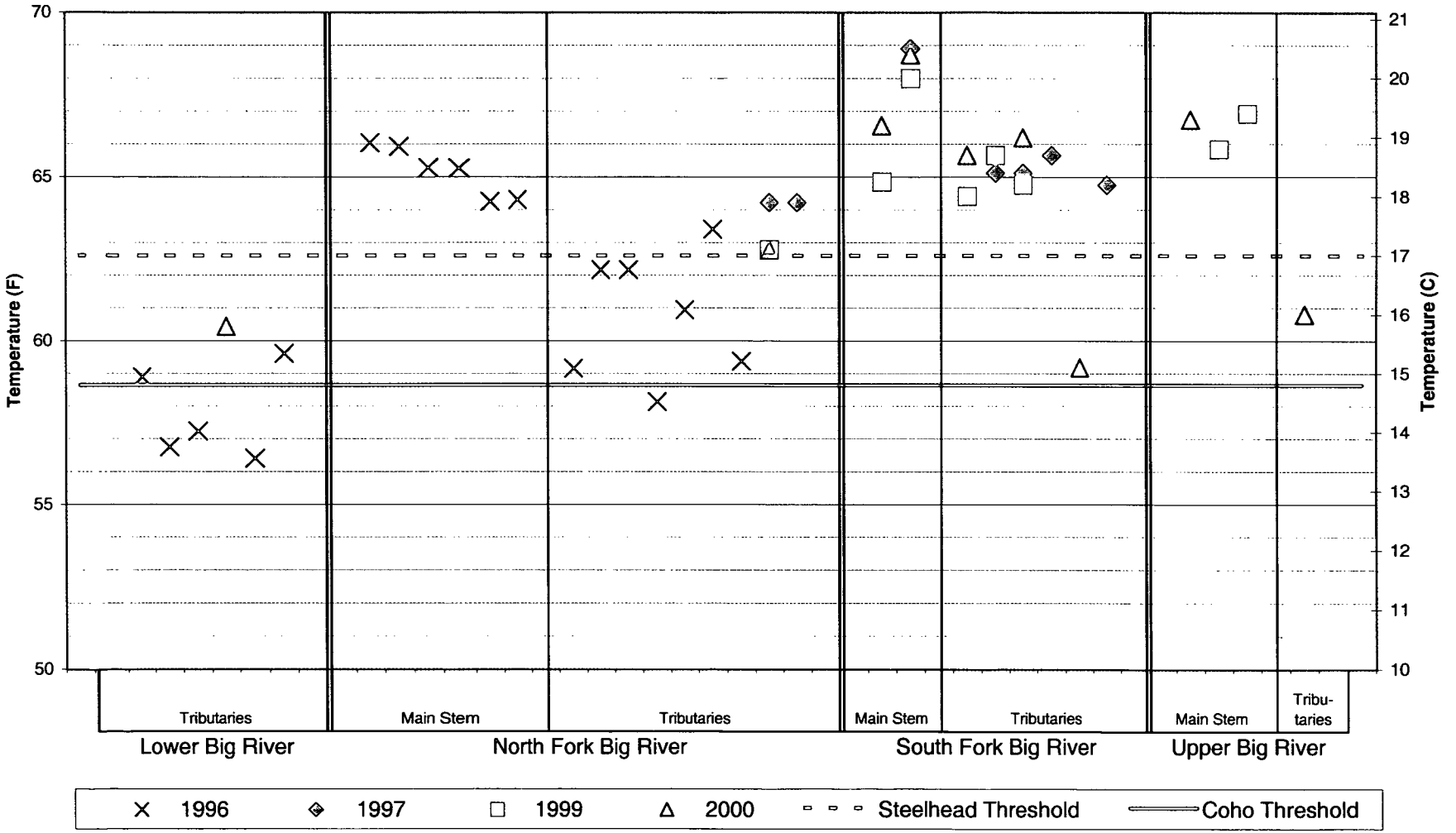
Sources: Forest Science Project, Sonoma County Water Agency, and Mendocino County Water Agency

