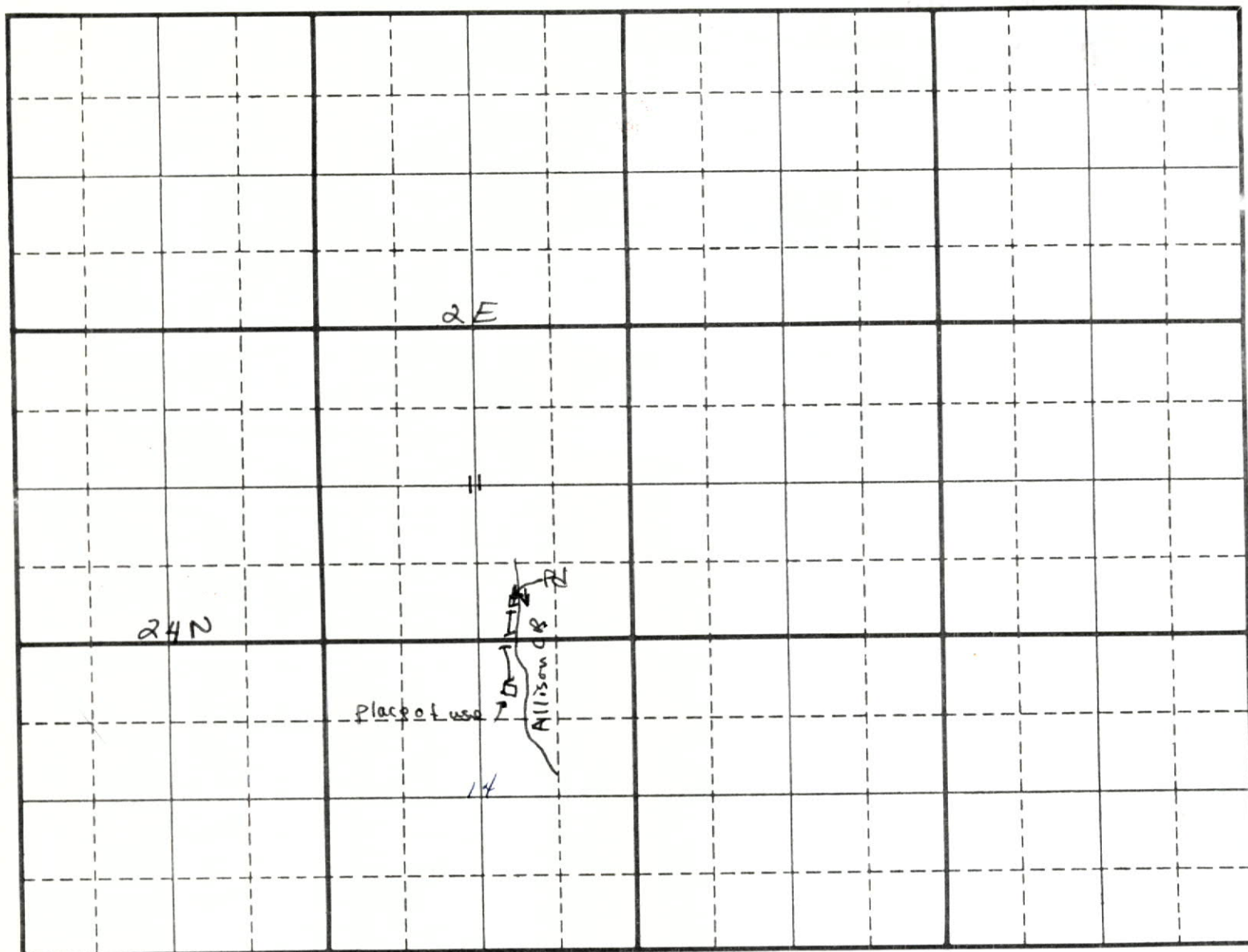


(8) Remarks _____



Scale: 2 inches equal 1 mile.

Map should show the location of the point of diversion and the place of use of the water by 40-acre subdivisions, section, township and range of the public land survey system.

State of Idaho)
County of Ada) ss.

Be it known that the undersigned, being duly sworn, deposes and says that he, she, they subscribed the foregoing claim to a water right, together with all attached information, and that the matters and facts therein are true to the best of the affiant's knowledge.

Sworn to before me this 20 day of April, 1981.

Gus Carlson
(Claimant)

Nancy M. Hathway
Notary Public
Residing at Boise

My commission expires Life

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MAR 03 1988

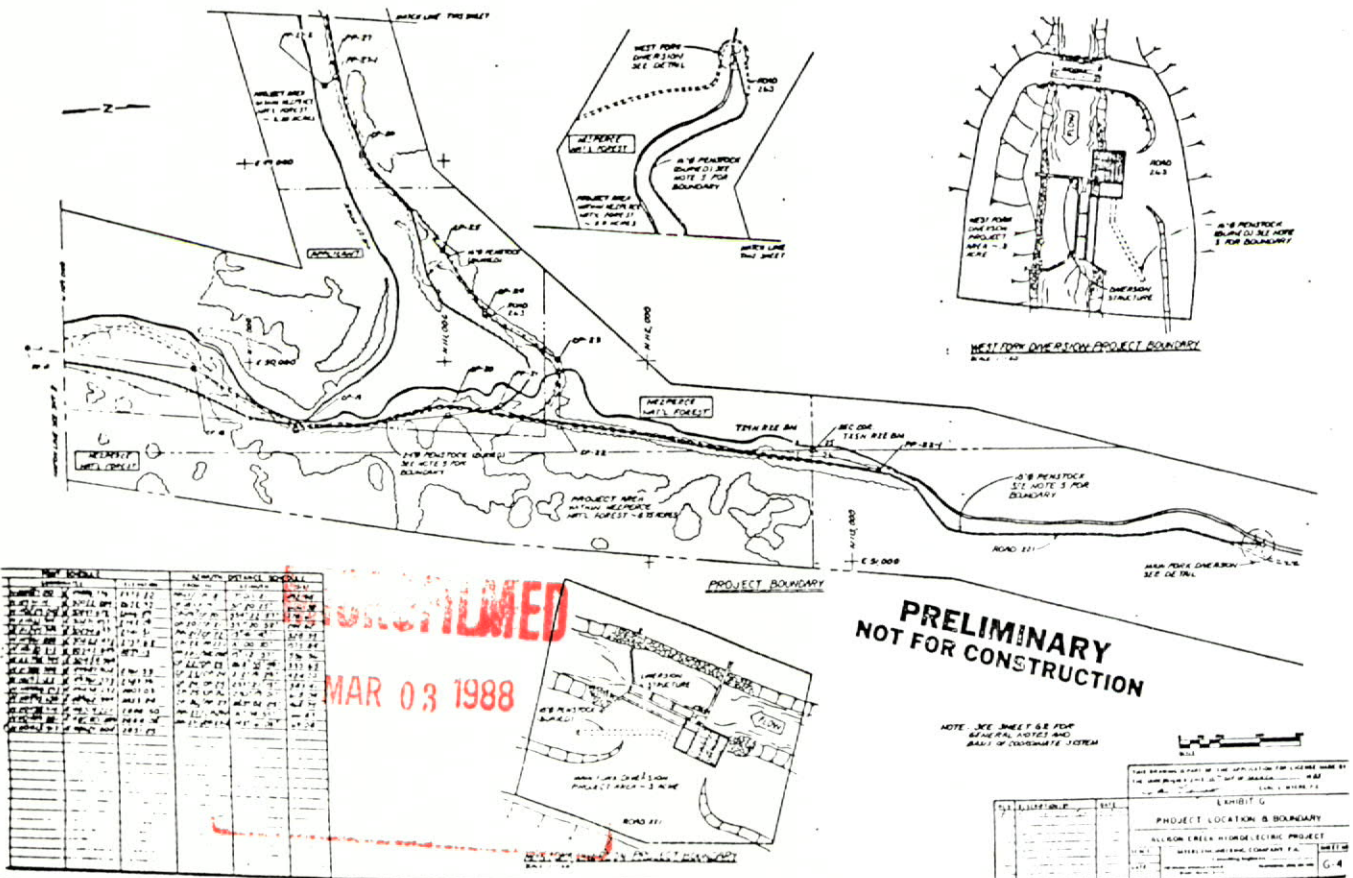
FOR DEPARTMENT USE ONLY

Received by <u>mm</u>	Date <u>4-20-81</u>	Exception filed by:	Forwarded to	Date
Prelim. check by <u>pf</u>	Date <u>4-28-81</u>		claimant by:	
\$30.00 fee received by <u>mm</u>	Date <u>4-20-81</u>	<u>4328</u>	<u>nea</u>	<u>5/29/81</u>
Published in <u>Idaho Co. Free Press</u>				
Dates <u>5/7 & 5/19/81</u>				

Agency Comments - Federal State, and local agencies that receive this notice through direct mailing from the Commission are requested to provide comments pursuant to the Federal Power Act, the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historic Preservation Act, the Historical and Archeological Preservation Act, the National Environmental Policy Act, Pub. L. No. 88-2 and other applicable statutes. No other formal requests for comments will be made.

Comments should be confined to substantive issues relevant to the issuance of a license. A copy of the application may be obtained directly from the Applicant. If an agency does not file comments with the Commission within the time set for filing comments, it will be presumed to have no comments. One copy of an agency's comments must also be set to the Applicants representatives.

Kenneth F. Plumb
Secretary



SPECIES	LIFE STAGE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
STEELHEAD	ADULT												
	JUVENILE												
	SPAWNING												
	INCUBATION												
SPRING CHINOOK	ADULT												
	JUVENILE												
	SPAWNING												
	INCUBATION												
RAINBOW TROUT	ADULT												
	JUVENILE												
	SPAWNING												
	INCUBATION												

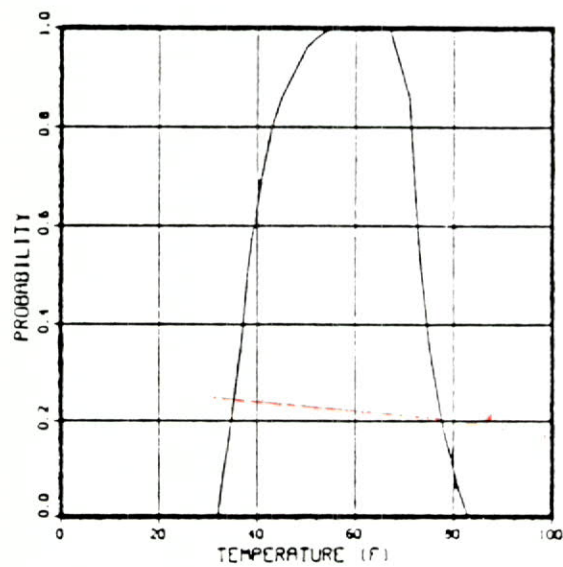
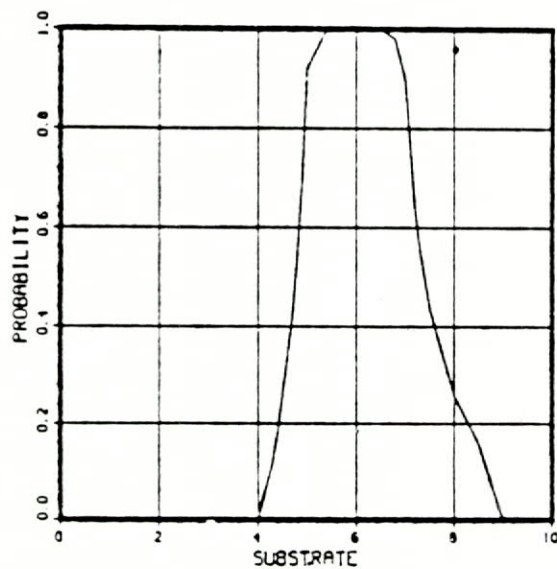
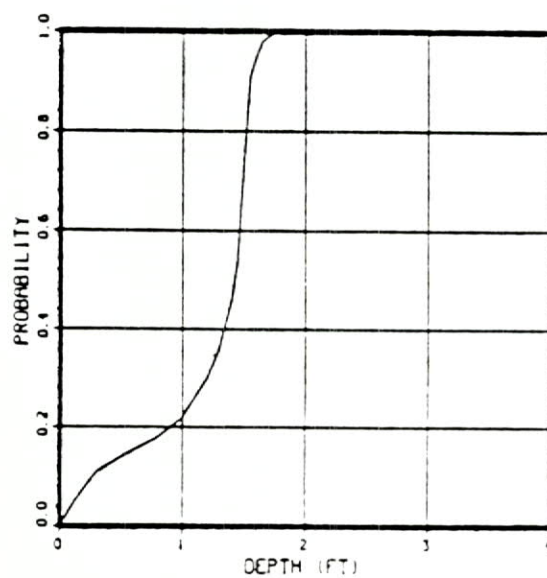
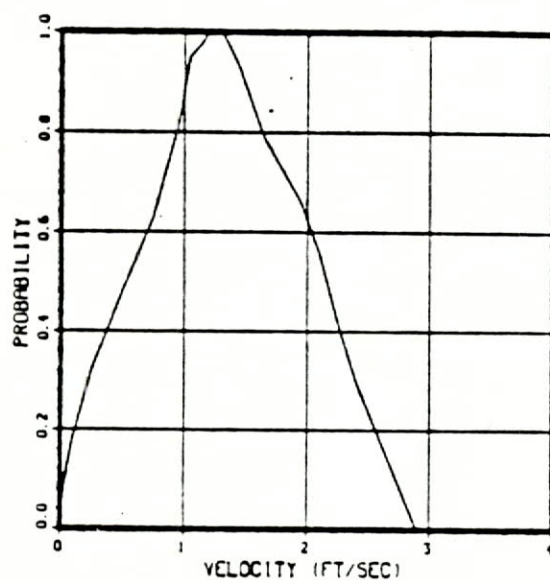
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ALLISON CREEK
FIGURE 1
SALMONID LIFE-STAGE TIMINGS

RAINBOW TROUT

ADULT



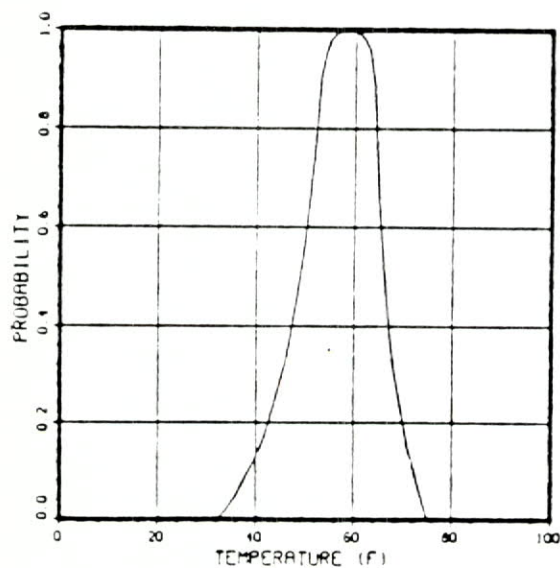
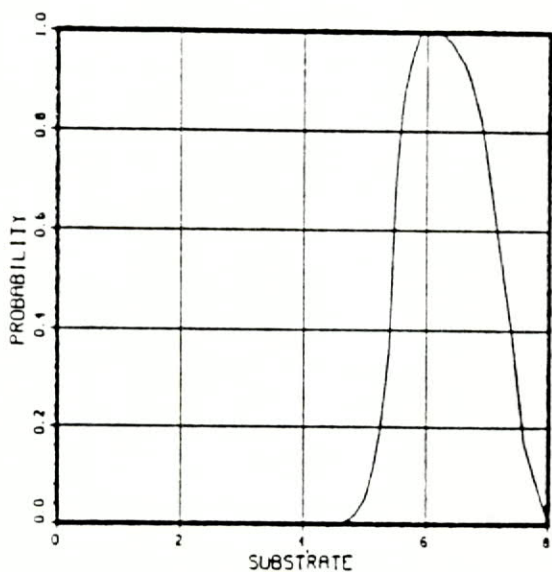
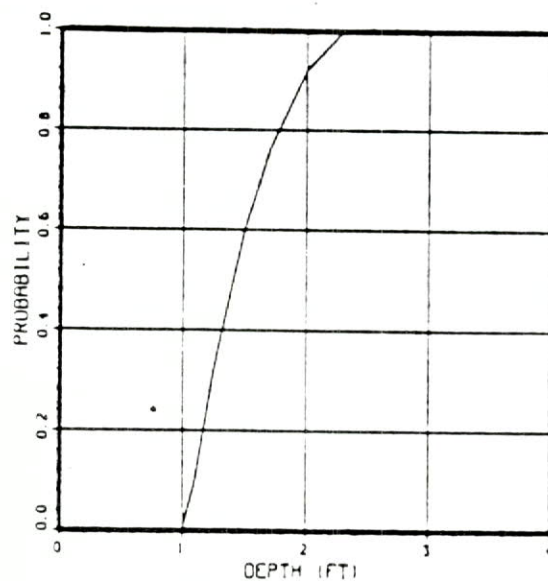
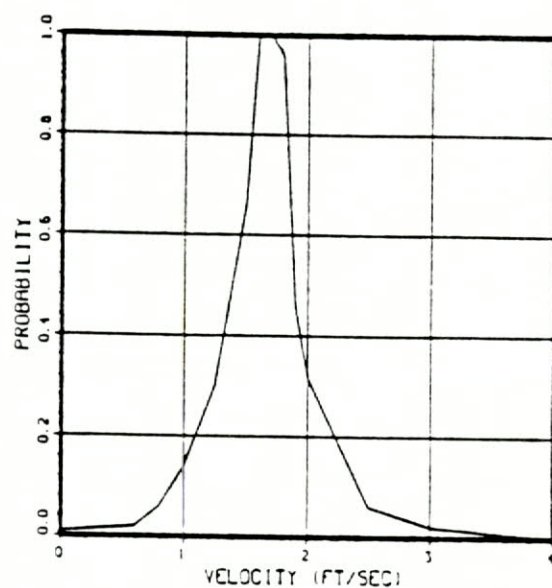
MICROFILMED

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Figure III-3
RAINBOW TROUT ADULT
HABITAT CRITERIA

WINTER STEELHEAD

ADULT

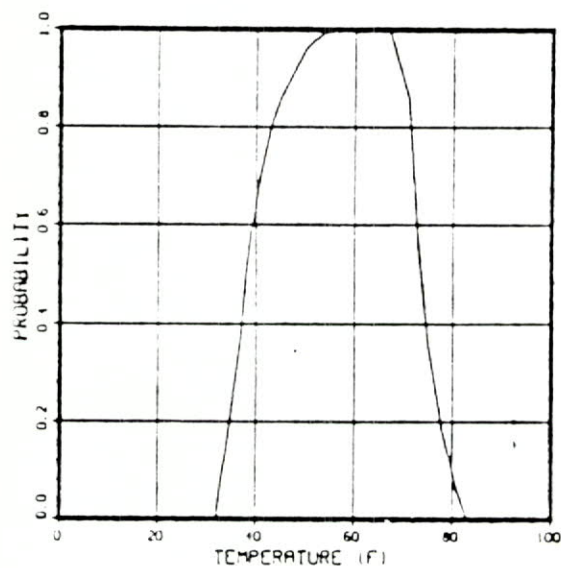
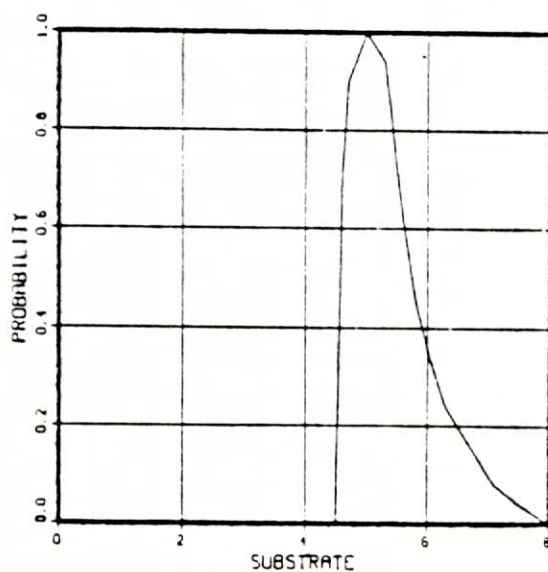
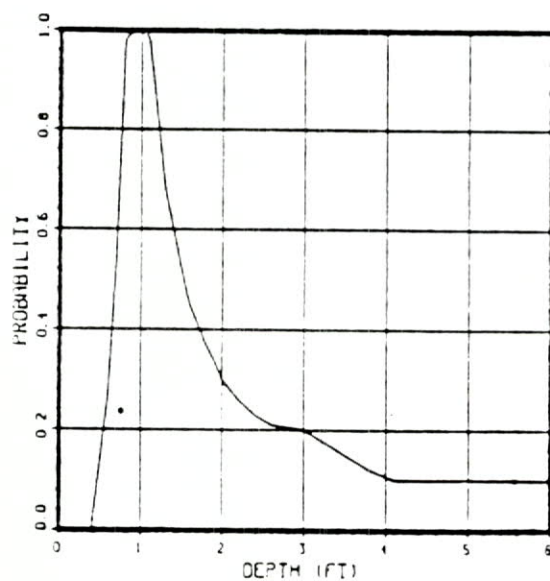
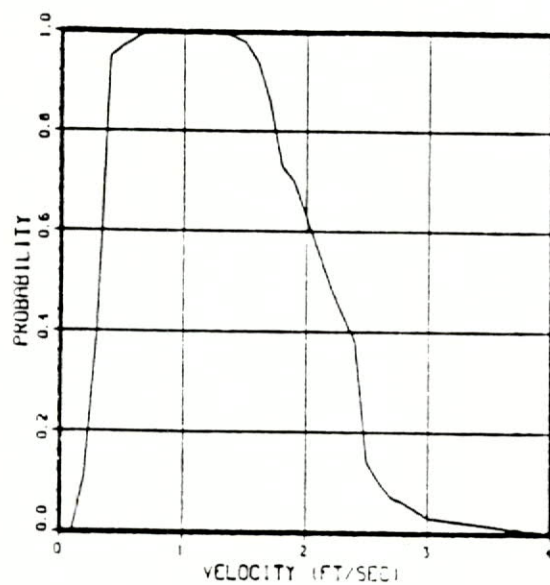


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Figure III-4
STEELHEAD ADULT
HABITAT CRITERIA

RAINBOW TROUT JUVENILES



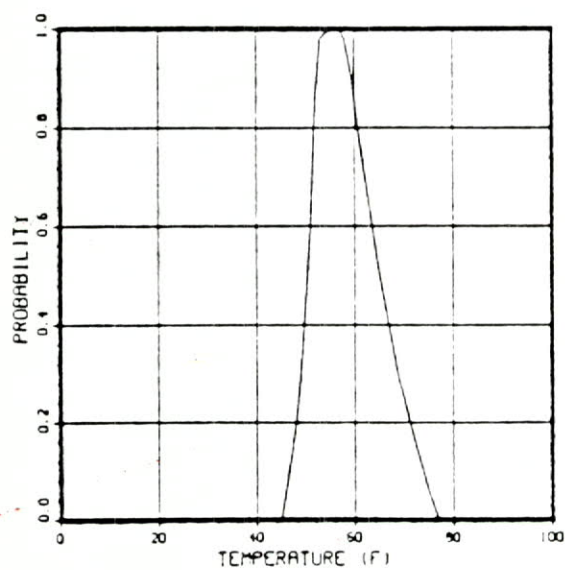
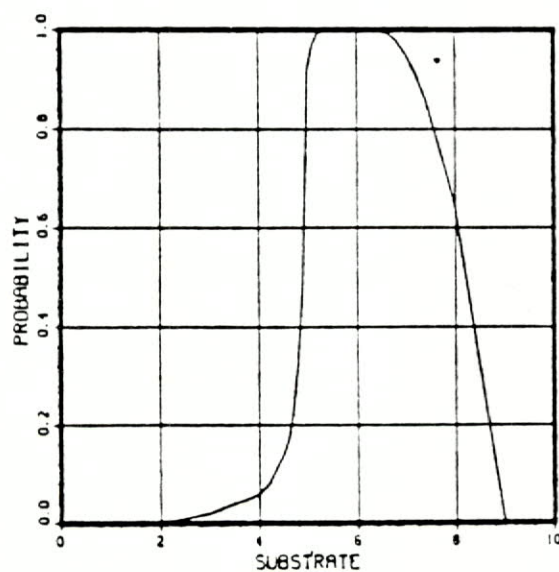
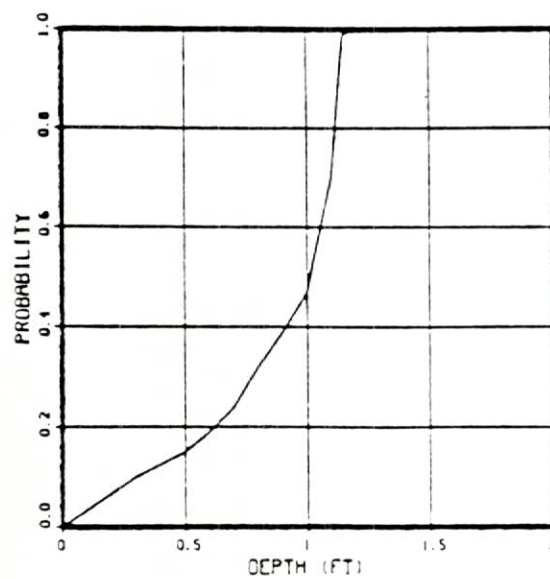
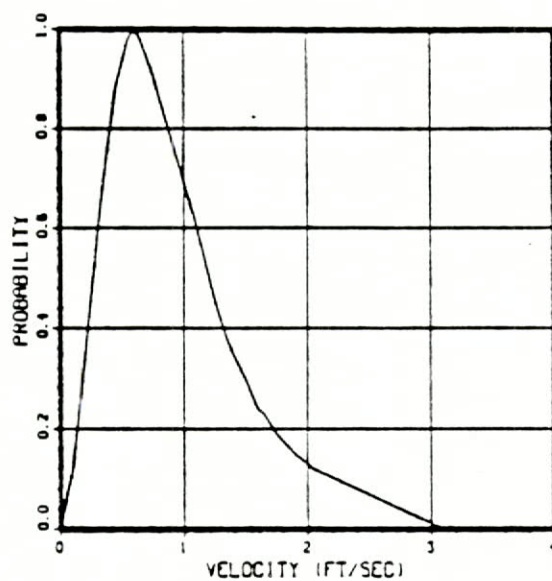
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Figure III-5
RAINBOW TROUT JUVENILE
HABITAT CRITERIA

CHINOOK SALMON

JUVENILE



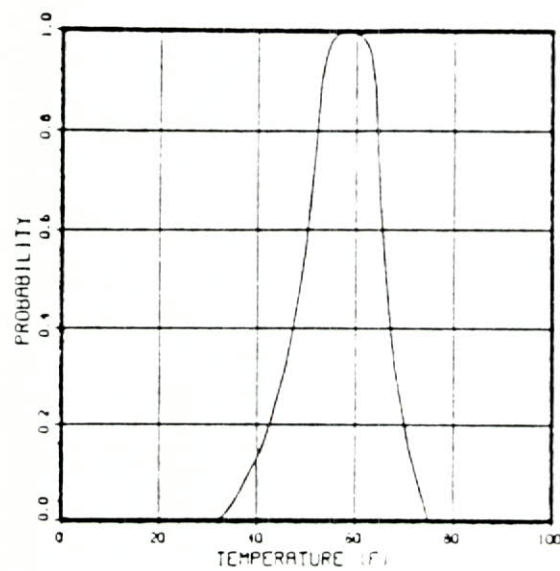
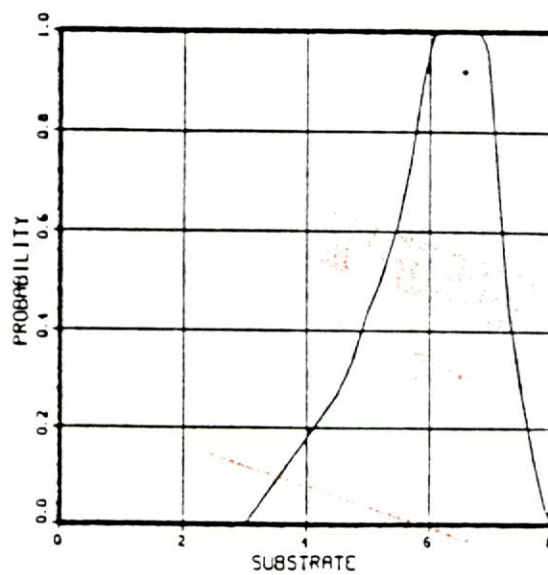
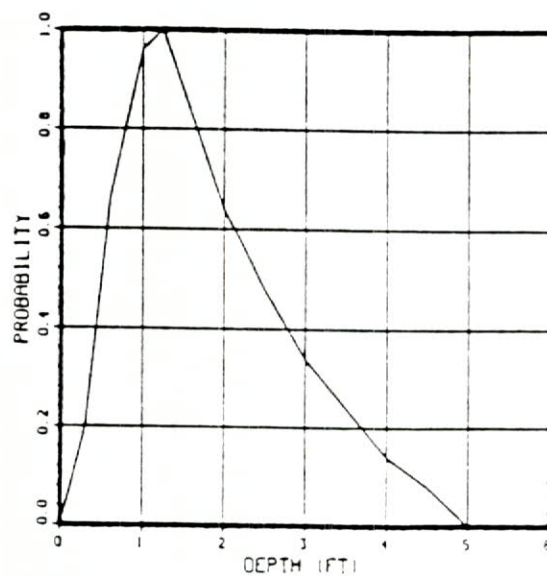
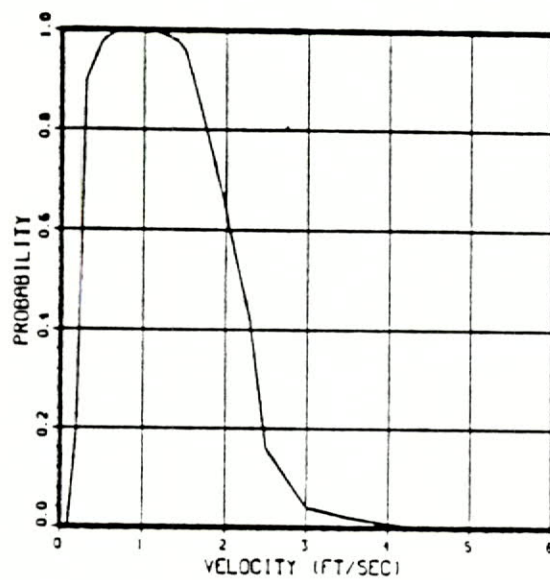
MICROFILMED

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Figure III-6
CHINOOK SALMON JUVENILE
HABITAT CRITERIA

WINTER STEELHEAD

JUVENILE



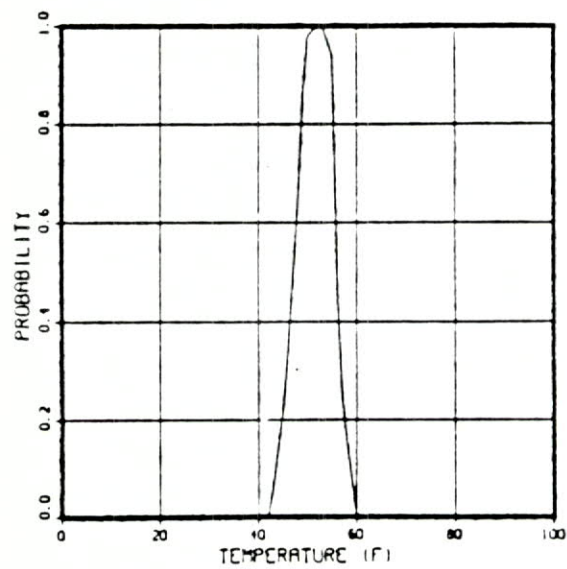
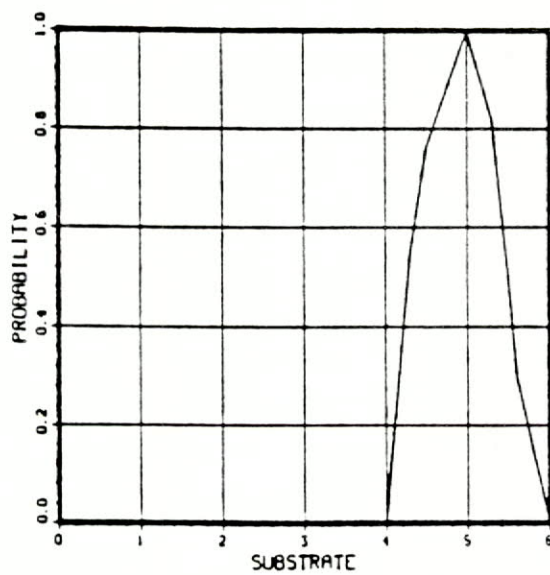
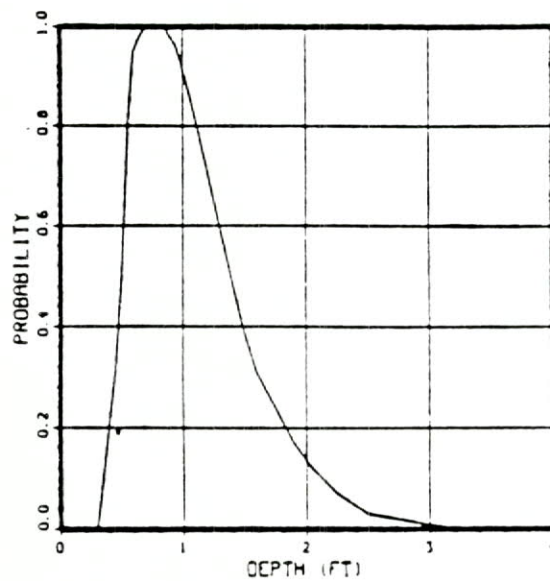
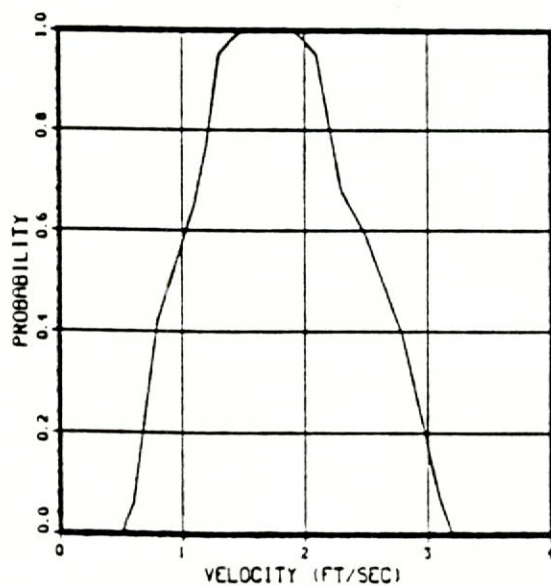
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Figure 11-7
STEELHEAD JUVENILE
HABITAT CRITERIA

RAINBOW TROUT

SPAWNING



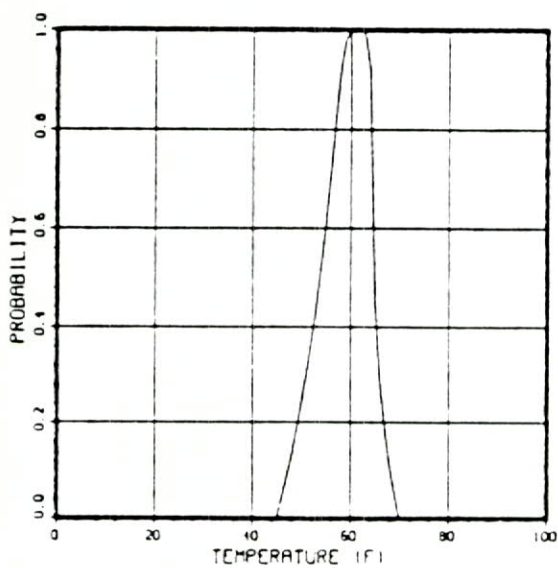
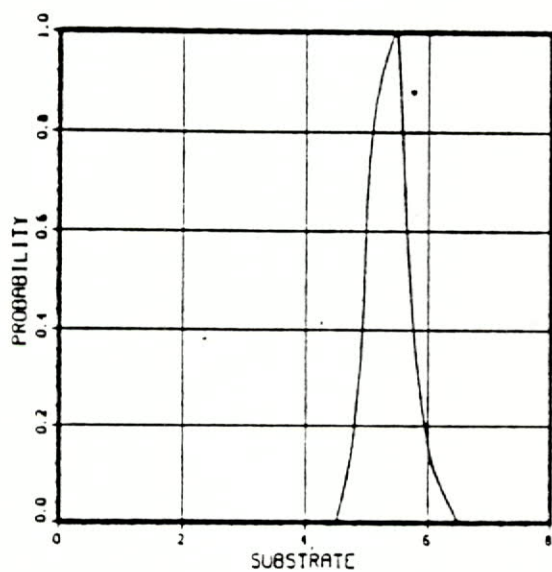
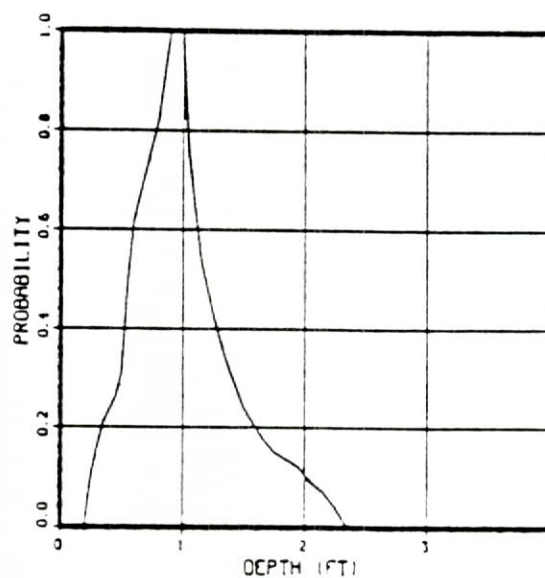
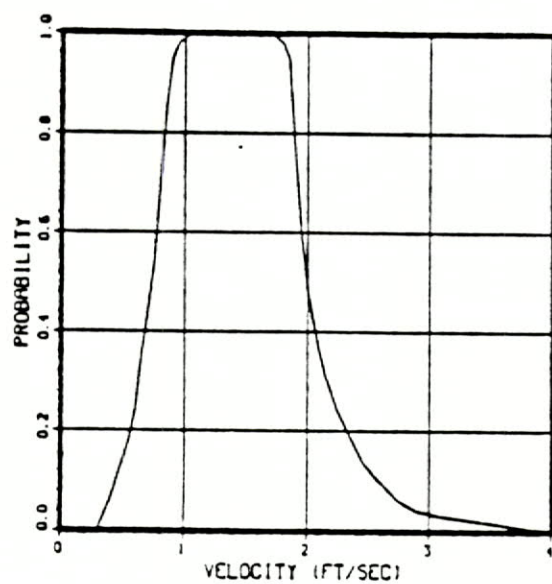
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Figure III-8
RAINBOW TROUT SPAWNING
HABITAT CRITERIA

SPRING CHINOOK

SPAWNING



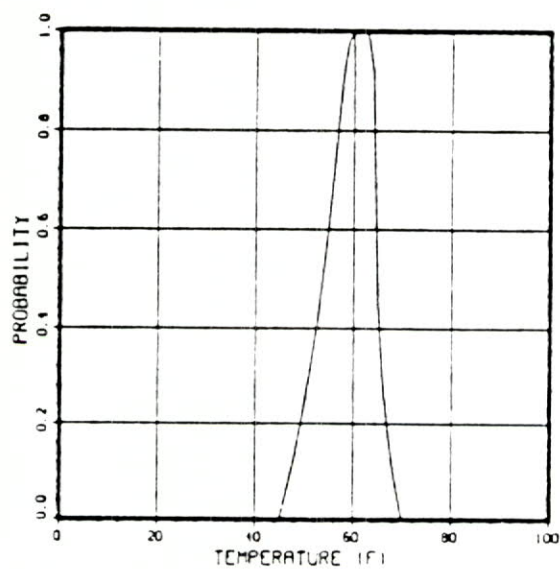
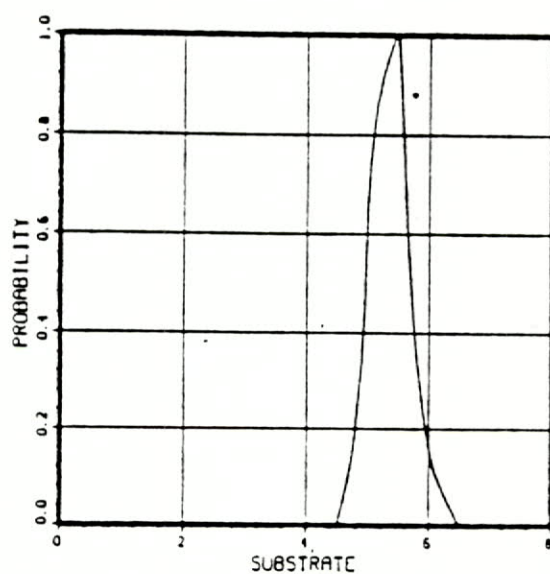
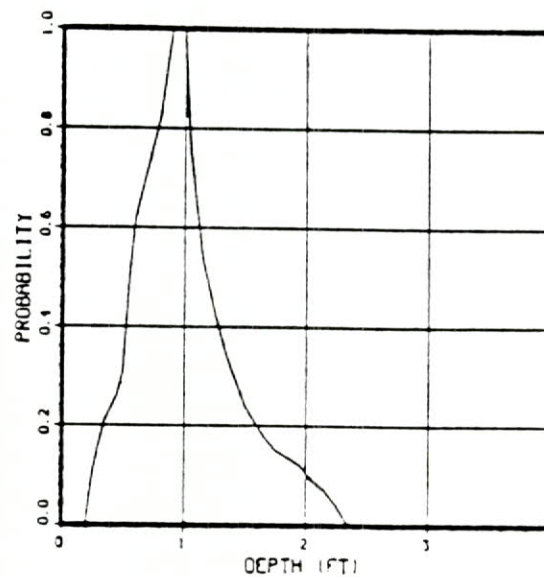
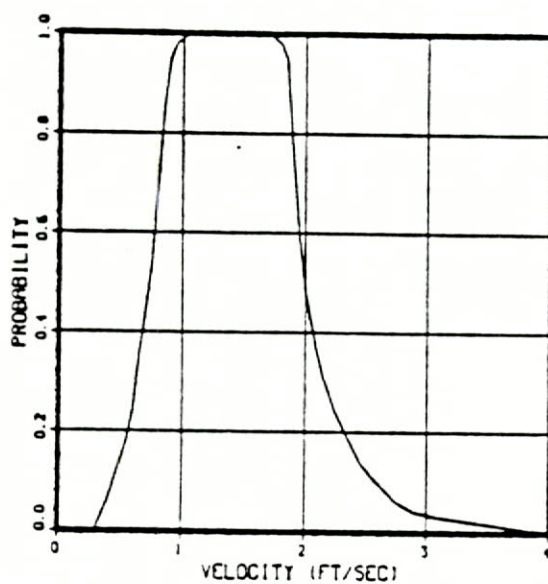
MICROFILMED

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Figure III-9
CHINOOK SALMON SPAWNING
HABITAT CRITERIA

SPRING CHINOOK

SPAWNING



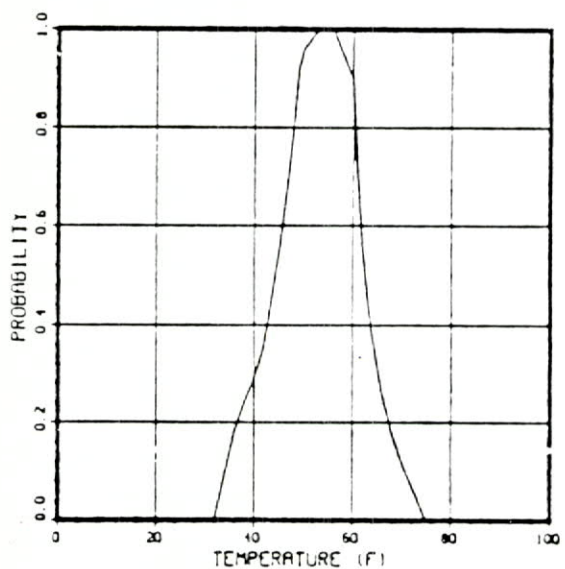
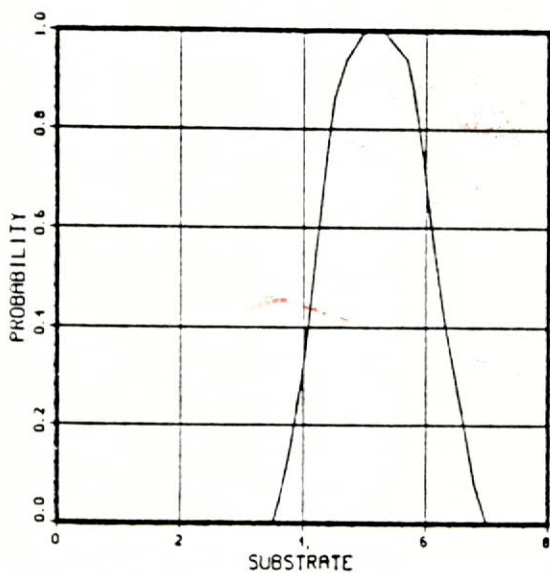
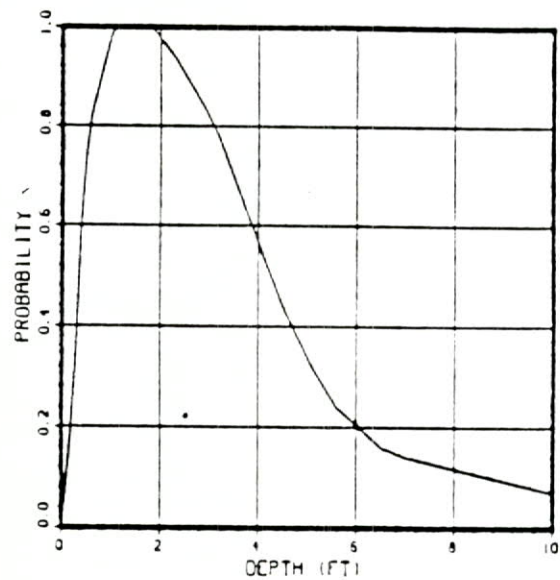
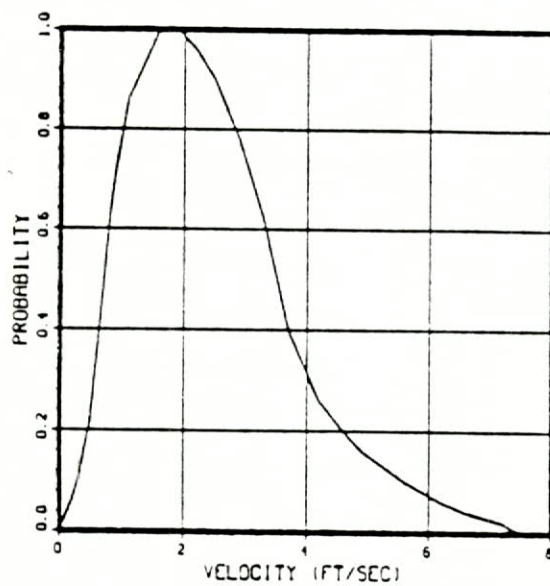
MICROFILMED

MAR 03 1988

Figure III-9
CHINOOK SALMON SPAWNING
HABITAT CRITERIA

RAINBOW TROUT (CLEAR WATER, $S=.001$)

