Publication No. 73-e83

December 13, 1973

WA-26-9110

State of Washington Department of Ecology

Memo to: Wes Hunter through John R. Raymond

From: Ron Pine RLP

Subject: Silver Lake - Problem Status.

Since the meeting called by Alan Thompson on October 26, 1973, Harvey Doerksen and the people from W.S.U. have briefly summarized the data that individuals attending the meeting were able to furnish them. Harvey has asked for the attendance list and as soon as he gets it from Alan Thompson he will send out a letter with the summarized data asking if there is anything the attendees would like to add. After a reasonable length of time they will take what data they have and write a report evaluating the available information and indicating where more is needed. The report will also contain a cost estimate for a limnological study of Silver Lake to determine what the problems are and what can be done.

The Vancouver Lake Study by Bill Funk, W.S.U. cost $44,600 to which he estimates you would have to add 20% ($53,520) in order to do the same job today. Dr. Funk estimates it would take several million dollars to rehabilitate Vancouver Lake. It is very shallow, similar to Silver Lake, and would involve dredging four feet of material from the surface of the bottom muds.

REP:jmh

University of Washington Washington State University

STATE OF WASHINGTON WATER RESEARCH CENTER

Address correspondence to:

Water Research Center
Washington State University
Pullman, Washington 99163

Telephone: AC 509, 335-5531
SCAN 426-5531

December 21, 1973

TO: Persons in attendance at the meeting held on October 26, 1973, in Castle Rock, Washington, re Silver Lake

FROM: Harvey R. Doerksen, Assistant to the Director

SUBJECT: DATA CONCERNING EUTROPHICATION PROBLEMS IN SILVER LAKE

As you will recall, at the October 26 meeting, many persons summarized information they had obtained concerning the eutrophication of Silver Lake. The State of Washington Water Research Center team, consisting of Dr. William Funk, Dr. Surinder Bhagat, and myself, were provided with a good deal of data concerning the lake.

Most of you who volunteered data have sent it to us, and we have been able to evaluate the materials. Those of you who have not sent the data, please do so right away. Before we prepare the final report on research needs, we wish to know whether any of you have additional data which is relevant to the eutrophication problem in Silver Lake. All materials should be sent to me no later than January 8, 1974.

We will prepare our final report in mid-January. Consistent with the objectives set forth at the October 26 meeting, we will examine all existing data for adequacy, determine what, if any, additional information is needed as a basis for a lake rehabilitation program, and make a recommendation for additional research. If more research is needed, we will submit cost estimates in the report.

Thank you for your help.

HD:lm

BOARD OF COUNTY COMMISSIONERS

COWLITZ COUNTY

JAMES F. BERRY .... DIST. NO. 1
BERNARD C. SCHEURICH .... DIST. NO. 2

C.F. GARDNER .... DIST. NO. 3
ELEANORE KOLSTAD .... CLERK OF BOARD

KELSO, WASHINGTON 98626

August 31, 1973

SEP 4 11 34 AM '73
DEPT. OF ECOLOGY

Mr. George Weyerhaeuser
Weyerhaeuser Company
Tacoma, Washington

Dear Mr. Weyerhaeuser:

Thank you very much for your letter of August 27, 1973, expressing a desire to work with us on the now obvious impossible weed problem and fish kill during the last five months at Silver Lake. It is true your people have done many good things to help our area. It is also true that your biologists have documented the past fertilization content of the bottom of the lake. This information is invaluable for future studies and for the analysis as to what must be done.

Your information as to where the fertilizer was placed does not tie in with what was actually seen by the naked eye, binoculars, and the scope. In this case there can be little doubt as to what did take place. Many lakes in the Northwest this year experienced additional weed growth but none so far as we can determine has lost its entire spawn or small fry fish as this lake did this year. Just for the record herewith enclosed is a small list of people telling in a very short narrative what they saw. There are many more.

It is our understanding that there will be some scientific group studies made on the lake. Mr. Cole, Director of the Department of Natural Resources, has shown a genuine interest in organizing such a group for the study. It will be interesting to see what this group, the consultant, and your qualified scientist actually determine.

We are looking forward to working with you on this now impossible task.

Yours very truly,

C.F. Gardner

C.F. GARDNER, Commissioner
District No. 3

enc: Pictures
Statement
Analysis

The attached letter has been sent to the following:

Governor Dan Evans

Rep. Julia Butler Hansen

Rep. Hugh Kalich

John Biggs, Department of Ecology, Olympia

Ronald N. Edwards, Assistant Director of Game, Olympia

Bert Cole, Department of Natural Resources, Olympia

Vincent Bousquet, Weyerhaeuser Company, Longview

Stan Fagerstrom, The Daily News, Longview

Washington State Environmental Council

We, the undersigned residents of Silver Lake, Washington, did on the last few days of March, 1973, observe a helicopter releasing a white substance upon the forest lands and this helicopter likewise released a powdery substance well into the waters of Silver Lake.

Name	Address
Chester L. Harlow	3201 Spirit Lake Hiway.
Ruby Mooney	3114 Spirit Lk Hy.
Kathryn A. Fox	300 Lake View Dr.
Ray L Mooney	3114 Spirit Lake Hy

Director / Carl N. Crouse

Assistant Directors / Ralph W. Larson
Ronald N. Andrews

Game Commission

Arthur S. Coffin, Yakima, Chairman
James R. Agen, LaConner
Elmer G. Gerken, Quincy
Claude Bekins, Seattle
Glenn Galbraith, Wellpinit
Frank L. Cassidy, Jr., Vancouver

DEPARTMENT OF GAME

600 North Capitol Way Olympia, Washington 98504

August 29, 1973

Honorable Hugh Kalich
Washington State Representative
P. O. Box 278
Toledo, Washington 98591

Dear Bud: RE: Silver Lake

On August 14, 1973 I went to Silver Lake in response to your concerns about the condition and future of that body of water for recreational use. Mr. Frank White, Regional Supervisor for the Department's Vancouver Region was with me. Mr. White has been in this capacity with the Department at Vancouver for the past four years and has a good background in the history of Silver Lake. We met Mr. Chet Gardner and Mr. McDonald at the lake and they expressed their opinions of past management problems and requested assistance and direction from some state agency to "save" the lake. They also took us out on the lake to view the problem, particularly in an area where clear cut logging operations had been conducted in the past few years.

For purposes of separating what appear to be the problems they expressed, I would like to refer to three areas of concern.

The first consideration is the present water condition. Mr. Gardner and Mr. McDonald are of the opinion that within the past year, the quality of the lake water has deteriorated to where they class it as a polluted condition. They relate this overall condition to fertilization of the surrounding lands by the Weyerhaeuser Company, in activities related to their High Yield Forestry program. They believe there is a strong possibility that the run-off for surrounding lands, particularly on a block that was clear cut in the early 1970's, has carried the fertilization agent into the lake resulting in: (1) a polluted condition of the water; and (2) abnormal weed growth.

They also have substantial accounts that in the application of the fertilization by helicopter, considerable material entered the lake directly.

The second consideration is reduction of the fisheries resource. The personal observations of Mr. Gardner and Mr. McDonald conclude that the fisheries resource of bass and perch has rapidly deteriorated. These species are from natural rearing within the lake. In that these men have been closely associated with the fisheries on the lake for many years, I would assume their observations are correct. Obviously they are concerned about the future of the fisheries resource.

The third consideration is the recreational future of the lake. In addition to the fisheries resources, there has been in the past use of the lake for water skiing. Mr. Gardner related that he had seen as many as 70 boats on the lake over a weekend enjoying this activity. There are public launch areas as well as resorts to provide access. There has also been considerable development on and around the lake for recreational home sites and many of these are year-round homes. Many of these were established because of the recreational opportunities available. A loss of these by the continuing condition of the lake would ultimately reduce the value of these homes and home sites as well as remove the potential for future development.

Comments

First, in responding to the pollution concerns, I am referring this to the Department of Ecology's Office of Technical Services -- Mr. Harry Tracy. The Department of Ecology is the state agency responsible for the water quality standards and is the appropriate state office to receive this complaint and request. They are qualified to determine the present condition of the lake water, as well as what effects may occur from fertilization agents entering the lake.

In responding to the problem of reduction of the fisheries resource, I am requesting the Regional Supervisor, Mr. Frank White, to prepare a report indicating what the Department has of record of species populations in the lake as well as a record of any planted fish. This will, in some part, indicate the past program. We will also request that they make an effort to determine the present populations of fish in the lake. Following this, the Department can indicate what the fisheries program will be should the lake remain unchanged in its present stage.

In response to the third concern, I have met with a number of resource people over the past two weeks. I have discussed Silver Lake with them and asked for their opinions. These persons include mainly Department personnel who are knowledgable on the subject. They all have about the same comments; that Silver Lake is undergoing a natural ecological change of a shallow lake basin filling in from silt. Its future will continue in this development to where it eventually will become a marsh or a bog. They believe this condition is a natural one, possibly slowing down by raising the lake level through impoundments, but destined to continue. This belief amounts to a lake basin filling in from natural run-off. If the consensus of these men is of value, then the problem of bringing the lake back would require some method of deepening the lake bed. I would assume dredging would be the most obvious consideration, but this would require competent hydraulic engineering studies to determine the practicality of dredging.

