IWR 3

Application No. IWR 70813

Permit No. .....

Certificate No. .....

Stream Index, Page No. .....

Klamath Co. LwR

WF

Name .....

By .....

Address .....

.....

Salem OR 97303

.....

Date filed OCT 26 1990

Priority .....

Action suspended until .....

.....

Return to applicant .....

Date of approval .....

FEES PAID

Date	Amount	Receipt No.
	Cert. Fee	

FEES REFUNDED

Date	Amount	Check No.

ASSIGNMENTS

Date	To Whom	Address	Volume	Page

CONSTRUCTION

Date for beginning .....

Date for completion .....

Extended to .....

.....

Date for application of water .....

Extended to .....

.....

PROSECUTION OF WORK

Form "A" filed .....

Form "B" filed .....

Form "C" filed .....

FINAL PROOF

Blank mailed .....

Proof received .....

Date certificate issued .....

REMARKS

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SP*70900-119

PROTEST

IMPORTANT MESSAGE

FOR TUES 01201 DATE 2-20 TIME 1144 A.M. P.M.

M DON HAGLAND

OF JMT RANCH — PHONED: +

PHONE ☐ FAX ☐ MOBILE (541) -882-6135 (AREA CODE / NUMBER / EXTENSION) — RETURNED YOUR CALL:

MESSAGE — PLEASE CALL: X

RESINC 541-884-0511 — WILL CALL AGAIN:

F.A. → APPLIC x 70813 — CAME TO SEE YOU:

K- FALLS CURIOUS — WANTS TO SEE YOU:

SIGNED

TOPS FORM 4006

IMPORTANT MESSAGE

FOR WED. 01201 DATE 2-21 TIME 919 A.M. P.M.

M DON x HAGLUND x

OF — PHONED: X

PHONE ☐ FAX ☐ MOBILE (541) -882-6135 (AREA CODE / NUMBER / EXTENSION) — RETURNED YOUR CALL:

MESSAGE — PLEASE CALL: X

IS 70813 PFO ? — WILL CALL AGAIN:

CAME TO SEE YOU:

ISWR " STATUS " — WANTS TO SEE YOU:

SIGNED

TOPS FORM 4006

Fix Source-
Should be
Link R 7
Klamath R
cindy 10/2/96

cc: Adam

STOEL RIVES LLP

ATTORNEYS

STANDARD INSURANCE CENTER
900 SW FIFTH AVENUE, SUITE 2300
PORTLAND, OREGON 97204-1268
Phone (503) 224-3380 Fax (503) 220-2480
TDD (503) 221-1045
Internet: www.stoel.com

May 16, 1997

WILLIAM H. HOLMES
Direct Dial
(503) 294-9207
email whholmes@stoel.com

Mr. Dwight French
Water Rights and Adjudication Division
Oregon Water Resources Department
158 12th Street, N.E.
Salem, OR 97310-0210

Re: Instream Flow Application Nos. IS-73368, IS-73369, IS-73370, IS-73371, IS-70094, IS-70812, IS-70813, IS-71172, IS-71173, IS-71174, IS-71175, IS-73350, IS-70695, IS-73379

Dear Mr. French:

The Water Resources Department (the "Department") recently issued a series of superseding proposed final orders ("PFOs") for four instream water rights applications in the Rogue River Basin. The applications were originally submitted by the Oregon Department of Fish and Wildlife ("ODFW") and include Applications IS-73368, IS-73369, IS-73370, and IS-73371. PacifiCorp operates hydroelectric facilities on the Rogue River and, on behalf of PacifiCorp, we have filed protests to all four applications.

PacifiCorp is prepared, however, to enter into a global settlement with ODFW concerning the various instream rights that affect rivers where PacifiCorp conducts hydroelectric operations. The language that the Department added to the superseding Rogue River PFOs provides a good starting point.

If the Department, ODFW, and PacifiCorp can agree on the following points, PacifiCorp would be willing to withdraw its objections to the instream water rights that it has protested:

1. PacifiCorp's hydroelectric facilities on the Rogue River and elsewhere are federally licensed. Therefore, condition no. 6 in the Rogue River Draft Certificates, (including IS-73368, IS-73369, IS-73370, and IS-73371) should be amended as follows:

"6. The instream water right will have no effect on hydroelectric uses authorized by the State of Oregon or any federal agency." (Emphasis shows addition.)

2. Condition Nos. 6 (as amended above), 7, and 8,[1] which were added to the Rogue River Draft Certificates, should be added to the certificates accompanying the following applications: IS-70094, IS-70812, and IS-70813 (Klamath Basin); IS-71172, IS-71173, IS-71174, IS-71175, and IS-73350 (North Umpqua Basin); IS-70695 (Deschutes Basin); and IS-73379 (Rogue Basin).

3. PacifiCorp believes that ODFW's requested instream flows are too large and are not supported by substantial evidence in the record. This issue is partly resolved by Condition Nos. 6, 7, and 8, which make it clear that each instream flow is subordinate to PacifiCorp's hydroelectric rights. However, these conditions do not resolve PacifiCorp's remaining concern, which is that ODFW's claimed flow levels could be used against PacifiCorp in a future proceeding.

PacifiCorp believes that this issue can be resolved if ODFW submits for the record in each of the instream applications described above a letter stating that (1) ODFW recognizes that PacifiCorp disagrees with the instream flow levels proposed by ODFW; (2) the parties have agreed to disagree for purposes of the issuance of the instream water rights certificates; (3) ODFW will not attempt to use an instream water right in any future state or federal proceeding as evidence that PacifiCorp has agreed to or acquiesced in such instream flows; (4) PacifiCorp shall not be collaterally estopped or barred by administrative res judicata in any future state or federal proceeding to raise such arguments or introduce such evidence as it deems reasonable or appropriate regarding appropriate flow levels; (5) ODFW will negotiate in good faith should PacifiCorp ever request the use of additional stream flows that are in conflict with the instream rights, just as it has with respect to instream flows at the Powerdale facility in the Hood River; and (6) ODFW understands that these representations

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[1] Conditions 7 and 8, as they appear in the Rogue River Draft Certificates, are as follows:

"7. The instream water right will not be enforceable against non-consumptive hydroelectric uses.

"8. The instream water right will have no call on water legally stored under a senior water right."

and understandings are a material inducement to PacifiCorp to withdraw its objections to the pending instream flow applications.

In exchange for these actions, PacifiCorp would be willing to withdraw its objections to all of the currently contested instream water rights applications and to dismiss its pending petition for review of IS-71175 (North Umpqua Basin). PacifiCorp v. Oregon Water Resources Department and Oregon Water Resources Commission, No. 96C14220.

After you have had an opportunity to review this settlement proposal, please contact me at 294-9207 or my associate, David Filippi, at 294-9529. We would, of course, be willing to meet with both Department and ODFW representatives to discuss a settlement of PacifiCorp's protests.

If ODFW is unwilling to further discuss settlement at this time, we request that the Department promptly schedule all of the protested applications for contested case hearings, as required by ORS 537.175.

Very truly yours,

William H. Holmes

cc: William R. Cook, Esq.
Karen L. Moynahan, Esq.

INTEROFFICE MEMORANDUM
Water Rights Section

TO: Rick Bailey

FROM: Dwight French, x268 DF

DATE: March 26, 1997

RE: Water Availability for ISWR applications/files

You asked about the file copies of Estimated Average Natural Flow (EANF) for ISWR applications.

There is not a printout in each file similar to what you would generally see in an out of stream application file. The EANF information is in either the Technical Review (TR) or Initial Review (IR) as well as the Proposed Final Order (PFO).

During the processing of the ISWR applications, Rick Cooper and/or Ken Stahr would provide us with a electronic copy of the water availability information for a particular group of ISWR applications. We would then cut and paste that information directly into the TR or IR. When preparing the PFO, we would cut and paste from the TR or IR directly into the PFO.

In summary, our EANF numbers are in the TR or IR and the PFO for each particular ISWR application file.

cc: Mike Mattick
All Protested ISWR Files

Instream Applications with Protests
4/2/97

Basin	App Num		
2			
	OK 71556	A	OREGON DEPARTMENT OF FISH & WILDLIFE
Total for Basin 2 :	**1**		
4			
	OK 71793	W	OREGON DEPARTMENT OF FISH & WILDLIFE
	OK 71798	W	OREGON DEPARTMENT OF FISH & WILDLIFE
	72076	W	OREGON DEPARTMENT OF FISH & WILDLIFE
	72077	W	OREGON DEPARTMENT OF FISH & WILDLIFE
	72078	W	OREGON DEPARTMENT OF FISH & WILDLIFE
	72079	W	OREGON DEPARTMENT OF FISH & WILDLIFE
	72080	W	OREGON DEPARTMENT OF FISH & WILDLIFE
	72081	W	OREGON DEPARTMENT OF FISH & WILDLIFE
Total for Basin 4 :	**8**		
5			
	OK 70353	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70354	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	OK 70357	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70358	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70358	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70358	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	OK 70605	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70606	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70606	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70612	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70695	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70695	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	73199	A	OREGON DEPARTMENT OF FISH & WILDLIFE
Total for Basin 5 :	**13**		
6			
	69949	A	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS
	69949	S	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS
	69951	S	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS
	69951	A	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS
	69958	S	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS
	69958	A	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS
	69958	S	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS
	69959	S	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS

Checked I cut to Dwight

8
9
18
74
2
1
3
9
19
8
12
12

Basin	App Num		
6			
	69959	S	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS
	69959	A	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS
	69961	A	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS
	69961	S	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS
	69961	S	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS
	69963	A	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS
	69963	S	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS
	69963	A	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS
	70251	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70589	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70640	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70640	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70641	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70641	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70642	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70642	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70645	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70645	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70646	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70646	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70651	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70651	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70652	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70652	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70653	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70653	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70654	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70654	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70655	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70655	A	OREGON DEPARTMENT OF FISH & WILDLIFE
Total for Basin 6 :	38		
9			
	70863	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70864	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70870	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	72163	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	72168	S	OREGON DEPARTMENT OF FISH & WILDLIFE

Basin	App Num		
9			
	72168	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	72169	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	72169	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	72170	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	72173	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	72181	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	72186	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	72187	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	72188	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	72191	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	72194	A	OREGON DEPARTMENT OF FISH & WILDLIFE
Total for Basin 9 :	**16**		
10			
	71450	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	71455	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	71455	A	OREGON DEPARTMENT OF FISH & WILDLIFE
Total for Basin 10 :	**3**		
11			
Dwight Done Right!	70020	A	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS
Total for Basin 11 :	**1**		
12			
	71467	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	71468	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	71472	A	OREGON DEPARTMENT OF FISH & WILDLIFE
Total for Basin 12 :	**3**		
13			
	70486	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70487	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70656	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70657	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70658	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70659	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70662	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70663	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70664	A	OREGON DEPARTMENT OF FISH & WILDLIFE
Total for Basin 13 :	**9**		

Basin	App Num		
14			
DWF	70094	A	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS
	70094	A	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS
	70094	A	OREGON DEPARTMENT OF FISH & WILDLIFE & PARKS
	70798	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70798	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70799	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70799	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70800	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70800	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70801	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70801	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70802	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70802	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70804	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70804	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70807	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70807	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70807	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70808	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70808	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70809	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70809	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70809	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70812	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70812	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70812	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70812	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70813	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70813	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70813	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70813	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70813	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70815	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70815	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70816	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70816	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70821	A	OREGON DEPARTMENT OF FISH & WILDLIFE

Basin	App Num		
14			
	70824	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70826	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70829	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70829	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70829	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70829	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70830	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70830	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70830	S	OREGON DEPARTMENT OF FISH & WILDLIFE
Total for Basin 14 :	46		
15			
	70982	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70993	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70998	W	OREGON DEPARTMENT OF FISH & WILDLIFE
	71008	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	71201	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	71614	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	71622	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	72843	A	OREGON DEPARTMENT OF FISH & WILDLIFE
Total for Basin 15 :	8		
16			
	71172	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	71173	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	71174	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	71181	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	71182	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	71183	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	71184	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	71185	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	71190	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	71192	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	71193	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	73350	A	OREGON DEPARTMENT OF FISH & WILDLIFE
Total for Basin 16 :	12		
17			
	70228	A	OREGON DEPARTMENT OF FISH & WILDLIFE

Basin	App Num		
17			
	70229	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70230	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70348	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70348	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70448	S	OREGON DEPARTMENT OF FISH & WILDLIFE
	70448	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70574	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70877	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70891	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70895	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70895	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	70915	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	71697	A	OREGON DEPARTMENT OF FISH & WILDLIFE
	80446	A	OREGON DEPARTMENT OF FISH & WILDLIFE
Total for Basin 17 :	**15**		
173			

STATE OF OREGON REMITTANCE ADVICE

388590

WARRANT NO.
114426108

WATER RESOURCES DEPARTMENT (503) 378-8455

INVOICE NO.	INVOICE DATE	INVOICE DESCRIPTION	AGY	DOCUMENT	AMOUNT
		REV REF 70094 7487	690	VP003144	200.00
		REV REF 70812 7486	690	VP003145	200.00
		REV REF 70813 7492	690	VP003146	200.00

ISSUE DATE: 03/24/97

WARRANT AMOUNT 600.00

VENDOR NAME: MOORE, JEANIE K E
VENDOR NUMBER: 9690000001

REMOVE & TEAR AT PERFORATION

STATE OF OREGON
WATER RESOURCES DEPARTMENT

INTEROFFICE MEMORANDUM

TO: MARIE LICARI, FISCAL
CC: FILE
FROM: Russ Klassen

SUBJECT: REQUEST FOR REFUND CHECK

PLEASE REFUND $ 200.00 TO BUREAU OF RECLAMATION
FILE # 70813, RECEIPT # 7492. THESE FUNDS ARE
REFUNDED DUE TO :

_____ APPLICATION REJECTED
_____ APPLICATION WITHDRAWN
_____ EXCESS FEES COLLECTED FOR APPLICATION
_____ FILE CLOSED
__X__ PROTEST FILING FEE
_____ OTHER: _____

PLEASE INCLUDE THE FOLLOWING MAILING ADDRESS ON THE CHECK:

SEE 70812 & 70094

MAR 2 0 1997

Oregon

WATER RESOURCES DEPARTMENT

March 17, 1997

John F. Cook
Acting Area Manager
Bureau of Reclamation
Klamath Basin Area Office
6600 Washburn Way
Klamath Falls, Oregon 97603

James K. Bryant
Chief, Water and Lands Division
Bureau of Reclamation
Klamath Basin Area Office
6600 Washburn Way
Klamath Falls, Oregon 97603

RE: Protest on Proposed Final Order - Instream Water Right Applications IS-70813, IS-70812, IS-70094

Dear Mr. Cook and Mr. Bryant:

On October 11, 1996, the Department received your protests to the Proposed Final Orders for Instream Water Right Applications IS-70813, IS-70812, and IS-70094. The protests you submitted were within the protest deadline, however, they do not meet the requirements of a complete protest under Oregon Administrative Rules. The protests cannot be accepted.

Specifically, under Oregon Administrative Rule 690-02-030 and 690-02-050, a complete protest must contain proof of service upon the applicant, Oregon Department of Fish and Wildlife. This requirement is described under "Protest Rights" on page (4) of the Proposed Final Orders. Your protest was not served on the applicant by mail or in person and therefore cannot be accepted.

I want to assure you that your comments remain an important part of the water right file. In developing the final order and certificate your comments will be considered along with any other protests and comments in the file.

By copy of this letter I am requesting the Department's fiscal section refund the fees you submitted in the amount of $200.00 per application referenced above.

If you have any question please feel free to contact me at 1-800-624-3199 ex. 262.

Sincerely,

Adam Sussman
Program Analyst, Water Rights Section

cc: Dwight French, OWRD
Dick Bailey, OWRD
Rick Kruger, ODFW
Fiscal Section
Jerry Gainey, OWRD
File
Watermaster District 17
Bob Main, OWRD

Commerce Building
158 12th Street NE
Salem, OR 97310-0210
(503) 378-3739
FAX (503) 378-8130

Oregon

WATER RESOURCES DEPARTMENT

March 17, 1997

John F. Cook
Acting Area Manager
Bureau of Reclamation
Klamath Basin Area Office
6600 Washburn Way
Klamath Falls, Oregon 97603

James K. Bryant
Chief, Water and Lands Division
Bureau of Reclamation
Klamath Basin Area Office
6600 Washburn Way
Klamath Falls, Oregon 97603

RE: Protest on Proposed Final Order - Instream Water Right Applications IS-70813, IS-70812, IS-70094

Dear Mr. Cook and Mr. Bryant:

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If you have any question please feel free to contact me at 1-800-624-3199 ex. 262.

Sincerely,

Adam Sussman
Program Analyst, Water Rights Section

cc: Dwight French, OWRD
Dick Bailey, OWRD
Rick Kruger, ODFW
Fiscal Section
Jerry Gainey, OWRD
File
Watermaster District 17
Bob Main, OWRD

Commerce Building
158 12th Street NE
Salem, OR 97310-0210
(503) 378-3739
FAX (503) 378-8130

IWR Application # 70813 Certificate #_____

STATE OF OREGON

WATER RESOURCES DEPARTMENT

Application for Instream Water Right by a State Agency

There is no fee required for this application.

Applicant: Randy Fisher for Oregon Department of Fish and Wildlife, PO Box 59, Portland, OR 97207

1. The name of the stream of the proposed instream water right is Link River, a tributary of Klamath River.

2. The public uses this instream water right is based upon include providing required stream flows for Lost River sucker (mullet), Klamath largescale sucker, rainbow trout, yellow perch, and pumpkinseed sunfish for migration, spawning, egg incubation, fry emergence, and juvenile and adult rearing.

3. The amount of water (in cubic feet per second) needed by month for each category of public use is as follows:

   USE(S): Migration, spawning, egg incubation, fry emergence, and juvenile and adult rearing.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
60	60	80	80	80	30	20	40	30	30	30	50

4. The reach of the stream identified for an instream water right is from (upstream end) Link River Dam, Section 30, Township 38S, Range 9E W.M., in Klamath County...

   Downstream to Lake Ewauna, river mile, Section 32, Township 38S, Range 9E W.M., in Klamath County.

5. The method used to determine the requested amounts was the Oregon Method.

6. When were the following state agencies notified of the intent to file for the instream water right?

Dept. of Environmental Quality	Date: October 4, 1990
ODFW (Fish, Wldlf, and Habitat)	Date: October 4, 1990
Parks and Recreation Division	Date: October 4, 1990

IWR Application # 70813 Certificate #_____

7. If possible, include recommendations for measuring locations or methods:

   Use USGS gage 11507500.

8. If possible, include recommendations for assisting the Water Resources Department (WRD) in measuring and monitoring procedures:

   Local ODFW personnel will assist the watermaster in establishing and implementing a monitoring program.

9. If possible, include other recommendations for methods or conditions necessary for managing the water right to protect the public uses [see OAR 690-77-020 (5)(c)]: None.

10. Remarks: Lost River sucker is listed as "endangered" under the federal Threatened and Endangered Species Act.

    The requested flows are the minimum required to maintain fish populations at their current levels. No provision is made at these flows for population restoration or enhancement.

THIS APPLICATION MUST BE ACCOMPANIED BY A BASIN MAP WITH THE APPLICABLE LAKE OR STREAM REACH IDENTIFIED.

An instream water right may be allowed for an instream beneficial use of water subject to existing water rights with an effective date prior to the filing date of this application.

This type of beneficial use is for the benefit of the public and a certificate issued confirming an instream water right shall be held in trust by the Water Resources Department for the people of the State of Oregon, pursuant to ORS 537.341.

Date: 10/23/90 Signed: Nancy M. MacHugh

Oregon Department of Fish and Wildlife

Assistant Director
Habitat Conservation Div.

File: LINK1.APP

IWR Application # 70813 Certificate # _____

This is to certify that I have examined the foregoing application, together with the accompanying maps and data, and return them for:

_____

_____

_____

In order to retain its priority, this application must be returned to the Water Resources Department with corrections on or before

_____, 19____.

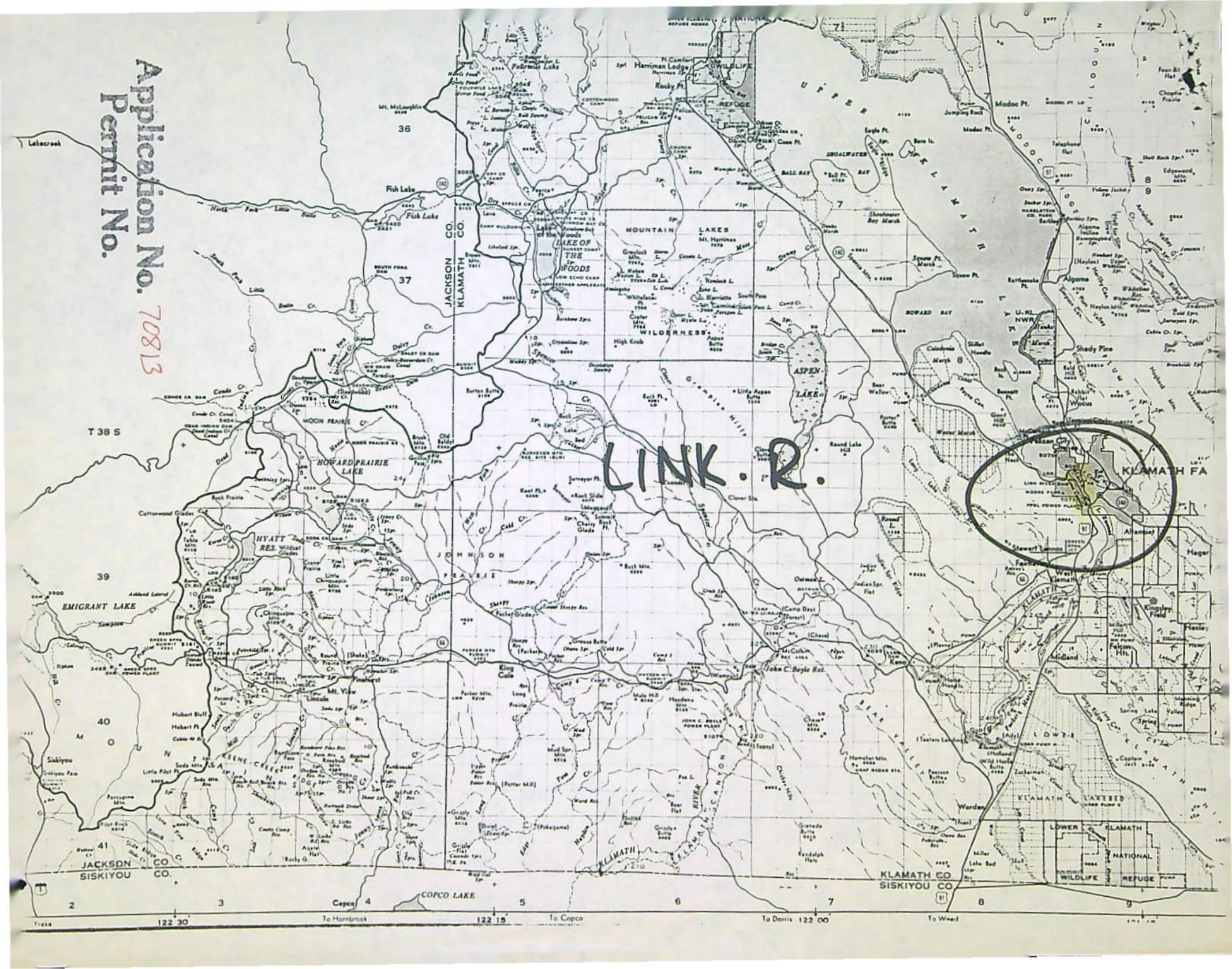
Date: _____, 19____.

_____

_____

This document was first received at the Water Resources Department in Salem, Oregon, on the 26th day of October, 1990, at 8 o'clock A. M.

Water Resources Department
3850 Portland Rd. NE
Salem, OR 97310


Application No.
Permit No.
51807
LINK R.
JACKSON CO.
KLAMATH CO.
JACKSON CO
SISKIYOU CO.
KLAMATH CO
SISKIYOU CO
T 38 S
T 39 S
T 40 S
T 41 S
MOUNTAIN LAKES WILDERNESS
LAKE OF THE WOODS
HOWARD PRAIRIE LAKE
HYATT RES.
EMIGRANT LAKE
JOHNSON PRAIRIE
ASPEN LAKE
KLAMATH FA
KLAMATH LAKES
LOWER KLAMATH NATIONAL WILDLIFE REFUGE
COPCO LAKE
Harriman Lodge
Rocky Pt.
Modoc Pt.
Fish Lake
Algoma
Shady Pine
Alturas
Hager
Midland
Falcon Hts.
Worden
Copco
To Hornbrook
To Copco
To Dorris
To Weed
122 30
122 15
122 00

Oregon Water Resources Department
Water Rights/Adjudication Section

Water Right Application Number: IS 70813

Proposed Final Order

Summary of Recommendation: The Department recommends that the attached draft certificate be issued with conditions.

Application History

On 10/26/90, the Oregon Department of Fish and Wildlife submitted an application to the Department for the following instream water right certificate.

Source: UPPER KLAMATH L TRIB KLAMATH R

County: Klamath

Purpose: Migration, spawning, egg incubation, fry emergence, and juvenile rearing.

The amount of water (in cubic feet per second) requested by month:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	D E C
60	60	80	80	80	30	20	40	30	30	30	50

To be maintained in:

LINK RIVER FROM LINK RIVER DAM (SECTION 30, TOWNSHIP 38S, RANGE 9E WM); TO LAKE EWAUNA AT RIVER MILE 0.0 (SECTION 32, TOWNSHIP 38S, RANGE 9E WM)

The Department mailed the applicant notice of its Initial Review on April 29, 1996. Public notice of the application was provide in the Department's weekly public notice on May 13, 1996. Comments were received for 30 days.

The following supporting data was submitted by the applicant:

(a) Fish and Wildlife Resources of the Klamath Basin, Oregon, and Their Water Requirements; April, 1970.

(b) Determining Minimum Flow Requirements for Fish, ODFW Report January 20, 1984.

(c) Developing and Application of Spawning Velocity and Depth Criteria for Oregon Salmonids, Alan K. Smith, Transactions of the American Fisheries Society, April 1973.

(d) Determining Stream Flows for Fish Life, Oregon State Game Commission Report, March 1972.

(e) A letter dated April 5, 1996, stating that the flows requested in this application are the minimum amount necessary to restore, protect and enhance populations and habitats of native wildlife species at self-sustaining levels

In reviewing applications, the Department may consider any relevant sources of information, including the following:

- comments by or consultation with another state agency
- any applicable basin program
- any applicable comprehensive plan or zoning ordinance
- the amount of water available
- the proposed rate of use
- pending senior applications and existing water rights of record
- the Scenic Waterway requirements of ORS 390.835
- applicable statutes, administrative rules, and case law
- any comments received

An assessment with respect to conditions previously imposed on other instream water rights granted for the same source has been completed.

An evaluation of the information received from the local government(s) regarding the compatibility of the proposed instream water use with land use plans and regulations has been completed.

The level of instream flow requested is based on the methods of determining instream flow needs that have been approved by administrative rule of the agency submitting this application.

Findings of Fact

The basin Basin Program **allows** the proposed use.

Senior water rights exist on this source or on downstream waters.

The source of water is within or above a State Scenic Waterway.

The source of water is not withdrawn from appropriation by order of the State Engineer or legislatively withdrawn by ORS 538.

The estimated average natural flow for the lower end of the requested reach is as follows (in cubic feet per second):

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2120	2210	2680	3210	3120	2740	1880	1310	1140	1240	1470	1760

Conclusions of Law

Under the provisions of ORS 537.153, the Department must

> presume that a proposed use will not impair or be detrimental to the public interest if the proposed use is allowed in the applicable basin program established pursuant to ORS 536.300 and 536.340 or given a preference under ORS 536.310(12), if water is available, if the proposed use will not injure other water rights and if the proposed use complied with rules of the Water Resources Commission.

The proposed use requested in this application is allowed in the basin Basin Plan.

No preference for this use is granted under the provisions of ORS 536.310(12).

The proposed use will not injure other water rights.

The proposed use complies with rules of the Water Resources Commission.

The proposed use complies with the State Agency Agreement for land use.

The proposed instream flows do not fully appropriate this source of water year round. Water is available for additional storage.

Water is not available for the proposed use at the amount requested year round because the unappropriated water available is less than the amounts requested during some months.

For these reasons, the presumption set forth in ORS 537.153, as discussed above, has not been established. The application therefore has been processed without the statutory presumption.

"When instream water rights are set at levels which exceed current unappropriated water available the water right not only protects remaining supplies from future appropriation but establishes a management objective for achieving the amounts of instream flows necessary to support the identified public uses." OAR 690-77-015(2).

"The amount of appropriation for out-of-stream purposes shall not be a factor in determining the amount of an instream water right." "The amount allowed during any time period for the water right shall not exceed the estimated average natural flow ..." (excerpted from OAR 690-77-015 (3) and (4)).

Because the proposed use exceeds the available water, it can not be presumed to be in the public interest. However, under the direction of OAR 690-77-015 (2)(3) and(4), the proposed use is in the public interest up to the limits of the estimated average natural flow.

Oregon law allows certain uses of water to take precedence over other uses in certain circumstances. When proposed uses of water are insufficient for all who desire to use them, preference shall be given to human consumption purposes over all other uses and for livestock consumption over any other use (excerpted from ORS 536.310 (12)).

The Department therefore concludes that

- the proposed use, as limited in the draft certificate, will not result in injury to other water rights,
- the proposed use, as limited in the draft certificate, will not impair or be detrimental to the public interest as provided in ORS 537.170.
- the proposed use, as limited in the draft certificate, will include the following conditions: for purposes of water distribution, this instream right shall not have priority over human or livestock consumption.

- the flows are to be measured at the lower end of the stream reach to protect necessary flows throughout the reach.
- the stream flows listed below represent the minimum flows necessary to support the public use.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
60	60	80	80	80	30	20	40	30	30	30	50

Recommendation

The Department recommends that the attached draft certificate be issued with conditions.

DATED AUGUST 27, 1996

Steven P. Applegate
Administrator
Water Rights and Adjudications Division

Protest Rights

Under the provisions of ORS 537.153(6) or 537.621(7), you have the right to submit a protest against this proposed final order. Your protest *must* be in writing, and must include the following:

- Your name, address, and telephone number;
- A description of your interest in the proposed final order, and, if you claim to represent the public interest, a precise statement of the public interest represented;
- A detailed description of how the action proposed in this proposed final order would impair or be detrimental to your interest;
- A detailed description of how the proposed final order is in error or deficient, and how to correct the alleged error or deficiency;
- Any citation of legal authority to support your protest, if known; and
- If you are not the applicant, the $200 protest fee required by ORS 536.050.
- Proof of service of the protest upon the applicant.

Your protest must be received in the Water Resources Department no later than October 11, 1996.

After the protest period has ended, the Director will either issue a final order or schedule a contested case hearing. The contested case hearing will be scheduled *only* if a protest has been submitted *and* if

- upon review of the issues the director finds that there are significant disputes related to the proposed use of water, *or*
- the applicant requests a contested case hearing within 30 days after the close of the protest period.

DRAFT

STATE OF OREGON

CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

Oregon Water Resources Department
158 12th Street NE
Salem, Oregon 97310

The specific limits for the use are listed below along with conditions of use.

Source: UPPER KLAMATH L TRIB KLAMATH R

County: Klamath

Purpose: Migration, spawning, egg incubation, fry emergence, and juvenile rearing.

To be maintained in:

LINK RIVER FROM LINK RIVER DAM (SECTION 30, TOWNSHIP 38S, RANGE 9E WM); TO LAKE EWAUNA AT RIVER MILE 0.0 (SECTION 32, TOWNSHIP 38S, RANGE 9E WM)

The right is established under Oregon Revised Statutes 537.341.

The date of priority is 10/26/90.

The following conditions apply to the use of water under this certificate:

1. The right is limited to not more than the amounts, in cubic feet per second, during the time periods listed below:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
60	60	80	80	80	30	20	40	30	30	30	50

2. The water right holder shall measure and report the in-stream flow along the reach of the stream or river described in the certificate as may be required by the standards for in-stream water right reporting of the Water Resources Commission.

3. For purposes of water distribution, this instream right shall not have priority over human or livestock consumption.

4. The instream flow allocated pursuant to this water right is not in addition to other instream flows created by a prior water right or designated minimum perennial stream flow.

5. The flows are to be measured at the lower end of the stream reach to protect necessary flows throughout the reach.

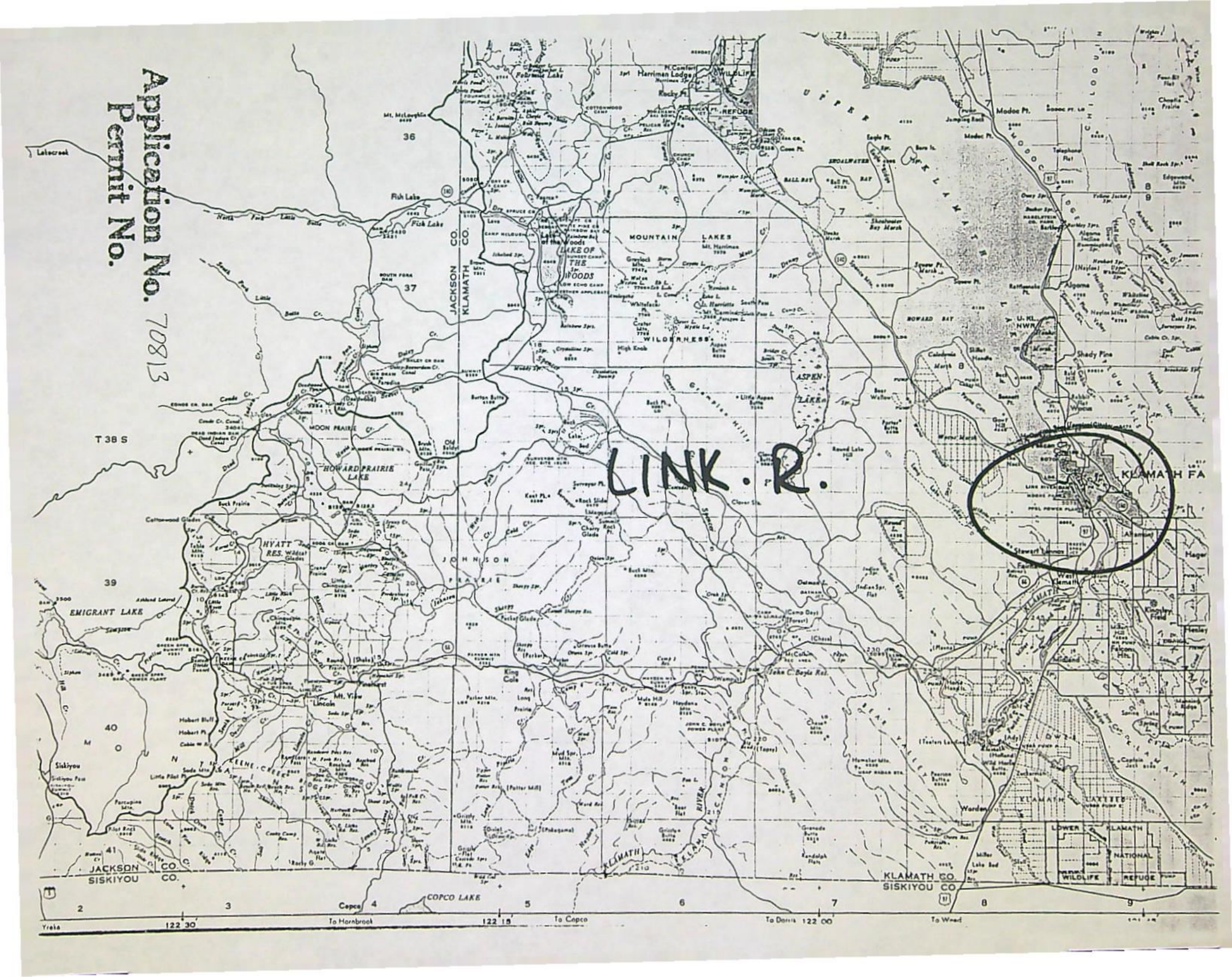
Witness the signature of the Water Resources Director affixed this ___ day of

_____, 19___.

_____
Water Resources Director

Recorded in State Record of Water Right Certificate number _____.