Gualala River MWATs



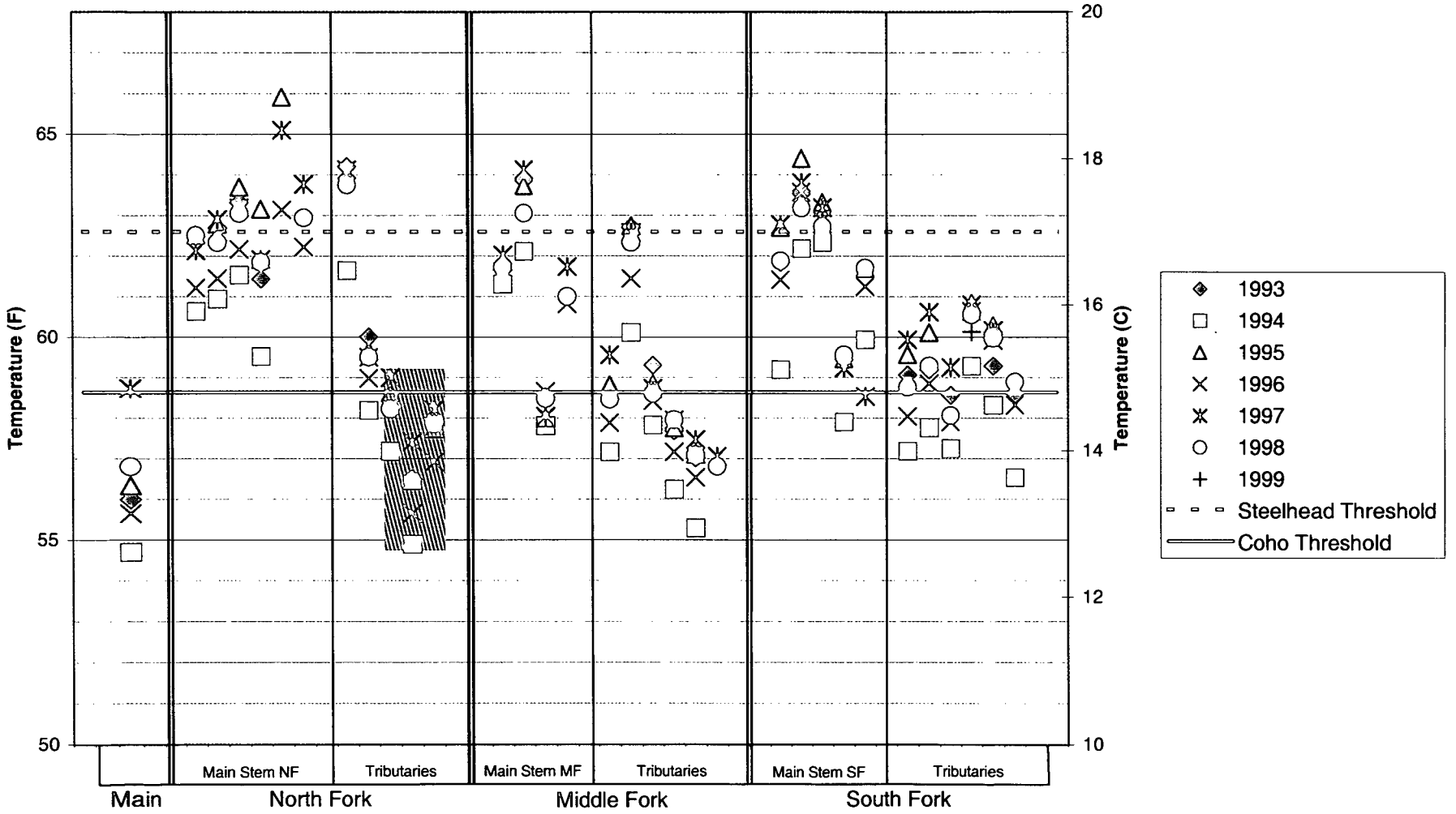
Sources: Gualala Redwoods Inc. and Gualala River Watershed Council