In summary, we have certainly not solved the problems presented by Mr. Gardner and Mr. McDonald but I believe we have presented the problem in perspective for you. We will follow through on the actions we have indicated in this letter and will be available in the future to work with you at your request.

Very truly yours,

THE DEPARTMENT OF GAME

Ronald N. Andrews

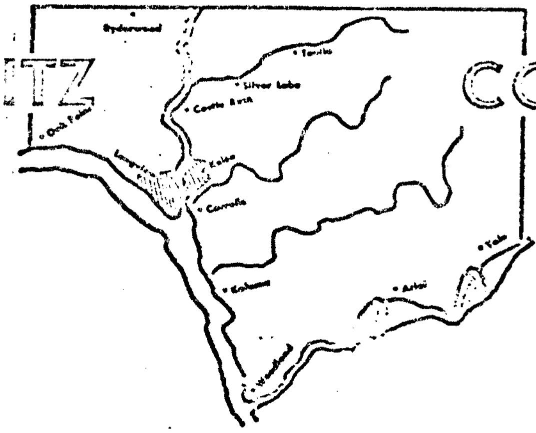
Ronald N. Andrews
Assistant Director

RNA:mm
Enclosure

cc: Mr. C. F. Gardner
Mr. Roy McDonald
Mr. Harry Tracy
Mr. Frank White

BOARD OF COUNTY COMMISSIONERS

COWLITZ COUNTY



JAMES F. BERRY..................DIST. No. 1
CHAS. S. NORDSTROM..............DIST. No. 2

C. F. GARDNER....................DIST. No. 3
SARAH (SALLIE) IVIE.......CLERK OF BOARD

KELSO, WASHINGTON

May 6, 1969

George H. Weyerhaeuser, President
Weyerhaeuser Company
Tacoma Building
Tacoma, Washington 98401

Dear Sir:

I write this letter in behalf of myself and the constituency that I represent as Chairman of the Cowlitz County Board of Public Health, regarding water pollution of the streams and lakes of Cowlitz County by nitrogen compounds.

During the past two months I have observed, on three different occasions, the application of fertilizer in the small second growth forests of the Weyerhaeuser Company holdings in Cowlitz County. It is my understanding that this fertilization is with 40% nitrogen that is applied by helicopter, and that it can be applied at the rate of 100,000 pounds per day. I understand that your company has applied several railroad carloads of fertilizer in our watersheds.

In registering this complaint, I want it clearly understood that our working relationship with the Weyerhaeuser Company has been very good and that I am seeking further information and possible clarification of the true intent of your company. I am sure that you are aware of the problems caused by the concentration of nitrogen within small bodies of water or streams, and the relative damage that can come about through excess fertilization. I believe that the policies of your company for producing more wood fibre are sound, except for the possible health hazards that can arise from such a procedure.

In many national magazines there have appeared articles relating to the use of nitrogen as a fertilizer, and some of these articles report that in many parts of our country the concentration has become so great that it has caused an extreme health hazard. In my observations of this fertilization program, I note that there has been no regard for the other natural resources of our state, to the extent that when the fertilizer is being applied, the spray from the helicopter is not restricted to the highlands but is sprayed right over all of the small streams that feed into our larger rivers and lakes.

LOGGING—LUMBER—PULP—PAPER PRODUCTS—PLYWOOD—ALUMINUM—SHIPPING—FURNITURE—CHEMICALS—BOATS—SHINGLES—FARMING

It just happens that apart from being a County Commissioner, I am a resort owner on Silver Lake in Cowlitz County. This has been a vantage point from which to observe your fertilizing program. Silver Lake is a very shallow body of water and has had a tremendous weed problem. Three weeks ago Sunday your company fertilized the upper watershed feeding Silver Lake -- this with 40% nitrogen. With such a concentration of nitrogen within this watershed, it appears only logical that the weed problem in this body of water will be disastrous within the next few years.

It has been found in Michigan and Wisconsin that the concentration of nitrogen in the public water supply has reached the danger point. I have therefore requested the Cowlitz County Public Health Officer to immediately take samples of our public water supply and all of our small streams feeding the Cowlitz River to establish the true nitrate concentration within our waters, and to carry on a monitoring program in the future.

You may recall that two years ago in August, when the Cowlitz River was extremely low, the Longview and Kelso filter plants very nearly became inoperative because of the vast amount of algae that was in the Cowlitz River. Certainly, with many millions of pounds of nitrogen now dumped into the headwaters of the Cowlitz River, both by the Weyerhaeuser Company and the Department of Natural Resources, this problem will be aggravated; and perhaps next time the algae will be so extensive that these public sources of water will be rendered useless.

I believe that your program of fertilization requires great study, and most of all, a policy by your company for the protection of the other natural resources of our state in carrying out such a program.

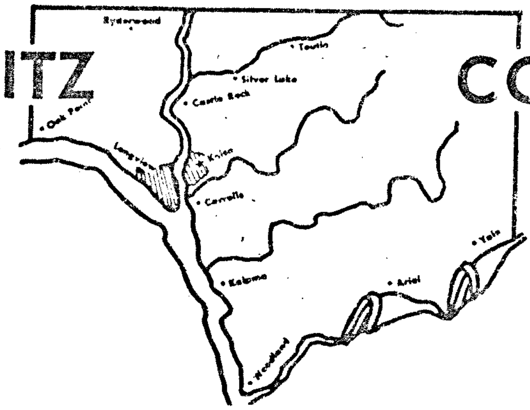
Yours very truly,

Chet F. Gardner, Chairman
COWLITZ COUNTY BOARD OF HEALTH

cc: Clyde R. Kalahan, Area Manager, Weyerhaeuser Company
Wallace Lane, M.D., State Director of Health
S. H. Gorton, M.D., Cowlitz County Health Officer
The Honorable Warren G. Magnuson
The Honorable Henry M. Jackson
The Honorable Julia Butler Hansen
The Honorable Daniel J. Evans
The Honorable Don L. Talley
The Honorable Arlie U. DeJarnatt
The Honorable Alan Thompson
The Honorable Bert L. Cole
Lowell Peterson, Chairman, Senate Natural Resources Committee
S. E. Flanagan, Chairman, House Natural Resources Committee
James P. Behlke, Director: Washington State Water Pollution Control Commission
John A. Biggs, Director, State Department of Game
Mayor Harry G. Kelsey, City of Longview
Mayor Joseph F. Wenaweser, City of Kelso
Henry R. Dunn, Cowlitz County Prosecuting Attorney

BOARD OF COUNTY COMMISSIONERS

COWLITZ COUNTY



JAMES F. BERRY .... DIST. NO. 1
BERNARD C. SCHEURICH .... DIST. NO. 2

C.F. GARDNER .... DIST. NO. 3
ELEANORE KOLSTAD .... CLERK OF BOARD

KELSO, WASHINGTON 98626

August 13, 1973

Mr. George Weyerhaeuser, President
Weyerhaeuser Company
Mail Department
Tacoma, Washington 98401

Dear Mr. Weyerhaeuser:

On May 6, 1969, I had the pleasure of corresponding with you regarding the forest practices of your company concerning the fertilization of the small second growth forest of the Weyerhaeuser Company holdings in Cowlitz County. In that communique I related to you the fears that I had on behalf of the constituency of the State of Washington and the nitrate that was being placed in the watershed and the body of water known as Silver Lake. The subsequent correspondence between you and I was most cordial but did not lead to any follow-up to the problem as outlined.

It is my unhappy duty to report to you that on March 27, 28, 29, and 30, 1973, once again your company proceeded to fertilize the Silver Lake watershed and <u>into</u> the waters of Silver Lake. If you will check you will find there are many witnesses that saw your spraying operation releasing the nitrate well over the water's edge. It is now obvious that this body of water has been destroyed.

In the conclusion of my May 28, 1969, letter I extended to you a cordial invitation to come down in August of that year and we would go for a boat ride to see the lake. George, I no longer extend that invitation as I don't believe that you would care to get stuck in the vegetation that now abounds in this body of water. However, I will extend an invitation to proceed with your helicopter to review the extent of the exploding weed growth that has taken place this summer. The recreational uses of Silver Lake are at a near standstill. Even the water skiers have given up. I believe it only fair to lay a big share of the blame right at the doorstep of the Weyerhaeuser Company.

In 1969 you were advised of the possible hazards of your fertilization program which at that time was only in the watershed. But with the actual nitrate being dumped directly into the lake, it has had most severe consequences. I have had the pleasure of taking Mr. Vince Bousquet for a boat ride and I wish to inform you that daily the weed growth grows worse. It is disheartening to think that such a development as this could occur after having correspondence with you and having direct conversation with you. I realize that you as the corporation president have little contact in the local areas. I realize that your company is very large. It is my understanding that you own one acre out of every section of these great United States. I agree with private enterprise and the profit making system, but I wonder if all to be gained should not be reviewed.