INCUBATION



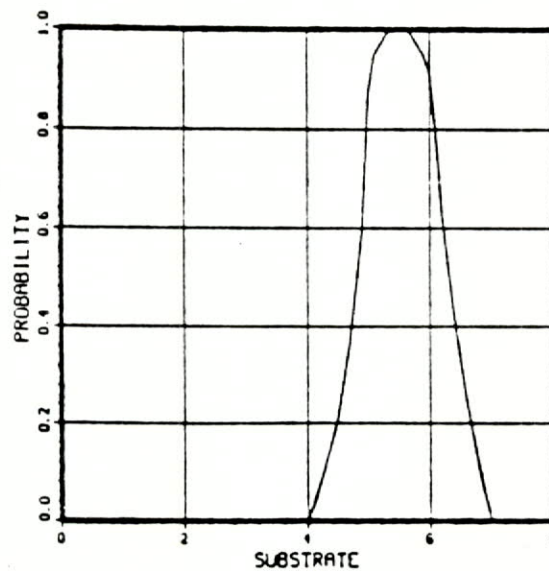
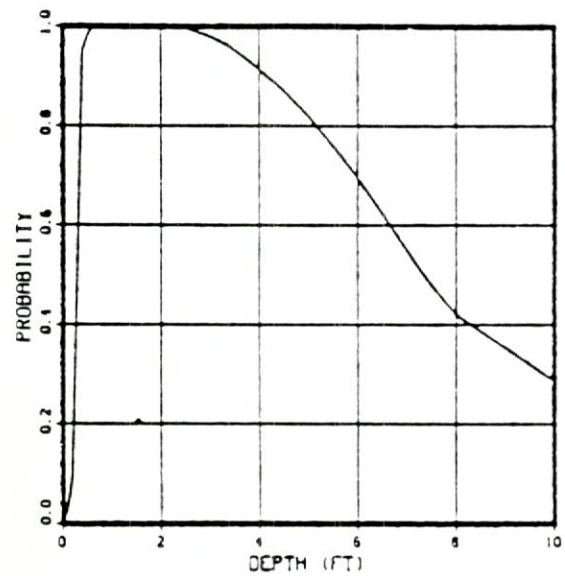
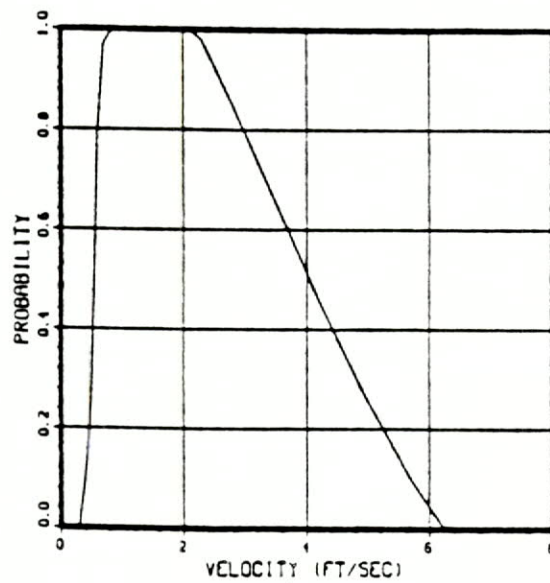
MICROFILMED

MAR 03 1988

Figure III-11
RAINBOW TROUT INCUBATION
HABITAT CRITERIA

CHINOOK SALMON (CLEAR WATER, S=.001)

INCUBATION



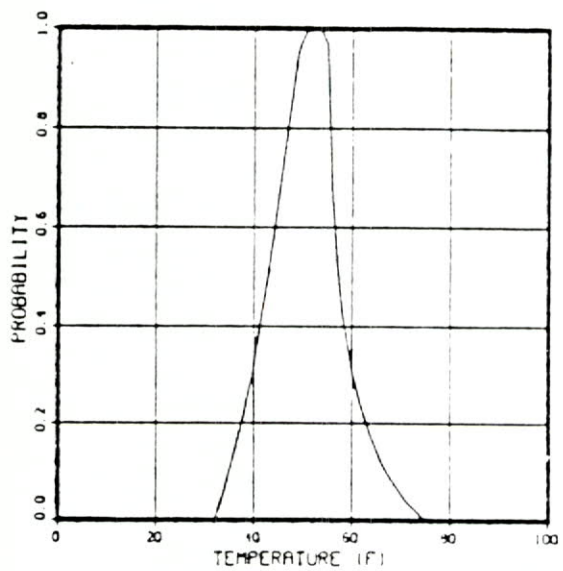
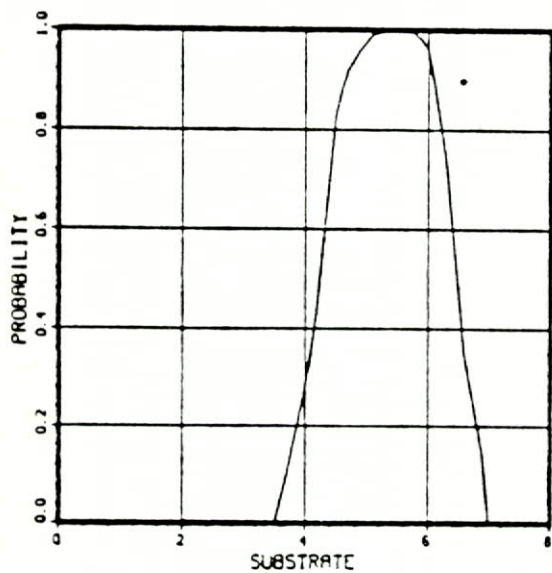
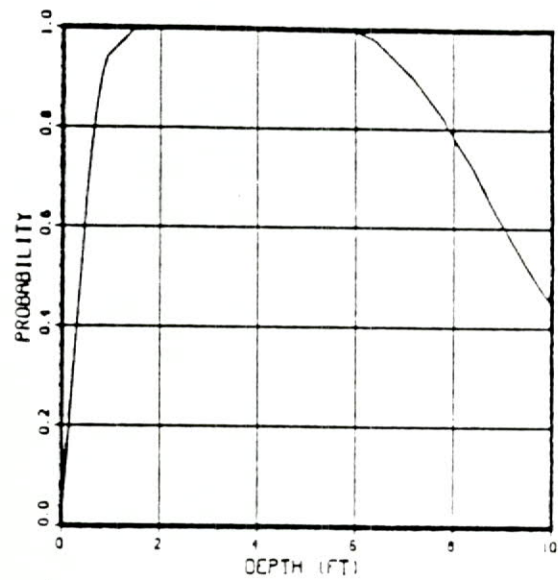
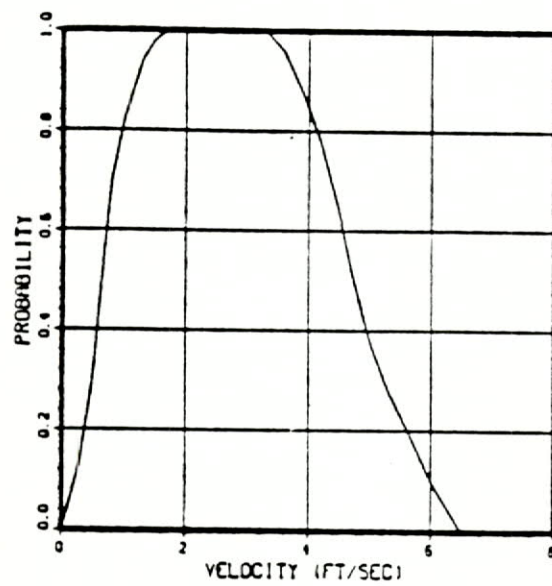
RECEIVED

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Figure III-12
CHINOOK SALMON INCUBATION
HABITAT CRITERIA

WINTER STEELHEAD (CLEAR WATER, $S=.001$)

INCUBATION

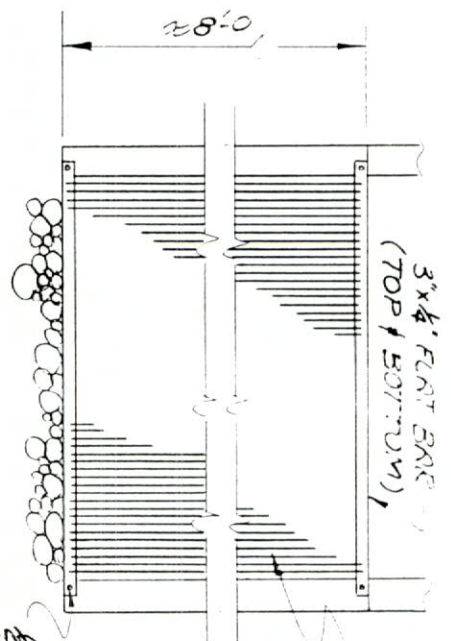
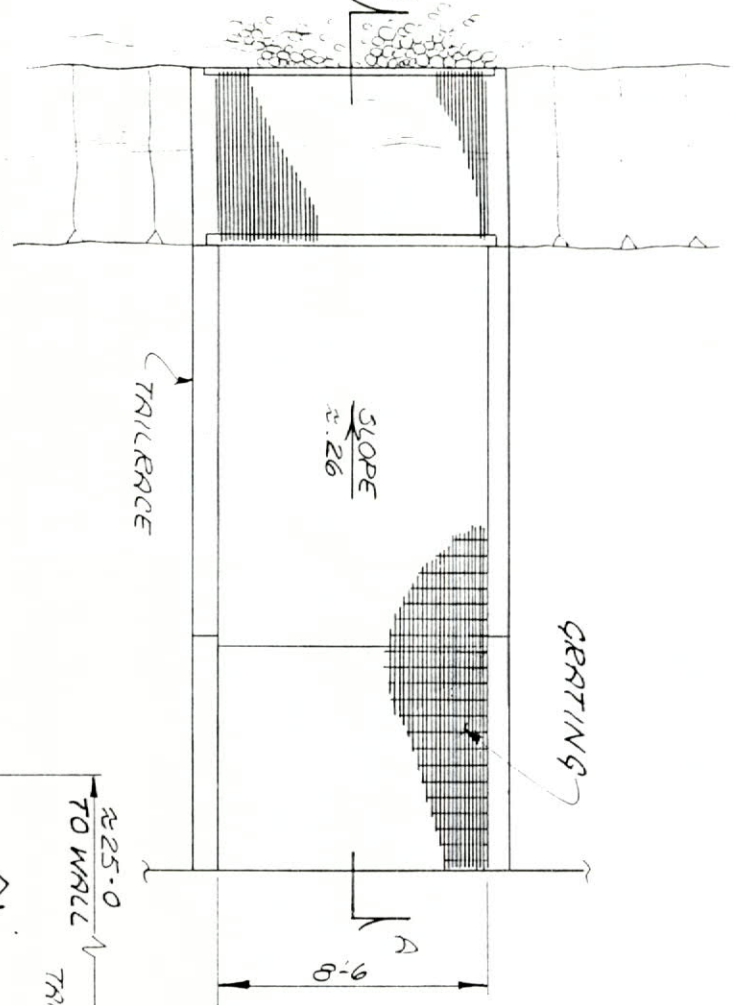


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MAR 03 1988

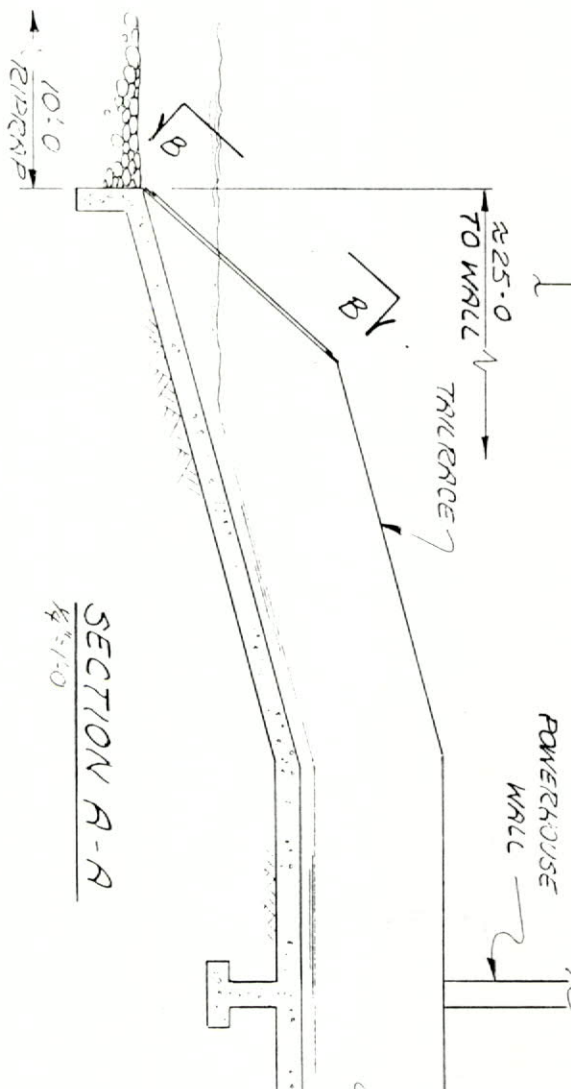
Figure III-13
STEELHEAD INCUBATION
HABITAT CRITERIA

ALLISON CREEK



ADULT FISH
BARRIER -
#4 REBAR @
1" CLEAR (MAX),
ALL METALWORK
GALVANIZED

1/2" Ø A.B.
(4 REQ'D.)



POWERHOUSE
WALL

NOT TO SCALE

MAR 03 1988

MYERS ENGINEERING COMPANY, P.A.

Consulting Engineers

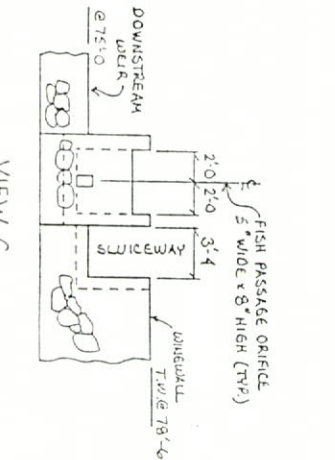
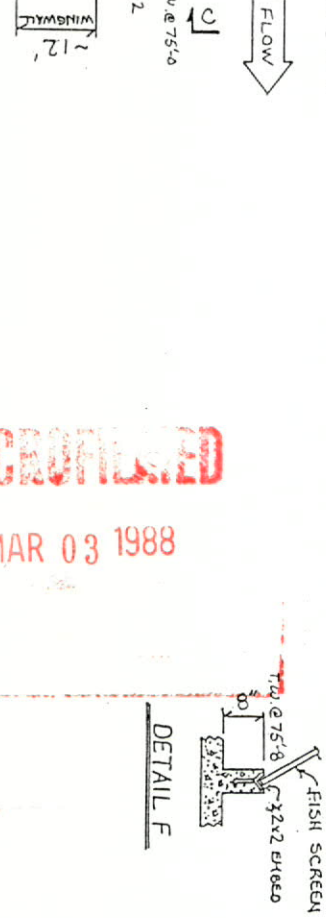
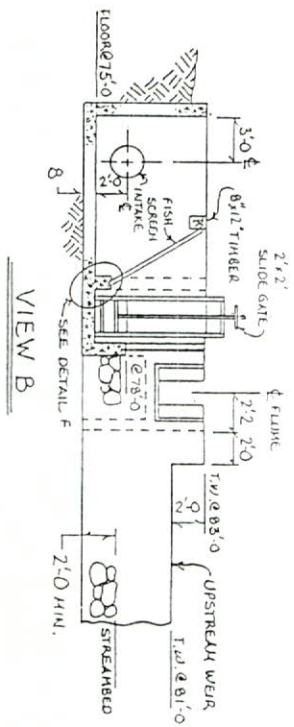
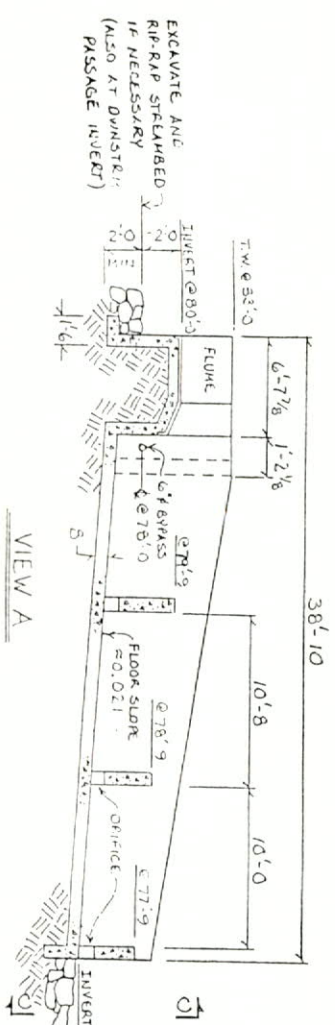
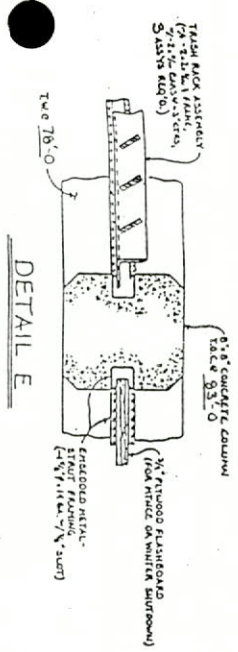
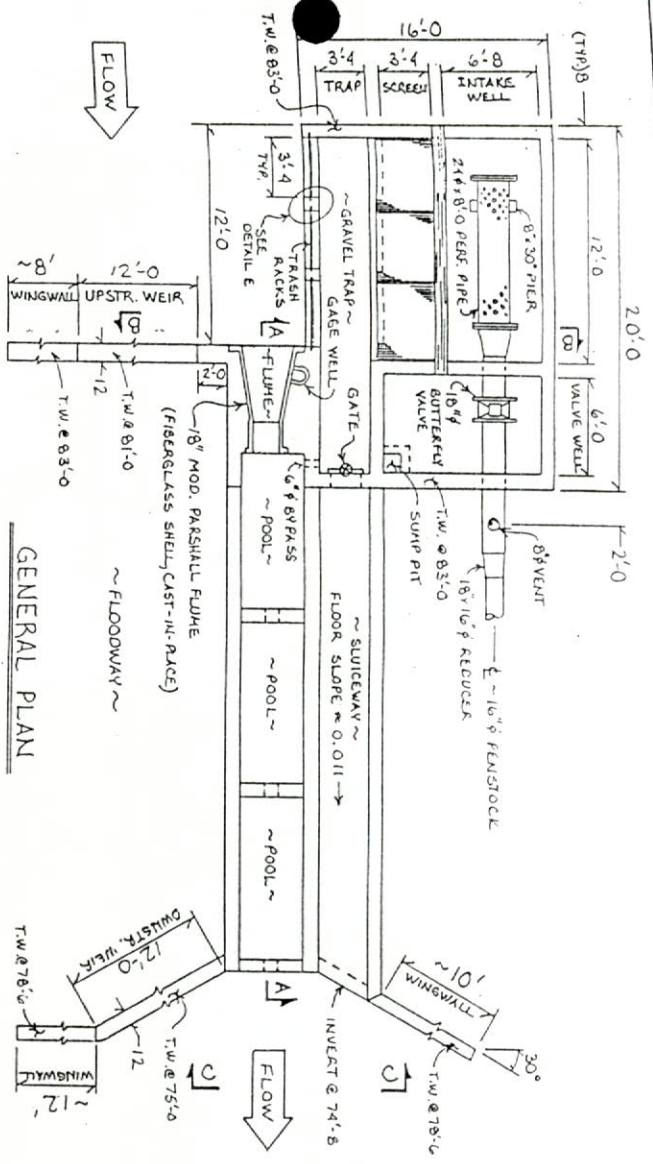
750 WARM SPRINGS AVENUE
BOISE, IDAHO 83712

TELEPHONE: (208) 336-1435

—TAILRACE—

ALLISON CREEK

9/12/85



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MAR 03 1988

PRELIMINARY
NOT FOR CONSTRUCTION

DATUM FOR ELEVATIONS
IS 2900 FT. MSL

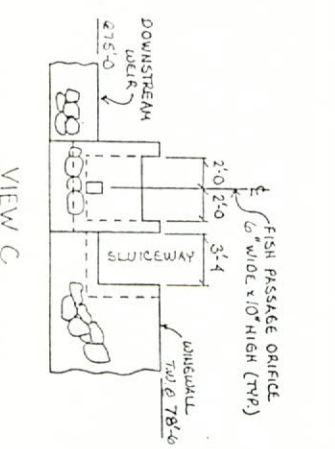
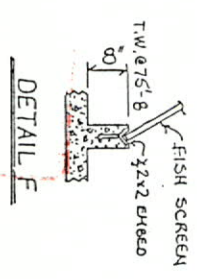
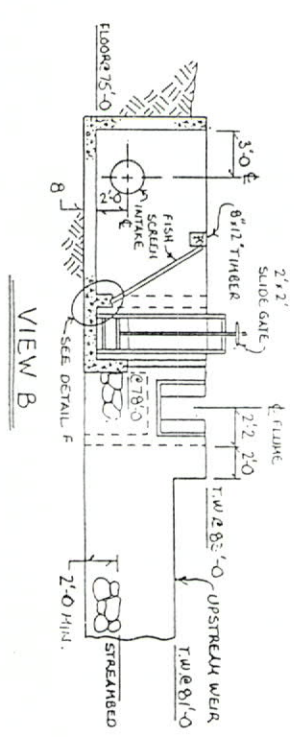
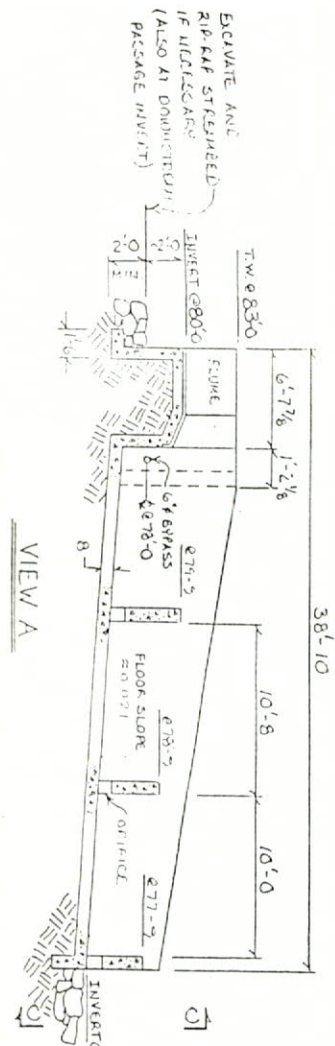
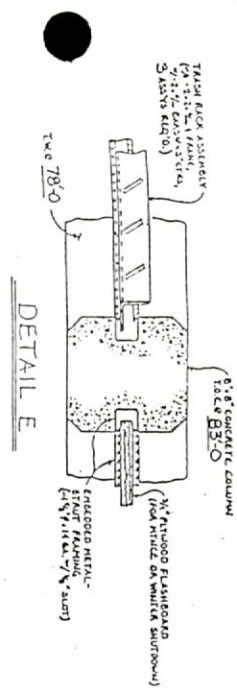
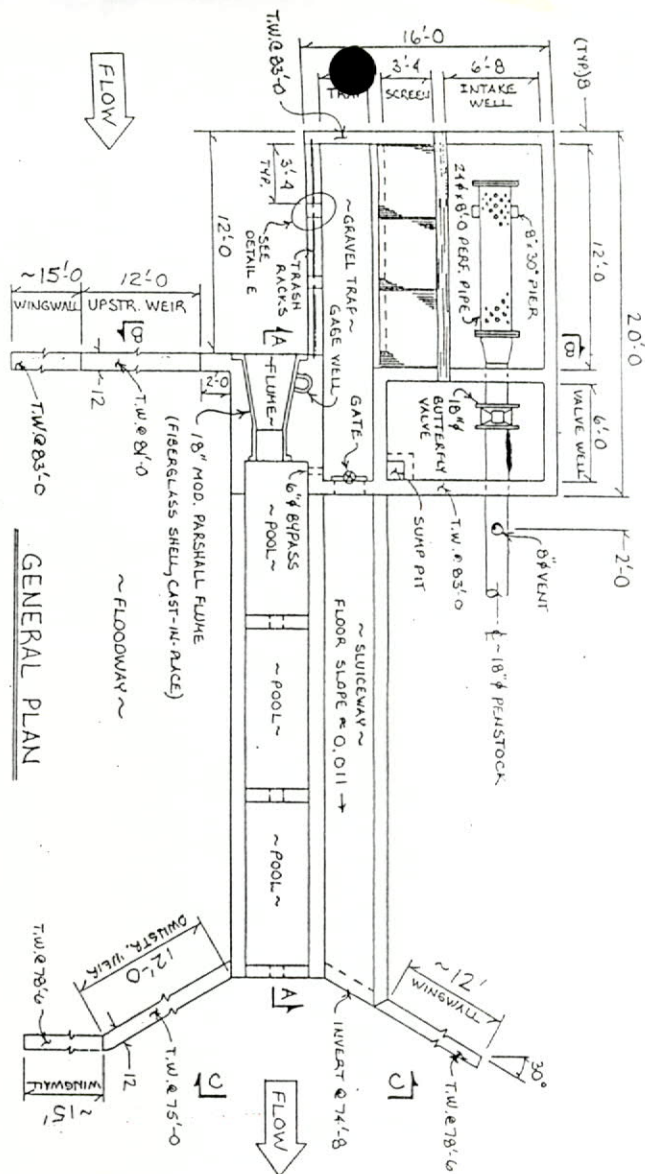
THIS DRAWING IS PART OF THE APPLICATION FOR LICENSE MADE BY
THE UNDERSIGNED THIS 12TH DAY OF MARCH, 1985
CARL L. MYERS, P.E.

EXHIBIT F

WEST FORK DIVERSION STRUCTURE DETAILS

ALLISON CREEK HYDROELECTRIC PROJECT

SCALE	AYERS ENGINEERING COMPANY, P.A.	SHEET NO.
N.T.S.	Consulting Engineers	F-2
DATE	THUNDERBOLT ROAD	
	EDMUND, ARIZONA	

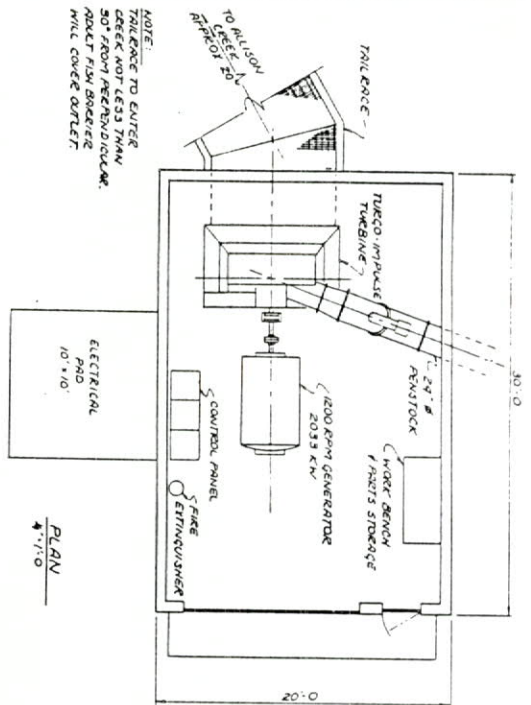


**PRELIMINARY
NOT FOR CONSTRUCTION**

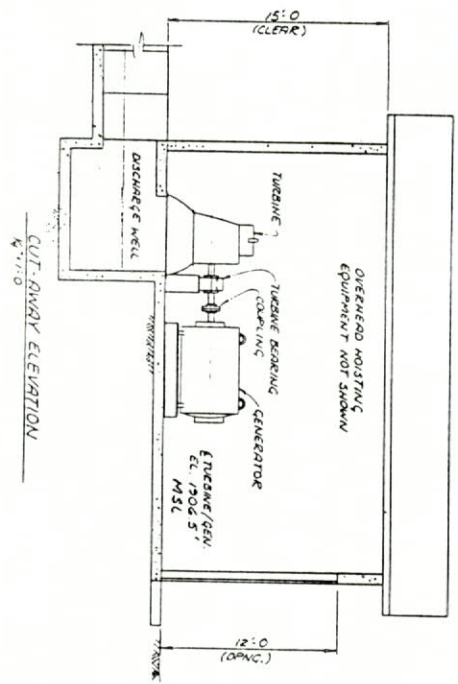
**DRAWN FOR ELEVATIONS
IS 2900 FT MSC**

THIS DRAWING IS PART OF THE APPLICATION FOR LICENSE MADE BY THE UNDERSIGNED THIS 12 TH DAY OF MARCH, 1985. <i>Carl L. Myers</i> CARL L. MYERS, P.E.	
EXHIBIT F	
MAIN FORK DIVERSION STRUCTURE DETAILS	
ALLISON CREEK HYDROELECTRIC PROJECT	
SCALE	SHEET NO.
DAT'S	F-3
DATE	
MAYERS ENGINEERING COMPANY, P.A. Consulting Engineers STATIONERS (P&H) 254-1411 MEMPHIS, TENN 38111	

NOTE:
TRAIL RACE TO ENTER
CREEK NOT LESS THAN
50' FROM PERIMETER DUCK
ADULT FISH BUCKER
WILL COVER OUTLET



PLAN
4" = 1'-0"



CUT-AWAY ELEVATION
4" = 1'-0"

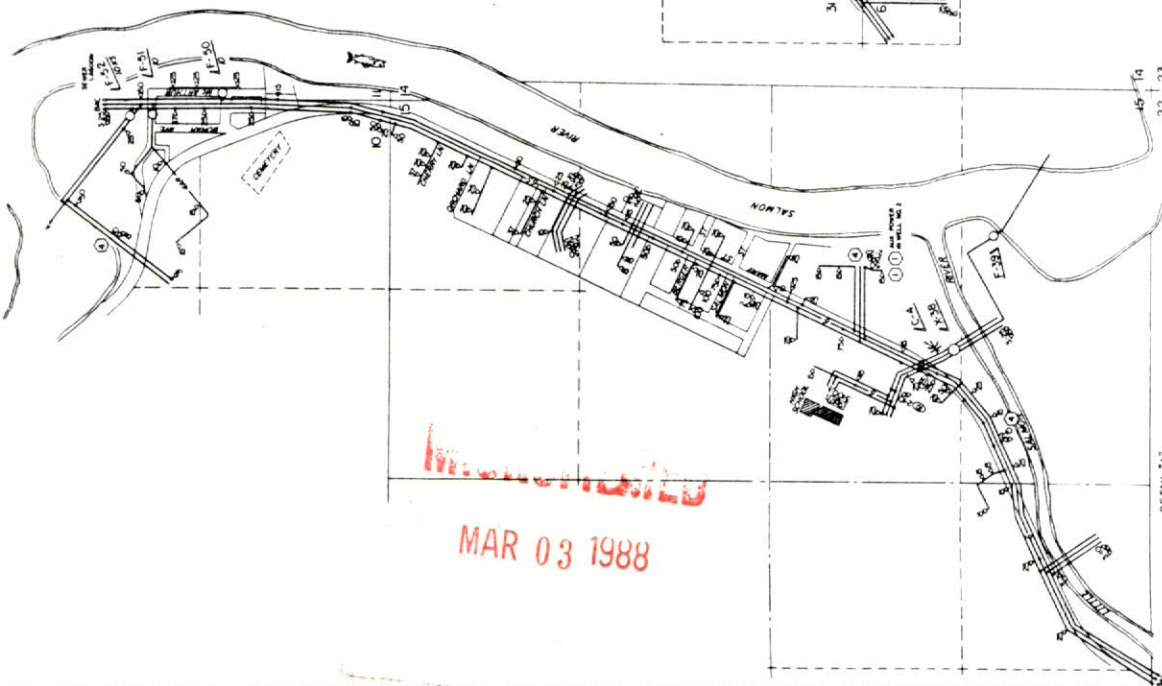
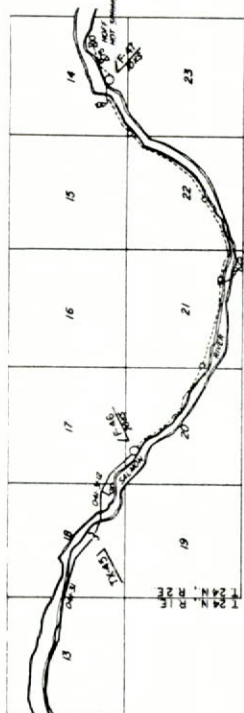
ADDITIONAL SECTIONS & DETAILS
TO BE PROVIDED WHEN CONFIRMED

MAR 03 1988

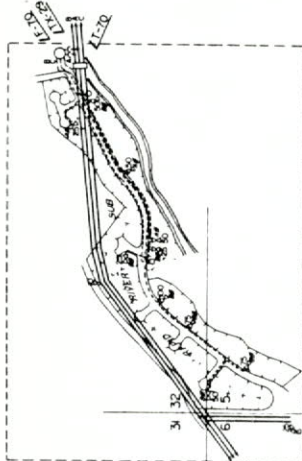
PRELIMINARY
NOT FOR CONSTRUCTION

THIS DRAWING IS PART OF THE APPLICATION FOR LICENSE MADE BY THE UNDERSIGNED THIS 12 TH DAY OF MARCH, 1988 <i>Carl L. Wirth, P.E.</i>	
DATE	12/27/87
BY	Carl L. Wirth, P.E.
POWERHOUSE PLAN AND SECTIONS	
ALLISON CREEK HYDROELECTRIC PROJECT	
MAYERS ENGINEERING COMPANY, P.A.	
SCALE	AS SHOWN
DATE	12/27/87
BY	
F-5	

Area	Area	Area	Area
C-2	300.51	1	24.128
C-4	500	1	24.128
C-2	300.51	1	24.128
C-4	500	1	24.128
C-2	300.51	1	24.128
C-4	500	1	24.128
C-2	300.51	1	24.128
C-4	500	1	24.128



MAR 03 1988



DETAIL "NR"
SCALE 1" = 400'

DETAIL "A"
RIGGINS

SCALE 1" = 400'

FOR FEEDER MILES SEE MAP 1

- LEGEND
- ① CITY WELL
 - ② CITY BOOSTER
 - ③ WATER STORAGE
 - ④ SEWER LIFT STA

DISTRIBUTION SYSTEM

FEEDER MAP NWMS-041-31-II
NWMS-041-31-12
NWMS-041-31-12
NEW MEADOWS - RIGGINS
IDAWO POWER COMPANY
SCALE 2 inches = 1 mile
DATE NOVEMBER 9, 1964
24 D-18505
17 2 of 4

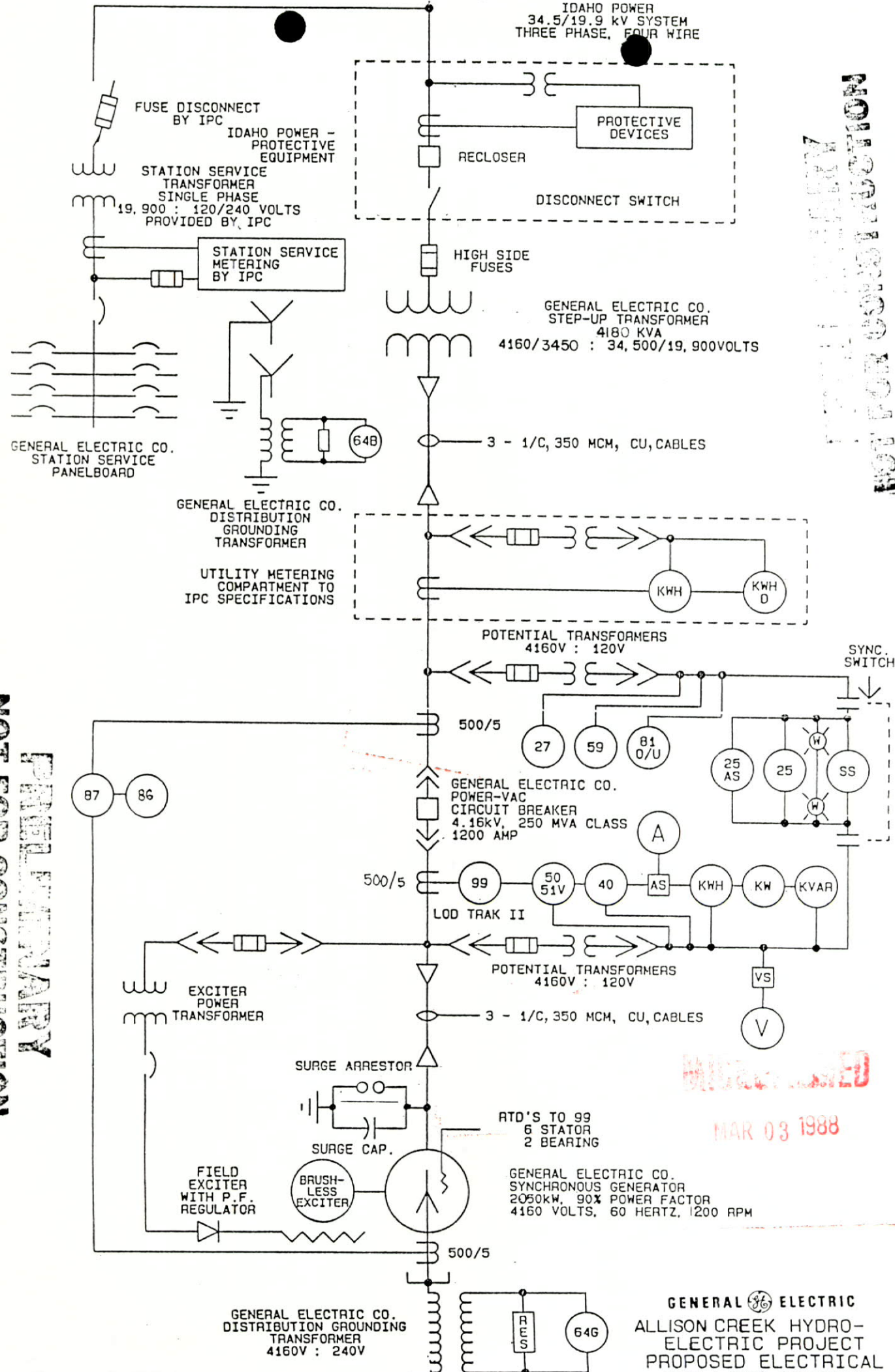
MAY 1985



Item	Size	Qs	Detail/Number
M-14	100	100	MVE 12 E LV
M-3	50		
Tx-2	3/500	20/14	RV
Tx-4	857	20/14	RV

NOT FOR CONSTRUCTION

NOT FOR CONSTRUCTION



1964

The filing of this claim does not confirm the water right claimed but failure to file may result in forfeiture of a water right.

(Name of Claimant)

Telephone No. 628-3381

(Mailing Address)

(Zip Code)

(1) Date of priority: (When was the water first applied to a beneficial use) 1956

(2) Describe the source of water: (Name of stream, lake, spring, etc., or ground water)

tributary to Salmon River

(cfs, gpd, AFA)		(Domestic, Irrigation, Stock, Etc.)		(Both dates inclusive)	
				(Mo., Day)	(Mo., Day)
Quantity	5.0cfs	Use	power	Period of Use From	To 12/31
Quantity		Use		Period of Use From	To
Quantity		Use		Period of Use From	To
Quantity		Use		Period of Use From	To
Quantity		Use		Period of Use From	To

(4)	5.0 cfs (cfs, gpd, AFA)	TOTAL QUANTITY USED.
-----	----------------------------	----------------------

(5) A) Point of diversion: (Location of point where water is diverted from its source)

SW ¼ SE ¼, Sec. 11 Twp. 24N Rge. 2E B.M., County of Idaho

Additional points of diversion:

B) Describe means of diversion of water: (Pump and pipeline, well, diversion dam, reservoir, length of ditch and field, etc.). Give sizes and capacities: be as specific as possible. Describe any changes in the system and give the date of the change.

Diversion dam with 14" penstock to 6" nozzle and 4' pelton wheel

(6) A Describe location of use by listing number of irrigated acres within each 40-acre tract in appropriate box. If use is not for irrigation, place an "X" in appropriate box to show location.

[illegible]

No. of acres

B) If water is used for other than irrigation, fully describe that use, being as specific as possible:

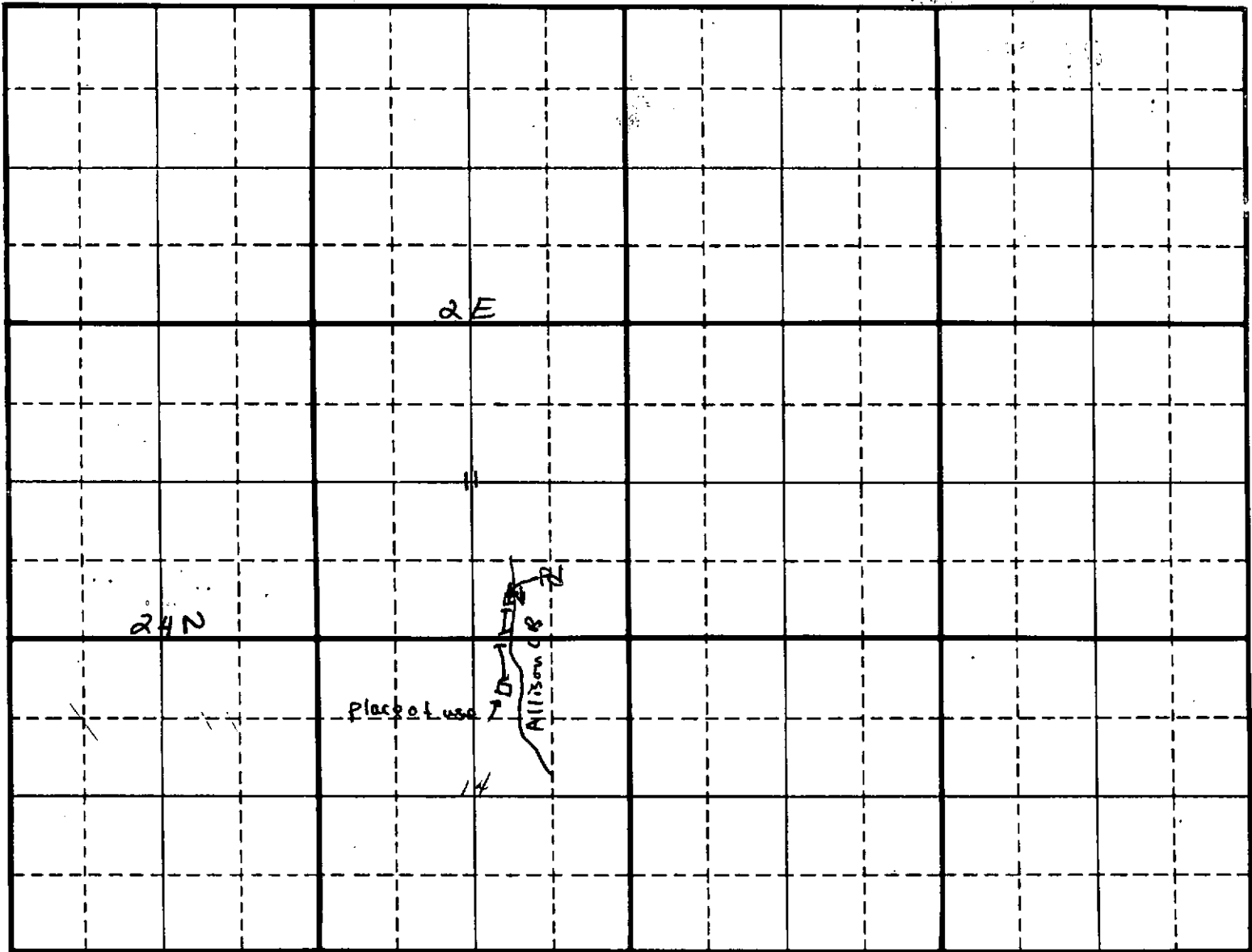
Power Generation

MAR 03 1988

NOTE: Include here the type and number of stock watered:

(7) If you are claiming water as a member of an organization, list name of organization:

(8) Remarks _____

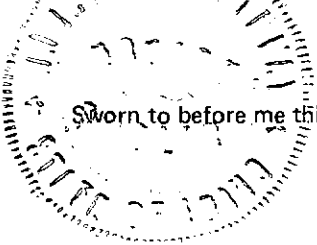


Scale: 2 inches equal 1 mile.

Map should show the location of the point of diversion and the place of use of the water by 40-acre subdivisions, section, township and range of the public land survey system.

State of Idaho)
County of Ada) ss.

Be it known that the undersigned, being duly sworn, deposes and says that he, she, they subscribed the foregoing claim to a water right, together with all attached information, and that the matters and facts therein are true to the best of the affiant's knowledge.



Sworn to before me this 20 day of April, 1981.

Gus Carlson
(Claimant)

Gary M. Hathway
Notary Public
Residing at Boise

My commission expires Life

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MAR 03 1988

FOR DEPARTMENT USE ONLY

Received by <u>mm</u>	Date <u>4-20-81</u>	Exception filed by:	Forwarded to	Date
Prelim. check by <u>js</u>	Date <u>4-28-81</u>		claimant by:	
\$30.00 fee received by <u>mm</u>	Date <u>4-20-81</u> #328		<u>WHA</u>	<u>5/29/81</u>
Published in <u>Idaho Co. Free Press</u>				
Dates <u>5/7 & 5/14/81</u>				

AFFIDAVIT OF PUBLICATION

NOTICE OF CLAIMS TO WATER RIGHTS

Notice is hereby given
that the following claim(s)
to water right(s) have been
established by diversion and
application to beneficial use:

77-4071

CARLSON, GUS
P.O. BOX 76, RIGGINS, ID
83549

Source: ALLISON CREEK
tributary to SALMON
RIVER

Priority Date: 01/01/1880

Amount: 1.30 CFS

Diversion Point: NENE Sec
11 T 24N R 02E, IDAHO Co.

Use: IRRIGATION (1.30
CFS) from 03/15 to 10/31

Place of Use: NENE SENE
NESE SESE Sec 11 T 24N R
02E NWNE NESW NWSE
Sec 14 T 24N R 02E FOR 65
ACRES

Diversion Means: DAM TO
GRAVITY & SPRINKLER
SYSTEM.

77-4072

CARLSON, GUS
P.O. BOX 76, RIGGINS, ID
83549

Source: ALLISON CREEK
tributary to SALMON
RIVER

Priority Date: 01/01/1956

Amount: 5.00 CFS

Diversion Point: SWSE Sec
11 T 24N R 02E, IDAHO Co.

Use: POWER (5.00 CFS)
from 01/01 to 12/31

Place of Use: NWNE Sec 14
T 24N R 02E

Diversion Means: DAM,
PENSTOCK, NOZZEL &
PELTON WHEEL.

Any exception to any
claim of water right may be
filed with the Director of the
Idaho Department of Water
Resources, 92 S. Cole Road,
Boise, Idaho 83709.

A. KENNETH DUNN

Director

Published 5/6 & 5/13/81.

M6-13

Nona Donaldson being first duly

sworn, says he is the office manager
of the IDAHO COUNTY FREE PRESS, a weekly newspaper which
is published and issued weekly at Grangeville, Idaho County,
State of Idaho, and which is of general circulation in said county
and state; that the said notice, of which the one hereto attached
is a true copy, was published in said paper for 2 weeks,
being published 2 times, the first publication being
on the 6th day of May, 1981,
and the last publication on the 13th day of
May, 1981; and that the said notice
was published in the newspaper proper and not a supplement;
that said newspaper has been continuously and uninterruptedly
published in said county during a period of more than seventy-
eight consecutive weeks prior to the first publication of said
notice or advertisement.

Nona Donaldson

Subscribed and sworn to before me this 13th day
of May, 1981.

Wm. J. ..., Notary Public
for State of Idaho, residing at Grangeville, Idaho.

O.K. Mel

RECEIVED

MAR 03 1988

RECEIVED

Idaho Department of Water Resources
Boise, Idaho 83709

DEC 31 1985

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

77-4072
83 FERC 62,372

Department of Water Resources

Allison Creek Associates) Project No. 9568-000 - *dismissed*
Renewable Resources Development)
and Carlson Hydroelectric Corporation) Project No. 7383-006 - *OK*

ORDER DISMISSING PRELIMINARY PERMIT APPLICATION

(Issued December 16, 1985)

On November 1, 1985, Allison Creek Associates (Applicant) filed a hydropower preliminary permit application to study the feasibility of developing Project No. 9568. A competing development application, Project No. 7383, was subsequently accepted.