IS 70813


Application No. 70813
Permit No.
LINK R.
KLAMATH FA
JACKSON CO.
KLAMATH CO.
SISKIYOU CO.
MOUNTAIN LAKES
WILDERNESS
THE WOODS
ASPEN LAKE
HOWARD PRAIRIE LAKE
HYATT RES.
EMIGRANT LAKE
COPCO LAKE
JOHNSON PRAIRIE
KLAMATH RIVER
LOWER KLAMATH NATIONAL WILDLIFE REFUGE
T 38 S
Yreka
To Hornbrook
To Copco
To Dorris
To Weed
122 30'
122 15'
122 00'

STATE OF OREGON
WATER RESOURCES DEPARTMENT

RECEIPT # 7492

158 12TH ST. N.E.
SALEM, OR 97310-0210
378-8455 / 378-8130 (FAX)

INVOICE #_____

RECEIVED FROM: K.E. Jeanie Moore
BY: _____

APPLICATION	
PERMIT	
TRANSFER	

CASH: ☐ CHECK: # ☐ _____ OTHER: (IDENTIFY) ☒ M/075-53

TOTAL REC'D $ 200. →

0417 WRD MISC CASH ACCT

	ADJUDICATIONS	$
	PUBLICATIONS / MAPS	$
_____	OTHER: (IDENTIFY) _____	$
_____	OTHER: (IDENTIFY) _____	$

REDUCTION OF EXPENSE _____ CASH ACCT. $

_____ PCA AND OBJECT CLASS _____ VOUCHER #

0427 WRD OPERATING ACCT PCA 77235

	MISCELLANEOUS				
0407	COPY & TAPE FEES				$
0410	RESEARCH FEES				$
0408	MISC REVENUE: (IDENTIFY) _____				$
TC165	DEPOSIT LIAB. (IDENTIFY) _____				$
	WATER RIGHTS:	**EXAM FEE**		**RECORD FEE**	
0201	SURFACE WATER	$	0202	$	
0203	GROUND WATER	$	0204	$	
0205	TRANSFER	$	0206	$	
	WELL CONSTRUCTION	**EXAM FEE**		**LICENSE FEE**	
0218	WELL DRILL CONSTRUCTOR	$	0219	$	
	LANDOWNER'S PERMIT		0220	$	
0223	OTHER (IDENTIFY) Protest $200.				

0437 WELL CONST. START FEE

0211	WELL CONST START FEE	$	CARD #	
0210	MONITORING WELLS	$	CARD #	
_____	OTHER (IDENTIFY) _____			

0539 LOTTERY PROCEEDS

1302	LOTTERY PROCEEDS	$

0467 HYDRO ACTIVITY

		LIC NUMBER	
0233	POWER LICENSE FEE (FW/WRD)		$
0231	HYDRO LICENSE FEE (FW/WRD)		$
_____	HRDRO APPLICATION _____		$

RECEIPT # 7492 DATED: 10-11-96 BY: D. Buschnell

Distribution-White Copy-Customer, Yellow Copy-Fiscal, Blue Copy-File, Buff Copy-Fiscal

STATE OF OREGON
WATER RESOURCES DEPARTMENT

RECEIPT # 7492

158 12TH ST. N.E.
SALEM, OR 97310-0210
378-8455 / 378-8130 (FAX)

INVOICE #_____

RECEIVED FROM: K.E. Jeanie Moore
BY: _____

APPLICATION
PERMIT
TRANSFER

CASH: ☐ CHECK: # ☐ _____ OTHER: (IDENTIFY) ☒ M/075-53

TOTAL REC'D $ 200. →

0417 WRD MISC CASH ACCT

ADJUDICATIONS $
PUBLICATIONS / MAPS $
_____ OTHER: (IDENTIFY) _____ $
_____ OTHER: (IDENTIFY) _____ $

REDUCTION OF EXPENSE _____ CASH ACCT. $

_____ PCA AND OBJECT CLASS _____ VOUCHER #

0427 WRD OPERATING ACCT PCA 77235

MISCELLANEOUS
0407 COPY & TAPE FEES $
0410 RESEARCH FEES $
0408 MISC REVENUE: (IDENTIFY) _____ $
TC165 DEPOSIT LIAB. (IDENTIFY) _____ $

WATER RIGHTS: EXAM FEE RECORD FEE
0201 SURFACE WATER $ 0202 $
0203 GROUND WATER $ 0204 $
0205 TRANSFER $ 0206 $

WELL CONSTRUCTION EXAM FEE LICENSE FEE
0218 WELL DRILL CONSTRUCTOR $ 0219 $
LANDOWNER'S PERMIT 0220 $
0223 OTHER (IDENTIFY) Protest $200.

0437 WELL CONST. START FEE

0211 WELL CONST START FEE $ CARD #
0210 MONITORING WELLS $ CARD #
_____ OTHER (IDENTIFY) _____

0539 LOTTERY PROCEEDS

1302 LOTTERY PROCEEDS $

0467 HYDRO ACTIVITY LIC NUMBER

0233 POWER LICENSE FEE (FW/WRD) $
0231 HYDRO LICENSE FEE (FW/WRD) $
_____ HRDRO APPLICATION _____ $

RECEIPT # 7492 DATED: 10-11-96 BY: D. Buschnell

Distribution-White Copy-Customer, Yellow Copy-Fiscal, Blue Copy-File, Buff Copy-Fiscal

7947

DE CUIR & SOMACH / A PROFESSIONAL CORPORATION

Account: DS96
Date: 10/9/96
Payee: Oregon Water Resources Department
Amount: 200.00
Memo: PROTEST: IS 70813

Klamath

5CICosts:5CLFiling Fees

200.00

STATE OF OREGON
WATER RESOURCES DEPARTMENT
158 12TH ST. N.E.
SALEM, OR 97310-0210
378-8455 / 378-8130 (FAX)

RECEIPT # 7505

INVOICE # _____

RECEIVED FROM: DeCuir & Somach

BY: _____

APPLICATION	FS 70813
PERMIT	
TRANSFER	

CASH: ☐ CHECK: # ☒ 11-49 OTHER: (IDENTIFY) ☐ _____

TOTAL REC'D $200.00

0417 WRD MISC CASH ACCT

	ADJUDICATIONS		$
	PUBLICATIONS / MAPS		$
_____	OTHER: (IDENTIFY)	_____	$
_____	OTHER: (IDENTIFY)	_____	$

REDUCTION OF EXPENSE _____ CASH ACCT. $

_____ PCA AND OBJECT CLASS _____ VOUCHER #

0427 WRD OPERATING ACCT

MISCELLANEOUS

0407	COPY & TAPE FEES		$
0410	RESEARCH FEES		$
0408	MISC REVENUE: (IDENTIFY)	_____	$
TC165	DEPOSIT LIAB. (IDENTIFY)	_____	$

WATER RIGHTS:

		EXAM FEE		RECORD FEE
0201	SURFACE WATER	$	0202	$
0203	GROUND WATER	$	0204	$
0205	TRANSFER	$	0206	$

WELL CONSTRUCTION

		EXAM FEE		LICENSE FEE
0218	WELL DRILL CONSTRUCTOR	$	0219	$
	LANDOWNER'S PERMIT		0220	$

0223 OTHER (IDENTIFY) Protest Apt 77235 $200.00

0437 WELL CONST. START FEE

0211	WELL CONST START FEE	$	CARD #	
0210	MONITORING WELLS	$	CARD #	

_____ OTHER (IDENTIFY) _____

0539 LOTTERY PROCEEDS

1302	LOTTERY PROCEEDS	$

0467 HYDRO ACTIVITY

		LIC NUMBER	
0233	POWER LICENSE FEE (FW/WRD)		$
0231	HYDRO LICENSE FEE (FW/WRD)		$
_____	HRDRO APPLICATION	_____	$

RECEIPT # 7505 DATED: 10-11-96 BY: C. Rich

Distribution-White Copy-Customer, Yellow Copy-Fiscal, Blue Copy-File, Buff Copy-Fiscal

STATE OF OREGON
WATER RESOURCES DEPARTMENT
158 12TH ST. N.E.
SALEM, OR 97310-0210
378-8455 / 378-8130 (FAX)

RECEIPT # 7527 INVOICE # _____

RECEIVED FROM: Stoel Rives
BY: _____

APPLICATION	70813
PERMIT	
TRANSFER	

CASH: ☐ CHECK: # ☒ 24.12 ☐ OTHER: (IDENTIFY) _____ TOTAL REC'D $ 200.

RECEIVED
OVER THE COUNTER

0417 WRD MISC CASH ACCT

	ADJUDICATIONS	$
	PUBLICATIONS / MAPS	$
_____	OTHER: (IDENTIFY) _____	$
_____	OTHER: (IDENTIFY) _____	$

REDUCTION OF EXPENSE

CASH ACCT. _____ $ _____
PCA AND OBJECT CLASS _____ VOUCHER # _____

0427 WRD OPERATING ACCT

PCA 77235

	MISCELLANEOUS			
0407	COPY & TAPE FEES			$
0410	RESEARCH FEES			$
0408	MISC REVENUE: (IDENTIFY) _____			$
TC165	DEPOSIT LIAB. (IDENTIFY) _____			$
	WATER RIGHTS:	**EXAM FEE**		**RECORD FEE**
0201	SURFACE WATER	$	0202	$
0203	GROUND WATER	$	0204	$
0205	TRANSFER	$	0206	$
	WELL CONSTRUCTION	**EXAM FEE**		**LICENSE FEE**
0218	WELL DRILL CONSTRUCTOR	$	0219	$
	LANDOWNER'S PERMIT		0220	$
0223	OTHER (IDENTIFY) Protest # 200.			

0437 WELL CONST. START FEE

0211	WELL CONST START FEE	$	CARD #	
0210	MONITORING WELLS	$	CARD #	
_____	OTHER (IDENTIFY) _____			

0539 LOTTERY PROCEEDS

1302	LOTTERY PROCEEDS	$

0467 HYDRO ACTIVITY

		LIC NUMBER	
0233	POWER LICENSE FEE (FW/WRD)		$
0231	HYDRO LICENSE FEE (FW/WRD)		$
_____	HRDRO APPLICATION _____		$

RECEIPT # 7527 DATED: 10-11-96 BY: D. Bushnell

Distribution-White Copy-Customer, Yellow Copy-Fiscal, Blue Copy-File, Buff Copy-Fiscal

STATE OF OREGON
WATER RESOURCES DEPARTMENT

RECEIPT # 7501

158 12TH ST. N.E.
SALEM, OR 97310-0210
378-8455 / 378-8130 (FAX)

INVOICE # _____

RECEIVED FROM: Klamath Drainage Dist
BY:

APPLICATION	
PERMIT	
TRANSFER	

CASH: ☐ CHECK: # ☑ 24-22 OTHER: (IDENTIFY) ☐ _____

TOTAL REC'D $600.00

0417 WRD MISC CASH ACCT

	ADJUDICATIONS	$
	PUBLICATIONS / MAPS	$
_____	OTHER: (IDENTIFY) _____	$
_____	OTHER: (IDENTIFY) _____	$

REDUCTION OF EXPENSE

_____ CASH ACCT. _____ $

_____ PCA AND OBJECT CLASS _____ VOUCHER #

0427 WRD OPERATING ACCT

IS 70812
IS 70813
IS 70994

	MISCELLANEOUS			
0407	COPY & TAPE FEES			$
0410	RESEARCH FEES			$
0408	MISC REVENUE: (IDENTIFY) _____			$
TC165	DEPOSIT LIAB. (IDENTIFY) _____			$
	WATER RIGHTS:	**EXAM FEE**		**RECORD FEE**
0201	SURFACE WATER	$	0202	$
0203	GROUND WATER	$	0204	$
0205	TRANSFER	$	0206	$
	WELL CONSTRUCTION	**EXAM FEE**		**LICENSE FEE**
0218	WELL DRILL CONSTRUCTOR	$	0219	$
	LANDOWNER'S PERMIT		0220	$

0223 OTHER (IDENTIFY) Protest PA 77235 $600.00

0437 WELL CONST. START FEE

0211	WELL CONST START FEE	$	CARD #	
0210	MONITORING WELLS	$	CARD #	

_____ OTHER (IDENTIFY) _____

0539 LOTTERY PROCEEDS

1302	LOTTERY PROCEEDS	$

0467 HYDRO ACTIVITY

		LIC NUMBER	
0233	POWER LICENSE FEE (FW/WRD)		$
0231	HYDRO LICENSE FEE (FW/WRD)		$
_____	HRDRO APPLICATION _____		$

RECEIPT # 7501 DATED: 10-11-96 BY: C. Rid

Distribution-White Copy-Customer, Yellow Copy-Fiscal, Blue Copy-File, Buff Copy-Fiscal

STOEL RIVES LLP
ATTORNEYS

STANDARD INSURANCE CENTER
900 SW FIFTH AVENUE, SUITE 2300
PORTLAND, OREGON 97204-1268
Phone (503) 224-3380 Fax (503) 220-2480
TDD (503) 221-1045
Internet: www.stoel.com

October 11, 1996

PETER L. SERRURIER
Direct Dial Number
(503) 294-9190
internet:plserrurier@stoel.com

VIA HAND DELIVERY

Mr. Dwight French, Acting Administrator
Water Rights and Adjudications Division
Oregon Water Resources Department
158 12th Street NE
Salem, OR 97310

Re: Protest of PacifiCorp to the Proposed Final Order for Instream Water Rights Application No. 70813

Dear Mr. French:

PacifiCorp operates the Link River Dam and owns and operates the Eastside Power Plant, Westside Power Plant, the Keno Dam, the J.C. Boyle Dam and Powerhouse, COPCO I and II (dams and powerhouses), and the Iron Gate Dam and Powerhouse (collectively, the "Klamath River Projects") on the Klamath River in Klamath County, Oregon, and Siskiyou County, California. The Oregon Department of Fish and Wildlife ("ODFW") has submitted an application (application no. 70813) for an instream water right on the Klamath River. Because the instream right may affect PacifiCorp's operation of the Klamath River Projects, PacifiCorp has a strong interest in the Water Resources Department's (the "WRD" or "Department") review of this matter. PacifiCorp submits this protest to the Department's Proposed Final Order ("PFO") recommending the approval of application no. 70813.

The name of the protestant is PacifiCorp. Its address is 920 SW Sixth Avenue, 610 PSB, Portland, Oregon 97204. Mr. Stanley A. deSousa is the contact person at PacifiCorp (503/464-5343). All formal correspondence regarding the protest should be sent

to me at the letterhead address with a copy to Mr. deSousa. Any questions or comments on technical or policy matters should be addressed to Mr. deSousa.

PacifiCorp's interest in the proposed final order ("PFO") is as a holder of a hydroelectric license and senior water rights for the Klamath River Projects. A detailed description of how the PFO would impair PacifiCorp's interest and how it is otherwise deficient is provided below, along with citations to legal authority supporting PacifiCorp's position. Although this protest attempts to raise all reasonably ascertainable issues, because PacifiCorp received actual notice of the PFO just three days before the close of the protest period, PacifiCorp reserves the right to raise additional issues after it has had an adequate opportunity to review the complete WRD file on this application.

A. BACKGROUND.

1. Klamath River Projects Description.

The Klamath River Projects are part of an interrelated system of hydropower projects that PacifiCorp operates in the Klamath River system including the Link River. The Link River Dam and associated Eastside and Westside projects are the most upstream projects located within the city limits of Klamath Falls. Keno Dam is operated as a regulation facility and has no hydrogeneration facilities. J.C. Boyle, COPCO 1 and 2 and Iron Gate are hydrogeneration facilities. The Iron Gate facilities are farthest downstream (RM 190). A map of the Klamath River Projects is attached as Exhibit A. The Klamath River Projects are described more thoroughly in the attached "Biological Assessment of PacifiCorp and the New Earth Company Operations Associated with the Klamath Project" prepared by the U.S. Bureau of Reclamation in June 1996 (Exhibit B).

Link River Dam is operated pursuant to a contract between PacifiCorp and the U.S. Bureau of Reclamation. It stores 523,700 acre feet of water in Upper Klamath Lake. Keno Dam is downstream from Link River Dam and controls Lake Ewauna levels. It stores 18,500 acre feet. There is already an agreement between PacifiCorp and ODFW to release minimum flows of 200 cfs at Keno Dam. To assure that this flow is met, Keno Dam is typically operated using a release of 250 cfs or greater.

The J.C. Boyle facilities divert flow from the Klamath River between the dam and the powerhouse. There is 100 cfs released into the bypass reach and an additional 250 to 300 cfs of accretion flow occurs in the reach. J.C. Boyle dam stores 3,377 acre feet. River fluctuation is limited to a 9-inch per hour ramp rate as established in

the FERC license (FPC 1961). COPCO 1 stores an additional 45,390 acre feet. COPCO 2 depends on COPCO 1 for water to generate and for storage.

Iron Gate is located at RM 190 and serves as the furtherest downstream regulating point of the Klamath River Projects. The Federal Energy Regulatory Commission ("FERC") has established a minimum instream flow schedule to protect downstream aquatic resources. Minimum flows are: 1,300 cfs from September through April; 1,000 cfs in May and August; and 710 cfs in June and July. There are no fish passage facilities at the dam. Iron Gate stores 58,794 acre feet.

2. FERC License Status.

PacifiCorp operates the Klamath River Projects pursuant to a hydropower project license (License 2082) issued by the FERC. The Federal Power Commission, FERC's predecessor agency, issued the initial license for the Klamath River Projects on March 1, 1956, pursuant to section 4(d) of the Federal Power Act ("FPA"), 16 USC § 797(d).

3. State Hydroelectric License.

On November 30, 1956, the Hydroelectric Commission of Oregon issued PacifiCorp a license (HE180) pursuant to the Oregon Hydroelectric Act, ORS Chapter 543. The license authorizes PacifiCorp to construct and operate the J.C. Boyle Project. The original license required a minimum flow of 200 cfs at all times.

4. PacifiCorp's Pre-1909 Water Rights.

PacifiCorp's predecessor company posted water rights claims notices and took other actions to appropriate water and construct the Klamath River Projects prior to the adoption of the 1909 Water Code which instituted the permit and certificate process that exists today. See 1909 Or Laws ch. 216, § 45. In January 1991, PacifiCorp submitted to the Department 11 Proofs of Claim for pre-1909 water rights in the Klamath River Basin adjudication. Based upon the historical pattern of development and water use, PacifiCorp claims a right to divert natural flows from the Klamath River during the entire year with a priority dates ranging from 1883 to 1905. The Department has not yet adjudicated these filings.

5. Endangered and Sensitive Species.

There are no anadromous fish species in the reach of the Klamath River for which ODFW seeks an instream water right. The application states that the instream water right is sought to maintain required stream flows for rainbow trout and the shortnose, Klamath Smallscale, Klamath Largescale and Lost River suckers. The shortnose and Lost Rive suckers are two endemic endangered and threatened species.

Since the instream water right application was filed, the U.S. Bureau of Reclamation has consulted with the U.S. Fish and Wildlife Service ("FWS") regarding the impacts of Klamath Basin Projects on the shortnose and Lost River suckers. A biological opinion was issued on July 22, 1992 and was later modified on August 11, 1994. Further consultation on PacifiCorp's operations occurred in 1996 as reflected in the attached Biological Assessment and Biological Opinion dated July 15, 1996 (Exhibit C).

As noted in the attached exhibits, ODFW and PacifiCorp conducted fish passage investigations at Link River, Keno, and J.C. Boyle dams from 1988 to 1991 to determine upstream and downstream fish migration patterns. These studies documented that the threatened and endangered species migrate through the Link River and Keno ladders, although none were found at the J.C. Boyle ladder. The Oregon Department of Environmental Quality ("DEQ") collected listed species from J.C. Boyle in 1986 while collecting fish samples for environmental contaminants. The Bureau of Reclamation has also collected listed species in J.C. Boyle Reservoir and COPCO Reservoir. These studies all show that the threatened and endangered species are present in the area affected by the instream water right request. This area is also within proposed critical habitat for shortnose and Lost River suckers by FWS. 59 Fed Reg 61744 (Dec 1, 1994).

6. Water Quality.

DEQ recently listed the Klamath River to the California border as water quality limited for many parameters, including Chlorophyll a, dissolved oxygen, pH, temperature, toxics (ammonia) and water contact recreation (fecal coliform). See "DEQ's 1994/1996 303(d) List of Water Quality Limited Waterbodies," July 1996.

7. Instream Water Rights Application.

On October 26, 1990, ODFW filed instream water right Application No. 70813 seeking an instream water right for an amount between 20 cfs and 80 cfs (depending on the month) between Link River from Link River Dam (Section 30,

Township 38 South Range 9 East, Willamette Meridian) to Lake Ewauna at River Mile 0.0 (Section 32, Township 38 South, Range 9 East, Willamette Meridian).

On August 27, 1996, the Department published a PFO concluding that the proposed use would not injure existing water rights and that it is consistent with the public interest. The PFO recommends approval of the application. For the reasons stated below, PacifiCorp respectfully disagrees with the Department's conclusions and protests that the PFO is technically flawed and fails to establish the statutory presumption that the proposed use will not impair the public interest.

B. SPECIFIC OBJECTIONS.

1. The Application and Proposed Final Order are Incomplete and Deficient.

The PFO does not state the purpose of the proposed instream water right beyond stating that it is for the purpose of "Migration, spawning, egg incubation, fry emergence and juvenile rearing." Although the application refers to the fish species supposedly being protected, the instream flow requirements of various species differ. There is no supporting data as to which flows are required for which species. Moreover, the PFO does not indicate which species is being protected. Accordingly, there is no basis in the PFO for determining that the requested flows are necessary or appropriate.

ODFW's application fails to include essential information required by the Division 77 rules including: (1) the appropriate section of a Department basin map with the applicable stream reach identified, OAR 690-77-020(4)(e) (the map submitted features only a large circle that includes portions of the Klamath River); (2) identification of affected local governments and copies of letters notifying these governments of the intent to file the application, OAR 690-77-020(4)(j); and (3) documentary evidence that an agreement has been reached with the reservoir owners to supply the instream flow from stored water, OAR 690-77-020(6) (see discussion below).

Also, on November 23, 1990, the Bureau of Reclamation provided specific comment to application no. 70812. The comments raise specific concerns about the application, including, but not limited to, senior water rights, availability of natural flows and the Klamath River Compact. Neither the PFO nor the record for this application address the Bureau of Reclamation's concerns. Without express response to these concerns, the application, record and PFO are incomplete and the application must be denied.

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Under OAR 690-77-020(6) applicants requesting instream water rights to be supplied from stored water must refer to the reservoir as the source of supply and show by documentary evidence "that an agreement has been entered into with the owners of the reservoir for a sufficient interest in the reservoir to impound enough water for the purposes set forth in the request." Although this rule was not adopted until after this application was filed, the rule is now in effect and the application should have been required to be supplemented to add this required information. In fact, even though the requested instream water right is dependent on stored water, ODFW has not entered into such an agreement with either PacifiCorp or the U.S. Bureau of Reclamation. Without the information required by WRD rules for instream flow applications, the application should be rejected as incomplete.

The PFO is incomplete when it lists the supporting data submitted with the application. The listed reports are not contained in the WRD file on this application and other reports are included which are not listed in the PFO. Specifically, there has been a variety of stream flow information developed on natural flows subsequent to the application.

Without the above referenced information, the application is incomplete. Under the applicable rules when the application was filed, the Department had no choice but to remand the application to ODFW. OAR 690-77-022(1) (repealed). This was not done. As a result, the PFO now proposes to approve an incomplete application. Under the current rules, the Department must return an incomplete application within 15 days of receiving it. OAR 690-77-027(1). The only cure for this defect is to return the application to ODFW for completion.

2. The Proposed Final Order Contains Incorrect Findings of Fact.

The estimated average annual natural flows for the lower end of the reach is not based on accurate, up-to-date information about the flows in this reach of the Klamath River and fails to correctly differentiate between natural flows, storage releases and natural inflows.

3. The Public Interest Presumption Is Not Established.

a. Klamath Basin Compact.

The PFO states that the proposed use is allowed in the basin plan. There is no basin plan for the Klamath Basin. OAR 690-500-010(5). Instead the rules of the WRD state that the basin is subject to rules of statewide applicability "and to the provisions of the Klamath River Basin Compact (ORS 542.620)." The PFO does not address the provisions of the Compact.

b. The Proposed Final Order Fails To Recognize Injury to and Impairment of PacifiCorp's State Water Rights.

The Department may not grant instream water rights if such action would impair the exercise of preexisting water rights. ORS 537.334(2); OAR 690-77-015(l). PacifiCorp holds both certificated and unadjudicated pre-1909 water rights within or above the reach affected by this application. The PFO concludes, incorrectly, that the instream water right will not injure other water rights.

(1) Unadjudicated Pre-1909 Water Rights.

At various dates prior to 1909, PacifiCorp's predecessors initiated the process for obtaining water rights for the Klamath River Projects by following the statutory process then in effect. In January 1991, PacifiCorp filed 11 Proofs of Claim in the Klamath Basin adjudication to have its pre-1909 rights adjudicated. The Department has not yet completed the adjudication. Nonetheless, pending the completion of the adjudication, neither the Department nor any other agency or person may take any action to impair or affect PacifiCorp's right to use water consistent with its filings. ORS 539.010(4). These pre-1909 rights do not terminate except as provided under the statutory abandonment procedures. Thus, the diversions and appropriations of water described in PacifiCorp's Statement and Proof of Claims filed in the Klamath Basin adjudication must be considered as an existing water right with a priority date that will always be senior to that sought by ODFW.

(2) Certificated Rights.

In addition to its pre-1909 rights to divert water from the Klamath River, PacifiCorp's state hydroelectric license grants it an additional right to store the amount of flows from Klamath River necessary to store water in the J.C. Boyle

Reservoir. This license article is a fully effective and enforceable water right. ORS 543.110; see also Op Atty Gen No. 8208 (May 26, 1989) (rights to store water are not subordinate to direct use rights with junior priority dates). Thus, the PFO also is flawed for failing to consider the rights granted by the November 30, 1956, hydroelectric license.

The grant of the requested instream right could injure PacifiCorp's existing water rights. The PFO and draft certificate do not condition the instream right upon senior water rights being satisfied. As proposed, the certificate might be interpreted to require PacifiCorp to meet instream flow levels by releases from storage, or by-passes of the reservoirs, through the Klamath River Projects, including, but not limited to, the Link River Dam. This would reduce hydro-electric generation, at considerable cost to PacifiCorp. Unless the Department makes additional specific findings and adds conditions assuring that the proposed use would not injure PacifiCorp's water rights, the Department has no choice but to deny the application. OAR 690-77-037(2).

To respond to PacifiCorp's concerns, the following conditions should be included in any instream water right certificate issued for this reach of the Klamath River:

1. "The use of water allowed herein may be made only at times when sufficient water is available to satisfy all prior rights." (This is a standard condition in most water right permits).

2. "This water right shall not take away or impair any vested, permitted, certificated or decreed right to any waters or to the use of any waters vested prior to the date of the issuance of this certificate." This is consistent with ORS 537.334(2))

3. "The instream right shall not require any releases from Upper Klamath Lake."

c. <u>The Proposed Use Does Not Comply with State Law and Rules of the Water Resources Commission</u>.

The Commission has adopted rules to protect threatened, endangered and sensitive species. OAR 690, Division 33. Although these rules are technically not applicable to this application, since it was filed before June 3, 1994, ODFW, OSPRD and the WRD are still required to comply with the state endangered species act. The way that they have chosen to do so, in the context of water rights applications, is through the new Division 33 rules. There is no question that listed species

are present in this reach. The proposed instream flows will affect the habitat of endangered suckers. There is no discussion or evaluation in the PFO or the WRD file of what these impacts will be. There is good reason to believe, based on the needs of rainbow trout when contrasted with the lacustrine requirements of the suckers, that the requested instream flows will adversely impact the suckers.

Many parties, including the Bureau of Reclamation, the Klamath Tribe, PacifiCorp, local irrigation districts and the FWS have been working very hard in recent years to recover sucker populations. Granting instream water rights without consideration of the impact on these fish is irresponsible and illegal.

The PFO also fails to consider the impact, if any, of ORS 537.360 on this application. ORS 537.360 prohibits action on applications for instream water rights until the Water Resources Commission issues a final order approving or denying any pending hydroelectric applications.

d. <u>There is No Evidence that the Proposed Use Complies with the State Agency Agreement for Land Use</u>.

There is no evidence of any kind in the WRD file for this application indicating that Klamath County was ever notified of this application. There is no land use compatibility statement in the file. The Klamath County Comprehensive Plan and Land Development Ordinance recognize the value of this reach of the Klamath River for hydroelectric power purposes. The requirements of OAR 690, Division 5 have not been met. The water right cannot be granted unless they are met.

e. <u>Water is Not Available for the Proposed Use</u>.

The PFO correctly concludes that water is not available for the proposed use in the amounts requested. Although the proposed instream flows may not fully appropriate the source, no water is available for additional storage given the water rights already held by PacifiCorp. The PFO is incorrect in concluding that water is available for storage, and in any case, the proposed use does not involve storage.

For the reasons stated above, the public interest presumption of ORS 537.153(2) and OAR 690-77-033(1) is not met. Not only is water not available, as asserted by the PFO, the proposed use is not consistent with the Klamath Basin Compact, will injure existing water rights, and fails to comply with other rules of the WRD and state law relating to endangered species and land use.

4. The Proposed Use Cannot Be Found to be in the Public Interest Based on the Existing Record.

Under OAR 690-77-037(2), if the public interest presumption is not established, the WRD must determine whether the proposed use will impair or be detrimental to the public interest considering the factors listed in ORS 537.170(8). Rather than doing this, the PFO simply concludes that the proposed use is consistent with the public interest "up to the limits of the estimated average natural flows." This conclusion is based only on the general provisions of OAR 690-77-015(2), (3) and (4) without any consideration of the specific factors listed in ORS 537.170(8). The PFO conclusions regarding even the general provisions relied upon are incorrect.

First, under OAR 690-77-015(2), if instream rights are requested at levels that exceed available water, it is recognized that the instream right protects the remaining supplies from future appropriation and "establishes a management objective for achieving the amounts of instream flows necessary to support the identified public uses." Here, the management objectives necessary to support the identified public uses are not at all clear. The PFO, at a minimum, must address how the proposed flows actually achieve the management objectives contained in the applications.

Second, under OAR 690-77-015(3) the amount of water appropriated for "out-of-stream purposes" are not to be considered in determining the amount of an instream water right. This rule is simply inconsistent with state law, which recognizes that existing water rights must be protected in granting instream water rights. Beyond this, it is inapplicable here since the water rights held by PacifiCorp are largely not for out-of stream purposes. They are for hydroelectric generation instream.

Finally, as noted above, it is unclear whether the "estimated average natural flow" in this reach is accurately stated in the PFO. For these reasons, the PFO does not support the conclusion that the proposed use will not impair or be detrimental to the public interest.

If the WRD had actually considered the factors it is required to consider in order to issue an instream water right when the public interest presumption has not been established, it could not find that this application is in the public interest. An examination of the statutory standards reveals several public interests that the proposed use would impair. These interests include: (1) power development, ORS 537.170(8)(a) (any required release of water from storage would result in a reduction in power generating capacity); (2) public recreation, ORS 537.170(8)(a) (any drawdown of Upper Klamath Lake

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to meet the requested flows would adversely affect recreational opportunities on the Lake); (3) "the maximum economic development of the waters involved," ORS 537.170(8)(b) (the economic loss caused by the reduction of power generating capacity greatly exceeds the negligible economic impact of greater instream flow on this reach); (4) "the prevention of wasteful, uneconomic, impracticable or unreasonable use of the waters involved," ORS 537.170(8)(e) (maintenance of the requested instream flow would require costly and complex modifications to Klamath River Projects, without any corollary economic benefit); (5) the "vested or inchoate rights to the waters of this state or to the use of the waters of this state," ORS 537.170(8)(f) (the use would injure PacifiCorp's water rights unless further conditioned); and (6) interests under both federal and state threatened and endangered species rules.

As discussed above, the PFO fails to address the impacts of the proposed instream flows on threatened and endangered fish present in this river reach. There is every reason to believe that the requested instream flows are not consistent with the recovery planning efforts underway for the Lost River and shortnose suckers which are now underway with the FWS, the Bureau of Reclamation, the FERC and the Klamath Tribe. WRD should not issue this water right until impacts on endangered species are thoroughly evaluated and mitigated.

In addition, the PFO does not address the impacts of the proposed instream flow on the parameters limiting the water quality of this reach of the river. The reach is water quality limited. The effect of flows on temperature, recreation use levels (which contribute to fecal coliform loading), flushing of toxic materials, and other parameters is analyzed nowhere in the PFO. It is unclear what the effect of the requested instream flows will be on water quality, but the effect must be evaluated before a finding can be made that the requested flows will not adversely affect or impair the public interest.

Because the proposed use impairs the public interest according to the standards described in ORS 537.170(8), the Department is obligated to deny the application, unless it makes specific findings that, "considering all of the public interest factors listed in ORS 537.170(8) the issuance of an instream water right certificate will not impair or be detrimental to the public interest." OAR 690-77-037(5). Given the range of public interest factors that an instream water right would adversely affect, as described above, such findings would be impossible to make based on the existing record.

5. The Proposed Instream Water Right Is Restricted or Prohibited by the Federal Power Act.

The Department is required to assess potential statutory provisions in its technical review. OAR 690-77-029(1)(a). The PFO fails to address the effect of the Federal Power Act ("FPA") on ODFW's application, and is, therefore, deficient. If the PFO had considered the FPA, it would have been clear that the FPA precludes enforcement of the proposed instream right as against PacifiCorp's rights to generate electrical energy pursuant to its current or any future federal power license.

Several federal cases establish clearly that when Congress enacted the FPA, it asserted federal regulatory power over hydroelectric projects to the maximum extent of the federal government's constitutional authority, reserving to the states only their traditional authority to regulate out-of-stream, consumptive uses such as those associated with irrigation and municipal water systems. See First Iowa Hydro-Elec. Cooperative v. Federal Power Com'n, 328 US 152, 66 S Ct 906, 90 L Ed 1143 (1946); California v. FERC, 495 US 490, 110 S Ct 2024, 109 L Ed 2d 474 (1990); Sayles Hydro Associates v. Maughan, 985 F2d 451 (9th Cir 1993). In each case the court concluded that allowing states to enforce state instream flow requirements against federal licensees impermissibly conflicts with FERC's statutory duty to balance power and non-power values in licensing proceedings. Accordingly, the state instream flow requirements at issue in all three cases were held to be preempted by the FPA.[1]

Under the rule established by these cases, the proposed instream water right, whatever their legal effect with respect to other water users in the Klamath River Basin, are not enforceable against PacifiCorp.

