APPENDIX F

Consultation documentation - PUD/Joint Agencies.

APPENDIX F
CONSULTATION DOCUMENTATION
PUD/JOINT AGENCIES

1. Memorandum from R. Metzgar to R. Vine Powerhouse Fish Passage Berm - Washington Department of Fisheries Inquiry, August 31, 1983.

2. PUD letter to Ken Bates, Washington Department of Fisheries, Sultan River Project, Fish Diversion Berm, September 6, 1983.

3. Jackson Project, Meeting Notes - Anadromous Fish Mitigation Studies, Joint Agencies - Powerhouse Fish Passage Berm, July 31, 1984.

4. Jackson Project Meeting Notes - Anadromous Fish Mitigation Studies, January 29, 1985.

5. PUD letter to Joint Agencies, Jackson Project Anadromous Fish Mitigation Studies, Progress Report Meeting, June 12, 1985.

6. PUD letter to Joint Agencies, Jackson (Sultan River) Project - FERC #2157, Anadromous Fish Mitigation Study, Adult Fish Passage (Powerhouse Berm) - Draft Final Report, December 11, 1985.

7. PUD letter to Joint Agencies, Jackson (Sultan River) Project - FERC #2157, Anadromous Fish Mitigation Study, Adult Fish Passage (Powerhouse Berm), 1986 Spawning Survey and Final Report, August 20, 1986.

8. PUD letter to Joint Agencies, Jackson (Sultan River) Project - FERC #2157, Anadromous Fish Mitigation Study, Adult Fish Passage (Powerhouse Berm), 1986 Chinook Spawning Survey Report, January 6, 1987.

9. PUD letter to Joint Agencies, Jackson (Sultan River) Project - FERC #2157, Anadromous Fish Mitigation Study, Adult Fish Passage (Powerhouse Berm), Study Report - Proposed Response to NMFS Review Comments, January 22, 1987.

10. PUD letter to Gary Engman, Washington State Department of Game, Jackson (Sultan River) Project - FERC #2157, Anadromous Fish Mitigation Study, Adult Fish Passage (Powerhouse Berm), Winter-Run Steelhead Spawning Ground Survey (1987), February 17, 1987.

11. PUD letter to Robert Gerke, Washington Department of Fisheries, Jackson Project - FERC #2157, Adult Fish Passage (Powerhouse Berm) Study, Pelton Turbine Operating Records - 1984 and 1986, February 19, 1987.

12. PUD letter to Joint Agencies, Jackson (Sultan River) Project - FERC #2157, Anadromous Fish Mitigation Study, Adult Fish Passage (Powerhouse Berm), Proposed Report to the FERC, November 19, 1987.

13. PUD letter to Joint Agencies, Jackson (Sultan River) Project - FERC #2157, Anadromous Fish Mitigation Study, Adult Fish Passage (Powerhouse Berm), 1987 Winter-Run Steelhead Trout Spawning Survey, November 24, 1987.

14. PUD letter to Joint Agencies, Jackson (Sultan River) Project - FERC #2157, Anadromous Fish Mitigation Study, Adult Fish Passage (Powerhouse Berm), 1987 Chinook Salmon Spawning Survey, December 9, 1987.

15. Washington Department of Fisheries letter to PUD, Review of February 5, 1987 Meeting Notes, December 31, 1987.

16. Washington Department of Fisheries letter to PUD, Review of the Revised Draft Report on Adult Fish Passage and Comments on the 1987 Spawning Survey Analysis, January 14, 1988.

17. United States Fish and Wildlife Service letter to PUD, Jackson Project - FERC #2157, Anadromous Fish Mitigations - Steelhead Spawning Survey, January 19, 1988.

18. PUD letter to Gary Engman, Washington Department of Wildlife, Jackson (Sultan River) Project - FERC #2157, Anadromous Fish Mitigation Study, Adult Fish Passage (Powerhouse Berm), 1988 Winter-Run Steelhead Trout Spawning Survey, February 18, 1988.

19. PUD letter to Gary Engman, Washington Department of Wildlife, Jackson Project, Anadromous Fish Mitigation Studies, Adult Fish Passage - Winter-Run Steelhead Trout, January 6, 1989.

20. PUD letter to Joint Agencies, Jackson (Sultan River) Project - FERC #2157, Anadromous Fish Mitigation Study, Adult Fish Passage (Powerhouse Berm), Fall Chinook Salmon Surveys - 1987 and 1988, January 20, 1989.

21. Washington Department of Fisheries letter to PUD, Review of the 1987 and 1988 Fall Chinook Spawner Survey Analyses, March 20, 1989.

22. PUD letter to Joint Agencies, Adult Fish Passage (Powerhouse Berm) Study, Winter-Run Steelhead Trout Spawning Ground Survey, March 27, 1989.

23. PUD letter to Joint Agencies, Jackson Project - FERC #2157, Adult Fish Passage (Powerhouse Berm) Study, 1989 Winter-Run Steelhead Trout Spawning Ground Survey, August 24, 1989.

MEMORANDUM August 31, 1983

TO: R. F. Vine

FROM: R. G. Metzgar

SUBJECT: Powerhouse Fish Passage Berm - Washington Department of Fisheries Inquiry

I received a telephone call from Mike Chamblin (259-5749) concerning the new berm. He inquired about construction methods and materials. WDF is of the opinion that the berm wasn't constructed according to the applicable HPA. Namely, ecology blocks were substituted for gabions. He asked how the berm was keyed to the channel and shoreline and tied together. I couldn't answer since I didn't observe any of the construction work.

Chamblin requested that copies of the plans and drawings of how the berm was/is built be sent to WDF, Olympia. They also requested a field inspection on September 20th starting at 10:30 a.m. They want to discuss it with Bechtel representatives who could answer their construction questions about the berm.

I have drafted a letter to the engineer regarding the above which requests appropriate assistance (hand-written draft attached).

RGM/sys

Attachment

SNOHOMISH COUNTY
PUD
PUBLIC UTILITY DISTRICT No. 1

2320 California St., Everett, Washington 98201 258-8211
Mailing Address: P. O. Box 1107, Everett, Washington 98206

September 6, 1983

PUD-12958

Mr. Ken Bates
Washington Department of Fisheries
Habitat Management Division
General Administration Building
Olympia, Washington 98504

Sultan River Project
Fish Diversion Berm

Dear Mr. Bates:

Enclosed is a drawing showing the modification of the fish diversion berm in the Sultan River adjacent to the Powerhouse. Joan Hett talked to Mike Chamblin on September 6, 1983 and explained the substitution and he requested we send a copy of the new diagram to you.

The only change made from the original drawing approved by Washington Department of Fisheries, was to substitute ecology blocks for gabions. Therefore, I feel a field inspection and meeting with Bechtel engineers is unwarranted at this time and if you have any additional comments, please feel free to contact me or Joan Hett at 258-8560.

Very truly yours,

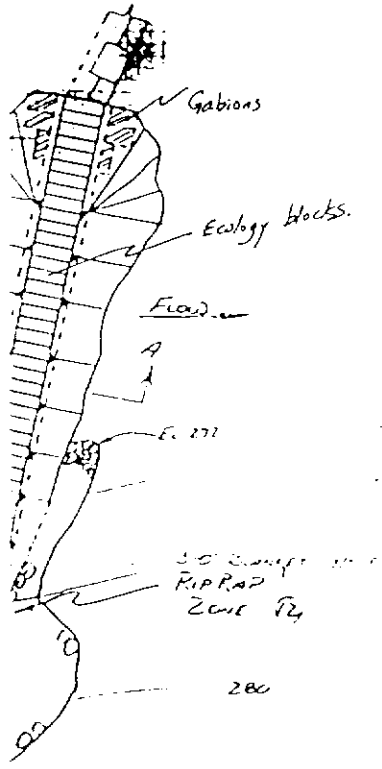
R. F. Vine
Sultan Project
Construction Manager

RFV/sys

Enclosure

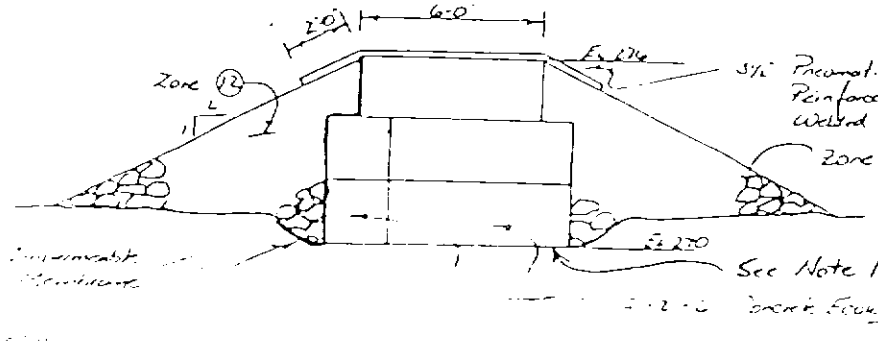
cc: T. C. Oxman
J. M. Hett

FISH DIVERSION BERM MODIFICATION	
CONSTRUCTORS PACCO SEATTLE	
DATE 7-14-83	



Berm - Plan

Scale 1" = 20'

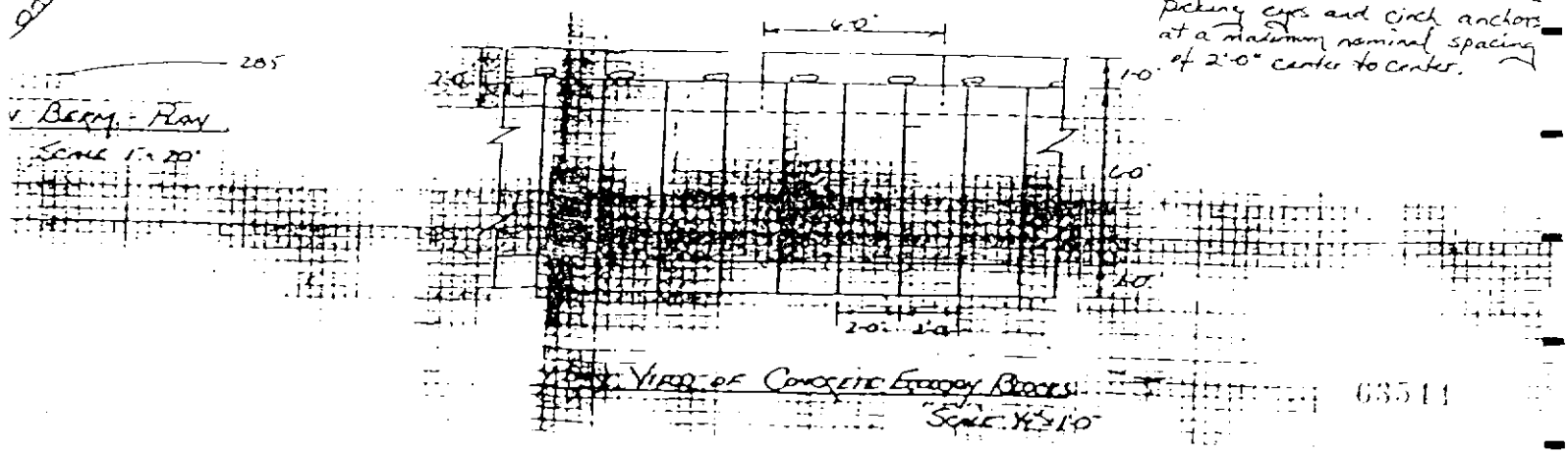


SECTION A-A

Scale 1" = 10'

NOTES:

1. Smooth River Bottom to Allow Blocks to be placed Level.
2. Tie welded wire to embedded picking eyes and cinch anchors at a maximum nominal spacing of 2'0" center to center.



VIEW OF CONCRETE ECOLOGY BLOCKS

Scale 1" = 10'

63511

Jackson Project
Meeting Notes - Anadromous Fish Mitigation Studies
Joint Agencies - Powerhouse Fish Passage Berm

Date: July 31, 1984 (0900-1420)
Place: Powerhouse - Sultan
Attendees: (See List Attached)

Purpose

This meeting was held at the suggestion of the Joint Agencies during a meeting on scoping the study plan (see letter to Joint Agencies - PUD 15465). The purpose was to observe the Pelton units running at full power, individually and separately and compare the discharge to the instream flow through the slot in the berm. Also, the fish water return line was observed in operation.

Conditions

Weather: clear, hot - temp. 80°+
Water: 1 NTU; ~110 cfs above the powerhouse, temp. 12°C.
Reservoir: 1,431.4' start and 1,431.2' at 1430
Discharge: Approx. 600-625 (620) cfs/unit.
Operation: Unit No. 1; Unit No. 2; and No. 1 and No. 2. Schedule followed as proposed in the letter.
Public Safety: Stationed Danny Miles at Sultan Park to warn people of changing river levels.

Field Tour

The Joint Agency personnel observed the powerhouse discharge into the river. Top deck, gantry crane and air depression tower were used as viewing points. Sorensen video-taped the three operating modes. The agency people asked questions about various discharges from the powerhouse: cooling water, sump, turbine discharge, and a small oil slick from Unit No. 2. The powerhouse was toured and control room activities related to fish were pointed out.

Noteworthy Items

1. Shoreline Turbidity: Kramer noted that the exposed clay formation on the right bank cause small turbidity plumes. Is the District going to rock/cover the clay deposit?

2. Water Temperature: a. Bates inquired about the temperature differential between above and below the berm. If the water is cooler below the berm (5 to 6°C) due to direct discharge, the fish will hold or perfer to stay in the "cooler" discharge area. Bates suggested keeping a record of the water temperature above and below the berm. This information could help explain observed fish behavior, "holding/staying" below the berm.

b. Metzgar mentioned the ave. annual water temp. adjustment and asked if they preferred warmer or cooler water. Given a choice, the preference expressed was for water temperature above the median value rather than below it.

3. Slot Velocity: The velocity of water through the slot was carefully scrutinized. Concern was expressed about the low velocity of the water through the berm versus full powerhouse discharge. The slot plume is dissipated readily by the powerhouse discharge, especially by Unit No. 1 only and full power.

4. Down Ramp Schedule: Bruya asked if we understood that the down ramp attentuation also meant travel time. That is, that the river should be stable for the entire reach from the powerhouse to the mouth of the river at one-half hour before daylight. He had asked Nephi Johnson and wondered if another letter was needed, based on his reply. Metzgar responded that the scheduler and he had worked on it, taking time of travel into account, without full explanation to the operators. Bruya seemed satisfied.

5. Powerhouse Fishing Prohibited Zone: The applicable WDG/WDF policy and regulations were discussed. Kramer came along specifically for that purpose. Cascade Creek and the USGS trolley cable were noted by Kramer as likely control points for the prohibited zone. Posting the notices on the powerhouse corners was mentioned as a way to reduce sign vandalism. Any emergency regulation could be published or just prepare the notice for routine Game Commission action with the 1985 Fishing Regulations (they didn't say which way they'd go although the latter seemed the most likely choice).

6. Road Gates/Keys/Public Access: Agency accessibility was brought up - gate keys for the agency. Metzgar described the pending plan for project lock/key control and key distribution to others such as the Joint Agencies. The plan was not completed yet. Joint Agencies will want keys for gates controlling access to the river.