With this in mind, I am including a couple of pictures. One is the flood damage that occurred on the Kalama River and the logging debris that accumulated in this stream. The other is a picture sample of the weeds in Silver Lake and I would like to ask a couple of questions. Supposing that through your corporation's powers in the next few years you are able to acquire the other 639 acres of every section of land so that you actually owned the whole works. I wonder if you could look around and say I am truly proud to own all of this? My second question being if these problems are occuring in this little area of the State of Washington, is it just possible that within your holdings elsewhere there are problems that you as the president of the company should be concerned with?

I hope that you will give this your earnest consideration for the problem is so vast now that without the complete cooperation of all property owners, water users, different departments of federal, state and local government, can this one problem be resolved. Any assistance you can give us on this matter will be greatly appreciated.

Very truly yours,

C.F. Gardner

C.F. GARDNER
Cowlitz County Commissioner
District #3

enc.

Weyerhaeuser Company
Research Division
Longview, Washington 98632
A/C 206 • 425-2150

October 24, 1969

Mr. Chet F. Gardner, Chairman
Cowlitz County Board of Health
Kelso, Washington 98626

Dear Mr. Gardner:

Please find enclosed a report covering the second of our quarterly surveys of Silver Lake to determine the quantities of various nitrogenous materials present in the lake.

The results show the levels of nitrogen and phosphorous in the lake to be very low. As Rudy Thut points out these very low concentrations may have been due to lack of precipitation and surface runoff. Also, it may be noted that the concentrations of urea, ammonia, and phosphate increased in Hemlock Creek as it passed through areas of human habitation.

If you or Dr. Garton have any questions please feel free to call upon us at any time.

Sincerely yours,

Gene Haydu

Eugene P. Haydu
Manager
Air and Water Quality Research

EPH:hc

cc: Dr. S. H. Garton
J. L. McClintock
O. Malm
V. W. Bousquet
G. R. Staebler

SILVER LAKE SAMPLING TRIP - SEPTEMBER 9, 1969

THE SECOND OF OUR QUARTERLY SURVEYS OF SILVER LAKE WAS CONDUCTED ON SEPTEMBER 9, 1969. THE SAMPLING STATIONS ARE DEPICTED IN FIGURE 1; THE RAW DATA ARE PRESENTED IN TABLE 1.

THE DEPTH OF THE WATER AT THE LAKE STATIONS RANGED FROM 5 TO 8-1/2 FEET; THE SECCHI DISK READINGS RANGED FROM 5 TO 6-1/2 FEET. THESE FIGURES ARE IDENTICAL TO THOSE OF LAST JUNE. THE TEMPERATURE WAS, ON THE AVERAGE, 1.5°C LOWER THAN LAST JUNE.

THE CONCENTRATIONS OF UREA, AMMONIA, NITRITE, NITRATE, AND PHOSPHATE WERE AGAIN VERY LOW; IN THE CASE OF UREA, AMMONIA, AND PHOSPHATE EVEN LOWER THAN LAST JUNE.

THE FLOW IN THE TWO INLET STREAMS, HEMLOCK AND SUCKER CREEKS, WAS VERY LOW AS WERE THE CONCENTRATIONS OF AMMONIA, NITRATE, AND PHOSPHATE. COLLECTIVELY, THE CONCENTRATION OF THESE SUBSTANCES WAS ONE-FIFTH TO ONE-SIXTH THE VALUES ENCOUNTERED THREE MONTHS AGO. APPARENTLY, THE LACK OF PRECIPITATION AND SURFACE RUN-OFF ACCOUNT FOR THE LOW LEVELS OF THESE NUTRIENTS. AGAIN THE LEVELS OF UREA, AMMONIA, AND PHOSPHATE INCREASED IN HEMLOCK CREEK AS IT PASSED THROUGH THE AREA OF HABITATION NEAR THE LAKE.

OUTLET CREEK WAS SCARCELY FLOWING AND THIS APPARENTLY CONTRIBUTED TO A STRONG REDUCING SITUATION AS WITNESSED BY THE RELATIVELY HIGH CONCENTRATIONS OF AMMONIA AND NITRITE.

R. N. THUT

9/17/69

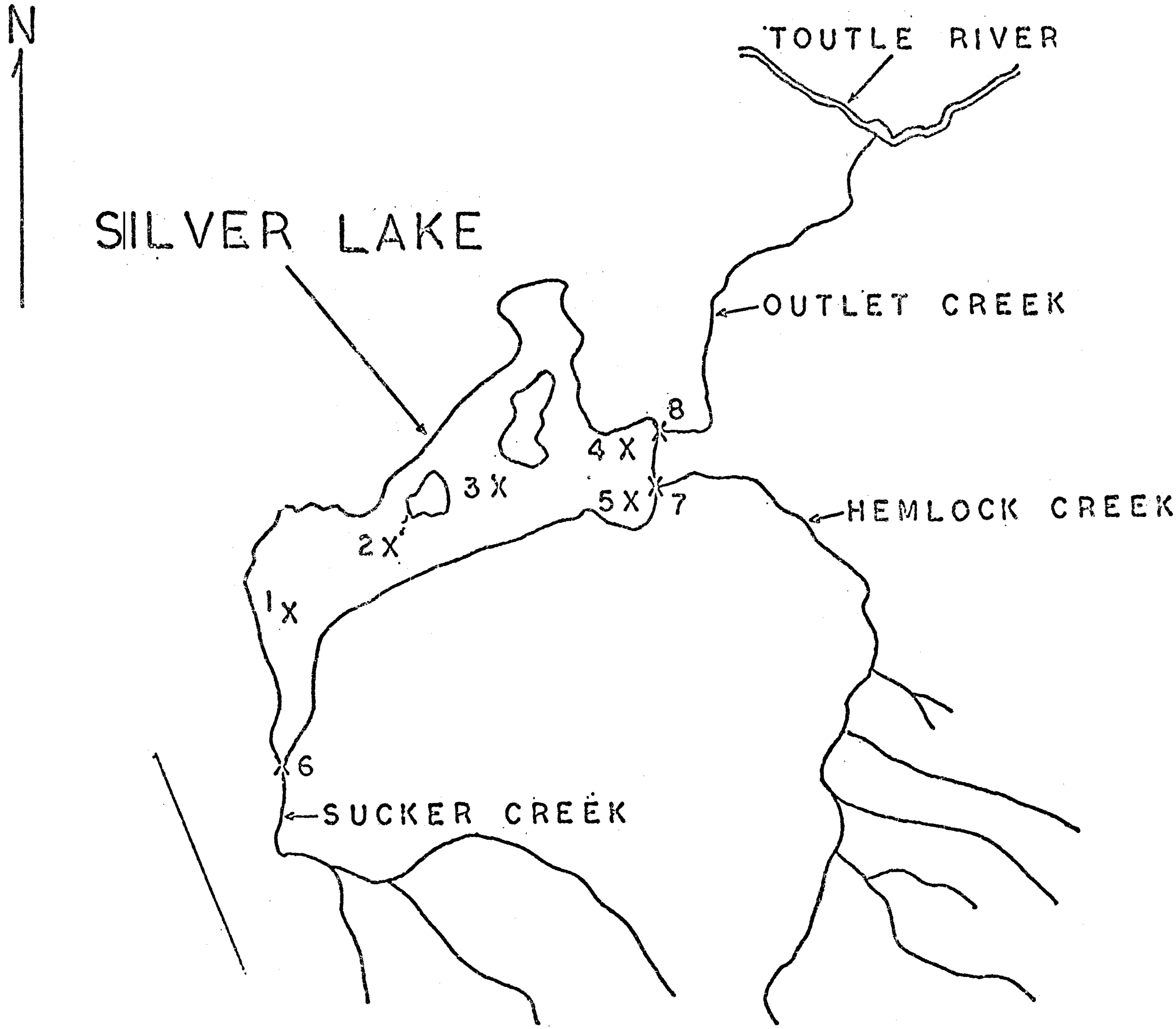


FIGURE 1. SAMPLING STATIONS ON SILVER LAKE AND ITS MAJOR INLETS AND OUTLET.