Big River MWATs

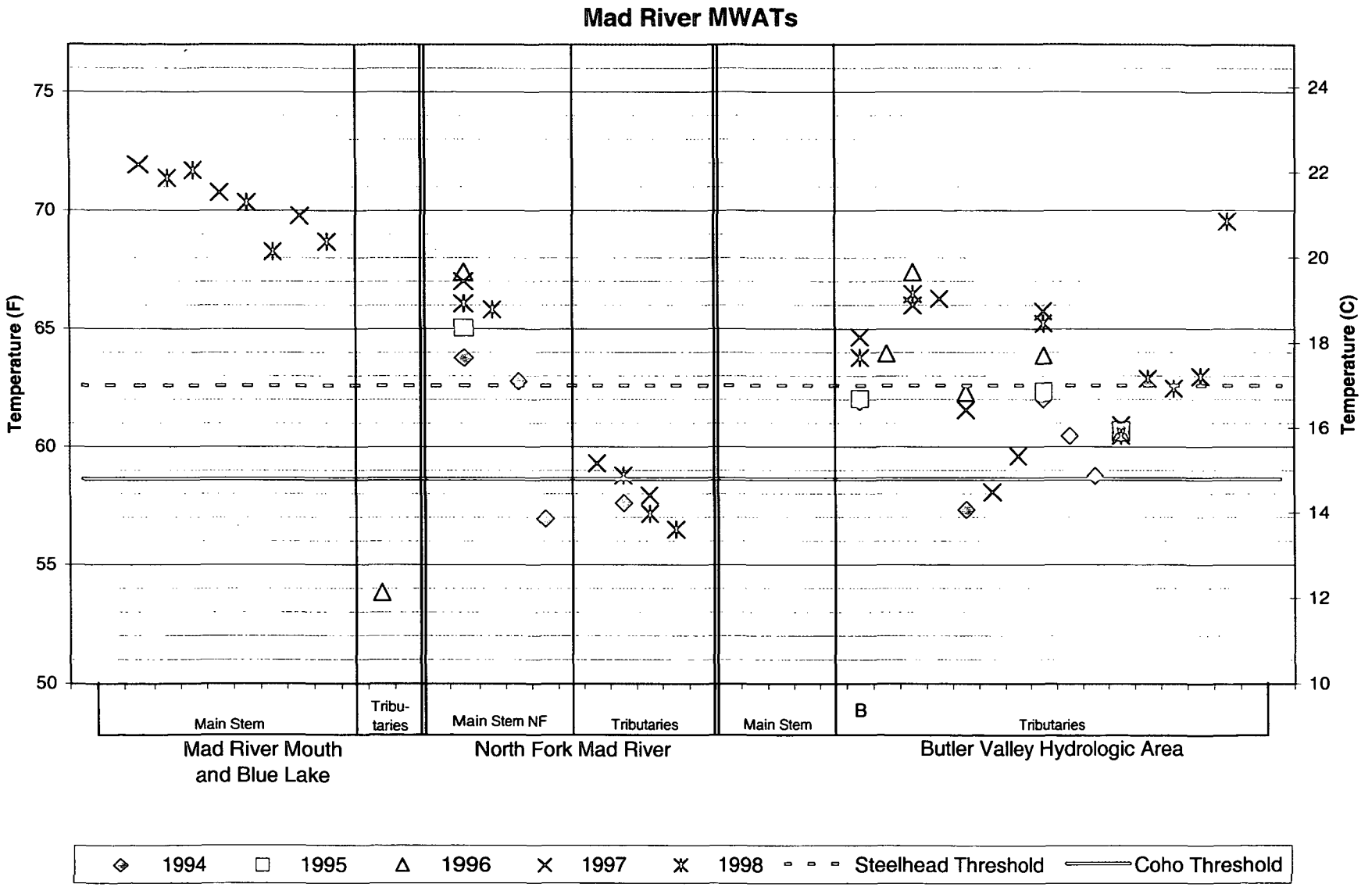


Sources: California Department of Forestry, Mendocino Redwood Company, and Mendocino County Water Agency

Ten Mile River MWATs

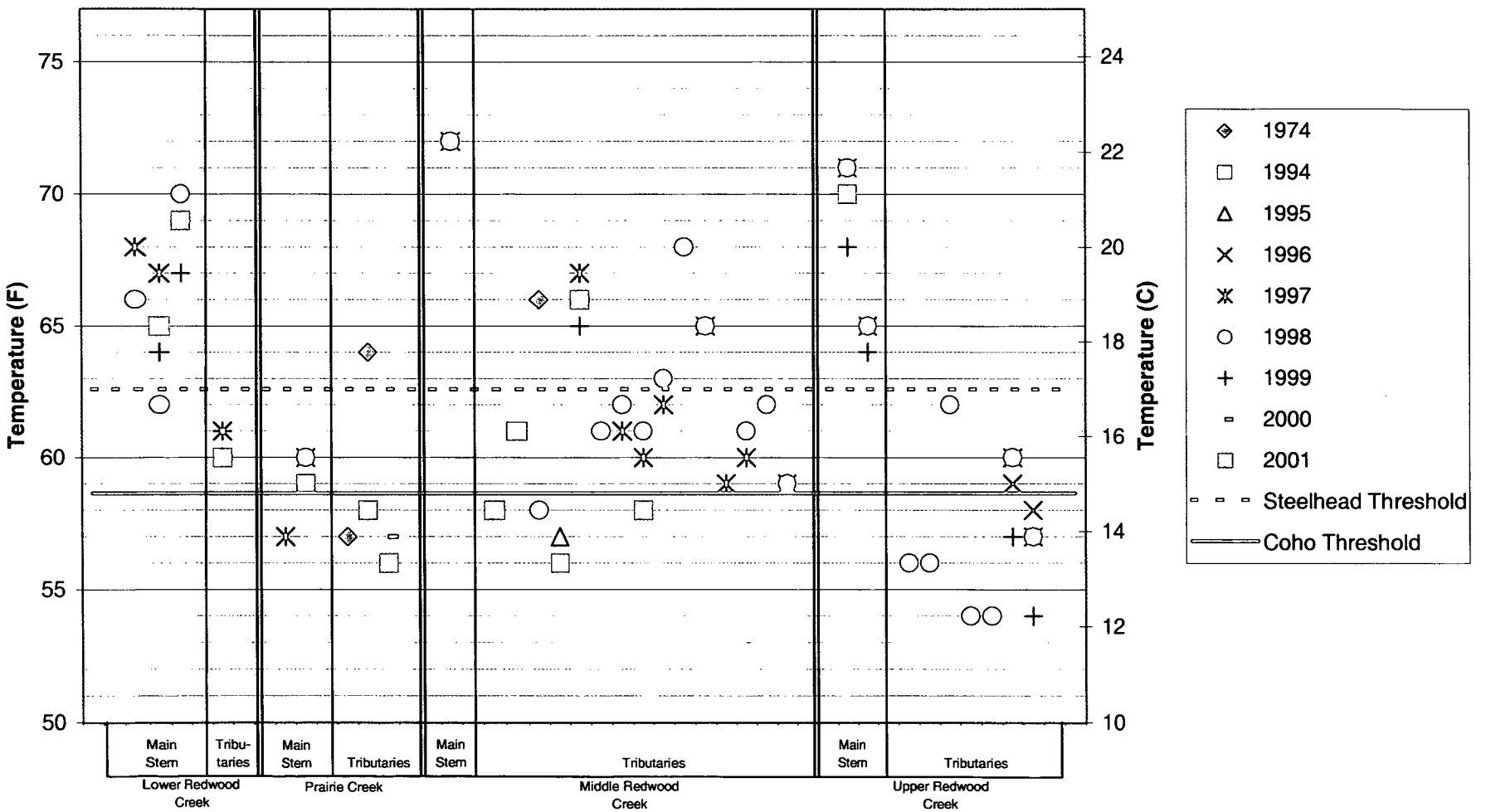


Source: Hawthorne Timber Company



Sources: Department of Fish and Game, Natural Resource Management, and Forest Science Project

Redwood Creek MWATs



Sources: Simpson Timber Company and Forest Science Project

STATE OF CALIFORNIA
MINI-MEMO
STD 100-B (REV. 9-70)

TO: Diane Beaulaurier
DWQ

SUBJECT: 303d

DATE: 12/17/01

MESSAGE

The attached are letters received by fax on 12/5/01, the day before our Board Workshop on 303d.