7. Steelhead Mitigation: Engman opined that the agencies had been had by the PUD on water temperature between Culmback and Everett diversion dams. They didn't know about the auxiliary water line until the dedication tour. They thought the 20 cfs fish flow would be through the Howell-Bunger valve (which would/could be too cold for fish production). They had wanted a line through the dam for warmer water temps, but were told that it couldn't engineeringly be done. Hence, they settled for no fish ladder at the diversion dam and no flow from Culmback Dam for instream steelhead production in the upper canyon above the diversion dam. Metzgar responded that he hadn't been involved so wasn't familiar with it (during the negotiating). Engman said they asked McMillen about it during the open house and he stuttered and stammered. Engman said they'll probably check the correspondence and meeting notes on the issue.

Concerning the Settlement Agreement terms about steelhead smolts, Metzgar stated that the WDG was supposed to send a letter requesting funds and thereafter provide annual reports. Some money had been budgeted for steelhead smolts. Engman said they weren't ready yet for the letter writing stage, referring back to the earlier discussion above about their views on the whole issue. Possibly there might be something coming up from the agencies about steelhead production mitigation as presently exists in the Settlement Agreement.

8. Spada Lake Resident Fish Mitigation: Engman mentioned that irrespective of the status of Exhibits R & S with the FERC, the WDG would like to get started on the mitigation activity for resident fish. Apparently, a letter will be coming from WDG about it.

9. Fish Water Return Line: The field day included a trip to the discharge structure at L. Chaplain (portal No. 2) and to the diversion dam to witness return flows discharging to the river. A few agency people walked the right-of-way from the dam to portal No. 1. Two gold miners with a hydraulic dredge were encountered at the diversion dam. A car presumably theirs was parked at the outer gate.

10. Public Accessibility to West Shore of Sultan River: Metzgar pointed out the location of the relocated inner gate and the proposed site for public parking. The mileage from the inner gate to the dam was noted to be 1.1 miles. Potential problems with gold miner control of the road was noted.

11. Project Flood Control: Metzgar reported on recent events in flood control with the Corps of Engineers. Supposedly, the Corps' March 30th letter and report were coming to the agencies. They'd seen nothing yet.

12. Fish Passage Technical Issues: Several specific technical points were brought up by different individuals. Some of the ones recollected were:

    a. configuration and composition of the channel bottom in front of the powerhouse;
    b. how the discharge canals physically align with the river channel bottom (above, identical height, etc.);
    c. discharge velocities and flow structure coming out of the canals.
    d. operating schedule (seasonally);
    e. lack of velocity through the berm relative to units' discharge (loss of plume);
    f. ways to concentrate present flow through the slot;
    g. put together Metzgar field notes on fish observations with flow data and operation information;
    h. flow surge and decrease for the tests might stimulate fish to come up river; and
    i. backwater effect of unit discharge on instream flow.

13. Water Quality: Two items were apparent.

    a. a small oil slick issued from Unit No. 2 until start-up; and
    b. small turbidity pockets were noted along the west shore (right bank) coming from the exposed blue clay bed. Agency personnel talked about more shoreline rip-rapping.

14. Temporary Continuous 70 cfs/6 MW: Johnson advised about the proposed operation scheme. This caused some concern that it would/could interfere with fish migration. It also earlier contradicted statements by Metzgar that the Pelton units would be shut down completely for either repair or refilling of reservoir to higher levels.

15. Summer Run Steelhead Passage Study: Metzgar reported that the consultant had prepared a proposal for this year. However, since today would be the last day of discharge as seen there didn't seem to be a need or reason to do it now. Consequently, the scope of work hadn't been included in the plan sent to the agencies on July 24th. Also, summerrun fish were observed about the powerhouse and they had to go past under similar conditions. Therefore, Metzgar proposed that the summerrun steelhead passage study be postponed until next year. Something should be put in the scope of work (added), but it couldn't be definite.

    Engman concurred by saying to the effect that he couldn't think right now of what it should be, but postpone and do it next year. Metzgar replied that management will be uncomfortable with the probable indefiniteness but something in the scope of work will put everyone on notice of the need and intent. Details will have to be worked out later on.

    Schadt advised that the observing would be done twice a day at dusk and dawn when fish movement might occur and could be observable. Problems with unfavorable viewing conditions were tossed around and what to do. (See No. 17.)

16. Winter Run Steelhead: Engman stated that some of the proposed aerial surveying work should be shifted from January to May.

17. Passage Study Scoping (Methodological Problems): How to deal with the problems that will be encountered to determine successful passage and blockage were discussed. Water quality and quantities will change for instream flows. How will that be dealt with by the consultant and what will be the PUD response? Metzgar stated that the PUD would be relying upon the consultant Parametrix to report observations and note problems. If any fish passage problem noted, then corrective strategies would be suggested by the consultant. The strategies would require testing for effect. Bates suggested that they be tried for short periods of time. Metzgar thought that if a blockage problem occurred that the envisaged operational changes might fit the load demand schedule (meeting peak demand and yet be able to modify discharge rates).

18. Criteria for Acceptance: Agencies indicated that this will be difficult for them and that immediate approval based on limited data and one year wouldn't be possible. Metzgar advised that the approach he envisaged would rely upon comparing the agency/District historic data of numbers of fish, spawning areas used; number of redds; size of each run; etc. Judgements will have to be made regarding the results. First, is the proposed work likely to produce useful results? Second, what does the new information mean. Third, what needs to be done (if anything) based on the new data/information regarding project operation? The agencies have an obvious "wait-and-see what happens approach."

19. Scope of Work Review by Joint Agencies: The schedule for comments from agencies was discussed. Based upon personal vacation plans of everyone and competing deadlines (see below) it was agreed that the Joint Agencies would submit comments by August 6 on the scope of work prepared by Parametrix.

20. Anadromous Fish Mitigation Studies: Metzgar summarized the extent and schedule of project studies in progress or pending. Based upon the information he presented this is the schedule proposed.

8/6 - Fish Passage Study Scope of Work review comments due from Joint Agencies

8/31 - Gravel Quality Study (M. Wert) reports review comments by Joint Agencies (shifted this study to lower priority and comment due date from 8/6 to 8/31.

8/31 - Gravel Quantity Study draft report by Geo. Engineers would be distributed for agency review.

? - Steelhead Fishability Study - request for consultant proposals would be issued soon by the District.

Sept. - Ramping Rate Study scope of work send to agencies for review.

Nov. (84) - After the coho salmon spawning conduct some ramping rate studies (see below).

21. Ramping Rate Study Postponent: Metzgar advised that CH2M-Hill (Forrest Olson) had prepared a draft scope of work. However, Metzgar hadn't proceeded with further review for release to agencies because of the lack of water to conduct the tests. The water storage was lower than expected due to lowering reservoir for hydro-generator work in dam spillway/tunnel; delayed finish of fish water return line; and lack of rain/runoff. Metzgar proposed shifting the tests on ramping rates to November 1984 after coho spawning and before winter run steelhead up migration. No agency person objected at this time or could think of any problems with the proposal.

Attachment
RGM:mb
cc: R. K. Schneider
L. C. Grimes
R. F. Vine
G. Mixdorf
S. D. Kern
T. Dickson (Williams, Novack & Hansen)

JACKSON PROJECT

POWERHOUSE FISH PASSAGE BERM STUDY

JOINT AGENCY FIELD OBSERVATION

Attendance List - July 31, 1984

Name	Agency
Ken Bates	WDF
Ken Bruya	WDF
Gary Engman	WDF
Curt Kramer	WDF
Jon Linvog	NMFS
Dave Somers	Tulalip Tribes
Dave Stout	USF & WS
Don Weitkemp	Parametrix
Tom Schadt	Parametrix
Roy Metzgar	PUD
Gary Sorensen	PUD (video-taping)
Nephi Johnson	PUD

Jackson Project

Meeting Notes - Anadromous Fish Mitigation

Date: January 29, 1985 (1000-1315)

Place: Seattle, NMFS Sand Pt.

Attendees: Bruya (WDF), Engman (WDG), Ging (USDWS), Linvog (NMFS), Somers (Tulalip Tribes), Forest Olson (CH2M-Hill), Schneider, Grimes, Kern and Metzgar (PUD).

Purpose: Familiarize Joint Agencies with Project Power Management concerns.

Agenda: Copy attached with handouts.

S. Kern made the presentation following the agenda outline. Portions of the information were for background purposes. Specific assumptions and parameters used by the District in scheduling power production from the Jackson Project were explained. The interests of the District and the implications of Corps' flood control operation proposals were explained.

Numerous questions were asked by the Joint Agency people and answered by District attendees. Schneider emphasized that the District wishes to develop and maintain a good working relationship with the Joint Agencies. They should keep in mind that some of the things that the District is willing to do or can do are not necessarily the same for other utilities, particularly those that have load control. There are valid reasons for different responses by different utilities to operational requests by the fish agencies for mitigation actions.

Near the conclusion of the meeting Bruya handed out a revised report on the 1983 salmon spawner survey of the Sultan River. He advised that the 1984 survey showed a significant reduction in chinook spawning use of areas above the powerhouse and suggested that the reasons for it would require investigation.

At the conclusion the Joint Agency personnel expressed appreciation for the meeting and interest in similar meetings in the future. Schneider suggested that a presentation by the joint agencies on fisheries management would be useful to the District.

Attachments
RGM:mb
cc: PUD attendees (w/o attachments)
Glen Mixdorf

AGENDA

I. Introduction

II. BPA Power Sales Contract

A. Customer Types

1. Metered requirements

2. Computed requirements

3. Load control

B. Declaration of firm resources

1. Centralia

2. Jackson

3. Coordination Agreement

4. Resource capability (Exhibit J)

C. Power Rates

1. Energy

2. Capacity

3. Summer versus winter

4. Heavy load versus light load hours

III. System Load Shapes

A. Summer

B. Winter

IV. Discussion

A. Forced outages

B. Low inflows

C. Low lake elevation/cold weather

D. Incurred charges

V. Questions and answers

SNOHOMISH COUNTY PUD
PUBLIC UTILITY DISTRICT No. 1

2320 California St., Everett, Washington 98201 258-8211
Mailing Address: P. O. Box 1107, Everett, Washington 98206

June 12, 1985
PUD 16403

Mr. Gary Engman
Washington State Dept. of Game
16018 Mill Creek Blvd.
Bothell, WA 98012

Mr. Gwill Ging
U.S. Fish & Wildlife
2625 Parkmont Lane S.W.
Olympia, Washingtn 98502

Mr. Jon Linvog
National Marine Fisheries Service
7600 Sand Point Way N.E.
Bin C 15700
Seattle, WA 98115

Mr. Robert Gerke
Department of Fisheries
3939 Cleveland Avenue
Tumwater, Washington 98504

Mr. David Somers
Tulalip Tribes, Inc.
6700 Totem Beach Road
Marysville, Washington 98270

Gentlemen:

Jackson Project
Anadromous Fish Mitigation Studies
Progress Report Meeting

This is a reminder/confirmation of the meeting scheduled on the subject starting at 9:30 a.m. on June 19, 1985, in the NMFS Conf. Room - Sand Point, Seattle. The tentative agenda will be as follows:

9:30-12:00 Powerhouse ramping rate study -
Forrest Olson (CH2M-Hill)

12:00-1:00 Lunch Break

1:00-2:30 Fish Passage (berm) Study -
Tom Schadt (Parametrix)

2:30-3:30 River gravel and flood control -
Roy Metzgar (PUD) and M. Wert

3:30-4:00 Steelhead Fishability Study and Spada Lake Creel Census
Mike Wert

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The schedule within this agenda might require shifting among presentations due to a potential conflict that day with the pending FERC Rock Island hearing testimony schedule.

To aid meeting productivity some study results/mitigation proposals have been prepared in advance for your review prior to this meeting. For that purpose the following documents are attached:

1. Powerhouse Ramping Rate Study:

   a. Test Results

   b. Recommended Down Ramp Rates

2. Powerhouse Fish Passage Berm study:
   Summer-run Steelhead Fish Passage - Proposed Scope of Work

3. River Temperature Report

   a. Powerhouse

   b. Diversion Dam

We look forward to meeting with you on June 19th.

Sincerely yours,

L. C. Grimes
Chief, Generating Resources

Attachments (5)
RGM:mb

60u

SNOHOMISH COUNTY
PUD
PUBLIC UTILITY DISTRICT No. 1

2320 California St., Everett, Washington 98201 258-8211
Mailing Address: P. O. Box 1107, Everett, Washington 98206

December 11, 1985
PUD-16650

Mr. Gary Engman
Washington State Department of Game
16018 Mill Creek Blvd.
Bothell, WA 98012

Mr. Jon Linvog
National Marine Fisheries Service
7600 Sand Point Way N.E.
Bin C 15700
Seattle, WA 98115

Mr. David Somers
Tulalip Tribes, Inc.
6700 Totem Beach Road
Marysville, WA 98270

Mr. Gwill Ging
U.S. Fish & Wildlife
2625 Parkmont Lane S.W.
Olympia, WA 98502

Mr. Robert Gerke
Department of Fisheries
3939 Cleveland Ave.
Tumwater, WA 98504

Gentlemen:

Jackson (Sultan River) Project - FERC #2157
Anadromous Fish Mitigation Study
Adult Fish Passage (Powerhouse Berm) - Draft Final Report

In accordance with pertinent Project License Articles and Orders issued by the Federal Energy Regulatory Commission, Settlement Agreement conditions, and the Anadromous Fish Study Plans (Proposed), the District has completed the required study on fish passage at the Jackson Project's powerhouse. The primary study objective was to determine if the berm/passageway would facilitate successful upstream migration of anadromous adult fish. Delay and injury of fish and distribution of spawning were the specific concerns. The enclosed report prepared by District's consultant, Parametrix, Inc., presents the results of field studies conducted during the past year. Please submit your review comments to the District by January 31, 1986.

Yours very truly,

J. D. Maner
Executive Director
Utility Operations

Enclosure (2 copies)
RGM:jk
cc: Dr. Weitkamp, Parametrix, Inc. (w/o encl.)

SNOHOMISH COUNTY
PUD
PUBLIC UTILITY DISTRICT No. 1

2320 California St., Everett, Washington 98201 258-8211
Mailing Address: P. O. Box 1107, Everett, Washington 98206

August 20, 1986
PUD-17021

Mr. Gary Engman
Washington State Department of Game
16018 Mill Creek Blvd.
Bothell, WA 98012

Mr. Jon Linvog
National Marine Fisheries Service
7600 Sand Point Way N.E.
Bin C 15700
Seattle, WA 98115

Mr. David Somers
Tulalip Tribes, Inc.
6700 Totem Beach Road
Marysville, WA 98270

Mr. Gwill Ging
U. S. Fish & Wildlife
2625 Parkmont Lane S.W.
Olympia, WA 98502

Mr. Robert Gerke
Department of Fisheries
3939 Cleveland Ave.
Tumwater, WA 98504

Gentlemen:

Jackson (Sultan River) Project - FERC #2157
Anadromous Fish Mitigation Study
Adult Fish Passage (Powerhouse Berm)
1986 Spawning Survey & Final Report

In accordance with pertinent Project License Articles and Orders issued by the Federal Energy Regulatory Commission, Settlement Agreement conditions, and the Anadromous Fish Study Plans (Proposed), the District completed initial study requirements on fish passage at the Jackson Project's (Project) powerhouse. The primary study objective was to determine if the berm/passageway would facilitate successful upstream migration of anadromous adult fish. Delay and injury of fish and distribution of spawning were the specific concerns.