Table 1. Data from Samples Taken Sept. 9, 1969 from Silver Lake and Associated Streams

	Depth (ft)	Secchi (ft)	Temp. (°C)	Urea-N (ug/l)	NH_3-N (ug/l)	NO_2-N (ug/l)	NO_3-N (ug/l)	PO_4-P (ug/l)
Station 1	7	6.5	20.5°	0	4	1	0	2
Station 2	8.5	6	21°	0	2	1	0	3
Station 3	6	5	20.5°	0	6	1	0	4
Station 4	5.5	5.5	20°	0	8	1	0	3
Station 5	5	5	20°	0	11	1	0	3
		Flow (cfs)						
Station 6 (Sucker Cr.)		0.75 (est.)	16°	18	1	5	27	20
Station 7 (Hemlock Cr.-above)		1.5	16.5°	11	0	5	29	8
Station 7 (" " -below)		...	19.5°	28	8	5	8	30
Station 8 (Outlet Cr.)		0.25 (est.)	18.5°	0	50	14	0	94

Weyerhaeuser Company

George H. Weyerhaeuser
President

Tacoma, Washington 98401
A/C 206 • 383-3361

May 19, 1969

Mr. Chet F. Gardner, Chairman
Cowlitz County Board of Health
Kelso, Washington

Dear Mr. Gardner:

I appreciate the concern expressed in your letter of May 6, 1969. We considered the environmental aspects of fertilization in the development of our "high-yield forest" program in which fertilization plays a key part in increasing the yield of wood fiber produced by our tree farms.

Our Forestry Research Center in Centralia was requested to look into the potential problems of fertilization most carefully before we initiated this new program. I would like to quote from their report written on October 6, 1967.

> As appraisal based on our present knowledge--both that founded on established soil science and the research done mostly by others--indicates that the chances of a deleterious effect of urea on streams is very remote. The urea we will use is converted to ammonia which is immediately tied up by the soil in an unleachable form. This, in fact, is one of the reasons for using urea (rather than a nitrate fertilizer). In this form it becomes readily available to all plant life in the forest and we firmly expect the nitrogen to be quickly tied up in the nutrient cycle of the plants with little chance of moving into streams. Should we use fertilizers containing nitrogen in the nitrate (rather than ammonia) form, the expected result might be quite different.

Based on this analysis we have initiated a fertilization program with urea and we have also continued our work to understand and to minimize any adverse consequences. Some further information has been developed:

1. Our present program is to apply urea in the spring, just prior to the driest portion of the year, therefore the likelihood of loss in run-off is still further reduced.

2. Utilization of urea by the tree is confined to the growing season, from spring until fall. Further research has shown that 90 percent of the fertilizer applied is in fact taken up by the tree. So again, the chance of fertilizer loss from the forest is reduced.

3. Differences between fertilizer applied and absorbed by the trees do not equate to run-off since some urea is converted to gaseous ammonia.

4. Growth of acquatic plants requires nitrogen, phosphorus and sunlight. No phosphorus is present in urea as shown by its formula, $CO(NH_2)_2$.

5. Many mountain lakes in the Pacific Northwest are so infertile that they represent a poor natural fish habitat. Some fisheries experts advocate fertilizing our lakes to make them more productive.

6. There remains the question of fertilizer falling directly into streams. Our use of helicopters permits the minimization of this, and we are making specific efforts to avoid this direct contamination.

7. We have initiated a water-testing program to further evaluate this fertilization effort. This will provide the final proof and we will certainly make the results available to you when enough data has been obtained to be significant.

This quite long reply to your letter is to acquaint you with the information evaluated by us and to show our concern for the total environment. We did not begin our fertilization program without a great deal of study. We will be pleased to cooperate with you or anyone else to obtain data that will confirm our sincere belief that fertilization of the forests under closely controlled conditions is not harmful to other users of the environment.

I have asked Clyde Kalahan and Gene Haydu to call on you to discuss this further at your convenience. Gene is also prepared to discuss testing techniques with Dr. Gorton since low concentrations of nitrogen and phosphorous are rather difficult to determine and Gene has had considerable experience.

Sincerely yours,

George H. Weyerhaeuser

GHW:kd

cc: C. R. Kalahan, Wallace Lane, S. H. Gorton, Warren G. Magnuson, Henry M. Jackson, Julia Butler Hansen, Daniel J. Evans, Don L. Talley, A. U. DeJarnatt, Alan Thompson, Bert L. Cole, Lowell Peterson, S. E. Flanagan, J. E. Behlke, John A. Biggs, H. G. Kelsey, J. F. Wenaweser, H. R. Dunn, and M. J. Durkan

MEMORANDUM

CHECK
INFORMATON
FOR ACTION
PERMIT
OTHER

TO: Howard Steeley

FROM: John Bernhardt JB.

SUBJECT: Investigation results regarding water quality violation ~~reported at Silver Lake, Cowlitz County during March~~ of 1973.

DATE: 10-23-73

State of Washington Department of Ecology

On August 15, 1973, Cowlitz County Health Department representative, Bill Harper, reported to the Department of Ecology, Southwest Regional Office that a serious aquatic weed problem was developing in Silver Lake, a popular bass fishing lake near the city of Castle Rock. Although the specific cause of the problem was unknown, it was thought to be associated with a forest fertilization project being conducted by Weyerhaeuser Company near the south shore of the lake since 1969.

One aspect of the Silver Lake problem was a citizen complaint of a water quality violation by the helicopter which applied the fertilizer during March 1973. This report documents the results of the DOE investigation into this aspect of the problem and presents a recommendation for enforcement action based on these findings.

SUMMARY OF FINDINGS

August 16 Investigation

The investigation covered herein entailed two field trips to Silver Lake. The first trip was made on August 16 in response to Mr. Harper's complaint. Upon arrival at the lake I was met by Chet Gardner, owner and operator of Anderson's Park resort, who outlined what he and other lakeshore residents had observed during the previous March and transported me by boat to the south shore of the lake where the incident had occured. According to Mr. Gardner, the helicopter had on numerous occasions passed out over the lake's waters and dropped fertilizer pellets while making routing "sweeps" across the forest area being fertilized (Enclosure 1). Both he and the following individuals would be willing to testify that they did observe this event:

Ruby and Ray Mooney	Evelan M. Sibbald	Carolyn Cates
Kathern A. Fox	Ralph Roggenback	
Jeanette Western	Sandy Palmer	

Conversely, Weyerhaeuser Company has stated that the helicopter may have passed out over the water but did not release fertilizer pellets while doing so.

The case is weakened by the fact that there is no sample evidence available since a six-month period elapsed between the time that the Silver Lake residents made their observations and notified the DOE of the problem. A final factor is that the witnesses made their observations from the north side of the lake at a distance of about one mile from where the helicopter was working. One witness made his observation through a telescope.

September 10 Investigation

On September 9 I received a report from Chet Gardner that flakes of chalk material resembling in physical characteristics the urea pellets used by Weyerhaeuser had been observed along the Silver Lake shoreline where the March 1973 fertilization project had taken place. In response to this complaint I conducted a field investigation the following day.

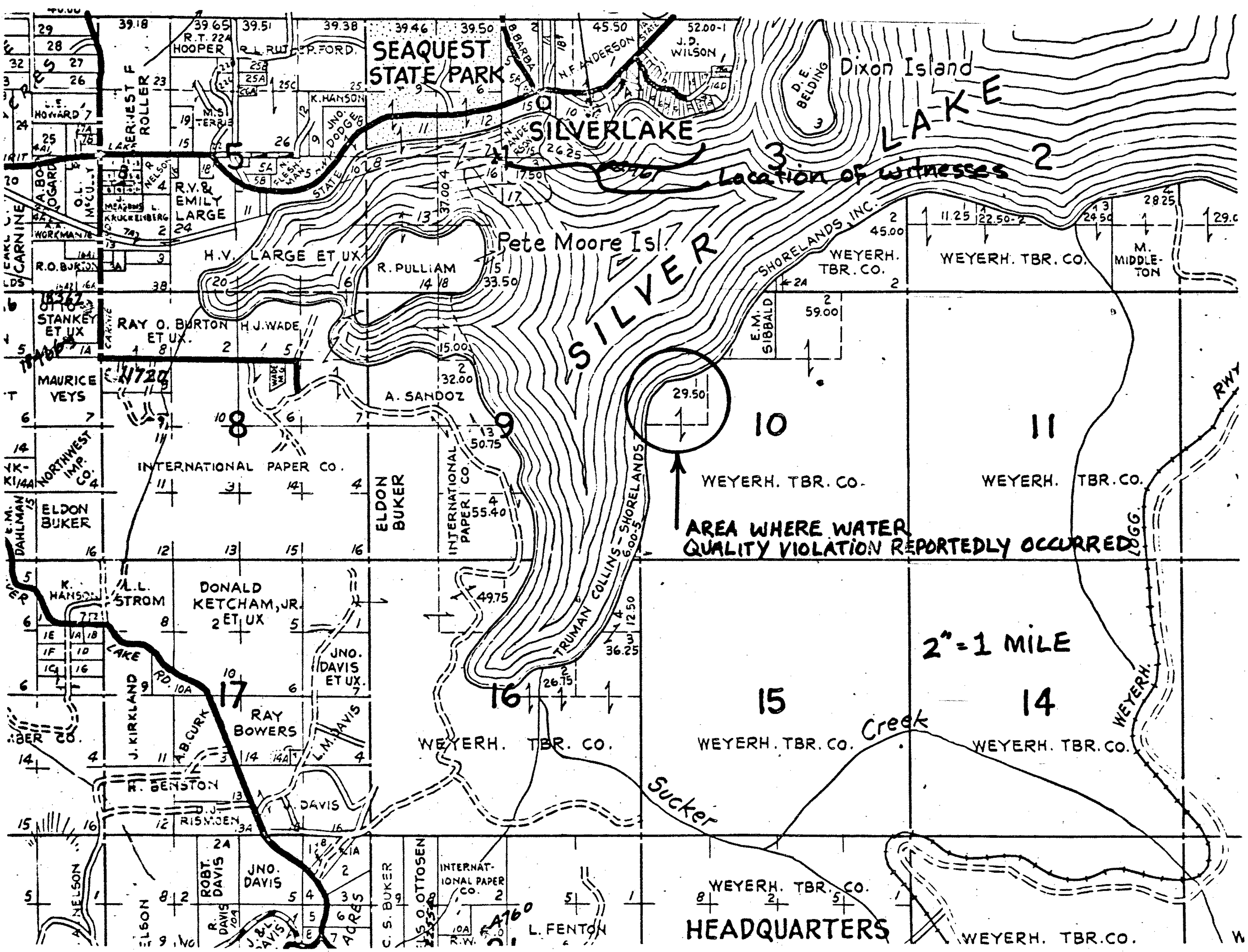
Samples of the chalk-like substance were collected and separated into three catagories by physical characteristics including bird-like droppings, lichen-like and chalk-like (Enclosure 2). These samples and a sample of the standard urea pellets used by Weyerhaeuser were forwarded to the DOE laboratory of Olympia for chemical analysis. Each sample was analyzed for urea-nitrogen, total phosphorous, NO_3-N, and NO_2N to determine if any of the three unknown substances were of the same chemical composition as the urea pellets. This approach was employed since pelletized urea is known to contain a low concentration of phosphorous but is high in urea-nitrogen.