Thanks,
Matt

RETURN TO	SIGNED ▷	ADDRESS	PHONE

REPLY

SIGNED ▷	ADDRESS	DATE

SEND PARTS 1 AND 3 INTACT — PART 3 WILL BE RETURNED WITH REPLY

85 93594

Elk County Water District
P.O. Box 54
Elk, California 95432
Charles Acker, Manager
Phone: 707-877-3474
Fax: 707-877-1833
cacker@mcn.org

Matt St. John
5550 Skylane Blvd., Suite A
Santa Rosa, CA 95403

December 5, 2001

re: Impaired status of Greenwood Creek

Dear Mr. St. John:

The ECWD provided data last May regarding the impaired status of Greenwood Creek. Word has come recently to the ECWD that the NCWQCB staff has reversed its decision to recommend listing Greenwood Creek as impaired. Since this decision may impact the water quality of Greenwood Creek, we are asking that we go on record as opposing the decision not to recommend listing Greenwood Creek as impaired.

I am attaching the cover letter of our package sent to you last May that lists our main concerns again. If one takes a broad view of the history of this watershed, once home to a climax redwood forest, bourgeoning with fish and wildlife, and compare it to today's situation, it is easy to see the classic definition* of impaired is met.

Please forward to us the recommendations you are making, and any supporting reasons.

Sincerely,

Charles Acker, Manager, ECWD

*impair – "to make or become worse; diminish in value, excellence, etc.; weaken"
-*The American College Dictionary*

Elk County Water District
P.O. Box 54
Elk, California 95432
Charles Acker, Manager
Phone: 707-877-3474
Fax: 707-877-1833
cacker@mcn.org

Matt St. John
5550 Skylane Blvd., Suite A
Santa Rosa, CA 95403

May 10, 2001

re: Water Quality Information
Greenwood Creek

Dear Mr. St. John:

The data we are providing in this report is in reference to the water quality of Greenwood Creek. Greenwood Creek is the main water supply source for the Elk County Water District, serving a population of approximately 100 people and about 15 businesses. The district has been tracking water quality as required under state water treatment guidelines as well as the turbidity of the creek itself. The main data in this package pertains to turbidity measured in the creek, the nearby wells, and after filtration. The data provided has been collected on a daily basis since 1993.

The water quality crisis from the district's point of view has to do with turbidity, siltation, and erosion from flooding.

The Greenwood Creek watershed is over 15,000 acres and is primarily forest lands. Logging has occurred since before the turn of the century and has continued at an accelerated rate in the past decades. With little emphasis given to the cumulative effects of timber harvesting, the issue of water quality degradation presents a problem for the district.

The water quality problem became a crisis in 1998 during the "El Nino" flood conditions when erosion caused the stream bank next to the district's wells to shift. The shifting bank and the flood-waters containing high turbidity entered, for the first time, into the main well which resulted in a "Boil Water Order." Since the 1998 floods were a declared disaster, state and federal funding has been provided so the district can remedy the situation.

While elevated siltation levels due to timber operations and other activities has been a long and hotly debated issue, we have here a specific, documented case where water quality was degraded. Erosion and high turbidity during rain events may indicate we have a degraded watershed. Not only are fish populations affected, but people as well.

I am sorry we are unable to provide this information in electronic form.

Sincerely,

Charles Acker, ECWD Manager

Redwood Coast Watersheds Alliance

tel (707) 877-3405 fax (707) 877-3887 P.O. Box 90, Elk, CA 95432 pirohuck@mcn.org

December 5, 2001

Chair, Board Members and Staff
North Coast Regional Water Quality Control Board
Attn.: Matt St. John or Jean Lockett
5550 Skylane Blvd., Santa Rosa, CA 95403

Dear Chair, Board Members and Staff of the NCRWQCB:

Enclosed please find the original of our letter of December 3, 2001, which we faxed to your attention prior to the Regional Board workshop scheduled for December 6. According to the September 10, 2001, Regional Water Quality staff report, of the 13 small coastal creeks that we nominated for 303(d) listing, Greenwood Creek was to be listed as sediment and temperature impaired, and the others put on a "watch list." The Greenwood Creek recommendation was then abruptly and arbitrarily changed—in fact, reversed--in the November 16, 2001, staff report, after in-put from a logging company. The second report was mailed to us on November 20, 2001. Staff meanwhile issued an agenda for the Dec. 6 workshop on November 13, which stated a November 21 deadline for public comment on the latter recommendations. This gave RCWA all of *one day* to provide public comment—and, at best, a week for the general public should they have been lucky enough to be aware of this about-face by the staff in time for comment.

We object to these procedures, as being in violation of the public process provisions of the California Environmental Quality Act, and trust that you received and considered our letter of comment for December 6 workshop.

The 13 small watercourses that we nominated for 303(d) listing have been "watched" long enough. It's time to do something about these grossly abused and neglected watersheds.

Allow me to draw your attention to the letter to the editor of the Jewish Rabbis, including Margaret Holub of Mendocino, in the Santa Rosa Press Democrat this morning. They ask for an end to the muddying of our rivers and creeks, the threats to people and property of landslides and dirty water, the destruction of the coho salmon, and destructive forest practices such as clearcutting. Eighty percent of the logging plans in the coastal creeks that we have nominated contain some form of clearcutting. These and past impacts are destroying the water resources of these coastal creeks.