On December 11, 1985, the District sent copies of the draft, final study report prepared by the District's consultant, Parametrix, Inc., to you for review with a 45-day comment period. To date, our records show receipt of written comments in reply by only the National Marine Fisheries Service (NMFS). The District has delayed responding to those comments in anticipation of receiving additional comments from other Joint Agency members since it is more efficient and effective to respond en masse rather than serially to review comments. Neverless, the District will now proceed with developing a response to NMFS comments.

230U

The Washington Department of Fisheries (WDF) has verbally advised District staff of their interest in and concern about the apparent redistribution of fall chinook spawning in the Sultan River coincident with project construction/operation. Namely, fewer adult spawners/redds above or up-river from the power plant. In response, the District agreed to and conducted a cooperative, joint spawning survey with the WDF on the 1985 fall salmon spawning run. This is to advise you that the District proposes to do so again for the 1986 fall salmon spawning run.

The District has requested continued technical assistance from Parametrix, Inc., to again conduct the spawner surveys because of their previous work and experience with this project anadromous fish mitigation study. Our consultant will be contacting WDF directly to arrange and schedule joint, cooperative spawning surveys of the 1986 fall salmon run. The District will presume that this proposal for a joint, cooperative salmon spawning survey is acceptable unless we are notified to the contrary by you prior to September 22, 1986.

In closing, the District has requested a one-year extension from the Federal Energy Regulatory Commission (FERC) for License Article 55 in order to prepare a final report on Project anadromous fish mitigation studies, such as this one on the adult fish passage/powerhouse berm. Relative to that regulatory obligation, the consultant's report on this year's spawning survey should be completed by the end of November. If so, we plan on transmittal of that report to the Joint Agencies shortly thereafter and allow a 30-day review period. Consequently, we anticipate a target date of about January 31, 1987, as the revised deadline for Joint Agency review comments on the entire adult fish passage/powerhouse berm study conducted to that time. The District intends to prepare its report to the FERC (with an opportunity for agency review/comment prior to submittal) based on the comments received at that time.

Very truly yours,

ORIGINAL SIGNED BY R. K. SCHNEIDER

R. K. Schneider
Director, Power Management

RGM:jk
cc: Q. Edson, FERC, Portland Regional Office
J. Hunter, FERC, Washington D.C.
Dr. Weitkamp, Parametrix, Inc.

2300

SNOHOMISH COUNTY PUD
PUBLIC UTILITY DISTRICT No. 1

2320 California St., Everett, Washington 98201 258-8211
Mailing Address: P. O. Box 1107, Everett, Washington 98206

January 6, 1987
PUD-17206

Mr. Gary Engman
Washington State Department of Game
16018 Mill Creek Blvd.
Bothell, WA 98012

Mr. Jon Linvog
National Marine Fisheries Service
7600 Sand Point Way N.E.
Bin C 15700
Seattle, WA 98115

Mr. David Somers
Tulalip Tribes, Inc.
6700 Totem Beach Road
Marysville, WA 98270

Mr. Gwill Ging
U. S. Fish & Wildlife
2625 Parkmont Lane S.W.
Olympia, WA 98502

Mr. Robert Gerke
Department of Fisheries
3939 Cleveland Ave.
Tumwater, WA 98504

Gentlemen:

Jackson (Sultan River) Project - FERC #2157
Anadromous Fish Mitigation Study
Adult Fish Passage (Powerhouse Berm)
1986 Chinook Spawning Survey Report

This is to transmit the District's report on the results of the 1986 chinook salmon spawning survey conducted jointly with the Washington Department of Fisheries on the Sultan River. This survey was done as part of the ongoing anadromous fish mitigation study of adult fish passage (powerhouse berm). Due to the low number of chinook salmon adults returning to the river above the powerhouse (RM 4.5) in 1984 and 1985, the Washington Department of Fisheries advised the District that it was concerned about the situation since it coincided with the initiation of hydroelectric project operations. Thus, the District chose to participate in the chinook spawner survey conducted in the fall, 1986, and prepare the enclosed report.

The District proposes to incorporate the contents of the enclosed report in a revised version of appropriate sections of the report sent to you on December 11, 1986 (serial PUD-16650). Before doing so, however, please submit your review comments, if any, to the District on the enclosure by February 16, 1987.

To assist you in your review of the enclosed report and to refresh your memory on the overall study work completed previously, very shortly the District will also be sending you a draft of proposed responses to the review comments received from the National Marine Fisheries Service on the draft report sent to you last year on the entire study.

Very truly yours,

Original Signed By
L. C. GRIMES for RKS

Robert K. Schneider
Director, Power Management

Enclosure (2 copies)
RGM:jk
cc: Dr. Weitkamp, Parametrix, Inc. (w/o enclosure)

SNOHOMISH COUNTY
PUD
PUBLIC UTILITY DISTRICT No. 1

2320 California St., Everett, Washington 98201 258-8211
Mailing Address: P. O. Box 1107, Everett, Washington 98206

January 22, 1987
PUD-17226

Mr. Gary Engman
Washington State Department of Game
16018 Mill Creek Blvd.
Bothell, WA 98012

Mr. Jon Linvog
National Marine Fisheries Service
7600 Sand Point Way N.E.
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Mr. Gwill Ging
U. S. Fish & Wildlife Service
2625 Parkmont Lane S.W.
Olympia, WA 98502

Mr. Robert Gerke
Washington State Department of Fisheries
3939 Cleveland Ave.
Tumwater, WA 98504

Gentlemen:

Jackson (Sultan River) Project - FERC #2157
Anadromous Fish Mitigation Study
Adult Fish Passage (Powerhouse Berm)
Study Report-Proposed Response to NMFS Review Comments

This is to transmit the District's proposed response to National Marine Fisheries Service review comments on the draft study report sent to you on December 11, 1985 (by Serial PUD 16650). Recently, we also sent you a report on the 1986 Chinook Salmon Spawning Survey (January 6, 1987 by Serial PUD 17206).

The District intends to incorporate the contents of the 1986 report and the enclosed proposed response (as may be changed soon) in a revised version of the final report. Following these revisions to the report, including the results of pending consultations, the report will be completed and sent to the Federal Energy Regulatory Commission (FERC) in accordance with the Anadromous Fish Mitigation Study Plan (PUD, 1983) and FERC Orders (22 FERC ¶ 61,140 issued February 9, 1983; and 28 FERC ¶ 62,240 issued August 22, 1984).

0322T

Following up on the NMFS suggestion "to meet with the PUD and study consultant to constructively discuss everyone's comments and concerns", a meeting has been scheduled for 9:30 a.m., February 5, 1987 at NMFS, Sand Point, Seattle. Consultant staff members will be in attendance. The study report, the 1986 Chinook Salmon Spawning Survey Report and the proposed response by the District will form a basis for this meeting. A tentative agenda for this meeting is enclosed also. The ultimate purpose of this meeting, besides discussing comments and concerns, is to develop the basis for a report to the FERC in accord with the Settlement Agreement, Project License, and related FERC orders. Your assistance is needed in order for the District to report effectively to the FERC on the status of the adult fish passage (powerhouse berm) anadromous fish mitigation study.

Very truly yours,

ORIGINAL SIGNED BY R. K. SCHNEIDER
Robert K. Schneider
Director, Power Management

Enclosures
RGM:jk
cc: Dr. Weitkamp, Parametrix, Inc.
B. Johnen, FERC (w/o enclosures)
S. Fucile, FERC "
J. Hunter, FERC "
P. Foote, FERC "

HENRY M. JACKSON PROJECT
(FERC #2157)

ANADROMOUS FISH MITIGATION STUDY

Meeting On Adult Fish Passage (Powerhouse Berm)

Date & Time:	February 5, 1987 9:30 a.m.
Place:	Conference Room, NMFS, Sand Point, Seattle
Purpose:	Evaluate study results to determine whether or not objectives have been met and prepare a report to submit to the FERC.
Agenda (Tentative):	• Review Study Objectives (copy of objectives attached) • Review Study History • Review Study Results • Agency Comments/District Response • Discussion • Work Schedule for Report to FERC

03227

HENRY M. JACKSON PROJECT
(FERC #2157)

ANADROMOUS FISH MITIGATION STUDY

Adult Fish Passage (Powerhouse Berm)

Synopsis of Study Objectives

Settlement Agreement

"Fish Passage: Studies to determine whether the powerhouse berm facilitates successful upstream migration of anadromous fish and whether entry into powerhouse draft tube outlets causes injury to such anadromous fish."

Study Plan

"This study will be conducted to determine whether or not the powerhouse berm facilitates successful upstream migration of anadromous fish past the tailrace area. Also fish entry (if any) into the powerhouse draft tubes and subsequent effects will be determined."

Study Scope of Work

The fishery agencies identified two concerns regarding adult migration past the powerhouse:

1. delay - due to inability to find the berm slot and thus fail to reach upstream spawning areas in time; or expend too much energy in attempting to find the slot and be unable to spawn successfully upon reaching spawning areas.

2. injury - caused by entry into the discharge canals and subsequent contact with the turbine runner or walls/floor of the canals due to turbulence or flow/velocity changes.

To address these concerns, the study was designed to evaluate berm effectiveness and monitor adult fish behavior in the vicinity of the powerhouse, especially the tailrace and berm slot areas.

The primary study objective was to determine if the berm passageway would successfully facilitate upstream migration of anadromous adult salmonids past the powerhouse by visual observations and monitoring movements of tagged fish in the tailrace area; and by comparing pre-project spawning distribution in the Sultan River.

Another study objective was to determine which powerhouse operating scenarios provide the best passage conditions.

RGM: 1/20/87

0322T

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

ENVIRONMENTAL & TECHNICAL SERVICES DIVISION
847 NE 19th AVENUE, SUITE 350
PORTLAND, OREGON 97232 2274
(503) 230-5400

April 4, 1986 F/NWR5

Mr. J. D. Maner, Executive Director
Utility Operations
Snohomish County Public Utility
District No. 1
P.O. Box 1107
Everett, Washington 98206

Dear Mr. Maner:

Re: Jackson (Sultan) Project - FERC No. 2157, Draft Report on the Adult Fish Passage Study

National Marine Fisheries Service (NMFS) reviewed the referenced report and has the following comments for your consideration.

In general, an uncommonly low runoff year and the resulting narrow range of discharge scenarios that the study was based on provide unconvincing results that do not totally alleviate our concern with fish migration past the powerhouse. The following specific comments should serve to clarify this position.

Specific Comments

Page 5, Flow Regime, paragraph 2. For more clarity, the reference to minimum flows required in the FERC operating license should also specify the minimum flows required for release at the diversion dam which vary during the year from 95 cfs to 175 cfs. (1)

Page 11, paragraph 2. It's stated that "Steelhead trout were reported swimming over the berm in that flow regime during testing of the Pelton turbines in the Spring, 1984." This is too vague and unless there is supporting documentation indicating the exact time and date of the observation and the person observing it, the statement should be deleted. (2)

Page 17, Spawning Ground Surveys. For comparative purposes, data from chinook spawner surveys conducted prior to project construction and also in 1985 should be included in the report in tabular form. (3)

Page 26, Summer-Run Steelhead. It's indicated that temperature monitoring above and below the fish berm was initiated during the summer-run steelhead migration. However, there is no reason given as to why similar temperature monitoring did not occur for the chinook or winter steelhead observations. (4)

Response by Public Utility District No. 1 of Snohomish County
to Review Comments by NMFS
(As of January 22, 1987)

1. The discussion about minimum instream flows on page 5 in paragraph 2 under Flow Regime has been revised by adding the flow schedule from the Settlement Agreement which is approved by Order of the FERC issued February 9, 1983 (22 FERC ¶ 61,140).

2. The observation was reported verbally by Jim Daley, Project Construction Engineer (Bechtel) to R. Metzgar. However, a diary review did not produce the date/time of the reported observation. Mr. Daley should be considered as a reliable witness. However, without further substantiating information, the statement will be deleted. Deletion, however, does not mean that the incident did not occur.

3. Agreed. Additional pre-construction chinook spawner survey data will be added. Revisions will be made at appropriate places in the text, such as at page 12 (first paragraph) and page 17, reflecting this revision. Also, the 1985 and 1986 survey results will be added to the report.

4. Monitoring water temperature with respect to the summer-run steelhead was suggested to the study consultant by the Washington Department of Game. The adult summer-run steelhead upstream migration season (summer) is the most likely one to have widely fluctuating temperature changes, rather than fall (constantly declining) or winter (nearly constant). Also, there was no reason to specifically monitor water temperature since project operation, direct discharge to the river at the powerplant was limited due to low water storage in the reservoir. Consequently, the possibility of a thermal "barrier" existing at the berm was deemed unlikely. Also, see comment #8 below.

(2199U)

Page 44, Spawning Ground Surveys, paragraph 2. The second sentence in this paragraph is missing a word after "distinctly." We assume that the word should be "different." (5)

Page 55, Discussion

Chinook Passage

As indicated in Figure 10, page 35, the chinook observations occurred during a period of very low powerhouse dischages (30-70 cfs +). These discharges represented only 15 to 40 percent of total flow. What will normal powerhouse discharge be during a normal or wet water year during this period? This evaluation may need repeating with more normal powerhouse (i.e. higher) discharges since migration delays would not normally be expected at the flow splits observed. (6)

Page 56, paragraph 1. It's indicated that "Powerhouse discharge represented only 15 to 50 percent of the total flow, . . . " However, the maximum percentage of powerhouse discharge that we can calculate from Figure 10, page 35 is approximately 40 percent. This occurred during the first part of September when powerhouse discharge was about 70 cfs and total flow about 180 cfs. (7)

Page 57, paragraph 2. It's puzzling why "temperature differences at the berm slot" are indicated as a possible cause of a chinook spawning distribution shift when apparently no temperature data was obtained in this regard. If it is available, it should certainly be presented and discussed in the report. (8)

In addition, another possible factor discussed as causing a spawning distribution shift is the amount of available spawning habitat upstream and downstream from the powerhouse. On page 59, the statement is made that "Re-regulation of Sultan River flows due to project operations has increased the spawning area available, especially downstream from the powerhouse." However, no data or analysis are presented which shows how re-regulated flows are better for the lower river spawning habitat compared to the natural, pre-project flow regime. (9)

Page 61, paragraph 2. We agree with the statement that ". . . it is not possible at this time to determine if mitigative action is warrented" (sic). (10)

Page 63, Winter-Run Steelhead. The fact that only two radio tagged steelhead passed the powerhouse provides inconclusive data that the fish berm effectively passed steelhead. Since most of the tagged fish were of hatchery origin, few of these fish, if any, would be expected to migrate past the powerhouse since they were planted as juveniles in the lower river. (11)

5. The comment refers to page 44, but the sentence mentioned is on page 48. The missing word is "different" as suggested, and is in the revised text.

6. Although project operating experience and data are limited, the District believes that the instream flow condition at the powerhouse will be quite similar in most years to that recorded thus far. That is, the stream flow range and direct releases from the power plant, if any, will be small (100 cfs to 450 cfs) during the months of August-September through mid-October. The project will always be operated in a water-conserving mode during late summer and early fall, the historic period of usual low rainfall and runoff. The only two exceptions to this "rule" would be a loss of generation capacity at the Centralia Steam Plant or from other sources which are providing firm power to the regional system for the District's share of the electric power demand. Then, if water storage in Spada Lake permitted, the District would produce to the extent feasible the equivalent amount of power by the Jackson Project.