The results of the laboratory test were negative in that each of the unknown substances were high in phosphorous content and low in urea-nitrogen while the reverse was true of the pelletized urea sample (Enclosure 3). In essence, this evidence does not strengthen the case against Weyerhaeuser Company.

RECOMMENDATION

It is my opinion that the evidence presented herein is not strong enough to warrent a docket against Weyerhaeuser Company for the water quality violation reported by residents of Silver Lake.

JB:po



Enclosure 1: Map of Silver Lake depicting area where helicopter reportedly passed out over the lake during routine fertilization of adjacent forest area.

MEMORANDUM

CHECK
INFORMATON ✓
FOR ACTION
PERMIT
OTHER

MERELY McCALL
TO: JOHN BERNHARDT ✓

FROM: REY ORQUIOLA

SUBJECT: SOLID SAMPLES FROM LAKE SHORE OF SILVER LAKE

DATE: 10-10-73

State of Washington
Department of Ecology

THE FOLLOWING ARE THE CONFIRMED ANALYTICAL RESULTS OF SOLID SAMPLES TAKEN FROM SHORE AREA OF SILVER LAKE ON AUGUST 8, 1973, 1400 HR:

SAMPLE LOG NO.	SAMPLE PHYSICAL DESCRIPTION	UREA-N PPM	TOTAL PHOSPHOROUS PPM	NO_3-N PPM	NO_2-N PPM
73-3288	SAMPLE #1 WHITE SOLID SPOTS ON DRIED LEAVES	1,060	36,700	400.	0
73-3289	SAMPLE #2 WHITE - GRAYISH SOLID MIXED WITH ROCKS	280.	34,700	28.	0
73-3290	SAMPLE #3 WHITE SOLID SPOTS ON TWIGS AND WOOD CHIPS	970.	2,560	77.	0
73-3291	SAMPLE #4 PELLITIZED FERTILIZER	39×10^4	326.	5.4	0

TO CONVERT TO PER CENT DIVIDE PPM BY 10,000.

~~CONCLUSION:~~ SAMPLE 1, 2, AND 3 ARE UNUSUALLY HIGH IN UREA-N, PHOSPHOROUS, AND NITRATE-N, THAN ORDINARILY FOUND ON SOME OTHER LAKES. WHEN COMPARED TO SAMPLE 4, THE LATTER GOT VERY LOW IN PHOSPHOROUS AND NITRATE, THEREFORE I CONCLUDE THAT SAMPLE 4 IS A DIFFERENT CHEMICAL SUBSTANCE THAN SAMPLE 1, 2 AND 3.

Enclosure 3

STATE OF WASHINGTON
Department of
Natural Resources

COMMISSIONER
BERT COLE

DON LEE FRASER
SUPERVISOR

OLYMPIA, WASHINGTON
98504

October 23, 1973

Mr. John Bernhardt
Department of Ecology
St. Martins College
Lacey, Washington 98504

Dear John:

Please find enclosed a preliminary report based on a one-day field trip to Silver Lake. It certainly is not conclusive, but might provide a basis for further discussion regarding possible cause and effect relationships.

Very sincerely,

BERT L. COLE
Commissioner of Public Lands

Fred Weinmann nR

FRED WEINMANN
Surveys & Marine Land Management

FW:nr
Enclosure

STATE OF WASHINGTON
DEPARTMENT OF NATURAL RESOURCES
OLYMPIA WASHINGTON 98504

Preliminary Report
Aquatic Weed Growth in Silver Lake

Prepared by

Frederick C. Weinmann
Algologist

Surveys & Marine Land Management

Preliminary Report
Aquatic Weed Growth in Silver Lake

Introduction

High summertime biomass production of aquatic plants (including phytoplankton and macrophytes) is characteristic of highly productive and relatively shallow waters. It is apparent that Silver Lake is a highly productive lake and has been for many years. The lake is very shallow (maximum depth of about 12 feet) with extensive marshy areas and having an acreage of about 3000 acres (See Figure 1). The main tributaries to Silver Lake are Hemlock Creek and Sucker Creek, and the outflow is via Outlet Creek. The amount of water entering or leaving the lake via seepage, overland flow, groundwater flow, or springs, is unknown.

Scientific data concerning the biological, chemical and physical characteristics of the lake is meager. The Weyerhaeuser Corporation has completed a limited survey of the nutrient input and nutrient concentrations for the lake in 1969-70, following fertilizer (urea) application to company owned forest lands on the south side of the lake. Intermittent examination of coliform bacteria concentrations has been conducted by the State Department of Social and Health Services (S&HS). S&HS has also made a very limited determination of the chemical properties of the lake waters. No information concerning circulation patterns, water or nutrient budgets, phytoplankton and macrophyte species composition and biomass production, or any other lake characteristics is available.

I will attempt in the following discussion based on information available to describe the Silver Lake problem and make some explanation of its probable cause and reasons for the severity of the problem in recent years. Hopefully, this evaluation will provide a framework for further discussion of possibilities for remedial action.

The Silver Lake Problem

The problem is currently manifested in Silver Lake by the presence of a tremendous biomass of aquatic macrophytes throughout much of the normally open waters of the lake. Of primary concern are those submerged plants growing from the lake bottom to the waters surface, as opposed to the emergent plants which border the shores. From my observations, it appears that Anacharis sp.(Elodea sp.) is of greatest concern, although significant occurrence of other species (esp. Ceratophyllum demersum) and Myriophyllum hippuroides) was noted. The luxuriant growth of these submerged plants has been of some historical concern by lake residents, however, interviews with residents as well as Washington State Department of Game officials, does seem to indicate an increasing severity of the problem in recent years. The impression given to me, is that the last two summers have been particularly dramatic with regard to the amount of weed growth in the lake. Apparently, recreational use of the waters for swimming, fishing and water skiing has been severely hampered. Of immediate concern then, is not the fact that these plants grow in the lake, but rather what factor or factors have resulted in the tremendous biomass produced by these plants in recent years.

Before elaborating on probable causes, a word should be inserted concerning the usual short term response of lakes to increased nutrient input. Year to year variations in nutrient supply are normally represented by detectable responses of the resident phytoplankton populations. In highly enriched lakes the result is often the occurrence of dense blue-green algal populations manifested eventually as surface scums and windrows of decomposing algae on the shorelines.

On the other hand, macrophytes are generally more responsive to physical variations such as incident light, turbidity, and lake level, or to characteristics of bottom sediments. Although lake residents have noted algal blooms in the past, 1973 is the first summer that season-long "pea soup" blooms have been reported. This information is included only to indicate that maximum biomass production of macrophytes might be wholly independent of recent nutrient enrichment.

Causes

Dying Lake Hypothesis

Many people are content to believe that all lakes have a finite life, and that Silver Lake is simply in the final stages of a natural process. However, it must be realized that this natural process occurs over geologic time periods and would not normally produce dramatically noticeable differences over a period of only a few years. In fact, many deeper lakes are remarkably stable over hundreds of years. The question then is whether recent man-caused events have produced a significant rate increase in the successional evolution of Silver Lake. Almost certainly, lakeshore activities have produced a significant effect when viewed over a fairly long time period (e.g. 20 years). Whether very recent events could have resulted in dramatic biomass increases is much less clear, although it is distinctly possible. It is equally possible that weather conditions of the past two years have been particularly suitable for growth of macrophytes which has increased the severity of the problem.