Yours sincerely,

Mary Pjerrou

Mary Pjerrou
and on behalf of the Greenwood Watershed Association
Enc.: Signature page (page 8) of RCWA 12/3/01 - 1 page.

Redwood Coast Watersheds Alliance

tel (707) 877-3405 fax (707) 877-3887 P.O. Box 90, Elk, CA 95432 pirohuck@mcn.org

December 3, 2001

Chair, Board Members and Staff
North Coast Regional Water Quality Control Board
Attn.: Matt St. John or Jean Lockett via fax to (707) 523-0135
5550 Skylane Blvd.
Santa Rosa, CA 95403

Dear Chair, Board Members and Staff of the NCRWQCB:

The Redwood Coast Watersheds Alliance and the Greenwood Watershed Association nominated 13 Mendocino coast creeks for 303(d) listing as impaired watercourses. We presented evidence of drastic impacts from overlogging, including the near extirpation of the coho salmon fishery in these watersheds. The National Marine Fisheries Service now tells us, in their March 2001 report, that the coast coho salmon is in imminent danger of extinction. Of all the coastal watercourses, the smaller creeks that we have nominated for listing are in the most danger of losing their fisheries, due to twenty years of deliberate neglect by the state of California. Indeed, the evidence is that these coastal creeks are losing their fisheries right now, this year, today, due to the impacts of continued forest liquidation. Regional Water Quality staff recommends that these creeks be put on a "Watch List" for further study. Several of the terrorists who flew the airplanes into the World Trade Center towers were on a "watch list." Lot of good it did.

We understand perfectly well what a "watch list" means, especially in the context of state regulation of the timber industry. It means that you won't act to protect public trust resources until the last dime has been extracted from these forests. We further understand that these smaller coastal watersheds are "sacrifice" areas. I stood before the Regional Water Quality Board in December 1997, when we requested listing for Greenwood Creek—a creek that is the sole source of water for the town of Elk—and heard one Board member say, "We have to let them log *somewhere*!"

Your staff's recent recommendation of 303(d) listing for Greenwood Creek, and its withdrawal of that recommendation after in-put from the logging company, is an almost exact repetition of what happened in 1997. We are asking you to do better this time. We ask you to list these creeks before all hope is lost for the recovery of the fisheries and other water resources of these unprotected watersheds.

The Redwood Coast Watersheds Alliance and the Greenwood Watershed Association specifically object to the following actions of Regional Water Quality Board regarding the 303(d) list update:

1. Failure to properly investigate and evaluate the decline of the coho salmon in the 13 nominated Mendocino coast creeks as one of the most sensitive indicators of the quality of the water and the ecological integrity of watersheds;

2. Failure to recommend 303(d) listing for Greenwood Creek and 12 other Mendocino coast creeks, where there is evidence of recent drastic declines in coho salmon and other impacts, and where there is intensive on-going management activity, chiefly logging, that has been established by the National Marine Fisheries Service, the CA Board of Forestry's Science Panel and numerous government and independent scientists as harmful to fish and other water resources;

3. Failure to require even the minimal necessary information from the major landowner and logger of these 13 watersheds, Mendocino Redwood Company (MRC), regarding current and projected harvest levels, cumulative road erosion data, mileage of existing and new roads, numbers of existing and new stream crossings, sources of sediment and turbidity, erosion hazard ratings, erosion predictions, and other cumulative impacts information;

4. Claiming "insufficient" information for the listing of these creeks, when 303(d) listing is, in part, an information-gathering process, and when objective new information cannot be obtained without 303(d) listing.

5. Changing the staff recommendation for the 303(d) listing of Greenwood Creek, after in-put from a logging company;

6. Providing only one week's notice for public comment on this abrupt and arbitrary turnabout by Regional Water Quality staff on the listing of Greenwood Creek;

7. Failure to investigate evidence of false and misleading information provided by the logging company regarding impacts to coho salmon and other water resources;

8. Failure to require the logging company to disclose unpublished fish distribution surveys conducted by previous owner Louisiana Pacific which contain evidence of the presence of coho salmon in Greenwood Creek as recently as 1995. Failure to compare and evaluate published and unpublished fish survey data for this creek. Failure to evaluate the integrity of logging company information. Failure to investigate the recent drastic decline of the coho salmon in Greenwood Creek (1995-2000) amidst intense logging activity.

9. Repeatedly ignoring the recommendation of the Elk County Water District, which operates municipal water wells in Greenwood Creek, the sole source of water for the town of Elk;

10. Failure to protect the water quality and water resources including the endangered fisheries of Greenwood Creek and 12 other Mendocino coast creeks over a ten year period; failure to participate effectively in timber harvest plan review; failure to conduct adequate inspections; failure to require adequate mitigations; failure to gather information for, monitor, and assess the cumulative impacts on water resources of multiple logging plans over time.

Discussion

The current action of Regional Water Quality staff with regard to Greenwood Creek is repetition of what occurred in December 1997. At that time, the Elk County Water

District and the Greenwood Watershed Association requested 303(d) listing for Greenwood Creek in order to obtain state assistance in monitoring and setting water quality standards for a town water source and endangered fishery. Then owner Louisiana Pacific intervened. The Board turned down the listing request of the municipal water district and the public interest group. At the Regional Board hearing, one Board member stated, "We have to let them log *somewhere*!"