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[1] In PUD No. 1 v. Washington Dept. of Ecology, 511 US 700, 114 S Ct 1900, 128 L Ed 2d 716 (1994), the U.S. Supreme Court recognized state imposition of minimum stream flows in the certification of a hydroelectric power plant. However, the holding in PUD No. 1 is inapplicable because that case involved permitting requirements under the Clean Water Act, which is not an issue in ODFW's application. In addition, the proposed power plant in PUD No. 1 had not yet received a license from FERC, so the minimum flow requirement did not interfere with the existing rights of a federal licensee.

6. The Proposed Instream Water Rights Flow Levels are Not Supported by the Record.

Oregon law limits the amount of water that may be included in a request for a new instream right to "the amount necessary to support those public uses as recommended by the State Department of Fish and Wildlife." ORS 537.336(1) (emphasis added). However, the proposed instream water rights exceeds the level of flow necessary to protect the intended public use.

a. ODFW's Use of the Oregon Method Is Impermissible.

According to the PFO, ODFW followed the so-called "Oregon Method" as the basis for its recommendations about the flows necessary to promote the stated public use. The results of a site specific implementation of the Oregon Method have not been provided to substantiate the flow rates in ODFW's application. Consequently, the PFO is flawed for failing to support its conclusion that the method of determining instream flow needs has been approved by administrative rule of the agency submitting the application.

b. No Support Exists for ODFW's Contention that the Requested Flows Are "Necessary."

Neither ODFW's application nor the Department's PFO provide any information about how ODFW applied the Oregon Method to arrive at its proposed flows for the Klamath River. The PFO states that ODFW relies on the following reports:

(a) Fish and Wildlife Resources of the Klamath Basin, Oregon, and Their Water Requirements, April 1970;

(b) Determining Minimum Flow Requirements for Fish, ODFW Report, January 20, 1984;

(c) Developing and Application of Spawning Velocity and Depth Criteria for Oregon Salmonids, Alan K. Smith, Transactions of the American Fisheries Society, April 1973;

(d) Determining Stream Flows for Fish Life, Oregon State Game Commission Report, March 1972; and

(e) A letter dated April 5, 1996, stating that the flows requested in this application are the minimum amount necessary to restore, protect and enhance populations and habitats of native wildlife species at self-sustaining levels.

None of the reports cited in the application provide specifics to support the proposed flows and none of them are in the WRD file for this application. ODFW's letter of April 5, 1996, contains only the bare assertion that the flows requested are the minimum amount necessary to maintain native wildlife. It provides no support for this claim. Without support for its numbers, ODFW fails to make even a minimal showing that the amount of water in its application is either "necessary" or reasonable. Without this information, the application is defective for seeking water not demonstrated to be in the public interest, and the PFO is deficient for failing to identify this flaw.

6. The Average Flow Data Fail To Take Into Account the Distinction Between Stored Water and Natural Flows.

The PFO states the estimated amount of "natural flows available from the proposed source" ranges from 1,330 cfs to 3,390 cfs. The report fails, however, to cite the source for this information. The report also fails to state whether the Department evaluated its "available water" analysis pursuant to the 80 percent availability requirement of the state water resources policy. OAR 690-400-010(11)(a).

Given the design and operation of the Klamath River System, it seems unlikely that average streamflows at these levels exist. Under Oregon law and the terms of PacifiCorp's hydroelectric license, releases of stored water are not "available" for new appropriation; they are being released for hydroelectric generation at PacifiCorp's downstream facilities.

C. CONCLUSION

As discussed in the preceding paragraphs, application 70813 and the Department's Proposed Final Order are defective on public interest and technical grounds. For that reason, PacifiCorp urges the Department to deny the application in its current form. PacifiCorp also requests that the Department recognize that significant water rights already exist on the Klamath River in both existing certificated rights and pre-1909 unadjudicated rights that call into question whether any new rights, instream or otherwise, can be issued.

PacifiCorp recognizes the important public policy considerations reflected in the instream water right statutes. Nonetheless, Congress and the Oregon legislature also have codified public policies in the statutes regulating the operation of hydropower operations. More important, the Oregon legislature and Water Resources Commission have established specific laws and regulations for approving applications for instream water rights. The application for (IS 70813) and its respective PFO are incorrect, incomplete and not consistent with Oregon laws and regulations. Accordingly, the WRD should issue an Order denying the application.

Please call if you have any questions or would like to meet with PacifiCorp to address its concerns.

Very truly yours,

Peter L. Serrurier

P-S:d-r
Enclosures

Figure 1. PacifiCorp and The New Earth Company facilities in the Upper Klamath Basin, Oregon, associated with the Klamath Irrigation Project.

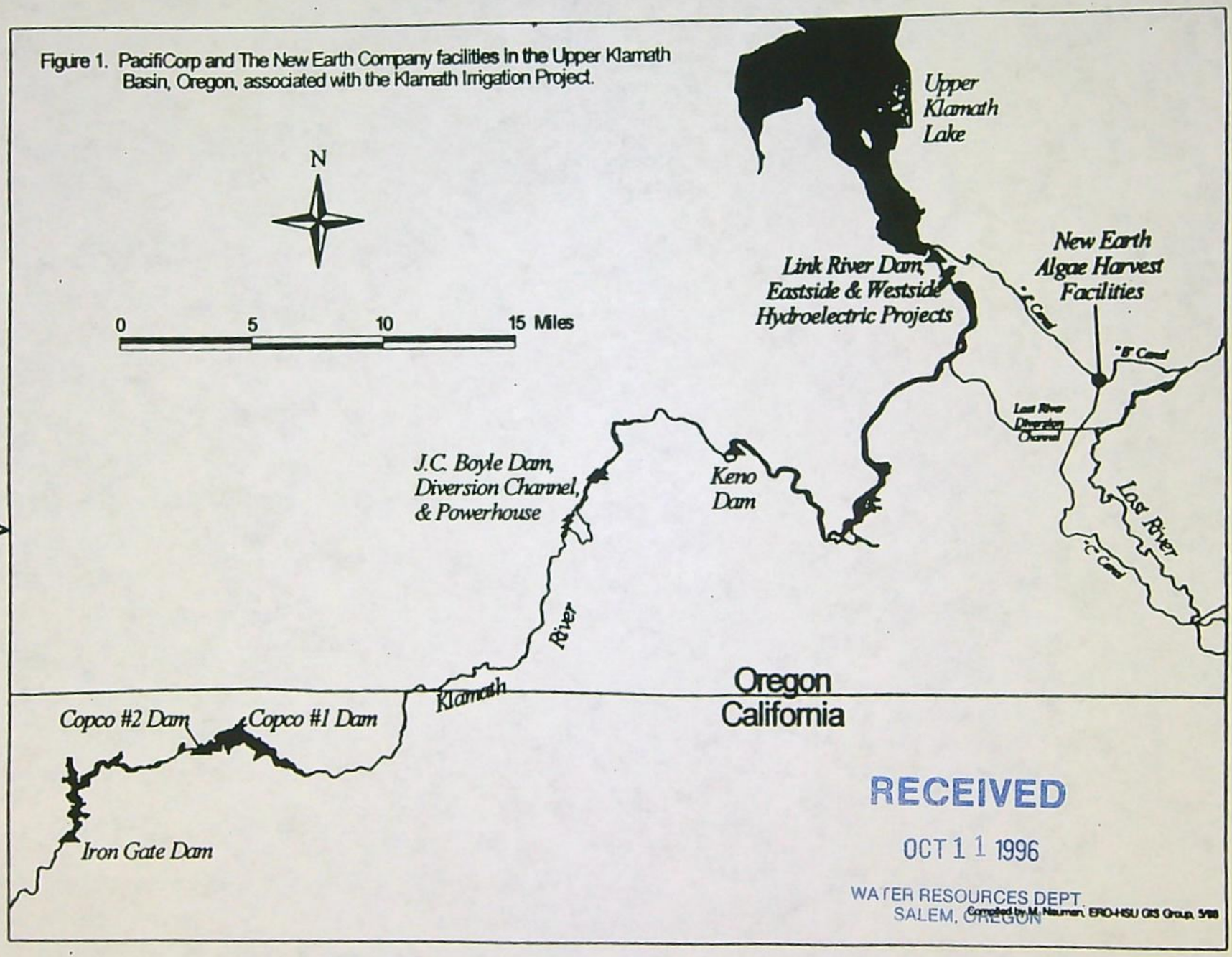

EXHIBIT A

S. DESOUSA

United States Department of the Interior

BUREAU OF RECLAMATION
Klamath Basin Area Office
6600 Washburn Way
Klamath Falls, Oregon 97603

IN REPLY REFER TO:

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KO-750
ENV-7.00

Mr. Steve Lewis
U.S. Fish and Wildlife Service
Klamath Falls Field Office
6600 Washburn Way
Klamath Falls, Oregon 97603

Subject: Formal Consultation on PacifiCorp and New Earth Operations Associated With the Klamath Project

Dear Mr. Lewis:

The Bureau of Reclamation is requesting formal consultation pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, as amended on PacifiCorp and The New Earth Company operations associated with the Klamath Project. Reclamation has prepared the enclosed biological assessment to guide in this formal ESA consultation.

If you have questions regarding the proposed action or analysis, please contact Mark Buettner at (541) 883-6935.

Sincerely,

Michael J. Ryan
Area Manager

Enclosure

cc: PacifiCorp
Stan A. deSousa
920 SW Sixth Ave
Portland OR 97204

New Earth Company
Darryl Kollman
1300 Main Street
Klamath Falls OR 97601

EXHIBIT B

BIOLOGICAL ASSESSMENT OF PACIFICORP AND THE NEW EARTH COMPANY OPERATIONS ASSOCIATED WITH THE KLAMATH PROJECT

June 1996

BIOLOGICAL ASSESSMENT OF PACIFICORP AND THE NEW EARTH COMPANY OPERATIONS ASSOCIATED WITH THE KLAMATH PROJECT

June 1996

1.0 INTRODUCTION

Reclamation has been developing a long-term operations plan (KPOP) for the Klamath Irrigation Project. The goals of this plan are to provide a template for continued water distribution to protect the endangered Lost River sucker (*Deltistes luxatus*) and shortnose sucker (*Chasmistes brevirostris*), provide agricultural water supplies, maintain the Tule Lake and Lower Klamath Lake National Wildlife Refuges, protect anadromous fisheries below Iron Gate Dam and support Indian Trust Assets. This plan will be finalized after completing the requirements of the National Environmental Policy Act (NEPA) of 1969, as amended. Reclamation expects to complete the NEPA process in the spring of 1997.

Reclamation has committed to formal consultation pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, as amended, on the effects of the Klamath Project Operations Plan. A biological assessment (BA) on KPOP will be finalized after the NEPA process is completed. It is anticipated that the BA and biological opinion (BO) will be completed before spring 1997. Until the consultation process is completed, Reclamation will operate under the existing BO, dated July 22, 1992 pertaining to the long-term operation of the Klamath Project. This opinion was partially modified by a BO dated August 11, 1994 that relates to operations at Clear Lake. The 1992 BO determined that Reclamation's proposed operation would likely jeopardize the continued existence of the Lost River sucker and shortnose sucker but would not likely jeopardize the continued existence of the bald eagle. The BO included reasonable and prudent alternatives and incidental take statements.

PacifiCorp and The New Earth Company (New Earth), two private corporations, have operations that are closely linked to Reclamations in the Upper Klamath Basin and who have new actions since 1992 that were not considered in previous consultations. New Earth harvests algae from Klamath Project canals and is required to obtain a permit from Reclamation for this activity. They have recently proposed major expansion of their facilities to harvest all water entering the A Canal and are seeking a permit amendment.

PacifiCorp operates Link River Dam pursuant to a contract with Reclamation. The contract gives them considerable latitude in regulating Upper Klamath Lake levels and Klamath River flows so long as irrigation supplies are not threatened. If that should happen Reclamation reserved the right to operate the lake. PacifiCorp also operates six hydroelectric projects on the Klamath River mainstem from Link River Dam to Iron Gate Dam.

PacifiCorp and New Earth have also been brought into this consultation process to request incidental take statements and also leverage greater benefits for the protection and recovery of the listed species. This BA describes PacifiCorp/New Earth actions, analyzes effects, and proposes biologically sound mitigation actions for those effects. The mitigative actions are designed to help restore the form and function of the Lower Williamson River to assist in larval and juvenile sucker survival and recruitment. Species to be addressed in this consultation are the Lost River and shortnose sucker. The area of consultation is Upper Klamath Lake, Link River Dam and associated facilities, B and C canal algae harvest facilities, and all Klamath River downstream reservoirs that potentially affect listed suckers.

2.0 PROJECT DESCRIPTION AND PROPOSED ACTION

2.1 PacifiCorp's Klamath Hydrofacilities

Within the Klamath River basin, defined here as River Mile (RM) 190 to headwaters, PacifiCorp owns and operates six hydroelectric projects on the Klamath River mainstem (Figure 1). The Link River Dam and associated Eastside and Westside projects are the most upstream projects (RM 253.7) located within the city limits of Klamath Falls, Oregon. Keno Dam is operated as a regulation facility and has no hydrogeneration facilities. J.C. Boyle (RM 225), Copco 1 (RM 199) and Copco 2 (RM 198) developments are hydrogeneration facilities. The Iron Gate development is furthest downstream (RM 190).

2.1.1 Link River Dam and Upper Klamath Lake

General Description:

Link River Dam provides regulation of Upper Klamath Lake, diverts water to the Eastside and Westside powerhouses, maintains a minimum flow in the Link River reach between the dam and the Eastside Powerhouse, and is operated pursuant to a contract between PacifiCorp (formerly Copco) and Reclamation. Should operations threaten irrigation supplies, Reclamation reserves the right to direct facility operation. Reclamation owns the dam while PacifiCorp owns the canals that carry water to the powerhouses.

There are no fish screens at the headworks of the power canals or the outflow from the dam to the Link River. A pool and weir type fish ladder was constructed in 1926 and modified with a vertical slot entrance pool in 1988. The ladder consists of 11 pools, is approximately 105 feet long, and provides for approximately 13 feet in elevation gain. Flow through the ladder is dependent upon Upper Klamath Lake water surface elevation. Flow to the ladder is adjusted manually by PacifiCorp operators.

Statistical Information

Location: Section 30, Township 38 South, Range 9 East, WM
River Mile: 254
Type of Dam: Concrete - reinforced concrete slab
Constructed: 1921
Dam Height: 15 feet
Spillway Crest: 4,143.3 feet
Intake Elevation: 4,121.3 feet, Eastside powerhouse
4,125.5 feet, Westside powerhouse
Storage: 523,700 acre - feet
Inactive Storage: 211,300 acre - feet
Dead Storage: 126,000 acre - feet
Surface Area: 85,000 acres
Shoreline: 98 Miles
Watershed: 3,800 Square Miles
Annual Inflow: 1,300,000 acre - feet, on average
Operator: PacifiCorp

Operations:

PacifiCorp operates the reservoir by following an envelope dictated by spring run-off conditions (Figure 2). The operating envelope provides a margin of safety that is required for flood protection. Specific lake levels were identified in the 1992 BO to protect endangered shortnose and Lost River sucker populations. In dry years the

reservoir undergoes a deeper drawdown in the fall months than in wet years. During the drawdown period, operations must balance downstream needs, irrigation requirements, power demands, and maintain a sufficient carryover storage. Typical diversions to the two powerhouses are 1,200 cubic feet per second (cfs) at Eastside and 250 cfs at Westside. The Westside Plant is only used when the Eastside Plant is at maximum capacity and additional water is needed to control either Upper Klamath Lake or Lake Ewauna water levels. Generating capacities for the two plants are 3.2 MW at Eastside and 0.6 MW at Westside. Six spill gates and numerous removable stop logs can be used to adjust Upper Klamath Lake elevations or provide water downstream.

2.1.2 Keno

General Description:

Keno Dam is located approximately 24 RM downstream of Link River Dam. The Keno development operates Lake Ewauna levels, J. C. Boyle inflows, and minimum flow requirements below the Iron Gate development. There are no power generating facilities at this project. A 24 pool weir and orifice type fish ladder is available for fish passage at the Keno facility. This fish ladder provides 19 feet of vertical passage in approximately 350 feet. The fish ladder was constructed in 1967.

Statistical Information

Location: Section 36, Township 39 S, Range 7 E, WM
River Mile: 230
Type of Dam: Concrete
Constructed: 1967
Dam Height: 25 feet
Spillway Crest: 4,085.0 feet
Storage: 18,500 acre - feet
Inactive Storage: N / A
Surface Area: N/ A
Shoreline: N/ A
Watershed: 3,955 Square Miles
Operator: PacifiCorp

Operations:

Operations of the Keno project reflect Lake Ewauna water level control, J.C. Boyle Reservoir (the downstream hydroelectric project also operated by PacifiCorp) inflow, and Iron Gate Dam (the furthest downstream hydroelectric project on the system) minimum flow requirements. PacifiCorp has an agreement with Oregon Department of Fish and Wildlife (ODFW) to release a minimum stream flow of 200 cfs at the dam. To assure this flow is almost always met, the project is operated using a minimum release of 250 cfs.

2.1.3 J. C. Boyle

General Description:

The project consists of a dam, diversion canal, and two generators (located 4.3 RM downstream of dam). Flow released from the dam into the bypass reach, the reach of the Klamath River between the dam and the powerhouse, is approximately 100 cfs. Springs within the bypass reach supply an additional 250 to 300 cfs of accretion flow to the river. Spencer Creek is the only perennial tributary to Klamath River between Keno and J. C. Boyle Dam.

The intake from the dam to the power canal is screened with four vertical traveling screens with high pressure spray cleaners. New fiberglass screens with 1/8 inch mesh replaced metal screens about 1992. A weir and orifice fish ladder with 57 pools is available for passage. The ladder is approximately 569 feet long and the change in elevation between pool 1 and pool 57 is approximately 67 feet. The fish ladder was constructed in 1958.

Statistical Information

Location: Section 6, Township 40 South, Range 7 East, WM
River Mile: 225
Type of Dam: Earth fill
Constructed: 1958
Dam Height: 68 feet
Spillway Crest: 3,781.5 feet
Intake Elevation: 3,775.0 feet
Storage: 3,377 acre - feet
Inactive Storage: 1,980 acre - feet
Surface Area: 420 acres
Shoreline: 7.5 Miles
Watershed: 4,080 Square Miles
Operator: PacifiCorp

Operations:

Normal operation at the J. C. Boyle project is to generate electricity at efficient loadings. Generation occurs when there is sufficient water available for efficient use of one or both turbines. As a result, flows below the powerhouse may fluctuate on a daily basis, based on the amount of water available to the plant. River fluctuation is limited to a 9 inch per hour ramp rate as established in the FERC license (FPC 1961). Combined hydraulic capacity of both generators is approximately 2500 cfs. Generation capacity is 88 MW through two units (one of 43 MW and the other 45 MW). High river flows may allow continuous operation of the powerhouse. During cold weather conditions, the plant generates power continuously, not necessarily at peak efficiencies. This practice prevents ice damage to the canal or equipment.

2.1.4 Copco No. 1

General Description:

The Copco development operates for power generation, flood control, and Copco and Iron Gate reservoir water surface elevation control. The Copco No. 1 powerhouse is located at Copco Dam. Water diverted through the Copco No. 1 plant is directed to the Copco No. 2 plant (see below) approximately 1/2 mile downstream.

There are no fish passage facilities associated with this project.

Statistical Information

Location: Section 29, Township 48 North, Range 4 West, MDM
River Mile: 199
Type of Dam: Concrete gravity arch
Constructed: 1918
Dam Height: 126 feet
Spillway Crest: 2,593.5 feet

Intake Elevation: 2,577.5 feet, penstock 1
2,579.5 feet, penstock 2
Storage: 45,390 acre - feet
Inactive Storage: N / A
Surface Area: 1,000 acres
Shoreline: 13.2 Miles
Watershed: 4,300 Square Miles
Operator: PacifiCorp

Operations:

The Copco No. 1 development is operated on a peak-load basis, and has a flow capacity of 3,000 cfs. The powerhouse can produce up to 20 MW through two units. Typically this facility is operated to generate during the day, when energy demands are highest, and store water during the non-peak times (week nights and weekends). During periods of high river flow the powerhouse generates continuously. Water is spilled through as many as 13 spill gates when the powerhouse is generating at capacity and storage capacity is maximized.

2.1.5 Copco No. 2

General Description:

The Copco No. 2 development consists of a diversion dam, flowline, and powerhouse (located 1.4 RM downstream of Copco No. 2 Dam). The reservoir created by the dam has minimal storage capacity. As a result, Copco No. 2 is entirely dependant upon Copco No. 1 for water to generate with and functions as a slave to the Copco No. 1 plant.

There are no fish passage facilities associated with the Copco No. 2 project.

Statistical Information

Location: Section 29, Township 48 North, Range 4 West, MDM
River Mile: 198
Type of Dam: Concrete gravity with an earth fill wing
Constructed: 1925
Dam Height: 33 feet
Spillway Crest: 2,473.0 feet
Intake Elevation: 2,439.0 feet
Storage: 73.5 acre-feet
Inactive Storage: N / A
Surface Area: 40 acres
Shoreline: 0.7 Mile
Watershed: 4,305 Square Miles
Operator: PacifiCorp

Operations:

Copco No. 2 operation follows that of Copco No. 1 (see preceding section on Copco No.1 for details). Flow capacity of Copco No. 2 is 3,000 cfs and generating capacity is 27 MW through 2 units. Water is spilled over the spillway crest when flows from Copco No. 1 exceed the hydraulic capacity of and exhaust the limited storage capacity of this project.

2.1.6 Iron Gate Dam

General Description:

Iron Gate Dam is located at RM 190 of the Klamath River and serves as the downstream-most regulating point on the system. The FERC has established a minimum instream flow schedule to protect downstream aquatic resources as a condition of PacifiCorp's project license. Minimum flows are 1,300 cfs from September through April; 1,000 cfs in May and August; and 710 cfs in June and July. There are no fish passage facilities at the dam.

Iron Gate Fish Hatchery is located downstream of the dam. PacifiCorp owns the hatchery and California Department of Fish and Game (CDFG) operates the facility which produces fall chinook salmon, coho salmon, and steelhead. The hatchery receives 20 to 55 cfs from Iron Gate Reservoir as needed.

Statistical Information

Location: Section 9, Township 48 North, Range 5 W, MDM
River Mile: 190
Type of Dam: Rock fill
Constructed: 1962
Dam Height: 173 feet
Spillway Crest: 2,328.0 feet
Intake Elevation: 2,299.0 feet
Storage: 58,794.0 acre - feet
Inactive Storage: N / A
Surface Area: 944.0 acres
Shoreline: 13.5 Miles
Watershed: 4,563 Square Miles
Operator: PacifiCorp

Operations:

The Iron Gate project is operated for base load generation (up to 18 MW) and to provide the required minimum flows downstream of the project. The Iron Gate project has a hydraulic capacity of 1,735 cfs. During periods of high flow when storage is not possible, water in excess of generating capacity is passed through the project via an uncontrolled spill crest and canal.

2.2 The New Earth Company Algae Harvest Facilities

2.2.1 C Canal Algae Harvest Facility

General Description and operations:

New Earth operates and maintains an algae harvesting and processing facility at the head end of the C Canal under permit by Reclamation (Figure 1). All of the water that flows down the C Canal (average flow 535 cfs) will pass through 630 ft. sq. of debris reduction devices (DRDs) to remove coarse debris (3/8 inch mesh). Operation of the DRDs will be ensured by manual removal and cleaning several times a day. Water is then routed through a series of distributary pipes to the screening infrastructure. At that structure, water is passed by gravity flow over a series of fine mesh algae harvest screens that are elevated above the C Canal. The algae and any entrained

larval fish are removed and the water returned to the C Canal downstream of the harvest facility. Algae concentrated on the screens is washed into collection channels adjacent to the screens and pumped in a slurry to the processing building adjacent to the canal.

In all described harvest senarios, the described harvest period will vary slightly depending on algae growing conditions in the lake. In general, algae harvest takes place during the summer when the algae is most concentrated, approximately June 1 to October 15. During harvest the fine mesh screens from which the algae is harvested are operated 24 hours a day. During 1995, approximately 20% of the flow from the C Canal during the harvest season was passed through the facility screens. In 1996, additional screens are being added to allow for processing of 100% of the C Canal flow.

2.2.2 B Canal Algae Harvest Facility

General description and operations:

New Earth has received approval from Reclamation to expand their facilities at the C Canal to harvest algae from the adjacent B Canal. A total of six pumps will deliver water from behind 450 ft. sq. of DRDs located within the walls near the head of the B Canal to a series of fine mesh algae harvest screens suspended above the B Canal. There, algae and any entrained larval stage fish will be removed. In combination with the C Canal harvest operation, this process allows New Earth to harvest virtually all algae from water that flows through the A canal without blocking fish from passing down the B Canal and possibly into the Lost River. DRDs (3/8 inch mesh) will be operated 24 hours a day, during all algae harvest activities. Operation of the DRDs will be ensured by manual removal and cleaning several times a day.

2.2.3 Eastside Diversion Canal at the Link River Dam (future operations)

General description and operations:

PacifiCorp maintains two hydroelectric facilities at the Link River Dam, Eastside and Westside. New Earth has entered into an agreement with PacifiCorp to harvest algae from these diversions. As water leaves the Link River and flows into the Eastside diversion canal it will pass through 900 ft. sq. (based on high water mark) of entrainment reduction devices (ERDs) which will reduce entrainment of fish and remove coarse debris (3/8 inch mesh). These devices will be "Service-approved ". It is anticipated that these devices will be effective in keeping most juvenile (age 1 and older or > 75 mm) and adult suckers out of the power canals. After the water has entered the canal, up to twenty 50 cfs pumps (1000 cfs maximum) will lift it onto a series of fine mesh algae harvest screens which will be suspended above the canal. There, the algae and any entrained larval and age 0 juvenile suckers will be removed. After harvest of algae, the water will fall through the screens and back into the canal on its way to the powerhouse. The concentrated algae slurry will be pumped to the A Canal about one-quarter mile away, where it will float downstream to the C and B canal algae harvest facilities.

During the summer harvest period, flows in the Eastside Diversion will depend on water supplies in Upper Klamath Lake and demands for power by PacifiCorp. The fine mesh algae harvest screens will be operated 24 hours a day as long as the algae composition and densities are acceptable to New Earth. ERDs will be operated 24 hours a day, during all algae harvest activities or between June 1 and October 15, whichever is greater beginning in 1997. They will be manually removed and cleaned several times a day.

2.2.4 Westside Diversion Canal at the Link River Dam (future operations)

General description and operations:

During the summer harvest period, up to 200 cfs. could be demanded by PacifiCorp for power generation in the Westside Diversion Canal. As the water leaves the Link River it will pass through 200 ft. sq. (based on high water mark) of ERDs which will reduce entrainment of juvenile (age 1 and older) and adult suckers and remove coarse debris (3/8 inch mesh). These devices will be "Service-approved ". It is anticipated that these devices will be effective in keeping most juvenile (age 1 and older) and adult suckers out of the power canals. After the water has entered the canal, up to eight 25 cfs. pumps will lift it onto a series of fine algae harvest screens which will be suspended above the canal. There, the algae and any entrained larval and age 0 juvenile suckers will be removed. After harvest of algae, the water will fall through the screens and back into the canal on its way to the turbine. The fine meshed algae harvest screens will be operated 24 hours per day as long as algae composition and densities are acceptable to New Earth. As with the Eastside operations, the concentrated algae will be pumped as a slurry to the A Canal where it will float downstream to the B and C canal algae harvest facilities. ERDs will be operated 24 hours a day, during all algae harvest activities or between June 1 and October 15, whichever is greater beginning in 1997. Operation of the ERDs will be ensured by manual removal and cleaning several times a day.

2.3 PROPOSED ACTION

Reclamation herein proposes to initiate consultation regarding PacifiCorp and New Earth activities and impacts within the Upper Klamath Basin, Oregon and California. Reclamation's operations are covered by the July 22, 1992 and August 11, 1994 Biological Opinions and Incidental Take Statements. Reclamation's additional Project-related impacts will be addressed through the KPOP consultation which will be completed by winter 1997.

As described below, New Earth proposes to operate algae harvest facilities within the Klamath Project at a site near the junction of Reclamation's B and C canals and at the Eastside and Westside canals at the Link River Dam. They have requested Reclamation issuance of a license to operate. Operation of these facilities are contingent on the completion of this consultation and subsequent implementation of the necessary measures required in the BO. Additional mitigative actions are described below.

As described below, PacifiCorp proposes to operate Link River Dam and associated facilities in compliance with the 1992 BO and the contract with Reclamation. Continued operation of five hydrofacilities on the Klamath River are also proposed. Operation of these facilities are contingent on the completion of this consultation and subsequent implementation of the necessary measures required in the BO. Additional mitigative actions are described below.

2.3.1 PacifiCorp Hydrofacilities Operations

PacifiCorp proposes to operate it's facilities at the Westside and Eastside hydrofacilities at Link River Dam, Keno Dam, J. C. Boyle Dam, Copco No. 1 and Copco No. 2, and Iron Gate Dam as described above in PacifiCorp Klamath Hydrofacilites (2.1). They are operating in compliance with a licence with the Federal Energy and Regulatory Commission. Operations will comply with maintanence of flows below Iron Gate Dam identified in the previous section.

2.3.2 The New Earth Company Algae Harvest Operations

In 1996, New Earth proposes to operate it's facilities on the C and B canals in compliance with a license issued by Reclamation, as amended (*see* 2.2 - The New Earth Company Algae Harvest Facilities). In 1997-1998 they plan to expand operations to include harvest facilities at PacifiCorp's Eastside and Westside power diversions at Link River Dam.

Discussions between the Service, Reclamation, PacifiCorp and New Earth have identified PacifiCorp and New Earth Company's operational impacts to the Lost River and shortnose suckers from Upper Klamath Lake downstream to Iron Gate Reservoir. The impacts are discussed in Section 4.0 - Effects of Project Operations. As a result of these discussions, PacifiCorp and New Earth in consultation with Reclamation and the Service agreed upon a combination of long-term and short-term measures intended to avoid jeopardizing the listed Lost River and shortnose suckers. The purchase of Tulana Farms as offsite habitat is the primary mitigation measure and agency, tribal and PacifiCorp and New Earth biologists expect that the restoration of offsite habitat at Tulana Farms in the Williamson River Delta will significantly benefit the Lost River and shortnose suckers over time. *See* Lower Williamson River Restoration Project - Tulana Farms Initial Biological Justification (April 1996). The ways and means by which restoration may be accomplished are still unknown, however the scientists collectively project the restoration effort will significantly increase the number of surviving sucker larvae which should in turn benefit the species as a whole.

The purchase of Tulana Farms is the major mitigation measure in this consultation, however, because the restoration of Tulana Farms is a long-term project, the following short-term mitigation measures were included in the consultation: entrainment reduction study (PacifiCorp), entrainment reduction devices at Link River power canal headgates during algae harvest season (New Earth Company), flood control study (PacifiCorp), genetics management study (PacifiCorp), and reservoir sucker population status studies (PacifiCorp). In addition, New Earth Company have agreed to a number of conservation measures including: endangered sucker and water quality monitoring, entrainment reduction study and the Fremont Bridge wetland restoration.

The Service may determine that it is necessary to reinitiate consultation on the Lost River and shortnose suckers at some future date if there is significant new information and after a thorough consideration of the status of the species overall.

2.3.3 PacifiCorp Action Items - PacifiCorp agrees to include the following action items that demonstrate their committment to the survival and recovery of the endangered suckers.

1) Entrainment Reduction Study - Data on sucker entrainment rates into the unscreened hydropower diversions at Link River Dam are lacking. The primary goal of this study is to determine the timing, size, magnitude, and duration of juvenile (age 1 and older or > 75mm) and adult sucker entrainment into the Eastside and Westside diversion canals. Entrainment will be evaluated during the period when entrainment reduction devices are not in operation, October 15 through May 31 (season). This study will be conducted in coordination with New Earth, Reclamation, ODFW and the Service. A study design will be "Service-approved" prior to implementation. It is anticipated that these studies will be conducted over two seasons and will be completed by May 31, 1999, with the intent of beginning field activity during 1996.

2) Genetics Management Plan - Management of endangered Lost River sucker and shortnose sucker populations has been complicated by the lack of genetic information and conflicting taxonomic status. These species also display highly variable morphological characteristics that have led to concern over potential hybridization/introgression among sucker species. This study is designed to determine the genetic relationships among four Klamath Basin sucker species, differences within the endangered species, and whether or not these species are presently hybridizing or may have hybridized in the past. This information will be used to improve management of the different stocks of endangered suckers and is essential for any future hatchery operations.

Although the Service listed the Lost River and shortnose suckers as taxonomic species and not distinct population segments, the Service believes there are important spawning subpopulations of suckers found in Upper Klamath Lake. As a result, PacifiCorp has agreed to cost share with Reclamation and other agencies to perform additional taxonomic and genetic studies. Reclamation made a collection of suckers throughout the Upper Klamath Basin in 1993 that can be used for these additional taxonomic and genetic studies. Findings from this research will be used to develop a genetics management plan that will guide management of sucker populations and potential future hatchery supplimentation. This work is tenatively scheduled to begin in October 1996 and continue for 3-4 years. PacifiCorp will fund these studies in a pro rata share amount not to exceed $80,000 total.

3) **Sucker Population Status** - Very little information is known about the endangered sucker populations in the Klamath mainstem reservoirs (J.C.Boyle, Copco, and Iron Gate). PacifiCorp will coordinate with Reclamation, ODFW, California Department of Fish and Game and the Service to develop a scope of work for sucker studies on the mainstem reservoirs. Study objectives are likely to include: determination of distribution and abundance, age class structure, recruitment success and habitat use by different life stages. A study design will be "Service-approved" prior to implementation. It is anticipated that the study period would be from 1997 to 1999. PacifiCorp will fund these studies and analyses in their entirety.

4) **Sucker Nursery Habitat Restoration** - Recent research on factors limiting sucker populations in Upper Klamath Lake indicates that a bottleneck exists at the larval life stage. Poor larval survival in sucker nursery habitat areas appears to be related to degraded water quality, predation, and lack of emergent vegetation habitat. The 1992 Klamath Project biological opinion analyzed a mitigation measure for marsh restoration construction and assessment. Based on this commitment, Reclamation, the Service, The Nature Conservacy (TNC), Natural Resources Conservation Service (NRCS), PacifiCorp, and New Earth have cooperatively proposed funding, restoring and maintaining a property on the Lower Williamson River. This restored habitat would be designed and managed to benefit riverine and lake water quality, reduce larval predation, and substantially increase larval sucker habitat in historic locations.

PacifiCorp and New Earth propose to invest 1.8 million dollars combined in the purchase of Tulana Farms with TNC and NRCS and propose to commit $75,000 each per year for ten years or the equivalent present net worth in lump sum to the operation and maintenance of the property. If unforeseen circumstances occur, and the purchase of Tulana Farms with TNC and NRCS does not materialize, PacifiCorp and New Earth agree to pursue the option to purchase Tulana Farms or other offsite habitat mitigation, such as Goose Bay Farms. PacifiCorp and New Earth agree to acquire property identified for offsite mitigation by January 1, 1997. If an acquisition is not facilitated, the Incidental Take Statements will become invalid and reinitiation of consultation will be required.

As proposed, approximately 1,000 acres of Tulana Farms would be excluded from the NRCS conservation easement. The NRCS and TNC with the assistance of the Lower Williamson River Restoration Team (LWRRT) will determine the precise location of these agricultural lands to be excluded from the easement. PacifiCorp is evaluating purchasing the agricultural lands in order to assist TNC with the purchase of Tulana Farms. If PacifiCorp purchases the agricultural lands, they will work with the Service to ensure that the management of these lands are consistent with the protection of the suckers under the ESA. The Service maintains the ability to reinitiate consultation with PacifiCorp via Reclamation if agricultural practices are still occurring on the land after 10 years.