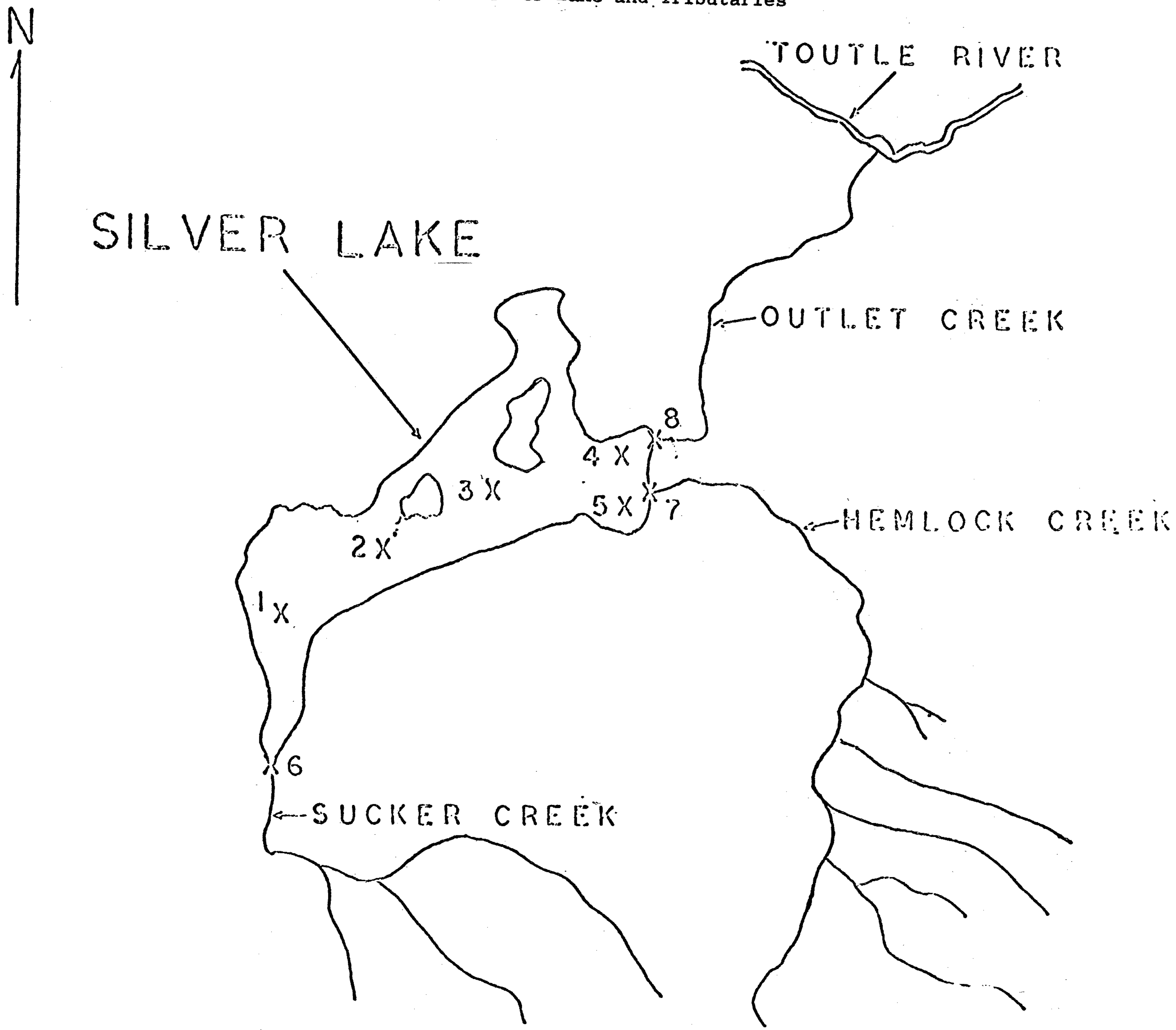
In summary, Silver Lake, due to its physical characteristics may be naturally eutrophic, however, lakeshore activities have certainly increased the rate of this process. Whether the rate increase has been dramatic in recent years and due to recent man-caused perturbations, is not clear.

Increase in Light Hypothesis

It is possible that a cyclic event such as variations in weather conditions could cause great short term increases in biomass production. This assumes that maximum biomass is normally, at least partially limited by light availability. Light limitation is, in fact, often the growth limiting factor for aquatic macrophytes. This hypothesis is particularly attractive, since the past two summers (1972 and 1973) have been relatively free of cloudy days. With no definitive historical data on light intensity relative to plant biomass production, this suggestion cannot be objectively evaluated.

Figure 1

Silver Lake and Tributaries



Nutrient Increase Hypothesis

Nutrient Sources

Many activities in recent years represent sources of increased nutrient input to Silver Lake. These include road construction, residential housing construction, lawn fertilization, and other lakeshore disturbances which result in nutrient sources that may be washed into the lake by erosion. Also of significance is the increase in number of septic tank effluents which reach the lake in a partially treated, or untreated condition. The sometimes inefficiency of septic tank operation is revealed by the coliform MPN data of Table 1. In addition, the Weyerhaeuser Corporation has instituted a fertilization program on forest lands bordering the south side of the lake. This has produced an increase in N input via the streams and very likely, via overland and ground water flow (Table 1). All of these sources have undoubtedly resulted in increased inorganic nutrient input to the lake in recent years.

Silver Lake Nutrient Budget

From the existing Weyerhaeuser data (Table 1) a preliminary tentative estimate of nutrient input to the lake can be made for 1969-70. The assumptions are that Outlet Creek is the only significant outflow, and that inflow other than from Sucker and Hemlock Creeks, had nutrient concentrations similar to these creeks.

Total water input is calculated from the mean of the quarterly flow rate data. Nutrient concentrations of the creeks are likewise based on the means from the quarterly sampling program conducted by Weyerhaeuser in 1969-70. These rough estimates give an annual nutrient budget of 1.61 $\times 10^7$ g/yr of N and 1.37 $\times 10^6$ g/yr for P. Assuming a lake area of 3000 acres, we get a loading rate of 1.89 $g/m^2/yr$ for N and 0.113 $g/m^2/yr$ for P. Now if we assume an average lake depth of about 7 feet, we can compare these loading rates with published information pertaining to dangerous limits of nutrient loading related to eutrophication. For N the dangerous level is reported to be 1.6 $g/m^2/yr$ and for P the reported value is 0.15 $g/m^2/yr$. These calculations, although very rough ones at best, suggest that P supply is low relative to N. This estimate would not reflect any influence of septic system effluents, which would be expected to be relatively higher in P than N. A critical importance of recent increases in P supply is indicated.

Nutrient Limitation to Biomass Production

In order to assess the impact of recent increases in nutrients, it must be assumed that one or more inorganic nutrients is limiting the maximum summertime biomass production of resident aquatic plants. In discussions with Weyerhaeuser personnel and others who have been associated with the lake, it has been suggested that N is the primary limiting nutrient in the lake. This tentative conclusion is based on examination of data on N input and lake concentrations (Table 1).

It is noticed that N input via Sucker and Hemlock Creeks is high relative to lake concentrations. Lake concentrations remain extremely low, although a slight increase is noted during winter when primary productivity is probably light-limited. This leads logically to the suggestion that N, as the limiting nutrient, is immediately incorporated into plant biomass on entering the lake. In my opinion, this is not necessarily the conclusion to be reached. In fact, as mentioned above, we are interested in what determines the maximum biomass production. Weyerhaeuser has evidence to suggest that an abundant N source exists in the shallow sediments of the lake, and the macrophytes can directly utilize this source. Also, the blue-green algae can obtain N through atmospheric N fixation. In addition, it has been shown experimentally that water with extremely low summer N concentrations having very high plant biomass, can produce even greater biomass on addition of P, but show no response to N addition. In other words, a consideration of P availability may be more to the point than N in Silver Lake.

Lake Stabilization

Recent completion of a stabilization dam has raised the late summer lake water level by several feet. Data from the USGS lake level gauging station indicates the summer of 1972 as the first year that the water level was regulated. There is some possibility that the maintenance of higher than normal water levels during summer months has increased maximum biomass production of resident plants. This would be possible due to decreased flushing rates relative to total lake volume. There is some evidence from other lakes to suggest that increased residence time of the water mass can lead to greater biomass production of resident aquatic plants. In addition, macrophyte growth in some reservoirs is apparently inversely correlated with water level fluctuation during the growing season. The probable effects of stabilization on weed growth in Silver Lake are not obvious, and certainly subject to conjecture.

Conclusions Concerning Causes

Evidently Silver Lake has for many years experienced problems with dense aquatic weed growth during summer months. There is reasonable evidence to suggest that maximum plant biomass production has increased dramatically in recent years. Several hypothesis can be developed to explain this increase. These include attributing it to the natural sequence of events for a "dying lake", increased nutrient input from Weyerhaeuser forest fertilization, the effect of septic tank effluents, etc.