The Commission's policy is to dismiss without prejudice permit applications that compete with development proposals (applications for license or exemption) when they fail to substantiate the technical, environmental, and economic aspects of the proposed project. See Dennis V. McGrew, 32 FERC 61,229 (Aug. 15, 1985). This policy is based on the premise that substantiation of the permit proposal is a necessary prerequisite to a comparative analysis of competing applications. 1/

Here, the preliminary permit applicant has failed to substantiate its proposal. Accordingly, the application for proposed Project No. 9568 will be dismissed. If the competing development application is subsequently dismissed or denied, the permit application will be reinstated automatically, with its original filing date intact, and the permit applicant will be notified.

If a development application is granted, the preliminary permit applicant will be served a copy of the granting order. The dismissal of the permit application will be with prejudice from the date of that order, and any appeal of the permit dismissal under Rule 1902 must be filed within 30 days from the date of that order.

The Director of the Office of Hydropower Licensing or the Director's designee, under 18 C.F.R. §375.314, orders:

The permit application submitted November 1, 1985, by Allison Creek Associates for proposed Project No. 9568 is dismissed without prejudice.

Don Crahan

MAR 03 1988

for Kenneth M. Pusateri
Acting Director, Office of
Hydropower Licensing

- 1/ Dismissal of a permit application without prejudice in these circumstances is within the Commission's administrative powers. See 16 U.S.C. §825h. The Director, Office of Hydropower Licensing, has delegated authority to dismiss permit applications if the applications otherwise qualify for delegated action. See 18

Stenc

77-4072

DEC 30 1985

P-7383-006

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Notice of Application filed with the Commission
(December 11, 1985)

Take notice that the following hydroelectric application
has been filed with the Federal Energy Regulatory Commission
and is available for public inspection:

- Department of Water Res
- a. Type of Application: License
 - b. Project No.: P-7383-006
 - c. Date filed: April 5, 1985
 - d. Applicant: Renewable Resources Development
 - e. Name of Project: Allison Creek
 - f. Location: In Nezperce National Forest on Allison Creek in Idaho County, Idaho
 - g. Filed Pursuant to: Federal Power Act, 16 U.S.C. 55 791(a) - 825(r)
 - h. Contact Person: Carl Myers
Myers Engineering Company
750 Warm Springs Avenue
Boise, ID 83712
 - i. Comment Date: FEB 7 1986
 - j. Description of Project: The proposed project would consist of:
(1) a 3-foot-high concrete check structure on the West Fork of Allison Creek at elevation 2890 feet; (2) 3,380-feet of 16-inch-diameter penstock from this diversion to the bifurcation; (3) a 3-foot-high concrete check structure on Allison Creek at elevation 2860 feet; (4) 4,320 feet of 18-inch-diameter penstock from this diversion to the bifurcation; (5) 13,200 feet of 24-inch-diameter penstock from the bifurcation to the powerhouse; (6) a powerhouse containing one generating unit with a capacity of 2,033 kW and an average annual generation of 6,535,600 kWh; and (7) 800 feet of 34.5-kV buried transmission line interconnecting with a new 34.5-kV that will go to a substation in Riggin. Estimated cost of the project would be \$ 2,343,000.
 - k. Purpose of Project: Project power would be sold.
 - l. This notice also consists of the following standard paragraphs: A3, A9, B, C, D1

MAR 03 1986

25

A3.

Development Application -- Any qualified development applicant desiring to file a competing application must submit to the Commission, on or before the specified comment date for the particular application, a competing development application, or a notice of intent to file such an application. Submission of a timely notice of intent allows an interested person to file the competing development application no later than 120 days after the specified comment date for the particular application. Applications for preliminary permit will not be accepted in response to this notice.

A9.

Notice of Intent -- A notice of intent must specify the exact name, business address, and telephone number of the prospective applicant, include an unequivocal statement of intent to submit, if such an application may be filed, either (1) a preliminary permit application or (2) a development application (specify which type of application), and be served on the applicant(s) named in this public notice.

RECORDED & INDEXED

MAR 03 1988

B.

Comments, protests, or motions to intervene - Anyone may submit comments, a protest, or a motion to intervene in accordance with the requirements of the Rules of Practice and Procedure, 18 C.F.R. §§385.210, .211, .214. In determining the appropriate action to take, the Commission will consider all protests or other comments filed, but only those who file a motion to intervene in accordance with the Commission's Rules may become a party to the proceeding. Any comments, protests, or motions to intervene must be received on or before the specified comment date for the particular application.

C.

Filing and Service of Responsive Documents - Any filings must bear in all capital letters the title "COMMENTS", "COMPETING NOTICE OF INTENT TO FILE COMPETING APPLICATION", "COMPETING APPLICATION", "PROTEST" or "MOTION TO INTERVENE", as applicable, and the Project Number of the particular application to which the filing is in response. Any of the above named documents must be filed by providing the original and the number of copies required by the Commission's regulations to: Kenneth F. Plumb, Secretary, Federal Energy Regulatory Commission, 825 North Capitol Street, N.E., Washington, D.C. 20426. An additional copy must be sent to: Mr. Fred E. Springer, Director, Division of Project Management, Federal Energy Regulatory Commission, Room 203-88, at the above address. A copy of any notice of intent, competing application or motion to intervene must also be served upon each representative of the Applicant specified in the particular application.

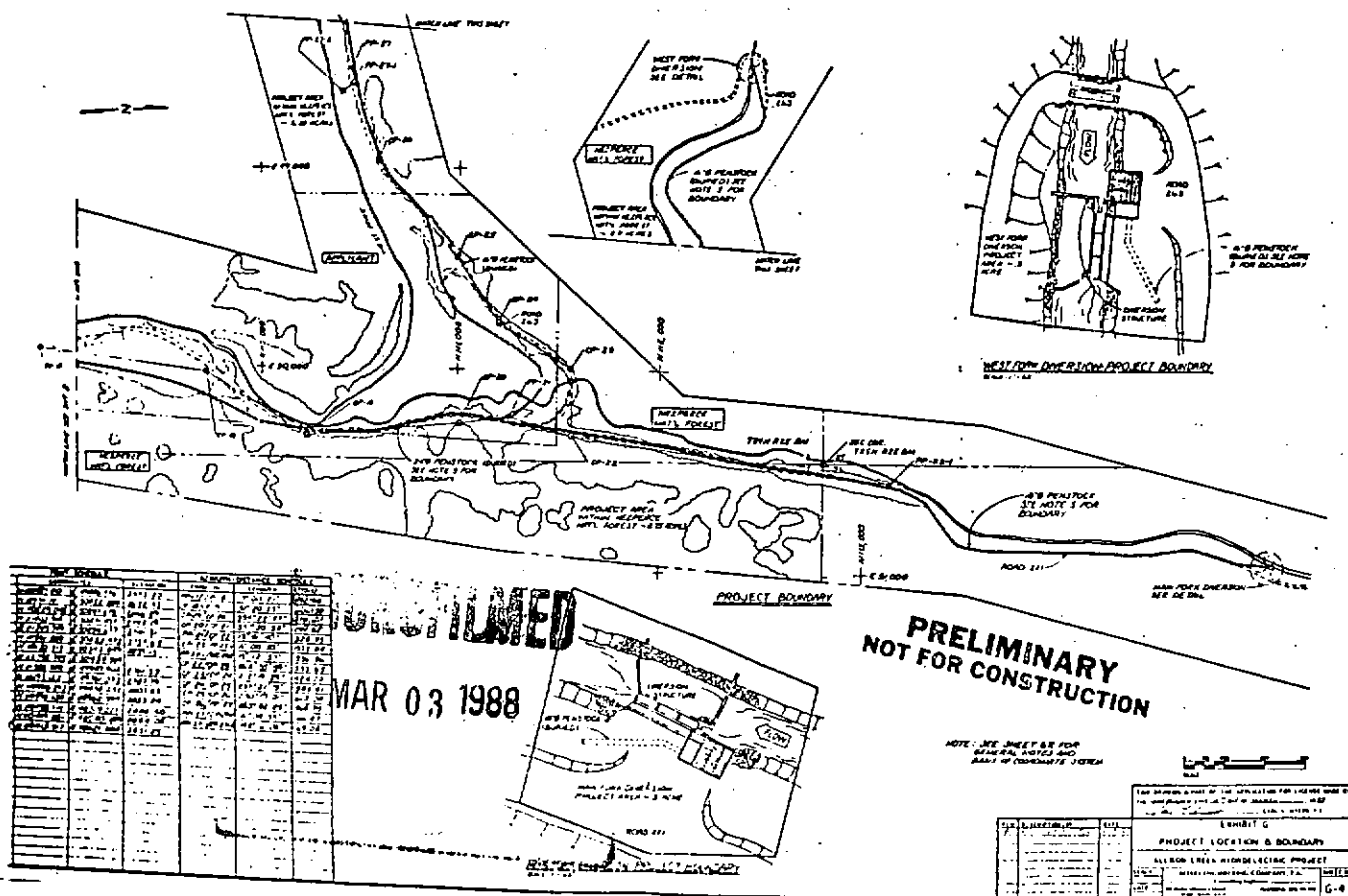
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D1. Agency Comments - Federal State, and local agencies that receive this notice through direct mailing from the Commission are requested to provide comments pursuant to the Federal Power Act, the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historic Preservation Act, the Historical and Archeological Preservation Act, the National Environmental Policy Act, Pub. L. No. 88-2 and other applicable statutes. No other formal requests for comments will be made.

Comments should be confined to substantive issues relevant to the issuance of a license. A copy of the application may be obtained directly from the Applicant. If an agency does not file comments with the Commission within the time set for filing comments, it will be presumed to have no comments. One copy of an agency's comments must also be set to the Applicants representatives.

Kenneth P. Plumb
Secretary



MYERS ENGINEERING COMPANY, P.A.

Consulting Engineers

750 Warm Springs Avenue
Boise, Idaho 83712
Telephone: (208) 336-1425

November 22, 1985

Kenneth Dunn
Idaho Department of Water Resources
450 West State Street
Boise, ID 83702

RECEIVED
DEC 12 1985

Department of Water Resources

Re: FERC Project No. 7383 - Allison Creek

Dear Mr. Dunn:

Enclosed is Deficiencies and Additional Information for the Allison Creek hydropower project.

Sincerely,



For Carl L. Myers, P.E.

Enclosure

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MAR 03 1988

BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Deficiencies & Additional Information
For The
ALLISON CREEK HYDROPOWER PROJECT

PROJECT NO. 7383-000

RIGGINS

IDAHO

PREPARED BY:

MYERS ENGINEERING COMPANY, P.A.
____ Consulting Engineers _____
750 WARM SPRINGS AVENUE
BOISE, IDAHO 83712

TELEPHONE: (208) 336-1425

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DEFICIENCIES

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MAR 03 1988

MYERS ENGINEERING COMPANY, P.A.

Consulting Engineers

750 Warm Springs Avenue
Boise, Idaho 83712
Telephone: (208) 336-1425

September 23, 1985

Mr. Kenneth Plumb, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street NE
Washington, DC 20426

Re: Project No. 7383 - Idaho; Allison Creek
FERC letter dated July 1, 1985

Dear Mr. Plumb:

This is the response to the above referenced letter regarding Project No. 7383 license application deficiencies.

The additional information requested in your letter will be supplied to you and concerned agencies within 60 days from the date of this letter.

Sincerely,



Carl L. Myers, P.E.

Enclosure

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ALLISON CREEK HYDROPOWER PROJECT
DEFICIENCIES

Report on Fish, Wildlife and Botanical Resources
(18 CFR, Sec. 4.41 (f)(3))

ITEM 1

Provide the letter of comments of the U.S. Fish and Wildlife Service (USFWS), as referenced in the section of the application entitled "Agency Comments and Applicant Response."

RESPONSE TO ITEM 1

Nowhere in the section of the Allison Creek license application entitled "Agency Comments and Applicant Response" is there specific mention of a letter from the U.S. Fish and Wildlife Service (FWS). A listing of the letter correspondence with the FWS on the proposed project is shown in Table 1.

It is expected, however, that the letter the FERC staff is referring to is the FWS comments on the draft Exhibit E. These comments were not provided in a timely matter. The FWS received the draft Exhibit E on December 26, 1984 (see Enclosure 1) and did not reply until the letter dated March 15, 1985 (see Enclosure 2). This is a full 25 days over the 60 day comment period. No good cause has been shown by FWS why the comments should be considered.

The FERC, however, appears to apply a different set of rules on timeliness of actions by agencies than by applicants. There are many examples of FERC's liberal policy regarding agency action and enforcing strict time limitations on applicants. The FWS should be held to the same policy as applicants and the late comments from FWS on the proposed Allison Creek project should be discounted.

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Table 1
ALLISON CREEK
U.S. FISH & WILDLIFE SERVICE
AGENCY CONSULTATION

DATE	FROM	TO	COMMENTS
26-Feb-82	Myers Engineering	Fish & Wildlife	Request for Comments
22-Mar-82	Myers Engineering	Fish & Wildlife	Additional Info.
14-Apr-82	Fish & Wildlife	Myers Engineering	Comments to 2-26-82
03-Jun-82	Fish & Wildlife	Myers Engineering	Endangered Species
23-Sep-82	CH2M Hill	Fish & Wildlife	Info. for Meeting
07-Oct-82	CH2M Hill	Fish & Wildlife	Specialist Meeting
20-Oct-82	CH2M Hill	Fish & Wildlife	Meeting Summary
18-Nov-82	CH2M Hill	Fish & Wildlife	Meeting Summaries
30-Nov-82	Fish & Wildlife	CH2M Hill	Study Plan Comments
11-Jan-83	CH2M Hill	Fish & Wildlife	SRHCo Study Agreement
23-Feb-84	Fish & Wildlife	Myers Engineering	Cumulative Impact
27-Feb-84	Myers Engineering	cc Fish & Wildlife	Study Plan Meeting
15-Mar-84	Myers Engineering	Fish & Wildlife	Request for Comments
07-May-84	Myers Engineering	Fish & Wildlife	Liaison Agent
25-May-84	Myers Engineering	Fish & Wildlife	Cum. Impact Data
07-Jun-84	CH2M Hill	Fish & Wildlife	Endangered Species
27-Jun-84	Fish & Wildlife	CH2M Hill	Endangered Species
03-Jul-84	Myers Engineering	cc Fish & Wildlife	Rebutal to NMFS
20-Dec-84	Myers Engineering	Fish & Wildlife	Draft Exhibit E
17-Jan-85	Myers Engineering	Fish & Wildlife	TPH-Sediment
15-Mar-85	Fish & Wildlife	Myers Engineering	Draft E Comments
04-Apr-85	Myers Engineering	Fish & Wildlife	License Application
17-Sep-85	Fish & Wildlife	Myers Engineering	Design Drawings

Report on Historic and Archaeological Resources
(18 CFR, Sec. 4.41 (f)(4))

ITEM 1

Provide evidence, in the form of a letter to the National Park Service (NPS), that the NPS has been afforded the opportunity to review and comment on a description of the proposed project together with copies of the Applicant's cultural resources reports contained in Appendix I and Appendix II of the Exhibit E Report on Historic and Archaeological Resources (Archaeological Report). Provide any written comments from the NPS on this material.

RESPONSE TO ITEM 1

A copy of the license application for the Allison Creek hydropower project was sent to the National Park Service (NPS) by letter dated May 28, 1985 (Enclosure 3). The San Francisco NPS office commented on the application in a letter dated September 12, 1985 (Enclosure 4). Copies of these letters have been attached.

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Report on Recreational Resources
(18 CFR, Sec. 4.41 (f)(7))

ITEM 1

Provide evidence that the Report on Recreational Resources was prepared in consultation with the NPS, Western Regional Office.

RESPONSE TO ITEM 1

A copy of the license application for the Allison Creek hydropower project was sent to the National Park Service (NPS) by letter dated May 28, 1985 (Enclosure 3). The Seattle NPS office commented on the application in a letter dated July 15, 1985 (Enclosure 5). Copies of these letters are attached.

ITEM 2

Describe any measures or facilities recommended by the agencies and explain why the Applicant rejected any measures or facilities recommended by the agencies.

RESPONSE TO ITEM 2

The NPS, in their letter dated July 15, 1985, indicated that project the size of Allison Creek are not normally expected to include any major expenditure for recreation facility development unless an unusual opportunity or need is shown to exist. Furthermore, the NPS believes that no such opportunity or need exists. The Applicant concurs.

The Idaho Department of Parks and Recreation (IDPR) responded to a request for comments on the draft Exhibit E on December 27, 1984. This letter stated that they had no comments on the project (Enclosure 6). In telephone conversations with Mr. Todd Graeff of the IDPR, he has indicated that the department does not recommend any measures or facilities on projects the size of the Allison Creek project. The Applicant concurs.

MAR 03 1988

MYERS ENGINEERING COMPANY, P.A.
Consulting Engineers

750 Warm Springs Avenue
Boise, Idaho 83712
Telephone: (208) 336-1425

December 20, 1984

Mr. John P. Wolflin
Fish & Wildlife Service
Ecological Services
4620 Overland Road
Boise, ID 83705

Re: Exhibit E Draft - ALLISON CREEK - Project No. 7383

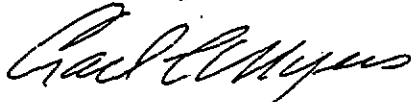
Dear Sir:

Enclosed is a draft copy of the Exhibit E portion of an application to
FERC for a Minor License on Allison Creek, Project No. 7383.

Also enclosed are maps and drawings that will appear in Exhibits F and
G, but which are necessary for understanding some portions of Exhibit E.

Regulations allow 60 days for agency review. We would appreciate your
questions and comments as they develop, so that they can be resolved
during the review period.

Sincerely,


Carl L. Myers, P.E.

Enclosures

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MAR 03 1988

Date of delivery:

12-26-84

by:



Agency:

Mr. John P. Wolflin
Fish & Wildlife Service
Ecological Services
4620 Overland Road
Boise, ID 83705

ALLISON CREEK

Received one copy of a draft Exhibit E to
FERC for licensing of the following
project:



United States Department of the Interior

FISH AND WILDLIFE SERVICE
BOISE FIELD OFFICE
4620 Overland Road, Room 209
Boise, Idaho 83705

March 15, 1985

Mr. Carl L. Myers, P.E.
Myers Engineering Company
750 Warm Springs Avenue
Boise, Idaho 83712

Re: FERC 7383, Allison Creek Hydro
Review of Draft Exhibit E

Dear Mr. Myers:

This responds to your request of December 20, 1984 for Fish and Wildlife comments on the referenced document. These comments should be used to revise the draft prior to forwarding the application for license to the Federal Energy Regulatory Commission (FERC). See our previous correspondence for the Lake Creek Project (FERC 7382) dated November 23, 1984 (attached). These detailed comments apply to the Exhibit E for Allison Creek.

Sediment Yield

You have estimated a sediment yield of 22.6 percent over current yield (122.6 percent of current yield). An important deficiency is indicated if the estimate is not related to the percentage over natural sediment yield. Also, these estimates should be related to fish habitat, especially in relation to salmon and steelhead spawning, incubation and rearing habitat. Using the Service Mitigation Policy (FR 46(15):7644-7663) we have determined that habitat of anadromous fish is Resource Category I. The mitigation goal for this category of habitat is no loss of existing habitat value. We recommend that all losses of existing habitat be prevented. Reference page 7657 of the Policy. Sedimentation limits the production capability of spawning, incubation and rearing habitat. Therefore, sedimentation rates should be mitigated to reflect this recommendation.

The Nezperce National Forest should comment on the adequacy of application of the sediment model to the Allison Creek drainage. We question the absolute predictions in Appendix II. To our knowledge, the model used uses output for relative comparison only.

Water Temperature

Water temperature can limit use by anadromous and resident fishes. The use of temperature information from John Day Creek (Figure III-1) may not be applicable to Allison Creek. Allison Creek flows from north to south; whereas John Day Creek flows from east to west. Drainage sizes and surface and ground water hydrology may differ substantially.

MAR 03 1988

Fishery Resources

One pair of chinook salmon do not require 16 square yards of streambed to successfully spawn. Sixteen square yards is optimal space for redd construction. In streams with limited spawning gravels/cobbles, pocket waters become very important for continued production. Any change in stream hydrology that would further limit this habitat is inconsistent with the Service Mitigation Policy.

Usually rearing habitat is more limiting than spawning habitat. Any change in stream hydrology which further reduces rearing potential is inconsistent with the Service Mitigation Policy. This would include production of autochthonous food sources (benthic production) and capture of allochthonous food sources (terrestrial insects).

The Exhibit adequately addresses factors which tend to limit fish production. In our view, the proposed project would further limit fish production inconsistent with the restoration efforts under the Columbia River Basin Fish and Wildlife Program implemented pursuant to the Pacific Northwest Power Planning and Conservation Act.

Figure 1 does not adequately or accurately reflect life stage timing of salmonids in the project area. See our previous correspondence for the Lake Creek project (FERC 7382) for a detailed recommendation concerning this figure.

Instream Flow

The Service has not been provided with a tabular output from the instream flow incremental method. It is the obligation of the applicant to provide all necessary information to the Service for our evaluation. The habitat/discharge curves, a rather preliminary step in relating flows to habitat, indicate inflections at 7-12 cfs for the three evaluation species. Proposed bypass flows would severely limit existing habitat inconsistent with the Service Mitigation Policy. They are not based on the IFIM results in our view.

Botanical Resources

The Exhibit E is not clear as to the origin of the determination that no candidate plant species occur in the Allison Creek drainage. If not already done, we recommend that project affected areas be surveyed for the candidate plant species Halimolobos perplexa v. perplexa. Please contact Robert Parenti (334-1806) to discuss any questions you may have concerning this candidate species.

Endangered Species

We have, to the best of our present knowledge, determined that no federally listed species present in the area would require Section 7 formal consultation under the Endangered Species Act.

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MAR 03 1988

Mitigation

Construction would have to be timed to miss spawning and incubation periods based on our letter of November 23, 1984 for the Lake Creek Project, not on your Figure 1. New instream construction, construction at stream crossings, and construction adjacent to the stream will add to the suspended and bed loads of Allison Creek. This would have adverse effects on the fishery and other aquatic resources and on habitat of Allison Creek.

Fish Passage

The Service must be consulted concerning fish passage pursuant to the Fish and Wildlife Coordination Act and the Federal Power Act. According to our engineers, your described plans appear conceptually acceptable. Design plans specific to the site must be reviewed and comments provided after receipt by the Service.

Benthic Production

We are not in agreement with your evaluation of possible effects to production of benthic invertebrates. We suspect that a significant reduction in benthic production would occur with the proposed reduced stream flows and subsequent reduced wetted useable area. See our Lake Creek correspondence.

Wetlands

Riparian habitats (including forested, scrub-shrub and emergent wetlands) are important in providing cover shading, stream bank stability, terrestrial food sources, and natural high discharge flood controls. Impacts to these wetlands may be inconsistent with Executive Order 11990 - Protection of Wetlands. These wetlands have been identified as Resource Categories I and II under the Service Mitigation Policy. Where anadromous fish are an evaluation species, these important habitats are Resource Category I. All losses should be prevented. Long term losses of these wetlands projected in the exhibit are inconsistent with the Service Mitigation Policy.

Cumulative Impacts

Your exhibit does not address the very real possibility of cumulative impacts from multiple hydro development in the Salmon River Basin. It similarly does not address the measures of consistency at Section 1200 of the Columbia River Basin Fish and Wildlife Program and Appendix E of the Regional Power Plan. We will advise FERC that this application is deficient unless our comments are adequately addressed in your license application.

Sincerely yours,


John P. Wolf
Field Supervisor

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MAR 03 1988

Attachment

cc: next page

cc: IDFG, McCall (Anderson)
IDFG, Hdqtrs., Boise (Richards)
NMFS, Portland (Bennett)
BLM, Boise (Minckler)
BLM, Cottonwood (Johnson)
BIA, Portland (Burnham)
Nez Perce Tribe, Lapwai (Fuller)
IWF/NWF, Portland (Thatcher)
USDI, Reg. Sol. Off., Portland (Lawton)
FWS, RO, AHR, Portland (Sundeen)
FWS, SE, Boise (1-4-84-SP-24)
FERC, Washington, D.C.
Nezperce N.F., Grangeville
Coeur d'Alene Tribe, Plummer

MYERS ENGINEERING COMPANY, P.A.
Consulting Engineers

750 Warm Springs Avenue
Boise, Idaho 83712
Telephone: (208) 336-1425

May 28, 1985

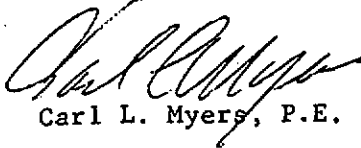
National Park Service
1920 Westin Building
2001 Sixth Avenue
Seattle, WA 98121

RE: FERC Project No. 7383 - Allison Creek

Gentlemen:

Enclosed is a copy of the application for license on the above project, which we apparently failed to send you at the time of issuance. Would you please examine the sections on recreation and archaeology, and give us your comments.

Sincerely,


Carl L. Myers, P.E.

Enclosure

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MAR 03 1988



United States Department of the Interior

NATIONAL PARK SERVICE

WESTERN REGION

450 GOLDEN GATE AVENUE, BOX 36063
SAN FRANCISCO, CALIFORNIA 94102

IN REPLY REFER TO:

H24 (WR-RRA)

September 12, 1985

Carl L. Myers, Project Engineer
Myers Engineering Company, P.A.
750 Warm Springs Avenue
Boise, ID 83712

Dear Mr. Myers:

We have reviewed the Historic and Archaeological Resources Report and License Application for the Allison Creek, ID hydro project (FERC 7383). Our comments should be considered early consultation as prescribed by FERC and not Interior's position on the project environmental document.

We are satisfied with the adequacy of the applicant's cultural resource survey. We note, however, that the Historic and Archaeological Resources report recommends the testing of the three sites at the mouth of Allison Creek. One of the three, relocated from a previous survey, is archeological site 10-IH-39, which contains a possible housepit depression. Two others, 366 and 370, were not relocated but are said to overlap 39. Their identity is not discussed. Spinden (1908) is also said to have reported an ethnographic village in this location.

It appears when the testing was recommended, the area of project impact was not clear. However, the report and the March 13, 1985 letter from the SHPO have stated that the project will not disturb these sites and that testing is unnecessary. We concur.

We would like to take this opportunity to state for the record that the proposed transmission line for this project probably will require cultural resource survey as will the lines for the Lake, Partridge, Elkhorn, and French Creek projects. We understand, however, that FERC advised you of this need early on.

If we can be of further assistance, please telephone Ron Corbyn or me at A.C. 415, 556- 5190.

Sincerely,

Garland J. Gordon
Chief, Interagency Archeological Services

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MAR 03 1988

cc: State Archaeologist-Green
FERC-Slatte
Nezperce NF archeologist-McKie
PNRO-Hyra



United States Department of the Interior

NATIONAL PARK SERVICE

Pacific Northwest Region
Westin Building, Room 1920
2001 Sixth Avenue
Seattle, Washington 98121

IN REPLY REFER TO:

L7619(PNR-RE)
FERC No. 7383

July 15, 1985

Mr. Carl L. Myers
750 Warm Springs Avenue
Boise, Idaho 83712

Dear Mr. Myers:

Thank you for the opportunity to review the application for license for Allison Creek Hydropower Project FERC No. 7383.

A project of this size (2.0 MW) is not normally expected to include any major expenditure for recreation facility development unless an unusual opportunity or need is shown to exist. Given the information supplied by the applicant no such opportunity or need appears to exist.

Richard L. Winters

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IDAHO DEPARTMENT of PARKS & RECREATION

2177 Warm Springs Ave., Statehouse Mail, Boise, Idaho 83720

(208) 334-2154

Robert L. Meinen, Director



John V. Evans, Governor

December 27, 1984

Mr. Carl L. Myers
Myers Engineering Co.
750 Warm Springs Ave.
Boise, ID 83712

Dear Mr. Myers:

Thank you for consulting us in regard to the proposed Allison Creek Hydro Project (FERC 7383). We have no comments.

Sincerely,

A handwritten signature in black ink, appearing to read "Todd Graeff", written over a horizontal line.

Todd Graeff
State Trails Coordinator

TG/dc

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Additional Information

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MAR 03 1988

MYERS ENGINEERING COMPANY, P.A.

Consulting Engineers

750 Warm Springs Avenue
Boise, Idaho 83712
Telephone: (208) 336-1425

November 21, 1985

Mr. Kenneth Plumb, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street NE
Washington, DC 20426

Re: Project No. 7383 - Allison Creek; FERC letter dated
July 1, 1985

Dear Mr. Plumb:

This is in response to the above-referenced letter regarding
the additional information.

Sincerely,

John Crockett
for Carl L. Myers, P.E.

Enclosure

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ALLISON CREEK HYDROPOWER PROJECT
ADDITIONAL INFORMATION

INTRODUCTION

The following information is provided pursuant to Section 4.31(f) of FERC regulations. This information supplements previous submittals on water quality and quantity, fish resources, general drawings, and power transmission information.

WATER QUALITY AND QUANTITY

- (1) Provide an assessment of the effects of the loss of up to 50 percent of the riparian vegetation on stream water temperatures.

RESPONSE TO ITEM 1

The Section 3 of the license application indicated that the riparian community along Allison Creek would be reduced by perhaps 50 percent as a result of water withdrawal (page 35). This statement was based on assumptions reflecting the minimum bypass flows that were proposed in the license application. Proposed minimum stream flows have been revised since the application was submitted and the increase will reduce any anticipated impact on the riparian community of Allison Creek. Furthermore, a 50 percent loss of riparian habitat would be a worst case situation and it is anticipated that the actual impact will be much less severe.

Reduced flows in Allison Creek will likely impact the riparian vegetation along the stream. The impacts would reflect the drier growing condition through changes in species composition, less vigorous growth, and greater spacing between plants. The upper portion of Allison Creek is primarily shaded

MAR 03 1988

by conifer trees. The lower portion is shaded by cottonwood, white alder and a variety of tree species. Reduced flows will not impact these trees by any measureable degree. Riparian vegetation that will be impacted will be in the form of greater plant spacing of grasses and similar small plants that do not provide the major portion of the stream shading. There is no evidence that suggests that the Allison Creek project will significantly elevate stream temperatures from vegetation loss caused by the reduced flows.

Methods to quantify impacts to riparian communities caused by reduced flows on small high gradient streams are simply not available. In the October 1985 Salmon River basin CIAP meeting, Mr. Gary Witmer of Argonne National Laboratory (ANL), discussed this dilemma with concerned agencies and developers. In addition, Richard Olsen, CIAP Program Manager from the ANL, indicated that he would be surprised if anyone attending that meeting believed that the proposed projects would significantly change stream water temperatures. Mr. Olsen then went on to ask the attendees if anyone did believe stream temperatures would change a significant amount. None of the attendees indicated they did.

- (2) Provide the date of request for the 401 Water Quality Certificate.

RESPONSE TO ITEM 2

The 401 Water Quality Certification for the Allison Creek project was originally requested on November 29, 1982. However, the "official" date of request was on September 10, 1985. Copies of this correspondence are included in Appendix 1.

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- (3) Provide an estimate of accretion flows along the reach of creek affected by diversion of flows for power generation.

RESPONSE TO ITEM 3

Based on the hydrologic analysis of C.A. Thomas (see Appendix 1, Section 2 of the Application for License), the accretion flows along the reach of creek affected by diversion of flows are estimated to be 1.9 cfs. This number corresponds to the average discharge of 11.9 cfs above the West Fork and the average discharge of 8.1 cfs at the West Fork.

- (4) Provide a quantification of the amount and duration of the proposed flushing flows for the bypassed reach, along with agency comments on the adequacy of the flows.

RESPONSE TO ITEM 4

The Applicant has proposed to guarantee a bypass flow for an amount that would equal or exceed 40 cfs over a continuous 7 day period to assure maintenance of the channel. This proposed flushing flow will be provided at the confluence of the West and Main Fork during the spring freshet every year the project is in operation. An assessment of the flows needed to maintain channel stability, minimize riparian encroachment, flush sediment, and permit gravel recruitment, along with the agencies response to the assessment and flow recommendation is included in Appendix 1.

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FISH RESOURCES

- (1) Provide the data requested by the National Marine Fisheries Service (NMFS) in a letter dated February 14, 1985, concerning the instream flow study. At the same time, provide NMFS comments on the analysis.

RESPONSE TO ITEM 1

The above mentioned information was supplied to NMFS by letter dated August 20, 1985. NMFS provided comments on the project, but not on the analysis. Furthermore, the NMFS comments contained numerous incorrect and oversimplified statements. For instance their letter stated that the study site is not within the bypass reach. Clearly it is. Copies of this correspondence are provide in Appendix II.

- (2) Provide an explanation of how recommended minimum flows for Allison Creek upstream from the West Fork and the West Fork were derived.

RESPONSE TO ITEM 2

The recommended minimum flows for Allison Creek upstream from the West Fork and the West Fork were based on the total recommended bypass flows below the West Fork and determined by the percentage of flow each stem supplies at the confluence. This percentage was derived from C.A. Thomas's median hydrographs dated November 3, 1983 for the West Fork and above the West Fork. Table 1 shows the median flows from each stem on a weekly basis. The percentages used to determine the separate bypass flows were 40 percent on the West Fork and 60 percent above the West Fork.

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TABLE 1

Based on C.A. Thomas's median hydrographs dated November 3, 1983 for the West Fork and above the West Fork of Allison Creek.

ALLISON CREEK FLOWS

PERIOD	FLOW M. F.	% TOTAL FLOW	FLOW W. F.	% TOTAL FLOW	TOTAL FLOW
JAN	5.60	61.54%	3.50	38.46%	9.10
JAN	5.60	61.54%	3.50	38.46%	9.10
JAN	5.80	62.37%	3.50	37.63%	9.30
JAN	6.00	63.16%	3.50	36.84%	9.50
FEB	6.00	63.16%	3.50	36.84%	9.50
FEB	6.00	63.16%	3.50	36.84%	9.50
FEB	6.00	63.16%	3.50	36.84%	9.50
FEB	6.00	62.50%	3.60	37.50%	9.60
MAR	6.00	61.22%	3.80	38.78%	9.80
MAR	6.40	61.54%	4.00	38.46%	10.40
MAR	6.80	59.13%	4.70	40.87%	11.50
MAR	7.00	58.33%	5.00	41.67%	12.00
APR	8.00	57.97%	5.80	42.03%	13.80
APR	11.00	57.89%	8.00	42.11%	19.00
APR	14.00	58.33%	10.00	41.67%	24.00
APR	18.00	60.00%	12.00	40.00%	30.00
MAY	21.00	58.33%	15.00	41.67%	36.00
MAY	26.00	56.52%	20.00	43.48%	46.00
MAY	27.00	55.10%	22.00	44.90%	49.00
MAY	27.00	50.94%	26.00	49.06%	53.00
JUNE	34.00	55.74%	27.00	44.26%	61.00
JUNE	40.00	57.14%	30.00	42.86%	70.00
JUNE	43.00	58.11%	31.00	41.89%	74.00
JUNE	37.00	57.81%	27.00	42.19%	64.00
JUL	28.00	58.33%	20.00	41.67%	48.00
JUL	18.40	58.60%	13.00	41.40%	31.40
JUL	14.00	58.33%	10.00	41.67%	24.00
JUL	12.00	57.69%	8.80	42.31%	20.80
AUG	10.00	58.14%	7.20	41.86%	17.20
AUG	8.80	58.67%	6.20	41.33%	15.00
AUG	7.40	58.73%	5.20	41.27%	12.60
AUG	6.50	58.56%	4.60	41.44%	11.10
SEP	5.90	59.60%	4.00	40.40%	9.90
SEP	5.00	58.14%	3.60	41.86%	8.60
SEP	5.20	57.78%	3.80	42.22%	9.00
SEP	5.40	58.70%	3.80	41.30%	9.20
OCT	5.00	59.52%	3.40	40.48%	8.40
OCT	4.60	56.79%	3.50	43.21%	8.10
OCT	5.40	61.36%	3.40	38.64%	8.80
OCT	5.40	61.36%	3.40	38.64%	8.80
NOV	5.60	62.22%	3.40	37.78%	9.00
NOV	5.60	62.22%	3.40	37.78%	9.00
NOV	5.60	60.87%	3.60	39.13%	9.20
NOV	5.20	57.78%	3.80	42.22%	9.00
DEC	5.00	56.82%	3.80	43.18%	8.80
DEC	5.40	60.67%	3.50	39.33%	8.90
DEC	5.60	61.54%	3.50	38.46%	9.10
DEC	5.60	60.87%	3.60	39.13%	9.20
AVERAGE % OF TOTAL:		59.33%	40.67%		

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- (3) Provide the biological rationale for the recommended instream flow regime to be provided in the bypassed reach of Allison Creek, to include an assessment of the anticipated impacts on size, distribution, passage, and reproduction of fish populations resulting from reduced flows during project operation.

RESPONSE TO ITEM 3

A detailed instream flow analysis was performed to quantify the gain and loss of habitat for each salmonid species and their lifestages for each month in the flow bypass reach of Allison Creek. This analysis is provided in Appendix II of this document. Loss of spawning, incubation, and rearing habitat will result in lowered recruitment and reproduction as well as alterations in distribution and abundance. Instream flows (or bypass flows) recommended for the project are different from those presented in the license application. Results of this analysis show that the new flow recommendations result in no loss of salmonid habitat.

- (4) Provide functional design drawings of proposed fish passage and protection facilities at the diversion structures, to include comments on the drawings from the NMFS, USFWS, and the Idaho Department of Fish & Game (IDFG). If agency recommendations are not included in the design of these facilities, Applicant must explain why they were not considered.

RESPONSE TO ITEM 4

Functional design drawings of proposed fish passage and protection facilities at the diversion structures were provided in the Application for License, Exhibit F-2 and F-3 drawings. Both drawings have been revised to include the vertical control datum and are included in Appendix III of this document.

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By letter dated September 17, 1985, NMFS, FWS, and IDFG were asked specifically to provide suggestions or comments on the fish facilities at the diversion structures. Copies of this correspondence is included in Appendix II and all comments that have been received are being considered.

The NMFS responded with cursory comments that are too obtuse and oversimplified to be of much value. While the IDFG did not respond to the letter, we are in contact with Mr. Grant Christensen, IDFG engineer, on a relatively regular basis and he will be continually consulted as the project is developed. In an effort to develop facilities that are functional and environmentally acceptable, the FWS has suggested that we arrange a meeting with engineers from the three resource agencies for the purpose of engineering review. We are currently preparing to arrange such a meeting tentatively scheduled in the middle of December. Prior to such a meeting, Mr. Jack Duckworth, from the FERC engineering staff, will be notified.

- (5) Provide functional design drawings of the diagonal guide rack to be placed in the tailrace outlet, along with comments on the drawings from the NMFS, IDFG, and USFWS.

RESPONSE TO ITEM 5

A functional design drawing of the diagonal guide rack to be placed in the tailrace outlet was provided to NMFS, IDFG, and USFWS, by letter dated September 17, 1985. Copies of the correspondence, in this regard, have been included in Appendix

11.

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- (6) Provide a description of construction techniques that would be used should penstocks be buried at stream crossings.

RESPONSE TO ITEM 6

The proposed project, as shown in Exhibits G-2 through G-4, will have three stream crossings. Two of these will cross the Main Fork and be above-stream crossings adjacent to existing bridges. The other will cross the West Fork at an old ford (vehicle stream crossing) below the streambed.

Standard construction techniques will be used to bury the penstock under the streambed. Excavation, for this portion of the pipeline installation, will occur during a low streamflow period as will the intake and tailrace structures. A cofferdam will be placed across the stream to divert the flow into a pipe. Stream bottom substrate will be stockpiled. The line will be trenched to a depth which allows the top of pipe 2 feet of cover under the existing bed. The pipe will be laid in the trench, then backfilled with the final layer being the original stream substrate that was previously stockpiled. The cofferdam will then be removed and the disturbed section of stream returned to its existing condition. It is expected that the total length of stream that will be disturbed is about 12 feet.

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GENERAL DRAWINGS

- (1) Revise the Exhibit F-2, F-3, and F-5 drawings by showing the vertical control datum for the given elevations of the diversion and powerhouse structures.

RESPONSE TO ITEM 1

Revised Exhibit F-2, F-3, and F-5 drawings, showing the vertical control datum for the elevations of the diversion and powerhouse structures, has been included as Appendix II. Please note that drawing F-5 did show an elevation of 1905.6 in the license application.

POWER TRANSMISSION INFORMATION

- (1) Provide transformer data (high and low side voltages and capacity).
- (2) Provide the name and/or circuit number of Idaho Power Company's (IPC) line to which the project will interconnect. Include the name of the substation in Riggins.
- (3) Provide a one-line diagram of the project and show the point of interconnection with IPC. Include the points of interconnection where known for the four proposed projects referenced on page A of the application.

RESPONSE TO ITEMS 1 - 3

The transformer for the proposed project will be an oil-cooled outdoor transformer. Step-up from 4160 V Delta to 34.5 KV Wye with a capacity of 4,180 KVA. Base rated for maximum generator output sudden overpressure and high-temperature protection.

The existing substation to which the Allison Creek project will be interconnected is Idaho Power Company's New Meadows Substation and the line name is NWMS-041. A map of the

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substation and transmission line distribution system is included in Appendix III. The line from the New Meadows substation to Riggins will be upgraded to 69-KV. This line is about 32 miles long. A completely new transmission line (34.5 KV) will be buried in the existing road from Riggins east to Lake Creek (FERC No. 7382) then Allison Creek. The line will also extend east from Allison Creek to pick-up power from proposed projects Elkhorn Creek (FERC No. 7378), Partridge Creek (FERC No. 7380), and French Creek (FERC No. 7899). The FERC project number, proposed capacity (KW), and anticipated annual energy production (MWH) for each of the powerhouses shown on Exhibit G-1 are given below.

PROJECT NAME	FERC NUMBER	PEAK KW CAPACITY	AVERAGE ANNUAL MWH PRODUCTION
Lake Creek	7382	4,637	9,336
Allison Creek	7383	2,033	6,563
Partridge Creek	7380	2,370	7,422
Elkhorn Creek	7378	4,826	8,478
French Creek	7899	8,444	21,310
Totals:		22,310	53,082

A map showing the general layout of the 18 mile-long new line is also included in Appendix III (Exhibit G, Sheet G-1 in the Application for license is a similar map. The map in Appendix III is revised with a slightly different route.) This map shows the five points of interconnection for the above mentioned projects. A preliminary one-line diagram for the proposed Allison Creek project is included in Appendix

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APPENDIX I

MAINTENANCE FLOW REPORT

AGENCY CORRESPONDANCE

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MYERS ENGINEERING COMPANY, P.A.

Consulting Engineers

750 Warm Springs Avenue
Boise, Idaho 83712
Telephone: (208) 336-1425

September 10, 1985

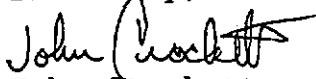
Mr. Jerry Yoder
Idaho Department of Health & Welfare
Division of Environment
Statehouse
Boise, ID 83720

Re: FERC Project No. 7383 - Allison Creek

Dear Mr. Yoder:

This is a request for 401 Water Quality Certification on the Allison Creek hydropower project. You were furnished a copy of the application for license on April 4, 1985.

Sincerely,


John Crockett

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STATE OF IDAHO

DEPARTMENT OF HEALTH AND WELFARE

DIVISION OF ENVIRONMENT
Statehouse
Boise, Idaho 83720

December 1, 1982

Ms. Helen Chenoweth
Consulting Associates, Inc.
P.O. Box 893
Boise, Idaho 83701

REFERENCE TO: Water Quality Certification of Salmon River
Basin Hydroelectric Projects - FERC

Dear Ms. Chenoweth:

This is in response to your request for comments on and water quality certification of proposed hydroelectric projects in the Salmon River Basin. We will consider 401 water quality certification of these projects when we have received and reviewed the environmental assessment portion (Exhibit E) of the FERC application for each project. In addition, since these are projects in the Salmon River drainage, we will need to review the basinwide studies that the responsible agencies and CH2M-Hill agreed were necessary to analyze cumulative impacts of the proposed hydro projects in the Salmon River Basin.

We have already commented to Carl L. Meyers in regard to the following projects:

1. Allison Creek
2. China Creek
3. Cow Creek
4. Elkhorn Creek
5. French Creek
6. Lake Creek
7. Partridge Creek
8. N. Fork Skookumchuck Creek
9. Lower and Middle Slate Creek
10. Upper Slate Creek

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Ms. Helen Chenoweth
December 1, 1982
Page 2

In regard to Graves Creek, Lower Hat Creek, Upper Hat Creek, S. Fork Race Creek, W. Fork Race Creek, Skookumchuck Creek, Squaw Creek and Upper Squaw Creek projects, we would have the following general concerns:

1. All aspects of the project development and operation must comply with state water quality standards. Of particular concern is any proposed impacts on stream dissolved oxygen, temperature, and gas supersaturation.
2. Any downstream drinking water usage must be protected.
3. Road building plans should employ best management practices to minimize erosion and keep road building material out of the channel.
4. Activities should be timed to avoid using soft roadway during rainy periods or freeze/thaw conditions.
5. Petroleum products and/or hazardous materials must be stored away from the stream.
6. Erosion safeguards should be employed to prevent the sloughing of overburden and subsequent sedimentation of the streams.

Thank for the opportunity to comment on these projects.

Sincerely,

Larry L. Koenig

Larry L. Koenig, Manager
Source Control Section

LLK:lab

cc: Ed Tulloch/George Dekan
Craig Shepard

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Consulting Associates, Incorporated

BOISE OFFICE
VERNON RAVENSCROFT
HELEN CHENOWETH

PHONE (208) 343-2670
P.O. BOX 893
BOISE, IDAHO 83701

November 29, 1982

Mr. Larry Koenig, Director
Water Quality Bureau
Division of Environment
Department of Health and Welfare
State of Idaho
Statehouse
Boise, Idaho 83720

Dear Mr. Koenig,

In follow-up to our telephone conversation regarding Water Quality Certificates under Section 401, I am including names of the streams and projects now being processed for application for licensure to the Federal Energy Regulatory Commission. All of these streams are small tributaries to the Salmon River or the Little Salmon River in northcentral Idaho. Most of the projects are located on or mostly on private land owned by the applicants. In every case, the powerhouses are located on private land.

Allison Creek
China Creek
Cow Creek
Elkhorn Creek
French Creek
Graves Creek
Lower Hat Creek
Upper Hat Creek
Lake Creek
Partridge Creek
S. Fk. Race Creek
N. Fk. Rack Creek
Sheep Creek
Skookumchuck Creek
N. Fk. Skookumchuck Creek
Lower & Middle Slate Creek
Upper Slate Creek
Squaw Creek
Upper Squaw Creek

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Page 2
To: Larry Koehn

November 29, 1982

Apparently, most of the applicants have solicited comment from the Water Quality Bureau, but apparently, through a miscommunication, comment on the specific 401 Water Quality Certificate was not understood. This is a specific item we must have to include in our FERC application.

I really appreciate your giving this your immediate attention, Larry, and should you want more information on the projects, please don't hesitate to call me.

Sincerely



Helen Chenoweth
for
Carl Myers, P.E.

cc: Carl Myers, P.E.

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MAINTENANCE FLOWS
Allison Creek

The purpose of the Idaho Department of Fish and Game (IDFG) and the Applicant's consultant, CH2M Hill, performing an instream flow study (IFIM) on Allison Creek was to determine the stream flows necessary to protect or enhance the fish and wildlife habitat, aquatic life, recreation, aesthetic beauty, and water quality.

The IFIM provides useful information in regards to channel morphology and flow conditions in the hydraulic portion of the model, however, it does not adequately address the impacts of flow reduction on the water/sediment balance. An additional "maintenance" or "flushing" flow may also be needed to flush accumulated substrate and nutrients from behind the diversion, clean silt from spawning gravels, permit downstream movement and accretion of spawning gravels, as well as maintain channel stability and minimize riparian encroachment.