PacifiCorp and New Earth will assist in formation of and participate in the LWRRT for the Lower Williamson River restoration program including representatives from Reclamation, Service, ODFW, TNC, NRCS, and the Klamath Tribes. This technical team will, among other activities, develop a recommended long-range restoration plan and associated monitoring schedule for the property and provide annual work plans to the Management Committee. The Management Committee will be made up of representatives from Reclamation, Service, ODFW, TNC, NRCS, New Earth, PacifiCorp and the Klamath Tribes.

A Management Committee will oversee the LWRRT's activities and also address non-technical issues. TNC would operate Tulana Farms and will act in good faith to implement the recommendations of the LWRRT. If the LWRRT is unable to reach consensus on the Restoration Plan, TNC may nonetheless continue to take reasonable steps to restore Tulana Farms, consistent with the incidental take statements applicable to PacifiCorp and New Earth. Restoration project success will be monitored via specific habitat and larval production criteria, as developed by the LWRRT. The Service would review the long-term restoration plan and the annual work plans to ensure consistency with the incidental take statements.

5) **Re-evaluate Flood Operations Plan for Upper Klamath Lake** - A review of scientific data pertaining to endangered suckers in Upper Klamath Lake suggests that elevations higher than those listed as Reasonable and Prudent Alternatives in the 1992 BO are necessary to provide habitat for sucker spawning, larval and juvenile rearing, and water quality protection. Some of these elevations, particularly those during late winter and early spring, are outside of PacifiCorp's operating envelope for Upper Klamath Lake.

PacifiCorp will develop a scope of work that includes consideration of the flood control rule curves, operational constraints, hydropower and shoreline habitat benefits to the suckers. The scope of work will be reviewed by Reclamation and the Service. PacifiCorp will complete the re-analysis of the Flood Operations Plan by October 1996.

2.3.4 THE NEW EARTH COMPANY ACTION ITEMS - New Earth agrees to include the following action items that demonstrate their committment to the survival and recovery of the endangered suckers. These items are also incorporated as conditions of the amended licence issued by Reclamation.

1) **Sucker Nursery Habitat Restoration** - Same as #4 PacifiCorp action item above.

2) **Entrainment Reduction Devices** - New Earth will install and maintain 3/8 inch mesh entrainment reduction devices (ERDs) at the Eastside and Westside diversion canals at the Link River Dam during all algae harvest activities or between June 1st through October 15, whichever is greater, for ten years or the remaining life of the FERC permit, beginning June 1, 1997 regardless of whether algae harvest activities have commenced. This size mesh is believed to be adequate to exclude suckers greater than 75 mm, or age 1 and older. The ERDs will be operated 24 hours a day. They will be manually removed and cleaned several times a day.

2.3.5 New Earth Conservation Measures - The following are additional research and conservation measures proposed by New Earth. None of the four actions described below will require reinitiation of this consultation upon completion of the individual activity. Reclamation and the Service believe these activities are important in developing additional information on the endangered suckers and therefore support their progressive implementation by New Earth.

1) **Endangered Sucker Monitoring** - Endangered sucker research will be conducted in relation to algae harvest activities at the B and C canal harvest facilities. Lifestages targeted include larval, juvenile, and adult forms. In coordination with the Service and Reclamation, New Earth proposes a study to determine the extent to which fish respond to algae harvest operations, debris reduction devices and associated water quality changes . Research will focus on identifying species composition, timing, and magnitude during entrainment. It is anticipated that this study will be initiated in 1996 and conducted over two years.

2) **Water Quality Monitoring** - New Earth will be harvesting large quantities of algae from the C and B canals and has plans to expand it's harvest operations to PacifiCorp's Eastside and Westside power diversions. These activities are expected to improve water quality conditions in the Lost and Klamath rivers below their operations.

New Earth will begin monitoring water quality conditions above and below harvest operations at the B and C canals in 1996. Link River monitoring will be initiated during the 1997 harvest season.

3) Entrainment Reduction Study - New Earth will participate in a study to determine the timing, size, magnitude, and duration of juvenile (age 1 and older or >75mm) and adult sucker entrainment into the Eastside and Westside diversion canals. Entrainment will be evaluated during the period when entrainment reduction devices are not in operation, October 15 through May 31 (season). This study will be conducted in coordination with PacifiCorp, Reclamation, ODFW, and the Service. A study design will be "Service-approved" prior to implementation. It is anticipated that these studies will be conducted over two seasons and will be completed by May 31, 1999, with the intent of beginning field activity during 1996.

4) Fremont Bridge Wetland Restoration - New Earth has acquired 3.5 acres at the Fremont Bridge on the Link River. They plan to restore approximately 1.5 acres to a functioning wetland which will potentially provide sucker nursery habitat, and enhance local water quality conditions. The site will have public access and will serve as an interpretive site for wetlands education. It is anticipated that restoration activities will be conducted over the next several years beginning in summer 1996.

3.0 CHAPTER 2 - GENERAL BIOLOGY OF THE ENDANGERED SUCKER SPECIES POTENTIALLY AFFECTED BY THE PACIFICORP AND NEW EARTH PROJECTS

3.1 Introduction

Reclamation formally consulted on the effects of long-term operation of the Klamath Project on the bald eagle, Lost River sucker, shortnose sucker and American Peregrine Falcon in 1992. A biological assessment was completed on February 28, 1992 and the Service completed a biological opinion on July 22, 1992. The Service also wrote a recovery plan for the Lost River and shortnose sucker (April 1993). Descriptions of the general biology and life history of these species can be found in these documents. This assessment provides new scientific data developed subsequent to these earlier activities. Substantial research activity has been completed over the last few years particularly for Upper Klamath Lake suckers.

3.2 Endangered Suckers

3.2.1 Klamath River

Sucker population status information through 1992 has been previously summarized (USFWS 1993, 1994). In November 1992, Reclamation sampled six sites in Lake Ewauna over 4 days using trapnets (Buettner unpublished data). Three juvenile shortnose suckers were captured. They were 177, 179, and 202 mm FL. A fish survey from Lake Ewauna to Keno Dam was conducted during the summer of 1993 (Hummel 1993). Hummel captured six juvenile shortnose suckers ranging in size from 205 to 324 mm FL. Based on scale analysis these fish appeared to be 2-4 years old. Infrequent sampling of the Klamath River near Miller Island was conducted by the ODFW in conjunction with Mazama High School since 1991; juvenile suckers and a few adult Lost River and shortnose suckers were captured during these trapnetting activities (Smith pers. comm.). Water quality in Lake Ewauna seasonally drops to extreme lows in terms of dissolved oxygen (DO), making this habitat virtually inhospitable to suckers. Reclamation has been collecting water quality data routinely since 1992 using Hydrolab multiparameter instruments. The data was recently summarized by CH2M HILL and used to model water quality in the Klamath River as part of the Oregon Department of Environmental Quality TMDL process (CH2M HILL 1995).

The ODFW and PacifiCorp conducted a fish passage investigation on the Klamath River at Link River, Keno, and J.C. Boyle dams from 1988-1991 to determine upstream and downstream fish migration patterns. Ladders were

checked daily on weekdays. The study documented small numbers of suckers migrating through the Link River and Keno ladders. No suckers were found using the J.C. Boyle ladder. Most suckers migrating through the Keno ladder were Klamath smallscale suckers with very few Lost River and shortnose suckers. Two Lost River and 4 shortnose suckers passed through the Link River ladder in 1988.

The Oregon Department of Environmental Quality collected four adult Lost River suckers and one Klamath largescale sucker from J.C. Boyle in 1986 while collecting fish samples for environmental contaminants (Ziller pers. comm.). Population survey information was collected in August 1988 by ODFW and the Service (Buettner unpublished data). Adult Lost River and shortnose suckers were captured by boat electrofishing at night above the Highway 66 bridge up to Spencer Creek. Twelve juvenile and adult Lost River suckers and six shortnose suckers were collected. Several dozen Klamath smallscale suckers and a few Klamath largescale suckers were also captured. In 1993, Reclamation sampled J.C. Boyle eight times collecting 20 shortnose suckers, one Lost River sucker, 30 Klamath smallscale suckers, and 6 Klamath largescale suckers. ODFW conducted an electrofishing survey at J.C. Boyle on June 14, 1995. They captured 32 juvenile suckers but did not identify the species.

Lost River and shortnose suckers were captured from Copco Reservoir in the 1950's and early 1960's (Coots 1965). An overview of population monitoring in Copco Reservoir is presented in the Shortnose and Lost River Recovery Plan (USFWS 1993). Shortnose sucker spawning runs were sporatically sampled in 1988, 1990, and 1991 by personel from CDFG and the Service (Buettner unpublished data). Sampling in the Klamath River approximately 2-3 km upstream, during April and May commonly encountered adult shortnose suckers. Shortnose suckers have not been documented spawning in Shovel Creek, a major spawning tributary for rainbow trout. Twenty-one adult shortnose suckers were captured from Copco during June 1990. In 1993, Reclamation sampled Copco and captured 10 adult shortnose suckers ranging from 427-500 mm FL.

Shortnose and Lost River suckers were not documented in Iron Gate Reservoir during 1990 when trapnetting was conducted on June 14 and 15 over most of the reservoir (Buettner and Scoppettone 1991). One Klamath largescale sucker was collected. In 1973 one shortnose sucker was sampled by CDFG biologists (Maria pers. comm.).

3.2.2 Upper Klamath Lake

3.2.2.1 Age and Growth

New information since 1992 indicates that Lost River sucker maturation can occur at an earlier age than was previously determined. Age at maturity was projected from spacing of annuli on opercles at 6-14 years, with most maturing at age 9 (Buettner and Scoppettone 1990). In 1993, several fish (5 females, 3 males) from the spawning run on the Williamson River were aged at 5 years (Scoppettone pers. comm.). From fish collected during a September 1995 sucker dieoff, gonads were developing in the majority of the age 4+ males and females indicating that they were likely to mature by the following spring. A few 3+ males had developing testes.

Age at maturity appears to be related to growth rate with fast growing fish maturing earlier that slower growing fish. This phenomenom has been well documented with the cui-ui, *Chasmistes cujus* (Scoppettone pers. comm.). Growth rate and sexual maturity appears to be density dependent in cui-ui with fast growth and early sexual maturation related to lower population size. As the cui-ui population increased substantially in recent years growth rates decreased markedly and correspondingly age of maturity shifted to older ages. Faster growth rates have been documented from recent Lost River sucker year classes compared to those from the 1960's and 1970's (Buettner and Scoppettone 1990). To illustrate this point, fish approximately 500 mm FL in the 1995 fish kill were 5+ and 6+ while growth curve data from 1986-1988 indicated that males reached this size at approximately age 10 and females age 9. Population size data is not available to evaluate whether the faster growth rates and

early sexual maturation are density dependent but creel census and spawning run monitoring suggested that populations were declining in the 1960's and 1970's and recruitment was poor in Upper Klamath Lake (Scoppettone and Vinyard 1991). We also lost Barkley and Harriman Springs spawning populations during this time.

Previously, sexual maturity in shortnose suckers was interpreted to occur between the ages of 5 and 8 with most fish maturing at the age of 6 or 7 (Buettner and Scoppettone 1990). However, in 1993, males as small as 265 mm FL and females 361 mm FL were captured in spawning condition at Ouxy Springs and were presumed to be 3 and 4 years old respectively. Actual ages of spawners were determined using opercles on numerous fish collected for genetic studies on the Williamson River in 1993. From a sample of 16 small males aged, 1 was age 4, 14 age 5 and 1 age 6. Females from the same sample included 3 - 5 year olds and 2 - 6 year olds (Scoppettone pers. comm.). Age 4+ males and females with developing gonads were commonly observed from the September 1995 fish kill sample (Buettner pers. observ.). A few 3+ males were also noted.

Faster growth in recent year classes may also explain the earlier age at sexual maturity in shortnose suckers. The back-calculated fork length at age 5 from the growth curve developed from fish captured in 1986-1988 was 330 mm FL (Buettner and Scoppettone 1990). Recent data from the 1993 genetics study sample indicates age 5 fish ranged from 317 to 400 mm (mean 360 mm, n=18). Shortnose suckers from the 1995 fish kill (age 4+) ranged from 330-392 mm (mean 365 mm, n=26).

3.2.2.2 Hybridization and Genetics

Three small Upper Klamath Basin sucker genetics studies have been conducted in recent years including: Harris 1991, Moyle and Berg 1991, and Buth and Haglund 1994. The first two have been previously discussed (USFWS 1992, USFWS 1993). Results from the latest study which focused on shortnose suckers, provides no evidence for hybridization in shortnose sucker samples analysed. The data support the hypothesis that the wide range of morphological variation observed, reflect differences in phenotypic expression as a response to differing physical environments, or the age of the individual (Moyle and Berg 1991). However, Buth and Haglund (1994) suggested that there was enough genetic variation separating Upper Klamath Lake shortnose suckers from those in Clear Lake, Gerber Reservoir, and Copco Reservoir, which were similar. Furthermore, they suggested that the Upper Klamath Lake population should be managed as a separate genetic unit (Buth pers. comm.). The three genetics investigations described above made no attempt to adequately address hybridization/introgression questions or assess genetic structuring of sub-populations throughout the basin.

3.2.2.3 Reproduction

In 1995, Klamath Tribal biologists captured mature Lost River suckers during late March at Kirk Springs, 128 km upstream from the lake (Dunsmoor pers. comm.). They also captured Lost River suckers at Kirk Springs in 1996. Over 300 shortnose suckers and Lost River suckers were sampled from the ladders at Sprague River Dam in 1996. Previously, Buettner and Scoppettone 1990, documented only Klamath largescale suckers migrating through the ladder and spawning at Kirk Springs during 1987 and 1988.

Intensified monitoring of lake spawning since 1993 by Reclamation and The Klamath Tribes have identified Lost River sucker spawning at six spring and two non-spring sites along the east shoreline of Upper Klamath Lake. Shortnose sucker spawning has been identified at three sites: Sucker Springs, Silver Building Spring, and Ouxy Springs.

Many historic spawning areas including Barkley Springs, Odessa Springs, and Harriman Springs are apparently not presently being used for spawning even though suitable habitat exists. Routine visual monitoring at Barkley Springs since 1993 has failed to document utilization by spawning suckers even after enhancement of spawning substate (Buettner pers. obser.). Oregon State University (OSU) identified at least four springs along the east side

of Upper Klamath Lake that were probably historic spawning locations (Simon et al. 1995). Evidence such as fishing line, treble hooks, lead weights, and spark plugs, proximity to flowing springs, and suitable spawning substrate suggest historical sucker spawning. Spark plugs, used as weights for snagging adult suckers, were used to date time period of spawning activities. Spawning has not been documented at three of the springs, however they have not been intensively monitored (Dunsmoor pers. comm.).

Since 1993, small numbers of shortnose and Lost River suckers have been observed spawning in gravelly shoreline sites with no detectable spring influence (Dunsmoor pers. comm., Buettner pers. obser.). The Klamath Tribes documented successful larval emergence in 1995 at one of these sites (Cinder Flat). Spawning in gravel or cobble shoreline areas was documented at Lake of the Woods for an extirpated shortnose sucker population (Bond 1948). Successful shoreline spawning has been documented for Warner suckers (*Catostomus warnerensis)* (Rollie White pers. comm.) and razorback suckers (*Xyrauchen texanus)* in Lake Mojave (Paul Marsh pers. comm.).

In 1993, small shortnose sucker spawners (age 4 and 5) were observed at Sucker Springs, Ouxy Springs and Silver Building Springs. Also, substantial numbers of age 4-6 shortnose suckers were captured from the spawning run on the Williamson River (Scoppettone pers. comm.). It is not known whether the observations of young spawners at springs reflect more intensified monitoring or recent colonization. It is speculated that first time spawners may follow older spawners to imprinted sites while others might be discovering spawning areas by random search. Imprinting of larval suckers to natal spawning areas is unknown. Recent imprinting studies on cyprinids from the Colorado River system has shown increased ATPase levels at hatch and swim-up and suggests the potential for imprinting to occur at that time (Gutermuth pers. comm.).

OSU recorded more than 30 springs along the east side of Upper Klamath Lake from Modoc Point to Sucker Springs (Markle and Simon 1994). Other than those that are known spawning areas (6) and have relatively large discharges, most are small seeps and springs discharging less than 50 gpm. Not all of these springs have been monitored for sucker spawning. OSU also recorded more than 90 spring areas ranging from small seeps to rapidly flowing springs on Bare Island. Several were warm 30-33° C, temperatures lethal to sucker eggs, but many were cooler and are potential spawning areas. No monitoring for sucker spawning has occurred at Bare Island, however in 1993 sucker larvae were collected there during June (Markle and Simon 1994).

3.2.2.4 Population Status

A distinct spawning population of Lost River suckers spawns at Sucker Springs on the eastern shore of Upper Klamath Lake. This population has been monitored fairly extensively since 1987 (Buettner and Scoppettone 1990, Dunsmoor pers. comm.). Population estimates determined by mark and recapture techniques were 1038 (1987), 817 (1988), 960 (1989), and 900 in (1993). The Sucker Springs population appears to be comprised of large, older adults which suggests a lack of recruitment over the last 20 years. In 1993, 60 out of 130 fish captured had been tagged in previous years with floy anchor tags. Visual observations at night using night vision goggles were conducted several times a week from late February through early May in 1993-1995. Based on these observations, large fish continued to dominate spawning aggregates (Buettner pers. obser.). However in 1993, dozens of smaller Lost River suckers were seen in late April and early May suggesting recent recruitment. Similar observations were made in 1994 and 1995 (Buettner pers. obser.).

An extensive visual survey of 10 other springs along the east side of lake during spring 1993 identified Lost River sucker spawning at four other springs (Silver Building, Ouxy Springs, and two small unnamed springs). Dunsmoor (pers. obser.) documented at least one additional lake spring and non-spring shoreline (Cinder Flat) spawning sites in 1995. Numbers of spawners observed at these sites were small compared to Sucker Springs. However, Cinder Flat may have a good-sized population of Lost River suckers. Small-sized Lost River suckers were also observed at Ouxy and Silver Building Springs in 1993-1995. Thirty-two smaller-sized fish ranging from 324 mm to 535 mm (mean 480 mm) were trammel netted from Sucker, Ouxy, and Silver Building springs in 1993.

Shortnose sucker spawning at springs in Upper Klamath Lake was first documented in 1992 at Ouxy Springs (Dunsmoor pers. comm.). Shortnose sucker spawning has been observed there every year since then (Buettner pers. observ.). In 1993, dozens of small shortnose suckers were observed in late April and May at Sucker Springs, Silver Building Springs and Ouxy Springs. Seventy-eight shortnose suckers were captured from Sucker, Ouxy, and Silver Building springs during sporatic trammel netting operations during April and May 1993. They ranged from 194 mm to 502 mm (mean 352 mm).

Population monitoring conducted in the 1980's (Buettner and Scoppettone 1990, Bienz and Ziller 1987) indicated that recruitment of Lost River and shortnose suckers to adult size classes was inconsistent, as evidenced by gaps in known year classes of spawning adults. The last known strong year classes were from 1977 and 1978 (Buettner and Scoppettone 1990). The Klamath Tribes has been qualitatively monitoring spawning runs in the Williamson and Sprague rivers since 1988 (Dunsmoor pers. comm.). Beginning in 1992, they have observed a substantial increase in the frequency of smaller Lost River and shortnose sucker spawners. During 1993, small-sized shortnose and Lost River suckers dominated the catch in May on the Williamson and Sprague Rivers. In that year limited population sampling was conducted by boat electrofishing to collect fish for taxonomic and genetic investigations. Collections targeted the more abundant small fish. Ages were determined on 18 shortnose suckers, one was age 4 and 17 were age 5 (Scoppettone pers. comm.). Of 13 Lost River suckers collected from the spawning run, two were age 4, six were age 5, one was age 6 and 4 older aged fish. Small-sized Lost River sucker adults were also captured at springs in Upper Klamath Lake for genetic evaluation studies. Of six fish collected, two were age 5, three age 6, and one age 20.

Population surveys were also conducted during the fall of 1993 and 1994 by Reclamation using trapnets and trammel nets. In 1993, 136 Lost River suckers and 31 shortnose suckers were captured over two days in November. Length frequency distributions indicated a predominance of small-sized shortnose and Lost River suckers. Shortnose suckers ranged from 267 to 377 mm FL. Lost River suckers ranged from 215 mm to 431 mm FL. In 1994, 42 Lost River suckers and 91 shortnose suckers were captured from 11 sample days during the fall. Shortnose suckers ranged from 292 mm to 495 mm. Lost River suckers from 290 mm to 690 mm FL.

3.2.2.5 Condition

Fulton condition factors were computed on suckers to assess interannual differences during wet and critically dry years. Fish captured during spring 1993 were used to represent 1992 lake conditions since little growth typically occurs in the winter. Because condition factor varies with age, we only analyzed younger year classes since data was lacking on large adults in 1994. Mean condition factor for shortnose suckers in spring 1993 and 1994 were 1.30 and 1.43 respectively. Lost River sucker mean condition factors were 1.20 in spring 1993 and 1.14 in spring 1994. It does not appear that the two years were very different. Mean fall condition factor for shortnose suckers was 1.41 in 1993 and 1.40 in 1994. Mean fall condition factor for Lost River sucker was 1.19 for both 1993 and 1994. Therefore, for younger year classes of both Lost River and shortnose suckers, condition factors during the fall of 1993 (wet year with high lake levels) and 1994 (critally dry year with record low lake levels) were not very different.

3.2.2.6 Sucker Die-offs

In 1986, 190 Lost River suckers, collected from a lake die-off ranged from 8 to 43 years old with 26 year classes represented (Buettner and Scoppettone 1990). Most were 19-28 years. In 1988, 33 Lost River suckers were aged from spawning runs up the Sprague and Williamson Rivers. These fish ranged from 9-30 years with most 10 and 11 years old (7 year classes). A comparison of the age class structure for 1986 and 1988 indicated that there was little recruitment from 1970 to 1976. After this hiatus, recruits from 1977 and 1978 reached sexual maturity and entered the spawning population. Age and length-frequency analyses collected in the 1988 spawning run suggests that either the 1986 die-off was selective for older adult fish and/or there was a greater propensity for younger fish to migrate in that year.

Only 8 shortnose suckers were collected during the 1986 fish die-off. Two were age 7, one age 12 and five age 19+ (Scoppettone 1986).

In 1995, another sucker die-off occurred, from which 378 Lost River suckers and 124 shortnose suckers were collected. The die-off included mostly young fish. Ninety-five percent of the Lost River suckers and shortnose suckers were age 7 years and younger (Figures 3 and 4). Only 14 and 9 year classes were documented for Lost River and shortnose suckers respectively. Age 4 and 5 fish, representing the 1991 and 1990 year classes respectively dominated the collection for both species. The absence of older fish indicates that the die-off was selective for younger fish and/or the numbers of older fish in the population are low. Population surveys conducted on Upper Klamath Lake using trapnets and trammel nets from 1993-1995 has documented very few large adults. It was suspected that the small catch of large adults was related to their lower rate of catchability. Older individuals are believed to be less active than younger fish and therefore are less vulnerable to passive netting gear. However, collection of all age classes of cui-ui at Pyramid Lake has been successful during monitoring of prespawning aggregates (Scoppettone pers. comm.). Trammel and trap netting surveys in the prespawning aggregate on the lower Williamson River in 1995 and 1996 by NBS captured mostly smaller adults suggesting that large adults were not very abundant. If the age distribution documented by Buettner and Scoppettone (1990) was representative of that present in 1986, and recruitment was poor since then, most Lost River suckers would be 27-37 years old in 1995. It appears likely that mortality within these age classes has been high. Shortnose sucker populations during the 1986-1988 period appeared small and runs were dominated by larger fish, similar to that documented by Bienz and Ziller (1987) in the early 1980's. This suggests that most of the older year classes present in the late 1980's may have died off.

Reclamation has captured, tagged and released several hundred juvenile and adult shortnose and Lost River suckers in Upper Klamath Lake since 1993. These fish were captured from several locations in Upper Klamath Lake and the lower Williamson River. Specifically, 305 shortnose have been PIT and/or Floy anchor-tagged and 15 radio-tagged. Twelve Lost River suckers were radio-tagged and 355 PIT and/or Floy tagged. During the spring of 1995, NBS PIT tagged 60 Lost River sucker adults and 405 shortnose sucker adults at the mouth of the Williamson River. Recapture rate has been extremely low. Reclamation recaptured one PIT tagged Lost River sucker in 1994 and one in 1995. One PIT tagged shortnose sucker was recaptured at Ouxy Springs in 1995.

Most suckers collected from the 1995 fish die-off were checked for tags. From approximately 300 Lost River suckers and 100 shortnose suckers checked for tags, none were detected. Tag shed rates for both implants into the dorsal musculature and ventral body cavity appear to be low based on recapture of double-tagged suckers at Clear Lake (Perkins pers. comm.) Because the fish die-off may have been selective to specific age classes, the length distribution of fish tagged in 1995 was compared to that of the die-off. The two length distributions for Lost River and shortnose suckers appear similar indicating there was a good representation of similar-sized fish in the die-off (Figures 5 and 6). It should be noted that approximately 35% of the die-off fish were highly decomposed when collected and there is a greater probability that tag loss could have occurred. Although no tagged fish were recovered, three of the 14 radio tagged adults died during the fish kill. The data from smaller-sized shortnose and Lost River suckers suggests that their population numbers are at least in the thousands of fish. Until more extensive monitoring is conducted, the relative abundance of older year classes can not be assessed.

3.2.2.7 Entrainment

Entrainment of larval suckers into the A Canal was documented in 1990 and 1991 (Markle and Simon 1993) and has been summarized in the Lost River and Shortnose Sucker Recovery Plan (USFWS 1993). In 1995, New Earth monitored larval suckers at the C Canal Drop for a period of about 8 weeks (July and August). Sampling occured daily at about 1300 and 0100. Subsamples of concentrated algae and fish were taken from their microscreens and sorted. Seven larval suckers were collected from the July 7 to 11.

Juvenile suckers have been salvaged from Klamath Project canals receiving water from Upper Klamath Lake yearly since 1991. These operations were conducted during the fall when diversions were shut off. Canals were drawn down and sampled with seines and backpack electrofishers. Most suckers salvaged were small juveniles less than 250 mm FL. The number of suckers salvaged from 1991-1995 were 3,166; 2,618; 788; 334; and 4,072 respectively. The large catch in 1991 supports OSU sucker age 0 survival data for the same year indicating establishment of a year class; also the fish die-off sample in 1995 was dominated by 1991 fish. The 1991 salvage collection included approximately 75% age 0 and 25% age 1 suckers. In 1992, although the overall catch was high (2,618), about 95%, based on length frequency, were 1991 year class fish. This also tracked with OSU juvenile sucker survey data indicating Lost River and shortnose sucker year class failure in 1992. Numbers of 1992 year class shortnose suckers in the 1995 die-off were low.

In 1993, only 788 juvenile suckers were salvaged even though sampling effort was similar to 1992. OSU data indicated that successful age 0 survival for both shortnose and Lost River suckers occurred. Approximately 70% were age 0 and 25% age 1 suckers. Possible explanations for the lack of correlation with Upper Klamath Lake age 0 survival data from Upper Klamath Lake include:

1) High lake levels were maintained affording more shoreline habitat for juveniles reducing straying,

2) Irrigation deliveries were lower in 1993 than 1992 particularly during the spring when most larval entrainment occurs,

3) Sampling efforts may have been less efficient in capturing suckers in the canals due to uneven distribution, and

4) Canal shutdown procedures were more successful in flushing suckers from the canals in 1993.

The smallest number of suckers salvaged since 1991 were obtained in 1994 (334) with about 90% age 0. This low number was consistent with age 0 survival data from Upper Klamath Lake (Simon et al. 1995). In 1995, over 4,000 suckers were salvaged, the largest salvage total numbers for the 5 years of effort, including about 50% age 0 and 50% age 1. OSU juvenile sucker age 0 survival estimates were high in the fall from cast net and trawl surveys indicating year class establishment (Simon pers. comm.).

Canal salvage data represent only a qualitative index of year class strength in Upper Klamath Lake for the following reasons: 1) Since some irrigation water originates from the Lost River, suckers from Gerber, Clear Lake, and the Lost River are likely included in the salvage sample. 2) Many irrigation canals are treated with Acrolein during the summer to control aquatic plants and this herbicide is highly toxic to fish. 3) Several practices have been implemented since 1992 to reduce the number of suckers that have to be salvaged. Most of these practices lead to draining of canals into the Lost River or Klamath River. 4) Patchy distribution of stranded suckers can also effect salvage success since not all potential holding habitat is sampled. 5) Sampling effort and personnel has also varied during annual salvage operations.

3.2.2.8 Freshwater Inflow Area Use

Freshwater inflow areas of relatively good water quality may be important for Lost River and shortnose suckers in Upper Klamath Lake during the summer and early fall when DO and pH levels can be stressful or lethal in much of the lake. Other fish species including rainbow trout, yellow perch and brown bullheads show seasonal movements apparently related to heavy algal blooms and attendant poor water quality (Vincent 1968). These fishes were usually found in the freshwater areas at the northern end of the lake during the summer or in other areas affected by incoming fresh water (Bond et al. 1968). Small numbers of adult suckers were captured in or

adjacent to Pelican Bay, Wood River, Williamson River, and Crystal Creek during July and August of 1986 when water quality was poor in Upper Klamath Lake (Bienz and Ziller 1987). In 1987, a few adult shortnose and Lost River suckers were captured during the summer near the lake/freshwater inflow interface of Odessa Creek (Scoppettone and Coleman 1988). None were captured in Thomason Creek. In 1966, a late August migration of about 2,000 Lost River suckers was observed below the Sprague River Dam; this same run was reported in 1967 (Golden 1969).

Sucker utilization of freshwater inflow areas has been most pronounced during fish die-off events. In 1986, during the August die-off, schools of 100-200 Lost River suckers were observed in Pelican Bay (Bienz and Ziller 1987). In 1995, during a sucker die-off in September small groups of Lost River and shortnose suckers were observed in Pelican Bay, Harriman Springs, Odessa Creek, Williamson River and Short Creek.

Recent radio telemetry and trammel netting data suggest that freshwater inflow areas are infrequently used by adult suckers unless fish are stressed or dying. Reclamation has monitored movements of 15 radio-tagged adult shortnose and 12 adult Lost River suckers in Upper Klamath Lake from 1993-1995. Fish locations have been determined by air and boat at 1-2 week intervals from May through October. During this tracking effort, there have not been any observations of radio-tagged fish in freshwater refugial areas with the exception of migrations for spawning. Because tracking efforts were limited to daylight hours, a telemetry station was set up during September and October, 1994 and July-October, 1995 to continuously monitor radio-tagged fish movements at the entrance to Pelican Bay. During this monitoring, no radio-tagged suckers were detected in the bay. However, three suckers were detected just outside of Pelican Bay during September (1995).

In August 1995, during a time period when several radio-tagged fish were concentrated near Pelican Bay, Reclamation set trammel nets in the lake just outside the bay and in the transition zone between the bay and the lake. On August 8, 28 adult Lost River suckers and 10 adult shortnose suckers were captured outside the bay and none in the transition zone during short (3-4 hour) day-time net sets. On August 22, 16 adult shortnose suckers and 13 adult Lost River suckers were captured along Fish Banks outside the bay and none in the transition zone. Because sampling occurred during daylight hours, net avoidance may have occurred in the relatively clear bay netting locations. However, algae densities were moderate there, decreasing visibility. The sample sites outside the bay sites had low visibility (Secchi disk depth < 1 meter).

Areas adjacent to freshwater inflows, like Fish Banks and the entrance to Pelican Bay have been used consistently during the summer months by radio-tagged suckers even though water quality in these areas has not always been good. On September 13-14, 1995, the Klamath Tribes collected diel dissolved oxygen profiles throughout the Pelican Bay interface and Fish Banks area, and showed consistently low DO's (2.5-4.3 mg/L) in the morning hours. In 1994 during September 19-28 there were numerous, widespread kills of chubs (and probably other species) in the northern lake. While pH was near neutral, DO's were very low (2-4 mg/L) over wide areas, even at midday, and not one radio tagged fish was in or near to Fish Banks. In fact, many of them had been at Fish Banks just days or weeks earlier, and moved to an area generally north of Bare Island during this time of poor water quality.

During sucker die-off events substantial numbers of dead and dying fish have been observed and collected from freshwater inflow areas. In 1971, during a massive chub die-off, at least 25 Lost River suckers, were observed dead off Rocky Point in Pelican Bay (ODFW 1971). However, only 6-8 were seen during several days of surveying throughout Upper Klamath Lake. In 1986, the majority of dead suckers collected during the August die-off were found in or adjacent to Pelican Bay (Scoppettone and Coleman 1986). In August 1994, 10 large adult Lost River suckers were found dead in Pelican Bay. And finally during the September 1995 die-off, substantial numbers of suckers were collected from several refugial areas including: Pelican Bay (80), Williamson River (8), Short Creek (8), Odessa Creek (12), Thomason Creek (3), and Harriman Springs (38).

Most suckers observed in freshwater inflow areas during die-off events were lethargic and relatively unresponsive to disturbance indicating they were sick or stressed (Bienz and Ziller 1987, Green pers. obser.) In 1995, several

fish displaying this behavior were collected and taken to OSU for pathological examination. All were acutely infected by a bacteria disease, columnaris *(Flexobacter columnaris)* (Banner 1995). This pathogen, was also documented as a primary causitive agent in the death of suckers collected during the 1971 and 1986 die-offs (Logan and Markle 1993). This information suggests that the freshwater inflow areas are used to a greater extent by acutely sick and dying fish than healthy fish and might be considered a dying ground. Since die-off events have occurred during periods of high lake temperature, it has been suggested that cold water shock may contribute to mortality of these already stressed fish (Bienz pers. comm.). Temperature differences between Pelican Bay and Upper Klamath Lake often exceed 10 C during the summer.

Recent large-scale fish die-offs have been documented from 1971, 1986, 1994, and 1995. Because of the long history of noxious blooms of bluegreen algae and associated poor water quality conditions, other fish kills most certainly have occurred. Fish kills involving non-game fish including chubs and suckers, may have not been reported by the public. Also, with the large populations of fish eating birds (cormorants, gulls, pelicans, grebes, terns) present in the area, sick and dead fish can be quickly consumed leaving no evidence of a fish kill. Large concentrations of fish eating birds were observed working local fish kills during summer 1994 (Dunsmoor pers. comm.) and 1995 (Simon pers. comm.).

Freshwater inflow areas provide rearing habitat for larval and juvenile suckers (Buettner and Scoppettone 1990; Markle and Simon 1994, Simon et al. 1995; Logan and Markle 1993; Klamath Tribes 1992, 1995). The lower Williamson River typically has the highest densities of larvae because major spawning areas occur upstream on the Sprague and Williamson Rivers. The studies cited above generally report relatively low numbers of juveniles in inflow areas compared to shoreline locations in Upper Klamath Lake. Lack of food and cover, cooler water temperatures, and increased susceptability to predation by avian and fish predators like rainbow trout and yellow perch in the clear water are likely factors limiting use of these areas.

Reclamation conducted larval and juvenile fish surveys at Barkley Springs and areas nearby during the summer of 1994 and 1995. Large numbers of larval suckers were observed in clear water along the shoreline in spring influenced areas during June in 1995. Also, approximately a dozen juvenile suckers (probably age 0 and age 1) were captured during both years in shoreline areas during July and August. Juvenile suckers have also been collected from the Odessa Creek area during summer (Dunsmoor pers. comm.). However, electrofishing surveys near Harriman Springs during August 1995 failed to document juvenile suckers.