It is probably true that over the past 20 years or so, the rate of aging of Silver Lake has been increasing. Causes for this come under the broad heading of "cultural eutrophication" and have been accentuated due to the shallowness of the lake basin.

There remain questions pertaining to the severity of the weed problem in very recent years. It is unlikely that the aquatic weeds have responded to annual fluctuations in nutrient input to the lake. Experience in other lakes has indicated that year to year changes in aquatic macrophyte biomass are most closely related to physical factors (e.g. sunlight, rainfall, water level fluctuation and turbidity) and to organic content of lake sediments rather than nutrient concentrations of the lake waters. However, the occurrence this summer of "pea-soup" algae blooms does indicate a recent increase in nutrient availability.

A conclusion equally tenable to the nutrient increase hypothesis, is that high incident light the past two years has been largely responsible for the severity of the weed problem. The effect of high light might, in fact, have been compounded by lake level stabilization.

In my opinion, no single recent event can be isolated as the sole cause of the aquatic weed problem in Silver Lake. There has undoubtedly been a nutrient build-up in the sediments over many years and possibly greatly increased nutrient input has occurred in recent years. .This may have provided a reservoir of nutrients which increased the response of the weeds as physical conditions become ideal for growth.

Remedial Action

Several methods, including dredging, mowing, and herbicide application have been used to control aquatic weed growth. All of these methods would be prohibitively expensive if attempted for the entire area of Silver Lake. Both herbicide application and mowing would have to be repeated on an annual basis. If one of these methods is adopted, a treatment of only a portion of the lake should be considered. Additional information concerning the economics and procedures for these control measures is readily available.

Biological control utilizing herbivorous fish has proved successful in some cases. However, introduction of foreign species can produce problems greater than those of existing weeds.

Recent evidence suggests that water level fluctuation can in some instances provide an effective control mechanism for aquatic weeds. If a considerable lowering of the water level can be achieved at a reasonable cost, it might be the most economical control mechanism available. Any attempt at control by lake level fluctuation must be considered experimental and should be preceded by a careful evaluation of lake geomorphology, as well as possible effects on resident fish populations. Nevertheless, consideration should be given to the possibility of an overwinter drawdown in Silver Lake.

A longer term approach to the problem would involve a biological, physical and chemical monitoring program in an attempt to pinpoint the specific causes of increased weed growth. This would constitute a solution to the problem, only if the causes were found to be relatively easily correctable.

The objectives of a monitoring would be several. The sources and fate of nutrient input could be identified and quantified. The annual regime of lake water nutrient concentrations could be evaluated and the primary limiting nutrient identified. The relation of weed growth to physical and chemical factors could be evaluated and the factors most closely correlated with weed growth identified. In total, a monitoring program would provide insight into the possibilities of success for any control measure which was subsequently instituted. In fact, a monitoring program would be desirable in conjunction with any instituted control measures. This would provide essential data for evaluation of the effects of the action and the possibilities for success of future actions.

FCW:cm
10/3/73

Chemical and Biological Data* from Silver Lake and Tr
Tabled Chronologically Beginning in 1968

Table I

Date	Sample Station	MG/L NO3-N	NO2-N	NH-3-N	Urea-N	PO4
3/7/68	Post Office Dock					
	Andersons Resort					
	Boat Landing; Kerr Rd.					
	Streeters Resort					
	Outlet on Sightly Road					
	Inlet on Canal Road					
7/15/68	Post Office					
	Boat Launch; Kerr Road					
	Streeters Resort					
	Inlet on Canal Road					
	Andersons Resort					
	Outlet on Sightly Road					
5/06/69	Andersons Resort					
	Kerr Road					
	Streeters Resort					
	Outlet Creek; sightly Rd.					
	Inlet; Canal Road					
5/19/69	Department-Game Access	0-35	0-008			0-0
6/12/69	Streeter Resort					
	Post Office					

*Stations 1-8 can be located on map in Figure 1.
W = Weyerhaeuser.
SHS = Social and Health Services.

Chemical and Biological Data* from Silver Lake and Tri
Tabled Chronologically Beginning in 1968

Table I

Date	Sample Station	MG/L NO3-N	NO2-N	NH-3-N	Urea-N	PO4-
6/11-6/12 1969	1 (Surface)	0.0	0.001	0.008	0.005	0.
	1 (bottom	0.0	0.001	0.004	0.0	0.
	2 (Surface)	0.0	0.001	0.005	0.003	0.
	2 (Bottom)	0.0	0.001	0.005	0.003	0.
	3 (Surface)	0.0	0.001	0.004	0.0	0.
	3 (Bottom)	0.0	0.001	0.006	0.001	0.
	4	0.0	0.001	0.007	0.0	0.
	5	0.0	0.001	0.024	0.030	0.
	6 (Sucker Creek)	0.145	0.004	0.021	0.005	0.
	*7 (Hemlock-above)	0.202	0.003	0.024	0.003	0.
	*7 (Hemlock-below)	0.183	0.004	0.050	0.014	0.
	8 (Outlet Creek)	0.0	0.002	0.016	0.003	0.
6/19/69	**Center of Lake	0.0	0.001	0.004		0.
9/09/69	1	0.0	0.001	0.004	0.0	0.
	2	0.0	0.001	0.002	0.0	0.
	3	0.0	0.001	0.006	0.0	0.
	4	0.0	0.001	0.008	0.0	0.
	5	0.0	0.001	0.011	0.0	0.
	6 (Sucker Creek)	0.027	0.005	0.001	0.018	0.
	*7 (Hemlock-above)	0.029	0.005	0.0	0.011	0.
	*7 (-below)	0.008	0.005	0.008	0.028	0.
	8 (Outlet Creek)	0.0	0.014	0.050	0.0	0.

* Above = Above area of residences
Below = Below area of residences

**Values are means of samples collected at 2-hour intervals from 6 a.m. to 10

Chemical and Biological Data* from Silver Lake and Tributaries
Tabled Chronologically Beginning in 1968

Table I

Date	Sample Station	NO3-N (MG/L)	NO2-N (MG/L)	NH-3-N (MG/L)	Urea-N (MG/L)	PO4-P	SD	MPN
1/12/70	1	0.066	0.002	0.003	0.018	0.004	6.0	
	2	0.080	0.002	0.004	0.005	0.004	5.0	
	3	0.013	0.002	0.004	0.002	0.003	4.5	
	4	0.018	0.002	0.003	0.005	0.004	4.0	
	5	0.025	0.002	0.006	0.007	0.005	4.0	
	6 (Sucker Creek)	0.192	0.004	0.001	0.009	0.016	7.0 CFS	
	**7 (Hemlock Creek-above)	0.363	0.002	0.003	0.005	0.011	24.0 CFS	
	**7(-below)	0.309	0.003	0.005	0.009	0.012		
	8 (Outlet Creek)	0.041	0.003	0.007	0.009	0.007	95 CFS	
3/26/70	1	0.0	0.002	0.001	0.020	0.004	3	
	2	0.0	0.002	0.001	0.015	0.004	3	
	3	0.0	0.002	0.001	0.016	0.004	3	
	4	0.0	0.002	0.001	0.015	0.004	3	
	5	0.0	0.001	0.0	0.016	0.0013	3	
	6 (Sucker Creek)	0.111	0.004	0.006	0.022	0.014	6 CFS	
	**7 (Hemlock-above)	0.206	0.002	0.002	0.005	0.007	15 CFS	
	**7 (-below)	0.176	0.002	0.004	0.009	0.009		
	8 (Outlet Creek)	0.003	0.002	0.001	0.016	0.004	142 CFS	

*Above = Above area of residences
Below = Below area of residences

**Values are means of samples collected at 2-hour intervals from 6 a.m. to 10 p.m.

State of Washington
House of Representatives

ALAN THOMPSON
Eighteenth District
112 Pleasant Hill Lane
Kelso 98626
Bus. Tel.: 274-6414
Res. Tel.: 274-8466

FORTY-THIRD LEGISLATURE 73-75
Assistant Majority Floor Leader
STANDING COMMITTEES:
Rules
Ways and Means
Appropriations
State Government
STATUTORY COMMITTEES:
Legislative Budget
Law and Justice
Alcoholism Advisory

October 17, 1973

TO: Cowlitz County Board of Commissioners
Cowlitz County Planning Department
Cowlitz County Health Department
Cowlitz County Shoreline Management Division
Silver Lake Flood Control District
Silver Lake Improvement Organization
Department of Ecology
Department of Natural Resources
Department of Game
Weyerhaeuser Timber Company
Longview Daily News

This notice is to announce a meeting, Friday, October 26, at 1:30 p.m., at the Castle Rock office of the Department of Natural Resources, involving representatives of the agencies and interests listed above with a team of researchers from the State Water Research Center.

A reading of the enclosed letter from the Center will explain the purposes of the meeting.

I hope your organization will find it possible to participate or provide representation.