Allison Creek is in steep forested land and drains about 19.9 square miles at the mouth. It is a high gradient stream with frequent bedrock controls on the banks and in the bed. The valley is often described as a V-shaped valley because of the downcutting of the stream. Visual inspection of the diversion reach indicated there is, in general, some lateral channel movement and bank erosion (5 to 10%) and minor channel scour or changing channels within the stream bed (Hill 1982). In this regard, Allison Creek is fairly typical of the high gradient streams in the area.

Allison Creek receives a poorly-sorted sediment load from its drainage, which ranges in particle size from silt to chair sized boulders. Most of this sediment is carried through the stream during the spring run-off, which in most years occurs for only a few days.

The Applicant commissioned Mark Hill of CH2M-Hill to perform environmental investigations on Allison Creek. On August 25, 1982, Mr. Hill conducted a fisheries observation survey that included a stream habitat physical profile rating. A copy of this report has been attached. This survey quantified the substrate, within the diversion reach, according to size as follows:

Subsection	>12"	3"-12"	0.1"-3"	<0.1"
SM 0.5	40%	45%	10%	5%
SM 1.0	0%	50%	50%	0%
SM 1.5	5%	75%	20%	0%
SM 2.0	5%	60%	20%	15%
SM 2.75	5%	10%	20%	65%

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The fish habitat estimated by Mark Hill's report is as follows:

Trout	275 square yards
Steelhead	150 square yards
Chinook	80 square yards

A complete description of the deposition of spawning gravels and an assessment of the stored spawning gravel present in the diversion reach of Allison Creek is presented in Section 3 of the license application. In general, spawning habitat is limited and is primarily found in discrete pockets behind (downstream of) obstructions.

To refine the data on the composition of spawning and rearing habitat, the BLM recently performed embeddedness measurements within the proposed diversion reach at stream mile 0.38. Using methods outlined by Dave Burns of the Payette National Forest, the study results indicate that the stream is 39.50% embedded (gasket effect). Embeddedness is a rating of the degree the larger particle sizes (e.g., gravel, rubble, and boulder) are covered with fine sediments. A zero rating means the particles are free and clear of fine sediments and their entire perimeter is available for direct contact with the water except for that part touching other particles other than fine sediment. A 100 percent rating would occur when the particle is completely covered by fine sediments.

The Nezperce N.F. have recently been involved in extensive road building within the drainage. Results of the BLM embeddedness study suggest that the road building activities have added a significant amount of sediment to the system. To our knowledge, the Nezperce N.F. has not quantified these recent activities, in regards to sediment production, nor do they intend to do so.

The Nezperce National Forest sediment modeling procedure was used to provide a conservative estimate of the amount of sedimentation that would be caused by the construction and operation of the proposed project. This study is contained in Section 2, Appendix II of the license application. The amount of sedimentation caused by the construction of the proposed project would be no more than what might be expected to occur in a natural event. The existing road, underwhich the pipe will be buried, is wide and it is expected that very little sediment will be able to migrate to the stream.

The Nezperce model estimates the annual natural sediment production in the Allison Creek drainage is about 660 tons. The amount of sediment delivered to the stream from man-caused activities, in any given year, is about 60 tons per year (based on 1981 conditions).

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The Nezperce National Forest sediment budget for the Allison Creek drainage is designed to protect the fisheries resource, which is the limiting factor in regards to sediment production. This sediment budget limits land disturbing activities within the drainage to a maximum allowable one-year increase of 45 percent over the baseline, with no more than two such activities per decade. A "worst case" scenario, therefore, would be 257 tons of sediment yield over baseline in one year (0.45×660), plus about 69 tons ($(18,000/67,500) \times 257$) from the previous year's activities, for a total of 326 tons over baseline.

Most of the sediment entering Allison Creek remains suspended, and is ultimately transported to the main Salmon River. This is clearly illustrated with the use of bedload transport equations. The most useful bedload transport equation for steep rivers and streams is the Meyer-Peter and Muller (1948) equation, which has been used widely for engineering in mountain streams and rivers. The formula is:

$$g = [39.25q^{2/3} S^{1.5} - 9.95d]$$

where:

- g = sediment discharge, in pounds per second foot of width
- q = water discharge, in cubic feet per second per foot of width
- S = slope of stream, in feet per foot
- d = size of bed sediment, in feet

The gradient of Allison Creek is as follows:

SM 0.00 to 0.53 - 5.7%
 SM 0.53 to 1.21 - 5.6%
 SM 1.21 to 1.91 - 5.4%
 SM 1.91 to 2.53 - 6.2%
 SM 2.53 to 2.91 - 6.0%

(SM 2.91 at confluence of Main and West Fork)

Sedimentation entering the stream from a land disturbing activity would be zero just above the disturbance, and increase, in somewhat of a linear fashion, to the maximum amount just below the furthest downstream area of disturbance. Sediment from one or more disturbance within the drainage will generally have the greatest impact in the lower reaches of the stream. Therefore, we are primarily concerned with the lower reach of the stream that has a 5.7% gradient.

Figure 1 represents a scenario for the sediment transport of Allison Creek under existing, or what might be assumed to be average conditions (1981 estimate). Flows are based on the median hydrograph. The Calculated Sediment Energy (lb/sec) is the amount of energy the stream has available to transport sediment with particle sizes less than or equal to 6.3 mm (0.0207 feet). Sediment particle sizes of less than 6.3 mm are generally considered to cause adverse impacts to fish habitat.

The Actual Sediment (lb/sec) used in the third column of Figure 1 represents the amount of sediment ($660 + 60 = 720$ tons/year), that would be expected to enter the stream in any given year. The distribution of the sediment is relatively arbitrary within the spring freshet, and the amount, 2.38 lb/sec over a one week period, is equivalent to 720 tons/year.

The last column in Figure 1 represents the Sediment Energy Difference (lb/sec), or amount of energy that was not used in sediment transport for particle sizes less than or equal to 6.3 mm. Several stream widths were run through the calculations and, for our purposes, had an insignificant effect. From various reports it was determined that a stream width of 12 feet adequately represents the stream.

Results from the bedload equation indicate that Allison Creek is a supply limited stream and generally in a state of degradation. That is to say that there is more energy available for sediment transport than there is sediment. Therefore the stream channel is characterized by a coarse-textured bed. There is limited bar development, and bed forms consist primarily of nondescript accumulations of rubble material that form the riffle and cascade areas.

Figure 2 represents the same situation as depicted in Figure 1 except for the diverted reach stream flows. These flows are the estimated diversion reach flows during project operation. These flows are different from the proposed minimum stream flows because the turbine can only operate within a specific range of discharges. Results illustrate that the stream still has enough energy available to move sediment particle sizes equal to or less than 6.3 mm.

Figure 3 represents the same situation as shown in Figures 1 and 2, except that the flows are the proposed minimum bypass flows. Again, the stream is supply limited.

Figure 4 represents the sediment transport condition in which the flows are the proposed minimum flows and the sediment supply is a "worst case" situation. This assumes that the maximum sediment budget of 45 percent increase over baseline occurred over two consecutive years. The additional sediment yield over baseline (326 tons) makes the total sediment delivered to Allison Creek to be 986 tons (3.26 lb/sec/week). Results show that adequate sediment transport energy is available, and the sediment would be flushed through the diversion reach.

By use of the Meyer-Peter and Muller (1948) bedload transport equation, it has been clearly demonstrated that the proposed bypass flows will provide adequate energy to remove sediment that is considered to cause adverse impacts to fish habitat.

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To quantify the effect of reduced flows on gravel recruitment within the project reach is extremely difficult. Bedload transport equations have very limited meaning in regards to gravel recruitment on streams such as Allison Creek. Spawning areas are limited, and are generally found in small discrete areas behind obstructions such as logs or boulders.

From a theoretical standpoint, however, the Meyer-Peter and Muller (1948) transport equation can be manipulated to solve for the flow that is needed to maintain gravel transport. For Allison Creek the equation becomes:

$$Q = [(9.95 (d) / 39.25 (S))^{1.5}] \times \text{Width}$$

The maximum size of gravel we are concern with in regards to fish habitat is 6 inches (0.5 feet). Solving the equation for Allison Creek we find that a flow of 39.8 cfs will be required to maintain transport of 6 inch gravel. The anticipated flows shown on Figure 2 of the estimated plant capacity indicate that the third week of June would bypass 36 cfs. This flow, plus accretion flows, would genrally provide enough flushing flow. These flows are estimated, however, and a guaranteed flushing flow should be provided.

Another concern associated with flushing flows is the diversion structure. Cross sections of the structures (see Exhibit F, Sheet F-2 of the license application) shows that they consist of a Parshall flume, a gravel trap, and a sediment trap.

A Parshall flume is a water measuring device which is self-cleaning. It is expected that most of the upstream bedload material will simply be flushed through the flume to the diversion reach. Some of the sediment from the upper drainage will be trapped in the intake chamber. Trapped sediment will be removed by hand from the chamber, and disposed of properly, when necessary. The design of the diversion structure will therefore, minimize any adverse impacts caused by the accumulation of bedload material. A gravel trap is located between the trash rack and the fish screen. A slide gate will be located on the downstream side of the gravel trap so gravel can easily be moved to the diversion reach.

Potential riparian encroachment caused by the reduced flows is also of concern to agencies. While it is extremely difficult to predict the impacts of the proposed project on the riparian community within the diversion reach, there are generally two situations in which agencies have expressed concern. One concern is that the reduced flow will cause a reduction in the riparian community. The other concern is that the reduced flows will result in riparian encroachment.

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It is expected, however, that the reduced flows associated with the proposed project will cause some vegetation encroachment as the environment seeks an equilibrium with the altered flows. This encroachment, however, is not necessarily an adverse impact. Encroachment on the stream caused by reduced flows would, for instance, provide shading that is needed to maintain stream temperature. It is expected that the proposed maintenance flows will minimize reduced carrying capacity because of riparian encroachment or prevent any other significant adverse impacts in this regard.

When providing for a stable channel, we are generally concerned with an orderly conveyance of water. A stable channel balance, or equilibrium, could be defined as the balance that a stream is continually trying to obtain by adjusting to provide the power and efficiency necessary to transport the sediment load supplied from the drainage without net aggradation or degradation of the channel. Flow reduction caused by the proposed project will certainly have some impact on the channel. The purpose here is to provide a flushing flow that maintains channel stability, and yet allow the channel to seek an equilibrium that best suits the new conditions.

The preceeding approach to maintaining channel stability suggests that Allison Creek is supply limited and there is a high probability that reduced flows will have a beneficial impact on the channel stability of the diverted reach. Lateral channel movement and bank cutting will certainly be reduced. It is expected that a maintenance flow of 40 cfs over a 7 day period will allow the channel to adjust to the flow alternations from project operation, and still maintain adequate carrying capacity.

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FIGURE 1
ALLISON CREEK HYDROPOWER PROJECT
FLUSHING FLOW ANALYSIS
EXISTING CONDITIONS

d50 = 0.0207

width = 12.0

slope = 0.057

MONTH	EXISTING STREAM FLOW (cfs)	CALCULATED SEDIMENT ENERGY (lb/sec)	ACTUAL SEDIMENT (lb/sec)	SEDIMENT- ENERGY DIFFERENCE
JAN	9.1	25.5	0.00	25.5
JAN	9.1	25.5	0.00	25.5
JAN	9.3	26.2	0.00	26.2
JAN	9.5	26.8	0.00	26.8
FEB	9.5	26.8	0.00	26.8
FEB	9.5	26.8	0.00	26.8
FEB	9.5	26.8	0.00	26.8
FEB	9.6	27.1	0.00	27.1
MAR	9.8	27.7	0.00	27.7
MAR	10.4	29.7	0.00	29.7
MAR	11.6	33.5	0.00	33.5
MAR	12.0	34.7	0.00	34.7
APR	13.8	40.5	0.00	40.5
APR	19.0	57.2	0.00	57.2
APR	24.0	73.4	0.00	73.4
APR	30.0	93.0	0.00	93.0
MAY	36.0	112.6	0.00	112.6
MAY	46.0	145.3	0.00	145.3
MAY	49.0	155.2	0.00	155.2
MAY	53.0	168.3	0.00	168.3
JUN	61.0	194.7	0.00	194.7
JUN	70.0	224.4	0.00	224.4
JUN	74.0	237.6	2.38	235.2
JUN	64.0	204.6	0.00	204.6
JUL	48.0	151.9	0.00	151.9
JUL	32.0	99.5	0.00	99.5
JUL	24.0	73.4	0.00	73.4
JUL	20.8	63.1	0.00	63.1
AUG	17.2	51.4	0.00	51.4
AUG	15.0	44.3	0.00	44.3
AUG	12.6	36.7	0.00	36.7
AUG	11.1	31.9	0.00	31.9
SEP	9.9	28.1	0.00	28.1
SEP	8.6	24.0	0.00	24.0
SEP	9.0	25.2	0.00	25.2
SEP	9.2	25.9	0.00	25.9
OCT	8.4	23.3	0.00	23.3
OCT	8.7	24.3	0.00	24.3
OCT	8.8	24.6	0.00	24.6
OCT	8.8	24.6	0.00	24.6
NOV	9.0	25.2	0.00	25.2
NOV	9.0	25.2	0.00	25.2
NOV	9.2	25.9	0.00	25.9
NOV	9.0	25.2	0.00	25.2
DEC	8.8	24.6	0.00	24.6
DEC	8.9	24.9	0.00	24.9
DEC	9.1	25.5	0.00	25.5
DEC	9.2	25.9	0.00	25.9

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FIGURE 2
ALLISON CREEK HYDROPOWER PROJECT
FLUSHING FLOW ANALYSIS
PROPOSED PROJECT

d50 = 0.0207

width = 12.0

Slope = 0.057

MONTH	ESTIMATED STREAM FLOW (cfs)	CALCULATED SEDIMENT ENERGY (lb/sec)	ACTUAL SEDIMENT SEDIMENT (lb/sec)	SEDIMENT- ENERGY DIFFERENCE
JAN	4.0	9.7	0.00	9.7
JAN	4.0	9.7	0.00	9.7
JAN	4.0	9.7	0.00	9.7
JAN	4.0	9.7	0.00	9.7
FEB	4.0	9.7	0.00	9.7
FEB	4.0	9.7	0.00	9.7
FEB	4.0	9.7	0.00	9.7
FEB	4.0	9.7	0.00	9.7
MAR	4.0	9.7	0.00	9.7
MAR	4.0	9.7	0.00	9.7
MAR	6.0	15.8	0.00	15.8
MAR	6.0	15.8	0.00	15.8
APR	6.0	15.8	0.00	15.8
APR	6.0	15.8	0.00	15.8
APR	6.0	15.8	0.00	15.8
APR	6.0	15.8	0.00	15.8
MAY	6.0	15.8	0.00	15.8
MAY	8.0	22.1	0.00	22.1
MAY	11.0	31.6	0.00	31.6
MAY	15.0	44.3	0.00	44.3
JUN	23.0	70.2	0.00	70.2
JUN	32.0	99.5	0.00	99.5
JUN	40.0	125.7	2.38	123.3
JUN	26.0	79.9	0.00	79.9
JUL	10.0	28.4	0.00	28.4
JUL	6.0	15.8	0.00	15.8
JUL	5.0	12.8	0.00	12.8
JUL	5.0	12.8	0.00	12.8
AUG	5.0	12.8	0.00	12.8
AUG	5.0	12.8	0.00	12.8
AUG	5.0	12.8	0.00	12.8
AUG	5.0	12.8	0.00	12.8
SEP	5.0	12.8	0.00	12.8
SEP	8.6	24.0	0.00	24.0
SEP	5.0	12.8	0.00	12.8
SEP	5.0	12.8	0.00	12.8
OCT	8.4	23.3	0.00	23.3
OCT	5.0	12.8	0.00	12.8
OCT	4.0	9.7	0.00	9.7
OCT	4.0	9.7	0.00	9.7
NOV	4.0	9.7	0.00	9.7
NOV	4.0	9.7	0.00	9.7
NOV	4.0	9.7	0.00	9.7
NOV	4.0	9.7	0.00	9.7
DEC	4.0	9.7	0.00	9.7
DEC	4.0	9.7	0.00	9.7
DEC	4.0	9.7	0.00	9.7
DEC	4.0	9.7	0.00	9.7

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FIGURE 3
ALLISON CREEK HYDROPOWER PROJECT
FLUSHING FLOW ANALYSIS
PROPOSED PROJECT

d50 = 0.0207

width = 12.0

slope = 0.057

MONTH	MINIMUM STREAM FLOW (cfs)	CALCULATED SEDIMENT ENERGY (lb/sec)	ACTUAL SEDIMENT SEDIMENT (lb/sec)	SEDIMENT- ENERGY DIFFERENCE
JAN	4.0	9.7	0.00	9.7
JAN	4.0	9.7	0.00	9.7
JAN	4.0	9.7	0.00	9.7
JAN	4.0	9.7	0.00	9.7
FEB	4.0	9.7	0.00	9.7
FEB	4.0	9.7	0.00	9.7
FEB	4.0	9.7	0.00	9.7
FEB	4.0	9.7	0.00	9.7
MAR	4.0	9.7	0.00	9.7
MAR	4.0	9.7	0.00	9.7
MAR	6.0	15.8	0.00	15.8
MAR	6.0	15.8	0.00	15.8
APR	6.0	15.8	0.00	15.8
APR	6.0	15.8	0.00	15.8
APR	6.0	15.8	0.00	15.8
APR	6.0	15.8	0.00	15.8
MAY	6.0	15.8	0.00	15.8
MAY	6.0	15.8	0.00	15.8
MAY	6.0	15.8	0.00	15.8
MAY	6.0	15.8	0.00	15.8
JUN	6.0	15.8	0.00	15.8
JUN	6.0	15.8	0.00	15.8
JUN	40.0	125.7	2.38	123.3
JUN	6.0	15.8	0.00	15.8
JUL	6.0	15.8	0.00	15.8
JUL	6.0	15.8	0.00	15.8
JUL	5.0	12.8	0.00	12.8
JUL	5.0	12.8	0.00	12.8
AUG	5.0	12.8	0.00	12.8
AUG	5.0	12.8	0.00	12.8
AUG	5.0	12.8	0.00	12.8
AUG	5.0	12.8	0.00	12.8
SEP	5.0	12.8	0.00	12.8
SEP	5.0	12.8	0.00	12.8
SEP	5.0	12.8	0.00	12.8
SEP	5.0	12.8	0.00	12.8
OCT	5.0	12.8	0.00	12.8
OCT	5.0	12.8	0.00	12.8
OCT	4.0	9.7	0.00	9.7
OCT	4.0	9.7	0.00	9.7
NOV	4.0	9.7	0.00	9.7
NOV	4.0	9.7	0.00	9.7
NOV	4.0	9.7	0.00	9.7
NOV	4.0	9.7	0.00	9.7
DEC	4.0	9.7	0.00	9.7
DEC	4.0	9.7	0.00	9.7
DEC	4.0	9.7	0.00	9.7
DEC	4.0	9.7	0.00	9.7

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FIGURE 4
ALLISON CREEK HYDROPOWER PROJECT
FLUSHING FLOW ANALYSIS
PROPOSED PROJECT

d50 = 0.0207

width = 12.0

slope = 0.057

MONTH	MINIMUM STREAM FLOW (cfs)	CALCULATED SEDIMENT ENERGY (lb/sec)	ACTUAL SEDIMENT SEDIMENT (lb/sec)	SEDIMENT- ENERGY DIFFERENCE
JAN	4.0	9.7	0.00	9.7
JAN	4.0	9.7	0.00	9.7
JAN	4.0	9.7	0.00	9.7
JAN	4.0	9.7	0.00	9.7
FEB	4.0	9.7	0.00	9.7
FEB	4.0	9.7	0.00	9.7
FEB	4.0	9.7	0.00	9.7
FEB	4.0	9.7	0.00	9.7
MAR	4.0	9.7	0.00	9.7
MAR	4.0	9.7	0.00	9.7
MAR	6.0	15.8	0.00	15.8
MAR	6.0	15.8	0.00	15.8
APR	6.0	15.8	0.00	15.8
APR	6.0	15.8	0.00	15.8
APR	6.0	15.8	0.00	15.8
APR	6.0	15.8	0.00	15.8
MAY	6.0	15.8	0.00	15.8
MAY	6.0	15.8	0.00	15.8
MAY	6.0	15.8	0.00	15.8
MAY	6.0	15.8	0.00	15.8
JUN	6.0	15.8	0.00	15.8
JUN	6.0	15.8	0.00	15.8
JUN	40.0	125.7	3.26	122.4
JUN	6.0	15.8	0.00	15.8
JUL	6.0	15.8	0.00	15.8
JUL	6.0	15.8	0.00	15.8
JUL	5.0	12.8	0.00	12.8
JUL	5.0	12.8	0.00	12.8
AUG	5.0	12.8	0.00	12.8
AUG	5.0	12.8	0.00	12.8
AUG	5.0	12.8	0.00	12.8
AUG	5.0	12.8	0.00	12.8
SEP	5.0	12.8	0.00	12.8
SEP	5.0	12.8	0.00	12.8
SEP	5.0	12.8	0.00	12.8
SEP	5.0	12.8	0.00	12.8
OCT	5.0	12.8	0.00	12.8
OCT	5.0	12.8	0.00	12.8
OCT	4.0	9.7	0.00	9.7
OCT	4.0	9.7	0.00	9.7
NOV	4.0	9.7	0.00	9.7
NOV	4.0	9.7	0.00	9.7
NOV	4.0	9.7	0.00	9.7
NOV	4.0	9.7	0.00	9.7
DEC	4.0	9.7	0.00	9.7
DEC	4.0	9.7	0.00	9.7
DEC	4.0	9.7	0.00	9.7
DEC	4.0	9.7	0.00	9.7

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SUBJECT Fisheries observations
of Allison Creek

DATE _____
SHEET NO. _____ OF _____
PROJECT NO. _____

The proposed project area on Allison Creek was surveyed on August 25, 1982. Results of the Fisheries Field data collection effort have been tabulated and are attached.

Qualitative observations

1. The stream gradient is steep in the lower half mile but becomes more moderate upstream. A thick canopy and light sediment affords good benthos production and salmonid spawning.
2. Anadromous habitat is limited to the lower 2 miles of stream where good substrate, low velocity and wide stream channel occurs.
3. Above SM 2.0 sedimentation increases and salmon spawning is limited to trout.
4. Benthos production is high with Trichoptera species dominating.
5. No migration blocks were observed and anadromous fish can negotiate the timber box culvert located 100 yds above the mouth.

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SUBJECT Allison Creek substrate
size of salmonid spawning
habitat

DATE _____
SHEET NO. _____ OF _____
PROJECT NO. _____

Subsection	% Boulder ≥ 12 inches	% Rubble 3 to 12 inches	% Gravel 0.1 to 3 inches	% Fines ≤ 0.1 inch
SM 0.5	40	45	10	5
SM 1.0	0	50	50	0
SM 1.5	5	75	20	0
SM 2.0	5	60	20	15
SM 2.75	5	10	20	65
Avg. Substrate	11	48	24	17

Spawning Habitat Rating	Substrate Size	
	Good	Possible
Trout	0.5 to 1.5 inch	0.25 to 1.5 inch
Salmon	1.0 to 2.5 inch	0.25 to 4.0 inch
Steelhead	1.5 to 4.0 inch	0.25 to 6.0 inch

Spawning Habitat Available Within Project Area

Trout 275 yd²
Steelhead 150 yd²
Chinook 50 yd²

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SUBJECT Adrian Creek pool
and riffle/rapid ratio.

DATE _____
SHEET NO. _____ OF _____
PROJECT NO. _____

<u>Subsection</u>	<u>Yd²</u>	<u>Pools</u> <u>Depth (ft)</u>	<u>Riffle/Rapid</u> <u>Yd²</u>	<u>Pool to Riffle</u> <u>Ratio</u>
SM 0.5	25	2.0	25	1:1.0
SM 1.0	35	0.5	40	1:1.1
SM 1.5	35	0.5	40	1:1.1
SM 2.0	25	0.5	25	1:1.0
SM 2.75	2	1.0	18	1:9.0

Avg 1:1.2

<u>Pool / Riffle</u>	
<u>Habitat Rating</u>	<u>Ratio</u>
Excellent	1:1
Good	1:5
Fair	1:10
Poor	1:15

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Results of electrofishing
in Allison Creek project
area

<u>Subsection</u>	<u>Electrofishing</u> <u>Time (sec)</u>	<u>Distance</u> <u>Sampled (ft)</u>	<u>Fish</u> <u>species</u>	<u>Length</u> <u>(cm)</u>	<u>Weight</u> <u>(gm)</u>
SM 0.5	—	—	—	—	—
SM 1.0	600	60	Rainbow	7.6	—
"	"	"	"	12.7	—
"	"	"	"	14.6	—
"	"	"	"	8.0	—
"	"	"	"	10.4	—
"	"	"	"	9.5	—
"	"	"	Sculpin	—	—
"	"	"	Sculpin	—	—
"	"	"	Dace	—	—
"	"	"	Dace	—	—
SM 1.5	—	—	—	—	—
SM 2.0	720	100	Rainbow	22.9	—
"	"	"	"	12.0	—
"	"	"	"	15.2	—
"	"	"	"	16.0	—
"	"	"	"	6.5	—
"	"	"	"	8.0	—
"	"	"	"	10.3	—
"	"	"	"	11.2	—
"	"	"	"	14.0	—
SM 2.75	570	50	None		

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STREAM HABITAT PHYSICAL PROFILE CLASS

*Allison Creek*A. Stream Shade (June - September; 11:00 a.m. - 5:00 p.m.)Rating:

4. X Shade more than 80%
3. _____ Shade 60% to 80%
2. _____ Shade 40% to 60%
1. _____ Less than 40% shade

B. Stream Bank ConditionRating:

4. _____ No negligible use/damage; vegetation ^{1/} well-rooted; sod intact; very little, if any erosion from vegetation areas; less than 5% bare soil showing.
3. X Some use/damage; vegetation generally well-rooted; sod mostly intact; soil showing in places (6% to 15% bare soil showing overall); some surface erosion evident.
2. _____ Use or damage close to sod; vegetation shallow rooted; moderate surface erosion (15% to 25% bare soil showing overall).
1. _____ Heavy to severe use/damage; vegetation generally cropped to sod; considerable soil showing (over 25%) with sod damage serious; active surface erosion a serious problem.

C. Stream Bank StabilityRating:

4. _____ Bank Stable and Undamaged - Partial or no evidence of bank damage; 90-100 percent of bank area free from use/damage. Little or no unnatural bank erosion or sloughing present.
3. X Bank Damage 20 Percent or Less - Banks 80 to 90 percent free from use/damage. Some erosion and sloughing but banks will not contribute significant amounts of sediment to the stream if factors causing erosion are eliminated.
2. _____ Bank Damage 40 Percent or Less - Banks having received 20 to 40 percent damage from use. Moderate to heavy bank erosion and sloughing on a seasonal basis, with some continuous erosion and sloughing. Prevailing conditions will not permit recovery of banks to a stability level greater than 60 percent.

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^{1/} Primarily grasses, sedges and forbs.

1. _____ Bank Damage Excessive - Banks exhibiting greater than 40 percent erosional and/or use damage. Accelerated erosion and sloughing present over virtually the entire bank surveyed. No evidence of bank recovery visible, and erosion is continuous.

D. Stream Channel Stability

Rating

4. _____ No or negligible lateral channel movement and bank erosion (cutting) (5%), scour, or changing channels.
3. X _____ Some lateral channel movement and bank erosion (5 to 10%), minor channel scour or changing channels within stream bed.
2. _____ Frequent lateral channel movement (10 to 15%); moderate channel scour or channel change within stream bed.
1. _____ More than 20% lateral channel movement and bank cutting, changing channels and severe scour evident, and source of extreme sedimentation.

E. Sedimentation of Stream Bed - Percent of fine sediments (particles sand size and smaller) covering stream bottom (wetted parameter) materials.

Rating

3. X _____ Less than 10%
2. _____ 10 - 25%
1. _____ More than 25%

F. Total Score

Condition Rating

<u>Overall</u>	<u>Numerical</u>
_____ Excellent	17+
<u>X</u> _____ Good	14-16
_____ Fair	10-13
_____ Poor	5-9

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MYERS ENGINEERING COMPANY, P.A.

Consulting Engineers

750 Warm Springs Avenue
Boise, Idaho 83712
Telephone: (208) 336-1425

October 18, 1985

Mr. Al Van Vooren
Idaho Dept. of Fish & Game
600 South Walnut
P.O. Box 25
Boise, ID 83712

Re: FERC Project No. 7383 - Allison Creek

Dear Mr. Van Vooren:

We have recently been provided enough information from studies, on the above mentioned project, to complete a "maintenance" flow analysis.

We are proposing to guarantee a bypass flow for an amount that would equal or exceed 40 cfs over a continuous 7 day period to assure maintenance of the channel. This proposed flushing flow will be provided at the confluence of the West and Main Fork during the spring freshet every year the project is in operation.

An assessment of the flows needed to maintain channel stability, minimize riparian encroachment, flush sediment, and permit gravel recruitment is attached. Would you please provide us with comments of this assessment and flow recommendation. We also request that your comments be provided in a timely matter. In order for your agency to participate in the final report, we will need your comments within 35 days of the date of this letter. Your comments will be greatly appreciated.

Sincerely,

John Crockett
John Crockett

Enclosure

cc: U.S. Fish & Wildlife Serv.
Beverly N.F., Robert Abbe
Craig Johnson
National Marine Fisheries

MICROFILMED

MAR 03 1988

by: *cc*
Date of Delivery: *10/21/85*

Mr. Al Van Vooren
Idaho Department of Fish & Game
P.O. Box 25
Boise, ID 83712

Agency:

Allison Creek - No. 7383
Hydropower Project

Received one copy of the
letter dated 10-18-85 for



IDAHO DEPARTMENT OF FISH AND GAME

600 South Walnut • Box 25
Boise • Idaho • 83707

October 30, 1985

Mr. John Crockett
Myers Engineering Company
750 Warm Springs Avenue
Boise, ID 83712

Re: FERC Project No. 7383 - Allison Creek
Maintenance Flow Analysis

Dear Mr. Crockett:

Thank you for providing us with the above report for our review.

We feel that other resource and land management agencies, such as the USFS or USGS, have greater expertise in the calculation of maintenance flows and, therefore, largely defer to their evaluations of your report.

It is our understanding, however, that the USFS uses a different method to calculate their flushing flow recommendations as provided under the Organic Act. Why was the MPM method chosen? How would the results compare to those using the method commonly used by the USFS?

From a cursory review, there are a few items in the report which seem contradictory. One is the conclusion that 40 cfs is sufficient to transport 6-inch gravel when under present flows 15 to 85 percent of the substrate consists of gravel 6 inches and less and the system is described as supply limited. Another is the statement that the system is supply limited, yet is in a state of aggradation.

You have used the slope for the lower half mile in your calculations, yet in the report by Mark Hill the stream gradient is described as "...steep in the lower half mile but becomes more moderate upstream." The 5.4 percent slope from SM 1.2 to 1.9 would probably be more appropriate for your calculations.

Your calculations suggest that under worst case conditions, the proposed flows will provide excess energy for sediment transport. This seems illogical in that the substrate in the upper portion of the diversion reach is composed of 65 percent fines less than 0.1 inch. Imbeddedness is 39.5%, which is indicative of a heavily impacted stream.

MAR 03 1988

Mr. John Crockett
October 30, 1985
Page 2

The report does not give an estimate of existing sediment input nor the estimated input from the proposed project, but the Imbeddedness rating suggests that Allison Creek may already be impacted beyond the goals set by the Department in our Anadromous Fisheries Management Plan.

We appreciate your efforts to consult with the Department. We trust that you will be provided a more thorough review of the report by the USFS.

Sincerely,



Al Van Vooren
Staff Biologist

cc: USFWS
Nez Perce NF
NMFS
BLM (Craig Johnson)
Region 2

RECEIVED

MAR 03 1988

MYERS ENGINEERING COMPANY, P.A.

Consulting Engineers

750 Warm Springs Avenue
Boise, Idaho 83712
Telephone: (208) 336-1425

October 18, 1985

Mr. Roy Heberger
U.S. Fish & Wildlife Service
Ecological Services
4696 Overland Road, Room 576
Boise, ID 83705

Re: FERC Project No. 7383 - Allison Creek

Dear Mr. Heberger:

We have recently been provided enough information from studies, on the above mentioned project, to complete a "maintenance" flow analysis.

We are proposing to guarantee a bypass flow for an amount that would equal or exceed 40 cfs over a continuous 7 day period to assure maintenance of the channel. This proposed flushing flow will be provided at the confluence of the West and Main Fork during the spring freshet every year the project is in operation.

An assessment of the flows needed to maintain channel stability, minimize riparian encroachment, flush sediment, and permit gravel recruitment is attached. Would you of this assessment and flow recomm your comments be provided in a timely agency to participate in the final r within 35 days of the date of this l be greatly appreciated.

Sincerely,


John Crockett

Enclosure

cc: National Marine Fisheries Service
Idaho Dept. of Fish & Game, Al
Nezperce N.F., Robert Abbott
BLM, Craig Johnson

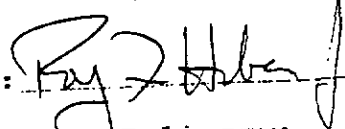
Received one copy of the
letter dated 10-18-85 for

Allison Creek - No. 7383
Hydropower Project

Agency:

Mr. John Wolfin
U.S. Fish & Wildlife Service
Ecological Services
4696 Overland Road, Room 576

BOISE, ID 83705

by: 
Date of Delivery:

10/21/85

MICROFILMED

MAR 03 1988

MYERS ENGINEERING COMPANY, P.A.

Consulting Engineers

750 Warm Springs Avenue
Boise, Idaho 83712
Telephone: (208) 336-1425

October 15, 1985

Mr. John Wolfin
U.S. Fish & Wildlife Service
Boise Field Office
4696 Overland Road, Room 576
Boise, ID 83705

Re: FERC 7383 - Allison Creek
FERC 7378 - Elkhorn Creek
FERC 7589 - Shingle Creek

Dear Mr. Wolfin:

Thank you for the letter dated October 2, 1985, notifying us that you are forwarding the materials we sent you, regarding fish passage and channel maintenance flows on the above mentioned projects, to your Engineering Division (EN).

From past experience of working with your office on similar items, we have found that your EN has generally indicated that they were not supplied enough information to adequately comment in a constructive matter. Often, we have found, the information they have requested is contained in the license application or supplemental information we have sent you.

At this stage of the process, we are attempting to develop projects that are functional and environmentally acceptable. Perhaps we can arrange a site visit with some of your engineers and/or hydrologists. FERC engineers have scheduled a field trip for the week of October 28, and your staff would be welcomed. At a minimum, however, we request that you forward our telephone number to the EN ((208) 336-1425) and provide us with their names and numbers so we can be in direct contact with them.

Sincerely,


John Crockett

MICROFILMED

MAR 03 1988



United States Department of the Interior

FISH AND WILDLIFE SERVICE
BOISE FIELD OFFICE
4696 Overland Road, Room 576
Boise, Idaho 83705

November 18, 1985

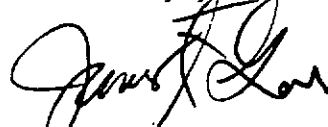
Mr. John Crockett
Myers Engineering
750 Warm Springs Avenue
Boise, Idaho 83712

Re: Review of Fish Passage Facilities
FERC 7378, 7382, 7383, 7389

Dear Mr. Crockett:

We have just been informed by Mr. Ron Walleen (208-231-6145) of our Regional Engineering Division that he would like to meet with you and engineers from Idaho Department of Fish and Game and National Marine Fisheries Service to discuss fish passage at the above referenced proposed projects. We suggest that you contact all three resource agencies to arrange a meeting for the purpose of engineering review. You may plan on using the Fish and Wildlife Service conference room for a meeting location. We suggest an early to mid December meeting date. Please keep us informed.

Sincerely yours,


John P. Wolflin
Field Supervisor

cc: FWS-AHR, Portland
FWS-EN, Portland
NMFS, Portland
IDFG, Hdqtrs., Boise

MICROFILMED

MAR 03 1988

MYERS ENGINEERING COMPANY, P.A.

Consulting Engineers

750 Warm Springs Avenue
Boise, Idaho 83712
Telephone: (208) 336-1425

October 18, 1985

Mr. Robert Abbott
Salmon River Ranger District
HC01, Box 70
Whitebird, ID 83554

NO
REPLY

Re: FERC Project No. 7383 - Allison Creek

Dear Mr. Abbott:

We have recently been provided enough information from studies, on the above mentioned project, to complete a "maintenance" flow analysis.

We are proposing to guarantee a bypass flow for an amount that would equal or exceed 40 cfs over a continuous 7 day period to assure maintenance of the channel. This proposed flushing flow will be provided at the confluence of the West and Main Fork during the spring freshet every year the project is in operation.

An assessment of the flows needed to maintain channel stability, minimize riparian encroachment, flush sediment, and permit gravel recruitment is attached. Would you please provide us with comments of this assessment and flow recommendation. We also request that your comments be provided in a timely matter. In order for your agency to participate in the final report, we will need your comments within 35 days of the date of this letter. Your cooperation would be greatly appreciated.

Sincerely,

John Crockett
John Crockett

MICROFILMED

MAR 03 1988

Enclosure

cc: U.S. Fish & Wildlife Ser
Idaho Dept. of Fish & Ga
BLM, Craig Johnson
National Marine Fisheries

Date of Delivery:

10/21/84

by:

M. S. Sowell

Mr. Robert Abbott
Salmon River Ranger District
HC01, Box 70
Whitebird, ID 83554

Agency:

Allison Creek - No 7383
Hydropower Project

Received and copy of the
letter dated 10-18-85 for

MYERS ENGINEERING COMPANY, P.A.

Consulting Engineers

750 Warm Springs Avenue
Boise, Idaho 83712
Telephone: (208) 336-1425

October 18, 1985

Mr. Steve Morris
National Marine Fisheries Service
847 N.W. 19th Avenue, Suite 350
Portland, OR 97232

No
Reply

Re: FERC Project No. 7383 - Allison Creek

Dear Mr. Morris:

We have recently been provided enough information from studies, on the above mentioned project, to complete a "maintenance" flow analysis.

We are proposing to guarantee a bypass flow for an amount that would equal or exceed 40 cfs over a continuous 7 day period to assure maintenance of the channel. This proposed flushing flow will be provided at the confluence of the West and Main Fork during the spring freshet every year the project is in operation.

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Sincerely,

John Crockett
John Crockett

MICROFILMED

MAR 03 1988

Enclosure

cc: Idaho Dept. of Fish & Game
U.S. Fish & Wildlife Serv.
Nezperce N.F., Robert Abt
BLM, Craig Johnson

Date of Delivery:
10/21/85

by:

Mr. Dale Evans, Division Chief
National Marine Fisheries Service
Environmental & Technical Service
847 N.E. 19th Avenue, Suite 350
Portland, OR 97232

Agency:

Allison Creek - No 7383
Hydropower Project

Received one copy of the
letter dated 10-18-85 for

MYERS ENGINEERING COMPANY, P.A.

Consulting Engineers

750 Warm Springs Avenue
Boise, Idaho 83712
Telephone: (208) 336-1425

October 18, 1985

Mr. Craig Johnson
Bureau of Land Management
Route 3, Box 181
Cottonwood, ID 83522

NO
REPLY

Re: FERC Project No. 7383 - Allison Creek

Dear Craig:

We have recently been provided enough information from studies, on the above mentioned project, to complete a "maintenance" flow analysis.

We are proposing to guarantee a bypass flow for an amount that would equal or exceed 40 cfs over a continuous 7 day period to assure maintenance of the channel. This proposed flushing flow will be provided at the confluence of the West and Main Fork during the spring freshet every year the project is in operation.

An assessment of the flows needed to maintain channel stability, minimize riparian encroachment, flush sediment, and permit gravel recruitment is attached. Would you please provide us with comments of this assessment and flow recommendation. We also request that your comments be provided in a timely matter. In order for your agency to participate in the final report, we will need your comments within 35 days of the date of this letter. Your cooperation would be greatly appreciated.

Sincerely,

John Crockett
John Crockett

MICROFILMED

Enclosure

MAR 03 1988

cc: National Marine Fisheries
Idaho Dept. of Fish & Game
U.S. Fish & Wildlife Service
Nezperce N.F., Robert Abbo

by: *Craig Johnson*
Date of Delivery: *10/24/85*

Mr. Lanny Wilson
Bureau of Land Management
Cottonwood District Office
Route 3, Box 181
Cottonwood, ID 83522

Agency:

Allison Creek - No. 7383
Hydropower Project

Received one copy of the
letter dated 10-18-85 for

APPENDIX II

IFIM DATA-NMFS COMMENTS

DESIGN DRAWINGS & AGENCY COMMENTS

INSTREAM FLOW ANALYSIS

REPRODUCED

MAR 03 1988



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 97232-2279
(503) 230-5400

September 11, 1985

F/NWR5:754

John Crockett
Myers Engineering Company, P.A.
750 Warm Springs Avenue
Boise, Idaho 83712

Re: FERC Project No. 7383 - Allison Creek

Dear Mr. Crockett:

The National Marine Fisheries Service (NMFS) has received your August 20, 1985 letter requesting comments on the instream flow analysis conducted in conjunction with development of the referenced project. We provide the following comments for your consideration.

1. NMFS was not involved in the scoping process for this study, nor were we involved in identification of study sites or transect locations. Agency concurrence requires involvement of all interested fishery agencies at all stages of the instream flow analysis.
2. The study site is not within the bypass reach and therefore cannot be considered representative of habitat in the project area. Also, no stream segmentation was conducted. On-site examination of Allison Creek by Steve Morris of my staff has indicated that the bypass reach is comprised of more than a single segment. Standard IFIM procedure requires the identification of 3 to 5 representative reaches per segment, and the number of study sites per reach must adequately reflect the channel and habitat diversity within the representative reaches. This does not appear to be the case in the present study. Additionally, the study site was not long enough to reflect variability within the bypass reach. Typically, a study site should be 6 to 10 times the average width of the representative reach. Also, reaches incorporating bridge crossings should be discarded.
3. A much more detailed description of fish habitat available within the study site is required.
4. The existing unlicensed hydropower diversion within the bypass reach must be considered a potential passage barrier and must be transected. Also, this diversion should be considered a segment boundary.
5. Adequate description of present (pre-project) stream conditions requires development of low and high water year hydrographs.

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6. The state of equilibrium of the stream channel should be determined for the results of the instream flow analysis to be meaningful.
7. The West Fork of Allison Creek should be included in the analysis. This reach may also represent a segment boundary.
8. The WSP model is not appropriate for evaluating instream flows in streams such as Allison Creek. This model is subject to extreme calibration problems in small high gradient creeks. We suggest using the IFG-4/WSP modified model for this type of work.
9. The WSP model does not allow extrapolation to flows less than $0.4 \times Q$ (the measured flow). Therefore, proposed bypass flows less than 5.24 cfs (0.4×13.1) are not valid. The work should be repeated using the IFG-4/WSP model with a broader range of measured discharges. Also, simulation should include high as well as low flows. According to the license application for this project, the mean annual discharge at the mouth of Allison Creek is 25 cfs with peak discharges of approximately 75 cfs. Therefore, the flows simulated in this analysis do not represent the actual hydrological conditions occurring in Allison Creek.
10. All Tape 12 output including velocity adjustment factors and velocity prediction errors should be submitted to the fishery agencies. This information is essential for adequate evaluation of the analysis.
11. The channel bend in the study site between T-1 and T-2 should be simulated.
12. The substrate codes used do not provide enough information to describe the substrate within the study site. We suggest using the Brusven index or a comparable alternative. Additionally, cover should be evaluated and cover/substrate conditional criteria should be considered.
13. It does not appear that transect weighting factors have been determined. The IFG methodology requires that this step be included in the analysis.
14. The WUA curves generated from this analysis do not reveal bypass flows that optimize fish habitat within the study site. This is a result of the very restricted range of low flows that were simulated. When this work is repeated an adequate range of flows within the extrapolation limits of the model should be incorporated in the simulation.
15. The erroneous velocity measurements (T-1, vertical 8.0; T-3, vertical 6.9, 7.3, 7.7, 8.1) must be explained and the source of these errors accounted for. Mistakes of this type reflect on the validity of the entire analysis.

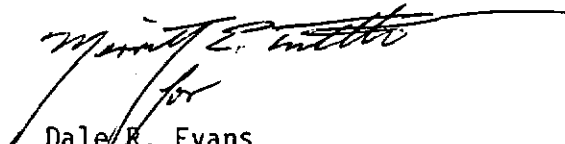
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MAR 03 1988

16. The proposed bypass flows appear to be based upon the hydraulic capacity of the powerhouse rather than on any meaningful biological criteria.

Thank you for the opportunity to provide these comments. Please refer any questions pertaining to this matter to Steve Morris of my staff at (503) 230-5430.

Sincerely yours,



Dale R. Evans
Division Chief

cc: FERC - Washington, D.C.
IDFG - Al Van Vooren
FWS - Boise, Heberger
EPA - Boise, Donald Martin
BLM - Coeur d'Alene, Lou Brown

MICROFILMED

MAR 03 1988

MYERS ENGINEERING COMPANY, P.A.

Consulting Engineers

750 Warm Springs Avenue
Boise, Idaho 83712
Telephone: (208) 336-1425

August 20, 1985

Mr. Dale R. Evans
National Marine Fisheries Service
Environmental & Technical Services Division
847 NE 19th Avenue, Suite 350
Portland, Oregon 97232-2279

Re: FERC Project No. 7383 - Allison Creek

Dear Mr. Evans:

As requested in your letter dated February 14, 1985 (page 4, paragraph 4), I have enclosed all of the field data on the instream flow study for the above mentioned project. This also includes a site drawing showing where the transects were located (just below the first bridge from the mouth, see Exhibit G in the license application). These transects were selected by our fisheries biologist, Mark Hill of CH2M Hill, and Bill Horton of the Idaho Department of Fish & Game. These transects were located where they were because Mr. Hill and Mr. Horton felt this area best represented the reach between the proposed diversion sites and the powerhouse.

It would be appreciated if you would review this material and provide comments on the instream flow analysis.