Monda and Saiki (1993, 1994) and Bellerud and Saiki (1995) conducted water quality tolerance tests to assess toxic levels of temperature, DO, pH, and un-ionized ammonia on larval and juvenile shortnose and Lost River suckers. The 96-hr LC50 values (lower 95% confidence interval) for Lost River sucker larvae were 9.77 pH, 2.3 mg/l DO, 30.5° C temperature, and 0.43 mg/l un-ionized ammonia. For juvenile Lost River suckers values were 9.87 pH, 1.9 mg/l DO, 29.9° C temperature and 0.70 mg/l un-ionized ammonia. For larval shortnose suckers values were 10.01 pH, 1.8 mg/l DO, 31.2° C temperature, and 0.73 mg/l un-ionized ammonia. Lower confidence intervals for shortnose sucker juveniles were 9.76 pH, 1.7 mg/l DO, 29.4° C temperature, and 0.32 mg/l unionized ammonia. Of these four parameters only temperature is not a significant threat to larval and juvenile suckers in Upper Klamath Lake. Bellerud and Saiki (1995) concluded that DO and pH in Upper Klamath Lake can be acutely lethal to larval and juvenile Lost River and shortnose suckers. Moreover, stressful water quality conditions that curtail successful survival of early life stages could explain the long-term decline of sucker populations in Upper Klamath Lake.

3.2.2.9 Lake Habitat

Habitat use by larval, juvenile, and adult life stages was previously summarized in the Lost River and Shortnose Sucker Recovery Plan (USFWS 1993). Recent research by The Klamath Tribes (The Klamath Tribes 1995), OSU (Markle and Simon 1993, 1994; Simon et al. 1995) and Klamath Basin Water Users (Vogel pers. comm. 1992) on

larval and juvenile sucker distribution and habitat, and Reclamation and NBS on adult distribution and habitat (Buettner 1995, Perkins pers. comm.) has furthered our understanding of the habitat needs of these life stages.

3.2.2.10 Larval Habitat

Vogel (pers. comm.) monitored larval sucker habitat utilization in the lower Williamson River by visual observation during May 1992. He observed that larval suckers were more frequently oriented in or adjacent to shoreline structure including emergent vegetation, submerged aquatic plants and instream woody debris than in shoreline areas lacking structure. OSU had a similar assessment of larval habitat use in the lower Williamson River (Markle and Simon 1994). They saw large numbers of larvae within submerged vegetation and large schools of larvae were seen swimming near the edges of vegetation. In other areas that were sampled in Upper Klamath Lake, individual larvae and small schools were observed in or near vegetation and physical structures such as rocks or logs.

There was no reference to bottom substrate in describing larval habitat in the two studies referenced above. However, the lower Williamson River is generally characterized by sand and firm mud bottoms. Since larval suckers are more surface oriented, bottom substrate may not be an important habitat parameter. Water depth was also not discussed in these studies, but it can be interpreted that most larval suckers were observed in shallow water; all sampling occurred at depths less than 1m.

Larval sucker use of offshore areas has not been studied. High densities of the bluegreen algae, *(Aphanizomenon flos-aquae)*, typically occur during the larval life stage, making it difficult to sample. Monitoring normally involves towing fine-meshed nets, that would quickly clog with algae if attempted in Upper Klamath Lake. However, the literature generally indicates that larval catostomids are shoreline oriented (Moyle 1993, Minkley 1973, Scoppettone et al. 1990). The Klamath Tribes (1995) developed sampling methodology using pop nets to quantify densities of larvae in shallow shoreline habitats. One aspect of their investigation was to compare larval sucker densities in fringe emergent vegetation habitat versus that in adjacent areas without vegetative structure. At the mouth of the Williamson River and Goose Bay, larval sucker densities were several times more abundant in emergent vegetation than adjacent open water sites of similar depth. Larval suckers were documented in emergent vegetation consisting of: *Scirpus, Polygonum, Sparganium*, and willows.

OSU has studied spatial and temporal distribution of sucker larvae around Upper Klamath Lake since 1991 (Markle and Simon 1993; Markle and Simon 1994, Simon et al. 1995). However, sampling was less extensive during 1991-1993. Larval suckers were distributed along shoreline areas throughout Upper Klamath Lake in 1994 and 1995, with the highest number in the lower Williamson River. The sample sites along the east side of the lake generally had more larvae than other areas. Very few sucker larvae were captured along the west side of Upper Klamath Lake and in Agency Lake. In 1993, 81 larvae were captured over rock substrate along the shore of Bare Island. Larvae were collected primarily in May and June during all years. The Klamath Tribes (1995) indicated that in 1995 most suckers had developed into juveniles by late July.

Water quality associations with larval sucker distribution were monitored in 1995 by OSU during larval fish towing and larval searches. Larval suckers were found in pH ranging from 7 to 10 (Simon pers. comm.). Distribution of pH values where fish were found paralleled the distributions at sampling sites. Larval suckers were captured at DO ranging from 4.5-14.5 mg/l. This work was not designed to show either avoidance behavior or acute toxicity. Fish captured at many of these sites might have shown active avoidance of these areas if they had the choice of moving to a better location. It is possible that they sampled larvae in conditions that were actually acutely toxic and were collected while dieing. OSU's data show that larval suckers are frequently found in areas in which water quality variables approach or exceed LC-50 values. Since chronic effect thresholds are usually substantially lower than acute, it is likely that chronic effects are expressed with regularity.

The catch data indicates that most larvae were captured in or near freshwater inflow areas that generally have good water quality (Markle and Simon 1994, Simon et al. 1995). A Hydrolab Datasonde 3 was placed at Goose Bay, a site heavily used by sucker larvae and juveniles, from June 15 to August 11, 1995 (The Klamath Tribes 1995). Water quality seldom exceeded acute toxicity thresholds in the *Polygonum* beds where larvae were located. DO infrequently decreased below 4 mg/l or 50% saturation and pH seldom rose above 9.7. However pH values of 9.6 were very common and are only slightly below measured 96hr LC 50 for larval and juvenile suckers (Bellerud and Saiki 1995). DO concentrations exceeded saturation in almost half of the measurements (The Klamath Tribes 1995). Acute toxicity to supersaturated water has not been evaluated.

3.2.2.11 Juvenile Ecology

Juvenile sucker ecology has been more extensively studied than that for sucker larvae in Upper Klamath Lake. Study objectives have included juvenile sucker distribution, habitat utilization, associated water quality, relative abundance, growth and parasites (Logan and Markle 1993; Markle and Simon 1993, 1994; Simon et al. 1995; Reclamation 1995; The Klamath Tribes 1995).

Examination of Lost River and shortnose suckers collected from Upper Klamath Lake in 1994 showed evidence of infestation by a digenetic trematode possibly of the genus *Neascus* (Simon et al. 1995). The parasite is present in the musculature and integument. It appears as a black, 1-2 mm cyst under the skin except in recently infested fish where it is yellow or white. In the normal host, one expects that infestation rates will increase over time (or size of fish) because the fish is a secondary host which must be eaten by a bird and the parasite often spends several years in the secondary host. There was no increase in infestation with fish size. The infestation rate seen in fish less than 49 mm (12.5-14%) was much greater than the 2.2% infestation rate found in fish 50-129 mm SL. There was little difference in infestation rate between species. Preliminary evaluation of 1990-1993 and 1995 samples show frequent infestation in young suckers collected from Upper Klamath Lake. Data from several years may provide long term trends in the infestation of this parasite and insight into the importance of this parasite in determining mortality. It seems probable that fish infected by parasites might have a lower rate of survival in Upper Klamath Lake where summer water quality conditions are also stressful to fish.

OSU has been collecting and reading otoliths from larval and juvenile suckers to help identify cohorts through otolith morphology and microchemistry, uncover timing of birth and document growth events (Markle and Simon 1993, Simon et al. 1995). Preliminary results from the otolith microchemistry investigation are suggestive that this tool can be used to distinguish lake-spawned from river-spawned Lost River suckers using either a bivariate measure or a multivariate measure of elemental composition (Markle and Simon 1993). Further study will be needed to determine whether individual spring-spawned stocks can be identified.

In 1995, depositional patterns of otolith rings was studied to determine if they were consistent and predictable (Hoff pers. comm.). Larval fish from the Braymill Hatchery were marked with a biological marker and held for varying time periods; wild larvae were also captured, marked and placed in an enclosure at the mouth of the Williamson River. After a period of a couple weeks the fish were sacrificed and otoliths removed. Examination of the otolith rings verified that the depositional patterns were constant and represented daily increments in both hatchery and wild suckers. This information indicates that sucker otoliths can be used to uncover time of birth and potentially cohort identity. To illustrate the utility of this information, cohorts produced from Sucker Springs might be easily identified since Lost River sucker spawning can be up to two months earlier than spawning in the Williamson and Sprague Rivers.

Other otolith research has shown that otolith growth appears to be driven by endogenous circadian rhythm while fish growth maybe slowed or halted due to various environmental stress factors. The implication is that otolith growth reflects age as well as, and perhaps more strongly than growth. Lapillus otolith weight and fish size were compared to determine if otolith weight can be used to predict fish ages. The data generally support a relationship between fish length (age) and lapillus otolith weight at lengths greater than about 80mm SL (Simon et al. 1995).

This method will allow processing of large numbers of fish for age analysis. In contrast, otolith preparation and counting of daily growth rings is very time consuming. Preliminary work has been conducted indicating that otolith growth and fish somatic growth are also coupled (Logan pers. comm.). When they are coupled and otolith ring widths are linearly related to somatic growth, these structures can be used to back calculate length at age. Growth rates of suckers surviving to fall can be analyzed to correlate with environmental variables. For example, juvenile suckers collected in the fall of 1994 were all recruits from late-spawned fish suggesting that environmental conditions during early season may have led to high mortality of cohorts produced from early spawning.

3.2.2.12 Juvenile Habitat

Spatial and temporal distribution of juvenile suckers in Upper Klamath Lake has been studied through systematic monitoring during the summer and fall (Markle and Simon 1993, 1994, Simon et al. 1995). In 1993, limited beach seining was conducted concurrent with larval sampling on June 5-6. No suckers were caught at any of the sites, and it was presumed that suckers had not reached sufficient size to be captured with beach seines. However, during the first seine survey from July 12-16, both species of suckers were captured. Median shortnose sucker size was 21mm SL and 30mm SL for Lost River suckers. Shortnose and Lost River suckers transform from larvae to juveniles between 17 and 25mm SL (Buettner and Scoppettone 1990, Dunsmoor pers. comm.). Like the larval life stage, age 0 juveniles were generally most abundant in shoreline areas within a few miles of the Williamson River mouth. Shoreline sampling was typically limited to distances less than 100 feet from shore and less than three feet deep. Juveniles were also consistently captured along the east shore of Upper Klamath Lake. Distributions were patchy for other sample locations around the lake. Juveniles were rarely captured in Agency Lake. By October, a few shortnose suckers were captured offshore in trawl samples. Offshore sampling occurred at least 300 feet from shore at depths ranging from one to five meters deep. Juvenile Lost River suckers were captured in shallow shoreline areas during the summer in 1991 and 1993 but were uncommon from shoreline areas in 1994 and 1995. They were more commonly caught during fall trawl surveys (1991, 1994, 1995).

During cast net surveys in 1991 and 1993, OSU noticed apparent relationships between sucker density and substrate types (Markle and Simon 1994). They grouped substrate into four general categories: boulder, gravel, muck, and peat. Gravel spans the range of sand, rock, gravel or cobble; and muck is any type of soft unconsolidated organic material, silt, etc. They did not sample areas with emergent vegetation because of gear limitations. In 1991, age 0 suckers were captured mostly over gravel and muck substrates; muck substrate was found at offshore stations. Age 0 suckers were captured most commonly over gravel substrates in 1993. Because of the uneven distribution of juvenile suckers along the shoreline and because indices of abundance from fixed site sampling might lead to inappropriate conclusions, OSU shifted to a stratified random design. In 1994 and 1995 shoreline habitat types were mapped including substrate types and vegetation. In 1995, age 0 sampling was based on random monitoring of specific habitat types to provide habitat-specific fish densities. Catch rates using cast nets were much higher from stratified-random sampling than fixed-sites (Simon pers. comm.).

The Klamath Tribes conducted dip net surveys within the emergent zone in late July 1995 and frequently found juvenile suckers in very shallow water (Dunsmoor pers. comm.). Data on juvenile sucker utilization of the emergent zone is lacking because of difficulties associated with sampling this habitat type.

Age 0 juvenile sucker distribution and associated water quality data was collected in 1994 during beach seining (Simon et al. 1995). For 82 seine samples at which pH and DO were collected, samples with more than one sucker were generally noted over the range of pH and DO monitored. For pH, the frequency distribution of pH values from sites where suckers were found and that from all sites sampled followed a similar pattern. No pH values over 9.8 were sampled. The frequency distribution for DO were similar at DO concentrations greater than 6 mg/l. However, few suckers were captured from sites with DO of 6 mg/l and below even though many sites were sampled with DO values of 4-6 mg/l.

In 1995, pH was measured at 659 beach seine and cast net sample sites (Simon pers.comm.). Most age 0 suckers were captured at sites where pH ranged from 9-10. Interestingly, large numbers of juveniles were captured at pH 10, which based on laboratory acute toxicity tests is lethal to juvenile Lost River and shortnose suckers (using the lower 95% confidence interval) (Monda and Saiki 1993, 1994). This observation is not entirely surprising since the pH data represent instantaneous daytime measurements typically measured when diel maximums occurred. Diel fluctuations of 1 pH unit are common during the summer when *Aphanizomenon* blooms occur (Kann and Smith 1993). Thus, the exposure to high pH may be for only a few hours each day whereas toxicity tests were conducted with a constant pH exposure over a 96 hour period. If high pH persists, high mortality might occur. Juvenile monitoring data from 1995 seems to indicate that juvenile sucker survival into October in shoreline habitat was poor at fixed-site stations. Catch rates for shortnose suckers were high during beach seine surveys during August but relatively low during fall cast net surveys at fixed-site stations. Juvenile Lost River suckers were poorly represented in the shoreline beach seining and cast netting samples. However, catch rates were relatively high offshore in fall trawl samples indicating that they were probably distributed offshore throughout the summer. Continuous water quality monitoring of two near-shore and four offshore locations was conducted during the summer using Hydrolab Datasonde 3 dataloggers but the data has not been analyzed.

DO was monitored at 661 cast net and beach seining sites in 1995. Juvenile suckers were found at sites where DO ranged from 6-15 mg/l with the largest number of suckers captured at DO's of approximately 8 mg/l. From over 100 sample sites with DO less than 6 mg/l only one site had juvenile suckers. It appears likely that juvenile suckers will seek areas of better water quality when it becomes stressful. This may explain the relative absence of fish in areas with DO less than 6 mg/l. Since the acute lethal DO concentration is about 2 mg/l, it is not likely that the absence of fish from sites with DO from about 3-6 mg/l was related to water quality induced mortality.

OSU has been monitoring juvenile sucker (age 0) survival in Upper Klamath Lake since 1991. Fall age 0 sucker surveys using cast nets and bottom trawls have been used to assess year class survival. The cast nets were effective for larger age 0 shoreline oriented fish and the trawl was used to monitor offshore abundance. The cast netting surveys were more consistent and successful in capturing suckers than trawl surveys. Trawl surveys were not conducted in 1992, and in 1994 and 1995 a larger trawl with a smaller mesh was used. Cast net survey results indicated that year class establishment occurred in 1991, 1993, and 1995 for both Lost River and shortnose suckers. No age 0 suckers were captured during fall cast netting surveys in 1992, and 1994 catches were minuscule (Simon et al. 1995).

Except for 1991, trawl catch rates seemed to have no correlation with shoreline abundances. In 1993, very few suckers were caught in trawl sampling while cast net catches were the highest of all years sampled. In 1994, trawl catch rates for Lost River suckers were the highest of the years sampled while cast net catches were small. Very few shortnose suckers were captured in either cast nets or trawl samples in 1994. In 1995, shortnose sucker catch rates patterns were similar for both cast net and trawl data. However, Lost River sucker trawl catch rates were high in 1995 while cast net catches were low. The inconsistencies between the cast net and trawl catch data may be related to size dependent changes in distribution. Simon et al. 1995 noted that suckers in the trawl samples were larger than those in shoreline cast net samples for the same sample period. It was suggested that suckers may gradually move to offshore regions as they grow larger (possibly 90 mm for LRS and 80 for SNS). This may explain the presence of age 0 LRS in trawl samples in 1991 and 1994, and the near absence of suckers in the 1993 trawl sampling, when age 0 suckers of both species were small. During early fall of the years trawled, trawling has been an ineffective sampler of age 0 SNS. In 1991, trawl surveys were conducted weekly beginning on September 8 and continuing until October 13. No suckers were captured until September 29 and catches increased on October 6 and October 15. The combined trawl and cast net data indicate Lost River year class establishment in 1991, 1993, 1994, and 1995. For shortnose suckers, year classes were produced in 1991, 1993, and 1995..

It should be noted that although these year classes were documented surviving the first 6-8 months of life, it does not ensure recruitment to the adult population. The fish kill in 1995 demonstrates that morality can be significant for older fish. Survival to adult life stages is more important in terms of the species' long term viability.

3.2.2.13 Adult Habitat

Adult Lost River and shortnose sucker spatial and temporal distribution in Upper Klamath Lake was assessed using radio telemetry methods from 1993-1995. Also, a trammel netting survey during the fall of 1994 provides additional distributional information. Fifty-five trammel net sets were made throughout Upper Klamath Lake from September 20 to November 3. Daytime sets of 1-3 hours were made with 90 m long by 1.8 m deep sinking trammel nets. A total of 40 Lost River suckers and 84 shortnose suckers were captured along with 22 rainbow trout and hundreds of blue and tui chub. Suckers were caught throughout the upper two-thirds of Upper Klamath Lake above Squaw Point. Only one sucker was caught in the lower portion of the lake. Largest numbers of suckers were captured from Ball Bay. Very few were caught in Shoalwater Bay. Sucker catch rates were similar between open water and near-shore areas; suckers were capture at depths ranging from 1m to 12m.

This fish survey was conducted when Upper Klamath Lake was at a record low elevation (4136.8 feet). During September, water quality (particularly DO) conditions were highly variable both vertically and spatially in Upper Klamath Lake. In particular, DO concentrations were low in several areas particularly near the bottom. From 16 sites where associated water quality was collected, suckers were captured where bottom DO ranged from 3.7 to 7.8 mg/l. At two net sites where bottom DO was 1.3 mg/l, no suckers were captured; DO at 0.5 m at these sites were 4.7 and 11.7 mg/l. Cold weather occurred the first week of October leading to improved water quality throughout Upper Klamath Lake.

Suckers were distributed vertically throughout the 1.8 m deep bottom set nets indicating that they were not exclusively bottom oriented. This pattern has been observed in other trammel netting efforts conducted in 1993 and 1995 (Buettner pers. observ.). This observation is important since water quality can vary throughout the water column particularly in deeper locations and during calm periods. Bottom DO's were consistently lower than other water column values. Suckers may avoid bottom areas when degraded water quality exists there.

During periods of degraded water quality in Upper Klamath Lake, freshwater inflow areas can provide refugial habitat for suckers and other fish. It has been well documented that these areas provide summer habitat for rainbow trout, brown bullhead, and yellow perch (Vincent 1968, Logan and Markle 1993, Bienz and Ziller 1987). Adult suckers have been reported from these areas during die-off events (1971, 1986, 1995). These areas are also important rearing areas for sucker larvae and juveniles. Water quality was monitored extensively in the two largest refugial areas, Pelican Bay and the lower Williamson River during 1992 and 1993. Hydrolab Datasonde 3 dataloggers continuously monitored water quality during the summer and early fall in 1992. Water quality remained good throughout the sampling period in Pelican Bay with temperature remaining below 18 C, pH below 9.7, and DO at 5.5 mg/l and above. In the lower Williamson temperatures remained below 20 C, pH below 9.2 and DO above 6.1 mg/l.

In 1994, extensive water quality monitoring was conducted beginning in mid-August and continuing through September after several dead Lost River suckers and trout were found in Pelican Bay (Kann pers. comm.). It was suspected that the dense macrophyte beds were negatively effecting water quality. Two dataloggers continuously monitored water quality near the mouth of the bay (near Fish Banks) and at the confluence of Crystal Creek. During August and September, the lowest recorded DO was 6.5 mg/l while pH reached a maximum of 9.2 (Crystal Creek hydrolab site). Weekly profile data indicated that stratification was minimal.

With historic low lake levels in 1994, the area of refuge with adequate water depth for adult suckers was greatly reduced. The dense macrophyte growth in Pelican Bay further reduced available habitat. To improve refuge conditions, macrophytes were removed from about 20 acres of the bay during September 7-15. Vegetation was cut above the bottom with a mower, collected, and off-loaded to shoreline disposal sites nearby. Water quality monitoring during this operation showed no deterioration with the exception of a temporary increase in turbidity (Vogel pers. comm.).

Intensive water quality monitoring was conducted in the lake outside Pelican Bay in 1994 to define the area of influence of the bay water on the lake (September 8 to October 4). Hydrolab water quality instruments were used to monitor temperature, dissolved oxygen, pH, and specific conductance during the morning and late afternoon/early evening hours. The survey indicated that the area of influence from Pelican Bay extended approximately 1 km out and 2 km north along Fish Banks. Dissolved oxygen coneentrations were occasionally less than 4 mg/L near the bottom during the morning hours, particularly at sites south and west of the entrance to Pelican Bay. Also, no radio-tagged fish were located in this area during the time of the survey.

Locations of 9, 22, and 20 radio-tagged adult shortnose and Lost River suckers were monitored during 1993, 1994, and 1995 respectively (Figure 7). These fish were mostly captured from pre-spawning aggregations at Sucker Springs and at the mouth of the Williamson River. A few were captured from spawning runs in the Williamson River and others from Shoalwater Bay. All fish were implanted with transmitters and released immediately after surgery. Of 39 fish implanted with transmitters 6 died shortly after release. Fish were tracked at one to two week intervals from June through October. Fish locations were first made by plane followed by boat tracking to obtain more exact locations. When location were fixed by boat, coordinate data was documented using a global positioning sytem or loran navigational instruments and habitat data collected including depth, substrate, and water quality. Hydrolab water quality was monitored at 0.5 m below the surface and 0.1 m above the bottom (temperature, DO, pH, specific conductance). Tracking efforts from November through May were less frequent, usually monthly and were by airplane only during the winter and early spring.

Radio-tagged suckers were restricted to the upper two-thirds of Upper Klamath Lake during 1993-1995. No fish were located in the lake below Howard Bay and observations below Bare Island were rare. Also, no fish were tracked from Agency Lake or the freshwater inflow areas, Pelican Bay and Williamson River (with the exception of spawning migrations).

During May, after most fish had spawned, many moved into Shoalwater Bay (SB; 45% of fish locations). A substantial number were also located near the Williamson River (WR; 27%). Smaller percentages were reported for Ball Bay (BB; 10), Entrance to Pelican Bay (EPB; 9), and Mid-North (MN; 8).

During June, SB was still the most frequently used area (34%) followed by the EPB (19%). The WR, BB, and MN had similar numbers of fish observations (15-16%). By July all fish had exited SB and were mainly distributed near MN (46%) and EPB (36%). No radio-tagged fish entered SB from June through September. BB was used throughout the May through October period, but not as frequently during July and August.

The more restricted fish distribution first observed in July continued in August with 84% of fish locations from EPB and MN. By September, fish began to disperse over a wider area. This dispersal was greatest in October with fish utilizing most lake areas north of Howard Bay. Fourteen percent of the fish locations were below Bare Island, the highest of any month.

Fish were generally distributed in off-shore areas at depths ranging from 1-9 m (Figure 8). Most fish locations were at 2-3 m. Fish generally avoided water less than 1 m (possibly due to greater vulnerability to bird predation) and greater than 5 m (possibly due to greater frequency of poor water quality conditions developing during calm periods.

Radio-tagged fish were located in areas with near-surface (0.5 m) water temperatures ranging from 7-28° C and near-bottom temperatures ranging from 6-24° C (Figure 9). Near-surface DO concentrations were 4-15 mg/l and near-bottom readings were 1-15 mg/l (Figure 10). Near-bottom readings which are probably more representative of preferred sucker habitat, were mostly above 4 mg/l (95th percentile).

pH at fish locations ranged from 7.5-10.8 at 0.5 m and 7.4-10.6 near-bottom (Figure 11). Very few fish locations were documented at sites with near-bottom pH of 10 or greater (5% of values).

Fish distributions followed similar patterns each year. It is suspected that food and water quality conditions were major factors affecting distribution. During May when water quality is good lake-wide, fish concentrated in the Shoalwater Bay area. During June and July when *Aphanizomenon* blooms lead to water quality degradation in Upper Klamath Lake fish moved out of bay areas that had more extreme fluctuations in water quality (USGS 1995 in preparation). Many fish were concentrated near the entrance to Pelican Bay during July and August, an area where a large inflow of freshwater enters the lake. The lack of fish in the lower portion of Upper Klamath Lake and Agency Lake is probably related to the more frequent degraded water quality conditions that occur there during the summer than in the open water areas of the northern portion of Upper Klamath Lake (USGS 1995 in preparation). Comparison of water quality associated with fish locations with that of sites representing a wide range of areas in the lake have not been completed.

Many radio-tagged fish captured and tagged just before the spawning season, exhibited movements suggesting that they spawned during that season, 6 of 10 in 1994 (2 Sucker Springs, 4 Williamson River) and 9 of 13 in 1995 (Williamson River). In 1993, fish that were radio-tagged were captured late in the spawning season at Sucker Springs (April 22 and 26). Since the next tracking effort occurred May 20, spawning activities were likely missed. Two Lost River suckers were tagged during their spawning run on the Williamson River (May 18 and 20).

Repeat spawning was indicated by several fish radio-tagged in 1993 and 1994. Four suckers tagged in 1993 at Sucker Springs (1 shortnose sucker, 3 Lost River suckers) returned during spring 1994. However, none of the three surviving fish were tracked at Sucker Springs during spring 1995. Two Lost River suckers tagged in the Williamson River in 1993 returned to spawn in 1994 and one returned again in 1995. One shortnose sucker radio-tagged at the mouth of the Williamson River in 1994 migrated up the river in both 1994 and 1995. Also, a Lost River sucker tagged at Sucker Springs in 1993 appeared to have spawned in 1994 and 1995. Spawning movements may have been missed for some fish in 1995 because tracking occurred at wider time intervals (3/23, 4/19, 5/3). All radio-tagged fish showed fidelity to the spawning area in which they were initially tagged.

Spawning migrations up the Williamson River by radio-tagged fish, were similar to spawning sites documented from other spawning distribution studies (Bienz and Ziller 1987, Buettner and Scoppettone 1990). Fish were located near Waterwheel Park (RM 6.5), near the Sportsmen's Access (RM 9), and near the confluence of the Sprague and Williamson River. No fish were tracked above Chiloquin Dam.

Besides the 6 of 39 tagged fish that died shortly after release due to handling stress, 13 died between 2 and 6 months after release. Mortality among this group was probably related to infections that developed due to exposure to poor water quality conditions during the summer or the stress of poor water quality itself. In 1994, several dead Lost River suckers and trout were found dead in Pelican Bay in early August indicating a die-off. One radio-tagged Lost River sucker also died about the same time near Pelican Bay. In 1995, a major sucker die-off occurred during September and early October. Three of 14 radio-tagged suckers (2 shortnose, 1 Lost River sucker) also died during this event.

4.0 CHAPTER 3 -EFFECTS OF PROJECT OPERATIONS

4.1 Effects of PacifiCorp Operations on Endangered Suckers

4.1.1 Entrainment

Each of the six Klamath River hydroelectric developments has the potential to entrain fish. All of the hydroelectric diversion intakes have trash racks constructed of iron bars with 3 inch spacing, but only the J.C. Boyle intake has 1/4 inch screens to prevent entrainment of small fish. Entrainment of Lost River and shortnose suckers has been documented at the Eastside forebay and Westside canal. Likelihood of sucker entrainment at downstream facilities is related to abundance of fish in the project area. For instance, only one shortnose sucker has been documented during population monitoring activities by CDFG in Iron Gate reservoir, thus it is probably unlikely entrainment of this species occurs at Iron Gate powerhouse.

4.1.1.1 Link River

The extent of fish entrainment from Upper Klamath Lake has not been fully evaluated. In a study conducted by OSU, suckers (species unknown) were collected in the Eastside forebay, however the abundance was low (Reclamation 1992). It seems reasonable that we could expect similar larval entrainment at the dam as that measured in the A-Canal based on their similar flows (*see* Section 4.2.1.1 Entrainment A-Canal).

Fish salvages conducted as part of project maintenance events have collected both shortnose and Lost River suckers from the forebay. Recent salvage efforts on May 11, 1995 retrieved 40 juvenile suckers and on December 11, 1995, collected 78 juvenile suckers. Suckers collected were less than 120 mm FL making it difficult to positively identify species (Green pers. comm.). Previous forebay fish salvages in September, 1989 collected a total of 87 juvenile suckers and 1 adult Lost River sucker during four different maintenance events (Shrier pers. comm.). In 1989, one of these juvenile suckers collected was a shortnose sucker and another was a Lost River sucker as identified by Larry Dunsmoor of The Klamath Tribes. Mr. Dunsmoor also identified some of the suckers as potential hybrids and others as Klamath largescale suckers (Shrier pers. comm.). In April 1988, the Eastside forebay was dewatered and no suckers were found either in the forebay or under the flowline (Shrier pers. comm.). The methodology to salvage fish from the forebay has changed slightly for recent salvages. For 1995 dewatering events, a seine was placed over the penstock entrance to prevent fish from escaping as the water was drawndown in the forebay.

Not all fish entrained at the powerhouse will suffer mortality. In a review of past studies of turbine-related fish mortality, Eicher Associates (1987) found turbine mortality is closely associated to the peripheral runner speed. Additional but less important factors include cavitation, wicket gate openings, and runner/tailwater relationships (Eicher Associates 1987). Fish size is generally believed to influence mortality because smaller fish are normally less subject to injury (Eicher Associates 1987). Based on the Eastside turbine specifications, past studies estimate the turbine mortality to range from 10 to 26 percent (Eicher Associates 1987). Injury rates and delayed mortality effects from entrainment are unknown.

Destination for surviving fish is Link River and Lake Ewauna. Fish population and water quality monitoring information indicate that very few suckers reside in this area and water quality is highly degraded during the summer (Buettner pers. comm.). Therefore, surviving entrained fish probably have a low rate of survival in the Link River and Lake Ewauna. The fish ladder at Link River dam is rarely used by suckers, indicating an eventual, almost complete loss of entrained suckers to the population.

Westside powerhouse facility like the Eastside facility diverts water from Klamath Lake at Link River dam. Flows from the generators are released into lower Link River. Normal diversion into the canal is 200 cfs. Typically this powerhouse only operates when water is needed downstream or to meet energy demands.

In 1991, entrainment of larvae and juvenile suckers into the Westside canal was demonstrated (USBR 1992). Sucker species were not identified, and similar to the Eastside collection, abundance of fish was low (Markle pers. comm. in USBR 1992). No fish salvage records are available for past maintenance events. Based on entrainment studies conducted by Eicher Associates 1987 turbine mortality is likely to range from 20 to 26 percent. All surviving fish would be transported to Link River and Lake Ewauna. They have the opportunity to pass upstream over the dam when their swimming capabilities allow and if . However, degraded water quality conditions in Lake Ewauna may lead to high mortality of fish surviving turbine entrainment.

4.1.1.2 J.C. Boyle

The effectiveness of the J.C. Boyle screening system to prevent entrainment has not been studied. The 1/8 inch mesh screen are probably effective in preventing entrainment of suckers age 1 and older. Based on fish recovered during canal maintenance fish salvages, some fish (trout, minnows) are able to get by the screens and enter the canal. The screen system was recently rebuilt and reviewed by divers in 1993 who did not find any visible gaps.

Fish salvages have been conducted during J.C. Boyle maintenance events since 1962. In April of 1994, 2 small suckers (approximately 3 inches in length) were observed, the first to be noted in the canal. The fish were too small to be identified to species. In 1995 no suckers were found following dewatering of canal. Both adult shortnose and Lost River suckers as well as Klamath smallscale and largescale suckers have been caught in J.C. Boyle reservoir (Green pers. comm). Klamath smallscale suckers spawn in Spencer Creek, a tributary to J.C. Boyle reservoir, approximately 3 miles upstream of the dam. Recruitment of Lost River and shortnose suckers to this area may be a result of larval, juvenile, and/or adults moving downriver from Upper Klamath Lake, however this has yet to be documented (Scoppettone pers. comm.in USBR 1992).

If fish somehow pass the screening system, they will be exposed to an estimated turbine mortality ranging from 33 to 48 percent (Eicher Associates 1987).

4.1.1.3 Copco Number 1

The occurrence of fish entrainment into the Copco No. 1 intakes has not been evaluated. The intake is not screened. Both shortnose and Lost River suckers are known to be present in Copco Reservoir. Population size and distribution of species in this reservoir are not well known. Reservoir surveys by Reclamation in the fall of 1993 caught 10 adult shortnose suckers and no Lost River suckers (Green pers. comm.). Lengths of the shortnose suckers ranged from 427 to 500 mm FL. Few Lost River suckers have been observed in the area. Beak Consultants (1987) caught only one Lost River sucker yet collected 136 adult shortnose suckers over a 3 month period in sampling near mid-reservoir. No suckers have been observed downstream of the dam. Turbine mortality at the powerhouse is estimated to range from 10 to 20 percent (Eicher Associates 1987).

4.1.1.4 Copco Number 2

It is unknown if sucker entrainment occurs at Copco No. 2 powerhouse. The intake is not screened. No suckers have been observed in the project area. Every 5 to 10 years the Copco No. 2 forebay is lowered to allow inspection of the tunnel and units. In September 1994, a fish salvage was conducted in response to such a maintenance event. Survey efforts found no suckers in the forebay area or in the bypass reach downstream of the dam. Only one endangered sucker has been observed downstream of Copco No. 2; a shortnose sucker in Iron Gate Reservoir.

4.1.1.5 Irrigation of PacifiCorp Ranchland

PacifiCorp owns property which borders the Klamath River for approximately 5 miles from near the Oregon/California state line downstream to just above Copco reservoir. The land is currently managed for

ranching. To provide irrigation water for pastures, several rock berm diversions extend into the Klamath River supplying water to 6 separate irrigation ditches. Amount of water diverted varies with each ditch and is dependent on seasonal needs. The total amount of water diverted is estimated to be less than 50 cfs. Ditches are typically shutoff in November and opened in April. These diversions do not have fish screens. Entrainment to these open ditch systems has not been evaluated.

Shortnose suckers have been observed to migrate upstream from Copco Reservoir into the Klamath River adjacent to PacifiCorp's holdings to access spawning habitat (Beak Consultants 1987). Most spawning occured within 2 miles of the reservoir, however in searching the river for larval fish, some sucker larvae were found at 2 sites further upstream (Beak Consultants 1987).

The potential to entrain suckers into the irrigation ditches exists, however the extent of entrainment is unknown. The fact that larval suckers occupy shoreline habitats during daylight hours may increase the likelihood that they are entrained during that time period. However, because most spawning occurs below their diversion point the likelihood of fish entrainment is small. Small fry or larvae are most vulnerable to entrainment as they have little swimming capability and are dependent on flow for dispersal. PacifiCorp is in the process of reviewing land management activities and the current irrigation system.