   The second exception would occur if the reservoir was filled (elevation 1,450') and spilling either was likely or occurring. Then the power plant would be operated so as to regain control of the reservoir. In this event, stream flow would be unusually high anyway due to the precipitation/runoff creating a spill condition. Also, the power plant would be operated so as to lower reservoir water surface elevation before late fall/early winter with expected usually heavier rainfall/runoff periods. This condition is one that needs to be analyzed (and will be) by pending operational studies to be conducted as part of the flood control operation plan required by FERC Project License Article 57.

7. The 50 percent of powerhouse discharge to total stream flow occurs during the last part of October with a discharge of 350 cfs in a total flow of 600 cfs (both approximate numbers). Thus, the powerhouse discharge contribution at that time is 58 percent as shown as Figure 10, page 35.

8. The matter of differential water temperatures at the berm was postulated as a possible factor affecting the upstream migration of chinook past the powerhouse. The comments on page 57 were speculative in both intent and content and since specific water temperature documentation is lacking, they will be treated similarly as the statement about the observation of steelhead swimming over the berm (see #2 above). They will be deleted. Furthermore, the most accurate statement assessing the 1985 season is: "Since the powerhouse was shutdown completely during the 1985 fall chinook spawning season, there could be no operationally related upstream passage problem at the berm".

   Speculation on water temperature arose due to the fact that instream flows in the Sultan River were maintained during the operational shutdown by releases at Culmback Dam. Since the Howell-Bunger valve is at the base of the dam, colder water than normal was released. This water was a few degrees colder than the historical minimum water temperature range. Thus, the upstream reaches of the river closer to Culmback Dam, such as those above the powerhouse, experienced colder water temperatures than reaches further downstream, which benefited from travel time and thus gradual warming of the water by warmer air temperatures and direct sunlight.

Page 44, Spawning Ground Surveys, paragraph 2. The second sentence in this paragraph is missing a word after "distinctly." We assume that the word should be "different." (5)

Page 55, Discussion

Chinook Passage

As indicated in Figure 10, page 35, the chinook observations occurred during a period of very low powerhouse dischages (30-70 cfs +). These discharges represented only 15 to 40 percent of total flow. What will normal powerhouse discharge be during a normal or wet water year during this period? This evaluation may need repeating with more normal powerhouse (i.e. higher) discharges since migration delays would not normally be expected at the flow splits observed. (6)

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9. Regarding the spawning habitat improvement to areas downstream of the powerhouse in the lower Sultan River (page 59), the statement is based on the establishment of an "optimum" minimum instream flow schedule by the Joint Agencies during the planning and licensing phase of Stage II of the project. Perhaps it is merely intuitive and, indeed, unsupported by data and analysis which show irrefutably how re-regulated flows are better for lower river spawning habitat compared to the natural pre-project flow regime. However, Project history shows that the Joint Agencies insisted on increasing minimum instream flows in the Lower river from 50 cfs from June 1 to September 30 and 125 cfs from October 1 to May 31 to 165 cfs (June 16 to September 14) and 200 cfs for the remainder of the year, respectively.

   In the past two spawning years (1985 and 1986), storage at Spada Lake has provided the ability to augment the natural seasonal low flows which would have occurred in the lower river without the Project. For example, over two weeks in September 1986 had flows below 100 cfs into Spada Lake (based on Project operational records). The lowest flow was 47 cfs. Similarly, such low flows were recorded for October, 1986. These low flows would have received some augmentation from tributary drainage below Culmback Dam. Nevertheless, the total flow would have been substantially below the present required minimum of 200 cfs for September 15 to June 15.

   A similar low flow situation occurred during the 1985 fall spawning season. At that time due to the large pink salmon spawner run, the Washington Department of Fisheries requested flow augmentation to provide more spawning areas and thus reduce redd supraimposition in some overcrowded river channel reaches. The spawner response was favorable in that adults moved into areas formerly inaccessible due to inadequate water depths and velocities. Thus, the District and its consultant speculated/concluded that more consistent and stable flows may have (emphasized) improved the desirability of existing spawning areas in the lower river.

10. Comment noted. The typographical error will be corrected in the word "warranted"..

11. The NMFS comments raise the point about passage effectiveness of the berm for winter-run steelhead. We believe the comment misses the point about the basic reason for radio-tagging, which was to monitor behavior in the tailrace area of the power plant, as one indicator of berm effectiveness. When high instream turbid river flows are combined with large discharges from the power plant, it is difficult to observe fish behavior in the tailrace, especially delay or entry, if any, into the discharge canals of turbine units nos. 1 and 2.

    It is an interesting artifact of the radio-tagging effort that apparently the fish trap and/or site chosen selectively fished mostly hatchery origin fish or that most wild fish successfully avoided the tagging fish trap, because post-project (Stage II) steelhead spawning ("wild" fish) above the berm was consistent with pre-project spawning records. Tagging only "natural" or "wild" fish rather than hatchery origin winter-run steelhead trout was intended, using the dorsal fin as the criteria. Discovery that most tagged fish were of hatchery origin instead of "wild/natural" was made through later laboratory analysis of scale samples collected at the trapping site while tagging fish.

Page 64, Summer-Run Steelhead. The summer steelhead study occurred during a period when the powerhouse was shut down most of the time, and therefore can't really be considered a valid test. The test should have occurred during more normal powerhouse operations. (12)

In addition, the flow split was about 109 cfs/327 cfs (above powerhouse/powerhouse discharge) during the time when the powerhouse discharge was 3° C. cooler than the water coming through the berm slot. Is this a normally expected flow split for this time of year? If the powerhouse discharge will normally be even greater, the temperature differential could have a more significant impact. Even 3° C. may be a problem, especially if the powerhouse discharge is large in relation to total flow.

The report should provide specific information on the ranges of streamflows and powerhouse discharges normally expected during the various seasons. Providing such information would allow a reviewer to better evaluate if the conditions studies were representative of conditions which will normally occur. (13)

We appreciate the opportunity to comment on the draft report and, pending receipt of comments from other fishery interests, believe that it may be appropriate to meet with Snohomish PUD and the study consultant to constructively discuss everyone's comments and concerns. (14) (15)

Sincerely,

Dale R. Evans

Dale R. Evans
Division Chief

cc: WDG (Engman)
WDF (Bruya)
USFW (Ging)
Tulalip Tribes (Somers)
Parametric, Inc. (Weitkamp)

12. Concerning the validity of the study on summer-run steelhead due to project shutdown, it appears that the months of July, August, September and mid-October will "normally" be low power generation periods for the Jackson Project. The three years of operating experience may not be definitive as each year was "unusually" dry. Nevertheless, when wetter summer seasons occur, the project will be operated to minimize spill yet conserve water. The exception has been discussed in #6 above. Consequently, the year of the study on summer-run steelhead (1985) appears to be "normal", except for water temperature, in terms of project operation (even through the project was shutdown completely), and thus the summer-run steelhead trout results are, indeed, valid and reflect expected future conditions and results for that species.

13. Project power operation is determined by several factors such as City of Everett water demand and consequent requirements to maintain certain elevations in Lake Chaplain; providing minimum instream flows; amount of water stored in Spada Lake; runoff into the reservoir; the snowpack; the time of year; terms of power supply contracts in force and Exhibit H (Figure H-3) in the License Amendment Application to the FERC. Some of these factors are dependent (interactive), and some are independent variables. Consequently, there are innumerable possible combinations which make it difficult to provide a reliable or reasonable range and schedule for powerhouse discharges which might be expected during various seasons. Generally, the following schedule may be expected, but the extent or duration of the discharge range will be determined by whether runoff conditions are "wet", "dry" or "average".

    The discharge, except for minimum flows, may be highly variable and the duration irregular during most seasons. The mid/late summer to fall season has been, thus far, and would seem to be the most likely to be consistent. The most extreme range with greatest frequency of extremes will occur during the winter. As a year advances from winter into spring, the likelihood of extremes, their frequency and duration decrease, reflecting the climate with a decrease in weather extremes (heavy rainfall). However, then the snowpack and snowmelt must be anticipated. The combination of air temperature, cloud cover and rainfall will determine the runoff produced from the snowpack. During the reservoir filling period, power operation is set to prevent spilling and to avoid (if possible) wide fluctuations in discharge. Project operation relies upon effective anticipation and interpretation of given conditions, meteorological and hydrological forecasts and projections of power supply/demand. Accuracy in setting power generation will improve with the experience gained from more years of project operation by the scheduler. Since the project has been operated for commercial power generation for only 2.5 years, the following generalized information is the best "guesstimate" that can be presented in response to the comment.

Page 64, Summer-Run Steelhead. The summer steelhead study occurred during a period when the powerhouse was shut down most of the time, and therefore can't really be considered a valid test. The test should have occurred during more normal powerhouse operations. (12)

In addition, the flow split was about 109 cfs/327 cfs (above powerhouse/powerhouse discharge) during the time when the powerhouse discharge was 3° C. cooler than the water coming through the berm slot. Is this a normally expected flow split for this time of year? If the powerhouse discharge will normally be even greater, the temperature differential could have a more significant impact. Even 3° C. may be a problem, especially if the powerhouse discharge is large in relation to total flow.

The report should provide specific information on the ranges of streamflows and powerhouse discharges normally expected during the various seasons. Providing such information would allow a reviewer to better evaluate if the conditions studies were representative of conditions which will normally occur. (13)

We appreciate the opportunity to comment on the draft report and, pending receipt of comments from other fishery interests, believe that it may be appropriate to meet with Snohomish PUD and the study consultant to constructively discuss everyone's comments and concerns. (14) (15)

Sincerely,

Dale R. Evans

Dale R. Evans
Division Chief

cc: WDG (Engman)
WDF (Bruya)
USFW (Ging)
Tulalip Tribes (Somers)
Parametric, Inc. (Weitkamp)

Discharge	Season	Comments
1,300 to 750 cfs	10/15 to 5/30	Used during winter to optimize stored water. In Spring, extent depends on snowmelt.
750 - 450 cfs	4/1 to 7/15	Depends on snowpack; used to maintain or gain reservoir elevation during filling.
450 - 200 cfs	5/15 to 7/15	Depends on rainfall; used to maintain or gain reservoir elevation during filling.
200 - 100 cfs	7/15 to 10/15	Used to provide instream flows during "dry" season.

In summary, the scheduler, with very few exceptions, maintains maximum water releases (approximately 1300 cfs) to the river for power when the reservoir is in State 1 and 2 as defined in Exhibit H, Figure H-3. When the reservoir is in State 3 water releases for power vary according to power demands with consideration given to present and forecasted conditions. When the reservoir is in State 4, only minimum water requirements are satisfied in terms of direct discharge from the powerhouse to the river.

14. The District agrees with the suggestion for further consultations and proposes that this set of responses to NMFS comments be the basis for revising the draft study report and for review/comment by other members of the Joint Agencies. These responses may be revised later also before submittal to the FERC along with other comments/responses produced by future consultations. The District desires to produce an accurate record of consultations for the benefit of the FERC in that agency's review of the adult fish passage anadromous fish mitigation issue.

15. Revised study report pages have been prepared reflecting review comments by the NMFS and the results of spawning surveys conducted in the fall 1985 and 1986.

SNOHOMISH COUNTY PUD
PUBLIC UTILITY DISTRICT No. 1

2320 California St., Everett, Washington 98201 258-8211
Mailing Address: P. O. Box 1107, Everett, Washington 98206

February 17, 1987
PUD-17257

Mr. Gary Engman
Washington State Dept. of Game
16018 Mill Creek Blvd.
Mill Creek, WA 98012

Dear Mr. Engman:

Jackson (Sultan River) Project - FERC #2157
Anadromous Fish Mitigation Study
Adult Fish Passage (Powerhouse Berm)
Winter-Run Steelhead Spawning Ground Survey (1987)

This is to transmit the District's proposed scope of work for a spawning ground survey for winter-run steelhead trout in the Sultan River. The attached scope of work is for year 1987 only. As we agreed during the meeting on February 5, however, similar surveys would be repeated again in 1988 and 1989. They would be conducted under a separate, different contract than the one now in force with Parametrix, Inc.

The reason for conducting these three surveys is presented in the scope of work. It is the District's understanding that the goal of these surveys is to obtain winter-run steelhead redd distributions during the spawning season in a year preferably when the Jackson Project powerhouse is providing greater duration of high discharges. This operational situation and resultant effect (if any) on up-river (above powerhouse) bound adult steelhead was not the operational situation during the one year surveyed thus far. Therefore, the need is to continue spawning ground surveys in order to obtain additional data, especially during a year when expected "worst conditions" occur for adult fish upstream passage past the powerhouse.

Since survey work is scheduled to commence very early in March, we would appreciate a prompt written reply from you as to the acceptability proposed scope of work (copy attached). Also, we would appreciate confirmation as to the evaluation criteria regarding the purpose and results of these surveys. If other Joint Agency members should have any comments involving revisions to the scope of work, we request that they coordinate with you about them before commenting to the District. Advance coordination will facilitate being able to initiate the survey on schedule. If the District

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receives no comments, either oral or written, by February 27, we will presume acceptance by the Joint Agencies and proceed under a contract change order with our consultant to implement the scope of work as proposed in the attachment.

Very truly yours,

ORIGINAL SIGNED BY R. K. SCHNEIDER

Robert K. Schneider
Director, Power Management

Attachment
RGM:jk
cc: Gerke, WDF
Ging, USFWS
Linvog, NMFS
Somers, Tulalip Tribes
Weitkamp, Parametrix, Inc.

Task 7: Steelhead Spawning Ground Surveys (Winter-Run 1987)

Scope of Work and Methods

Steelhead spawning ground surveys for the winter-run were conducted in 1985 as Task 7 in the Adult Fish Passage Study. The results of the 1985 survey indicated that steelhead redd distribution was consistent with the two pre-project year's data that had been collected. Discharge from the powerhouse during the 1985 steelhead migration was moderate. In 1986, during the steelhead migration, discharge from the powerhouse was considerably greater than 1985. This difference in powerhouse operating conditions from year to year has raised a concern over whether or not the steelhead migration (redd distribution) might be affected during a year when high discharge occurs from the powerhouse. As a result of this concern, steelhead redd distribution will be monitored during 1987 in an attempt to determine the distribution during a high discharge year.

Eight surveys of the Sultan River will be conducted during the 1987 winter-run steelhead migration. The surveys will begin the first part of March, will be conducted about every two weeks, and will end about the middle of June. When a survey occurs, it will be determined by favorable hydrological and meteorological conditions, preferably at regular two-week intervals. The surveys will be conducted from a helicopter, and will include surveying the entire river from the mouth to the Diversion Dam. Counts of steelhead redds judged to be complete redds will be made, and tallied according to whether or not they occurred upstream or downstream from the powerhouse.

Artificial redds will be created to determine redd life (i.e., how long does a redd remain visible before it is no longer discernible). Redd life data will be used to adjust total counts observed on each survey day to a total count for the season. Due to different flow and light conditions in the reaches upstream and downstream from the powerhouse, redd life may also be different between these reaches. Therefore, one artificial redd will be constructed in the reach downstream from the powerhouse and one will be constructed in the reach upstream from the powerhouse. Since the winter-run migration extends over a 3-4 month period, redd life may also change within this time period, especially as the day length becomes longer and the river water temperature increases. Therefore, two different pairs of artificial redds will be constructed, once in March at the beginning of the migration, and again in May towards the middle-end of the migration.