Sincerely,


John Crockett

Enclosure

MICROFILMED

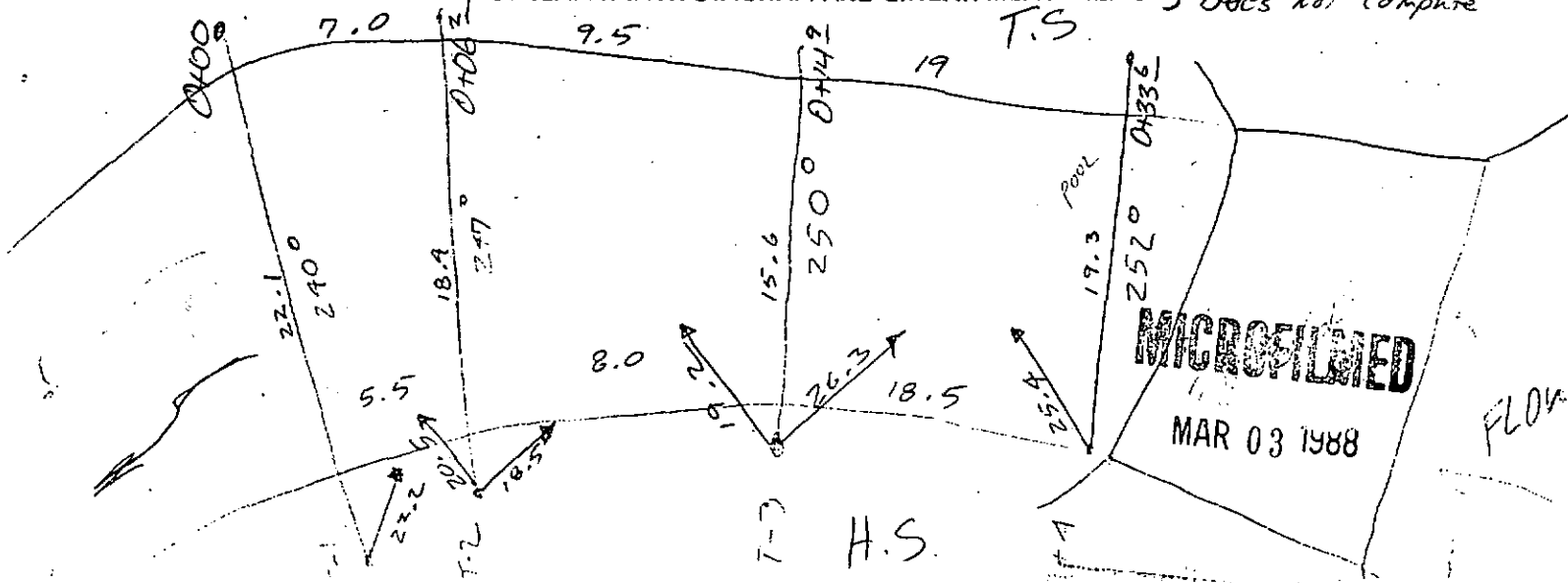
MAR 03 1988

STREAM FLOW DATA SHEET
(ELEVATIONS)

STREAM ALLISON CRK REACH _____
DATE 12-22-82 TIME 15:00 PROJECT NO. B16136 CO
GAGING STATION _____ FLOW _____ WETTED WIDTH _____
FISH PERIODICITY _____

[illegible]

STREAM REACH DIAGRAM AND LINEAR MEASUREMENTS





STREAM FLOW DATA SHEET (TRANSECTS)

STREAM ALLISON CRK TRANSECT NO. T-1 OF 4 DATE 12-22-82
CROSS SECTION WIDTH 22.1 TIME 11:00 PROJECT NO. 316136.CO
DISTANCE FROM UPSTREAM CROSS SECTION 6.2' / 10+00 HI 103.25
VEGETATIVE COVER TREES + BZUSH

DIST	FS	ELEV	DEPTH	SUBSTRATE	REVOLUTIONS/SECOND			VELOCITY		
					2 DEPTH	6 DEPTH	8 DEPTH	2	6	8
0.0	3.75	100.00	H.S.			130 SEC				
1.3	4.7	99.0	H.W.M.			#1 PROP				
3.0	5.3	98.5	BRK							
5.3	5.62	98.13	W.S.	5-6		0		0		
6.0	5.9	97.9	0.3			81		1.039		
6.5	5.9	97.9	0.3			96		1.198		
7.0	5.9	97.9	0.3			72		0.949		
7.5	5.8	98.0	0.2	6-7		160		1.923		
8.0	6.1	97.7	0.5			343	EXCEED MAX	3.994		
8.5	6.1	97.7	0.5			252		2.964		
9.0	6.0	97.8	0.4			17	500 SEC	0.394		
9.5	6.1	97.7	0.5			164	W.S. 0.1 PILLAR	1.968		
10.0	6.2	97.6	0.6			262		3.077		
10.5	6.0	97.8	0.5			81		1.039		
11.0	6.5	97.9	0.5			138		1.674		
11.5	6.0	97.8	0.6	4-6-7		72		0.949		
12.0	5.8	98.0	0.7			131		1.594		
12.5	5.5	98.3	0.7				BOULDER			
13.0	6.1	97.9	0.7			108		0.133		
13.5	6.2	97.6	0.8			175		2.092		
14.0	6.3	97.5	0.9			166		1.991		
14.5	6.3	97.5	0.9			190		2.262		
15.0	6.4	97.4	1.0			158		1.700		
15.5	6.1	97.7	0.7			162		1.945		
16.0	6.3	97.5	1.0			148		1.787		
16.5	6.0	97.8	0.6			168		2.013		
17.0	6.0	97.8	0.6			174		2.081		
17.5	6.1	97.7	0.7							
18.0	6.0	97.8	0.6			97		1.21		
18.5	6.0	97.8	0.6			135		1.640		
19.0	6.0	97.8	0.6			70		0.929		
19.5	5.9	97.9	0.5			69		0.919		
20.2	5.5	98.0	0.5			0		0.223		
20.2	5.51	98.2A	1.0			0				
20.5	4.7	99.1	H.W.M.							13.45
22.1	3.27	100.45	T.S.							

SUBSTRATE VALUE: 1 - PLANT DETRITUS 2 - CLAY 3 - SILT 4 - SAND 5 - GRAVEL
6 - COBBLES 7 - BOULDERS 8 - BEDROCK 9 - UNDEFINED

STREAM FLOW DATA SHEET (TRANSECTS)



STREAM FLOW DATA SHEET (TRANSECTS)

STREAM ALLISON CRK TRANSECT NO. T-3 OF 4 DATE 12-23-82
CROSS SECTION WIDTH 15.6 TIME 8:00 PROJECT NO. 1316136.00
DISTANCE FROM UPSTREAM CROSS SECTION 18.7 / 10+14.9 HI 103.29
VEGETATIVE COVER TREES + BRUSH

DIST	FS	ELEV	DEPTH	SUBSTRATE	REVOLUTIONS/SECOND			VELOCITY		
					2 DEPTH	6 DEPTH	8 DEPTH	2	.6	.8
0.0	3.48	99.81	H.S. + MWM			30/SEC	#6			
1.9	4.67	98.62	W.S.	7		0			0	
2.3	5.0	98.3	0.3			0			0.223	
2.6	5.0	98.3	0.3			10			0.324	✓
2.9	5.0	98.3	0.3			6.3'			0.858	✓
3.2	5.1	98.2	0.4			73			0.959	✓
3.5	5.1	98.2	0.4			207			2.455	✓
3.8	5.1	98.2	0.4			181			2.160	✓
3.9	5.0	98.3	0.3			180			2.149	✓
4.2	4.9	98.4	0.1			0			0.223	✓
5.3	4.4	98.9	BOULDER			0			0.223	✓
6.5	4.9	98.4	BOULDER	BELOW WATER SURFACE? ON TOP OF BOULDER OUT OF WATER?		0		How do you get a flow when .3 above H.O. surface	0.223	✓
6.9	5.7	95.6	1.0			383			4.446	✓
7.3	5.6	97.7	#1.1			345			4.016	✓
7.7	5.1	98.2	0.4			315			3.677	✓
8.1	5.4	97.9	0.7			306		EXCEEDS MAX VEL	3.575	✓
8.5	5.4	97.9	0.8			152			1.832	✓
8.9	5.4	97.9	0.8			254			2.986	✓
9.3	5.2	98.1	0.3			251'			2.952	✓
9.7	5.2	98.1	0.3			244			2.873	✓
10.1	5.3	98.0	0.4			208			2.466	✓
10.5	5.3	98.0	0.4			55			0.757	✓
10.9	5.4	97.9	0.5			61			0.838	✓
11.3	5.4	97.9	0.5			70			0.929	✓
11.7	5.6	97.7	0.7			119			1.459	✓
12.1	5.7	97.6	0.8			167'			2.002	✓
12.5	5.5	97.8	0.6			223			2.636	✓
12.9	5.7	97.6	0.8			239			2.817	✓
13.3	5.6	97.7	0.7			201			2.387	✓
13.7	5.5	97.8	0.6			89			1.120	✓
14.1	5.5	97.8	0.6			52			0.747	✓
14.4	5.3	98.0	0.5			49			0.717	✓
14.8	4.25	98.54	W.S.						0	
15.6	2.98	100.31	T.S.							

MAR 03 1988

STREAM FLOW DATA SHEET (TRANSECTS)

STREAM ALLISON CREEK TRANSECT NO. 7-9 OF 4 DATE 12-23-82
CROSS SECTION WIDTH 19.3 TIME 10:10 PROJECT NO. B16136.C0
DISTANCE FROM UPSTREAM CROSS SECTION LAST 10+336 HI 103.29
VEGETATIVE COVER TREES + BRUSH

DIST	FS	ELEV	DEPTH	SUBSTRATE	REVOLUTIONS/SECOND			VELOCITY		
					2 DEPTH	6 DEPTH	8 DEPTH	2	6	8
0.0	2.69	100.60	HS. + HWM			PER 30 SEC				
2.0	2.9	100.4	BRK			#6				
4.5	3.28	99.51	W.S.	4					0	
5.7	4.0	99.3	0.2	1		0			0.723	.04
6.1	4.2	99.1	0.4	1		14			0.364	
6.5	4.3	99.0	0.5	1		66			0.888	
6.9	4.4	98.9	0.6	1		110			1.357	
7.3	4.3	99.0	0.5	5+6		140			1.696	
7.7	4.3	99.0	0.5	1		143			1.730	
8.1	4.3	99.0	0.5	1		125			1.527	
8.5	4.4	98.9	0.6	1		112			1.379	
8.9	4.4	98.9	0.6	1		128			1.561	
9.3	4.4	98.9	0.6	1		159			1.911	
9.7	4.4	98.9	0.6	1		214			2.534	
10.1	4.5	98.8	0.7	1		255			2.998	
10.5	4.6	98.7	0.8	1		197			2.341	
10.9	4.7	98.6	0.9	1		140			1.696	
11.3	4.8	98.5	1.0	1		145			1.753	
11.7	4.9	98.4	1.1	1		134			1.628	
12.1	5.1	98.2	1.3	1		151			1.821	
12.5	5.1	98.2	1.3	1		136			1.651	
12.9	5.1	98.2	1.3	1		161			1.934	1.01
13.3	5.2	98.1	1.4	1		90			1.131	
13.7	5.0	98.3	1.2	6		26			0.485	.23
14.1	4.9	98.4	1.1	6		2			0.243	
14.5	4.6	98.7	0.8	6+4		0			0.223	
15.0	3.23	99.56	W.S.	1		0			0	
15.5	2.9	100.4	BRK + HWM							10.87
19.0	2.2	101.9								
19.3	0.48	102.81	T.S.							

SUBSTRATE VALUE: 1-PLANT DETRITUS 2-CLAY 3-SILT 4-SAND 5-GRAVEL
6-COBBLER 7-BOULDERS 8-BEDROCK 9-UNDEFINED

DISTRIBUTION CODE: HORTON

USERID: USFWSFG

DL FILE ID: 0467 NWE: PLOT

ALISON

FILE: PLOT ALISON A1 U N I V E R S I T Y O F I D A H O VM7SP-CMS RELEASE

3

	500JUV	5THSPAWN	5THINCUB	5TH
3.8	531	23	850	
2.3	902	8	987	
3.8	1108	38	1319	
4.4	1142	38	1340	
5.0	1241	101	1519	
5.7	1283	100	1541	
6.4	1435	178	1783	
7.2	1674	278	2164	
8.1	1792	413	2384	
9.0	1873	586	2584	
10.9	1989	907	2926	
13.1	2045	1141	3208	

999.

	500JUV	RBTADULT	RBTSPAWN	RBTINCUB
3.8	75	185	170	729
2.3	271	252	380	891
3.8	461	308	561	1212
4.4	476	312	585	1237
5.0	604	319	778	1423
5.7	633	324	811	1448
6.4	736	370	1045	1707
7.2	822	433	1347	2167
8.1	946	448	1573	2402
9.0	1089	456	1796	2580
10.9	1295	463	2277	2866
13.1	1413	466	2519	3059

999.

	700JUV	CKSPAWN	CKINCUB	CK
3.8	156	181	962	
2.3	231	492	1356	
3.8	260	671	1678	
4.4	266	690	1720	
5.0	286	939	2163	
5.7	294	958	2189	
6.4	296	1122	2532	
7.2	305	1293	3130	
8.1	311	1327	3442	
9.0	323	1315	3608	
10.9	357	1493	3872	
13.1	378	1563	4006	

999.

MAR 03 1988

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
DAVIDSON, IDAHO

HOWEVER, SINCE THERE IS LESS THAN 10.0 FEET INVOLVED, THE END-POINT WILL BE RAISED AND THE RUN ALLOW

Al. m. Creek

Q VS. AVAILABLE HABITAT AREA PER 1000 FEET OF STREAM FOR WINTER STEELHEAD %CLEAR WATER, S#.0

MONTH	Q	JUVENILE	ADULT	SPAWNING	INCUBATI
1	13.1	2045.	100.	1141.	3208.
2	10.9	1989.	56.	907.	2926.
3	9.0	1873.	12.	586.	2584.
4	8.2	1792.	0.	413.	2384.
5	7.4	1674.	0.	278.	2164.
6	6.4	1435.	0.	178.	1783.
7	5.7	1283.	0.	100.	1541.
8	5.0	1241.	0.	101.	1519.
9	4.4	1142.	0.	38.	1340.
10	3.8	1108.	0.	8.	1319.
11	3.3	902.	0.	8.	987.
12	2.8	531.	0.	23.	850.

$x = 3 \quad y = 500$

Q VS. AVAILABLE HABITAT AREA PER 1000 FEET OF STREAM FOR RAINBOW TROUT %CLEAR WATER, S#.001

MONTH	Q	JUVENILE	ADULT	SPAWNING	INCUBATI
1	13.1	1413.	466.	2512.	3059.
2	10.4	1295.	463.	2277.	2866.
3	9.0	1089.	456.	1796.	2580.
4	8.4	946.	448.	1573.	2402.
5	7.4	822.	433.	1347.	2167.
6	6.4	736.	370.	1045.	1707.
7	5.7	633.	324.	811.	1448.
8	5.0	604.	319.	778.	1423.
9	4.4	476.	312.	585.	1237.
10	3.8	461.	308.	561.	1212.
11	3.3	271.	252.	380.	891.
12	2.8	75.	185.	170.	729.

Q VS. AVAILABLE HABITAT AREA PER 1000 FEET OF STREAM FOR CHINOOK SALMON %CLEAR WATER, S#.001

MONTH	Q	JUVENILE	SPAWNING	INCUBATI
1	13.1	378.	1563.	4006.
2	10.4	357.	1493.	3872.
3	9.0	323.	1315.	3608.
4	8.4	311.	1327.	3442.
5	7.4	305.	1293.	3130.
6	6.4	226.	1122.	2532.
7	5.7	294.	958.	2189.
8	5.0	286.	933.	2163.
9	4.4	266.	690.	1720.
10	3.8	260.	671.	1678.
11	3.3	231.	492.	1356.
12	2.8	156.	181.	962.

$x = 3 \quad y = 700$

MAR 03 1988

MYERS ENGINEERING COMPANY, P.A.

Consulting Engineers

750 Warm Springs Avenue
Boise, Idaho 83712
Telephone: (208) 336-1425

September 17, 1985

Mr. Dale Evans
National Marine Fisheries Service
Environmental & Technical Services
847 N.E. 19th Avenue, Suite 350
Portland, OR 97232

Re: FERC Project No. 7383 - Allison Creek

Dear Mr. Evans:

Enclosed is a functional design drawing of the tailrace outlet, including the diagonal guide rack, for the above mentioned project. Would you please provide us with any suggestions or comments you may have on the drawing.

In addition, would you provide us with any suggestions or comments on the proposed fish passage and protection facilities at the diversion structures. A functional design drawing of the diversion structures is contained in Exhibit F of the license application. We have proposed that the screen spacing of 0.125 inches be used and the screen sized so that the approach velocity does not exceed 0.5 feet per second.

A reply within 30 days of the date of this letter would be greatly appreciated.

Sincerely,


John Crockett

Enclosure

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☒ To
☐ From STEVE MORRIS - NMFS
☐ To
☒ From JOHN CROCKETT - MYERS ENG.

TOLD STEVE I HAD ONE QUESTION FOR 2 THINGS

- 1) WE ARE FINALIZING THE ELK CREEK POWERHOUSE DESIGN (CURRENTLY UNDER CONSTRUCTION) & I WOULD LIKE SOME INPUT ON THE TAILRACE
- 2) FERC HAS REQUESTED DRAWINGS ON TAILRACE ON ALLISON CREEK - WITH AGENCY INPUT

STEVE SAID HE NEEDED TO TALK WITH ENGINEER &
HE WOULD GET BACK WITH ME TODAY.

I EXPLAINED WHAT THE GENERAL SITUATION WOULD BE IN THE TAILRACE & ASK STEVE WHAT THEIR CONCERNS WERE.

STEVE SAID THEY DID NOT WANT THE FISH TO BE
DELAYED OR BE CONFUSED & IT WAS CRITICAL!

— RETURNED CALL

STEVE SAID HE HAD TALKED TO ROB PIERCE (NMFS-ENGINEER) & HAD THE FOLLOWING CRITERIA

- 1) 1 INCH CLEAR SPACING
- 2) 1 FOOT / PER SEC
- 3) ~~LOCATED AT~~ CONFLUENCE OF STREAM

MAR 03 1988



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 97232-2279
(503) 230-5400

October 9, 1985

F/NWR5:781

Mr. Carl Myers, P.E.
Myers Engineering Co.
750 Warms Spring Avenue
Boise, Idaho 83712

Dear Mr. Myers:

This letter is in regard to the fish facilities for the Allison Creek Hydroelectric Project, FERC #7383, Idaho County, Idaho. The National Marine Fisheries Service has reviewed the fish facilities drawings and offers the following comments for your consideration.

Juvenile Facilities

The juvenile bypass pipe should be at least 8 inches in diameter rather than a 6-inch diameter pipe proposed in the drawings. Juvenile fish would less likely hesitate in entering the pipe and debris would pass through the pipe more effectively. To reduce downstream migrant delay, we recommend the bypass discharge into tailwater and the longitudinal centerline of the bypass pipe entrance be placed parallel and closer to the fish screen structure.

Adult Passage

The size of the orifices in the fishway is not adequate. To minimize fish injury due to scraping against the edges of the orifice, we recommend an orifice size of 15 inches wide by 15 inches high.

Utilizing a Parshall flume at the fishway exit is not recommended because adult fish may acquire injuries caused by jumping in attempt to locate the flume exit. On table F-2 in the license application, you state that the depth of water at the converging section of the flume (Ha) is 0.31 feet during times of minimum flow. A depth this shallow may cause injury to adult fish due to jumping and scraping against the flume walls.

Powerhouse Outfall

To minimize injury to adult fish, the turbine draft tube discharge should be completely submerged at low tailwater. A submerged outlet reduces surface turbulence which creates false attraction and jumping opportunities for adult fish.

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The selection of #4 rebars for the adult fish barrier is not recommended. Injuries to fish may occur if they should come in contact with the deformations on these bars. Therefore, we recommend any bars used for the adult fish barrier have smooth surfaces.

Thank you for the opportunity to comment on this project. Please direct questions to Randy Lee of my staff at (503) 230-5411.

Sincerely,



Dale R. Evans
Division Chief

cc: IDFG - Virgil Moore
EPA - Boise, Don Martin
BLM, Coeur d'Alene - Lou Brown
Nez Perce Tribe
Nez Perce National Forest -
Rick Stowell
FWS - Roy Heberger

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MYERS ENGINEERING COMPANY, P.A.

Consulting Engineers

750 Warm Springs Avenue
Boise, Idaho 83712
Telephone: (208) 336-1425

September 17, 1985

Mr. Al Van Vooren
Idaho Department of Fish & Game
P.O. Box 25
600 South Walnut
Boise, ID 83712

No
REPLY

Re: FERC Project No. 7383 - Allison Creek

Dear Mr. Van Vooren:

Enclosed is a functional design drawing of the tailrace outlet, including the diagonal guide rack, for the above mentioned project. Would you please provide us with any suggestions or comments you may have on the drawing.

In Addition, would you provide us with any suggestions or comments on the proposed fish passage and protection facilities at the diversion structures. A functional design drawing of the diversion structures is contained in Exhibit F of the license application. We have proposed that the screen spacing of 0.125 inches be used and the screen sized so that the approach velocity does not exceed 0.5 feet per second.

A reply within 30 days of the date of this letter would be greatly appreciated.

Sincerely,

John Crockett
John Crockett

Enclosure

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MYERS ENGINEERING COMPANY, P.A.
Consulting Engineers

750 Warm Springs Avenue
Boise, Idaho 83712
Telephone: (208) 336-1425

September 17, 1985

Mr. John Wolfin
U.S. Fish & Wildlife Service
Ecological Services
4696 Overland Road, Room 576
Boise, Idaho 83705

Re: FERC Project No. 7383 - Allison Creek

Dear Mr. Wolfin:

Enclosed is a functional design drawing of the tailrace outlet, including the diagonal guide rack, for the above mentioned project. Would you please provide us with any suggestions or comments you may have on the drawing.

In addition, would you provide us with any suggestions or comments on the proposed fish passage and protection facilities at the diversion structures. A functional design drawing of the diversion structures is contained in Exhibit F of the license application. We have proposed that the screen spacing of 0.125 inches be used and the screen sized so that the approach velocity does not exceed 0.5 feet per second.

A reply within 30 days of the date of this letter would be greatly appreciated.

Sincerely,


John Crockett

Enclosure

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

BOISE FIELD OFFICE
4696 Overland Road, Room 576
Boise, Idaho 83705

October 2, 1985

Mr. John Crockett
Myers Engineering Company, P.A.
750 Warm Springs Avenue
Boise, Idaho 83712

Re: FERC 7383 : Allison Creek
FERC 7378 : Elkhorn Creek
FERC 7589 : Shingle Creek

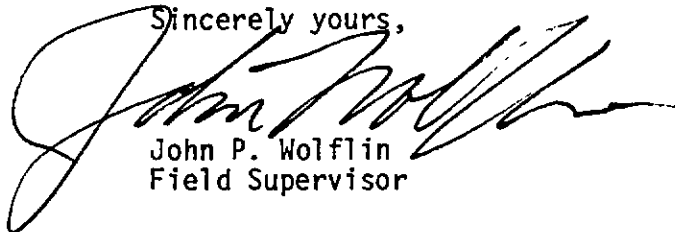
Dear Mr. Crockett:

The Fish and Wildlife Service (Service) has recently received materials for three planned hydro projects as follows:

1. FERC 7383 : Allison Creek
: September 19, 1985 : Functional Design Drawing of Tailrace Outlet
: August 30, 1985 : Materials concerning stream flows sent to NMFS, which NMFS copied to the Service
2. FERC 7589 : Shingle Creek
: September 12, 1985 : letter requesting Service comments concerning instream flow analysis and fish passage
3. FERC 7378 : Elkhorn Creek
: September 19, 1985 : Maintenance flow analysis

This is to notify you that we are forwarding any materials related to fish passage or channel maintenance flows to the Engineering Division (EN) of our Regional Office in Portland, Oregon, as discussed on September 19 when you visited our office. We will provide comments on the above items pending EN review.

Sincerely yours,

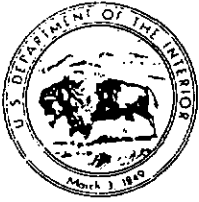


John P. Wolflin
Field Supervisor

cc: IDFG, Hdqtrs., Boise
NMFS, Portland

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
BOISE FIELD OFFICE
4696 Overland Road, Room 576
Boise, Idaho 83705

November 18, 1985

Mr. John Crockett
Myers Engineering
750 Warm Springs Avenue
Boise, Idaho 83712

Re: Review of Fish Passage Facilities
FERC 7378, 7382, 7383, 7389

Dear Mr. Crockett:

We have just been informed by Mr. Ron Walleen (208-231-6145) of our Regional Engineering Division that he would like to meet with you and engineers from Idaho Department of Fish and Game and National Marine Fisheries Service to discuss fish passage at the above referenced proposed projects. We suggest that you contact all three resource agencies to arrange a meeting for the purpose of engineering review. You may plan on using the Fish and Wildlife Service conference room for a meeting location. We suggest an early to mid December meeting date. Please keep us informed.

Sincerely yours,


John P. Wolflin
Field Supervisor

cc: FWS-AHR, Portland
FWS-EN, Portland
NMFS, Portland
IDFG, Hdqtrs., Boise

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ALLISON CREEK INSTREAM FLOW ANALYSIS

STUDY OBJECTIVE

To assess the potential impacts of flow reduction on the fisheries resources in the diversion reach of Allison Creek, an instream flow analysis using the Instream Flow Incremental Methodology (IFIM) was employed. The specific objective of the study was to develop habitat versus flow relationships for the potentially affected fish species and life stages present in the proposed diversion reach, and to use this information to recommend an instream flow regime that would protect the overall existing fishery resource. While different interpretations are possible, the instream flows recommended in this report are intended to provide protection for existing fisheries resources in Allison Creek.

METHODS AND MATERIALS

The IFIM, developed by the Cooperative Instream Flow Service Group (IFG), U.S. Fish and Wildlife Service, Fort Collins, Colorado (Bovee and Milhous, 1978; Bovee, 1982), was used to assess the potential impacts of alternative flow regimes. Under this methodology a hydraulic simulation model (IFG-2) is used to predict depth and velocities within a stream reach at various flows. These simulations are then incorporated with substrates and habitat suitability functions (expressed as probability-of-use for depth, velocity, and substrate) for the particular fish species and lifestage of concern to determine the amount of usable or suitable habitat area available at various flows. Instream flows can then be recommended on the basis of the effects that incremental changes in instream flow have on the amount of usable habitat. The method is not designed simply to derive a minimum streamflow, but to provide information that can be interpreted and used in negotiations for instream flows where out-of-stream water uses and several simultaneously occurring species of concern must be considered.

Applying the methodology consists of seven steps:

1. Literature review, agency consultation, and field observations to determine seasonal species utilization in the stream.
2. Selection of a study reach or reaches that best describe the areas to be affected by flow change.
3. Field measurements of hydraulic and stream channel characteristics.

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4. Determination selection of the appropriate habitat suitability criteria for each species' lifestage of concern.
5. Hydraulic simulation to predict depth, velocity, and substrate combinations at various flows.
6. Calculations of weighted 'usable area (WUA) for each species' lifestage as a function of incremental changes in streamflow.
7. Interpretation and recommendations by biologists familiar with the species of concern and their management priorities.

These seven steps are discussed below.

1. Species Utilization

Allison Creek provides habitat for spring chinook salmon, steelhead trout, and rainbow trout. Knowledge of the timing of spawning, incubation, and rearing as well as relative abundance is essential for establishing a monthly flow regime that best meets the needs of the species present. The lifestage timings referred to in the license application (Section 3, page 10) were developed in 1983 by William Horton, of the Idaho Dept. of Fish and Game, and Mark Hill, the Applicant's fisheries biologist from CH2M Hill. In the IDFG letter dated February 19, 1985, different lifestage timings were proposed. These proposed timings are reasonable and justified with the exception that adult rainbow trout are considered to utilize the stream year round instead of mid-March to mid-June. The lifestage timings of the salmonids in Allison Creek as suggested by the IDFG are depicted in Figure 1 and will be used for this analysis.

2. Study Reach and Transect Location

The study reach, transect location, field data acquisition, and computer analysis were performed by the Idaho Department of Fish and Game (IDFG) and CH2M Hill. The study reach was within the bypass reach of the proposed project and consisted of four transects located downstream of the bridge about 2000 feet upstream from the mouth. A diagram of the transect locations is included with the field data sheets.

3. Field Measurements

Measurements of water surface elevation, water depth, water velocity, substrate composition, and bottom profile were taken at stations at various intervals along each transect.

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Water surface elevations were determined at each transect at the right and left stream margins on the same day when depth and velocity measurements were obtained for those transects. If the elevations on both sides of a transect were unequal, the average value was used (Horton, 1984).

4. Habitat Criteria

Habitat criteria curves were used to predict frequency of occurrence (as equated with probabilities) related to increments of preferred depth, velocity, and substrate for each species' lifestage being considered. The point of greatest frequency of occurrence is assigned a probability of 1.0. Where frequency of occurrence is zero, the probability equals zero. Intermediate values are assigned on a linear scale basis.

When selecting criteria for a particular species, it is important to be sure the size of the species in question has is similar to that from which the criteria were developed and the approximate size of the stream in question is similar to that of the streams from which the criteria were developed.

The IDFG selected the probability-of-use criteria for the species of concern in Allison Creek. Curves depicting probability-of-use are presented in Figures III-3 to III-13.

5. Hydraulic Simulation

The IFG-2 hydraulic model was used to predict hydraulic conditions throughout a range of unobserved streamflows. This computer program establishes linear regression equations for the $\log_{10}$ (stage) versus $\log_{10}$ (discharge) relationships for each transect and $\log_{10}$ (velocity) versus $\log_{10}$ (discharge) relationships for each vertical along the transect. Once these relationships are established, the IFG hydraulic simulation model is calibrated for that stream reach. The water depth and velocity in each cell can then be estimated for a given discharge.

In the process of calibrating the IFG-2 hydraulic simulation model, the depth and velocity data were checked for any anomalies. Depths were calculated for each station surveyed by subtracting the streambed elevation from the water surface elevation. The calculated depths were then compared to the measured depths (Horton, 1984).

The IFG model is based on the premise that the velocity at a given location will increase as the flow increases. However, due to the turbulent nature of Allison Creek, and particularly the shifting eddy lines, not all velocities increased with increasing flow. Because the model cannot handle these situations, most of the anomalous velocity data

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SPECIES	LIFE STAGE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
STEELHEAD	ADULT												
	JUVENILE												
	SPAWNING												
	INCUBATION												
SPRING CHINOOK	ADULT												
	JUVENILE												
	SPAWNING												
	INCUBATION												
RAINBOW TROUT	ADULT												
	JUVENILE												
	SPAWNING												
	INCUBATION												

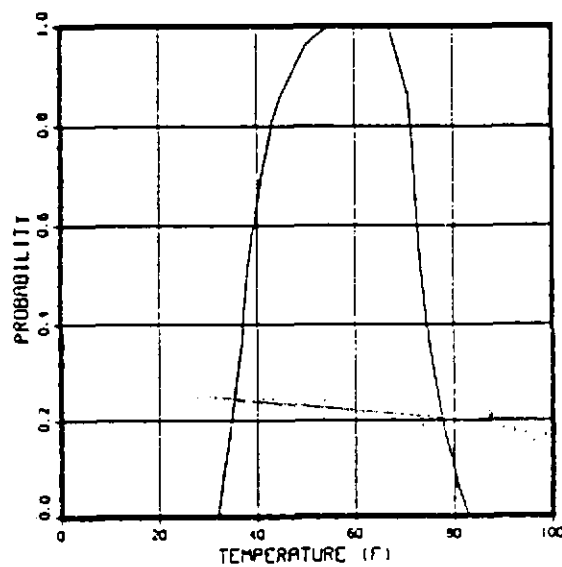
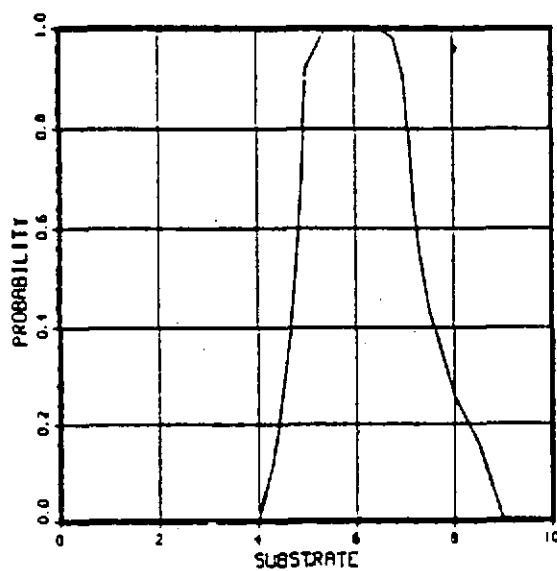
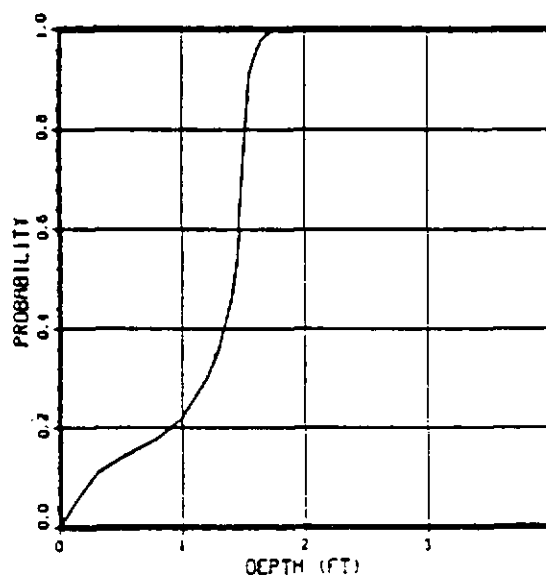
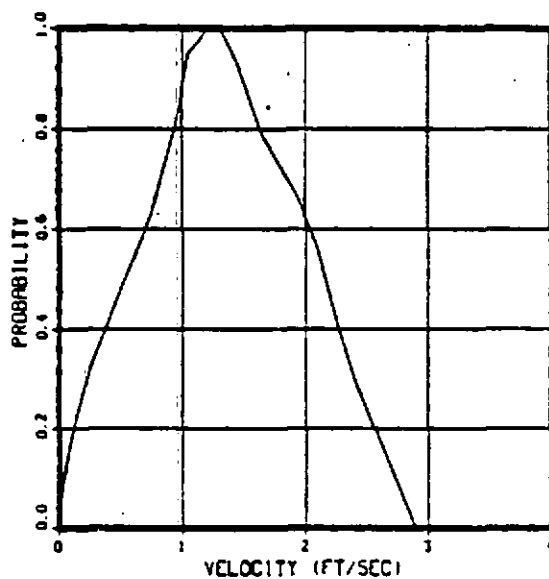
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ALLISON CREEK
FIGURE 1
SALMONID LIFE-STAGE TIMINGS

RAINBOW TROUT

ADULT



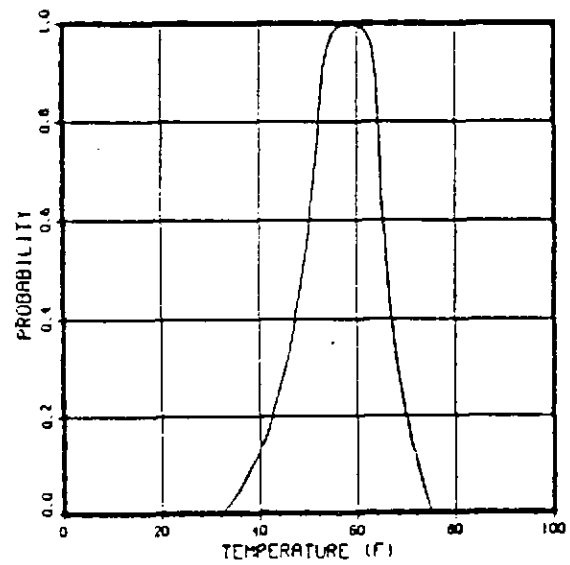
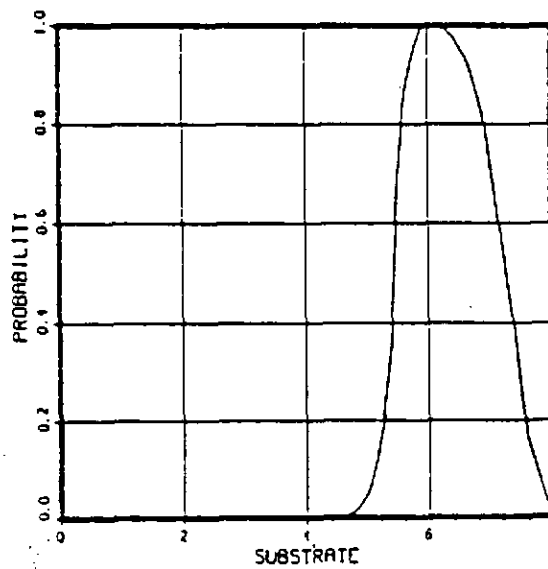
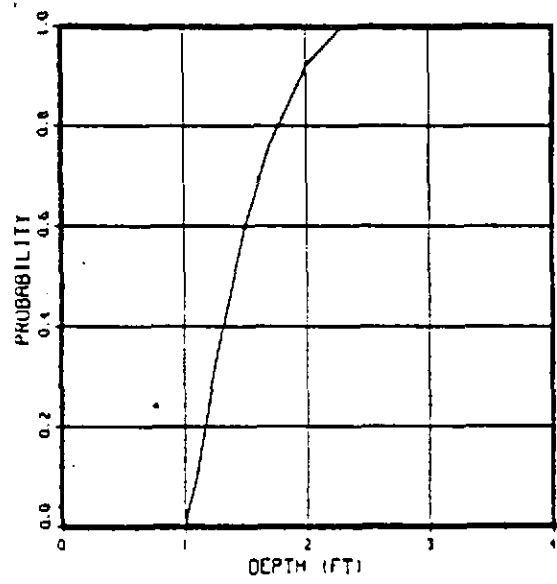
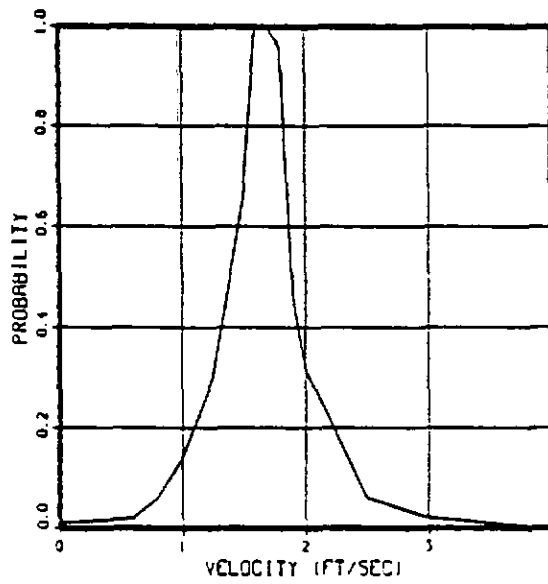
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Figure III-3
RAINBOW TROUT ADULT
HABITAT CRITERIA

WINTER STEELHEAD

ADULT



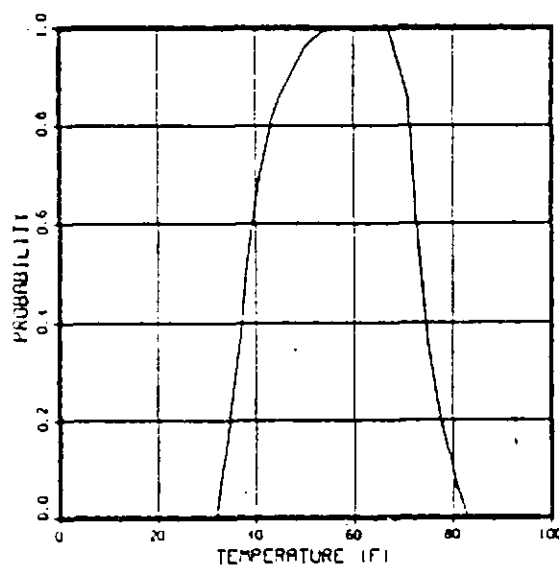
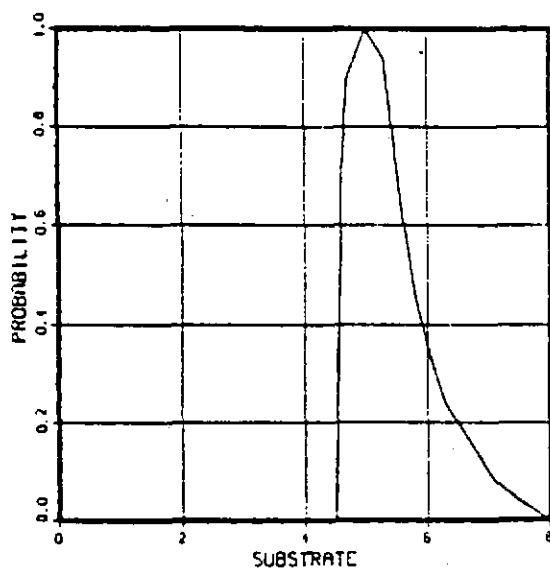
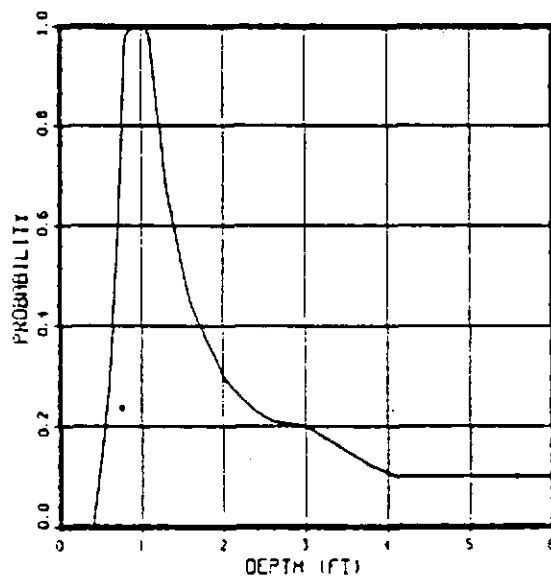
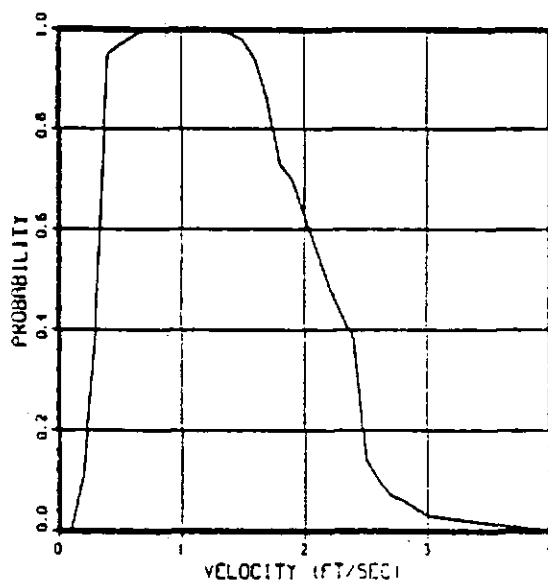
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Figure III-4
STEELHEAD ADULT
HABITAT CRITERIA

RAINBOW TROUT

JUVENILES



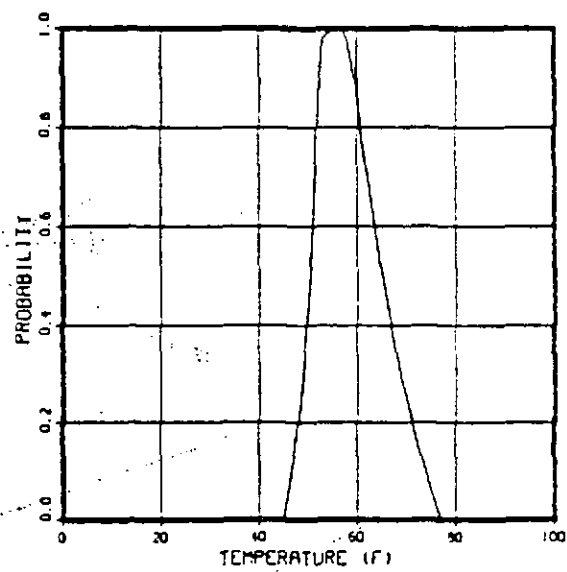
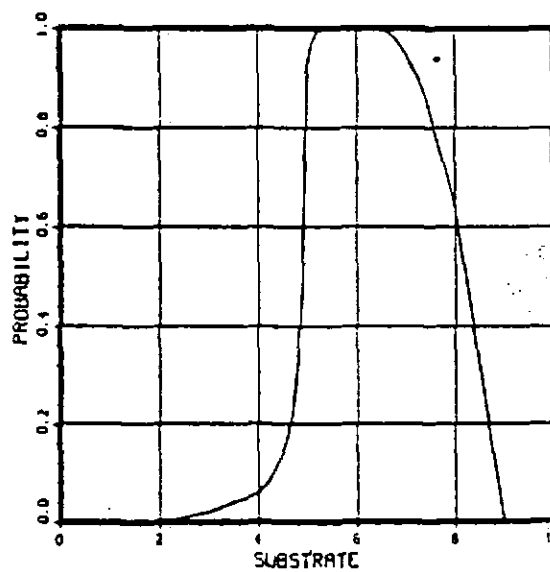
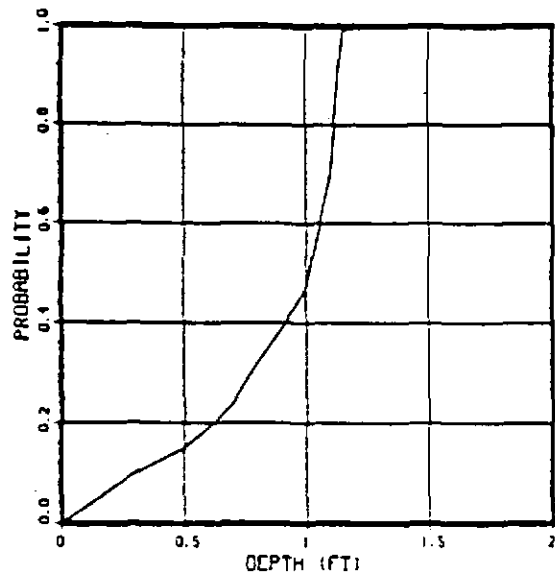
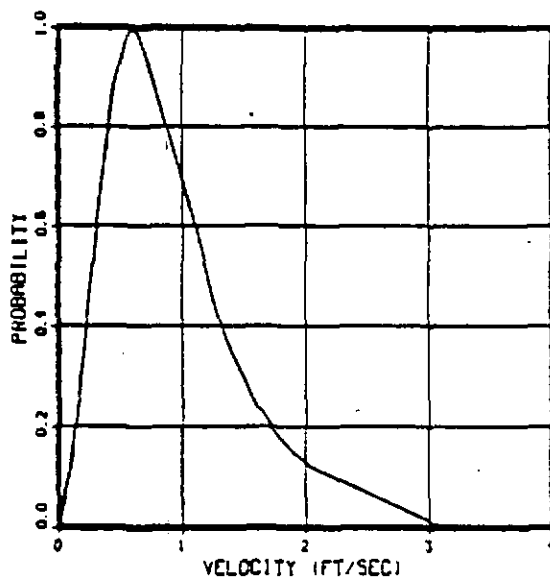
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Figure III-5
RAINBOW TROUT JUVENILE
HABITAT CRITERIA

CHINOOK SALMON

JUVENILE



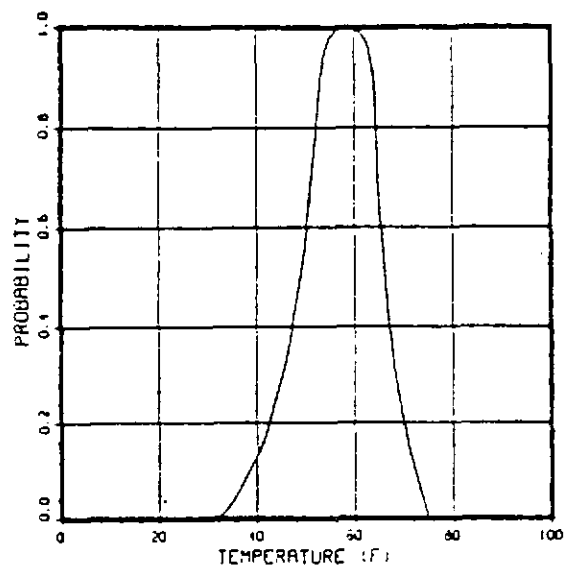
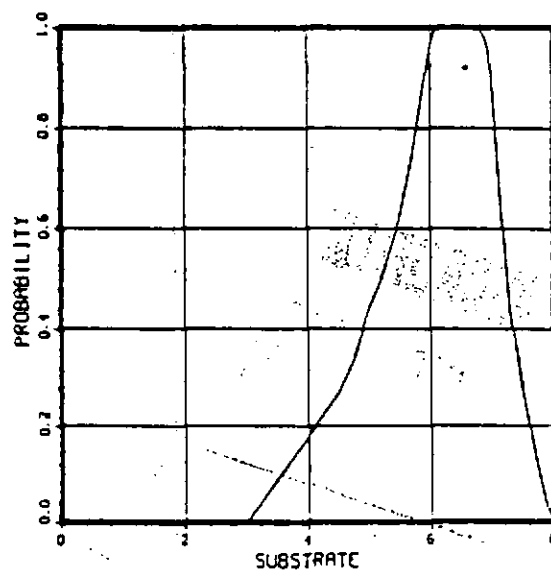
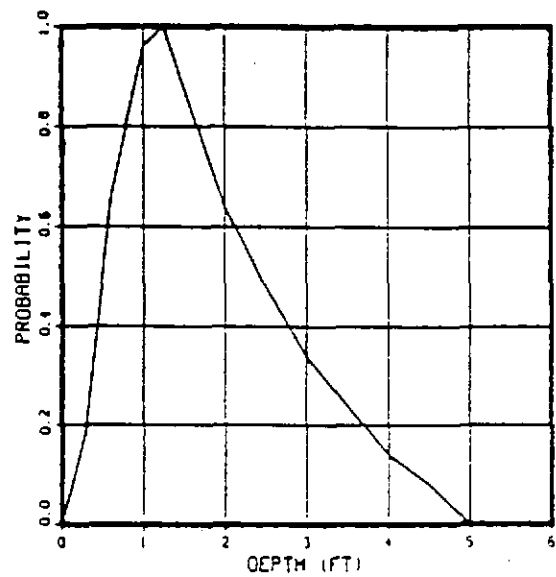
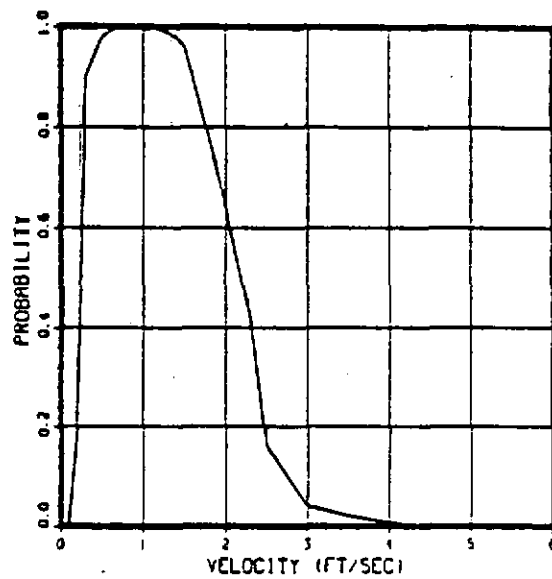
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Figure III-6
CHINOOK SALMON JUVENILE
HABITAT CRITERIA