4.1.2 Spill Termination at Link River Dam

Spill may occur at the Link River hydrofacilities when basin water inflow is greater than can be stored in system reservoirs and is more than can be passed through generating facilities or when facility maintenance requires no flow through a powerhouse and water must be spilled to meet downstream flow requirements. When a spill is completed, the potential to strand fish in isolated pools of the river bed is likely dependent on ramping rate, season, and period of spill prior to shutoff.

The stranding area downstream of the Link River Dam is variable depending on flow. Spill of 100 cfs or less is confined to the main river channel. At spill flows greater than 100 cfs side channels are watered up, and at flows greater than 500 cfs adjacent low lying areas become innundated. To provide time for fish to escape stranding areas, a rate of spill change was established in 1987 (Table A) as part of standard operating procedures for spill termination.

Table A. Link River Spill Decreasing Ramping Schedule

	Spill Flow (cfs)		
	0 to 300	300 to 500	500-1500
Ramp Rate (cfs/min)	20 cfs/ 5 min	50 cfs/ 30 min	100 cfs/ 30 min

The number of suckers that have been salvaged following spill termination has ranged from 0 to 133 fish. In May 1994, after roughly 8 hours of 100 cfs spill, a fish salvage of the area found no stranded suckers. Recent maintenance events at the Eastside facility in December of 1995 resulted in a 16 day spill event with spill flows of approximately 500 cfs. Following spill termination and implementation of the ramping procedure, only one 100 mm sucker was found in a side channel and was returned to Link River. In 1995 Link River dam spilled water from March 14 to April 27 with an average spill flow of approximately 1850 cfs. Upon spill termination, fish salvage efforts collected 12 juvenile suckers; 10 shortnose and 2 Lost River. Four days later on May 1, the spill resumed May 24, 1995. Average spill flow for this period was approximately 2,370 cfs, with a maximum of 4,900 cfs noted on May 14, 1995. A fish salvage conducted at the conclusion of spill collected 132 juvenile shortnose suckers, 5 juvenile Lost River suckers, and 1 juvenile Klamath largescale sucker. It appears that short-

term maintenance events that require spill at Link River dam result in a lower probability of fish stranding as opposed to longer spill events caused by climatic conditions.

The extent to which fish stranding occurs following spill termination at dams downstream of Link River is unknown. Ramp rates are used to minimize stranding at all facilities. Both Copco No. 1 and Iron Gate dams have plunge pools located at the base of the dam. These pools are directly connected to the river and have little stranding potential.

Bird predation also occurs as a result of spill termination at Link River Dam. Large numbers of fish eating birds have been observed on some occasions (Shrier pers. comm.). The extent of bird predation on stranded fish is unknown. However, intensive bird predation particularly by seagulls is an annual event during Klamath Project canal shutdown at the end of the irrigation season.

4.1.3 Power Operations at the J.C. Boyle Development

As described in Chapter 1, the J.C. Boyle powerhouse operates as a power peaking facility. During such operations, generation occurs when there is sufficient water available for efficient use of one or both turbine units. During times of low river flows, generation typically occurs only during the day. At night or off-peak, the project is shutoff to allow the reservoir to refill. The water fluctuation in the reservoir averages 1 to 2.5 ft. during this daily cycle.

The extent that power peaking generation can change downstream flow is limited to a 9 inch per hour ramp rate set by the FERC license (FPC 1961). Ramp rate is measured at an established USGS gage downstream of powerhouse. Actual timing and extent of stage change downstream of the powerhouse is dependent on whether one or both generators are operated.

Shortnose sucker spawning runs have been documented in this reach primarily in the area near Copco Reservoir (Buettner pers. obser.). The area is roughly 12 miles downstream of the J.C. Boyle powerhouse. The effects of large daily flow fluctuations to spawning behavior is unknown. There may be a negative affect of peaking on sucker eggs and embryo survival. Eggs deposited during low river flow in riffle areas with large-sized and compacted cobble substrate may be swept downstream when flows are increased. Eggs could be moved to unsuitable incubation areas or be exposed to fish predation. Eggs or larvae in shallow water areas during high river flow conditions may become desiccated during low flow periods.

Sucker larvae have been observed stranded in certain areas downstream of the J.C. Boyle powerhouse following a downramp in river flow (Beak Consultants 1987). In reviewing the amount of potential stranding areas, Beak Consultants determined that stranding of sucker larvae could occur on less than 10 percent of the total stream length of the Klamath River from the Oregon-California state-line downstream to Copco Reservoir (Beak Consultants 1987). Timing of flow fluctuation is important as peak sucker larval drift was shown to occur between 2200 and 0300 hours (Beak Consultants 1987). Powerplant operations during this nighttime period are typically steady with low river flows. The study concluded that considering the brief residence time in the river coupled with the short migration to the reservoir, susceptibility of sucker larvae to mortality from stranding may be a relatively minor occurrence (Beak Consultants 1987).

4.1.4 Fish Passage

Link River Dam, Keno Dam, and J.C. Boyle Dam have fish ladders to provide fish passage. Ladders were originally designed for trout passage, however suckers have been observed to use both the Link River Dam and Keno Dam ladders. In 1988 through 1991 a cooperative study was conducted by PacifiCorp and ODFW to help evaluate the status and effectiveness of trout management programs and activities in the Oregon portion of the Klamath River (Hemmingsen et. al. 1992). As part of the study, fish traps were installed near the top of the 3

project fish ladders. Trout and suckers collected in the traps were noted with some fish being tagged in hopes of recovering them at upstream traps or during spawning ground surveys.

Located on the east side of the Link River Dam, the fish ladder is a pool and weir type structure with a vertical slot entrance. The ladder consists of 11 pools, each pool approximately 8 ft. wide and 8 ft. long. Flow through the ladder is dependent on Upper Klamath Lake elevation along with wind direction and speed. Ladder water flow is controlled by the addition or removal of stop logs. Approximate flow is 15 cfs. The exit weir into the lake is at an elevation of 4138.5 ft. mean sea level (msl). In dry water years when lake elevations are below 4138.5 ft., no water is available for the ladder. In 1992, Upper Klamath Lake was below this elevation during August, September and October; in 1994 lake levels were below this level from August through December.

Few suckers have been observed to use the Link River Dam fish ladder. The trap in the fish ladder collected 4 adult shortnose suckers and 2 adult Lost River suckers from 1988 through 1991. All of these suckers were caught in April and May of 1989. During the 4 year sampling period, 131 trout were collected, with most of those captured in 1989.

The fish ladder at Keno Dam is a 24 pool weir and orifice type structure. Each pool is approximately 6 ft. wide, 10 ft. long, and 5 ft. deep. The orifice is located near the pool floor and is approximately 10 inches wide with a height of 15 inches. Water flow down the ladder is maintained at approximately 25 cfs.

The number of fish passing through the Keno Dam ladder has been variable. During the study period, suckers were observed each year with the majority of fish being Klamath smallscale suckers. Total number of endangered suckers collected was low; 7 adult Lost River suckers and 5 adult shortnose suckers. Numbers of trout caught ranged from 11 in 1989 to 160 fish in 1990.

The longest of the project fish ladders, the J.C. Boyle structure consists of a weir and orifice type ladder with 57 pools and an elevation gain of 67 feet. Pools are approximately 6 ft. wide, 6 to 8 ft. long, and 3.5 ft. deep (weir height). A small orifice (4 in. by 4 in.) is located at a bottom corner of each weir. Flow at the top of the fish ladder is maintained at approximately 6.5 cfs. To attract fish to the ladder, approximately 55 cfs is released from a conduit parallel to the fish ladder entrance.

Although trout were observed using the ladder in each year of the study, no suckers were collected from the ladder. The apparent non-use of the ladder by suckers may be a factor of the low sucker population in the immediate area of the ladder and Klamath River downstream of the facility. Electrofishing surveys downstream of the ladder entrance did not locate any suckers that could potentially use the ladder (Shrier, pers. comm.).

It is not known whether the lack of suckers trapped from the Keno, Boyle and Link River fish ladders was related to inadequate ladder designs, fish avoidance of ladder and fish trap facilities, low sucker population numbers in adjacent reservoirs, or lack of migratory behavior. However, this information suggests that sucker populations in the Klamath River reservoirs are segregated. Segregation has negative impacts with regards to genetic isolation.

4.1.5 Instream Flow

The FERC license that governs Klamath River hydropower operations established monthly instream flow releases from the Iron Gate development (FPC 1961). Specific instream flows between the hydrofacilities upstream of Iron Gate dam were not stipulated in the license. However, Keno and J.C. Boyle projects are operated to meet formal agreements with ODFW. No instream flow analysis has been done within this reach of the river to help describe the relation of fish habitat to river flow.

A minimum of 90 cfs is released continously into Link River from the Link River Dam. Downstream of the Eastside powerhouse, operations typically maintain at least a minimum of 450 cfs.

To provide sufficient flow for fishery resources within the Keno reach, PacifiCorp has an agreement with ODFW to provide a minimum stream flow of 200 cfs. Flow in the reach rarely approaches the minimum, only doing so in critically dry water years. During the summer of 1992, a critically dry year, Reclamation reduced the outflow from Upper Klamath Lake thereby reducing flows in the Keno reach to 150 cfs. Visual surveys by personnel in the river reach below Keno dam did not observe dead or dying trout or suckers. Water quality monitoring indicated water temperatures and DO levels were marginal for salmonids (Fortune pers. comm.).

Under FERC license conditions, instream flows were stipulated to protect aquatic life immediately downstream of the J.C. Boyle Dam. The minimum instream flow below J.C. Boyle Dam was set at 100 cfs by agreement with the Oregon State Game Commission. Several springs are located in this reach of the river and contribute approximately 300 cfs increasing the total flow to roughly 400 cfs.

The minimum flow in the 1.3 mile reach below Copco No. 1 dam is approximately 5 cfs and is released at Copco No. 2 Dam through a slide gate.

4.1.6 Reservoir Operations - Klamath River

PacifiCorp jointly operates Link River Dam with Reclamation and therefore affects Upper Klamath Lake through their water management program. Impacts of lake operations have been previously discussed in the Reclamation's 1992 BA. A new biological assessment is planned after KPOP has been developed that will address the effects of reservoir operations on endangered suckers. The following discussions focus solely on reservoir operations downstream of Link River Dam.

Operation of Klamath River mainstem reservoirs downstream of Link River dam are operated to maintain fairly stable water elevations with the exception of J.C. Boyle Reservoir.. Reservoirs have little active storage and capacity is limited by project works (ie. intake depth) which set minimum operating elevations. Drafting may occur on occasion to allow facility maintenance or in extreme conditions to provide some water to downstream resources. Iron Gate dam flows as given in the FERC license are to be greater than 1,300 cfs from September through April, 1,000 cfs in May and August, and 710 cfs in June and July (FPC 1961).

Keno Dam controls the elevation of the reservoir through 6 spill gates and a sluice valve. The reservoir is normally maintained at an elevation between 4085.3 and 4085.6 ft. msl. as gaged at Weed bridge. The reservoir may be slightly drafted in the winter and spring for flood control. The operating elevation provides a stable water source for local irrigation pumps, the ADY Canal, Lost River Diversion Channel and the F Canal. Approximately every 5 years, the reservoir is drawndown approximately 2 ft. for a 2 day period to allow maintenance of irrigation pump intakes.

J.C. Boyle Reservoir water elevations are typically maintained between 3789.5 and 3793.0 ft. msl. Elevation may fluctuate 1 to 2 feet on a daily basis dependent on J.C. Boyle powerhouse operations. At an elevation of 3788.0 ft. water ceases to flow down the fish ladder.

Copco Reservoir is maintained near the maximum pool elevation in the summer, while in the winter and spring the pool is drawndown 3 to 5 feet for flood control. Summer elevations generally range from 2604.5 to 2606.0 ft. msl. while winter and spring elevations range from 2601.0 to 2603.0 ft.

The most downstream reservoir, Iron Gate Reservoir is typically maintained near an elevation of 2326.0 to 2328.0 ft. msl. Maximum pool elevation is 2328.0 ft. Based on the need for winter and spring flood control, the reservoir may be drafted to 2324.0 ft.

The potential indirect effects of reservoir regulation at all mainstem Klamath reservoirs on endangered suckers appears to be minimal with the possible exception of J.C. Boyle where the daily fluctuations are 1-2 feet. Substantial areas of shoreline habitat particularly in the reservoir upstream of Highway 66 are impacted and even dewatered daily. These areas provide habitat for larval and juvenile suckers. Fluctuations may result in greater predation rates by larger fish as small suckers are forced from shoreline vegetation habitat; sucker food organisms dependent on these areas could be negatively impacted; and aquatic vegetation which serves multiple habitat functions may be affected.

4.1.7 Water Quality - Klamath River

Operation of the project and hydrofacilities on the Klamath River mainstem could potentially affect water quality in the river reach from Link River to downstream of Iron Gate Dam. Water in this section originates from Upper Klamath Lake, the Lost River through the Lost River Diversion Canal and from return flows from the Klamath Straits Drain into Keno Reservoir. Downstream of Keno Dam, most water use is nonconsumptive.

It is difficult to assess the impacts of project operations on water quality. With the exception of temperature and flow data, little other water quality data has been collected near the hydrofacilities. Some periodic monitoring of other water quality constituents has been conducted within and downstream of the project, however monitoring is infrequent and was not designed to evaluate project effects. Additional information is being prepared by ODEQ as part of a Total Maximum Daily Load study that addresses water quality in the Klamath River between Upper Klamath Lake and Keno Dam.

In review of Klamath River temperature data, surface water temperatures at Keno Dam and Iron Gate Dam are in the same range as surface water temperatures in Upper Klamath Lake (CH2MHill 1995). Water temperature appears to be controlled by a combination of meteorological and flow conditions. The maximum temperature in the river however, does not appear to vary substantially between years (CH2MHill 1995). Bartholow (1995) indicates there appears to be a downstream warming trend of approximately 0.045 F per year since the construction of Iron Gate Dam in 1962. Additionally, Bartholow found that project operations may have reduced downstream temperatures in July up to 3.6 F and increased downstream temperature in October by the same amount (Bartholow 1995). Bartholow has qualified his analysis by noting temperature modeling is needed before definite conclusions can be reached (Bartholow 1995).

Monitoring has shown that the Klamath River water quality criteria most commonly exceeded were temperature, DO concentrations, pH, ammonia and ortho-phosphorus (Campbell 1995). River water quality conditions appear to be controlled by Upper Klamath Lake conditions and further affected by various pollutant loadings in Keno Reservoir (CH2MHill 1995).

4.1.8 Exotic Fish - Klamath River

A number of exotic fish species have been introduced into the Klamath River system. Some of these species have taken advantage of the reservoir habitat and now comprise large populations in Iron Gate, Copco, and J.C. Boyle reservoirs (Buettner and Scoppettone 1991). In sampling conducted by Reclamation in Copco Reservoir (1993), pumpkinseed and yellow perch composed 55 percent of the total number of fish caught (Mike Green pers. comm.). The significance of the large yellow perch population is in the timing of their spawning migration into the Klamath River upstream of Copco Reservoir. Yellow perch migrate into the sucker spawning areas at approximately the same time young suckers are emerging from the gravel. The suspected result is heavy predation by the yellow perch on the sucker larvae (USBR 1992). Largemouth bass populations exist in all mainstem reservoirs and are very effective piscivores.

4.1.9 Habitat Modification - Klamath River

Construction of the project and associated reservoirs resulted in the innudation of several hundred acres. Riverine habitat has decreased and lacustrine type habitat has increased. This change in habitat may benefit suckers in the area. Both shortnose and Lost River suckers generally are only found in free flowing river sections during spawning or migration. Other life stages appear to prefer lake type habitat.

4.2 Effects of The New Earth Company Algae Harvest Operations on Endangered Suckers

4.2.1 Entrainment

4.2.1.1 A Canal

1995

A collection permit was obtained from the Service and New Earth initiated a study in July 1995 to elucidate the number of suckers taken during algae harvest operations as well as to determine environmental relationships which might be used to predict their occurrence in the A Canal. Though the study was initiated too late in the season to intercept early larval migration (Markle and Simon 1993), collected data indicated that fish less than 30 mm in total length could pass through the DRDs and are taken on algae harvest screens. Sucker larvae were documented in samples collected during the study. However, this study was not designed to evaluate entrainment of juvenile fish. No monitoring was conducted to determine fish impingement on the DRDs.

1996

New Earth harvest operations have the potential to "take" fish which pass through the DRDs. It is assumed that larval fish will pass through and be taken according to the amount of flow which is diverted and processed through harvest screens. As more flow is diverted through harvest screens, more fish will theoretically be taken.

Results of an OSU study of sucker entrainment in the A Canal estimated a total of 422,474 entrained suckers from June 27 through October 13, 1990 (95% confidence interval = 0 to 1,124,594; Harris and Markle 1991). A similar study conducted from May 21, 1991 to July 21, 1991 estimated that a total of 759,150 suckers entered the canal during this time period (95% confidence interval = 204,701 to 1,422,248; Markle and Simon 1993). Based on these numbers, it is estimated that New Earth will "take" 400,000 to 800,000 suckers during the 1996 harvest season.

Although identification of larval stage suckers in these studies was tentative, principal component analysis showed that A Canal suckers compared best to known Klamath largescale suckers, which are not protected by the Endangered Species Act (Harris and Markle 1991). However, later identification work indicated that the shortnose and Klamath largescale suckers were similar in appearance. For numerical comparison, The Klamath Tribes (Dunsmoor pers. comm.) estimated a 70 million larval sucker emigration during 1989 sampling at River mile 6 on the Williamson River. However, only 5 million larval suckers were monitored at the mouth of the Williamson River.

The employment of the DRDs across the intake of the C Canal (approximately June 1 - October 15, 1996) will minimize entry of juvenile and adult suckers into the C Canal. No entrainment reduction actions occur from April 15 (when the A Canal is normally opened) to June 1. Consequently, fewer suckers will be lost to the C Canal and released in downstream field irrigation. Instead fish are expected to be concentrated in the shorter B Canal. It is anticipated that concentration of fish in the B Canal will accommodate a more thorough salvage effort at the

irrigation season's end (when the canal is drained), and might offer a more plausible route for fish back to the Lost River when the canal is drained (Green pers. comm.). It is speculated that these factors might benefit the overall numbers of suckers which are entrained in the A Canal as less will be lost in crop irrigation flows downstream.

Though we have estimated this direct take of suckers, it is likely that a large percentage of A Canal larval fish would be lost to the population as a result of downstream irrigation practices or poor water conditions regardless of algae harvest operations.

4.2.1.2 Eastside and Westside Diversion Canals on the Link River

1997-1998

An estimation of larval suckers screened during harvest activities at PacifiCorp's Eastside and Westside facilities is difficult to ascertain as no complete studies of fish entrainment have been performed at these sites. However, if we assume that similar numbers of suckers will be available for entrainment in these diversion canals as are diverted into the A canal, then we can make an estimate of harvest take based on flow. By using an approximate average summer flow in the A canal of 750 cfs and a season entrainment of 759,150 suckers (Markle and Simon 1993), we can estimate a flow dependent entrainment of about 1012 suckers per cfs of water flowing in the harvested canals during the summer period. Using this method, the seasonal take of sucker larvae is estimated at 1,012,200 and 202,400 in the Eastside (1,000 cfs average flow) and Westside (200 cfs average flow) diversions, respectively. A total harvest of less than 1,300,000 suckers would be expected at the proposed New Earth - Link River harvest site.

Similar to harvest operations on the A Canal, it is expected that New Earth harvest operations should enhance water quality on the Link River, downstream of the Eastside and Westside harvest locations. Enhancement of water quality should have beneficial effects for the aquatic habitat and its inhabitants downstream in Lake Ewauna and the Klamath River.

The employment of ERDs across the intakes of the Eastside and Westside power canals (June 1 to October 15 or for the duration of the algae harvest season whichever is greater) will reduce entry of juvenile and adult suckers into these facilities. Therefore entrainment losses will be reduced and more fish are likely to remain in Upper Klamath Lake.

4.3 Lower Williamson River Restoration

PacifiCorp and New Earth propose to invest in the purchase and operation and maintenance of Tulana Farms or other offsite habitat mitigation, such as Goose Bay Farms. The restoration project is intended to restore essential habitat for millions of larval suckers produced in the Sprague and Williamson rivers. The project is anticipated to recreate the wetland habitat needed to reduce population losses from predation, starvation, and water quality during the most vulnerable life stage. It is anticipated that the wetland restoration project will benefit other native fish and water associated bird species and is also likely to improve water quality in Upper Klamath Lake. However, this restoration will likely take several years to actually benefit the fish.

Restoration plans are likely to call for movement of dikes and other earth movement work that may increase turbidity and sedimentation potentially negatively impacting food resources for larval and juvenile suckers and their ability to see food items. Sediment may also cause temporary reduction of oxygen in the water due to sediment oxygen demand and potential release of toxic substances in the sediments. Construction of new channels off the Williamson River may lead to the diversion and stranding of suckers. New habitat may also benefit sucker predators like fathead minnows and yellow perch.

A short-term and long-term restoration plan will be developed by a technical work group which will include considerations for reducing adverse impacts during restoration activities and later operations, and implemented as per Service/Reclamation review and approval.

4.4 Cumulative Effects

The cumulative effects of future non-federal activities on endangered and threatened species or critical habitat that are reasonably certain to occur within the action area were described in the 1992 BO (USFWS 1992). The major impacts were related to continued farming and grazing that occurs over a large area upstream of the Project area in the Wood River, Williamson River, Sprague River, and Lost River watersheds. New activities not addressed include the development of the Running Y Ranch Resort which calls for restoration of 1000 acres of marsh habitat. This action may benefit water quality and sucker habitat conditions in Upper Klamath Lake. Other activities likely to occur include largescale riparian restoration along the major tributaries through fencing and improved grazing practices, and wetland restoration.

5.0 CHAPTER 4 - DETERMINATION OF EFFECTS

Operation of the PacifiCorp and New Earth facilities associated with the Klamath Project affect the endangered Lost River suckers and shortnose suckers through loss of spawning and larval and juvenile rearing habitat and degradation of water quality related to regulation of water levels in lakes and reservoirs; insularization of sucker populations increasing the risk of hybridization, introgression and loss of genetic variability due to dams and other facilities that have decreased the connectivity between different lakes and rivers in the Upper Klamath Basin; and entrainment and loss of fish through diversions including irrigation canals, pumping plants, power turbines, and algae harvesting screens. Although the project has had, and continues to effect endangered suckers, we believe these effects may be ameliorated in the long-term by the fish restoration actions being proposed as part of the action. It is our determination that the Klamath Irrigation Project and associated operations by PacifiCorp and New Earth is likely to affect the shortnose and Lost River sucker or its proposed critical habitat. Reclamation requests an Incidental Take Statement (authorization) in addition to Reclamations current Incidental Take Statement for these entities operations, under their federalized status.

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7.0 Personal Communications

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Roger Smith, Fisheries Biologist, Oregon Department of Fish and Wildlife, Klamath Falls, Oregon.

David Vogel, Lead Scientist, Natural Resource Scientists, Inc. Red Bluff, California.

David Simon, Research Associate, Oregon State University, Corvallis, Oregon.

Rollie White, Fish and Wildlife Biologist, U.S. Fish and Wildlife Service, Portland Field Station, Portland, Oregon.

Jeffrey Ziller, Fisheries Biologist, Oregon Department of Fish and Wildlife, Springfield, Oregon.

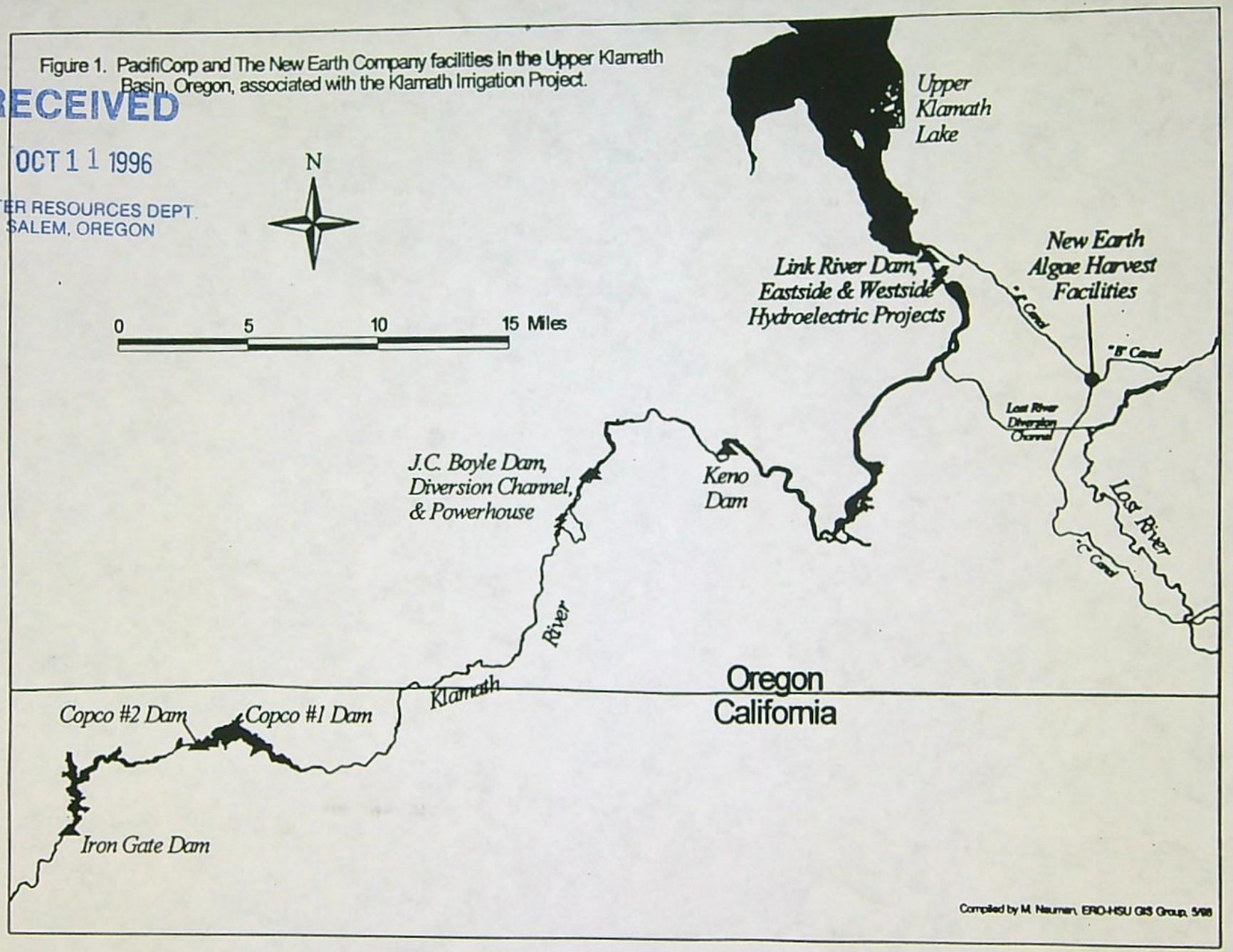
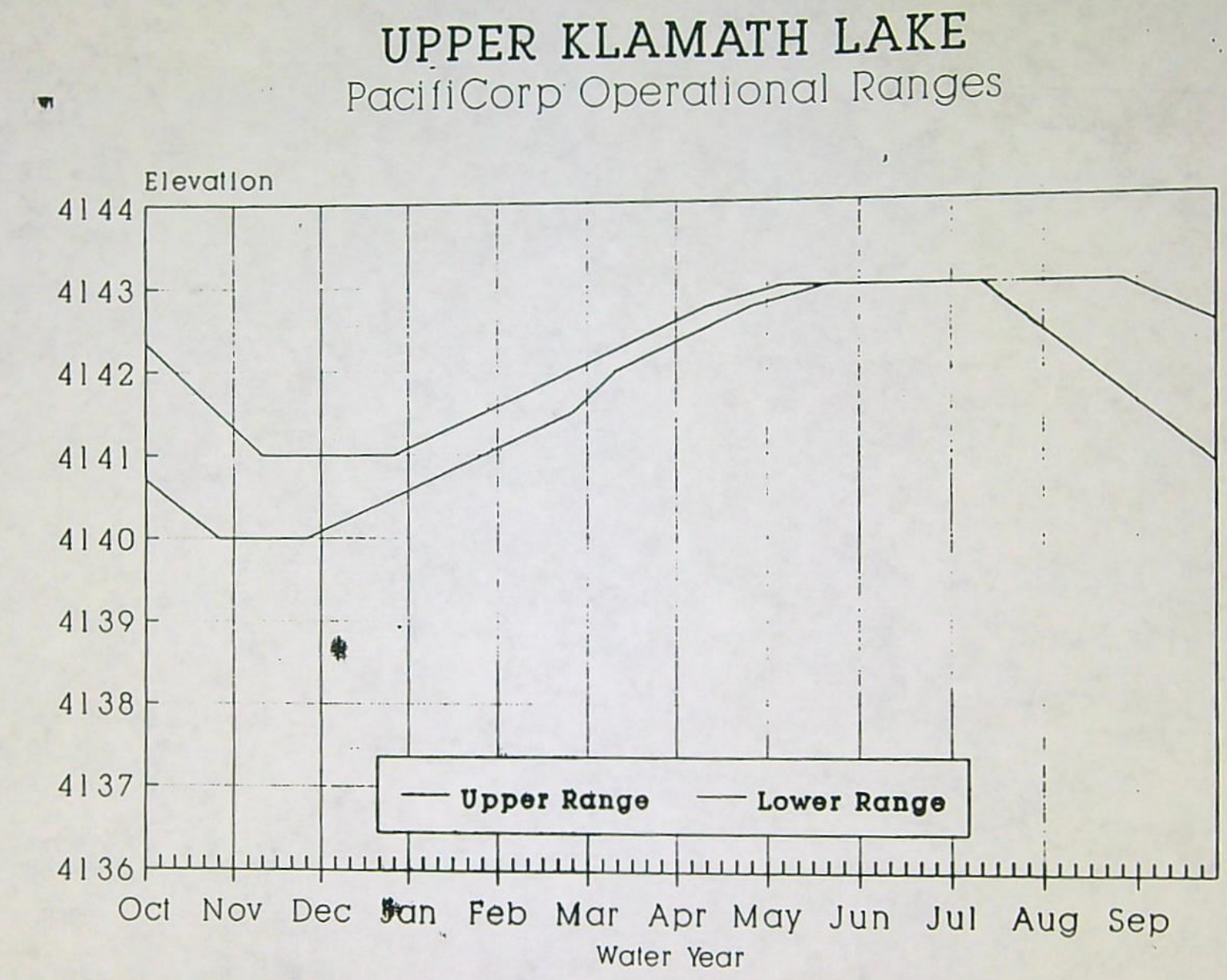
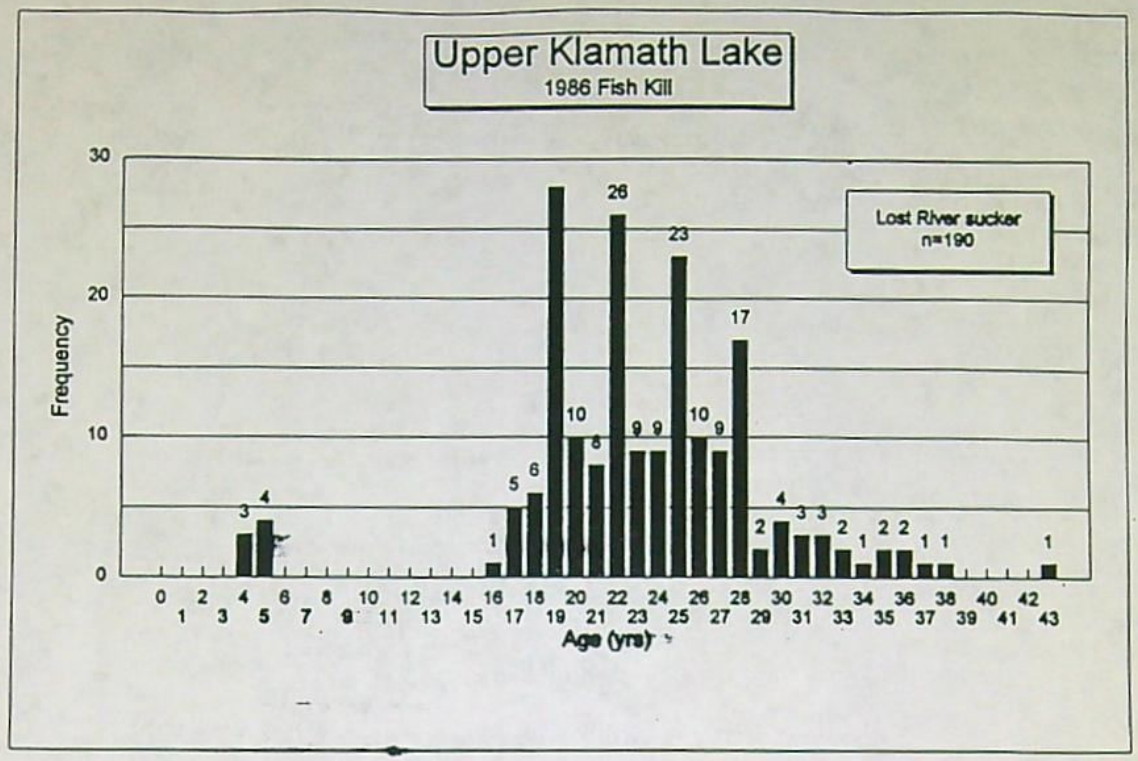


Figure 1. PacifiCorp and The New Earth Company facilities in the Upper Klamath Basin, Oregon, associated with the Klamath Irrigation Project.