This, in turn, was a repetition of what had occurred earlier in the decade. Greenwood Creek had been on the original EPA 303(d) list in the mid-1990s, and was removed from that list for the trivial reason that it was "too small."

Regional Water Quality has been turning a blind eye to the impacts of unsustainable logging on the smaller Mendocino coast creeks for the past ten years. To this day, Greenwood Creek continues to receive no help from the state in monitoring and controlling impacts from years of overlogging, to which the Mendocino Redwood Company is now adding the impacts of 18 new logging plans in Greenwood Creek in the last three years alone—with more logging plans being filed every week.

In Elk Creek, the number is up to 20 new logging plans. Much of this new logging in unprotected Mendocino coast creeks is clearcutting in steep and unstable areas. A recent large clearcutting plan in Greenwood Creek, for instance—THP 1-01-241 MEN—contains 25 known slides, and proposes midslope road construction with 18 stream crossings, adjacent to the main stem of Greenwood Creek, a town water source with an endangered coho salmon and steelhead fishery. There was no Regional Water Quality inspection of this logging plan, or none that Regional Water Quality staff will acknowledge. (There was some sort of secret or informal inspection for which we cannot obtain a report.)

In Elk Creek, MRC added 1.5 miles of duplicative road—within 500 feet of an existing road—in Timber Harvest Plan 1-00-363 MEN, and then *amended* the plan at the last minute to *remove* a water quality mitigation that one of these duplicative roads be retired after operations. In nearby Alder Creek, MRC's timber operator cut 2,000 feet of new road in the wrong place, in another year 2000 logging plan; MRC then sought to amend this "mistaken" road into the plan without inspection.

Worse even than these sorts of violations, no effort has been made by MRC, by CDF, or by Regional Water Quality, to provide valid cumulative impacts assessment or any kind of long term watershed plan for these intense new logging activities in already impacted watersheds.

The Greenwood Watershed Association, and the Elk County Water District, have been asking for cumulative impacts assessment and watershed analysis for Greenwood Creek for more than a decade. Meanwhile, numerous state and federal authorities, including the Board of Forestry, and numerous independent scientists, have all concluded that watershed analysis is an essential component of cumulative impacts assessment, and that current Forest Practice Rules and assessment processes are inadequate for the protection of endangered fisheries and other water resources.

In addition, the GWA and RCWA recently won a lawsuit against MRC logging plans in which the judge stated that MRC is not conducting valid cumulative impacts assessment in Greenwood Creek and other watersheds, and that MRC is required by law to disclose its long term management plans for individual watersheds as part of that assessment. (Mendocino Superior Court case CV 78423, RCWA et al vs. CDF and Real Party MRC).

MRC has not complied with this ruling, nor with any request for disclosure of its long term watershed plan and for valid cumulative impacts assessment, in any of its 18 logging plan submissions in Greenwood Creek. The story is the same for all of the 13 small watersheds that we have nominated. MRC has furthermore provided false and misleading information, and has suppressed critically important information, in its timber harvest plan filings in Greenwood Creek and Elk Creek.

For instance: The Louisiana Pacific Sustained Yield Plan states that "coho populations are present within the Upper and Lower Greenwood Creek planning watersheds." (SYP 95-003, page 8, 40, WWAA 84--Greenwood Creek) In Timber Harvest Plan 1-00-357 MEN, MRC falsely stated to CDF, in the Official Response to Public Comment--which is published after plan approval--that the SYP writers did not mean "Greenwood Creek" when they said Greenwood Creek, but rather intended to say "Cuffey's Point," a third area that is unrelated to Greenwood Creek. "Cuffey's Point" streams—a ranch area of small trickle streams behind the town of Elk--drain directly to the Pacific Ocean over a 140 foot cliff adjacent to Highway One—an impossible leap for coho salmon.

The point was to try to place these SYP coho salmon anywhere but Greenwood Creek—even jumping a 140 foot cliff.

There is no evidence whatsoever that the SYP writers intended to say "Cuffey's Point." No reasonable person would say that. Indeed, L-P did not have any fish distribution survey sites in "Cuffey's Point" for the very reason that it is not suitable habitat.

This is the kind of information that MRC has been providing in order to avoid its obligation to restore beneficial uses, and in order to avoid any regulation that would cut into profits, including 303(d) listing.

MRC foresters have in fact mounted a campaign in their timber harvest plans to "prove" that there are no coho salmon in Greenwood Creek. This campaign involves a so-called "literature search" conducted by MRC foresters which cites all the evidence that these foresters could find for the absence of coho salmon, and excludes or attempts to debunk all evidence to the contrary, including L-P's Sustained Yield Plan, the unpublished L-P Fish Distribution surveys, a local fisherman's declaration in 1990, and the local history book by Walter Matson which describes coho salmon "ganging up" in the Greenwood Creek estuary in the 1920s-1930s.

While excluding all of the above, the MRC foresters cite flimsy items such as a 1966 stream survey in which—if you read the THP appendices--the surveyor states that the stream was "too muddy to see many fish." They quote a fisherman in the 1980s who says he didn't think there were coho in Greenwood and Elk Creeks—while, as a matter of fact, L-P's *published* fish surveys found coho salmon in *Elk* Creek in 1995 (so, how reliable

are this fisherman's very iffy statements?). Finally, they "do a job" on the Hassler, Sherr and Griffin and try to debunk them—using, as "evidence," the unquoted, anonymous, hearsay opinion of MRC personnel.