WINTER STEELHEAD

JUVENILE



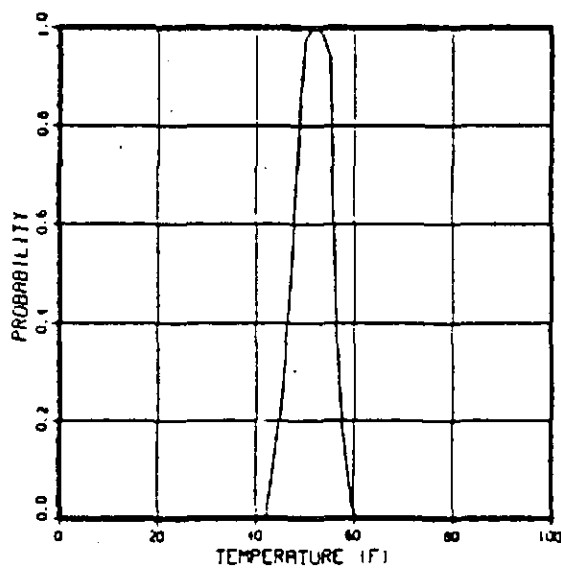
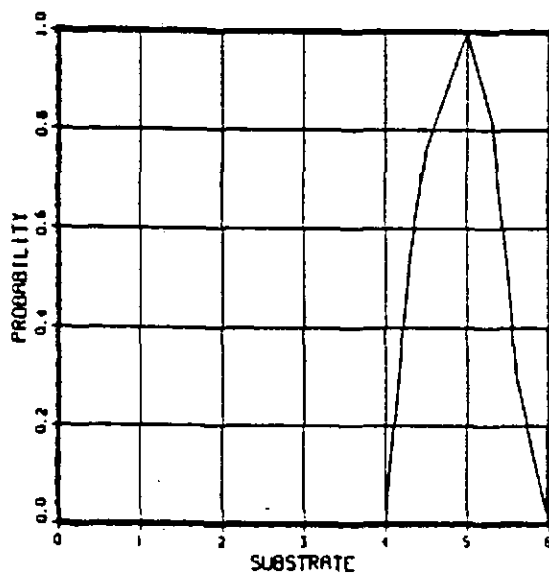
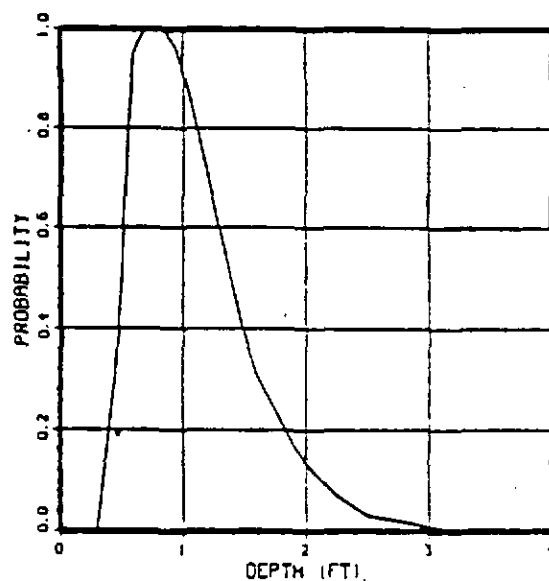
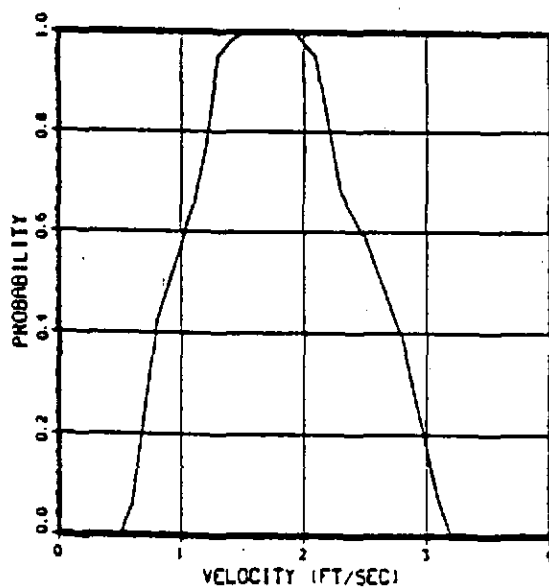
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Figure NI-7
STEELHEAD JUVENILE
HABITAT CRITERIA

RAINBOW TROUT

SPAWNING



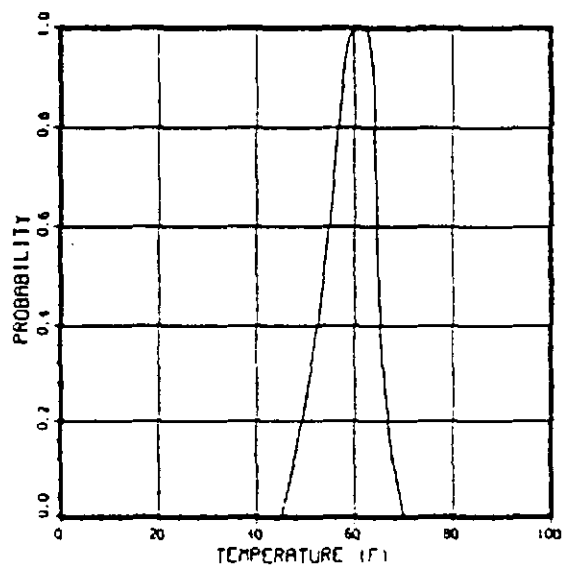
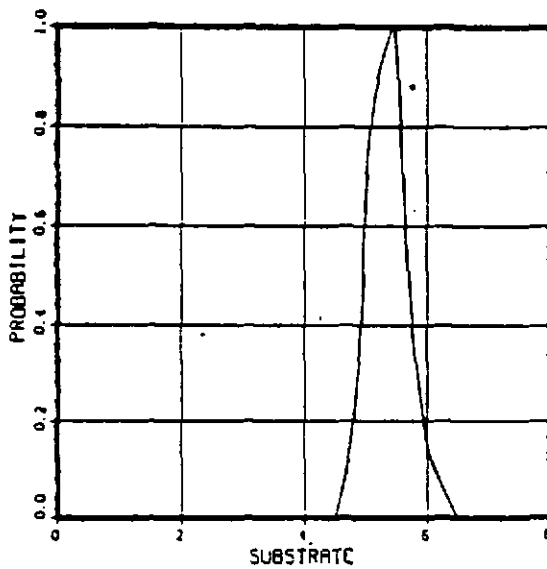
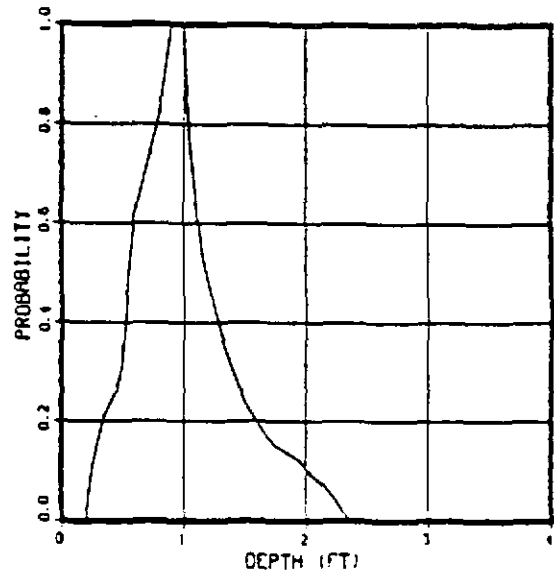
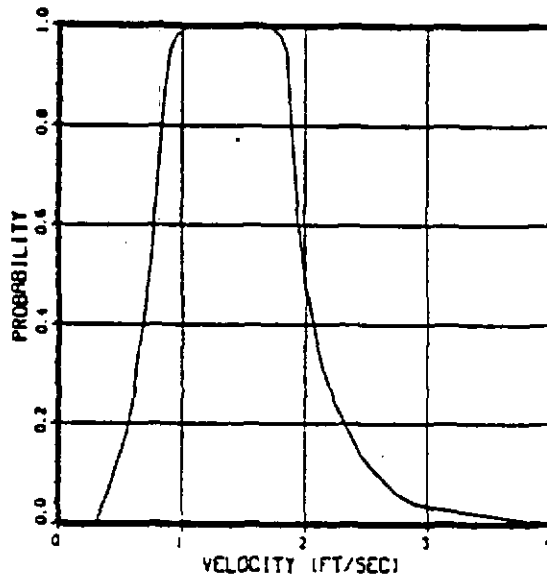
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Figure III-8
RAINBOW TROUT SPAWNING
HABITAT CRITERIA

SPRING CHINOOK

SPAWNING



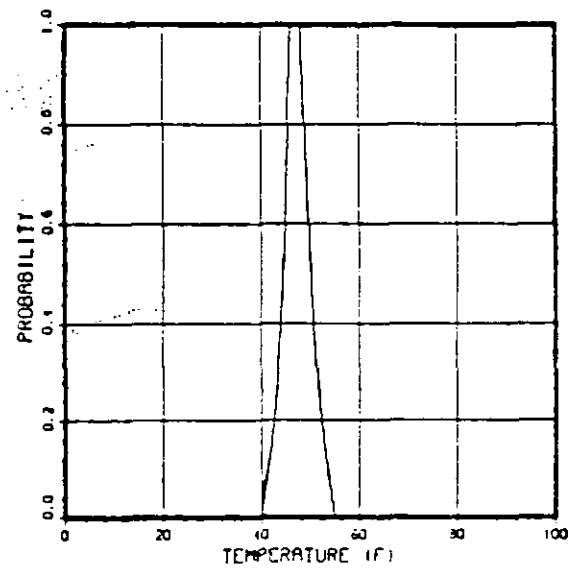
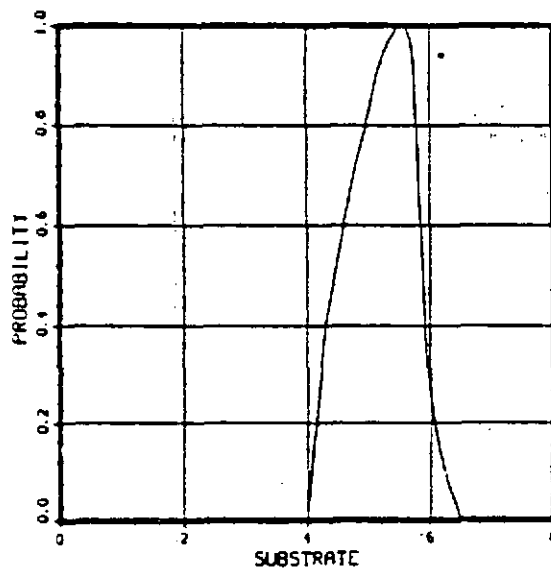
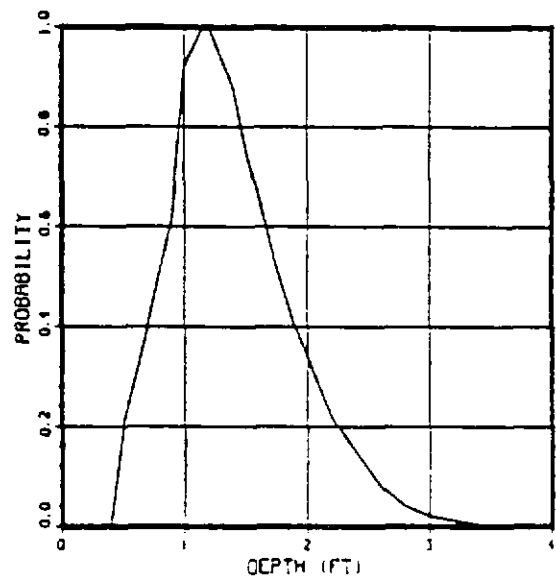
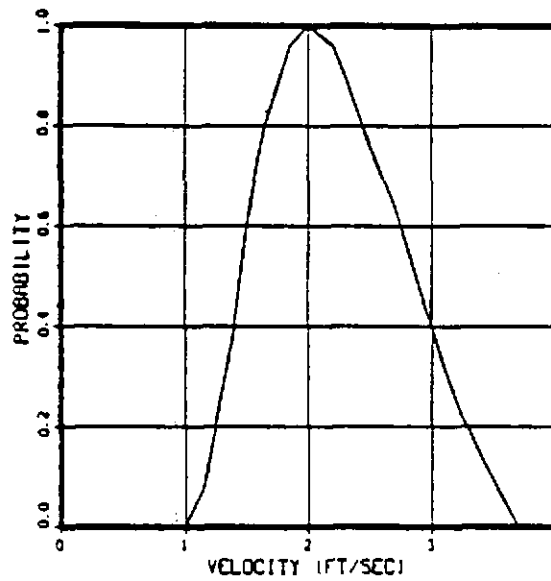
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Figure III-9
CHINOOK SALMON SPAWNING
HABITAT CRITERIA

WINTER STEELHEAD

SPAWNING



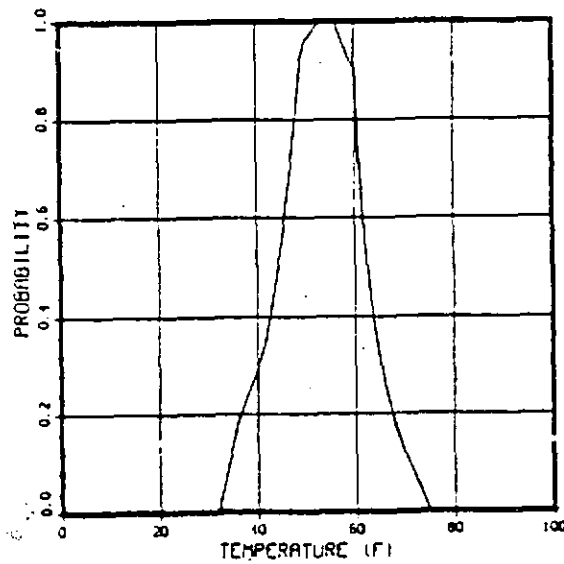
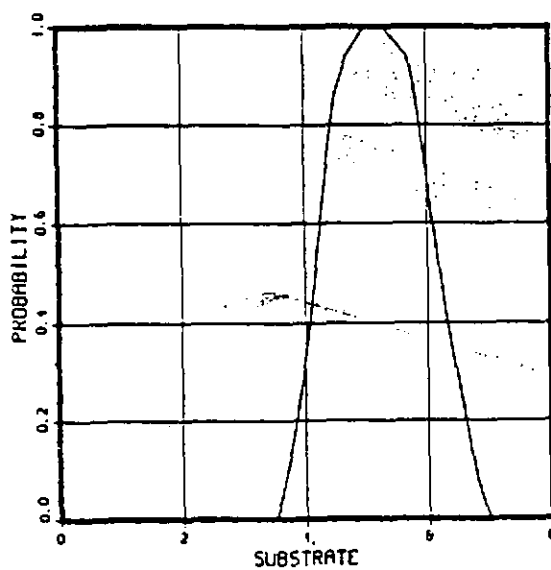
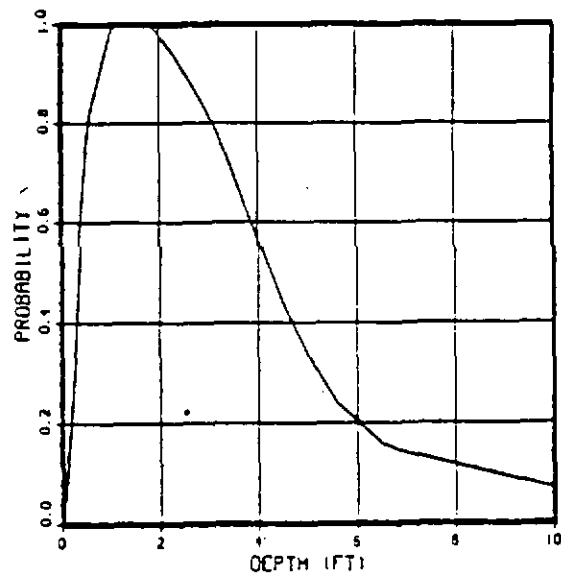
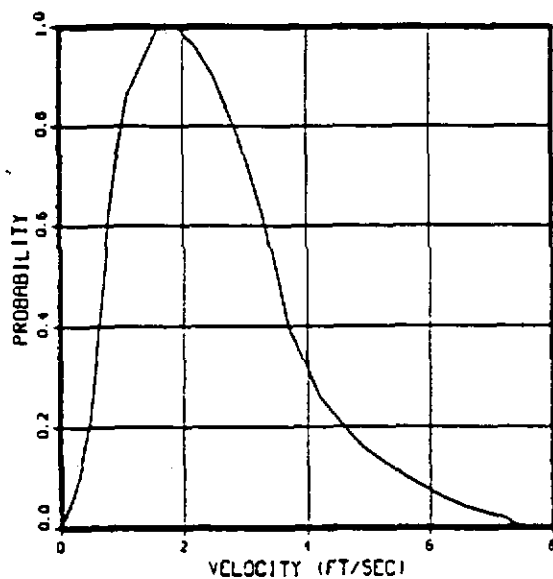
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Figure III-10
STEELHEAD SPAWNING
HABITAT CRITERIA

RAINBOW TROUT (CLEAR WATER, $S=.001$)

INCUBATION



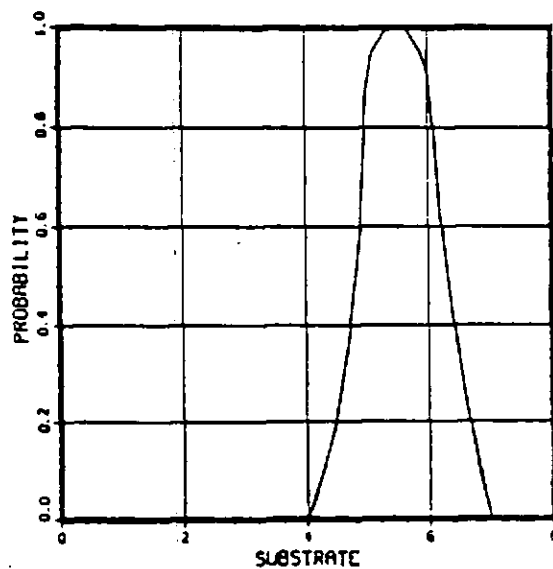
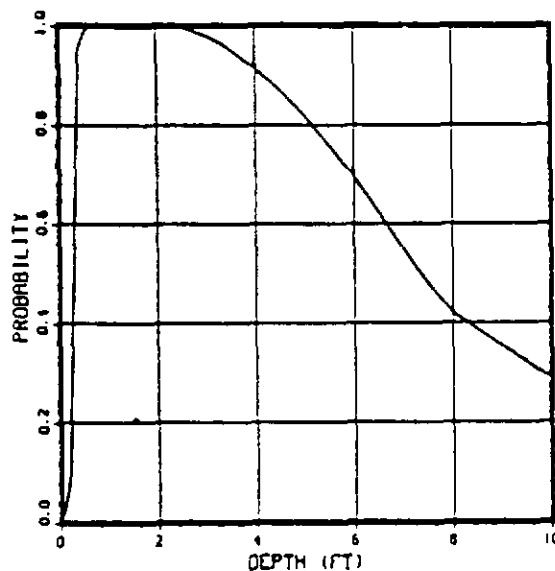
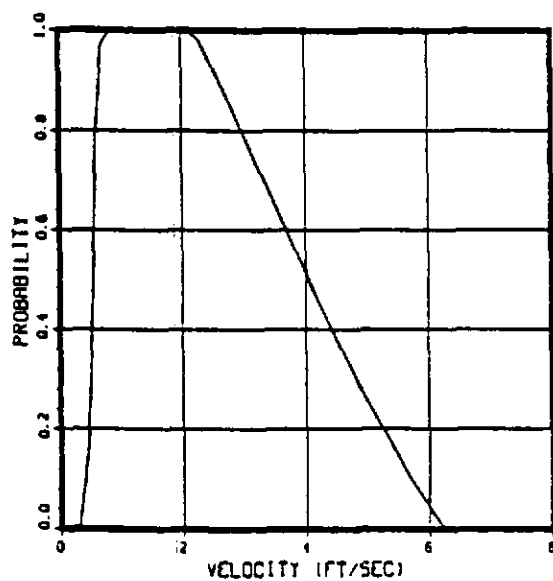
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Figure III-11
RAINBOW TROUT INCUBATION
HABITAT CRITERIA

CHINOOK SALMON (CLEAR WATER, S=.001)

INCUBATION



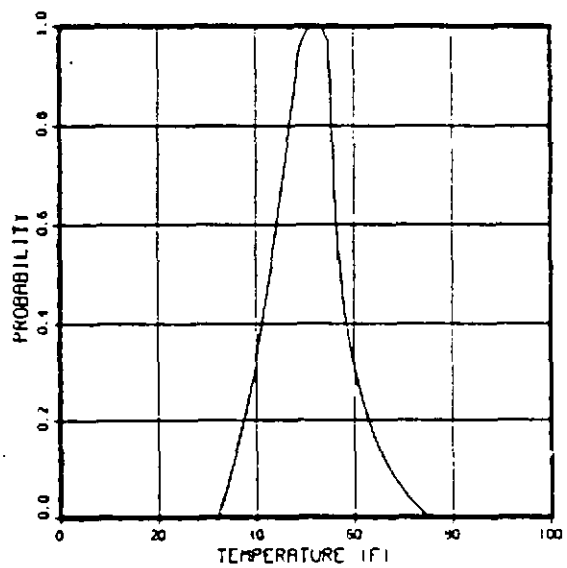
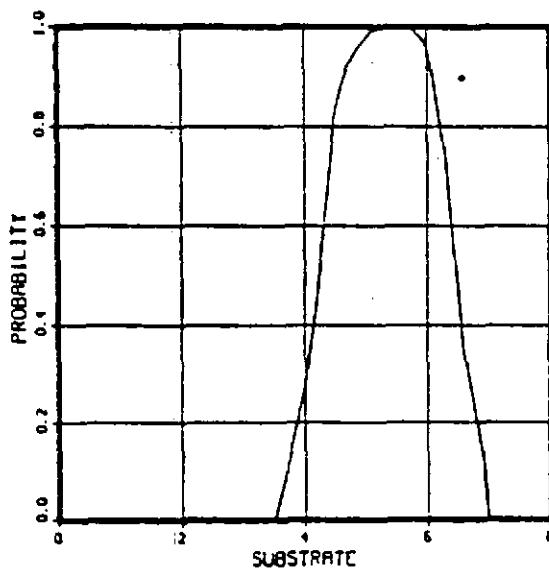
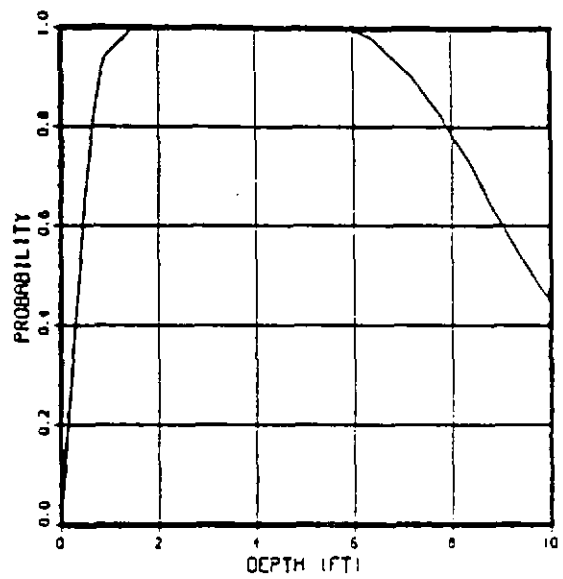
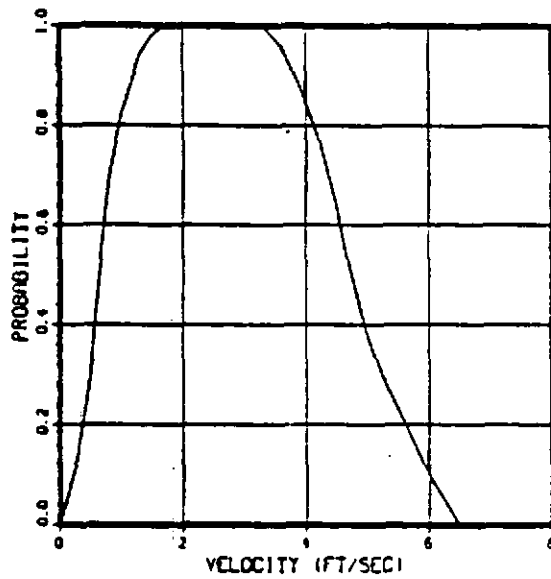
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Figure III-12
CHINOOK SALMON INCUBATION
HABITAT CRITERIA

WINTER STEELHEAD (CLEAR WATER, S=.001)

INCUBATION



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Figure III-13
STEELHEAD INCUBATION
HABITAT CRITERIA

were not input to the model. Occasionally, where the anomalies were minor, the velocities were modified slightly to make them compatible with the model limitations (Horton, 1984).

6. Calculations of Weighted Usable Width

After the hydraulic simulation of the stream reach was completed, the resulting predictions of depth and velocity at various discharges were interfaced with the substrate data, suitability criteria curves, and distances between transects by means of the IFG-3 HABTAT program. The program computes the amount of physical habitat weighted by its suitability for the target species and lifestage.

To estimate the composite probability of use for each cell, the IFG HABTAT program cross-multiplies the individual probabilities drawn from depth, velocity, and substrate curves as follows:

$$C_i = f_v(V_i) \times f_d(D_i) \times f_s(S_i)$$

where:

C_i = Composite weighing factor for suitability in cell i

$f_v(V_i)$ = Suitability factor for velocity in cell i

$f_d(D_i)$ = Suitability factor for depth in cell i

$f_s(S_i)$ = Suitability factor for substrate in cell i

The total surface area of each cell is multiplied by its respective composite weighing factor, and the resultant products are totaled to provide an index of habitat available within the study reach for each species and lifestage being analyzed. The estimate of habitat usability is called the weighted usable area and is computed as follows:

$$WUW = \sum_{i=1}^n C_i A_i$$

where

C_i = Composite weighing factor for suitability

A_i = Surface area of Cell i

n = Total number of cells within the simulated stream reach

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The WUA is generally presented in square feet of available habitat per 1,000 feet of the. The WUA is then plotted against discharge. Once the WUA has been computed for each discharge of interest and for each target species and lifestage, then the impact of altering streamflow regimes can be assessed from the estimated change in weighted usable area.

7. Interpretation and Recommendations

Establishing the WUA versus discharge relationships does not in itself necessarily provide a recommended flow regime in most cases and particularly not in the case of Allison Creek. Several species' lifestages overlap in both time and space, and rarely are the desired flows the same for each. Therefore, it is necessary for fisheries biologists who know the species use within the system to develop a flow regime that best suits the overall objective of fisheries production. If other competing uses of the water are involved, they too must be represented in later negotiations.

Establishing an incremental regime for fisheries protection requires a thorough knowledge of the factors that limit production for each species. For example, juvenile rearing rather than spawning success is generally considered the limiting factor for steelhead production. Chinook salmon production, on the other hand, is highly dependent on spawning success. In cases where the limiting lifestages of several species overlap, flows must provide a balance of protection.

Another factor that must be considered is the management priorities for each species. This is often based on relative abundance, distribution, or relative value of the species involved. Some stocks are managed to optimize production from naturally produced fish while others are managed on a basis compatible with hatchery production. For Allison Creek, however, salmon as well as steelhead are managed for natural production.

The final treatment and analysis of habitat simulation data to assess the impacts of flow alteration and derived recommended flows are not standardized. The simulation output is a large mass of refined data subject to divergent interpretations. Therefore, we selected a step-wise procedure of IFIM data analysis and interpretation, similar to one developed by Geer (1983), which could account for the complexity of biological and hydrological information characterizing Allison Creek. This procedure mathematically incorporates the pertinent biological information for assessing impact and recommending flows. The results are expressed conditions for a series of alternative streamflow regimes. The data treatment and step-wise analytical procedures are described below.

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Step 1: Determine the 50 percent exceedance flows by month (based on daily values) from historical streamflow data. The 50 percent exceedance flows are used to characterize the overall prevailing hydraulic conditions experienced by the fish. The 50 percent exceedance flows are preferred over mean flows because mean flows often reflect too much of the short-duration peak discharges. The 50 percent exceedance flows for Allison Creek are shown below.

50 PERCENT EXCEEDANCE FLOWS
FOR ALLISON CREEK

January	4.6 cfs	July	15.8 cfs
February	4.8 cfs	August	7.0 cfs
March	5.5 cfs	September	4.6 cfs
April	10.9 cfs	October	4.3 cfs
May	23.0 cfs	November	4.5 cfs
June	33.6 cfs	December	4.5 cfs

Step 2: Summarize the pertinent biological data and define the periods of major, minor, and no activity for the fish species and lifestages in the affected reach of stream (see Figure III-1).

Step 3: Establish fishery management objectives for the subject stream reach that can be ultimately expressed in terms of habitat quantity and quality. These must consider the mix of species and lifestages occurring simultaneously, possible interactions, and degree of present use.

Step 4: Compute the WUA of habitat in selected increments of discharge for each of the species lifestages of concern (from IFIM HABITAT model). Depict results graphically for ease of interpretation and in tables for ease of further computation.

Step 5: Determine the amount of WUA for each species lifestage at the 50 percent exceedance flow for the months of major activity. These represent the amount of habitat available under existing conditions. Then convert all WUA values for each flow increment to "individual percent deviations" (IPD) from the WUA values for existing conditions. The percent deviation is used as a means of standardizing the habitat data for each species lifestage.

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- Step 6: On the basis of the specific management objectives (Step 3) and possibly on other biological criteria, develop a series of relative weighting equations by month for the periods of biological significance (major activity). These equations are used to determine "mean percent deviations" (MPD) from existing conditions. These MPD values are the arithmetic mean reflecting the balanced considerations of biologically active lifestages that occur simultaneously. The MPD thus enables the WUA data to be converted to a single index incorporating the management objectives and needs of each species.
- Step 7: Use the relative weighting equations from Step 6 to convert the IPD for each species lifestage to MPD values for each month or, optionally, for several months having the same biological significance. The flows that need to be considered range from the lowest possible up to the flow corresponding to the greatest WUA for the species lifestage requiring the most water during that period.
- Step 8: Develop a summary table indicating the IPD and MPD for each flow increment and for each biologically significant period or month.
- Step 9: Review the summary table developed in Step 8 to develop recommendations for instream flows that maintain or enhance the overall fisheries habitat. If the stream is to be managed solely for a specific fish habitat optimization, the flow corresponding to the greatest positive deviation from existing conditions will provide the best possible streamflow regime for the target species. If the stream is to be managed for multiple use, flows can be selected that may provide less than optimal habitat but are sufficient to protect and, in some cases, enhance the balanced fish habitat values.

RESULTS AND DISCUSSION

HABITAT - FLOW RELATIONSHIP

The outcome of the IFIM HABITAT model is depicted graphically by curves relating WUA of habitat to increments of flow in Figure 3.2. The HABITAT model computes the total available habitat area versus flows to develop the WUA curves. These computations are presented in Tables 2. The WUA for such species lifestages at the 50 percent exceedance flows for each month are shown in Table 3.

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Table 3
MONTHLY WUA FOR ALLISON CREEK
50 PERCENT EXCEEDENCE FLOW

Month and 50 Percent Flow												
Species and Life Stage	Jan 4.6 cfs	Feb 4.8 cfs	March 5.5 cfs	April 10.9 cfs	May 23 cfs	June 33.6 cfs	July 15.6 cfs	Aug 7 cfs	Sept 4.6 cfs	Oct 4.3 cfs	Nov 4.5 cfs	Dec 4.5 cfs
Steelhead												
Juvenile	1175	1208	1271	1989	2045	2045	2045	1614	1175	1136	1159	1159
Spawning	--	--	100	907	1141	1141	--	--	--	--	--	--
Incubation	--	--	1535	2926	3208	3208	3208	2069	1400	--	--	--
Rainbow												
Adults	314	317	323	463	466	466	466	417	314	311	313	313
Juvenile	519	561	614	1295	1413	1413	1413	801	519	474	497	497
Spawning	--	--	802	2277	2519	2519	--	--	--	--	--	--
Incubation	--	--	1441	2866	3059	3059	3059	2052	1299	--	--	--
Chinook												
Juvenile	273	279	294	357	378	378	378	300	273	262	269	269
Spawning	--	--	--	--	--	--	--	1250	771	687	--	--
Incubation	1868	2015	2182	3872	--	--	--	2981	1868	1713	--	--

Note: Straight line extrapolation.

WUA beyond 13.1 cfs assumed constant.

WUA in square feet per 1,000 feet of stream.

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INTERPRETATION AND RECOMMENDATIONS

The WUA versus flow relationships were used to recommend a monthly flow regime for the diversion reach. We applied the stepwise procedure outlined in the methods section to establish a regime that provides balanced protection for the overall fisheries habitat. An important step in this procedure is the establishment of weighting formulas for each month that account for the species' lifestage occurring simultaneously. Because all salmon and steelhead using Allison Creek are managed for natural production, we gave equal weighting to all simultaneously occurring lifestages with one exception; we provided three times more weight to the steelhead lifestages relative to the salmon lifestages because steelhead have access to approximately three times more stream length in the proposed diversion reach. The weighting formulas used to derive the mean percent deviations of habitat are as follows:

October 16 to April 15

$$MPD = [3(\text{Steelhead } J+S+I) + (\text{Chinook } J+I) + (\text{Rainbow } A+J+S+I)]/15$$

March 16 to April 15

$$MPD = [3(\text{Steelhead } J+S+I) + (\text{Chinook } J) + (\text{Rainbow } A+J+S+I)]/14$$

June 16 to August 15

$$MPD = [3(\text{Steelhead } J+I) + (\text{Chinook } J) + (\text{Rainbow } A+J+I)]/10$$

August 16 to September 15

$$MPD = [3(\text{Steelhead } J) + (\text{Chinook } J+S+I) + (\text{Rainbow } A+J+I)]/12$$

September 15 to October 15

$$MPD = [3(\text{Steelhead } J) + (\text{Chinook } J+S+I) + (\text{Rainbow } A+J)]/11$$

where:

MPD = Average of Arc Sine

transformed IPD's at 50% exceedence flow

A = Adult weighted useable area (WUA)

J = Juvenile weighted useable area (WUA)

S = Spawning weighted useable area (WUA)

I = Incubation weighted useable area (WUA)

The IPD is simply a calculation of ratios:

$$\frac{\text{WUA} - \text{WUA}_1}{\text{WUA}_2} \times 100$$

However, in order to calculate the mean of ratios, an arc sin transformation of the IPD's is necessary to complete the MPA

calculation. This transformation is as follows:

$$x = \text{IPD} \sin (y)$$

where

$$x = \text{IPD in degrees}$$

$$y = \text{IPD in percent}/100$$

This is equivalent to $y - \sin^2 x$

If the IPD is >100 percent, then the transformed IPD was:

$$x = 90^\circ (z) + \arcsin (y)$$

where

$$z + y = \text{IPD in percent}/100$$

and z is an integer

and y is <1

Results of this modeling are shown in Table 5. The recommended flows based on this analysis are summarized in Table 6. In most cases, the recommended flow regime provides enhancement of the weighted habitat values for each month. A brief discussion of the monthly flow recommendations follows.

Table 6
RECOMMENDED INSTREAM FLOWS

January	5.0 cfs	July	13.1 cfs
February	5.0 cfs	August	7.2 cfs
March 1 to March 15	5.7 cfs	September 1-15	5.0 cfs
March 16-31	5.7 cfs	September 16-30	5.0 cfs
April	10.9 cfs	October	4.4 cfs
May	13.1 cfs	November	5.0 cfs
June	13.1 cfs	December	5.0 cfs

January: 5 cfs (MPD, +15.47 percent). This flow results in a 5.6 percent increase in juvenile steelhead habitat, 4.8 percent increase in juvenile chinook and 15.8 percent increase in chinook incubation habitat, and an increase of 1.6 percent and 16.4 percent in rainbow trout adult and juvenile habitat, respectively.

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February: 5 cfs (MPD, +10.57 percent). At this flow juvenile steelhead habitat is increased 2.7 percent. Chinook juvenile and spawning habitat is increased 2.5 and 7.3 percent, respectively. While rainbow trout adult and juvenile habitat is increased 0.6 and 7.7 percent, respectively.

March 1-15: 5.7 cfs (MPD, +4.76 percent). This flow results in 0.9 percent increase in juvenile steelhead habitat. Juvenile chinook is unchanged which incubation habitat is increased slightly (0.3%). Rainbow trout adult and juvenile habitat will increase 0.3 and 3.1 percent, respectively.

March 16-31: 5.7 cfs (MPD, +3.61 percent). This produces a 0.9 percent increase in juvenile steelhead habitat, no change in spawning habitat and 0.4 percent increase in steelhead incubation habitat. Chinook juvenile habitat will increase by 0.32 percent. Rainbow trout habitat will increase by 0.3 percent for adults, 3.1 percent for juvenile, 1.1 percent for spawning, and 0.5 percent for incubation.

May & June: 13.1 cfs (MPD, +8.28 percent). This will increase steelhead incubation by 39 percent, all other species habitat is unchanged.

July: 13.1 cfs (MPD, +0.1 percent). This flow will increase rainbow trout incubation by 0.03 percent. All other species habitat is unchanged.

August 1-15: 7.2 cfs (MPD, +11.22 percent). This flow results in 3.7 and 4.6 percent increase in steelhead juvenile and incubation habitat, respectively. Chinook juvenile habitat will increase by 1.7 percent. Rainbow trout adult, juvenile, and incubation habitat will increase by 3.8, 2.6, and 5.6 percent, respectively.

August 16-31: 7.2 cfs (MPD, +11.32). At this flow steelhead juvenile and incubation habitat will increase by 3.7 and 4.6 percent, respectively. Chinook juvenile, spawning, and incubation habitat will increase by 1.7, 3.4, and 5.0 percent, respectively. Rainbow trout adult, juvenile, and incubation habitat will increase by 3.8, 2.6, and 5.6 percent, respectively.

September 1-15: 5 cfs (MPD, +17.03). This flow results in increased steelhead juvenile and incubation habitat by 5.6 and 8.5 percent, respectively. Chinook juvenile, spawning, and incubation habitat will increase by 4.8, 21.0 and 15.8 percent, respectively. Rainbow trout adult, juvenile, and incubation habitat will increase by 3.8, 2.6, and 5.6 percent, respectively.

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October: 4.4 cfs (MPD, +3.09 percent). This results in a 0.5 percent increase in juvenile steelhead habitat. Chinook juvenile, spawning, and incubation habitat will increase by 1.5, 0.4, and 0.4 percent, respectively. Rainbow trout adult and juvenile habitat will increase by 0.3 and 0.4 percent, respectively.

November & December: 5 cfs (MPD, +18.18 percent). At this flow juvenile steelhead will increase by 7 percent. Juvenile and incubation chinook habitat will increase by 6.3 and 26.3 percent. Adult and juvenile rainbow trout habitat will increase by 1.9 and 21.5 percent, respectively.