Products

Routine visual aerial observations
Spawner/redd surveys (counts)
Redd inventory location maps
Data report and assist District in responding to Joint Agency comments on report, if necessary

Schedule

March 1 to June 15, 1987 - Helicopter aerial surveys with tentative flight dates as follows:

March:	2, 16, 30
April:	13, 27
May:	11, 25
June:	10

March 2 and May 11 (tentative) - Artificial redd construction
June 30 - Data report to District
July 31 - Completion of Task 7

SNOHOMISH COUNTY
PUD
PUBLIC UTILITY DISTRICT No. 1

2320 California St., Everett, Washington 98201 258-8211
Mailing Address: P. O. Box 1107, Everett, Washington 98206

February 19, 1987
PUD-17261

Mr. Robert Gerke
Washington Department of Fisheries
3939 Cleveland Ave.
Tumwater, WA 98504

Dear Mr. Gerke:

Jackson Project - FERC #2157
Adult Fish Passage (Powerhouse Berm) Study
Pelton Turbine Operating Records - 1984 & 1986

This is to follow-up on Mr. Bruya's recent request for operating records of the Jackson Project's Pelton turbines during the adult chinook salmon upstream migratory period in the Sultan River. That period was defined as September 1 through October 10. The years 1984 and 1986 represent the only operating record thus far during that period because the Project was shutdown in 1985 during that time interval.

The requested records are attached. A chart has been made of these records to facilitate comparison of the two years (copy attached also).

In 1984, continuous powerhouse discharge from the Pelton turbines ranged from 39 to 70 cfs (3 to 6 MW) to augment upstream flow in order to maintain required minimum instream flows at the powerhouse stream gage. There was some interchange between Units nos. 1 and 2. In 1986, the discharge was a continuous 39 cfs except on September 28 and 29. Operational time in 1986 was split between Unit no. 1 from September 1 until September 18 when discharge was shifted to Unit no. 2 for the remainder of the time period.

In closing, the attached operating record addresses another issue besides chinook spawning distribution versus powerhouse discharge rates. Consider this information in the context of License Article 57 (Flood Control) and previous Joint Agency concerns regarding the potential effect of reservoir drawdown upon salmon spawning. Whenever the reservoir is in State 4 during September and October, the river flows and powerhouse discharge scenarios will be like 1984 and 1986 as shown on the attachments. Increasing Pelton turbine discharge significantly will not occur any sooner than necessary and only unless reservoir storage is pushed into State 2 before mid-October by early fall rains. Based on post-Stage II spawning surveys, it appears that the peak

of spawning in the Sultan River occurs in early October. Thus, there should be infrequent occurrences of higher than desired flows in the lower river causing interference with the fall salmon spawning season.

Very truly yours,

Original Signed By
L. C. GRIMES

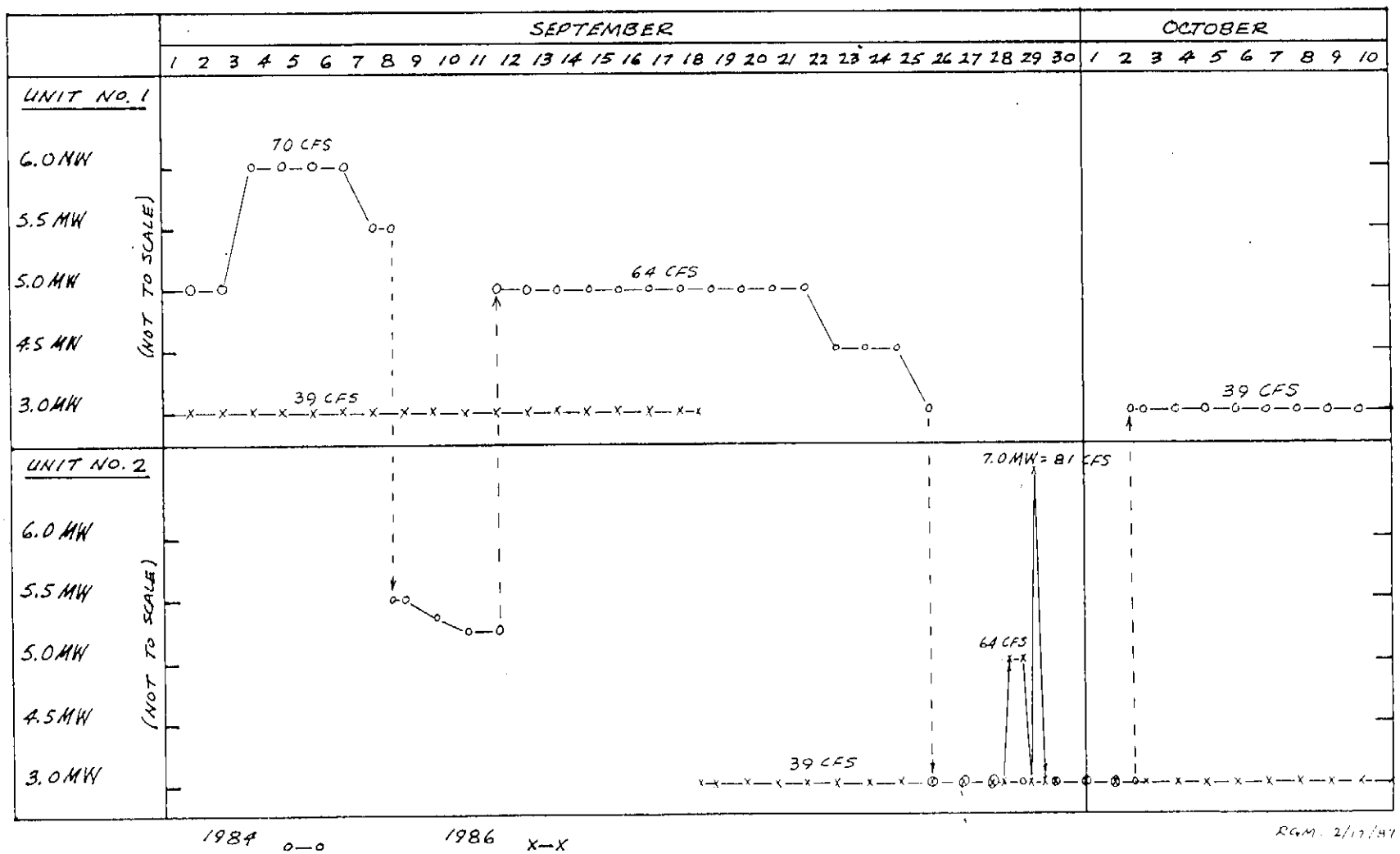
L. Chet Grimes
Manager, Generating Resources

Attachments (2)
1) Jackson Project Daily Generation and Discharge Summaries: 9/1 to 10/10, 1984 & 1986
2) Operating Record (chart) for Pelton Turbines: 9/1 to 10/10, 1984 & 1986

RGM:jk
cc: Engman, WDF (w/attachment 2)
Ging, USFS (w/attachment 2)
Linvog, NMFS (w/attachment 2)
Somers, Tulalip Tribes (w/attachment 2)
Foster, Corps Engrs. (w/attachment 2)

HENRY M. JACKSON HYDROELECTRIC PROJECT — FERC # 2157

OPERATING RECORD FOR PELTON TURBINES — SEPTEMBER 1 TO OCTOBER 10 (1984 & 86)



RGM 2/17/87

SNOHOMISH COUNTY
PUD
PUBLIC UTILITY DISTRICT No. 1

2320 California St., Everett, Washington 98201 258-8211
Mailing Address: P. O. Box 1107, Everett, Washington 98206

November 19, 1987
PUD-17417

Mr. Gary Engman
Washington State Dept. of Wildlife
16018 Mill Creek Blvd.
Mill Creek, WA 98012

Mr. Jon Linvog
National Marine Fisheries Service
7600 Sand Point Way N.E.
Bin C 15700
Seattle, WA 98115

Mr. David Somers
Tulalip Tribes, Inc.
6700 Totem Beach Rd.
Marysville, WA 98270

Mr. Gwill Ging
U. S. Fish & Wildlife Service
2625 Parkmont Lane S.W.
Olympia, WA 98502

Mr. Robert Gerke
Department of Fisheries
3939 Cleveland Ave.
Tumwater, WA 98504

Gentlemen:

Jackson (Sultan River) Project - FERC #2157
Anadromous Fish Mitigation Study
Adult Fish Passage (Powerhouse Berm)
Proposed Report to the FERC

On February 5, 1987, the District met with the Joint Agencies to review results of the study, discuss agency comments and District responses, and conclude the present phase of the study with a concensus report to the Federal Energy Regulatory Commission (FERC). The meeting was very productive. The next steps agreed to were:

1) conduct another winter-run steelhead spawning survey immediately (if possible);

2) District review of the Washington Department of Fisheries (WDF) comments on the fall chinook spawning distribution and surveys; and

3) District revise/update the report on the mitigation study and provide an opportunity for agency review prior to transmittal to the FERC.

This letter presents the results of follow-up efforts to the February 5 meeting. A copy of the District's notes for that meeting is attached.

1987 Winter-run Steelhead Spawning Survey

Regarding the winter-run steelhead spawning survey, a survey was conducted by the District on this year's run. The results have been prepared and will be transmitted to you in a separate report. After Joint Agency review, the report including agency comments (if any) will be sent to the FERC, but as a part of the overall effort on adult fish passage.

District Review of WDF Comments

The District has completed a review of WDF's comments on fall chinook salmon spawning survey results. Those comments were discussed on an informal basis by our consultant (Schadt) with the WDF staff (Bruya). Consequently, it was agreed to revise the final report to reflect WDF's comments and the District's response. It is our understanding that the District's response is acceptable to the WDF pending review of the final draft of the study report.

Final Report Revision and Review

A revised report has been prepared. The revisions reflect Joint Agency comments and incorporate the results of the 1985 and 1986 chinook salmon spawning surveys as well as the 1986 WDF comments on chinook salmon spawning surveys in the Sultan River.

Please submit your written comments, if any, to the District by December 31, 1987, on either the revised report or meeting notes. Thereafter, the District will proceed with preparing a transmittal to the FERC.

Further Mitigative Activities

Based upon the results of the February 5, 1987 meeting, the following items were identified as the remaining activities concerning adult fish passage.

1) Winter-run steelhead - conduct three additional spawning surveys, commencing in 1987 (if possible) and concluding by 1990. The need for conducting each year's survey or further ones will be based on the previous results looking for a representative "unfavorable" passage condition to have been evaluated. Since the initial survey in the series was done in 1987, the series would be completed in 1989 instead of 1990.

2) Delay or injury - the District will continue to monitor the tailrace and berm passageway areas. If any fish are observed either to be injured or exhibiting unusual behavior, the District will immediately notify the Joint Agencies (by telephone).

3) Chinook salmon - the WDF will continue to conduct fall salmon spawner surveys with assistance by the District.

Wrap-up

To conclude this phase of study on adult fish passage, the District intends to submit to the FERC the revised final report and supportive documents, such as meeting notes and written comments received previously from the Joint Agencies. The 1987 winter-run steelhead trout spawning survey report will also be sent to FERC. As agreed at the last meeting, the District's response to WDF comments and the attachments would determine whether another meeting would be necessary before the Joint Agencies would be able to provide written comments for the transmittal to the FERC. Unless we are advised to the contrary by any Joint Agencies member during the ensuing review period, the District will presume that another meeting is unnecessary before the District transmits the report and supportive documents, including Joint Agency comments, to the FERC.

Very truly yours,

ORIGINAL SIGNED BY
M. HATSCHER

Martin Hatscher
Acting Director, Power Management

Attachments (2)
1 - Meeting Notes (2/5/87)
2 - Revised Draft - Adult Fish Passage (Powerhouse Berm) Study Report

RGM:jk
cc: Plumb, FERC (w/o attachments)
Edson, FERC (w/o attachments)
Bell & Ingram
Dr. Weitkamp, Parametrix, Inc.

Jackson Project
Adult Fish Passage (Powerhouse Berm) Study
Meeting Notes

Date: February 5, 1987 (0945-1515)
Place: NMFS, Sand Point, Seattle
Attendees: Linvog (NMFS), Somers (Tulalip Tribes), Ging (USFWS), Gerke and Bruya (WDF), Engman (WDG), Schneider, Grimes, Metzgar and Sorensen (PUD), Weitkamp and Schadt (Parametrix, Inc. - PUD)
Agenda: Copy attached
Purpose: To start the meeting, Metzgar inquired if the proposed agenda was acceptable. It was. Metzgar repeated the purpose of the meeting as stated on the agenda - that a report should be made to the FERC on the adult fish passage study to comply with FERC Project License Orders. The extended deadline for reporting is in June, 1987.

Videotape Showing

Immediately prior to the start of the meeting and during the lunch break, video tapes produced by Sorensen on salmon spawning in the immediate vicinity of the berm slot during 1986, and of different discharge scenarios run for turbine units nos. 1 and 2 on July 31, 1984, were shown by Sorensen.

Study Objectives

Since it has been sometime since the study started, a review of the original objectives would be useful for the discussion later on. Metzgar briefly reviewed study objectives (copy attached) and their history.

Study History

Through reviewing file records, Metzgar prepared and presented a summary of milestone events in the study. Copies would be made available to the Joint Agencies (copy attached). Metzgar noted that study history record showed extensive participation/consultation with the Joint Agencies in developing the scope of work.

Review Study Results

Schadt presented a brief summary of methods employed on different salmonid species and the results. During the chinook salmon results, Bruya raised several technical questions related to differences between the WDF and Parametrix reports on the 1986 chinook spawning survey. (Note: The WDF report was received by the PUD and Parametrix the day before the meeting so they were unprepared to respond to WDF questions.) A major difference concerned water visibility and the consequent effect on fish/redd count. Gerke stated that there are significant differences upstream and downstream from the powerhouse. This difference is factored into WDF surveys,

but Parametrix hadn't done so. Also, there were questions by WDF about other issues in the Parametrix report on the 1986 chinook salmon survey.

Metzgar expressed disappointment that these technical issue differences had developed. The reason for joint surveys in 1985 and 1986 was to avoid them as much as possible. Gerke and Bruya responded that this developed only recently with the comments and data presented by Parametrix in their 1986 spawning survey report for the PUD.

Technical discussion followed regarding visibility, survey variability, and strategies for reconciling differences (if possible). Further discussion was deferred in order to cover the other fish species' results.

Regarding coho and chum salmon redd counts, in reply to a question by Ging about the coho salmon redd count, Schadt said that it was based upon spotting coho on a redd. Otherwise you couldn't tell the difference between coho/chum redds.

With the winter-run steelhead radio-tagging, the results were due to unintentionally tagging lower river hatchery plants. However, the dorsal fin height test wasn't effective. Later, fish scale analyses showed that all fish were of hatchery origin. Consequently, it was surprising that even two fish went upstream past the powerhouse. The major basis for determining the effect on winter-run steelhead was redd counts. The distribution percentage remained the same pre- and post-project above/below the powerhouse. Engman asked for clarifying information about the method for adjusting redd counts in Table 6 (p. 50) in the study report. Schadt provided some information, but he will refer to field notes and files for further reply. It was agreed that some of this additional information on steelhead redd counts should be added either to the text or as a footnote to the table.