Sincerely,

Alan Thompson

ALAN THOMPSON
State Representative

AT: dfo
enc:

University of Washington

Washington State University

STATE OF WASHINGTON WATER RESEARCH CENTER

SEATTLE

PULLMAN

Address correspondence to:

Water Research Center
Washington State University
Pullman, Washington 99163

Telephone: AC 509, 335-5531
SCAN 426-5531

October 3, 1973

Mr. Alan Thompson
112 Pleasant Hill Lane
Kelso, WA 98626

Dear Mr. Thompson:

As we agreed on the phone, the Water Research Center's team of researchers will meet on October 26 with a group of legislators, county officials and other interested parties, to discuss the eutrophication of Silver Lake. We will arrive at the Department of Natural Resources regional office in Castle Rock at about 11 a.m. We must leave in time to catch a flight from Seattle's Boeing Field which departs at 7:20 p.m.

The following persons will represent the Water Research Center:

Surinder Bhagat, Head, Sanitary Engineering Department and co-investigator in the Vancouver Lake study.

William Funk, professor, Sanitary Engineering, and principal investigator in a comprehensive study of the Coeur d'Alene Lake-Spokane River drainage.

John Orsborn, Head, Albrook Hydraulic Laboratory, and co-investigator in the Vancouver Lake study.

Allen Agnew, Director, State of Washington Water Research Center, and Professor of Geology.

Harvey Doerksen, Assistant to the Director, State of Washington Water Research Center.

We understand that there is considerable local interest in the present and future quality of Silver Lake. The objectives of the meeting, as we perceive them, are to learn from the local people what they see as the problem, what kinds of studies they feel are needed, and what courses of action may be appropriate. We can indicate the kinds of research which the University can conduct as an aid to decision makers. Together, a determination can be made of what research, if any, is required. Discussion of research costs and sources of funds should be deferred until we arrive at the stage where the need for research is documented, and the scope and nature of the required research is specified.

Pursuant to our telephone conversation I am enclosing two copies each of two reports on water quality based upon research conducted by Washington State University. (1) Summary Report, Water Quantity and Quality Studies of Vancouver Lake, Washington, by Surinder F. Bhagat and John F. Orsborn, September, 1971. This study was supported jointly by the Federal Water Pollution Control Administration and the Port of Vancouver with contributed support from Washington State University. (2) Good Water?, by David C. Flaherty. This highly readable report is prepared for the layman. It describes the comprehensive water quality study in Coeur d'Alene Lake and Spokane River which is being conducted by a joint Washington State University-University of Idaho team with funding from the U.S. Department of the Interior, Office of Water Resources Research. These two brochures should be helpful in describing the kinds of research service which can be performed by Water Research Center teams.

Sincerely,

Harvey Doerksen

Harvey Doerksen
Assistant to the Director

HD:cm

Enc. (2)

cc: Surinder Bhagat
William Funk
J. F. Orsborn

September 11, 1972

Mr. C. F. Gardner, Chairman
Board of County Commissioners
Cowlitz County
Cowlitz County Courthouse
Kelso, Washington 98626

Dear Mr. Gardner:

Mr. Biggs referred your letter of September 1 to me for consideration. The accelerated growth of weeds in Silver Lake is a problem observed in many of our Washington lakes on both sides of the Cascades. As yet, there doesn't seem to be a single, practical long-range remedy to solve this weed growth problem for all lakes. Each lake must be evaluated individually.

For many lakes, cutting the weeds appears to be the most effective method of short-term control. Several satisfactory weed harvesters are available. Also, service companies have been organized for the express purpose of harvesting and disposing of lake weeds on a fee basis.

Members of the Department's Technical Services staff are available to meet with you and the Silver Lake Improvement Organization to discuss our common lake weed problems. Please let me know a time and place convenient for you to meet with our representatives.

Thank you for contacting us. I am sure our staff will be of assistance to you.

Sincerely,

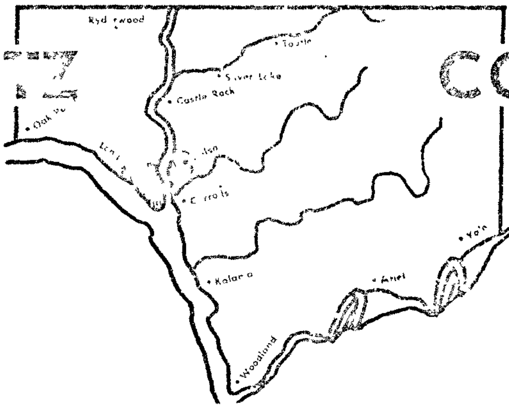
James P. Behlke
Executive Assistant Director
Public Services Branch

JPB:bao

cc: Governor Daniel J. Evans
Mr. John Biggs, Dept. of Ecology
Mr. Carl Crouse, Dept. of Game

BOARD OF COUNTY COMMISSIONERS

COWLITZ COUNTY



JAMES T. PERRY . . . . . . DIST. No. 1
CHAS. S. NORDSTROM . . . DIST. No. 2

C. F. GARDNER . . . . DIST. No. 3
ELEANOR KOLSTAD . . . . . CLERK OF BOARD

KELSO, WASHINGTON 98626

September 1, 1972

Bettle

JB

Mr. John Biggs, Director
Department of Ecology
Olympia, Washington

Dear John:

Over the past 12 years I have had the pleasure of working with you on many projects, some that we agreed on and some that we disagreed on. Nevertheless, our ability to serve has always led to the fullfillment of projects much needed.

I am back again.

As you know, Silver Lake has finally been stabilized. Also, you are aware that this body of water is very shallow and has a weed problem. When you were Director of the Department of Game we had one commitment from you that no money would be spent by your department for weed control until the lake was stabilized. Since that commitment many environmental considerations have changed and the removal of weeds in Silver Lake is of a much larger scope than was ever considered in 1968.

On behalf of the Silver Lake Improvement Organization I have been requested to contact you to see if there is someone in the Department of Ecology who we can work thru to put together the proper perspectus in an environmental impact study for this weed removal. We are considering weed cutting, aquatic weed spraying, dredging of the bottom of the lake, and any other possible alternatives that should be considered.

We therefore respectfully request, John, any information that you may have on any personnel in your department that could guide our group in reaching conclusions in solving this terrible problem.

The weeds in this body of water have really expounded and it is our feeling that within 10 years there will be very little inhabitable water for fish or for other recreational uses. Any consideration that can be given in this matter will be appreciated.

Yours very truly,

C.F. Gardner

C.F. GARDNER
Cowlitz County Commissioner
from District #3
Member of Silver Lake
Improvement Organization

cc: Governor Daniel J. Evans
Mr. Carl Crouse, Dept. of Game
University of Washington

Memo. 9/8/72

To: Jim Behlke

From: John R. Raymond

Jim: attached is a proposed draft in answer to Comm. Gardner's letter. I left out reference to possible federal aid (Sec. 314, H.R. 11896). I think this may have more impact if discussed at the meeting.

I put the burden on him to select a time and place for the meeting. Depending on the time and place, Scott Jeane, Ron Pine or I could meet with them. Ron is overburdened and I would like to take as much load off of him as possible — or maybe you have someone else in mind that could attend the meeting.

We can get some excellent active and/or passive assistance from Bill Funk (W.S.U.) and Mike Collings + D.C. Bortleson (U.S.G.S.) on any and all aspects of lake eutrophication and weed control. We have special project funds specifically for this type of aid w/ U.S.G.S.

I'll be back Friday, Sept. 15. Let me know if you need additional information

LIncoln 2-4210

G. L. PUTNAM, PH. D.
Professional Engineer
1628 North 167th Street
Seattle, Washington 98133

May 8th, 1971

Mr. Ronald A. Lee, Biologist
Washington Department of Ecology
P. O. Box 829
Olympia, Washington 98501

Dear Mr. Lee:

Attached herewith are the coal samples we discussed yesterday.

The samples were obtained April 12th by Ralph Gillispie who lives near the western city limits of Morton, about a block off Highway 508. Mr. Gillispie is well known in Morton and has an excellent reputation as a pioneer coal and mercury miner.

The locations of the samples, as shown me on a map by Mr. Gillispie, are:

No. 1 Sample. N1/2 Sec. 6, Twn. 12 N, R 5 E. Barnum mine - original Gillispie discovery. Chapman Creek area. Old road cut.

No. 2 Sample. N 1/2, W 1/4 Sec. 6, Twn. 12 N, R 5 E. Gillispie Property. No. 5 Tunnel of Morton Cinnabar Co. Two miles east of Morton on Highway 12, north 1 mile on unimproved road.

If I can be of further help, please let me know.

Sincerely,

Garth L. Putnam

Garth L. Putnam

MEMORANDUM

CHECK

INFORMATON ____

FOR ACTION ____

PERMIT ____

OTHER ____

State of Washington
Department of Ecology

TO:

FROM:

SUBJECT:

DATE:

Daniel J. Evans, *Governor* John A. Biggs, *Director* Olympia, Washington 98504 Telephone (206) 753-2800