Figure 2. Flood Control Envelop for Upper Klamath Lake, Oregon



Source: U.S. Bureau of Reclamation



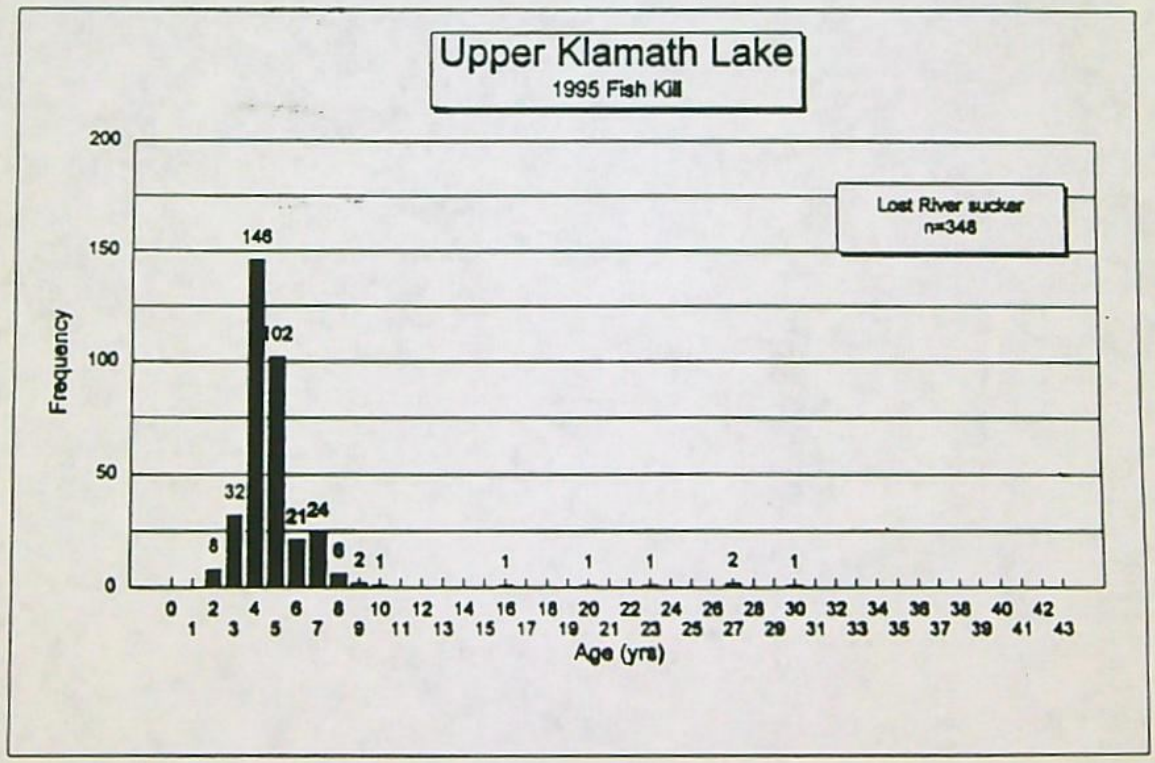
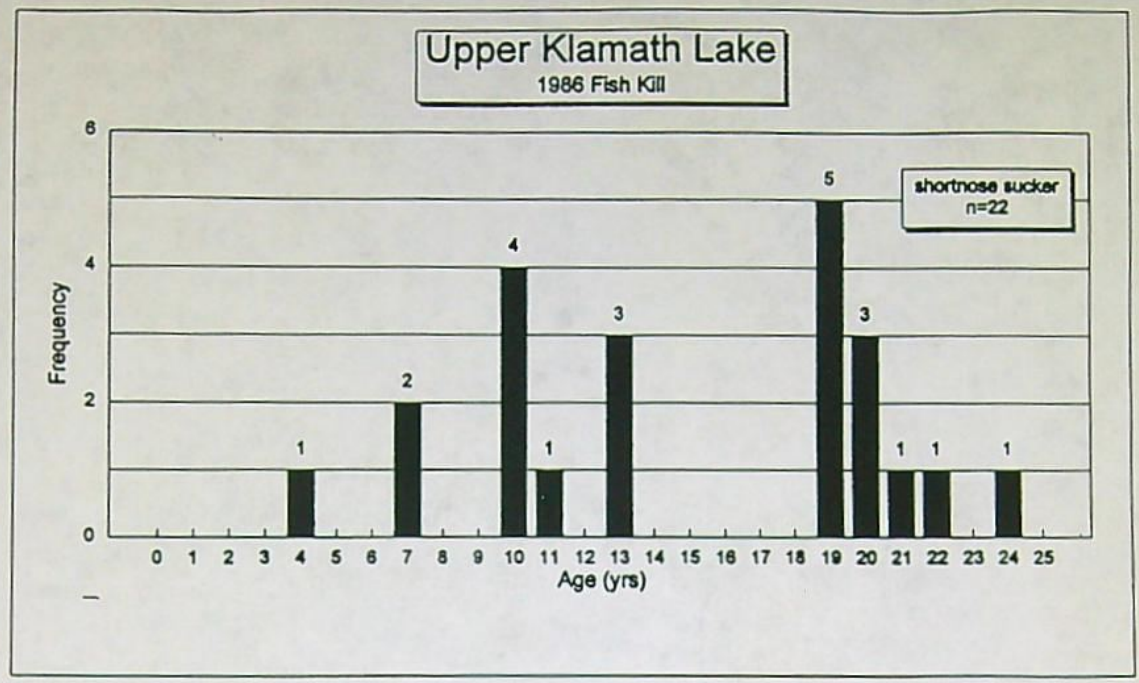


Figure 3. Age-frequency (number) of Lost River suckers collected in the 1986 and 1995 fish kills on Upper Klamath Lake, Oregon.



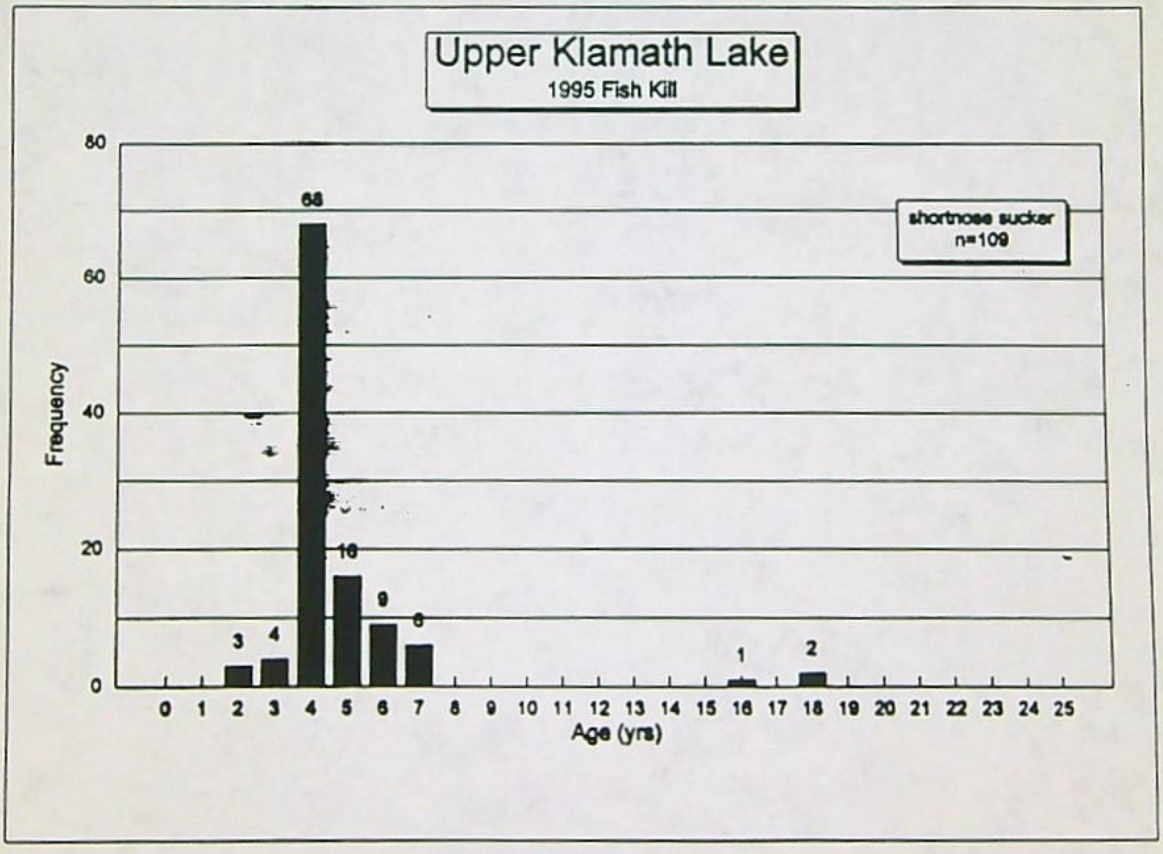


Figure 4. Age-frequency (number) of shortnose suckers collected in the 1986 and 1995 fish kills on Upper Klamath Lake, Oregon.

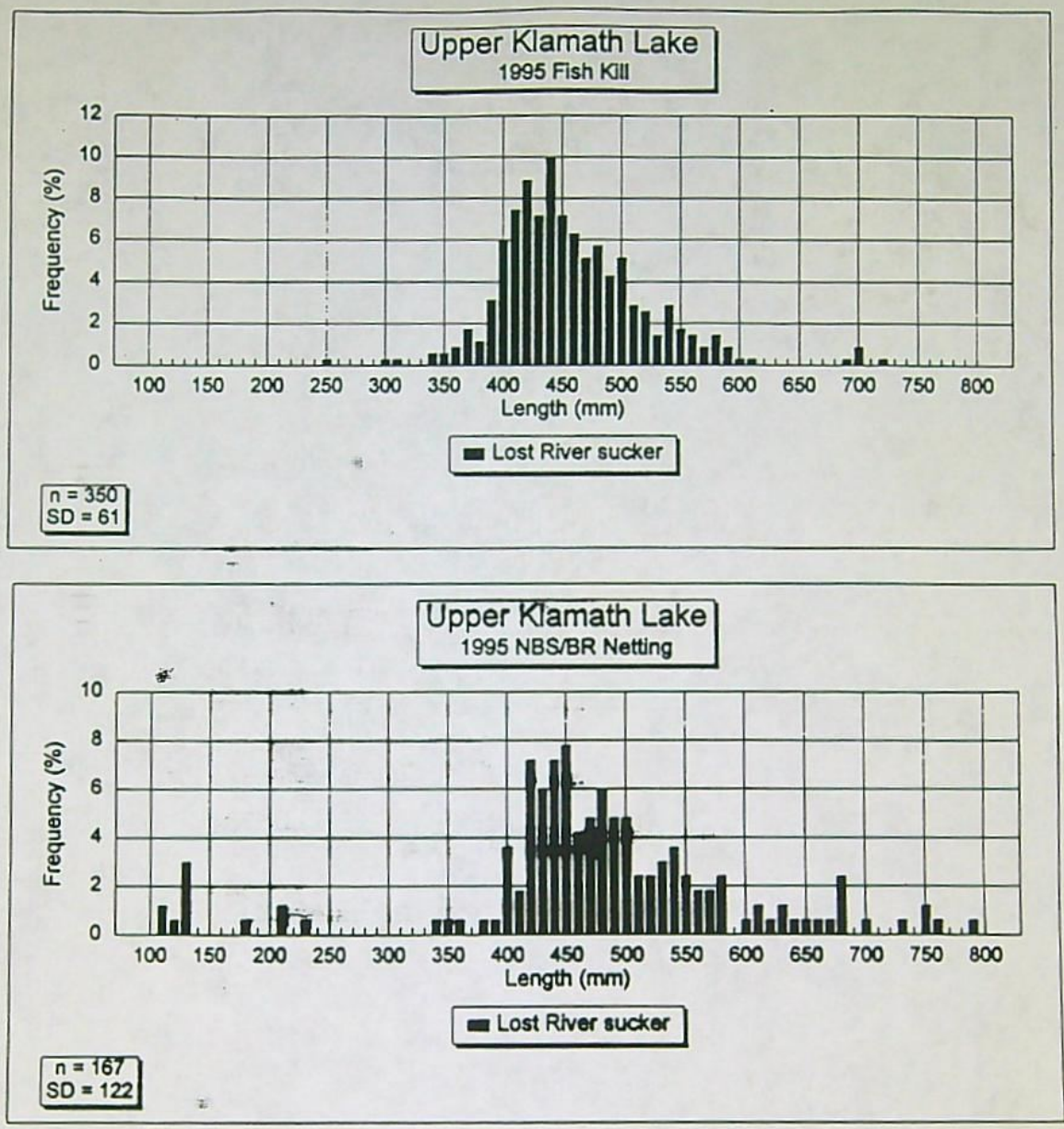
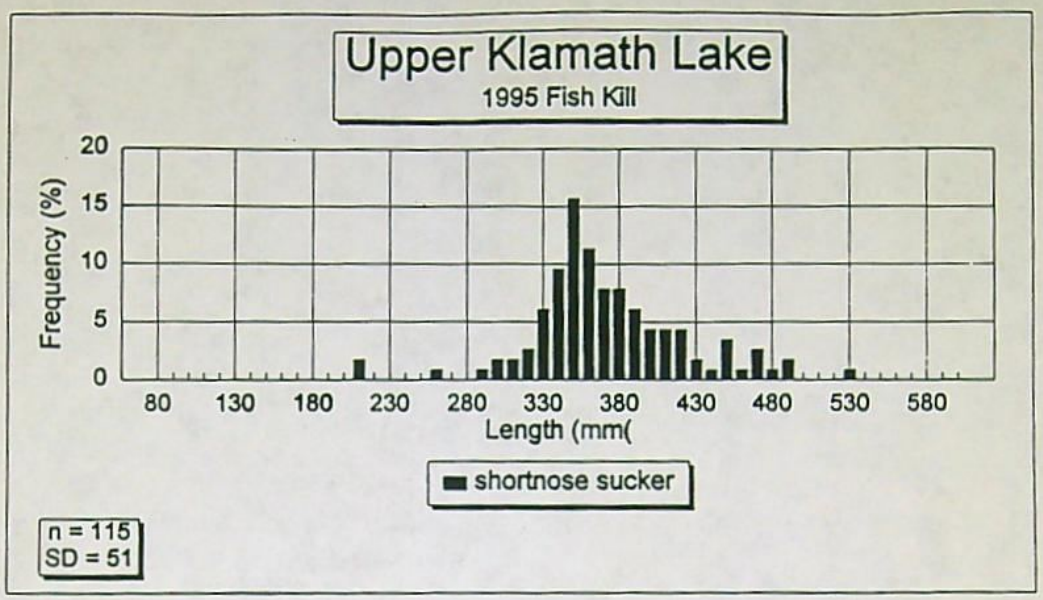


Figure 5. Length-frequency (%) of Lost River suckers collected in the fish kill and netting activities on Upper Klamath Lake, Oregon, in 1995.



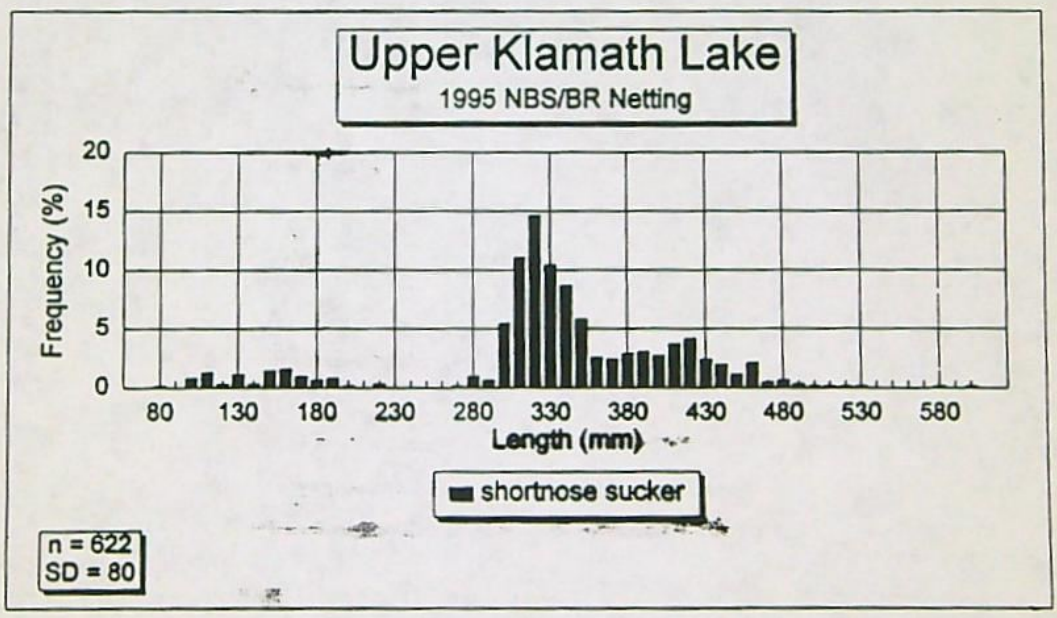


Figure 6. Length-frequency (%) of shortnose suckers collected in the fish kill and netting activities on Upper Klamath Lake, Oregon, in 1995.

Figure 7. Radio-tagged Lost River and Shortnose Sucker locations in Upper Klamath Lake, Oregon (1993-1995).

UPPER KLAMATH LAKE

Sucker Radio Telemetry

May 1993 - December 1995

Lost River sucker
- Boat Observation
- Aerial Observation

shortnose sucker
- Boat Observation
- Aerial Observation

Background Hydrology
- Marsh
- Lake/River (no depth)
- Upland

Lake Depth
- 1 - 2 m
- 2 - 3 m
- 3 - 4 m
- > 4 m

N

1 0 1 2 3 4 Miles

Sucker Radio Telemetry:
Klamath Project Office, U.S. Bureau of R[illegible]mation
Background Hydrology:
National Wetlands Inventory, U.S. Fish & Wildlife Service
Upper Klamath Lake Bathymetry:
U.S. Bureau of Reclamation 1953; Surface Elevation = 4,143'
Compiled by: M. Neuman, Humboldt State Univ. GIS Group, 2/96

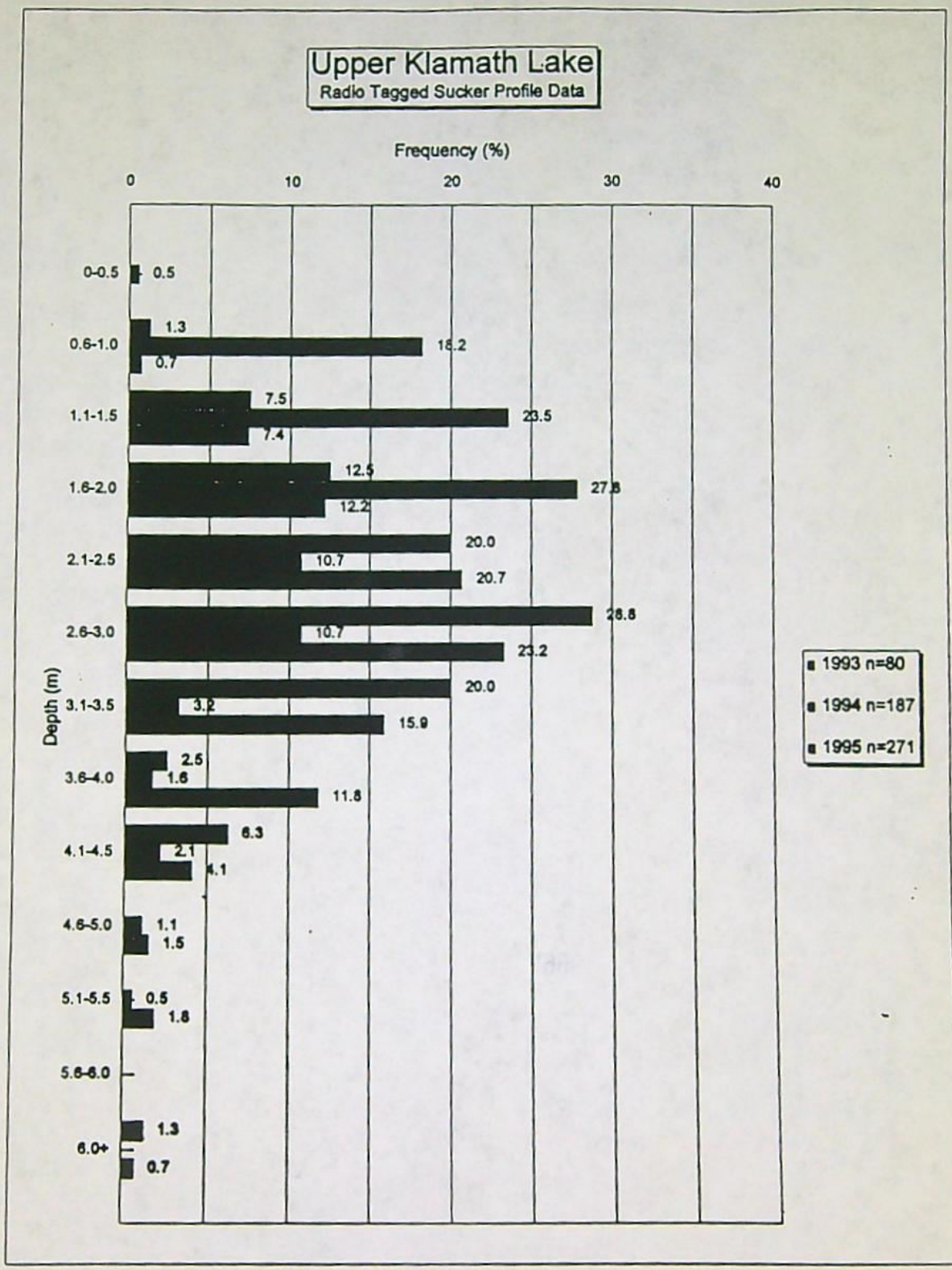


Figure 8. Frequency (%) of bottom depths where radio-tagged suckers occurred in Upper Klamath Lake, Oregon 1993-1995.

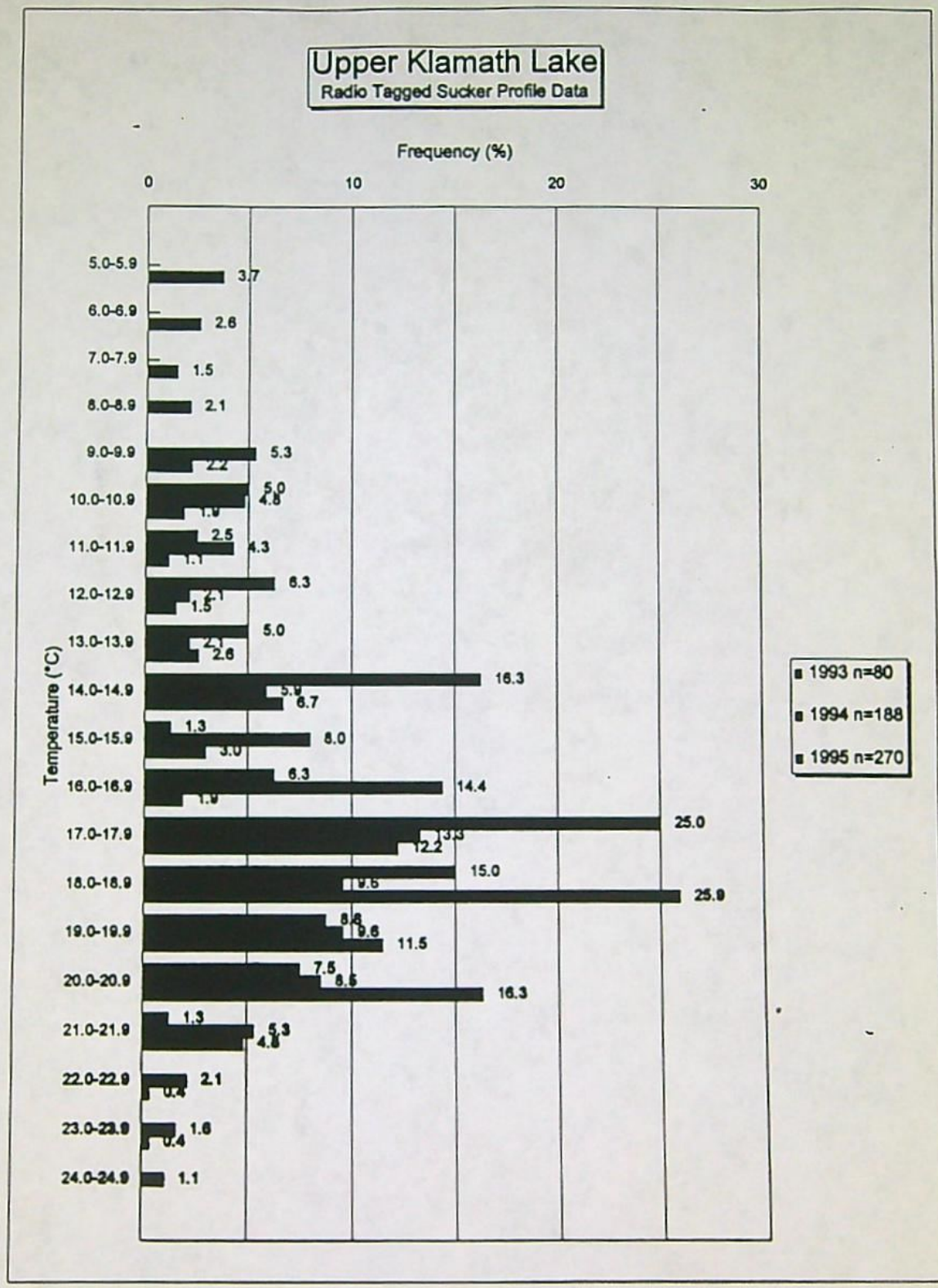


Figure 9. Frequency (%) of bottom water temperatures where radio-tagged suckers occurred on Upper Klamath Lake, Oregon, in 1993-1995.

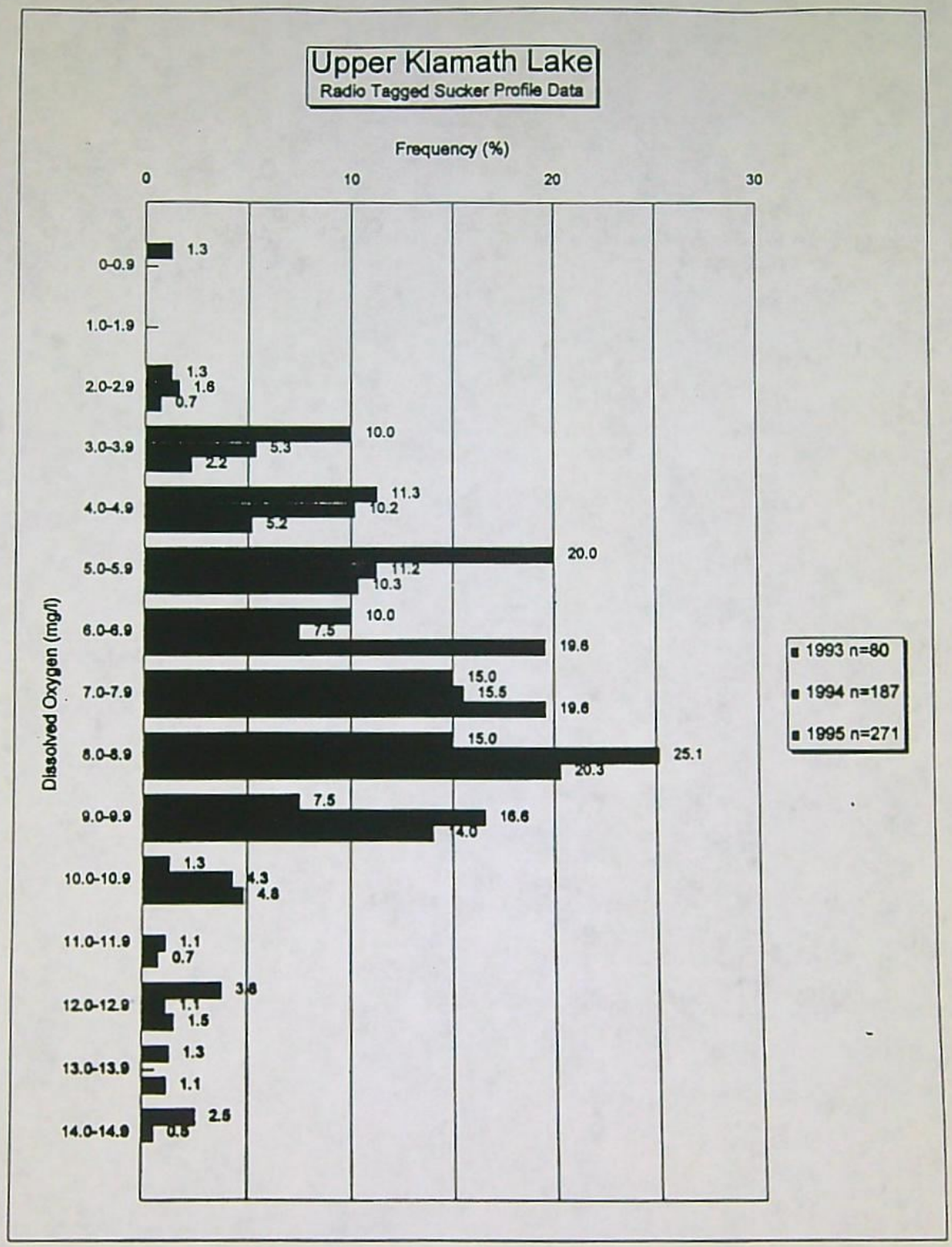


Figure 10. Frequency (%) of bottom dissolved oxygen where radio-tagged suckers occurred on Upper Klamath Lake, Oregon, in 1993-1995.

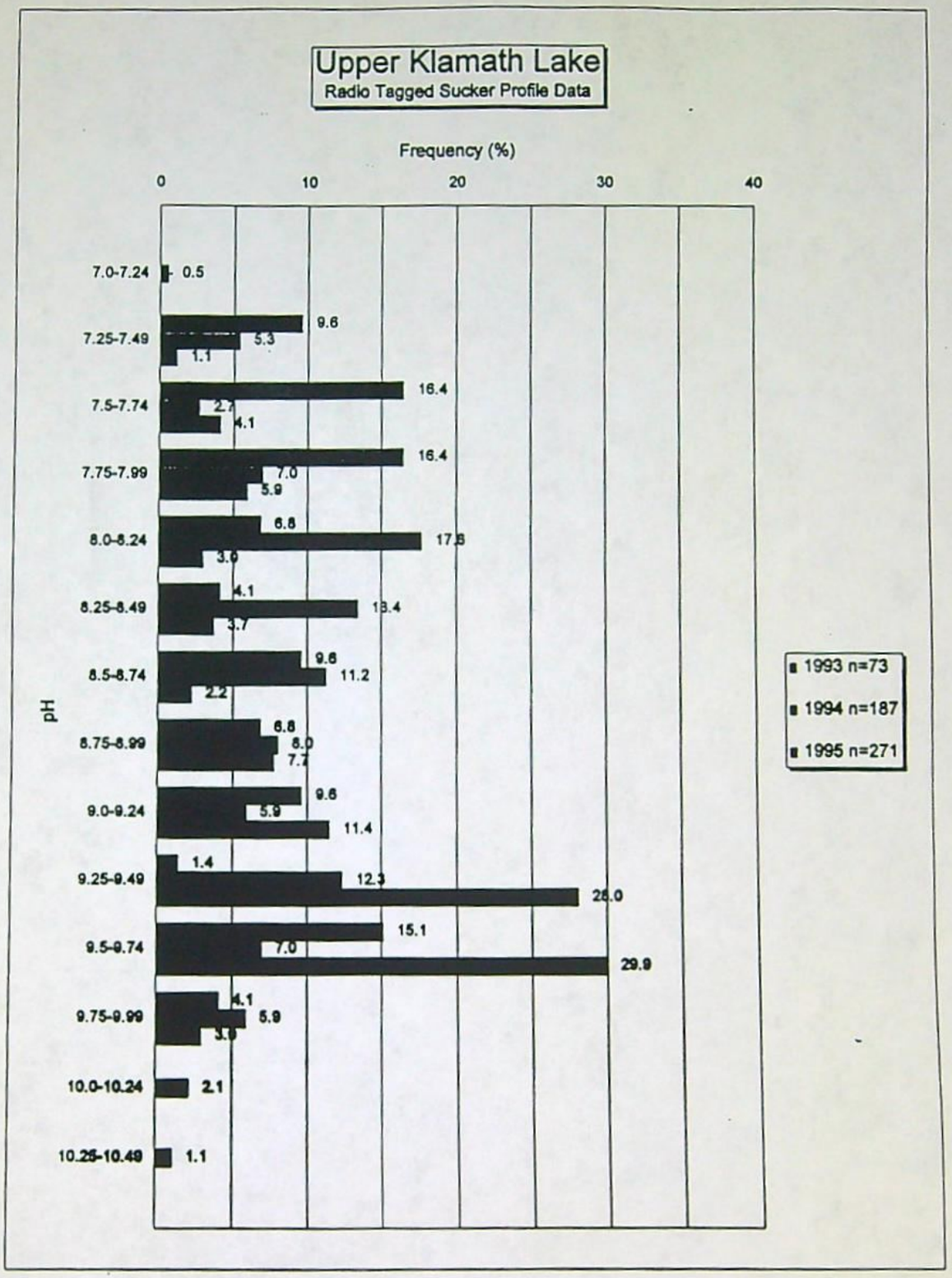


Figure 11 . Frequency (%) of bottom pH where radio-tagged suckers occurred on Upper Klamath Lake, Oregon, in 1993-1995.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Klamath Basin Ecosystem Restoration Office
6600 Washburn Way
Klamath Falls, OR 97603
(541) 885-8481 FAX: (541) 885-7837

In Reply Refer To: 1-10-96-F-039

July 15, 1996

Memorandum

To: Area Manager, Bureau of Reclamation, Klamath Basin Area Office
Klamath Falls, OR

From: Project Leader, Ecosystem Restoration Office, Klamath Falls, OR

Subject: Formal Consultation on PacifiCorp and The New Earth Corporation Operations, as Permitted by Bureau of Reclamation, for the Lost River Sucker and Shortnose Sucker

Attached is the U.S. Fish and Wildlife Service, Ecosystem Restoration Office's (Service), biological and conference opinions for PacifiCorp's and The New Earth Company's proposed operations and actions, as permitted by Bureau of Reclamation (Reclamation), on Klamath Project (Project) lands and facilities. These actions effect the endangered shortnose sucker *Chasmistes brevirostris* and endangered Lost River sucker *Deltistes luxatus*, and proposed critical habitat for shortnose and Lost River suckers.

Important assumptions were made by the Service in completing these biological and conference opinions: 1) The Service assumed, in the interim between this consultation and completion of the Upper Klamath Lake endangered sucker consultation by spring 1997, water elevations and corresponding target dates in Reclamation's "low range elevations" proposal would be achieved during 1996; 2) The Service assumed Reclamation will complete the anticipated Upper Klamath Lake endangered sucker consultation by spring 1997. The Service anticipates the Upper Klamath Lake endangered sucker consultation will address other Project impacts and summarize and/or update new data not addressed in these PacifiCorp and The New Earth Company biological and conference opinions; 3) The Service assumed new information presented in the Upper Klamath Lake consultation would be integrated into Reclamation's and PacifiCorp's management of Upper Klamath Lake water elevations. These operations should provide annual lake levels in 1997 and beyond that are conducive to enhanced endangered sucker survival while proposed long-term habitat restoration activities are implemented and biotic response is monitored; 4) The Service assumed all ongoing research and monitoring, as specified under the July 22, 1992 Project long-term biological opinion, would continue; 5) The Service assumed that, in the long term, Lower Williamson River restoration efforts would prove successful and benefit all life stages of endangered suckers, reducing the need for short-term protections; 6) The Service assumed proposed short-term actions will remain valid until long-term Lower Williamson River restoration efforts are determined successful and Service analysis of species recovery potential validates relaxation of short-term measures.

EXHIBIT C

The Incidental Take Statement (ITS) contained in these biological and conference opinions estimates incidental take of Lost River suckers and shortnose suckers resulting from operations of PacifiCorp and The New Earth Company facilities and exempts the Applicants from the Endangered Species Act's section 9 prohibitions. This exemption is specific to PacifiCorp and The New Earth Company operations and does not supersede or otherwise replace Reclamation's responsibilities under ITS's in previous Project biological opinions. Additionally, all pre-existing Reasonable and Prudent Alternative elements from previous Project biological opinions remain in effect for Reclamation.

The biological opinion and ITS define specific timeframes for proposed activities and take reduction guidelines. The following table summarizes these actions.