We call this "The Seven Proofs of the Non-Existence of Coho Salmon in Greenwood Creek," which is the Medieval title that it deserves. This use of highly selective "evidence" and highly prejudiced argumentation "proves" nothing. Indeed, one can't "prove" the absence of coho salmon in an historical salmon fishery. Presence can be proven; absence cannot. Why go to such lengths to "prove" the unprovable? What is the point—if not to conceal the truth about the impacts of logging on the coho salmon in Greenwood Creek and to avoid responsibility for it?

In these timber harvest plan submissions, the *unpublished* L-P fish data, which reveals coho salmon in Greenwood Creek as recently as 1995, is never mentioned. The discrepancy between the published and unpublished data is not disclosed. (For the unpublished data, see *Historical and Current Presence/Absence of Coho Salmon (Oncorhychus Kisutch) in the Central California Coast ESU, April 1999, by Peter B. Adams et al, Administrative Report SC 9902*, Southwest Fisheries Science Center, National Marine Fisheries Service, ref #42.)

When *all* the evidence is presented, the story is this: Greenwood Creek at one time had an abundant coho salmon fishery, during this century. This fishery went into steady decline during the 1940s to 1990s, with a period of especially heavy logging from the 1960s-1990s. Coho salmon were still present as recently as 1995. MRC found *no* coho salmon in year 2000. MRC, with its 18 new logging plans, is likely dealing the final blow to this endangered fishery—while providing invalid cumulative impacts assessment, according to a Mendocino Supeior Court judge; no watershed analysis, no watershed management plan, no "sustained yield plan," no information on harvest levels, no road erosion data, no water quality monitoring, no water quality standards, and wrong and misleading information about the salmonid fishery.

There is a similar failure to "connect the dots" in MRC logging plans in Elk Creek, where the coho salmon count declined from ">10" fish in 1995 to *zero* fish in year 2000. MRC logging plans omit the first piece of information—just as they omit the evidence of coho salmon in Greenwood Creek only five years ago. The "dots" never get connected. Some of the "dots" are left out.

Given this evidence of current, on-going extirpation of these coho salmon fisheries, how can anyone in good conscience propose placing these creeks on a "Watch List"? Watch *what*? Watch the coho salmon disappear forever? Watch the steelhead follow the coho salmon into oblivion?

The GWA and the ECWD have repeatedly asked the Regional Water Quality Board for help with regard to Greenwood Creek, which, in addition to having a fishery on the verge of extinction, provides the town of Elk's drinking water. We have provided volumes of information to the CA Department of Forestry and Regional Water Quality including the ECWD's extensive turbidity data, GWA's road erosion surveys, and compilations of data from the previous owner's Sustained Yield Plan and from CDF documents.

What does the public have to do to obtain even the bare minimal protection of future monitoring and standard setting for its water resources? What does the public have to do to obtain scientifically valid cumulative impacts assessment and watershed analysis? What does the public have to do to get the laws enforced in this state?

Why didn't Regional staff insist that MRC reveal the evidence of decline of the coho salmon fisheries in these creeks? Where are the unpublished L-P Fish Distribution surveys in this record? Where is the staff's analysis of fish survey information? Where are MRC's cumulative road impacts surveys? Where is there even a figure for new MRC road construction in these creeks?

Staff has failed to gather and has failed to assess existing information that reveals obvious and devastating impacts. The Regional Board and other agencies have failed to develop new information, have failed to monitor these creeks, and have failed to require the major landowner in these creeks to provide the most obvious information needed for an assessment—information that is in the possession of the company and which the company refuses to make public, including its long term watershed management plans and cumulative road information.

Under these circumstances, and with this long history of deliberate neglect ("We have to let them log *somewhere*"), the Regional Board is currently in violation of the U.S. Clean Water Act, and will commit yet another act of neglect and illegality by failing to list these 13 coastal watersheds as impaired and in critical need of your immediate attention.

We are losing the coho salmon fishery in these creeks right now, today. We lost their water quality long ago. This is not a matter for tomorrow's "Watch List."

Additional information on the Mendocino Redwood Company, major landowner and logger of these 13 creeks

The Mendocino Redwood Company is not the only culprit in this disaster, but it is the chief culprit, major landowner and logger in all 13 creeks. This company was permitted by CDF—and with the loud silence of the Regional Water Quality Board—to *drop out* of the Sustained Yield planning process of the CA Forest Practice Rules in early 2000. The long awaited "sustained yield" plans, promised to Mendocino County as the answer to "liquidation logging" in the mid-1990s, never materialized. The sorts of information that Louisiana Pacific began to develop for its SYP--the development of watershed-specific cumulative impacts information, monitoring and protections plans, risk ratings and other elements of proper forest management--were never seen again. The promise of publicly reviewed "sustained yield plans" was "shuckin jive," as we all know.

Later in the same year (2000), MRC sought and obtained a private "certification" from the Forest Stewardship Council in a secret process in which the public had no right to see any documents and no right to participate. MRC now touts this private "certificate" to agencies such as Regional Water Quality and to the public as if it were as substitute for public disclosure of its long term watershed plans and potential impacts. "Summaries" of the "certification"—published after "certification" was granted—reveal ridiculously lax

provisions, such as a phase out of clearcutting by 2050—fifty years from now!—and continued use of toxic herbicides.