Engman inquired also about the redd life factor. Schadt will review field notes and other records and follow by telephone discussion with Engman.

Weitkamp and Schadt provided information about the tailrace area, the discharge canals and the berm slot based on their observations from skin-diving in those areas.

Agency Comments/Discussion

To start this phase of the meeting, Metzgar suggested that the issues could be grouped or categorized in ways which might aid focusing comments and discussion. For example,

berm effectiveness - as a physical facility separate from power operations does it work getting adult fish upstream?

operations - what operational situations improve, change, effect the berm's effectiveness for adult upstream passage?

delay -

injury -

spawning distribution - upstream/downstream before and after powerhouse construction/operation?

Subsequent discussion identified criteria for evaluating the study results. They are:

- project operating conditions - what was the operating state (discharge) from the powerhouse?
- sufficiency of study information;
  - Is it representative of actual conditions?
  - How well does the study work report on the conditions?

With regard to operating conditions, Bruya requested discharge records for turbine unit nos. 1 and 2 during 1984 and 1986 for the month of September and through October 10. Grimes and Metzgar replied that those records would be provided to the WDF.

Further discussion ensued about project operation, operational history and likely future operation particularly during adult upstream migration by chinook salmon and winter-run steelhead trout. Linvog asked what were the project operating conditions during the study? Were those conditions representative of future/real conditions that could be expected? In reply, operating charts prepared by the Jackson Project scheduler (Rod Crocker) for 1984, 1985 and 1986 were presented by Metzgar and discussed in terms of adult migration implications and the adequacy/inadequacy of coverage by study results. Also, Metzgar referred to the discussion presented in the District's proposed response to written review comments by NMFS (Linvog). Metzgar also distributed copies of three tables drafted for the steelhead fishability mitigation study. These tables (copies attached) display the frequency of the flow regime of the Sultan River above 700 cfs during the months of December - February for 10 years before Stage II completion and since operation. These tables were presented as an example of flow/frequency analyses that could be done with the flow records of the Sultan River for upstream migratory periods.

Winter-run Steelhead Trout. In commenting on the report in combination with the operating information, Engman expressed reservations about the conclusions. This was due to the relevancy of study conditions coverage to other operating conditions and the limited operating record. There is considerable room for significant differences in future operating years. Also, we don't know about the 1986 spawning distribution which had much more power generating than 1985. Was 1985 redd count different from 1986?

Engman opinioned that radio-tagging was a failed effort. We don't know much about delay and maybe the data indicate to the contrary from report discussion. Metzgar asked about the significance of delay and how it could be determined or interpreted with steelhead trout? Engman replied that the bottom line is reproduction (spawning/eggs in the gravel) if the fish can't get upstream past the powerhouse, then the "delay" becomes important. The best way to approach it is spawner surveys. Schneider asked what do you do with the data? How would it be used? Engman replied that you determine the percentage of redds above/below the powerhouse and compare the distribution of various years, looking for any trend. Also, compare the spawning survey data results with operation scenarios for effect, if any, which might be detected, e.g., more power generation few redds upstream from the powerhouse equals delay/blockage.

Metzgar advised that he and the consultant agreed that the data were lacking for conclusive determination at this time and that spawning surveys (redd and fish counts) were the most effective method to obtain needed additional data. It was agreed that additional winter-run steelhead trout spawning ground surveys should be done. If possible, they should start this year (1987) and continue through 1989. So three years would be done. If not possible to ~~start in~~ 1987, then for sure start in 1988 and go through 1990. The survey period would extend from March 1 through early June, and would be done by helicopter. Insert 3

Summer-run Steelhead Trout. Engman advised that he was more comfortable with the study results on this species. No further survey work was necessary. Metzgar indicated that powerhouse personnel have been instructed to record any observations of salmon or steelhead in the tailrace/berm area. The PUD intends to remain vigilant regarding adult fish passage/behavior at the powerhouse, including more video-taping when opportunities arise.

Engman stated that he had some questions about certain statements in the text that could be handled by a telephone conversation with Parametrix. These included table construction - Table 6 (p. 50), artificial redd life, pre-project data sources, etc. Schadt provided some information, but it was agreed that Engman/Schadt would follow-up by telephone.

Lunch Break - videotape show.

NMFS comments/PUD Proposed Responses. At Metzgar's request, Linvog said that he disagreed with PUD response #9, particularly the use of the term "optimum" with minimum instream flows. Linvog thought that the instream flow schedule agreed to in the Settlement Agreement protected what they had. Metzgar responded by pointing out the significant difference between Stage I vs. Stage II instream flows. Also, he believed that the word "optimum" was not his choice but came from other Project documents. After further discussion, Metzgar advised that the objectionable statement(s) would be revised. The proposed revision would be coordinated with Linvog by telephone.

Chinook Salmon. Discussion resumed on the technicalities of WDF/Parametrix field work, data presentation and analyses concerning the 1986 spawning survey. Bruya briefly presented a few figures and tables from WDF's report. The Parametrix report (1986) is the basis for WDF concerns, according to Gerke.

Bruya asked about the shift in use by chinook of the Sultan River for spawning -- why did it occur? Various possible technical interrelationships or cause/effect were mentioned. Bruya suggested that more, additional effort should be expended trying to determine the cause. Metzgar replied that while not disagreeing, it seemed more fruitful to continue the spawning survey effort instead, because if the spawning distribution trend becomes favorable, then it may be a moot issue. If not, then more effort would be warranted although it may never be determined anyway no matter how much effort is put into it.

Injury

Prior to adjournment, Ging asked about ~~the~~ resolution to the concern about fish entry into the discharge canals and injury. How should it be handled? It was a concensus opinion that it was difficult to handle scientifically and provide meaningful results. Radio-tagging was probably the best way to go, but based on the cost/results, it was not desirable again. It was agreed that observation and monitoring would be acceptable for now. Metzgar advised that Project operators were instructed to report any incidents of dead/injured fish at the powerhouse. The PUD would report promptly to the Joint Agencies if any problems were detected.

Next Steps

It was agreeable to all parties present that the following would be the next steps.

1. Winter-run Steelhead - the PUD would prepare a proposal and submit it to the WDG (Engman) with copies to the other agencies. Preferably, the first year of the three-year effort would be 1987 (if the PUD contract change order procedure will allow it).

2. WDF 1986 report - the PUD needs to review this report and respond in writing to the WDF. The content of the PUD response will determine the need for another meeting.

3. Revise the final report - update the report reflecting the 1986 survey. Also, agency comments will be added. PUD will prepare draft responses as done with NMFS comments and provide an opportunity for review before including them in the report to the FERC.

   Gerke stated that it would be preferable to have agreement among the parties before the FERC rather than a dispute or disagreement and have a lesser knowledgeable party become involved with the issues. Metzgar agreed.

Attachments
RGM:jk
cc: Attendees

REVISIONS/ADDITIONS TO MEETING NOTES

Insert 1 Parametrix proposed that the visibility estimates are totally subjective and not based on any measurable factors such as flow, turbididty, river characteristics (depth, cover), etc. Parametrix stated that the differences that occur between index areas do not change substantially from survey to survey and therefore consistently taking the data at face value is as as accurate as applying a subjective visibility estimate. Weitkamp pointed out that there is no way of knowing what percentage of the fish were actually seen and that the application of visibility estimates to raw counts without some knowledge could substantially bias the expanded count. Gehrke verified that the visibility estimates are not based on any information from a system that has weir and actual known counts of fish, but said that would be the best way to develop that type of information. Bruya stated he believed that some visibility factor was important even if it was a subjective estimate. Everyone appeared to agree that it is desireable to find some objective index of visibility.

Insert 2 Engman also asked for clarification on how the pre-project data were adjusted, and wanted to be sure that the comparisons between pre and post-project were valid (i. e., both used adjusted redd counts based on redd life). Schadt mentioned that the pre-project redd counts were taken from an Exhibit E that the District had prepared as part of their license application and was not sure if the counts had been adjusted for redd life. Schadt also mentioned that he would need WDG to check their files to verify that redd life was factored into those counts and he would be in contact with Engman.

Insert 3 The three year time frame was chosen based on a need to monitor redd distribution during a migration season that included high discharge from the project (similar to 1986). Engman commented that if such conditions occurred during the 1987 survey, then further surveys would not be required providing redd distribution was consistent with pre-project years. If the 1987-1989 monitoring does not include a high discharge year, further discussion will be necessary to determine how much more, if any, monitoring is necessary.

SNOHOMISH COUNTY
PUD
PUBLIC UTILITY DISTRICT No. 1

2320 California St., Everett, Washington 98201 258-8211
Mailing Address: P. O. Box 1107, Everett, Washington 98206

November 24, 1987
PUD-17628

Mr. Gary Engman
Washington State Dept. of Wildlife
16018 Mill Creek Blvd.
Mill Creek, WA 98012

Mr. Jon Linvog
National Marine Fisheries Service
7600 Sand Point Way N.E.
Bin C 15700
Seattle, WA 98115

Mr. David Somers
Tulalip Tribes, Inc.
6700 Totem Beach Rd.
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Mr. Gwill Ging
U. S. Fish & Wildlife Service
2625 Parkmont Lane S.W.
Olympia, WA 98502

Mr. Robert Gerke
Department of Fisheries
3939 Cleveland Ave.
Tumwater, WA 98504

Gentlemen:

Jackson (Sultan River) Project - FERC #2157
Anadromous Fish Mitigation Study
Adult Fish Passage (Powerhouse Berm)
1987 Winter-Run Steelhead Trout Spawning Survey

This letter transmits the report on the results of the 1987 winter-run steelhead trout spawning survey. On February 5, 1987, the District met with the Joint Agencies to review results of the overall adult fish passage study, discuss agency comments and District responses, and conclude the present phase of the study with a report to the Federal Energy Regulatory Commission (FERC). The meeting was very productive. Among the next steps agreed to were to conduct another winter-run steelhead spawning survey immediately in 1987 (if possible).

The results of the 1985 steelhead spawning ground survey indicated that redd distribution was similar to pre-project years. However, additional surveys were requested by the Washington Department of Game (Wildlife) because powerhouse discharge was only moderate during the 1985 migration. Winter-run steelhead migration and distribution might be affected differently during periods of higher Project discharge than periods of lower powerhouse discharge. To address this concern, the District agreed to conduct three more steelhead spawning ground surveys through 1990, if necessary. If a high powerhouse discharge scenario should occur prior to then, further surveys

might not be needed, depending upon satisfactory results. At the time of the agreement to conduct more surveys, the District was uncertain whether the next steelhead spawning survey in the series could be started in 1987. Since the first one was done in 1987, the survey series now concludes in 1989 or earlier rather than 1990.

The attached report presents the results of the 1987 steelhead spawning ground survey in the augmented spawning survey series. While the spawning distribution data are the basic purpose of the survey, the Project operational history and related flow regime in the Sultan River, particularly at the powerhouse, are the critical factors that indirectly are being evaluated through the redd count/distribution. Therefore, we have added information on power operation/generation to the spawning survey data. The attached report will be useful also for your review of the proposed revision to the reservoir operating plan in accord with FERC Orders on Project License Article 57 - Flood Control.

Your review of the steelhead survey report is directed to address at least the following issues:

1) technical adequacy and acceptability of field work;

2) acceptability of survey results regarding adult fish migration and distribution; and

3) the need for another survey.

These issues are pertinent for determining whether to conduct another survey in 1988 and the scope of work for that survey. Your response is needed promptly in order to provide sufficient lead time for us to prepare for that survey, if warranted. Therefore, we propose about a 30 working day review period for the attached report. Since this spawning survey is part of the adult fish passage study, you may wish to coordinate your review/comments with those on the revised draft report on the overall study which we just sent to you. Accordingly, please submit your review comments, if any, about the attached report to the District by no later than December 31, 1987.

Very truly yours,

ORIGINAL SIGNED BY
M. HATSCHER

Martin Hatscher
Acting Director, Power Management

Attachment
RGM:jk
cc: Bell & Ingram (with attachment)
Plumb, FERC (w/o attachment)
Edson, FERC (w/o attachment)
Dr. Weitkamp, Parametrix, Inc. (with attachment)

SNOHOMISH COUNTY
PUD
PUBLIC UTILITY DISTRICT No. 1

2320 California St., Everett, Washington 98201 258-8211
Mailing Address: P. O. Box 1107, Everett, Washington 98206

December 9, 1987
PUD-17642

Mr. Gary Engman
Washington State Dept. of Wildlife
16018 Mill Creek Blvd.
Mill Creek, WA 98012

Mr. Jon Linvog
National Marine Fisheries Service
7600 Sand Point Way N.E.
Bin C 15700
Seattle, WA 98115

Mr. David Somers
Tulalip Tribes, Inc.
6700 Totem Beach Rd.
Marysville, WA 98270

Mr. Gwill Ging
U. S. Fish & Wildlife Service
2625 Parkmont Lane S.W.
Olympia, WA 98502

Mr. Robert Gerke
Department of Fisheries
3939 Cleveland Ave.
Tumwater, WA 98504

Gentlemen:

Jackson (Sultan River) Project - FERC #2157
Anadromous Fish Mitigation Study
Adult Fish Passage (Powerhouse Berm)
1987 Chinook Salmon Spawning Survey

The report on the results of the 1987 chinook salmon spawning survey on the Sultan River is transmitted herewith for your review. The attached report presents the results of the 1987 survey of spawning areas in the Sultan River. Your review is directed to address at least the following items:

1) technical adequacy and acceptability of field work; and

2) results of 1987 survey.

Since this spawning survey is part of the adult fish passage study, we request that you coordinate your review/comments on the 1987 salmon spawning survey report with those on the revised draft report on the overall

924U

study which we recently sent to you. Accordingly, please submit your review comments, if any, about the attached report to the District by no later than December 31, 1987.

Very truly yours,

ORIGINAL SIGNED BY
M. HATSCHER
Martin Hatscher
Acting Director, Power Management

Attachment
RGM:jk
cc: Bell & Ingram
Dr. Weitkamp, Parametrix, Inc.
Plumb, FERC (w/o attachment)
Edson, FERC (w/o attachment)

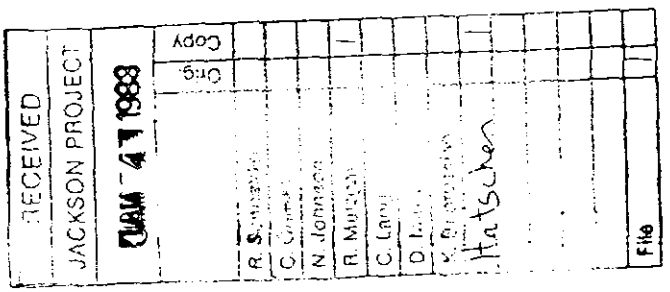
EPH R. BLUM
Director

STATE OF WASHINGTON

DEPARTMENT OF FISHERIES

115 General Administration Building • Olympia, Washington 98504 • (206) 753-6600 • (SCAN) 234-6600

December 31, 1987



Mr. Martin Hatscher
Acting Director, Power Management
Snohomish County PUD No. 1
P.O. Box 1107
Everett, WA 98206

Dear Mr. Martin:

Review of the February 5, 1987 Meeting Notes

Washington Department of Fisheries (WDF) has received your November 19, 1987 request for our review of the February 5, 1987 meeting notes. Due to the length of time between the meeting and the mailing of the meeting notes, our review is somewhat general in nature and is based on the notes in our files and staff memory of the meeting. We understand that the delay in receiving these notes is due to the changes in PUD personnel during 1987.