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Table 5

IPDMPD
 STREAM: ALLISON CREEK
 MONTH: JANUARY
 502 EXCEEDANCE: 4.6 CFS
 MPD FORMULA: MPD = L3 (STEELHEAD J) + (CHINOOK J+I)

+ (RAINBOW R+J) / 7

NO.	FLOU	WINTER STEELHEAD				INCUBATION			
		SPAWNING		INCUBATION		SPAWNING		INCUBATION	
NO.	FLOU	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS
1	2.8	-54.81	-42.76	--	--	--	--	--	--
2	3.3	-23.23	-28.82	--	--	--	--	--	--
3	3.8	-5.70	-13.82	--	--	--	--	--	--
4	4.0	-2.81	-9.65	--	--	--	--	--	--
5	4.4	-2.81	-9.65	--	--	--	--	--	--
6	*5.0	5.62	13.71	--	--	--	--	--	--
7	5.7	9.19	17.65	--	--	--	--	--	--
8	6.0	14.72	22.56	--	--	--	--	--	--
9	6.4	22.13	28.06	--	--	--	--	--	--
10	7.2	42.47	40.67	--	--	--	--	--	--
11	8.1	52.51	46.44	--	--	--	--	--	--
12	9.0	59.40	50.42	--	--	--	--	--	--
13	10.9	69.26	56.34	--	--	--	--	--	--
14	13.1	74.04	59.37	--	--	--	--	--	--

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NO.	MPD1	CHINOOK				INCUBATION			
		SPAWNING		INCUBATION		SPAWNING		INCUBATION	
NO.	MPD1	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS
1	-47.98	-42.86	-40.89	--	--	-46.50	-44.14	--	--
2	-30.18	-15.38	-23.09	--	--	-27.41	-31.57	--	--
3	-14.30	-4.76	-12.60	--	--	-10.17	-18.60	--	--
4	-12.04	-4.03	-11.58	--	--	-9.42	-17.88	--	--
5	-10.83	-2.56	-9.21	--	--	-7.92	-16.35	--	--
6	15.47	4.76	12.60	--	--	15.79	23.42	--	--
7	18.82	7.69	19.10	--	--	17.18	24.49	--	--
8	23.67	8.06	18.49	--	--	25.05	30.04	--	--
9	28.99	8.42	16.87	--	--	35.55	36.60	--	--
10	40.73	11.72	20.02	--	--	67.56	95.28	--	--
11	47.68	13.92	21.91	--	--	84.26	74.03	--	--
12	61.20	18.32	25.34	--	--	93.15	112.35	--	--
13	72.40	30.77	33.69	--	--	107.26	--	--	--
14	37.22	38.46	38.32	--	--	114.45	0.00	--	--

NO.	IPD	RAINBOW				INCUBATION			
		SPAWNING		INCUBATION		SPAWNING		INCUBATION	
NO.	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD
1	-41.08	-34.86	-85.52	-67.66	--	--	--	--	--
2	-19.75	-26.36	-47.76	-43.73	--	--	--	--	--
3	-1.91	-7.95	-11.16	-19.53	--	--	--	--	--
4	-1.59	-7.22	-10.21	-18.64	--	--	--	--	--
5	-0.64	-4.56	-8.29	-16.73	--	--	--	--	--
6	1.59	7.25	16.36	-16.73	--	--	--	--	--
7	3.18	10.26	21.91	27.95	--	--	--	--	--
8	9.55	18.00	30.44	33.49	--	--	--	--	--
9	17.83	24.96	41.81	40.39	--	--	--	--	--
10	37.90	38.00	53.36	49.83	--	--	--	--	--
11	42.68	40.75	82.21	65.10	--	--	--	--	--
12	45.22	42.26	100.83	134.72	--	--	--	--	--
13	47.45	43.34	149.52	148.21	--	--	--	--	--
14	48.11	44.05	170.25	0.00	--	--	--	--	--

Table 5 Con't

IPDMPD
 STREAM: ALLISON CREEK
 MONTH: FEBRUARY
 502 EXCEEDANCE: 4.8 CFS
 MPD FORMULA: MPD = (3 (STEELHEAD J) + (CHINOOK J+J) + (RAINBOW R+J) / 7

NO.	FLOW	WINTER STEELHEAD			
		SPAWNING		INCUBATION	
NO.	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD-TRANS
1	-56.04	-48.47	--	--	--
2	-25.33	-30.22	--	--	--
3	-8.28	-16.72	--	--	--
4	-5.46	-13.52	--	--	--
5	-5.46	-13.52	--	--	--
6	2.73	9.51	--	--	--
7	6.21	14.43	--	--	--
8	11.59	19.90	--	--	--
9	18.79	25.69	--	--	--
10	38.58	38.40	--	--	--
11	48.34	44.05	--	--	--
12	55.05	47.90	--	--	--
13	64.65	53.52	--	--	--
14	69.29	58.35	--	--	--

NO.	MPD1	CHINOOK			
		SPAWNING		INCUBATION	
NO.	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD-TRANS
1	-44.09	-41.60	--	-52.26	-46.29
2	-17.20	-24.51	--	-32.70	-34.88
3	-6.81	-15.13	--	-16.72	-24.14
4	-6.09	-14.29	--	-16.03	-23.60
5	-4.66	-12.47	--	-14.64	-22.50
6	2.51	9.11	--	7.34	15.72
7	5.36	13.41	--	8.64	17.09
8	5.73	13.86	--	15.93	23.52
9	6.09	14.29	--	25.66	30.43
10	9.32	17.77	--	55.33	48.06
11	11.47	19.80	--	70.82	62.77
12	15.77	23.40	--	79.06	73.74
13	27.96	31.92	--	92.16	83.73
14	35.46	38.56	--	98.81	

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NO.	IPD	RAINBOW			
		SPAWNING		INCUBATION	
NO.	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS
1	-41.64	-40.15	-68.53	--	--
2	-30.50	-20.92	-51.65	-45.97	--
3	-2.84	-9.70	-17.83	-24.97	--
4	-2.52	-9.14	-16.91	-24.30	--
5	-1.58	-7.21	-15.15	-22.91	--
6	0.63	4.56	7.66	16.07	--
7	2.21	3.52	12.82	20.99	--
8	8.52	10.97	20.66	27.05	--
9	16.72	21.14	33.95	33.95	--
10	36.59	37.22	46.52	43.01	--
11	41.32	40.00	63.63	58.94	--
12	43.85	41.41	75.96	75.96	--
13	46.06	43.74	136.07	--	--
14	47.00	43.26	151.81	0.00	--

Table 5 Con't

IPOND
STREAM: ALLISON CREEK
MONTH: MARCH 1-15
502 EXCEEDANCE: 5.5 CFS
MFD FORMULA: MFD = 13 STEELHEAD J + CHINOOK J+J
+ (RAINBOW A+J) / 7

NO.	FLOW	WINTER STEELHEAD				INCUBATION			
		JUVENILE		SPAWNING		JUVENILE		SPAWNING	
		IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS
1	2.8	-58.22	-49.73	---	---	---	---	---	---
2	3.3	-29.03	-32.60	---	---	---	---	---	---
3	3.8	-12.82	-20.98	---	---	---	---	---	---
4	4.0	-10.15	-18.58	---	---	---	---	---	---
5	4.4	-10.15	-18.58	---	---	---	---	---	---
6	5.0	-2.36	-8.84	---	---	---	---	---	---
7	5.7	0.94	5.58	---	---	---	---	---	---
8	6.0	6.06	14.25	---	---	---	---	---	---
9	6.4	12.90	21.05	---	---	---	---	---	---
10	7.2	31.71	34.27	---	---	---	---	---	---
11	8.1	40.99	39.81	---	---	---	---	---	---
12	9.0	47.36	43.49	---	---	---	---	---	---
13	10.9	56.49	48.73	---	---	---	---	---	---
14	13.1	60.90	51.29	---	---	---	---	---	---

CHINOOK:

NO.	MFD	JUVENILE				SPAWNING				INCUBATION			
		JUVENILE		SPAWNING		JUVENILE		SPAWNING		JUVENILE		SPAWNING	
		IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS
1	-50.17	-46.94	-43.24	---	---	---	---	---	---	---	---	---	---
2	-34.24	-21.43	-27.58	---	---	---	---	---	---	---	---	---	---
3	-21.99	-11.56	-19.86	---	---	---	---	---	---	---	---	---	---
4	-20.67	-10.86	-19.26	---	---	---	---	---	---	---	---	---	---
5	-20.01	-9.52	-17.98	---	---	---	---	---	---	---	---	---	---
6	-7.87	-2.72	-9.49	---	---	---	---	---	---	---	---	---	---
7	4.76	0.00	0.00	---	---	---	---	---	---	---	---	---	---
8	13.56	0.34	3.34	---	---	---	---	---	---	---	---	---	---
9	20.06	0.68	4.78	---	---	---	---	---	---	---	---	---	---
10	32.36	3.74	11.15	---	---	---	---	---	---	---	---	---	---
11	38.37	5.76	13.91	---	---	---	---	---	---	---	---	---	---
12	43.46	9.86	18.30	---	---	---	---	---	---	---	---	---	---
13	57.13	21.43	27.56	---	---	---	---	---	---	---	---	---	---
14	42.00	28.57	32.31	---	---	---	---	---	---	---	---	---	---

RAINBOW:

NO.	MFD	JUVENILE				SPAWNING				INCUBATION			
		JUVENILE		SPAWNING		JUVENILE		SPAWNING		JUVENILE		SPAWNING	
		IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS
1	-42.72	-40.82	-87.79	---	---	---	---	---	---	---	---	---	---
2	-21.98	-27.96	-58.86	---	---	---	---	---	---	---	---	---	---
3	-4.64	-12.48	-24.92	---	---	---	---	---	---	---	---	---	---
4	-4.53	-12.02	-24.10	---	---	---	---	---	---	---	---	---	---
5	-3.41	-10.62	-22.46	---	---	---	---	---	---	---	---	---	---
6	-1.24	-9.35	-1.62	---	---	---	---	---	---	---	---	---	---
7	0.51	3.19	3.05	---	---	---	---	---	---	---	---	---	---
8	6.50	14.77	10.26	---	---	---	---	---	---	---	---	---	---
9	14.55	22.42	19.87	---	---	---	---	---	---	---	---	---	---
10	34.06	35.70	33.86	---	---	---	---	---	---	---	---	---	---
11	38.70	38.47	54.07	---	---	---	---	---	---	---	---	---	---
12	41.18	39.92	77.36	---	---	---	---	---	---	---	---	---	---
13	43.34	41.11	110.91	---	---	---	---	---	---	---	---	---	---
14	44.27	41.71	130.13	---	---	---	---	---	---	---	---	---	---

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Table 5 Con't

IPDPOD
 STREAM: ALLISON CREEK
 MONTH: MARCH 16-31
 502 EXCEEDANCE: 5.5 CFS
 IPD FORMULA: IPD = ((STEELHEAD J+S+I) + (CHINOOK J+I))

+ (RAINBOW J+S+I) / 15

NO.	FLOW	WINTER STEELHEAD			
		JUVENILE	SPAWNING	INCUBATION	
		IPD	IPD-TRANS	IPD	IPD-TRANS
1	2.8	-58.22	-49.73	-77.00	-44.63
2	3.3	-29.03	-32.60	-92.00	-35.70
3	3.8	-12.82	-20.98	-51.94	-14.07
4	4.0	-10.15	-18.58	-62.00	-12.70
5	4.4	-10.15	-18.58	-51.94	-12.70
6	5.0	-2.36	-8.84	5.74	-1.04
7	45.7	0.94	5.58	0.00	0.39
8	6.0	6.06	14.25	35.06	7.17
9	6.4	12.90	21.05	62.03	16.16
10	7.2	31.71	34.27	78.00	23.70
11	8.1	40.99	39.81	291.13	40.98
12	9.0	47.36	43.49	428.03	55.31
13	10.9	56.49	48.73	735.34	66.34
14	13.1	60.90	51.29	939.82	90.62
			1041.00	0.00	106.99

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NO.	IPD1	CHINOOK			
		JUVENILE	SPAWNING	INCUBATION	
		IPD	IPD-TRANS	IPD	IPD-TRANS
1	-51.21	-46.94	-43.24	-55.91	-46.40
2	-43.67	-21.43	-27.56	-37.86	-37.97
3	-28.84	-11.56	-19.88	-25.10	-26.72
4	-27.92	-10.86	-19.26	-22.46	-26.29
5	-27.46	-9.52	-12.96	-21.17	-22.40
6	-4.79	-2.72	-9.46	-0.87	-5.35
7	3.61	0.00	0.00	0.32	3.25
8	19.00	0.34	3.34	7.06	15.41
9	30.43	0.66	4.72	16.04	22.61
10	88.00	3.74	11.15	43.45	41.23
11	122.02	5.76	13.91	57.75	49.46
12	193.11	9.86	18.30	65.35	53.94
13	248.12	21.43	27.56	77.45	61.65
14	19.60	28.57	32.31	83.59	66.11

NO.	IPD	RAINBOW			
		JUVENILE	SPAWNING	INCUBATION	
		IPD-TRANS	IPD	IPD-TRANS	IPD
1	-12.72	-40.81	-87.79	-69.54	-49.41
2	-21.98	-27.96	-55.86	-48.37	-36.17
3	-4.64	-12.44	-24.91	-30.95	-15.89
4	-4.33	-12.03	-24.10	-29.40	-15.34
5	-3.41	-10.63	-22.46	-28.30	-14.16
6	-1.24	-0.35	-1.63	-7.33	-1.25
7	0.31	3.15	3.05	10.13	0.49
8	6.50	14.71	10.26	18.68	6.19
9	14.65	22.42	19.87	26.47	16.46
10	34.06	35.70	33.86	50.30	33.40
11	38.70	38.47	54.07	67.96	50.38
12	41.18	39.92	54.07	66.13	45.23
13	42.34	41.17	77.36	123.94	62.76
14	44.17	41.71	10.91	163.92	79.04
			130.12	214.09	98.89
			0.00	0.00	112.26
					0.01

Table 5 Con't

IPDMPD
 STREAM: RALLISON CREEK
 MONTH: APRIL 1-15
 50% EXCEEDANCE = 10.9 CFS
 MPD FORMULA: MPD = [3(STEELHEAD J+S+I) + (CHINOOK J+I)
 + CRAINBOU R+J+S+I)] / 15

WINTER STEELHEAD			
NO.	FLOW	NO.	NO.
1	2.8	1	1
2	3.3	2	2
3	3.8	3	3
4	4.0	4	4
5	4.4	5	5
6	5.0	6	6
7	5.7	7	7
8	6.0	8	8
9	6.4	9	9
10	7.2	10	10
11	8.1	11	11
12	9.0	12	12
13	10.9	13	13
14	13.1	14	14

CHINOOK			
NO.	MPD	NO.	NO.
1	-64.05	1	1
2	-58.51	2	2
3	-52.12	3	3
4	-51.75	4	4
5	-51.57	5	5
6	-47.00	6	6
7	-46.33	7	7
8	-44.10	8	8
9	-41.16	9	9
10	-33.41	10	10
11	-37.59	11	11
12	-21.39	12	12
13	0.00	13	13
14	17.06	14	14

RAINBOW			
NO.	IPD	NO.	NO.
1	-50.04	1	1
2	-45.57	2	2
3	-33.48	3	3
4	-33.26	4	4
5	-32.61	5	5
6	-31.10	6	6
7	-30.02	7	7
8	-29.70	8	8
9	-20.09	9	9
10	-6.48	10	10
11	-3.24	11	11
12	-1.51	12	12
13	0.00	13	13
14	0.65	14	14

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IPDMPD
 STREAM: RALLISON CREEK

Table 5 Con't

IFDMPD
 STREAM: ALLISON CREEK
 MONTH: APRIL 16-30
 502 EXCEEDANCE: 10.9 CFS
 MPD FORMULA: MPD = [3(STEELHEAD J+S+I) + (CHINOOK J)
 + (RHINBOW R+J+S+I)] / 14

NO.	FLOW	WINTER STEELHEAD					
		JUVENILE		SPAWNING		INCUBATION	
		IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS
1	2.8	-73.30	-88.89	-97.46	-80.84	-70.95	-57.39
2	3.3	-54.65	-47.67	-99.12	-84.61	-66.27	-54.49
3	3.8	-44.29	-41.72	-95.81	-78.19	-54.92	-47.82
4	4.0	-42.58	-40.74	-95.81	-78.19	-54.20	-47.41
5	4.4	-42.58	-40.74	-95.81	-78.19	-54.20	-47.41
6	5.0	-37.61	-37.82	-88.86	-70.51	-48.09	-43.90
7	5.7	-35.50	-36.57	-88.97	-70.61	-47.33	-43.47
8	6.0	-32.23	-34.59	-85.34	-67.48	-43.78	-41.43
9	6.4	-27.85	-31.59	-80.37	-63.70	-39.06	-36.68
10	7.2	-15.84	-23.45	-69.35	-56.38	-26.04	-25.49
11	8.1	-9.90	-18.34	-54.47	-47.56	-18.52	-19.99
12	9.0	-5.83	-13.97	-35.39	-36.51	-11.69	-10.00
13	*10.9	0.00	0.00	0.00	0.00	0.00	0.00
14	13.1	2.82	9.66	25.80	30.53	9.64	18.09

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NO.	MPD1	CHINOOK					
		JUVENILE		SPAWNING		INCUBATION	
		IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS
1	-64.33	-56.30	-48.62	--	--	--	--
2	-58.86	-35.29	-36.46	--	--	--	--
3	-52.36	-27.17	-31.42	--	--	--	--
4	-51.98	-26.61	-31.05	--	--	--	--
5	-51.81	-25.49	-30.32	--	--	--	--
6	-47.39	-19.89	-26.48	--	--	--	--
7	-46.69	-17.65	-24.84	--	--	--	--
8	-44.47	-17.37	-24.63	--	--	--	--
9	-41.55	-17.09	-24.42	--	--	--	--
10	-33.95	-14.57	-22.44	--	--	--	--
11	-28.17	-12.89	-21.04	--	--	--	--
12	-21.84	-9.92	-17.96	--	--	--	--
13	0.00	0.00	0.00	--	--	--	--
14	17.51	5.86	14.04	--	--	--	--

NO.	ADULT	RHINBOW					
		JUVENILE		SPAWNING		INCUBATION	
		IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS
1	-60.04	-50.79	-94.21	-76.07	-92.53	-74.14	-74.56
2	-45.57	-42.46	-79.07	-62.78	-63.31	-65.89	-66.31
3	-33.48	-35.35	-64.40	-53.37	-75.36	-60.24	-57.44
4	-33.26	-35.22	-64.02	-53.14	-75.01	-60.01	-57.43
5	-32.61	-34.83	-63.24	-52.68	-74.31	-59.54	-56.84
6	-31.10	-33.90	-63.36	-46.93	-64.38	-52.36	-50.35
7	-30.02	-33.22	-61.12	-45.64	-59.99	-50.36	-48.48
8	-26.70	-30.46	-47.72	-43.69	-54.11	-47.36	-46.60
9	-20.09	-26.63	-43.17	-41.07	-40.84	-39.72	-40.44
10	-6.48	-14.72	-36.52	-37.18	-30.92	-32.78	-32.73
11	-3.24	-10.37	-26.92	-31.27	-21.12	-27.36	-23.41
12	-1.51	-7.06	-15.91	-23.51	0.00	0.00	-18.41
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.65	4.62	9.11	17.87	10.63	19.03	13.04

NO.	FLOW	NO.	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS
1	2.8	1	-74.03	-59.37	-97.98	-81.84	-63.17	-52.64
2	3.3	2	-55.89	-48.38	-99.30	-85.20	-57.24	-49.16
3	3.8	3	-45.82	-42.60	-96.67	-79.48	-42.85	-40.89
4	4.0	4	-41.16	-41.64	-96.67	-79.48	-41.94	-40.36
5	4.4	5	-41.16	-41.64	-96.67	-79.48	-41.94	-40.36
6	5.0	6	-39.32	-38.83	-91.13	-72.63	-34.19	-35.78
7	5.7	7	-37.26	-37.62	-91.24	-72.78	-33.23	-35.20
8	6.0	8	-34.08	-35.72	-88.34	-70.04	-32.41	-32.41
9	6.4	9	-29.83	-23.10	-84.40	-66.74	-22.75	-28.49
10	7.2	10	-18.14	-25.21	-75.64	-60.42	-6.24	-14.46
11	8.1	11	-12.37	-20.59	-63.80	-53.01	3.29	10.46
12	9.0	12	-8.41	-16.86	-48.64	-44.22	11.96	20.23
13	10.9	13	-2.74	-9.52	-20.51	-26.93	26.78	31.16
14	*13.1	14	0.00	0.00	0.00	0.00	36.99	36.64

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NO.	IPD1	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS
1	-63.92	-58.73	-50.03	--	--	--	--
2	-58.43	-58.89	-38.58	--	--	--	--
3	-51.89	-31.22	-33.97	--	--	--	--
4	-51.50	-30.69	-33.64	--	--	--	--
5	-51.34	-29.63	-32.96	--	--	--	--
6	-47.00	-24.34	-29.56	--	--	--	--
7	-46.31	-22.22	-28.13	--	--	--	--
8	-44.06	-21.96	-27.94	--	--	--	--
9	-41.08	-21.69	-27.76	--	--	--	--
10	-32.70	-19.31	-26.07	--	--	--	--
11	-23.30	-17.72	-24.90	--	--	--	--
12	-16.96	-14.55	-22.42	--	--	--	--
13	-5.96	-5.56	-13.63	--	--	--	--
14	8.26	0.00	0.00	--	--	--	--

NO.	IPD	IPD-IRANS	IPD	IPD-IRANS	IPD	IPD-IRANS	IPD	IPD-IRANS
1	-50.30	-50.94	-94.65	-76.68	-93.25	-74.94	-76.17	-60.78
2	-48.92	-42.66	-80.82	-64.03	-84.91	-57.15	-70.87	-50.94
3	-33.91	-35.61	-67.37	-55.17	-77.73	-51.34	-60.38	-50.94
4	-33.69	-35.46	-67.02	-54.95	-77.41	-51.62	-60.12	-50.84
5	-33.05	-35.05	-66.31	-54.52	-76.78	-51.19	-59.36	-50.51
6	-31.55	-34.11	-61.26	-49.17	-69.11	-55.24	-53.48	-47.00
7	-30.47	-33.51	-58.20	-47.99	-67.80	-55.43	-52.66	-46.53
8	-26.18	-30.77	-52.05	-46.20	-63.83	-51.03	-49.04	-44.45
9	-20.60	-29.99	-47.91	-43.80	-58.52	-41.90	-44.20	-41.67
10	-7.06	-15.42	-41.82	-40.30	-46.53	-41.01	-29.16	-32.68
11	-3.66	-11.33	-33.05	-35.09	-37.65	-31.79	-21.88	-27.61
12	-2.15	-3.42	-22.93	-28.61	-28.70	-31.39	-15.66	-23.31
13	-0.64	-1.66	-8.32	-16.80	-9.61	-11.06	-6.31	-14.55
14	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

Table 5 Con't

IFDMPD
 STREAM: ALLISON CREEK
 MONTH: JUNE 1-15
 502 EXCEEDANCE : 33.6 CFS
 MPD FORMULA: MPD = (3(STEELHEAD J+S+I) + (CHINOOK J)
 + (RAINBOW R+J+S+I)) / 14

NO.	FLOW	WINTER				STEELHEAD			
		JUVENILE		SPAWNING		INCUBATION		INCUBATION	
		IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS
1	2.8	-74.03	-59.37	-97.98	-81.84	-63.17	-52.64	-49.16	-37.34
2	3.3	-55.89	-48.38	-99.30	-65.20	-57.24	-49.16	-49.16	-37.34
3	3.8	-45.82	-42.60	-96.67	-79.48	-42.85	-40.89	-40.89	-30.99
4	4.0	-44.16	-41.64	-96.67	-79.48	-41.94	-40.36	-40.36	-30.99
5	4.4	-44.16	-41.64	-96.67	-79.48	-41.94	-40.36	-40.36	-30.99
6	5.0	-39.32	-38.83	-91.15	-72.69	-34.19	-35.78	-35.78	-27.61
7	5.7	-37.26	-37.62	-91.24	-72.78	-33.23	-35.20	-35.20	-27.61
8	6.0	-34.08	-35.72	-88.34	-70.04	-26.73	-28.49	-28.49	-23.31
9	6.4	-29.83	-33.10	-84.40	-66.74	-22.75	-24.46	-24.46	-20.23
10	7.2	-18.14	-25.21	-75.64	-60.42	-6.24	-14.46	-14.46	-14.55
11	8.1	-12.37	-20.59	-63.80	-53.01	3.29	11.96	11.96	-14.55
12	9.0	-8.41	-16.86	-48.64	-41.22	26.78	31.16	31.16	-14.55
13	10.9	-2.74	-9.53	-20.51	-26.93	38.99	38.64	38.64	-14.55
14	13.1	0.00	0.00	0.00	0.00				

CHINOOK

NO.	MPD1	JUVENILE				SPAWNING			
		IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS
1	-63.92	-58.73	-50.03	--	--	--	--	--	--
2	-58.43	-38.89	-38.58	--	--	--	--	--	--
3	-51.89	-31.22	-33.97	--	--	--	--	--	--
4	-51.50	-30.69	-33.64	--	--	--	--	--	--
5	-51.34	-29.63	-32.98	--	--	--	--	--	--
6	-47.00	-24.34	-29.56	--	--	--	--	--	--
7	-46.31	-22.22	-28.13	--	--	--	--	--	--
8	-44.06	-21.96	-27.94	--	--	--	--	--	--
9	-41.08	-21.65	-27.76	--	--	--	--	--	--
10	-32.70	-19.31	-26.07	--	--	--	--	--	--
11	-23.30	-17.72	-24.90	--	--	--	--	--	--
12	-16.98	-14.55	-22.42	--	--	--	--	--	--
13	-5.96	-5.36	-13.63	--	--	--	--	--	--
14	8.28	0.00	0.00	--	--	--	--	--	--

RAINBOW

NO.	IPD	JUVENILE				SPAWNING			
		IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD
1	-50.30	-50.94	-94.65	-76.68	-63.25	-74.94	-74.17	-60.78	-57.34
2	-45.92	-42.66	-80.82	-64.03	-64.91	-67.15	-70.87	-57.34	-50.99
3	-33.91	-35.61	-67.37	-55.17	-77.73	-61.84	-60.38	-50.84	-47.00
4	-33.69	-35.46	-67.02	-54.95	-77.41	-61.62	-60.12	-50.84	-47.00
5	-33.05	-35.05	-60.31	-54.52	-76.78	-61.19	-59.56	-47.00	-44.45
6	-31.25	-34.17	-57.26	-49.17	-69.11	-56.24	-53.48	-47.00	-44.45
7	-30.47	-33.51	-55.20	-47.99	-67.80	-55.43	-52.66	-47.00	-44.45
8	-26.18	-30.77	-52.05	-46.20	-63.83	-53.03	-49.04	-44.45	-41.67
9	-20.60	-26.99	-47.91	-43.80	-58.52	-49.30	-44.20	-41.67	-32.63
10	-7.08	-15.43	-41.82	-40.30	-46.53	-43.01	-39.16	-32.63	-27.61
11	-3.66	-11.33	-33.02	-35.09	-37.55	-37.79	-31.48	-27.61	-23.31
12	-2.15	-3.42	-23.92	-28.61	-28.70	-32.39	-15.66	-23.31	-14.55
13	-0.64	-1.60	-3.32	-16.80	-9.61	-18.06	-6.31	-14.55	-14.55
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MAR 03 1988

IPDMPD
 STREAM: ALLISON CREEK
 MONTH: JUNE 16-30
 502 EXCEEDANCE: 33.6 CFS
 MPD FORMULA: MPD = [3(STEELHEAD J+I) + CHINOOK J] / 10

WINTER STEELHEAD									
NO.	FLOW	JUVENILE		SPAWNING		INCUBATION			
		NO.	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD-TRANS
1	2.8	1	-74.03	-59.37	--	--	-63.17	-52.64	--
2	3.3	2	-55.89	-48.38	--	--	-57.24	-49.16	--
3	3.8	3	-45.82	-42.60	--	--	-42.85	-40.89	--
4	4.0	4	-44.16	-41.64	--	--	-41.94	-40.36	--
5	4.4	5	-44.16	-41.64	--	--	-41.94	-40.36	--
6	5.0	6	-39.32	-38.03	--	--	-34.19	-35.78	--
7	5.7	7	-37.26	-37.62	--	--	-35.23	-35.20	--
8	6.0	8	-34.08	-35.72	--	--	-28.73	-32.41	--
9	6.4	9	-29.83	-33.10	--	--	-22.75	-28.49	--
10	7.2	10	-18.14	-25.21	--	--	-6.24	-14.46	--
11	8.1	11	-12.37	-20.59	--	--	3.29	10.46	--
12	9.0	12	-8.41	-16.86	--	--	11.96	20.23	--
13	10.9	13	-2.74	-9.53	--	--	26.78	31.16	--
14	13.1	14	0.00	0.00	--	--	38.99	38.64	--

CHINOOK:

NO.	HPD1	JUVENILE		SPAWNING		INCUBATION			
		NO.	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD-TRANS
1	-57.44	1	-58.73	-50.03	--	--	--	--	--
2	-49.52	2	-38.89	-38.58	--	--	--	--	--
3	-42.62	3	-31.22	-33.97	--	--	--	--	--
4	-42.09	4	-30.69	-33.64	--	--	--	--	--
5	-41.91	5	-29.63	-32.98	--	--	--	--	--
6	-38.37	6	-24.34	-29.56	--	--	--	--	--
7	-37.46	7	-22.22	-28.13	--	--	--	--	--
8	-35.37	8	-21.96	-27.94	--	--	--	--	--
9	-32.50	9	-21.69	-27.76	--	--	--	--	--
10	-23.35	10	-19.31	-26.07	--	--	--	--	--
11	-12.93	11	-17.72	-24.90	--	--	--	--	--
12	-7.27	12	-14.55	-22.42	--	--	--	--	--
13	1.53	13	-5.56	-13.63	--	--	--	--	--
14	11.59	14	0.00	0.00	--	--	--	--	--

RAINBOW:

NO.	IPD	ADULT		JUVENILE		SPAWNING		INCUBATION	
		NO.	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS
1	-50.30	1	-50.94	-94.69	-76.68	--	--	-76.17	-60.78
2	-45.92	2	-42.66	-80.82	-64.03	--	--	-70.87	-57.34
3	-33.91	3	-35.61	-67.37	-55.17	--	--	-60.38	-50.99
4	-33.69	4	-35.46	-67.02	-54.95	--	--	-60.12	-50.84
5	-33.05	5	-35.05	-66.31	-54.52	--	--	-59.56	-50.51
6	-31.55	6	-34.17	-57.25	-49.12	--	--	-53.48	-47.00
7	-30.47	7	-33.51	-55.20	-47.99	--	--	-52.66	-46.53
8	-26.18	8	-30.77	-52.09	-46.20	--	--	-49.04	-44.45
9	-20.60	9	-26.99	-47.91	-43.80	--	--	-46.20	-41.67
10	-7.08	10	-15.43	-41.83	-40.30	--	--	-29.16	-32.68
11	-3.86	11	-11.33	-35.04	-35.09	--	--	-21.48	-27.61
12	-2.15	12	-8.42	-30.93	-28.61	--	--	-15.66	-23.21
13	-0.64	13	-4.66	-8.35	-16.80	--	--	-6.31	-14.55
14	0.00	14	0.00	0.00	0.00	--	--	0.00	0.00

IPDMPD
 STREAM: ALLISON CREEK

MICROFILMED

MAR 03 1988

Table 5 Cont.

IFPMPD
 STREAM: ALLISON CREEK
 MONTH: JULY
 50% EXCEEDANCE: 15.6 CFS
 MPD FORMULA: MPD = (3 STEELHEAD J+) + (CHINOOK J+) + (RAINBOW A+J+) /10

NO.	FLOW	WINTER STEELHEAD				INCUBATION			
		SPawning		Incubation		SPawning		Incubation	
NO.	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD
1	2.8	-74.03	-59.37	-	-73.50	-59.02	-	-59.02	-
2	3.3	-55.89	-48.38	-	-69.23	-56.31	-	-56.31	-
3	3.8	-45.82	-42.60	-	-58.88	-50.12	-	-50.12	-
4	4.0	-44.16	-41.64	-	-58.23	-49.74	-	-49.74	-
5	4.4	-44.16	-41.64	-	-58.23	-49.74	-	-49.74	-
6	5.0	-39.32	-38.83	-	-52.65	-46.32	-	-46.32	-
7	5.7	-37.26	-37.62	-	-51.96	-46.13	-	-46.13	-
8	6.0	-34.08	-35.72	-	-48.72	-44.27	-	-44.27	-
9	6.4	-29.83	-33.10	-	-41.42	-41.80	-	-41.80	-
10	7.2	-18.14	-25.21	-	-32.54	-34.78	-	-34.78	-
11	8.1	-12.37	-20.59	-	-25.69	-30.45	-	-30.45	-
12	9.0	-8.41	-16.86	-	-19.45	-26.17	-	-26.17	-
13	10.9	-2.74	-9.53	-	-8.79	-17.25	-	-17.25	-
14	13.1	0.00	0.00	-	0.00	0.00	-	0.00	-

CHINOOK:

NO.	IPD	SPawning				INCUBATION			
		SPawning		Incubation		SPawning		Incubation	
NO.	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD
1	-59.36	-58.73	-50.03	-	-	-	-	-	-
2	-51.67	-38.89	-33.58	-	-	-	-	-	-
3	-45.39	-31.22	-33.97	-	-	-	-	-	-
4	-44.90	-30.69	-33.64	-	-	-	-	-	-
5	-44.72	-29.63	-32.98	-	-	-	-	-	-
6	-41.59	-24.34	-29.56	-	-	-	-	-	-
7	-40.74	-22.22	-23.15	-	-	-	-	-	-
8	-38.93	-21.96	-27.76	-	-	-	-	-	-
9	-36.49	-19.31	-26.07	-	-	-	-	-	-
10	-29.44	-17.72	-24.90	-	-	-	-	-	-
11	-25.21	-14.53	-22.42	-	-	-	-	-	-
12	-21.18	-13.56	-13.63	-	-	-	-	-	-
13	-12.99	0.00	0.00	-	-	-	-	-	-
14	0.10	0.00	0.00	-	-	-	-	-	-

RAINBOW:

NO.	IPD	SPawning				INCUBATION			
		SPawning		Incubation		SPawning		Incubation	
NO.	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD
1	-60.30	-50.94	-94.69	-76.68	-	-	-76.16	-60.77	-
2	-45.82	-42.66	-80.82	-64.03	-	-	-70.86	-57.33	-
3	-33.91	-39.61	-67.37	-55.17	-	-	-60.37	-50.98	-
4	-33.69	-35.46	-67.02	-54.95	-	-	-60.10	-50.83	-
5	-33.05	-35.09	-60.31	-54.52	-	-	-59.35	-50.50	-
6	-31.55	-34.17	-57.25	-49.17	-	-	-53.47	-46.99	-
7	-30.47	-33.51	-55.20	-47.99	-	-	-52.65	-46.52	-
8	-26.18	-30.71	-52.09	-46.20	-	-	-49.02	-44.44	-
9	-20.60	-26.99	-47.91	-43.60	-	-	-45.18	-41.66	-
10	-7.08	-15.45	-41.85	-40.30	-	-	-25.14	-32.67	-
11	-3.86	-11.33	-33.02	-35.09	-	-	-21.45	-27.59	-
12	-3.15	-3.45	-21.93	-26.61	-	-	-15.65	-23.29	-
13	-0.64	-1.60	-3.35	-16.80	-	-	-14.51	-14.51	-
14	0.00	1.00	1.00	0.00	-	-	0.03	1.04	-

MAR 03 1988

IPDMPD
 STREAM: ALLISON CREEK
 MONTH: AUGUST 1-15
 50% EXCEEDANCE: 7 CFS
 MPD FORMULA: MPD = (3 STEELHEAD J+I) + (CHINOOK J+I) /10
 + (RAINBOW R+J+I) /10

WINTER STEELHEAD									
NO.	FLOW	JUVENILE				SPAWNING			
		NO.	IPD	IPD-TRANS	IPD	NO.	IPD	IPD-TRANS	IPD
1	2.8	1	-67.10	-59.00	--	1	-58.92	-50.14	-50.14
2	3.3	2	-44.11	-41.62	--	2	-52.30	-46.32	-46.32
3	3.8	3	-31.35	-34.05	--	3	-36.25	-37.02	-37.02
4	4.0	4	-29.24	-32.74	--	4	-35.23	-36.41	-36.41
5	4.4	5	-29.24	-32.74	--	5	-36.41	-36.41	-36.41
6	5.0	6	-23.11	-28.73	--	6	-26.58	-31.04	-31.04
7	5.7	7	-20.51	-26.93	--	7	-25.52	-30.34	-30.34
8	6.0	8	-16.48	-23.95	--	8	-20.49	-26.92	-26.92
9	6.4	9	-11.09	-19.45	--	9	-15.82	-21.83	-21.83
10	*7.2	10	3.72	11.12	--	10	4.59	12.37	12.37
11	8.1	11	11.03	19.40	--	11	15.22	22.97	22.97
12	9.0	12	16.05	23.61	--	12	24.89	29.93	29.93
13	10.9	13	23.23	28.82	--	13	41.42	40.06	40.06
14	13.1	14	26.70	31.12	--	14	55.05	47.90	47.90

CHINOOK									
NO.	MPD1	JUVENILE				SPAWNING			
		NO.	IPD	IPD-TRANS	IPD	NO.	IPD	IPD-TRANS	IPD
1	-53.31	1	-48.00	-43.85	--	1	--	--	--
2	-43.47	2	-23.00	-28.66	--	2	--	--	--
3	-34.58	3	-13.33	-21.42	--	3	--	--	--
4	-33.87	4	-12.67	-20.85	--	4	--	--	--
5	-33.59	5	-11.33	-19.67	--	5	--	--	--
6	-28.41	6	-4.67	-12.48	--	6	--	--	--
7	-26.82	7	-2.00	-8.13	--	7	--	--	--
8	-23.73	8	-1.67	-7.42	--	8	--	--	--
9	-19.08	9	-1.33	-6.63	--	9	--	--	--
10	11.22	10	1.67	7.42	--	10	--	--	--
11	20.35	11	3.67	11.04	--	11	--	--	--
12	26.18	12	7.67	16.07	--	12	--	--	--
13	34.27	13	19.00	25.84	--	13	--	--	--
14	39.32	14	26.00	30.66	--	14	--	--	--

RAINBOW									
NO.	IPD	ROULET				SPAWNING			
		NO.	IPD	IPD-TRANS	IPD	NO.	IPD	IPD-TRANS	IPD
1	-55.64	1	-43.24	-90.64	-72.18	1	-64.47	-53.41	-53.41
2	-39.57	2	-33.96	-60.17	-54.43	2	-56.58	-48.78	-48.78
3	-26.14	3	-30.75	-42.45	-40.66	3	-40.94	-39.78	-39.78
4	-25.90	4	-30.59	-41.82	-40.29	4	-39.55	-39.55	-39.55
5	-25.18	5	-30.12	-40.57	-39.57	5	-39.72	-39.07	-39.07
6	-23.50	6	-29.00	-24.59	-29.73	6	-30.65	-33.62	-33.62
7	-22.30	7	-29.16	-27.26	-27.26	7	-32.43	-32.86	-32.86
8	-17.51	8	-24.72	-15.46	-23.17	8	-24.03	-29.35	-29.35
9	-11.27	9	-19.62	-8.11	-16.55	9	-16.81	-24.21	-24.21
10	3.84	10	11.30	7.62	9.72	10	5.60	13.69	13.69
11	7.43	11	15.82	13.10	15.18	11	17.06	24.39	24.39
12	9.35	12	17.81	18.10	16.84	12	25.73	30.48	30.48
13	11.03	13	19.40	21.75	19.94	13	35.67	39.04	39.04
14	11.75	14	20.02	20.94	20.94	14	49.07	44.47	44.47

Table 5 Con't

IPOND
STREAM: ALLISON CREEK
MONTH: AUGUST 16-31
502 EXCEEDANCE : 7 CFS
MPD FORMULA: MPD = (3 STEELHEAD J+I) + (CHINOOK J+S+I)
+ (RAINBOW R+J+I) /12

WINTER STEELHEAD											
JUVENILE			SPAWNING			INCUBATION					
NO.	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD
1	-67.10	-55.00	--	--	--	--	-58.92	-50.14	--	--	--
2	-44.11	-41.62	--	--	--	--	-52.30	-46.32	--	--	--
3	-31.35	-34.05	--	--	--	--	-36.25	-37.02	--	--	--
4	-29.24	-32.74	--	--	--	--	-35.23	-36.41	--	--	--
5	-29.24	-32.74	--	--	--	--	-35.23	-36.41	--	--	--
6	-23.11	-28.73	--	--	--	--	-26.58	-31.04	--	--	--
7	-20.51	-26.93	--	--	--	--	-25.52	-30.34	--	--	--
8	-16.48	-23.95	--	--	--	--	-20.49	-26.92	--	--	--
9	-11.09	-19.45	--	--	--	--	-13.82	-21.83	--	--	--
10	3.72	11.12	--	--	--	--	4.59	12.37	--	--	--
11	11.05	19.40	--	--	--	--	15.22	22.97	--	--	--
12	16.05	23.61	--	--	--	--	24.89	29.93	--	--	--
13	23.25	28.82	--	--	--	--	41.42	40.06	--	--	--
14	26.70	31.12	--	--	--	--	55.05	47.90	--	--	--

CHINOOK:

CHINOOK											
JUVENILE			SPAWNING			INCUBATION					
NO.	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD
1	-48.00	-43.85	-65.52	-67.63	-67.73	-55.38	--	--	--	--	--
2	-23.00	-28.66	-60.64	-51.14	-54.51	-47.59	--	--	--	--	--
3	-13.35	-21.42	-46.32	-42.89	-43.71	-41.39	--	--	--	--	--
4	-12.67	-20.85	-45.84	-42.61	-43.24	-41.12	--	--	--	--	--
5	-11.35	-19.67	-44.80	-42.02	-42.30	-40.57	--	--	--	--	--
6	-4.67	-12.48	-25.36	-30.24	-27.44	-31.59	--	--	--	--	--
7	-2.00	-8.13	-23.36	-28.90	-26.57	-31.03	--	--	--	--	--
8	-1.67	-7.42	-17.76	-24.92	-21.64	-27.72	--	--	--	--	--
9	-1.35	-6.63	-10.24	-16.66	-15.06	-22.84	--	--	--	--	--
10	1.67	7.42	3.44	10.69	5.00	12.92	--	--	--	--	--
11	3.67	11.04	6.16	14.37	15.46	23.16	--	--	--	--	--
12	7.67	16.07	5.20	13.18	21.03	27.30	--	--	--	--	--
13	19.00	25.84	19.44	26.16	29.89	33.14	--	--	--	--	--
14	26.00	30.66	25.04	30.03	34.38	35.90	--	--	--	--	--

RAINBOW:

RAINBOW											
ADULT			JUVENILE			SPAWNING			INCUBATION		
NO.	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD
1	-55.64	-48.24	-90.64	-72.18	--	--	-64.47	-53.41	--	--	--
2	-39.57	-38.96	-60.17	-54.43	--	--	-56.58	-48.78	--	--	--
3	-26.14	-30.75	-42.45	-40.66	--	--	-40.94	-39.78	--	--	--
4	-25.90	-30.59	-41.82	-40.29	--	--	-40.85	-39.55	--	--	--
5	-25.18	-30.12	-40.57	-39.67	--	--	-39.72	-39.07	--	--	--
6	-23.50	-29.00	-24.55	-29.73	--	--	-30.65	-33.62	--	--	--
7	-22.50	-28.16	-29.97	-27.76	--	--	-29.43	-32.86	--	--	--
8	-17.51	-24.73	-15.46	-23.17	--	--	-24.03	-29.35	--	--	--
9	-11.27	-19.62	-9.11	-16.45	--	--	-16.81	-24.21	--	--	--
10	3.64	11.30	2.62	9.32	--	--	5.60	13.69	--	--	--
11	7.43	15.82	13.10	25.18	--	--	17.06	24.39	--	--	--
12	9.35	17.81	35.96	36.84	--	--	25.73	30.48	--	--	--
13	11.03	19.40	61.67	51.75	--	--	39.67	39.04	--	--	--
14	11.75	20.02	76.40	50.94	--	--	49.07	44.47	--	--	--

MAR 03 1988

IPDMPD
 STREAM: ALLISON CREEK
 MONTH: SEPTEMBER 1-15
 502 EXCEEDANCE : 4.6 CFS
 MPD FORMULA: MPD = [3 (STEELHEAD J+1) + (CHINOOK J+5+1)
 + (RAINBOW R+J+1)] / 12

WINTER STEELHEAD									
NO.	FLOW	JUVENILE		SPAWNING		INCUBATION		IPD	IPD-TRANS
		IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS		
1	2.8	-54.81	-47.76	--	--	-39.29	-38.81	--	--
2	3.3	-23.23	-28.82	--	--	-29.50	-32.90	--	--
3	3.8	-5.70	-13.82	--	--	-5.79	-13.92	--	--
4	4.0	-2.81	-9.65	--	--	-4.29	-11.95	--	--
5	4.4	-2.81	-9.65	--	--	-4.29	-11.95	--	--
6	5.0	5.62	13.71	--	--	8.50	16.95	--	--
7	5.7	9.19	17.65	--	--	10.07	18.50	--	--
8	6.0	14.72	22.56	--	--	17.50	24.73	--	--
9	6.4	22.13	28.06	--	--	27.36	31.94	--	--
10	7.2	42.47	40.67	--	--	54.57	47.62	--	--
11	8.1	52.51	46.44	--	--	70.29	56.97	--	--
12	9.0	59.40	50.42	--	--	84.57	66.87	--	--
13	10.9	69.28	56.34	--	--	109.00	122.67	--	--
14	13.1	74.04	59.37	--	--	129.14	0.00	--	--

CHINOOK

NO.	MPD1	JUVENILE		SPAWNING		INCUBATION		IPD	IPD-TRANS
		IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS		
1	-46.23	-42.86	-40.89	-76.52	-61.02	-48.50	-44.14	--	--
2	-31.75	-15.38	-23.09	-36.19	-36.98	-27.41	-31.57	--	--
3	-14.83	-4.76	-12.60	-12.97	-21.11	-10.17	-18.60	--	--
4	-12.90	-4.03	-11.56	-12.19	-20.44	-9.42	-17.88	--	--
5	-11.93	-2.56	-9.21	-10.51	-18.91	-7.92	-16.35	--	--
6	17.03	4.76	12.60	21.01	27.28	15.79	23.42	--	--
7	19.71	7.69	16.10	24.25	29.50	17.18	24.49	--	--
8	28.14	8.06	16.45	33.33	35.26	25.05	30.04	--	--
9	31.17	8.42	16.87	45.53	42.43	38.55	36.60	--	--
10	44.85	11.72	20.02	67.70	67.70	67.56	66.28	--	--
11	52.49	13.92	21.91	72.11	58.12	84.26	66.63	--	--
12	64.12	18.32	25.34	70.56	57.14	93.15	74.83	--	--
13	69.73	30.77	33.65	75.40	75.40	107.28	112.35	--	--
14	21.71	38.46	38.32	102.72	0.00	114.45	0.00	--	--

RAINBOW

NO.	IPD	ADULT		JUVENILE		SPAWNING		INCUBATION	
		IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD-TRANS
1	-41.08	-39.84	-65.55	-67.66	--	--	-43.88	-41.48	--
2	-19.75	-26.36	-47.76	-43.73	--	--	-31.41	-34.09	--
3	-1.91	-7.95	-11.16	-19.53	--	--	-6.70	-15.00	--
4	-1.59	-7.25	-10.21	-18.64	--	--	-6.06	-14.28	--
5	-0.64	-4.56	-3.29	-16.73	--	--	-4.77	-12.62	--
6	1.59	7.25	19.36	23.87	--	--	9.55	18.00	--
7	3.18	10.26	21.97	27.95	--	--	11.47	19.80	--
8	9.55	18.00	30.44	33.49	--	--	20.02	26.58	--
9	17.83	24.96	41.81	40.29	--	--	31.41	34.09	--
10	37.90	38.06	53.36	49.63	--	--	66.82	54.83	--
11	42.68	40.79	62.31	65.10	--	--	84.91	67.14	--
12	45.22	42.26	104.83	134.72	--	--	96.61	83.24	--
13	47.45	43.54	149.51	146.21	--	--	120.63	126.50	--
14	48.41	44.05	172.25	0.00	--	--	135.49	0.00	--

RECEIVED

MAR 03 1988

Table 5 Con't

IPDPO
 STREAM: ALLISON CREEK
 MONTH: SEPTEMBER 15-30
 50% EXCEEDANCE : 4.6 CFS
 MPD FORMULA: MPD = (3 STEELHEAD J) + (CHINOOK J*5+1)
 + (RAINBOW R*J) /11

NO.	FLOW	WINTER STEELHEAD				INCUBATION			
		NO.	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD
1	2.6	1	-54.81	-47.76	--	--	--	--	--
2	3.3	2	-23.23	-28.82	--	--	--	--	--
3	3.8	3	-5.70	-13.82	--	--	--	--	--
4	4.0	4	-2.81	-9.65	--	--	--	--	--
5	4.4	5	-2.81	-9.65	--	--	--	--	--
6	4.5.04	6	5.62	13.71	--	--	--	--	--
7	5.7	7	9.19	17.65	--	--	--	--	--
8	6.0	8	14.72	22.56	--	--	--	--	--
9	6.4	9	22.13	28.06	--	--	--	--	--
10	7.2	10	42.47	40.67	--	--	--	--	--
11	8.1	11	52.51	46.44	--	--	--	--	--
12	9.0	12	59.40	50.42	--	--	--	--	--
13	10.9	13	69.26	56.34	--	--	--	--	--
14	13.1	14	74.04	59.37	--	--	--	--	--

CHINOOK

NO.	MPD1	JUVENILE				SPRINGER				INCUBATION			
		NO.	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD
1	-36.08	1	-42.86	-40.89	-76.52	-61.02	-48.50	-44.14	-44.14	-44.14	-44.14	-44.14	-44.14
2	-22.56	2	-15.38	-23.09	-36.19	-26.98	-27.41	-31.57	-31.57	-31.57	-31.57	-31.57	-31.57
3	-11.02	3	-4.76	-12.60	-12.97	-21.11	-10.17	-16.60	-16.60	-16.60	-16.60	-16.60	-16.60
4	-9.52	4	-1.03	-11.96	-12.19	-20.44	-9.42	-17.88	-17.88	-17.88	-17.88	-17.88	-17.88
5	-8.61	5	-2.56	-9.21	-10.51	-18.91	-7.92	-16.35	-16.35	-16.35	-16.35	-16.35	-16.35
6	12.32	6	4.76	12.60	21.01	27.26	15.79	23.42	23.42	23.42	23.42	23.42	23.42
7	14.66	7	7.69	16.10	24.25	29.50	17.18	24.49	24.49	24.49	24.49	24.49	24.49
8	18.27	8	8.06	16.48	33.33	35.26	25.05	30.04	30.04	30.04	30.04	30.04	30.04
9	22.30	9	8.42	16.87	45.53	42.43	36.55	36.55	36.55	36.55	36.55	36.55	36.55
10	30.95	10	11.72	20.02	67.70	55.37	67.56	58.28	58.28	58.28	58.28	58.28	58.28
11	35.62	11	13.92	21.91	72.11	58.12	84.26	66.03	66.03	66.03	66.03	66.03	66.03
12	44.14	12	18.32	25.34	70.56	57.14	93.15	74.83	74.83	74.83	74.83	74.83	74.83
13	52.93	13	30.77	33.69	93.64	75.40	107.28	112.35	112.35	112.35	112.35	112.35	112.35
14	23.66	14	38.46	38.33	102.72	0.00	114.45	0.00	0.00	0.00	0.00	0.00	0.00

RAINBOW

NO.	IPD	ROULF				JUVENILE				SPRINGER				INCUBATION			
		IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD	IPD-TRANS
1	-41.08	-39.86	-85.53	-67.66	--	--	--	--	--	--	--	--	--	--	--	--	--
2	-19.75	-26.38	-47.76	-43.73	--	--	--	--	--	--	--	--	--	--	--	--	--
3	-1.91	-7.92	-11.16	-19.53	--	--	--	--	--	--	--	--	--	--	--	--	--
4	-1.59	-7.23	-10.21	-18.64	--	--	--	--	--	--	--	--	--	--	--	--	--
5	-0.64	-4.56	-3.25	-16.73	--	--	--	--	--	--	--	--	--	--	--	--	--
6	1.59	7.23	16.36	23.87	--	--	--	--	--	--	--	--	--	--	--	--	--
7	3.18	10.26	21.97	32.95	--	--	--	--	--	--	--	--	--	--	--	--	--
8	9.55	18.06	30.44	33.49	--	--	--	--	--	--	--	--	--	--	--	--	--
9	17.83	24.96	41.81	40.29	--	--	--	--	--	--	--	--	--	--	--	--	--
10	37.90	38.06	58.36	49.83	--	--	--	--	--	--	--	--	--	--	--	--	--
11	42.66	40.79	82.27	65.10	--	--	--	--	--	--	--	--	--	--	--	--	--
12	45.22	41.26	104.82	124.72	--	--	--	--	--	--	--	--	--	--	--	--	--
13	47.45	43.54	149.52	148.21	--	--	--	--	--	--	--	--	--	--	--	--	--
14	48.41	44.05	172.25	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--

MAR 03 1988

IPDPD
 STREAM: ALLISON CREEK
 MONTH: OCTOBER 1-15
 50% EXCEEDANCE : 4.3 CFS
 MPD FORMULA: MPD = (3 STEELHEAD J) + (CHINOOK J*5+1)
 + (RAINBOW R*J) /11

WINTER STEELHEAD			
NO.	FLOW	JUVENILE	
		IPD	IPD-TRANS
1	2.8	-53.26	-46.87
2	3.3	-20.60	-26.99
3	3.8	-2.46	-9.03
4	4.0	0.53	4.17
5	*4.4	0.53	4.17
6	5.0	9.24	17.70
7	5.7	12.94	21.08
8	6.0	18.66	25.59
9	6.4	26.32	30.87
10	7.2	47.36	43.49
11	8.1	57.75	49.46
12	9.0	64.88	53.65
13	10.9	75.09	60.06
14	13.1	80.02	63.45

CHINOOK			
NO.	MPD1	JUVENILE	
		IPD	IPD-TRANS
1	-35.16	-40.46	-39.50
2	-20.65	-11.83	-20.12
3	-5.84	-0.76	-5.01
4	-1.17	0.00	0.00
5	3.09	1.53	7.10
6	16.28	9.16	17.62
7	18.33	12.21	20.46
8	21.76	12.60	20.79
9	25.82	12.98	21.11
10	35.22	16.41	23.90
11	44.16	18.70	25.62
12	52.30	23.28	28.85
13	61.90	36.26	37.02
14	75.18	44.27	41.71