Private "certification" cannot be used as a substitute for public process. The public remains entirely in the dark about MRC's long term management plans for these and all other MRC watersheds. And so is the Regional Water Quality Board and every other responsible agency. You don't know watershed harvest levels, current or projected. You don't know road construction totals, current or projected. You don't even add up the numbers for already approved logging plans , to try to make a guess at potential impacts, as we have taken the trouble to do.

The Mendocino Redwood Company is meanwhile further polluting already-polluted creeks and rivers with over 10,000 acres of new logging plans this year alone—added to 7,000 acres of new logging plans last year, 7,000 acres of new logging plans the year before that, and 4,000 acres of new logging plans in its first year of ownership (1998). This year's logging plans by MRC (over 10,000 acres of it) represent a 150% increase in the area that is being entered and logged, over Louisiana Pacific levels in the late 1990s.

And these figures don't even include the 104 logging plans that MRC purchased from Louisiana Pacific. What is the future of these watersheds? How will future plans, harvest levels and new road construction interact with current and past logging plans? You don't have the information. And yet you *presume* that everything will be all right, that you and we can afford to "watch and wait"—with the coho salmon fishery already nearly gone, and the people of the town of Elk spending $10,000 a year to remove the gunk from Greenwood Creek water.

In Elk Creek, MRC has some 20 new logging plans—most of it clearcutting (as in adjacent Greenwood Creek). Every one of these logging plans fails to disclose the drastic recent decline in the coho fishery. Neither this fact, nor any other fact about Elk Creek, is disclosed in *any* MRC management document. The same for Greenwood Creek and all the other creeks.

Is this lack of information—for which MRC itself is responsible, in addition to information gathering responsibilities of Regional Water Quality and other agencies—to be used as a reason for *not* listing these creeks? What's wrong with this picture?

What has MRC to say about the use of chemical herbicides, such as Garlon, that are known to be toxic to salmon, in creeks that are losing their coho salmon populations? Where are MRC's Fish and Game 1603 permits for water drafting and stream alterations in these creeks? The most basic information has not been demanded or assessed.

(Note: According to toxics expert Dr. Marc Lappe of CETOS (Center for Ethics and Toxics), "Garlon has dramatic and disturbing sub-acute toxicity for threatened and endangered salmonid species, specifically a low-level toxicity (down to 30 ppb) on swimming ability of juvenile coho salmon. "Barron, M.G. et al, "The Pharmacokinetics and metabolism of triclopyr Ester in Coho Salmon," Aquatic Toxicology, 1990, Vol. 16, pp. 19-31.)

We have been waiting for MRC's long term watershed plans, road erosion studies, promised watershed analysis, unpublished fish survey information, and numerous other

items that need not be explained here (such as Mendocino Superior Court case CV 81923, a ruling requiring disclosure of MRC's northern spotted owl surveys), for the length of their tenure as owners of this property, almost four years now.

The impacts of MRC's intensive logging program are occurring right now—on top of all the existing impacts from years of rapacious logging. Does the end of the coho salmon—its extirpation from our local watersheds for all time—mean nothing?

This is an extremely urgent matter. Regional Water Quality needs to acknowledge the damage to and loss of these water resources, and needs to recommend these creeks for listing to the state board and to the EPA this year.

We hope never to read another report such as the CalPEER report last year regarding political pressure on CA Fish and Game biologists in timber harvest plan review. We ask you to do your job and to bring "law and order" to Mendocino forests at long last.

We hereby attach and incorporate by reference all timber harvest plans and associated public comment submitted to CDF in these 13 coastal streams 1990 through 2001, and in particular the public comment record for THP 1-01-358 MEN, Exhibits 1 through 80, and the administrative and public comment records for THPs 1-00-228, 1-01-241, 1-01-254, 1-00-357, and 1-97-352 (MEN), in Greenwood Creek, THPs 1-00-363, 1-01-239, and 1-97-445 (MEN), in Elk Creek, and THP 1-00-249 MEN in Alder Creek.

These CDF documents, with which Regional Water Quality should be familiar, contain, among other things, MRC's "Management Plan August 2000," MRC's FSC "certification" summaries (also at mrc.com), MRC's "Option A," the L-P Sustained Yield Plan, NMFS' March 2001 report on the status of coastal fisheries, the GWA/GCWP road survey, comment by fisheries biologist Dr. Edmund Smith, a history of logging impacts on the Elk water district wells, the CalPEER report ("California's Failed Forest Policy: State Biologists Speak Out," Summer 2000 – capeer@peer.org), the Board of Forestry Science Panel report, the Little Hoover Commission report, the LSA report, the Dunne report ("A Scientific Basis for the Prediction of Cumulative Watershed Effects," June 2001), various NMFS reports, statements and final rules, quotes from Dr. Leslie Reid of the Redwood Lab, all of the lawsuits (EPIC, RCWA, GWA et al), and other information and documents that we hereby reference in support of the nomination of these 13 coastal watersheds for 303(d) listing.

Please also see our letter of May 14, 2001, and letters of conveyance of May 15, 2001 (attachments 1-44, and a-j), regarding Greenwood Creek, Elk Creek, Alder Creek, Mallo Pass Creek, Brush Creek, Schooner Gulch, Cottaneva Creek, Hardy Creek, Juan Creek, Howard Creek, DeHaven Creek and Wages Creek. We also hereby nominate Usal Creek.

Thank you for your attention to these very important matters.

Mary Pierrou

Mary Pierrou
President, Redwood Coast Watersheds Alliance
and on behalf of the Greenwood Watershed Association