Our notes indicate that a brief discussion occurred at the opening of the meeting regarding the delay in the development of the gravel quantity and quality study (the monitoring of the sediment during high flows and the placement of scour chains in the river). Since this study change was proposed by the agencies, the PUD's consultant, and agreed to by the PUD in December, 1985, some reference to this discussion would be appropriate.

Although the meeting notes do not reflect this, my staff involved at the meeting believed that discussion regarding the validity of percent visibility occurred. Percent visibility is an estimation of the probable percent of fish observed and is based on the stream surveyors assessment of water turbidity, light levels, and other environmental conditions such as rainfall or cloud cover that affects the visual siting of fish. This percent visibility factor is used in stream survey reports by WDF. WDF had given the PUD or their consultant copies of all the project related spawner survey write-ups and these have included a percent visibility factor.

We were surprised that the PUD's draft berm passage report of December, 1986, and the spawner survey write-up of January, 1987, did not use this weighting factor. The use of this factor allows for meaningful statistical comparison between years. Without use of this factor, counts from years of poor or variable visibility between index areas are equated with years of excellent visibility throughout the index areas.

The index areas above and below the powerhouse are different in type of habitat, stream length surveyed, and viewing conditions. When percent visibility is not factored into the analysis, the results of the comparisons are significantly different than when the visibility factor is included. If this visibility factor was not relevant for the Sultan River Surveys, we would expect minor or no differences between the PUD's and our statistical analyses.

We note that comments regarding the spawning survey report of December, 1987, and the Adult Fish Passage study results of July, 1987 are not due until January 15, 1988. We expect to meet this deadline, but will contact Mr. Roy Metzgar of your staff if we experience any problems in this regard.

Thank you for requesting our comments on the meeting notes. We hope this letter will be of help in preparing clearer meeting notes and provide you with a better understanding of the issues discussed at the meeting. If you have further questions, please contact Mr. Ken Bruya at (206) 753-0250.

Sincerely,

Joseph R. Blum
Director

JRB:KB:bb

cc: Schadt, PMX (Tom Schadt-Parametrix)
Ging, USFWS
Somers, Tulalip
Engman, WDW
Linvog, NMFS

O PH R. BLUM
Director

STATE OF WASHINGTON
DEPARTMENT OF FISHERIES
115 General Administration Building • Olympia, Washington 98504 • (206) 753-6600 • (SCAN) 234-6600

January 14, 1988

Mr. Martin Hatscher
Acting Director, Power Management
Snohomish County PUD No. 1
P.O. Box 1107
Everett, Washington 98206

Dear Mr. Martin:

Review of the Revised Draft Report on Adult Fish Passage and
Comments on the 1987 Spawning Survey Analysis

Washington Department of Fisheries (WDF) has reviewed the July 1987 Draft Report. We would like to take this opportunity to thank you and your consultants for involving us in the review of this report. The effort appears to have been fruitful, for this report has improved substantially from the draft report discussed at the February 5, 1987 joint agency and Snohomish County PUD No. 1 (PUD) meeting. The significant differences between WDF's and the PUD's analysis have been adequately resolved or explained in the July draft of this report.

General Comments

Your consultant's analysis is slightly different from WDF's in that it compared the numbers of fish observed instead of the percent of fish observed above the powerhouse. The conclusion of our two analyses are similar. There appears to have been a significant decrease in the chinook usage of the upper Sultan River since the Jackson Project (and fish passage berm) was completed. Recent surveys show that the magnitude of this shift appears to be decreasing. We agree with your conclusion that this situation needs to be carefully monitored.

There is insufficient pre-project as well as post-project information to determine if a similar shift in coho usage has occurred. However, snorkel survey observations of juvenile coho upstream of the fish passage berm indicate successful passage and spawning above the powerhouse.

Specific Comments

Chinook Salmon, Executive Summary, p. v. The summary does not give the reader information regarding the number of chinook observed. This useful information was included in the coho and steelhead passage summaries. A suggested change would be to include that the passage results are based on observing 7 adult fish during periods of low (to moderate?) powerhouse discharge conditions.

Executive Summary, p. vi. This section states that the fish passageway effectively facilitated (made easier) the upstream migration of adult salmonids. The pre-berm construction chinook spawner surveys showed that fish movement beyond the powerhouse and berm site was greater before the berm was constructed, indicating that fish passage was facilitated by the natural stream conditions. There is insufficient coho data to determine if post-berm construction passage was easier than pre-construction passage. Therefore, the conclusion that the berm facilitates fish passage is inappropriate. The limited number of post-construction salmon passage observations indicate that salmon movement appeared not to be hindered under the observed operating conditions. Use of an alternate verb should eliminate this potential for misunderstanding. (See also the last paragraph on p 42.)

Coho, Spawning Ground Surveys, p. 14. The area and methods used to conduct the stream survey on November 8, 1984 were different than the survey conducted on December 5, 1984 (see page 30). Although this section does not state that the surveys were conducted in the same way, it could lead the reader to assume the same stream reaches were observed in the same manner since the differences are not discussed. The description of these differences should be included in the "Methods" section of the report.

Table 3, BPA Powerline to River Mouth, 10/09, p 27. Our records show that 16 dead adults were seen.

Table 4, Gold Camp and Diversion Dam, 10/02, p 28. Our records show that the visibility at Gold camp was 90% and the visibility at the Diversion Dam was 85%.

Chinook, Passage, p. 42. The reader should be able to review what the flow conditions were when fish moved through the fish passage slot. A table containing the date and time of fish passage observation, the numbers of fish seen to pass the slot, the stream flow above the powerhouse berm, and the operating flows from the powerhouse would be the type of information needed for this comparison.

We had hoped that this study would have sufficient flow releases to determine if fish will migrate through the berm slot regardless of the operating flows from the powerhouse. The worst case scenario for fish

passage would be full powerhouse operation while minimum flows were being released from the diversion dam. The report discusses that during the visual observation of chinook passage, 15-35% of the river's flow was from discharge at the powerhouse by the pelton units instead of a potential 90+%. It is possible that passage problems may occur under the 90+% operating scenario. WDF realizes that additional discussion regarding this issue is needed. However, if these conditions occur before we have developed the methods to monitor fish passage under these conditions, WDF and the other joint agencies should be contacted.

1987 Spawning Survey Analysis

WDF has contacted your consultant regarding changes warranted in the survey information presented in Table 1. These changes may affect the statistical analysis. We suggest that WDF and the other agencies comment on the 1987 survey after these changes are incorporated in the 1987 Spawning Survey Report.

Summary

These comments are provided by Washington Department of Fisheries (WDF) in order to help Snohomish County PUD No. 1 (PUD) prepare their final report. Overall, we find the report quite satisfactory. The above suggestions were made to identify or clarify potentially misleading or obscure sections. WDF hopes these comments will help you and your consultants in completing this final report. If you have any questions regarding these comments, please contact Mr. Ken Bruya at (206) 753-0250.

Sincerely,

Robert J. Turner /for

Joseph R. Blum
Director

JRB:KB:bb

cc: Schadt-Parametrix
Ging-USFWS
Somers-Tulalip
Engman-WDW
Linvog-NMFS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
2625 Parkmont Lane SW, Bldg B
Olympia, Washington 98502
206/753-9440 FTS 434-9440

January 19, 1988

Mr. Martin Hatscher, Acting Director
Snohomish County PUD No. 1
P.O. Box 1107
Everett, Washington 98206

Re: Jackson Project - FERC 2157
Anadromous Fish Mitigation - Steelhead Spawning Survey

Dear Mr. Hatscher:

We appreciate the opportunity to review the Snohomish Public Utilities District's report on the 1987 steelhead spawning survey. Your November 24, 1987 cover letter requested our response to the following three items: (1) the technical adequacy and acceptability of the field work; (2) the acceptability of survey results regarding adult fish migration and distribution; and (3) the need for another survey.

Before we respond to the above issues, a recap of the basis for the spawning surveys may clarify our position. It is our understanding that radio tagging efforts during 1985 were largely unsuccessful and inconclusive at determining the potential for powerhouse discharges to delay upstream steelhead migration. Failure of the study centered on the low number of trapped steelhead and their subsequent identification as being from hatchery stock. The most direct approach at addressing the passage issue would have been to redo the study with a sufficient number of "wild" steelhead. The logistical problems, together with the high cost associated with capturing and holding a sufficient number of steelhead until the proper test conditions, were believed to be sufficient to seek an alternative approach. Under this secondary approach, if the steelhead redd distribution above and below the powerhouse is shown to be similar to the pre-project distribution, powerhouse discharge is assumed to have an insignificant impact on steelhead passage. It is also assumed that three years of spawner distribution data, beginning with the 1987 survey, is sufficient to resolve the passage issue.

The study design of the steelhead redd surveys for documenting spawner distribution appears to be technically adequate. We do not have problems with the 1987 survey results which indicate that an acceptable percentage of the spawning steelhead passed the powerhouse discharge. It should be noted, however, that the runoff conditions and powerhouse operation did not approach the desired test conditions, i.e., high power output for an extended period of time accompanied with low river discharge. Consequently, the 1987 data, by itself, is insufficient to resolve the passage issue. At this time, we must continue to recommend the completion of the 3-year spawning survey.

In light of the low Spada Lake water level and the limited potential for the collection of redd data during conditions which are considered to present the most problems for passage, Mr. Roy Metsgar of your staff suggested the 1988 sampling be postponed with the study extended through 1990. If low rainfall and snowpack conditions persist through February, 1988, we would concur with the postponement. Otherwise, we would prefer continuation of the study and completion by the summer of 1989.

If you have any questions regarding the contents of this letter, please contact Gwill Ging at the above phone/address.

Sincerely,

David J. Stout

David J. Stout
Acting Field Supervisor

c: WDW, Bothell (Engman)
NMFS, Portland (Linvog)
Tulalip Tribes (Somers)

SNOHOMISH COUNTY
PUD
PUBLIC UTILITY DISTRICT No. 1

2320 California St., Everett, Washington 98201 258-8211
Mailing Address: P. O. Box 1107, Everett, Washington 98206

February 18, 1988
PUD-17733

Mr. Gary Engman
Washington State Dept. of Wildlife
16018 Mill Creek Blvd.
Mill Creek, WA 98012

Dear Mr. Engman:

Jackson (Sultan River) Project - FERC #2157
Anadromous Fish Mitigation Study
Adult Fish Passage (Powerhouse Berm)
1988 Winter-Run Steelhead Trout Spawning Survey

Due to the projected poor runoff conditions this Spring, we propose to defer the pending winter-run steelhead trout spawning survey on the Sultan River. The hydrological reasoning is presented in our recent letter (PUD-17720) to the U. S. Army Corps of Engineers (copied to the Joint Agencies) regarding a possible waiver of the reservoir rule curve for Spada Lake. Reducing the power plant's direct discharge to the river in order to store more water in the reservoir will reduce the frequency and duration of high discharge flows. Therefore, power plant discharge will be inadequate for the basic intent of the adult winter-run steelhead trout spawning survey.

The proposed deferral does not change the total number of remaining surveys agreed upon. One of the three surveys was conducted in 1987. Instead of concluding this series in 1989, the third and last spawning survey in the present series would be concluded with the 1990 (March-June) run. This revised schedule assumes that the second survey will be done in 1989 when runoff and power generation conditions are more favorable for spawner survey purposes.

This deferral was proposed officially to you by Roy Metzgar via telephone call on February 17 with telephone messages left with Messrs. Ging and Somers. The preceding paragraphs summarize the essence of our proposal. Our understanding with you is that you are comfortable with our proposal and concur with deferring the next survey until 1989. If someone else among the Joint Agencies should disagree with deferring the next winter-run steelhead trout spawner survey until next year or needs more information, they will

1032U

contact the District immediately (Roy Metzgar at 347-4319). Arrangements must begin at once for a survey to be done this year. No comment from the Joint Agencies by February 26, 1988, will mean concurrence with survey deferral.

Very truly yours,

ORIGINAL SIGNED BY
M. HATSCHER

Martin Hatscher
Acting Director, Power Management

RGM:jk
cc: D. Somers, Tulalip Tribes
R. Gerke, WDF
J. Linvog, NMFS
G. Ging, USFWS
Q. Edson, FERC
Bell & Ingram

SNOHOMISH COUNTY
PUD
PUBLIC UTILITY DISTRICT No. 1

2320 California St., Everett, Washington 98201 258-8211
Mailing Address: P. O. Box 1107, Everett, Washington 98206

January 6, 1989
PUD-18137

Mr. R. Gary Engman
Washington Department of Wildlife
Region 4
16018 Mill Creek Blvd.
Mill Creek, WA 98012

Dear Mr. Engman:

JACKSON PROJECT
ANADROMOUS FISH MITIGATION STUDIES
ADULT FISH PASS - WINTER-RUN STEELHEAD TROUT

A proposed Scope of Work is attached for this year's spawning ground survey for Sultan River winter-run steelhead trout. This will be the second in a series of three (as/if needed). The first was conducted in 1987. By mutual agreement, the second survey in 1988 was postponed due to anticipated poor (low) runoff conditions associated with the ongoing drought. Ironically, subsequent weather provided the river flow and powerhouse discharge conditions sought for these surveys.

Please review the attached proposed Scope of Work. The work will be done again by consultant (Parametrix).

If you have any comments, please notify the District by no later than January 31, 1989. That deadline is necessary for our contract administration, if the first survey is to be done in accord with the tentative schedule. If you prefer an earlier start than March 1st, please notify me immediately by telephone at 347-4319.

Very truly yours,

ORIGINAL SIGNED BY R. G. METZGAR

Roy G. Metzgar
Sr. Hydro. Environmental Specialist

RGM:vb
Attachment
cc: G. Ging, USFWS
J. Linvog, NMFS
D. Somers, Tulalip Tribes
R. Gerke, WDF
J. Jones, Bell & Ingram
T. Schadt, Parametrix

PROFESSIONAL SERVICES CONTRACT NO. 793
CHANGE ORDER NO. 13

Task 7: Steelhead Spawning Ground Survey (Winter-Run 1989)

SCOPE OF WORK AND METHODS

Winter-run steelhead spawning ground surveys were conducted in 1985 as part of the Adult Fish Passage Study. The results indicated that redd distribution was similar to pre-project distributions. This suggested that winter-run steelhead could successfully migrate past the powerhouse. However, powerhouse discharge rates during the 1985 season were considered only moderate. This prompted a request by the Washington Department of Wildlife for additional spawner surveys for up to three more years. Of particular concern is the ability of steelhead to migrate past the powerhouse during periods of high discharge.

The first of the three-year follow-up surveys was conducted in 1987. The 1987 results indicated a slightly higher distribution of redds upstream from the powerhouse than in previous years. The two pre-project years (1979 and 1980) and one post-project year (1985) showed similar distributions of 29 - 30 percent upstream of the powerhouse. In 1987 the upstream distribution increased to 50 percent. However, the flows during the steelhead spawning season were still only moderate at 74.1 percent of average. Since the primary purpose of these additional surveys is to monitor passage during high flow conditions, no surveys were conducted in 1988 due to anticipated low flows with drought conditions.