RAINBOW			
NO.	IPD	JUVENILE	
		IPD	IPD-TRANS
1	-40.51	-84.18	-66.56
2	-18.97	-25.82	-40.88
3	-0.96	-5.64	-9.53
4	-0.64	-1.69	-7.46
5	0.32	3.22	3.72
6	2.57	9.23	21.43
7	4.18	11.80	35.54
8	10.61	19.01	40.88
9	18.97	25.82	48.03
10	39.23	38.76	58.96
11	44.05	41.56	66.28
12	46.62	43.04	73.42
13	48.67	44.34	82.72
14	49.84	44.91	88.85

MICROFILMED
 MAR 03 1988

Table 5 Con't

IPOMPO
 STREAM: ALLISON CREEK
 MONTH: OCTOBER 16-31
 502 EXCEEDANCE : 4.3 CFS
 MPD FORMULA: MPD = (3 (STEELHEAD J) + (CHINOOK J+J) + (RAINBOW R+J) / 7

NO.	FLOW	WINTER STEELHEAD			
		SPawning		Incubation	
NO.	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD-TRANS
1	2.6	-53.26	-46.87	--	--
2	3.3	-20.60	-26.99	--	--
3	3.8	-2.46	-9.03	--	--
4	4.0	0.53	4.17	--	--
5	*4.4	0.53	4.17	--	--
6	5.0	9.24	17.70	--	--
7	5.7	12.94	21.08	--	--
8	6.0	18.66	25.59	--	--
9	6.4	26.32	30.87	--	--
10	7.2	47.36	43.49	--	--
11	8.1	57.75	49.46	--	--
12	9.0	64.88	53.63	--	--
13	10.9	75.09	60.06	--	--
14	13.1	80.02	63.45	--	--

CHINOOK:

NO.	IPD	CHINOOK			
		SPawning		Incubation	
NO.	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD-TRANS
1	-46.81	-40.46	-39.50	--	--
2	-27.85	-11.83	-20.12	--	--
3	-7.93	-0.76	-5.01	--	--
4	-0.85	0.00	0.00	--	--
5	4.32	1.52	7.10	--	--
6	20.34	9.16	17.62	--	--
7	23.24	12.21	20.46	--	--
8	27.79	12.60	20.75	--	--
9	33.04	12.96	21.11	--	--
10	45.36	15.41	23.90	--	--
11	58.70	18.70	25.62	--	--
12	71.27	23.26	28.85	--	--
13	79.89	35.26	37.02	--	--
14	39.57	44.27	41.71	--	--

RAINBOW:

NO.	IPD	RAINBOW			
		SPawning		Incubation	
NO.	IPD	IPD-TRANS	IPD	IPD-TRANS	IPD-TRANS
1	-40.51	-39.53	-84.16	-66.56	--
2	-18.97	-25.82	-42.83	-40.88	--
3	-0.96	-3.64	-2.74	-9.53	--
4	-0.64	-4.60	-1.65	-7.46	--
5	0.32	3.22	0.42	2.72	--
6	2.87	3.22	27.42	31.58	--
7	4.18	11.80	33.54	35.39	--
8	10.61	19.01	42.83	40.83	--
9	18.97	25.82	55.21	48.03	--
10	39.23	33.76	73.42	58.96	--
11	44.05	41.56	99.56	80.28	--
12	46.62	43.04	129.75	148.83	--
13	48.87	44.36	173.21	172.08	--
14	49.84	44.91	193.10	0.00	--

MICROFILMED

MAR 03 1988

Table 5 Con't

IPDPD
 STREAM: ALLISON CREEK
 MONTH: NOVEMBER & DECEMBER
 50% EXCEEDANCE : 4.5 CFS
 IPD FORMULA: IPD = I3 (STEELHEAD J) + (CHINOOK J+I)
 + (RAINBOW R+J) / 7

MINTER STEELHEAD				
NO.	FLOW	NO.	IPD	IPD-TRANS
1	2.8	1	-54.18	-47.40
2	3.3	2	-22.17	-28.09
3	3.8	3	-14.40	-12.11
4	4.0	4	-1.47	-6.96
5	4.4	5	-1.47	-6.96
6	*5.0	6	-7.08	-15.43
7	5.7	7	10.70	19.09
8	6.0	8	10.31	23.82
9	6.4	9	23.81	29.21
10	7.2	10	44.43	41.80
11	8.1	11	54.62	47.65
12	9.0	12	61.60	51.71
13	10.9	13	71.61	57.81
14	13.1	14	76.45	60.97

CHINOOK:

CHINOOK:				
NO.	IPD1	NO.	IPD	IPD-TRANS
1	-47.28	1	-42.01	-40.40
2	-28.87	2	-14.13	-22.06
3	-11.14	3	-3.35	-10.54
4	-6.21	4	-2.60	-9.28
5	-5.48	5	-1.12	-6.06
6	18.18	6	6.32	14.56
7	21.31	7	9.29	17.75
8	26.00	8	9.67	18.11
9	31.29	9	10.04	18.47
10	43.50	10	13.38	21.46
11	55.46	11	15.61	23.27
12	69.44	12	20.07	26.62
13	76.34	13	32.71	34.89
14	89.11	14	40.72	39.54

RAINBOW:

RAINBOW:				
NO.	IPD	ADULT	IPD-TRANS	IPD
1	-10.89	1	-39.75	-84.91
2	-19.49	2	-20.23	-43.47
3	-1.60	3	-7.24	-15.61
4	-1.28	4	-2.43	-9.24
5	-0.32	5	-3.24	-11.86
6	1.92	6	7.96	27.65
7	3.51	7	10.80	31.54
8	9.90	8	18.54	36.22
9	18.21	9	25.24	43.90
10	38.34	10	39.26	53.96
11	43.13	11	41.05	71.89
12	45.69	12	42.53	141.10
13	47.92	13	45.81	156.65
14	48.88	14	44.36	184.31

MICROFILMED

MAR 03 1988

APPENDIX III

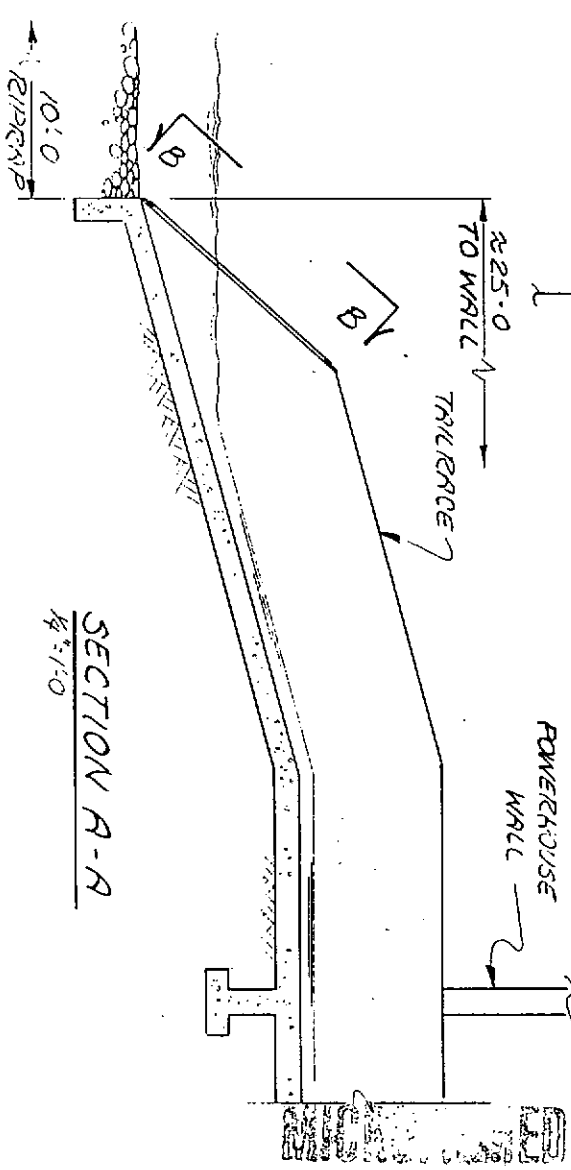
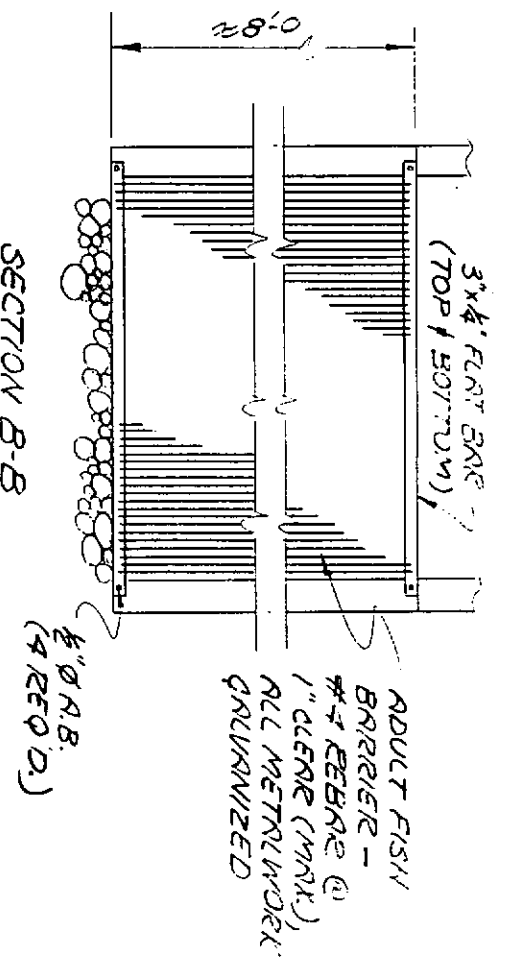
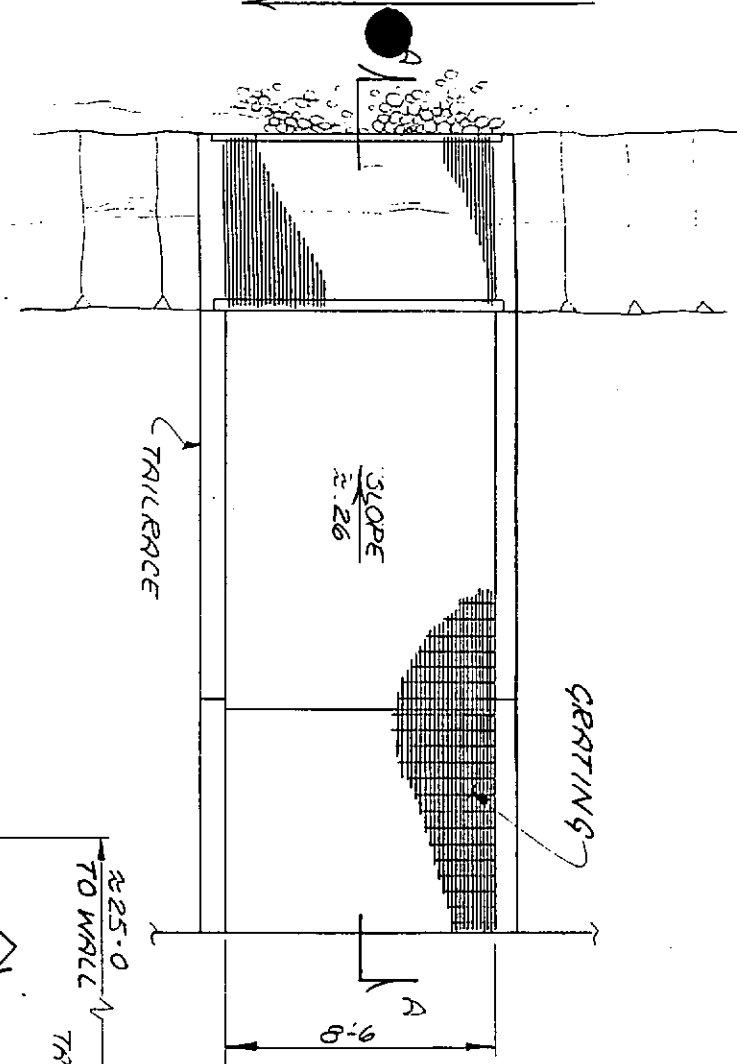
REVISED DRAWINGS

POWER TRANSMISSION DRAWINGS

REF FILMED

MAR 03 1988

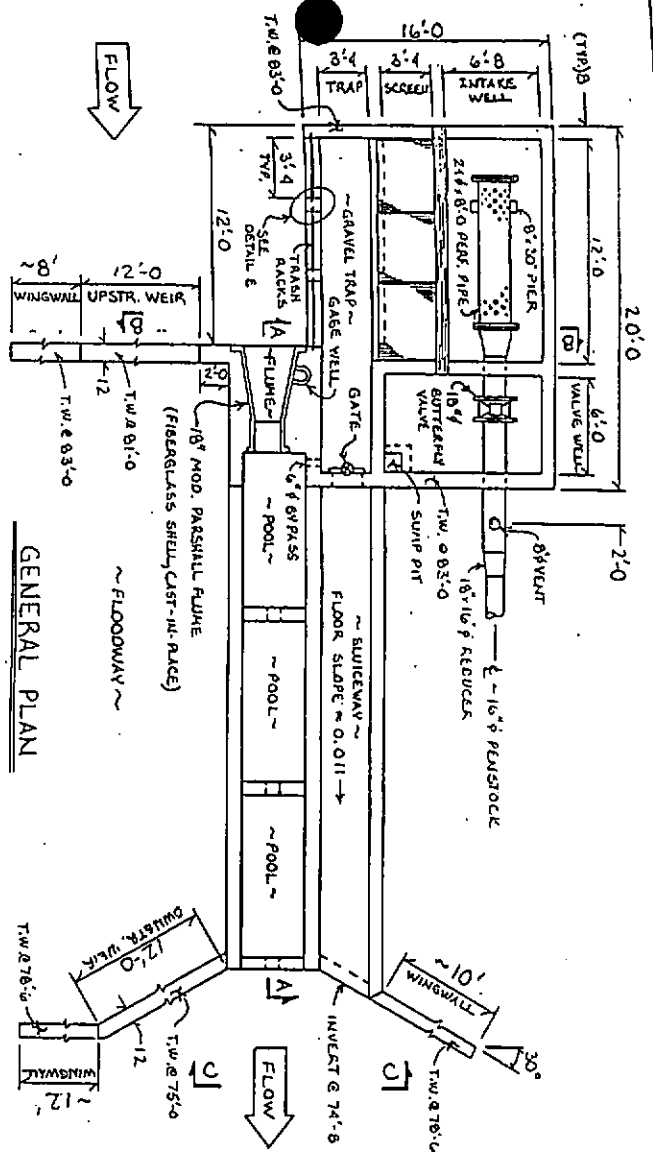
ALLISON CREEK

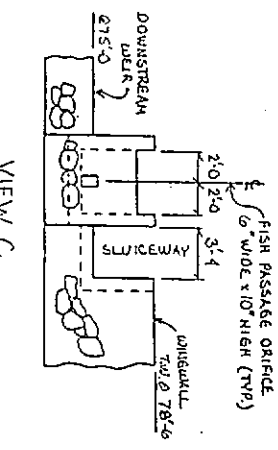
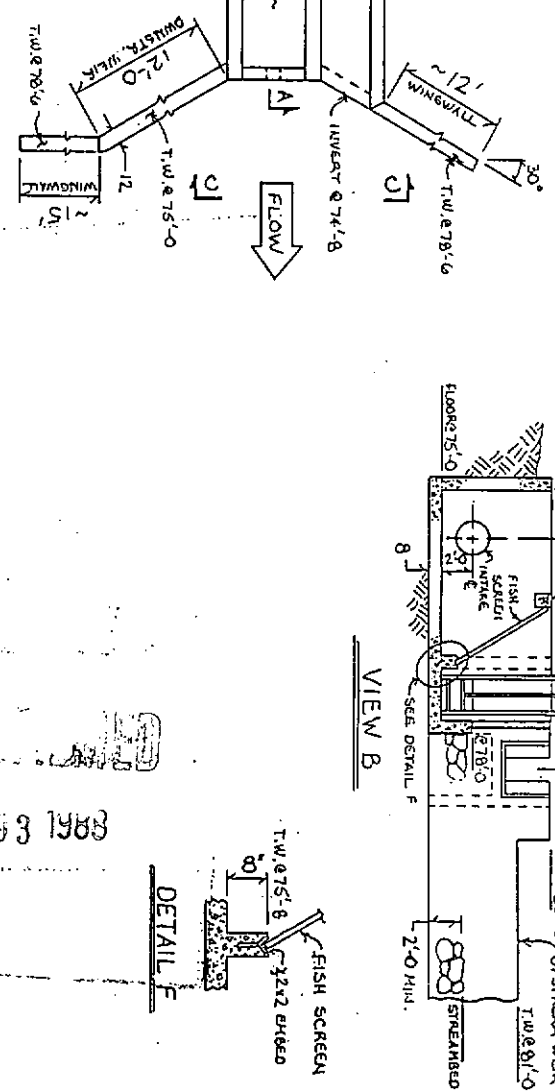


MAR 03 1988

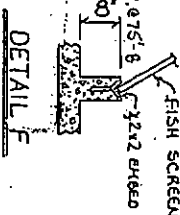
MYERS ENGINEERING COMPANY, P.A.
Consulting Engineers
750 WARM SPRINGS AVENUE
BOISE, IDAHO 83712
TELEPHONE: (208) 336-1435

—TAILRACE—
ALLISON CREEK
9/12/85





MAR-63 1988



THIS DRAWING IS PART OF THE APPLICATION FOR LICENSE MADE BY
THE UNDERSIGNED THIS 12TH DAY OF MARCH, 1965.
Charles L. Myers CARL L. MYERS, P.E.

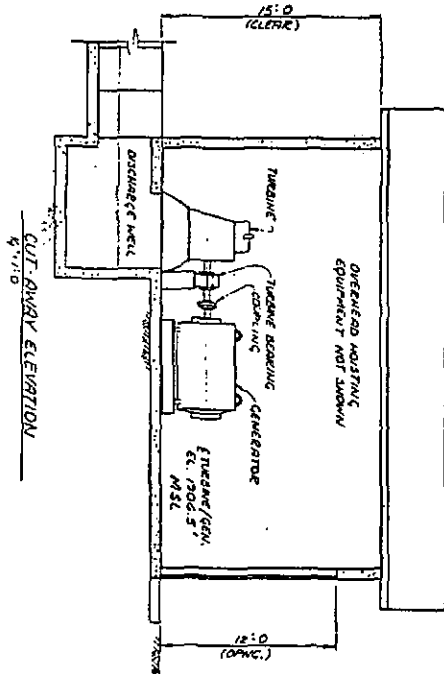
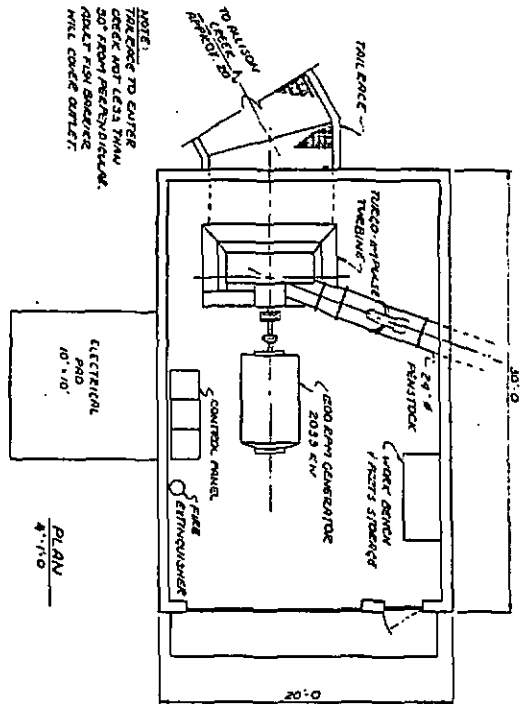
EXHIBIT F

MAIN FORK DIVERSION STRUCTURE DETAILS

ALLISON CREEK HYDROELECTRIC PROJECT

SCALE	MAYERS ENGINEERING COMPANY, P.A.	SHEET NO.
DRAWN BY	Consulting Engineers	
CHECKED BY	MEMPHIS, TENN 38101	
DATE	27-7-65	F-3

NOTE:
TAKING TO ENTER
DOCK AND REAR
DOCK FISH BOAT
WILL COVER OUTLET.



ADDITIONAL SECTIONS & DETAILS
TO BE PROVIDED WHEN COMPLETED

MAR 03 1988

PRELIMINARY
NOT FOR CONSTRUCTION

DATE	REVISION	BY	APP'D
10/1/87	1	W. J. HARRIS	
10/1/87	2	W. J. HARRIS	
10/1/87	3	W. J. HARRIS	
10/1/87	4	W. J. HARRIS	
10/1/87	5	W. J. HARRIS	
10/1/87	6	W. J. HARRIS	
10/1/87	7	W. J. HARRIS	
10/1/87	8	W. J. HARRIS	
10/1/87	9	W. J. HARRIS	
10/1/87	10	W. J. HARRIS	
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10/1/87	13	W. J. HARRIS	
10/1/87	14	W. J. HARRIS	
10/1/87	15	W. J. HARRIS	
10/1/87	16	W. J. HARRIS	
10/1/87	17	W. J. HARRIS	
10/1/87	18	W. J. HARRIS	
10/1/87	19	W. J. HARRIS	
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10/1/87	96	W. J. HARRIS	
10/1/87	97	W. J. HARRIS	
10/1/87	98	W. J. HARRIS	
10/1/87	99	W. J. HARRIS	
10/1/87	100	W. J. HARRIS	

ELECTRIC POWER TRANSMISSION PLAN
LOWER SALMON RIVER BASIN

Small hydroelectric projects proposed on tributaries of the lower Salmon River near Riggins, Idaho, require reconstruction of an existing transmission line plus some new line. Riggins and vicinity are presently served by Idaho Power Company over a 35-mile deadend distribution feeder (Line No. NWMS-041), operated at 34.5 kv between New Meadows, the northernmost point of Idaho Power's grid system, and Pollock, a distance of about 16 miles. At this point voltage is dropped to 25 kv for the remaining 19 miles to Riggins.

Service over this line is and always has been unsatisfactory. Until 1982 a sawmill with a connected load of 2500 kw was in operation at Riggins. Whenever the mill's large motors drew a load, voltage throughout the area fluctuated drastically (90 volts or less at a 110-v. outlet). All electric customers were damaged: flickering lights, burned-out motors, food spoilage from burned-out freezer motors, television burnouts, and all the other problems associated with a deadend service line. Nearly all of the Riggins area residents and businesses repeatedly petitioned Idaho Power for relief. Nothing was accomplished because there is nothing that can be done to substantially change the built-in limitations of a long deadend line under a heavy, variable load.

In 1982 the Riggins sawmill burned down and was closed. This reduced the voltage problems but also removed the only payroll in the area and caused serious economic distress that continues to the present time - high unemployment, loss of population, closed businesses, etc. Southern Idaho County (Riggins) is one of the most economically depressed areas in the State. Efforts have been made and are continuing to reestablish an industrial base at Riggins and restore the jobs so desperately needed. But the problem of unstable electric power remains and will continue until a solution is found. Two options are available:

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interconnect the Idaho Power system with the Washington Water Power/Bonneville Power grids at Grangeville (40 miles north of Riggins), or add generating capacity at the Riggins end of the existing deadend line. A third option would be a connection across the Hells Canyon National Recreation Area to Idaho Power's Hells Canyon dam. This is not considered feasible.

Even without the Riggins sawmill load, service to the Riggins area is not satisfactory. Surveys made in 1984 with a recording voltmeter showed unacceptable conditions, and about 90% of the residents again petitioned for improvements. The most viable solution is construction of new capacity at or near Riggins. Seventeen small hydroelectric sites have been identified on tributaries of the lower Salmon River, five of them east (upstream of Riggins) and 12 of them in the Little Salmon basin. These total up to about 75-mw capacity if developed to maximum levels per FERC's policies. The feasibility of this system is linked to sale of energy and capacity to the utility responsible for serving this corner of its franchised area, under rulings and orders of the Idaho Public Utility Commission implementing PURPA in this State. The plan requires the following changes in the existing transmission system:

1. The existing line between New Meadows (grid terminus) and Riggins is a service line, not a transmission line, and does not have the capacity to accept any significant new generation past that already committed (Projects 3503 and 4205). Therefore it is planned to replace this line in the same right-of-way with higher poles conductored for 69 kv and underbuilt for the existing 34.5/25-kv service line. The 69 kv matches the New Meadows loop voltage, and would be operated solely to

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MAR 03 1988

deliver new generation to the loop. Each new plant would include a 4.16/69-kv step-up transformer.

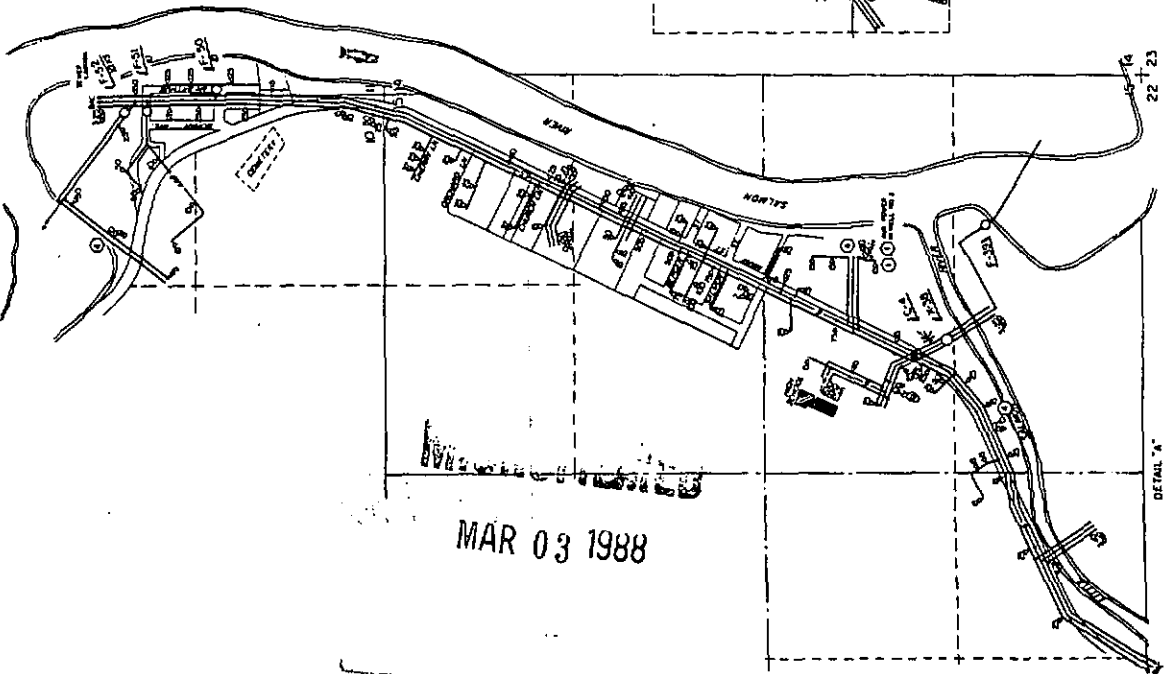
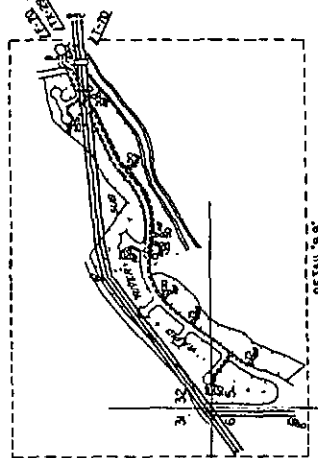
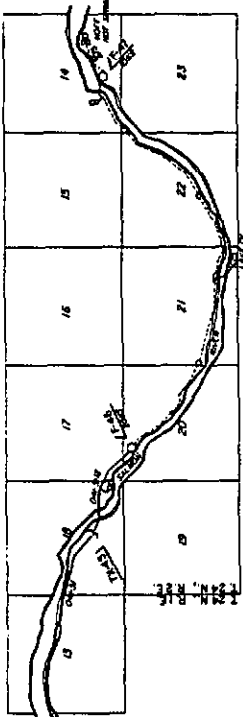
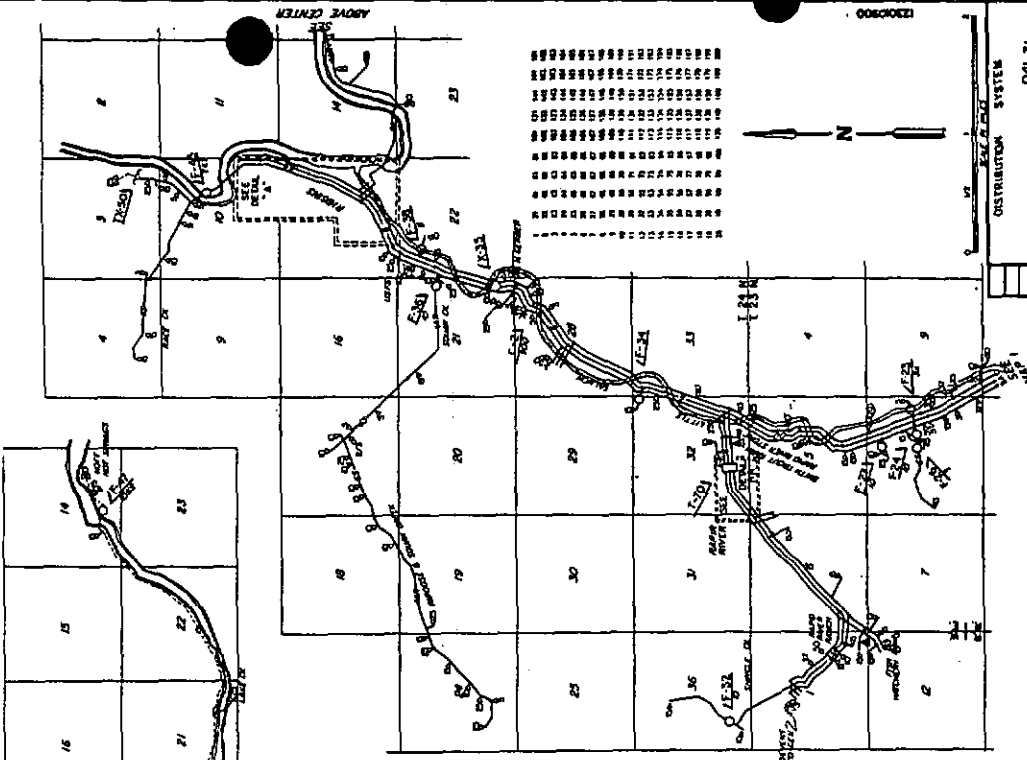
2. The five projects east of Riggins would be collected by a new 34.5-kv underground line and delivered to a new 25/34.5/69-kv substation at Riggins and connected to the above new 69-kv line. This would also be the switch point to connect a 25-kv tap to the existing 25-kv service line. Idaho Power has indicated its intention to upgrade this 25-kv section to 34.5 kv, in which case the new 34.5-kv line would switch direct to the service line. Metering would be at Riggins for the five east projects and at New Meadows for the others, with individual plant metering for revenue distribution.

An underground line east of Riggins was selected to avoid environmental problems. The cost of this line plus the Riggins-New Meadows rebuild would be paid by the five east projects - Nos. 7383 (Allison), 7378 (Elkhorn), 7899 (French), 7382 (Lake), and 7380 (Partridge), with proportional reimbursement as other projects are developed.

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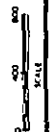
MAR 03 1988

Sheet	Map	Scale	Projection
C-1	1000	1" = 100'	NAD 83
C-2	1000	1" = 100'	NAD 83
C-3	1000	1" = 100'	NAD 83
C-4	1000	1" = 100'	NAD 83
C-5	1000	1" = 100'	NAD 83
C-6	1000	1" = 100'	NAD 83
C-7	1000	1" = 100'	NAD 83
C-8	1000	1" = 100'	NAD 83
C-9	1000	1" = 100'	NAD 83
C-10	1000	1" = 100'	NAD 83



MAR 03 1988

DETAIL "A"
RIGGINS



FOR FEEDER MAPS SEE MAP 1

- LEGEND
- CITY WELL
- CITY BOOSTER
- WATER STORAGE
- SEWER LIFT STA

DISTRIBUTION SYSTEM	
FEEDER MAP	NWMS-041-312
NEW MEADOWS - RIGGINS	
ISLAND POWER COMPANY	DATE: 04/17/88
SCALE: 2 inches = 1 mile	PROJECTION: NAD 83
DATE: 04/17/88	BY: 17
NO. 17	2 of 4

MAY 1985



FDR CONT. SEE
PAGE BELOW

FDA CONT. JZC
'MAP 2'



MAX FLOOD FAULT CURRENT

[illegible]

FEEDER MAP NYMS-041

NEW MEADOWS - RIGGINS

IDAHO POWER COMPANY 807.251.1000

APPROVED	24 D-18505
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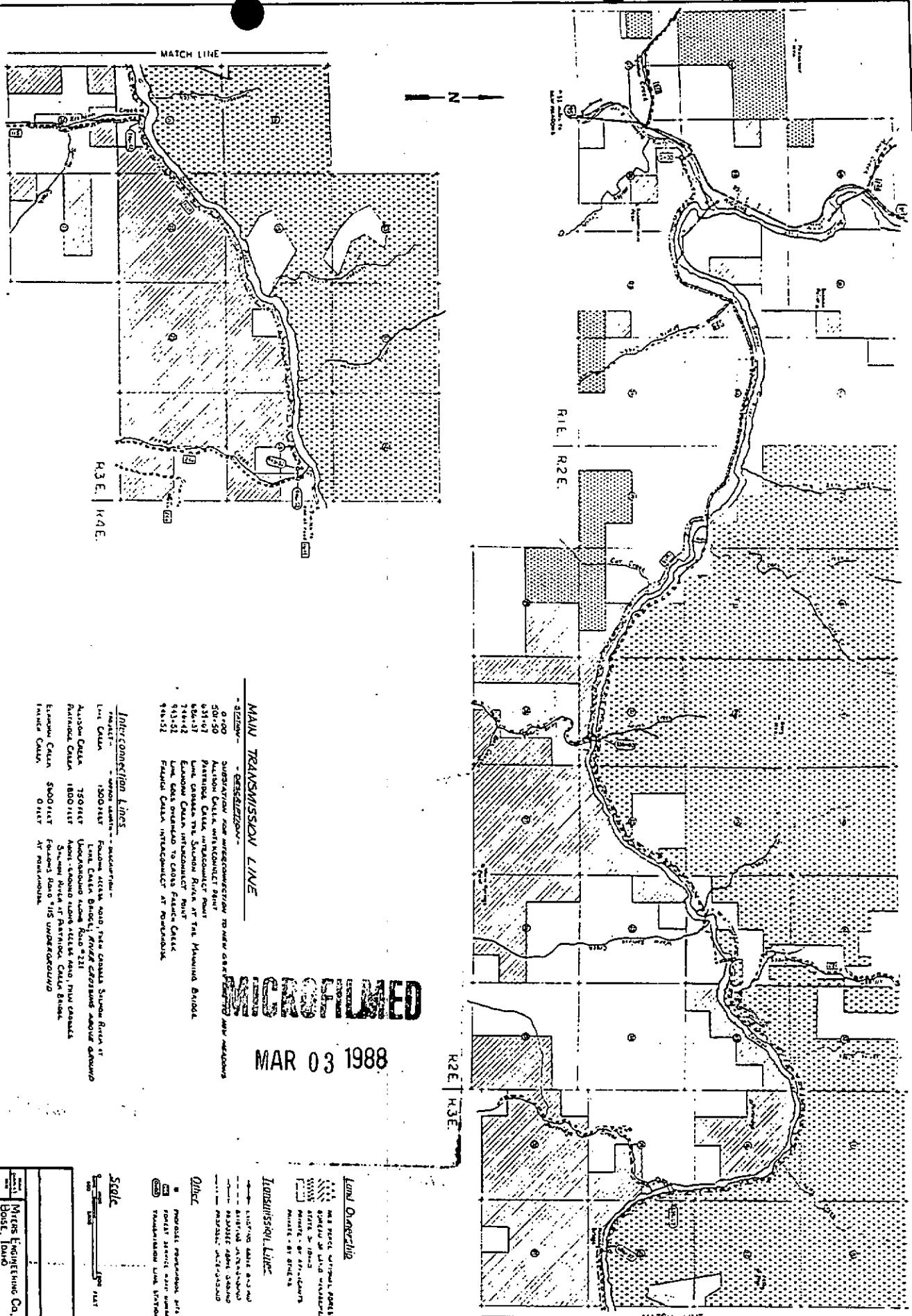
CH.		ent.	17	MADRID
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MAR 03 1988

SEE LEFT ABOVE

NWMS
SUB

Item	Size	Qd	Detail/Number
W-14	202000		ME 131 LV
ME-1	50		
1-2	2200		20/14.4 RV
1-4	817		20/14.4 RV



MAIN TRANSMISSION LINE

- 0.000 - SUBSTATION FOR INTERCONNECTION TO NEW YORK
- 50+50 - PATRICK CREEK INTERCONNECTOR POINT
- 63+07 - PATRICK CREEK INTERCONNECTOR POINT
- 66+37 - LINE CROSSING THE SAVANNAH RIVER AT THE PLANNING BRIDGE
- 74+42 - EASTMAN CREEK INTERCONNECTOR POINT
- 93+52 - LINE CLOSING TO CROSS PATRICK CREEK
- 94+52 - PATRICK CREEK INTERCONNECTOR AT PORTLAND

Interconnection Lines

- Line 1 - 1800 feet - From the north, near the Savannah River at
- Line 2 - 1800 feet - From the south, near the Savannah River at
- Line 3 - 1800 feet - From the east, near the Savannah River at
- Line 4 - 1800 feet - From the west, near the Savannah River at
- Line 5 - 1800 feet - From the north, near the Savannah River at
- Line 6 - 1800 feet - From the south, near the Savannah River at
- Line 7 - 1800 feet - From the east, near the Savannah River at
- Line 8 - 1800 feet - From the west, near the Savannah River at

NOT REPRODUCED

MAR 03 1988

Line Direction

- Line 1 - 1800 feet - From the north, near the Savannah River at
- Line 2 - 1800 feet - From the south, near the Savannah River at
- Line 3 - 1800 feet - From the east, near the Savannah River at
- Line 4 - 1800 feet - From the west, near the Savannah River at
- Line 5 - 1800 feet - From the north, near the Savannah River at
- Line 6 - 1800 feet - From the south, near the Savannah River at
- Line 7 - 1800 feet - From the east, near the Savannah River at
- Line 8 - 1800 feet - From the west, near the Savannah River at

Transmission Lines

- Line 1 - 1800 feet - From the north, near the Savannah River at
- Line 2 - 1800 feet - From the south, near the Savannah River at
- Line 3 - 1800 feet - From the east, near the Savannah River at
- Line 4 - 1800 feet - From the west, near the Savannah River at
- Line 5 - 1800 feet - From the north, near the Savannah River at
- Line 6 - 1800 feet - From the south, near the Savannah River at
- Line 7 - 1800 feet - From the east, near the Savannah River at
- Line 8 - 1800 feet - From the west, near the Savannah River at

Other

- Line 1 - 1800 feet - From the north, near the Savannah River at
- Line 2 - 1800 feet - From the south, near the Savannah River at
- Line 3 - 1800 feet - From the east, near the Savannah River at
- Line 4 - 1800 feet - From the west, near the Savannah River at
- Line 5 - 1800 feet - From the north, near the Savannah River at
- Line 6 - 1800 feet - From the south, near the Savannah River at
- Line 7 - 1800 feet - From the east, near the Savannah River at
- Line 8 - 1800 feet - From the west, near the Savannah River at

Scale



Miles Engineering Co., P.A.
Boise, Idaho

IDAHO POWER
34.5/19.9 KV SYSTEM
THREE PHASE, FOUR WIRE

FUSE DISCONNECT
BY IPC

IDAHO POWER -
PROTECTIVE
EQUIPMENT

STATION SERVICE
TRANSFORMER
SINGLE PHASE
19,900 : 120/240 VOLTS
PROVIDED BY IPC

STATION SERVICE
METERING
BY IPC

GENERAL ELECTRIC CO.
STATION SERVICE
PANELBOARD

GENERAL ELECTRIC CO.
DISTRIBUTION
GROUNDING
TRANSFORMER

UTILITY METERING
COMPARTMENT TO
IPC SPECIFICATIONS

PROTECTIVE
DEVICES

RECLOSER

DISCONNECT SWITCH

HIGH SIDE
FUSES

GENERAL ELECTRIC CO.
STEP-UP TRANSFORMER
4180 KVA
4160/3450 : 34,500/19,900VOLTS

3 - 1/C, 350 MCM, CU, CABLES

POTENTIAL TRANSFORMERS
4160V : 120V

SYNC.
SWITCH

500/5

GENERAL ELECTRIC CO.
POWER-VAC
CIRCUIT BREAKER
4.16kV, 250 MVA CLASS
1200 AMP

500/5

LOD TRAK II

POTENTIAL TRANSFORMERS
4160V : 120V

3 - 1/C, 350 MCM, CU, CABLES

EXCITER
POWER
TRANSFORMER

SURGE ARRESTOR

SURGE CAP.

FIELD
EXCITER
WITH P.F.
REGULATOR

BRUSH-
LESS
EXCITER

RTD'S TO 99
6 STATOR
2 BEARING

GENERAL ELECTRIC CO.
SYNCHRONOUS GENERATOR
2050KW, 90% POWER FACTOR
4160 VOLTS, 60 HERTZ, 1200 RPM

GENERAL ELECTRIC CO.
DISTRIBUTION GROUNDING
TRANSFORMER
4160V : 240V

GENERAL  ELECTRIC
ALLISON CREEK HYDRO-
ELECTRIC PROJECT
PROPOSED ELECTRICAL

NOT FOR CONSTRUCTION
PRELIMINARY

NOT FOR CONSTRUCTION
PRELIMINARY

RECEIVED

MAR 03 1988

WRR100
77-4072

IDAHO DEPARTMENT OF WATER RESOURCES
WATER RIGHTS PROOF READING REPORT

PAGE 1
16-DEC-1985 08:21:03

01 WATER RIGHT NUMBER - 77-4072

02 OLD (C) NUMBER -

03001 - CARLSON ✓ LAST NAME

04001 - GUS ✓ FIRST NAME

05001 - C ORIG. OWNER

06 ADD LINE 1 - P.O. BOX 76 ✓

07 ADD LINE 2 -

08 ADD LINE 3 -

09 CITY - RIGGINS ✓

10 STATE - ID ✓

11 ZIP - 83549 ✓

12 STAGE - S STATUTORY CLAIM ✓

13 STATUS -

SOURCE
14001 - ALLISON CREEK ✓

TRIBUTARY OF
15001 - SALMON RIVER ✓

16 DIVERSION MEANS - DAM, PENSTOCK, NOZZEL & PELTON WHEEL.

17 COUNTY - 49 IDAHO ✓

18 DIVERSION CAPACITY - .000 ✓

19 TOTAL DIVERSION RATE = 5.000 ✓

20 TOTAL DIVERSION VOLUME = .00 ✓

21 WATER DISTRICT -

TRACT				SEC				TWN				RNG				LOT				RFLG				S T R E A M				I N D E X				F I E L D S			
22001 -	SWSE ✓	23001 -	11 ✓	24001 -	24N ✓	25001 -	02E ✓	26001 -	27001 -	28001 -	0	272.0	92.0	115.0	0.0	0.0	0.0	0.0	0	0	0	1.0													

29 NON-IRRIGATION USE -

USE CODE / USE		TWN		RNG		SEC		TRACT		ACRES		LOT	
30001 -	28 POWER ✓	31001 -	24N ✓	32001 -	02E ✓	33001 -	14 ✓	34001 -	NWNE ✓	35001 -		36001 -	
												TOTAL ACRES: 0 ✓	

PERIOD FROM		PERIOD TO		USE CODE / USE		WATER USE		DIVERSION RATE		DIVERSION VOLUME	
37001 -	0101 ✓	38001 -	1231 ✓	39001 -	28 POWER ✓	40001 -	5.000 ✓	41001 -	0.00 ✓		

42 DECREE PLAINTIFF NAME -

43 DECREE DEFENDANT NAME -

REMARKS
44001 -

APPROVAL CONDITIONS: 45001 -

46 OTHER RIGHTS FOR SAME USE -

D A T E S				D A T E S				F L A G S			
47	PRIORITY	-	1-JAN-1956 ✓	55	LICENSE	-		63	TRANSFER/AMENDED	-	
48	PROOF DUE	-		56	APPL RECEIVED	-		64	DLE/CAREY ACT	-	
49	PROOF MADE	-		57	FIELD EXAM MADE	-		65	FLAG_1	-	
50	APPROVE/DENIED	-		58	DECREE	-		66	FLAG_2	-	
51	PROTESTED	-		59	START WORK	-		67	FLAG_3	-	
52	HEARING	-		60	ORDER SHOW CAUSE	-					
53	VERIFIED	-		61	DATE_1	-					
54	LAST UPDATE	-	13-NOV-1981	62	DATE_2	-					

State of Idaho
Department of Water Resources

4/30/81 *SR*

CLAIM ANALYSIS SHEET

INITIAL REVIEW BY: *Jan J. Jover*

Right Number 77-4072 Applicant Carlson

NOTE: IF ANY OF THE ITEMS BELOW ARE MISSING, THE CLAIM IS INCOMPLETE AND MUST BE RETURNED IMMEDIATELY TO THE CLAIMANT ALONG WITH THE APPROPRIATE COVER LETTER.

CHECK:

- ☒ Name and address.
- ☒ Date of priority. (Check for a date past the mandatory filing dates.) (One date only.)
- ☒ Source.
- ☒ Quantity, use, period.
- ☒ Point(s) of diversion.
- ☒ Location of use.
- ☒ Signature/notarization/fee.

FINAL REGIONAL PROCESSING REVIEW:

- ☒ Affidavit of publication received.
- ☒ Claim published correctly.
- ☐ Exceptions processed.

By DBS Date 5/28/81

STATE OFFICE PROCESSING:

- ☒ Claim review complete.

By *Lauren* Date 6/1/81

3/79

IDENT. NO. 77-4072

I D A H O D E P A R T M E N T O F W A T E R R E S O U R C E S

WATER RIGHT
DATA ENTRY LOG

[illegible]

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
Western Region

92 South Cole Road
Boise, Idaho 83709
(208) 334-2190

MAY 27, 1981

GUS CARLSON
P.O. BOX 76
RIGGINS

ID 83549

RE: Claim No. 77-4072

Dear Claimant:

The Department of Water Resources has completed the advertising of your claim to a water right, and no further action is authorized under Section 42-243 and 42-244, IDAHO CODE. Your claim will be retained in our files and will be available at any time for use by you or the court.

The filing and advertising of the claim does not confirm the water right claimed, but will serve to record and preserve the information and the evidence which you included in your claim.

If, at a later date, you find that you have additional information or supporting evidence that you would like to have included with the claim, you may have that information or evidence added at any time. Please refer to the claim identification number when corresponding with this office.

We are enclosing a copy of your claim for your records. If you have questions, or if this office may be of further assistance, please feel free to contact us.

Yours truly,

DAVID B. SHAW
Western Region Supervisor

Enclosure

MICROFILMED

MAR 03 1988

CARLSON, GUS

P.O. BOX 76, RIGGINS, ID 83549

Source: ALLISON CREEK tributary to SALMON RIVER

Priority Date: 01/01/1956

Amount: 5.00 CFS

Diversion Point: SWSE Sec 11 T 24N R 02E, IDAHO Co.

Use: POWER (5.00 CFS) from 01/01 to 12/31

Place of Use: NWNE Sec 14 T 24N R 02E

Diversion Means: DAM, PENSTOCK, NOZZEL & PELTON WHEEL.

MICROFILMED

MAR 03 1988