Conduct eight steelhead surveys during the 1989 winter-run migration. The surveys will be conducted every other week beginning the first week of March through the first week in June. The surveys will be done from a helicopter and cover the area of the Sultan River between the diversion dam (RM 9.7) and the confluence with the Skykomish River (RM 0.0). Observations will be made on the number and location of steelhead redds in the areas above and below the powerhouse (RM 4.5).

During the survey the location and percent visibility of each redd will be marked on a map of the river. This will provide a survey-by-survey distribution of redds for comparison with flow rates that occurred since the previous survey. The maps provide another tool for identifying and subtracting old redds from the current survey total.

Artificial redds or new redds (i.e., fish observed actively digging a redd) will be marked using colored rocks for identification purposes from the helicopter. Redds will be marked prior to the first survey and observed on subsequent surveys. This will provide an estimate of redd life (i.e., the amount of time that a redd remains distinctly visible). Redd life data is used to adjust the number of redds observed on a given survey to eliminate recounting older redds observed previously.

In order to minimize biases created by different flow and light conditions above and below the powerhouse, a redd will be marked in each reach. These redds will be observed from the ground prior to each subsequent aerial survey

to determine their degree of detectability. Redd detectability is rated as 100, 75, 50, 25 and 0 percent visible. These visibility ratings give a better indication of the effects of light and flow conditions on the aerial observations (i.e., survey visibility). They also provide an additional means of differentiating old from new redds during the survey and provides more accurate redd life data. When a redd is considered less than 50 percent visible due to scour or algae build up, a new artificial redd will be built.

Report to the District any sightings of injured adult fish or unusual observations which could be related to the basic purpose of the aerial survey work.

Prepare a written report of survey results. The report format and content will be similar to the previous report on the 1987 survey. Assist the District, if necessary, in responding to Joint Agency comments on the report and survey results.

PRODUCTS

Routine visual aerial observations
Spawner/redd surveys (counts)
Redd inventory location maps
Data report

SCHEDULE

The tentative schedule for helicopter aerial surveys is as follows:

March:	1, 15, 29
April:	12, 26
May:	10, 24
June:	7

Flight dates may change because of unfavorable weather or streamflow (visibility) conditions.

SNOHOMISH COUNTY
PUD
PUBLIC UTILITY DISTRICT No. 1

2320 California St., Everett, Washington 98201 258-8211
Mailing Address: P. O. Box 1107, Everett, Washington 98206

January 20, 1989
PUD-18155

Mr. Gary Engman
Washington State Department of Game
16018 Mill Creek Blvd.
Bothell, WA 98012

Mr. Jon Linvog
National Marine Fisheries Service
7600 Sand Point Way N.E.
Bin C 15700
Seattle, WA 98115

Mr. David Somers
Tulalip Tribes, Inc.
6700 Totem Beach Road
Marysville, WA 98270

Mr. Gwill Ging
U. S. Fish & Wildlife
2625 Parkmont Lane S.W.
Olympia, WA 98502

Mr. Robert Gerke
Department of Fisheries
3939 Cleveland Ave.
Tumwater, WA 98504

Dear Gentlemen:

Jackson Project - FERC #2157
Anadromous Fish Mitigation
Adult Fish Passage (Powerhouse Berm) Study
Fall Chinook Salmon Surveys - 1987 and 1988

This is to transmit copies of reports on salmon spawner surveys conducted during the fall 1987 and 1988 spawning seasons on the Sultan River. The surveys were conducted jointly by the Washington Department of Fisheries (WDF) and the District as in the past and in accord with previously agreed methods.

Concerning the 1987 report, it is our understanding that our consultant has coordinated with WDF (Bruya) on statistical and technical shortcomings in the initial draft. The copy attached has been revised accordingly.

Concerning 1988 results, substantially higher numbers of fish were observed in the river index areas above the powerhouse compared to previous years, either pre- or post-project. As in the other surveys, there was no mention of any injured fish which might be attributable to the project.

Recalling the purpose of these surveys and the overall study, it is "to determine whether or not the powerhouse berm facilitates successful upstream migration of anadromous fish past the tailrace

area...The success of upstream attraction of migrating fish past the powerhouse tailrace will be documented by visual observation and spawner surveys." The study plan states further that "comparisons will be made of pre-project and operational spawning of the same species downstream of the powerhouse in order to ascertain the degree to which balance of usage between upstream and downstream areas is maintained." (Anadromous Fish Mitigation Study Plans. PUD, 1983, p. 13).

After the 1985 survey WDF expressed concern about the results, noting both the low number and maldistribution of adult chinook spawners above the powerhouse as compared to downstream areas. It is our further recollection that no technical cause/effect relationship was attributed to the Jackson Project, except the "coincidence" of results of 1984 and 1985 with completion, start-up and operation of the hydropower project. Consequently, WDF asked for continued salmon spawner surveys by the District. We agreed.

Based on the 1988 results, yet recognizing the variability in spawner numbers that can and will occur naturally from year-to-year, we believe that the purpose of the study as regards salmon and the powerhouse fish passage berm has been fulfilled. Therefore, we propose to cease our salmon spawner surveys and reporting as of the 1988 survey.

Please submit your written comments on the attached reports and our proposal on future salmon spawner surveying to the District by February 28, 1989.

Very truly yours,

Original Signed By:
J. D. Maner

J. D. Maner, Director
Engineering and Power Supply

RGM:vb
Attachments (2)
1) Report on 1987 Chinook Spawning Survey
2) Report on 1988 Chinook Spawning Survey

cc: J. Jones, Bell & Ingram
B. Johnen, FERC, Portland (w/o att.)
K. Plumb, FERC (w/o att.)
T. Schadt, Parametrix (w/o att.)

PH R. BLUM
irector

STATE OF WASHINGTON

DEPARTMENT OF FISHERIES

115 General Administration Building • Olympia, Washington 98504 • (206) 753-6600 • (SCAN) 234-6600

March 20, 1989

Snohomish Co. PUD No. 1
ATTENTION: J.D. Maner, Director
Engineering and Power Supply
Post Office Box 1107
Everett, Washington 98206

SUBJECT: Review of the 1987 and 1988 Fall Chinook Spawner Survey Analyses

Dear Mr. Maner:

Thank you for sending us a copy of these draft reports for our review. We note that you will no longer be participating in the surveys with your consultant now that a more normal distribution is occurring with the spawners in the Sultan River. Washington Department of Fisheries (WDF) appreciates your past participation in the fall salmon surveys.

Overall, the present analysis appears to be fine. It utilizes different run size parameters than the WDF analyses and as such provides a slightly different view of the data. The results of our different statistical tests reached the same conclusion however, that a significant change in chinook spawner distribution occurred after the operation of the Jackson Project.

The 1988 spawner distribution was most encouraging. It is unfortunate that the river flows in the anadromous reach were drastically reduced this fall due to operational problems. We look forward to discussing what monitoring methods are available to ensure that these types of project shutdowns and concurrent instream flow problems do not occur in the future. Since we will be meeting in the near future regarding flood control, we should plan some time to discuss what options are available to protect this reach from unwarranted project shutdowns.

Specific Comments

1987 Survey, Results, page 2, last paragraph. Since the data has been tested for statistical significance, the results of the test should be used to describe what level of decrease occurred in fish using the Sultan River, i.e., a significant decrease. Describing the change without this term would indicate that a decrease occurred, but that it wasn't significant.

1987 and 1988 Surveys, Results. The introduction states that the surveys from 1978 to 1982 were used to determine pre-project conditions but only the 1978 to 1980 data were presented in the results section. Was the 1982 data used in the analysis? If it was, inclusion of the 1982 data are

needed in the results section. If it wasn't, a brief discussion regarding why it wasn't included along with correcting the statement in the introduction section is warranted.

1987 and 1988 Surveys, Results, Direct comparison of the numbers of fish using the index areas above the powerhouse in 1978-1980 [82?] and 1986-1988. WDF agrees that the present analysis is appropriate. We understand the value of and the differences between the actual spawner count data and the lower river spawners-upper river spawners ratio data. Without providing additional discussion in these reports, we are unsure whether future readers will understand why one set of data were used in the statistical analysis and the other not used. A discussion of the type of information provided by the ratio data versus count data appears warranted. Also, a brief discussion regarding the value of the upper reaches used by salmon may be beneficial to personnel at FERC who will review this information.

WDF is aware of the importance of the Sultan River's upper reaches. The adult fish are provided a greater level of protection due to the inaccessibility of this section of river. Additionally, emergent fry in the lower river are unable to reach the rearing habitat of the upper river due to their small size and swimming ability. The rearing potential of the upper river can be utilized only if spawning occurs in this reach and the resulting fry disperse into this habitat.

Maintenance of the naturally occurring ratio of lower river to upper river spawners is an indicator that the river is being 'seeded' with juvenile fish as occurred under pre-project conditions. A significant decrease in this ratio would indicate that the upper Sultan River rearing potential is not being utilized and greater demand is being placed on the lower river.

Since a larger return of fish to the river normally places more fish, within each of the different stretches than smaller returns, the count of fish in a reach over different years would be affected by run size variation as well as fish access to the reach. If a significant difference resulted from a test using the numbers of fish in the upper reach, it could be showing that run sizes are significantly different not whether spawner utilization of the upper river has changed. Whereas, statistical tests using the ratio of upper to lower river spawners data would indicate whether a significant change in utilization pattern is occurring.

Including a brief discussion of the above factors would present the reader with information needed for better understanding of the area, the count and ratio data, and the statistical test.

1987 and 1988 Surveys, Results, Table 2, Footnote 1. John Easterbrooks, WDF biologist, noted that the since the 1981 survey occurred sufficiently past the peak of spawning, analyses using these data may not be

representative of the 1981 run. Because of this factor, WDF has omitted the 1981 spawner survey data from further analysis. Footnote 1 should be changed to state that since the survey occurred past the peak of spawning, the data may not representative of that years return and were not included in the analyses.

1987 and 1988 Surveys, Results, Table 2. 1983 data were not used in the analysis. A footnote is needed to describe why these data were not used.

1988 Survey, Methods, page 2, paragraph 2. This paragraph appears to need further explanation. Based on the discussion in this paragraph, it is not clear to us why one couldn't compare redd counts in different index areas. A change in the wording would clarify why this type of analysis is not appropriate. For example, 'Comparing the redd counts above and below the powerhouse is inappropriate because of the inability to identify chinook redds in the lower river in pink salmon spawning years'.

1988 Survey, page 2, paragraph 5. There appears to be a typographical error in the third sentence. Was the word significant omitted from "Despite the statistically [significant] difference, the distribution..." ?

Summary

We appreciate the help provided by the PUD in the past with these surveys and note that if they wish, they are invited to accompany us in the future. Surveys will be planned for the end of September or the beginning of October to coincide with the peak of spawning. Feel free to contact us before the end of September for the date of the survey.

Except for the few minor suggestion and typographical points, WDF feels these reports to be very complete. If we can provide further explanation of our comments, please contact Mr. Ken Bruya at (206) 754-0250.

Sincerely,

Robert J. Gerke

Robert J. Gerke
Habitat Management Division

RJG:KB:br

cc: Engman, WDW
Linvog, NMFS
Somers, Tulalip
Ging, USFWS
Cashell, FERC
Martin, FERC

SNOHOMISH COUNTY
PUD
PUBLIC UTILITY DISTRICT No. 1

2320 California St., Everett, Washington 98201 258-8211
Mailing Address: P. O. Box 1107, Everett, Washington 98206

March 27, 1989
PUD-18260

Mr. Gary Engman
Washington State Dept. of Wildlife
Region 4
16018 Mill Creek Boulevard
Mill Creek, WA 98012

Mr. Jon Linvog
National Marine Fisheries Service
7600 Sand Point Way NE
Bin C 15700
Seattle, WA 98115

Mr. David Somers
Tulalip Tribes, Inc.
6700 Totem Beach Road
Marysville, WA 98270

Mr. Gwill Ging
U.S. Fish & Wildlife Service
2625 Parkmont Lane SW
Olympia, WA 98502

Mr. Robert Gerke
Department of Fisheries
3939 Cleveland Avenue
Tumwater, WA 98504

Gentlemen:

Adult Fish Passage (Powerhouse Benn) Study
Winter-run Steelhead Trout Spawning Ground Survey

This is to advise all members of the Joint Agencies that the District has initiated the subject survey in accord with our mutual agreement in follow-up to previous years' study results. A copy of the scope of work, development of which was coordinated with Mr. Engman, is attached.

The first survey was conducted by our consultant (Parametrix - T. Schadt) on March 8th with no redds or adult spawners reported. Mr. Schadt is making survey reports direct to the Washington Department of Wildlife (Steve Foley) after each flight.

On the survey flights extra seats are available, if anyone would like to participate. Mr. Ging has so indicated (his time permitting) later in the spawning season. The helicopter service chartered for the surveys is certified for flying Federal employees. The survey flight schedule is tentative for reasons stated in the scope of work. Survey scheduling coordination could be done to accommodate your schedule, subject to favorable conditions for conducting a survey.

(1529U)

Please contact Roy Metzgar at 347-4319 if you have any comments or wish to arrange participation in the spawning ground surveying.

Very truly yours,
Original Signed By
J. D. Maner

J. D. Maner, Director
Engineering and Power Supply

RGM:db
Attachment

cc: L. Cashell, FERC (triplicate)
J. Jones, Bell & Ingram
S. Foley, WA Dept. Wildlife
T. Schadt, Parametrix, Inc.

(1529U)

PROFESSIONAL SERVICES CONTRACT NO. 793
CHANGE ORDER NO. 13

Task 7: Steelhead Spawning Ground Survey (Winter-Run 1989)

SCOPE OF WORK AND METHODS

1. Conduct eight steelhead surveys during the 1989 winter-run migration, weather and streamflow conditions permitting. The surveys will be conducted during March through June in accord with the schedule. The surveys will be done from a helicopter and cover the area of the Sultan River between the diversion dam (RM 9.7) and the confluence with the Skykomish River (RM 0.0) Observations will be made on the number and location of steelhead redds in the areas above and below the powerhouse (RM 4.5). During the survey the location and percent visibility of each redd will be marked on a map of the river.

2. Mark artificial redds or new redds (i.e., fish observed actively digging a redd) in each reach above and below the powerhouse using colored rocks for identification purposes. Redds will be marked prior to the first survey and weekly thereafter, and will be observed on subsequent surveys. These redds will be observed from the ground prior to each aerial survey to determine their degree of detectability. Redd detectability will be rated 100, 75, 50, 25 or 0 percent visible, indicating the effects of light and flow conditions on the visibility of aerial observations.

3. Report to the District any sightings of injured adult fish or unusual observations which could be related to the basic purpose of the survey.

4. Report afterwards (by telephone or telefax) to the Washington Department of Wildlife (Steve Foley) the results of each survey.

5. Prepare a written report of survey results. The report format and content will be similar to the 1987 survey report. Assist the District, if necessary, in responding to Joint Agency comments on the report and survey results.

PRODUCTS

Routine visual aerial observations
Spawner/redd surveys (counts)
Redd inventory location maps
Data report

SCHEDULE

The tentative schedule * for helicopter aerial surveys is as follows:

March:	1, 15, 29
April:	12, 26
May:	10, 24
June:	7

*. Flight dates may change because of unfavorable weather or streamflow (visibility) conditions.

Draft report due - July 15, 1989
Completion of work - September 15, 1989