Responsible Entity	Action	Timeframe/Due Date
PacifiCorp	Develop Entrainment Study Plan	August 31, 1996
PacifiCorp	Complete Entrainment Study	May 31, 1999
PacifiCorp	Entrainment Study Annual Report	October 15 (2 years)
PacifiCorp	Genetics Funding	To Be Determined
PacifiCorp	Klamath Reservoirs Study Report	December 31, 1999
PacifiCorp	Flood Operations Plan	October 31, 1996
PacifiCorp	ESA O&M Activity Plan	September 30, 1996
PacifiCorp	ESA O&M Report	December 31 Annually
PacifiCorp/BOR	Identify Fish Ladder Ownership	December 31, 1996
PacifiCorp or BOR	Fish Ladder Report	December 31, 1998
New Earth	Implement Entrainment Reduction at East/West Hydros	June 1, 1997
New Earth	Annual Entrainment Report	February 28 (2 years)
New Earth	Annual Salvage Report	Annual If Salvage Occurs
LWRRT	Draft Long Range Restoration Plan	December 31, 1996
LWRRT	Final Long Range Restoration Plan	April, 1997
LWRRT	Annual Restoration Plans	Prior to Annual Activities
PacifiCorp/New Earth	Assist with Land Purchase	January 1, 1997
PacifiCorp/New Earth	Land O&M Payments	Annually
Agricultural Land Owners	Annual Agricultural Operations Plans	Prior to Annual Activities

The ERO compliments Reclamation, PacifiCorp, and The New Earth Company for cooperatively and proactively participating in this consultation process. The proposed Lower Williamson River restoration action is an outstanding example of Federal government and private industry partnership opportunities to cooperatively benefit endangered species. If you have any questions please contact Steve Lewis, Project Leader, Marcus Horton, Supervisor Ecological Services, or Doug Young, Fish and Wildlife Biologist, at the above letterhead address/phone.

cc:
Stoel Rives, attn: Barb Craig
PacifiCorp: Frank Shrier, Tim O'Connor, Terry Flores
New Earth Company: Jim Carpenter, Brandt Gutermuth
Larry Salata
Dale Hall
Russell D. Peterson, OSO, attn: Rollie White
Randy Brown
Yreka
Arcata
ODFW: Roger Smith
Klamath Tribes, attn: Craig Bienz

Formal Consultation on PacifiCorp and The New Earth Company Operations, as Permitted by Bureau of Reclamation, for the Lost River Sucker and Shortnose Sucker

INTRODUCTION

The U.S. Fish and Wildlife Service (Service), Ecosystem Restoration Office (ERO), has reviewed PacifiCorp's and The New Earth Company's proposed operations and actions, as permitted by Bureau of Reclamation (Reclamation), on Klamath Project (Project) lands and facilities, located in California and Oregon. Reclamation's biological assessment (Assessment) requesting initiation of formal consultation and conference for these operations and actions was received on June 7, 1996. This document represents the Service's biological opinion on the effects of the proposed operations and actions on shortnose sucker (*Chasmistes brevirostris*) and Lost River sucker (*Deltistes luxatus*), and conference opinion on the effects of the proposed operations and actions on proposed critical habitat for shortnose and Lost River suckers, in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)(Act).

These biological and conference opinions are based on the following information: 1) the June 7, 1996 Assessment (Reclamation 1996a); 2) previous Project Assessments and their appendices; 3) information presented in all previously released biological opinions addressing Project operations; 4) results of previous and current field and laboratory research activities; 5) information provided in published and non-published literature pertaining to the listed species; 6) file information in this office; 7) documents provided by PacifiCorp and The New Earth Company; 8) personal communication between ERO staff and researchers familiar with these listed species; 9) the Klamath Tribes; 10) discussions with members of the informal Lower Williamson River Restoration Team (LWRRT); 11) phone and direct communication between ERO, PacifiCorp, The New Earth Company, and Reclamation staffs and representatives; and 12) a July 11, 1996 letter from The New Earth Company clarifying the intent of the proposed Cooperative Agreement between The New Earth Company and the Service for future Upper Klamath Lake algae harvest (described below).

Important assumptions made by the Service in analyzing these data and developing these opinions included: 1) The Service assumed, in the interim between this consultation and completion of the Upper Klamath Lake endangered sucker consultation by spring 1997, water elevations and corresponding target dates in Reclamation's "low range elevations" proposal (Reclamation 1996b) would be achieved during 1996; 2) The Service assumed Reclamation will complete the anticipated Upper Klamath Lake endangered sucker consultation by spring 1997. The Service anticipates the Upper Klamath Lake endangered sucker consultation will address other Project impacts and summarize and/or update new data not addressed in these PacifiCorp

and The New Earth Company biological and conference opinions; 3) The Service assumed new information presented in the Upper Klamath Lake consultation would be integrated into Reclamation's and PacifiCorp's management of Upper Klamath Lake water elevations. These operations should provide annual lake levels in 1997 and beyond that are conducive to enhanced endangered sucker survival while proposed long-term habitat restoration activities are implemented and biotic response is monitored; 4) The Service assumed all ongoing research and monitoring, as specified under the July 22, 1992 Project long-term biological opinion (LTBO), would continue; 5) The Service assumed that, in the long term, Lower Williamson River restoration efforts would prove successful and benefit all life stages of endangered suckers, reducing the need for short-term protections; 6) The Service assumed proposed short-term actions will remain valid until long-term Lower Williamson River restoration efforts are determined successful and Service analysis of species recovery potential validates relaxation of short-term measures. Should any of these assumptions not hold true, Reclamation, on behalf of PacifiCorp and The New Earth Company, will be required to reinitiate section 7 consultation. A complete administrative record of this consultation is on file in the ERO.

The New Earth Company is proposing, under a separate Cooperative Agreement and consultation with the Service, to implement an Upper Klamath Lake algae harvesting operation. The New Earth Company will propose to offset any unavoidable impacts to endangered suckers through, in part, annual contributions to a Tulana Farms operations and maintenance fund. While The New Earth Company's proposed financial contribution for purchase of Tulana Farms for canal harvest impacts (identified in this consultation) is separate from The New Earth Company's proposed contribution for lake harvest impacts (proposed in the Cooperative Agreement), both proposed actions are analyzed together in this consultation to ensure a full review of this long-term restoration action.

ERO and Reclamation staff worked to "streamline" this consultation process by cooperatively developing the proposed operations and actions, then negotiating and proposing measures deemed necessary to avoid jeopardy to these species and to reduce take of listed suckers. This progressive approach involved describing PacifiCorp/The New Earth Company actions, identifying and analyzing effects by action and endangered sucker life stage, and proposing biologically sound jeopardy avoidance actions and additional conservation measures to help facilitate survival and recovery of the species under review. Proposed jeopardy avoidance actions and conservation measures include research, monitoring, review of flood control rules, habitat enhancement, and entrainment reduction activities. Research and operational reviews do not, in and of themselves, reduce impacts to endangered species, reduce take, or enact corrective measures. However, Reclamation has stated in its Assessment that Service review of research and results with subsequent determination if reinitiation of consultation is required will be expected in the future. Therefore, research may eventually bring about changes in actions to avoid jeopardy or assist species conservation in ways not previously considered.

CONSULTATION HISTORY

The shortnose sucker and Lost River sucker were listed as endangered species on July 18, 1988. Reclamation initially consulted with the Service on the use of Acrolein on Project lands (biological opinion dated June 14, 1989). Several subsequent short-term consultations were completed for Project operations (biological opinions dated August 14, 1991, January 6, 1992, March 27, 1992, and May 1, 1992). On July 22, 1992, a jeopardy biological opinion was transmitted for the long-term operations of the Project. This LTBO's Reasonable and Prudent Alternative (RPA) and Incidental Take Statement (ITS) superseded all previous Project RPA's and ITS's. In April, 1993, the Service published a Recovery Plan for the shortnose and Lost River suckers. On August 11, 1994, a jeopardy biological opinion was transmitted for Project operations at Clear Lake Reservoir. The 1994 opinion's RPA requirements superseded the portions of the 1992 LTBO's RPA that referred to Clear Lake Reservoir, and provided an updated ITS for the entire Klamath Project operations. On December 1, 1994, critical habitat was proposed for Lost River and shortnose suckers. On February 9, 1995, a non-jeopardy biological opinion was completed, including an ITS, for Reclamation's Lease Lands pesticides applications. On February 2, 1996, additional Lease Lands pesticides were addressed in another non-jeopardy biological opinion and new ITS requirements were provided. On April 19, 1996, a consultation was completed that amended the February 2, 1996 opinion.

Reclamation's February 28, 1992 Assessment discussed PacifiCorp and The New Earth Company's activities within the Project area. Due to modified operations and actions, PacifiCorp and The New Earth Company have requested review of their impacts with a desire to receive an exemption to the section 9 prohibitions against take of endangered species under the Act. The 1992 LTBO addressed effects of The New Earth Company's algae harvest, estimated in 1992 at 20% of the flow of Reclamation's C-Canal. The New Earth Company's new proposed activity, as described below, has been expanded to include harvest from the entire flow of the C-Canal and all flows of the B-Canal (during algae harvest season only) and flows into the Eastside and Westside hydroproject diversions on the Link River (also during algae harvest season only). The 1992 LTBO addressed Reclamation's agreements with PacifiCorp for operating Link River Dam on Upper Klamath Lake and described a flood control operational "envelope". Due to lack of other specific information regarding the impacts of PacifiCorp's operations, other impacts and incidental take were not analyzed in the 1992 LTBO or ITS. New information and additional analysis regarding PacifiCorp's and New Earth Company's potential impacts and incidental take is therefore provided in this consultation.

Reclamation has been developing a long-term operations plan (KPOP) for the Project that will provide a template for water distribution to protect endangered suckers, provide agricultural supplies, maintain flows to the Tule Lake and Lower Klamath National Wildlife Refuges, protect anadromous fisheries below Iron Gate Dam, and support Tribal Trust resources. The Service anticipates a biological assessment on effects of the Project on Upper Klamath Lake water

elevations will be finalized with a biological opinion completed by spring 1997. In the interim period, Reclamation has provided a "low range elevations" proposal (Reclamation 1996b), to identify target Upper Klamath Lake elevations and corresponding dates during 1996. These water elevations are more protective for listed suckers than the requirements of the 1992 LTBO. The anticipated Upper Klamath Lake water elevations consultation will address other Project impacts, both beneficial and detrimental, and summarize new data that are not addressed in these PacifiCorp and The New Earth Company biological and conference opinions. Water operation impacts associated with PacifiCorp's activities, as addressed in this document, will be analyzed fully in the anticipated Upper Klamath Lake water elevations consultation.

BIOLOGICAL AND CONFERENCE OPINIONS

DESCRIPTION OF THE PROPOSED ACTION

PacifiCorp's and The New Earth Company's proposed action is a combination of historic and new operational activities, specific research and review, endangered species jeopardy avoidance and take reduction actions, and associated conservation measures. The action area encompasses Upper Klamath Lake downstream to Iron Gate Dam on the Klamath River, Oregon and California.

As described below, New Earth proposes to operate algae harvest facilities within the Klamath Project at sites near the junction of Reclamation's B- and C-Canals and at the Eastside and Westside Canals at the Link River Dam. They have requested issuance of a license to operate on these Reclamation facilities. Reclamation has made operation of these facilities contingent on the completion of this consultation and subsequent implementation of the necessary measures required in the opinions.

As described below, PacifiCorp proposes to operate Link River Dam and associated facilities in compliance with the 1992 LTBO and the contract with Reclamation. Continued operation of five hydrofacilities on the Klamath River are also proposed. Reclamation has made future operation of these facilities contingent on the completion of this consultation and subsequent implementation of the necessary measures required in the opinions. A subsequent Upper Klamath Lake water elevation consultation between the Service and Reclamation, to be completed by spring, 1997, will update PacifiCorp's 1992 LTBO lake level commitment identified above.

Operational Activities

PacifiCorp's facilities are comprised of six hydroelectric and/or re-regulating dams on the Link and Klamath Rivers, Oregon and California. Operations at these facilities occurs 24 hours a day, all year long. The Project Description and Proposed Action section of Reclamation's

Assessment describes the various hydrofacilities' locations, purposes, designs, features, and associated operational information. Description of PacifiCorp's Flood Control "envelope" and operations based on water year scenario is provided in Reclamation's 1992 biological assessment. The Service incorporates those descriptions by reference in these biological and conference opinions.

The New Earth Company's existing algae harvest facilities are located on Reclamation's C-Canal, below the A-Canal diversion from Upper Klamath Lake, Oregon. Harvest operations at this facility occur 24 hours a day, from approximately June 1 to October 15, and utilize approximately 20% of C-Canal flows. Harvest activities cease at the end of the irrigation season when the A-Canal headworks are closed. The Project Description and Proposed Action section of Reclamation's Assessment describes the purposes, designs, features, and associated operational information. The Service incorporates those descriptions by reference in these biological and conference opinions.

The New Earth Company's proposed new activity would include harvesting algae from the entire flow of the C-Canal and all flows of the B-Canal (during algae harvest season only, ending when irrigation season ceases). Debris Reduction Devices will be employed at both B- and C-Canal facilities only during actual harvest periods. However, unlike the C-Canal where all flows would be screened via Debris Reduction Devices, only the pumping facilities would be screened with Debris Reduction Devices at the B-Canal, potentially allowing some unimpeded flow down the middle of the canal and therefore some incidental movement of suckers past this facility without site-specific entrainment impacts. Additionally, The New Earth Company proposes to expand harvest activities in 1997-1998 to the Eastside and Westside hydroproject diversions at Reclamation's Link River Dam, where all flows passing through the diversion channels would eventually be harvested. Entrainment reduction devices, described below, would be operated at the Eastside and Westside facilities during all algae harvest activities or between June 1 through October 15, whichever is a greater period of time. Reclamation's Assessment, Project Description and Proposed Action section, describes the purposes, designs, features, and associated operational information for these new actions. The Service incorporates those descriptions by reference in these biological and conference opinions.

Existing Protections

PacifiCorp currently operates fish ladders on the following facilities: Link River Dam, Keno Dam, and J.C. Boyle Dam. A fish entrainment reduction device is provided at J.C. Boyle Dam. Fish entrainment reduction devices are not installed at the Link River Dam spillway or either of the Link River Dam powerhouse intakes. Minimum flows are provided downstream of Link River Dam (80 cfs), Keno Dam (200 cfs), and J.C. Boyle Dam (a combination of up to 500 cfs of various accretions). Ramp rates have been developed for the Link River below Link River Dam to reduce fish stranding. PacifiCorp's Standard Operating Procedures includes a salvage plan for salvaging endangered suckers from the Link River and from various hydrofacilities. The Link River salvage plan directs PacifiCorp to collect all suckers in dewatered areas and return them

safely, after biological evaluation and data collection, to their water of origin. During 1995 and 1996, PacifiCorp implemented salvage activities after spill termination under Reclamation's section 10(a)(1)(A) Recovery Permit.

The New Earth Company currently operates coarse (3/8" mesh) debris screens at its C-Canal algae harvest facility. These debris screens may incidentally serve to reduce The New Earth Company's entrainment of juvenile and adult fish.

Future Research, Review, Jeopardy Avoidance Measures, and Conservation Measures

Discussions between the Service, Reclamation, PacifiCorp, and The New Earth Company identified PacifiCorp and The New Earth Company operational impacts to endangered suckers from Upper Klamath Lake downstream to Iron Gate Reservoir. The impacts are identified and discussed in Effects of Action section of these opinions. As a result of these discussions, PacifiCorp and New Earth Company, in consultation with Reclamation and the Service, agreed upon a combination of long-term and short-term measures intended to avoid jeopardizing the continued existence of the listed Lost River and shortnose suckers. The purchase of Tulana Farms as offsite habitat is the primary jeopardy-avoidance measure, and Service, Reclamation, tribal, PacifiCorp, and New Earth biologists expect that the restoration of off site habitat at Tulana Farms in the Williamson River Delta will significantly benefit the Lost River and shortnose suckers in the long term. *See* Lower Williamson River Restoration Project - Tulana Farms Initial Biological Justification (PacifiCorp 1996). The above-mentioned scientists collectively project the restoration effort will significantly increase the number of surviving sucker larvae which should, in turn, benefit each species as a whole.

The purchase of, and provision of operation and maintenance funds for, Tulana Farms is the major jeopardy-avoidance measure in this consultation, however, because the restoration of Tulana Farms is a long-term project, the following short-term measures were included in the consultation: entrainment reduction study (PacifiCorp), entrainment reduction devices at Link River power canal headgates during algae harvest season (New Earth Company), flood control study (PacifiCorp), genetics management study (PacifiCorp), and reservoir sucker population status studies (PacifiCorp). In addition, New Earth Company has agreed to a number of conservation measures including: endangered sucker and water quality monitoring and assisting PacifiCorp with the entrainment reduction study.

Reclamation, PacifiCorp, and The New Earth Company understand the Service or Reclamation may determine it necessary to reinitiate consultation on the Lost River and shortnose suckers at some future date if there is significant new information and after a thorough consideration of the status of the species overall.

PacifiCorp Action Items - PacifiCorp agrees to include the following action items that demonstrate their commitment to the survival and recovery of the endangered suckers. These items also are incorporated as conditions of the contract issued by Reclamation.

1) **Entrainment Reduction Study** - Data on sucker entrainment rates into the unscreened hydropower diversions at Link River Dam are lacking. The primary goal of this study is to determine the timing, size, magnitude, and duration of juvenile (age 1 and older or > 75mm) and adult sucker entrainment into the Eastside and Westside diversion canals. Entrainment will be evaluated during the period when entrainment reduction devices are not in operation, October 15 through May 31 (season). This study will be conducted in coordination with New Earth, Reclamation, Oregon Department of Fish and Wildlife and the Service. A study design will be "Service-approved" prior to implementation. It is anticipated that these studies will be conducted over two seasons and will be completed by May 31, 1999, with the intent of beginning field activity during 1996.

2) **Genetics Management Plan** - Management of endangered Lost River sucker and shortnose sucker populations has been complicated by the lack of genetic information and potentially conflicting taxonomic status. These species also display highly variable morphological characteristics that have lead to concern over potential hybridization/introgression among sucker species. This study is designed to determine the genetic relationships among four Klamath Basin sucker species, differences within the endangered species, and whether or not these species are presently hybridizing or may have hybridized in the past. This information will be used to improve management of the different stocks of endangered suckers and is essential for any future hatchery operations.

Although the Service listed the Lost River and shortnose suckers as taxonomic species and not distinct population segments, the Service believes there are important spawning subpopulations of suckers found in Upper Klamath Lake. As a result, PacifiCorp has agreed to cost share with Reclamation and other agencies to perform additional taxonomic and genetic studies. Reclamation made a collection of suckers throughout the Upper Klamath Basin in 1993 that can be used for these additional taxonomic and genetic studies. Findings from this research will be used to develop a genetics management plan that will guide management of sucker populations and potential future hatchery supplementation. This work is tentatively scheduled to begin in October 1996 and continue for 3-4 years. PacifiCorp will fund these studies in a pro rata share amount, based on the financial contributions of other research participants, not to exceed $80,000 total.

3) **Sucker Population Status in Mainstem Reservoirs** - Very little information is known about the endangered sucker populations in the Klamath mainstem reservoirs (J.C. Boyle, Copco, and Iron Gate). PacifiCorp will coordinate with Reclamation, Oregon Department of Fish and Wildlife, California Department of Fish and Game, and the Service to develop a scope of work for sucker studies on the mainstem reservoirs. Study objectives are likely to include: determination of distribution and abundance, age class structure, recruitment success and habitat use by different life stages. A study design will be "Service-approved" prior to implementation. It is anticipated that the study period would be from 1997 to 1999. PacifiCorp will fund these studies and analyses, which are expected not to exceed $120,000.

4) Sucker Nursery Habitat Restoration - Recent research on factors limiting sucker populations in Upper Klamath Lake indicates that a bottleneck exists at the larval life stage. Poor larval survival in sucker nursery habitat areas appears to be related to degraded water quality, predation, and lack of emergent vegetation habitat. The 1992 LTBO analyzed a Conservation Measure for marsh restoration construction and assessment. Based on this commitment, Reclamation, the Service, The Nature Conservancy (TNC), NRCS, PacifiCorp, and New Earth have cooperatively proposed funding, restoring and maintaining a property on the Lower Williamson River. The NRCS proposes to enroll a large portion of the property under a permanent easement in the Wetlands Reserve Program. This proposed action also includes any future federal funds transferred for restoration activities. This restored habitat would be designed and managed to benefit riverine and lake water quality, reduce larval predation, and substantially increase larval sucker habitat in historic locations. This type of habitat restoration action is strongly supported within the Recovery Plan for the two sucker species (Service 1993).

PacifiCorp and New Earth propose to invest 1.8 million dollars combined in the purchase of Tulana Farms with TNC and NRCS, and PacifiCorp proposes to commit $75,000 each per year for ten years or the equivalent present net worth in lump sum to the operation and maintenance of the property. If unforeseen circumstances occur, and the purchase of Tulana Farms with TNC and NRCS does not materialize, PacifiCorp and New Earth agree to pursue the option to purchase Tulana Farms or other offsite habitat mitigation. PacifiCorp and New Earth agree to acquire property identified for offsite mitigation by January 1, 1997. If an acquisition is not facilitated, the Incidental Take Statement will become invalid and reinitiation of consultation will be required.

As proposed, approximately 1,150 acres of Tulana Farms would be excluded from the perpetual NRCS conservation easement to allow for agricultural use. The NRCS and TNC, with assistance of the LWRRT, will determine the precise location of these agricultural lands to be excluded from the easement. PacifiCorp, The New Earth Company, and TNC ("the parties"), or some combination of these parties, may hold an interest in the agricultural inholdings. The parties who ultimately acquire an interest in the agricultural inholdings will work with the Service to ensure that the management of these lands are consistent with the protection of the suckers under the Act. The Service maintains the ability to reinitiate consultation with the parties via Reclamation if agricultural practices are still occurring on these lands after 10 years.

PacifiCorp and The New Earth Company will assist in formation of, and also participate in, the LWRRT for the Lower Williamson River restoration program. The LWRRT will include representatives from Reclamation, Service, Oregon Department of Fish and Wildlife (ODFW), TNC, NRCS, and the Klamath Tribes. This technical team would, among other activities, develop a recommended long-range restoration plan for the property and provide annual work plans to the Management Committee. The Management Committee will be made up of representatives from PacifiCorp, The New Earth Company, Reclamation, Service, ODFW, TNC, NRCS, and the Klamath Tribes. The Management Committee would oversee the LWRRT's activities and also address non-technical issues. TNC would operate Tulana Farms and would

act in good faith to implement the recommendations of the LWRRT. If the LWRRT is unable to reach consensus on the Restoration Plan, TNC and NRCS may nonetheless continue to take reasonable steps to restore Tulana Farms, consistent with the ITS requirements applicable to PacifiCorp and The New Earth Company. Restoration project success will be annually monitored via specific habitat and larval and early juvenile production criteria, as developed by the LWRRT. The Service would review the long-range restoration plan and the annual work plans to ensure consistency with this consultation. The annual and long-range restoration plans will be developed to meet NRCS restoration program guidelines.

5) Re-evaluate Flood Operations Plan for Upper Klamath Lake - A review of scientific data pertaining to endangered suckers in Upper Klamath Lake suggests that elevations higher than those listed as an element of the Reasonable and Prudent Alternative in the 1992 LTBO are necessary to provide habitat for sucker spawning, larval and juvenile rearing, and also provide water quality protection. Some of these elevations, particularly those during late winter and early spring, are outside of PacifiCorp's operating envelope for Upper Klamath Lake.

PacifiCorp will develop a scope of work that includes consideration of the flood control rule curves, operational constraints, hydropower, and shoreline habitat benefits to the suckers. The scope of work will be reviewed by Reclamation and the Service. PacifiCorp will complete the re-analysis of the Flood Operations Plan by October 1996.

The New Earth Company Action Items - New Earth agrees to include the following action items that demonstrate their commitment to the survival and recovery of the endangered suckers. These items also are incorporated as conditions of the amended licence issued by Reclamation.

1) Sucker Nursery Habitat Restoration - Same as #4 PacifiCorp action item above for property acquisition, agricultural inholdings, and restoration planning and implementation. Additionally, The New Earth Company will provide, at final closing of the Tulana Farms property, $75,000 for the first year's operation and maintenance of the property. As noted in the Introduction section, The New Earth Company will provide $75,000 per year, for years two through ten, or the equivalent present net worth in lump sum, for the operation and maintenance of the property via the proposed Cooperative Agreement with the Service. This total contribution of $675,000 is proposed to offset The New Earth Company's future Upper Klamath Lake algae harvest operations, and is a separate action from this consultation. If the Cooperative Agreement is not completed by December 31, 1996, The New Earth Company commits to providing $75,000 per year, for years two through ten, or the equivalent present net worth in lump sum, for the operation and maintenance of the property , under the same process proposed above by PacifiCorp.

2) Entrainment Reduction Devices - New Earth will install and maintain entrainment reduction devices that maintain exclusion of suckers greater than 75 mm, at the Eastside and Westside diversion canals at the Link River Dam during all algae harvest activities or between June 1 through October 15, whichever is a greater period of time, for ten years or the remaining

life of the Federal Energy Regulatory Commission (FERC) permit, beginning in June 1, 1997 regardless of whether algae harvest activities have commenced. The entrainment reduction devices will be operated 24 hours a day. They will be manually removed, cleaned, and replaced several times a day.

The New Earth Company Conservation Measures - The following are additional research and conservation measures proposed by The New Earth Company. None of the three actions described below will require reinitiation of this consultation upon completion of the individual activity. Reclamation and the Service believe these activities are important in developing additional information on the endangered suckers and therefore support their progressive implementation by The New Earth Company.

1) Endangered Sucker Monitoring - Endangered sucker research will be conducted in relation to algae harvest activities at the B- and C-Canal harvest facilities. Life stages targeted include larval, juvenile, and adult forms. In coordination with the Service and Reclamation, The New Earth Company proposes a study to determine the extent to which fish respond to algae harvest operations and associated debris reduction devices. Research will focus on identifying species composition, timing, and magnitude during entrainment. It is anticipated that this study will be initiated in 1996 and conducted over two years.

2) Water Quality Monitoring - The New Earth Company will be harvesting large quantities of algae from the B- and C-canals and has plans to expand its harvest operations to PacifiCorp's Eastside and Westside power diversions. These activities are expected to improve water quality conditions in the Lost and Klamath rivers below their operations. The New Earth Company will begin monitoring water quality conditions (DO, pH, temperature, specific conductivity, turbidity) above and below harvest operations at the B- and C-canals in 1996. Link River monitoring will be initiated during the 1997 harvest season.

3) Entrainment Reduction Study - The New Earth Company will participate in a study to determine the timing, size, magnitude, and duration of juvenile (age 1 and older or >75mm) and adult sucker entrainment into the Eastside and Westside diversion canals and guide development of additional entrainment reduction methods and operating periods if required in reinitiation. Entrainment will be evaluated during the period when entrainment reduction devices are not in operation, October 15 through May 31 (season). This study will be conducted in coordination with PacifiCorp, Reclamation, ODFW, and the Service. A study design will be "Service-approved" prior to implementation. It is anticipated that these studies will be conducted over two seasons and will be completed by May 31, 1999, with the intent of beginning field activity during 1996.

STATUS OF THE SPECIES

Historically, populations of shortnose and Lost River suckers occupied the Upper Klamath River basin and the seasonally-connected Lost River drainage. A complete description of known historic distribution is provided in Reclamation's February 28, 1992 Assessment. Current distribution is reduced from historic due to damming of rivers, diversions, loss of marsh habitat (FR 53 27130), and poor water quality (Kann and Smith 1993). Sucker populations in the Lost River are segregated without passage facilities between water developments; Tule Lake supports limited sucker populations due to historic habitat loss and continued habitat degradation due to sedimentation of the sumps and poor water quality (D. Mauser, Service, pers. comm., 1996). Sucker populations in Clear Lake and Gerber Reservoir, while more stable than other populations (Scoppettone et al. 1995; M. Buettner, Reclamation, pers. comm.), are still faced with restricted distribution, lack of genetic connectivity with other populations, and, in the case of Clear Lake, limitation to one spawning tributary system. Numerous spawning populations in Upper Klamath Lake and its tributaries have been extirpated; spawning populations that historically utilized Seven Mile Creek, Four Mile Creek, tributaries to the Wood and Sprague Rivers, Barkley Springs, Odessa Springs, Harriman Springs and at least four other springs in Upper Klamath Lake have disappeared (Reclamation 1996a; Simon et al. 1995). Spawning activity is greatly reduced in the Sprague River, especially above Chiloquin Dam, in the Wood River and its tributaries, and springs in Upper Klamath Lake. Historic habitat conditions in Upper Klamath Lake and its tributaries have been altered; wetland habitats around Upper Klamath Lake, critical to survival of all life stages, have been reduced approximately 35,000 acres in the last 80 years (Gearhart et al. 1995). Remaining Upper Klamath Lake wetland areas are affected by Project water level management.

These types of data were originally used to determine these two sucker species to be endangered, to develop these species' Recovery Plan, and to propose critical habitat. These conditions, which led to the listing of these species in 1988, still exist and continue to endanger the Lost River and shortnose suckers. These conditions will require long time periods for their resolution. However, numerous activities have been initiated and/or completed, mainly supported by Reclamation, since the 1992 LTBO. These activities include development of water elevation requirements, within the 1992 LTBO and 1994 Project biological opinion, for Gerber Reservoir, Clear Lake, Tule Lake, and Upper Klamath Lake. Minimum flows have been established for the Lost River below Anderson-Rose Dam during sucker spawning periods. The 20 conservation measures proposed in the February 28, 1992 biological assessment have been initiated or completed. These activities have been necessary to ensure Project operations do not jeopardize the continued existence of the suckers. Additionally, a total of 51 recovery actions from the 1993 Recovery Plan, including those listed above as required under the 1992 LTBO and 1994 Project biological opinion, have been initiated, are in various ongoing stages, and/or completed by Reclamation or with cooperation from Reclamation.

Major summaries of endangered suckers' general biology, habitats, distribution and abundance, taxonomy, reasons for decline, life history, and reproduction are found in Reclamation's February 28, 1992 biological assessment, the Service's 1992 LTBO and 1994 Project biological opinion, the Lost River Sucker and Shortnose Sucker Recovery Plan (Service 1993), and the

Proposed Critical Habitat Biological Support Document (Service 1994). These data are incorporated into these biological and conference opinions by reference.

ENVIRONMENTAL BASELINE

The Environmental Baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species or its habitat. This analysis describes the status of the shortnose and Lost River suckers and factors, including the proposed action, affecting the environment of the two suckers and their proposed critical habitat in the proposed action area.

Status of Species Within Action Area

Significant new research, monitoring, and management actions have been conducted throughout the range of the listed suckers since the 1992 LTBO. These new data will be considered under the forthcoming Upper Klamath Lake water elevations consultation, which will address all other Reclamation impacts specific to the entire range of these species. The following provides new scientific data for the current consultation's action area, Upper Klamath Lake downstream to Iron Gate Reservoir on the Klamath River. A complete list of new scientific data citations for Upper Klamath Lake, if not cited below, is provided in Reclamation's Assessment, Literature Cited section.

Areas Below Upper Klamath Lake

The following includes a summary of new endangered sucker information provided in Reclamation's Assessment. This new information from the Assessment is incorporated by reference.

Limited endangered sucker sampling has occurred since 1992 in the Link River, Lake Ewauna, the Klamath River, and PacifiCorp reservoirs downstream to Iron Gate Dam. Few juvenile and adult suckers were collected during this period. Efforts to collect larval stages in this area have not been attempted since 1992 (M. Buettner, Reclamation, pers. comm.). Water quality is a limiting factor in the Link River to Keno Dam reach; summer and fall dissolved oxygen concentrations throughout this reach are reduced to lethal levels.

In 1993, Reclamation sampled J.C. Boyle Reservoir eight times collecting 20 shortnose suckers, one Lost River sucker, 30 Klamath smallscale suckers, and 6 Klamath largescale suckers. The ODFW conducted an eletrofishing survey at J.C. Boyle Reservoir on June 14, 1995. They captured 32 juvenile suckers but did not identify them. In 1993, Reclamation sampled Copco Reservoir and captured 10 adult shortnose suckers ranging from 427-500 mm fork length (FL). PacifiCorp's salvage activities during 1994 and 1995 in the Link River have collected between 0 and 138 suckers. In May 1994, a fish salvage of the Link River found no suckers. Fish salvage

efforts in April, 1995, collected 12 suckers; 10 shortnose and 2 Lost River. A fish salvage conducted at the conclusion of spill in May 1995 collected 132 shortnose suckers, 5 Lost River suckers, and 1 Klamath largescale sucker. In December, 1995, only one 100 mm sucker was salvaged in a side channel and was returned to Link River. Salvage operations at J.C. Boyle hydrofacility since 1992 have resulted in observation of only 2 juvenile suckers (Reclamation 1996a).

As noted in the February 28, 1992 Assessment, limited spawning occurs in the Klamath River above Copco Reservoir. It is possible limited spawning also occurs in the Klamath River above J.C. Boyle Reservoir.

Upper Klamath Lake

Substantial new information has been collected from Upper Klamath Lake since the 1992 LTBO. Reclamation's Assessment summarizes this new information in the following 12 categories: age and growth; hybridization and genetics; reproduction; population status; condition; sucker die-offs; entrainment; freshwater inflow area use; larval habitat; juvenile ecology; juvenile habitat; and adult habitat. The following includes a summary of new information provided in Reclamation's Assessment, and includes new information not addressed in Reclamation's Assessment on larval ecology and habitat, larval and juvenile sucker water quality tolerances, Upper Klamath Lake water quality, and endangered sucker passage at PacifiCorp's facilities. The new information addressed in the Assessment is incorporated by reference, with additional citations from other sources provided to complement this newly-summarized information.

Age and Growth

New information collected since 1992 indicates that both shortnose and Lost River sucker maturation can occur at an earlier age than was previously determined. Faster growth rates also have been documented from recent shortnose and Lost River sucker year classes compared to those from the 1960's and 1970's (Buettner and Scoppettone 1990). Age at maturity for shortnose and Lost River suckers appears to be related to growth rate, with faster growing fish maturing earlier than slower growing fish. This phenomenon has been well documented with the cui-ui, a species closely related to the shortnose sucker (Scoppettone pers. comm., cited in Reclamation 1996a). Growth rate and sexual maturity appears to be density dependent in cui-ui with fast growth and earlier sexual maturation related to lower population size. As the cui-ui population increased substantially in recent years, growth rates decreased markedly and correspondingly age of maturity shifted to older ages. Unfortunately, population size data for shortnose and Lost River suckers are not available to evaluate whether the recently-recorded faster growth rates and earlier sexual maturation are density dependent. These age and growth data and comparisons are addressed in detail within the Assessment, and are included herein by reference.

Hybridization and Genetics

Recent studies by Buth and Haglund (1994) focus on shortnose suckers. This study supports previous protein electrophoresis work (Harris and Markle 1991, Moyle and Berg 1991) indicating that substantial hybridization has not occurred in shortnose sucker populations. Buth and Haglund's 1994 data support the hypothesis that the wide range of morphological variation observed in the wild reflect differences in phenotypic expression as a response to differing physical environments, or the age of the individual (Moyle and Berg 1991). However, Buth and Haglund (1994) determined that there was genetic variation separating Upper Klamath Lake shortnose suckers from those in Clear Lake, Gerber Reservoir, and Copco Reservoir. Shortnose expressed similar genetic variation in the latter three reservoirs.

Buth and Haglund (1994), and a recent abstract by Buth et al. (1996), indicate the Upper Klamath Lake shortnose sucker population should be managed as a separate genetic unit. Buth et al. (1996) indicate shortnose and Lost River suckers, throughout their ranges, do not exhibit inbreeding depression and, for Lost River sucker, this was the first study to indicate Lost River sucker do not exhibit hybridization. These studies did not include different sucker age classes or different Upper Klamath Lake spawning populations in their analyses. A thorough, basinwide analysis, utilizing allozyme electrophoresis, mtDNA, and meristics/morphometrics data collected simultaneously from the same individual fishes, must be completed to adequately address hybridization, introgression, and genetic structuring of sub-populations (L. Dunsmoor, Klamath Tribes, pers. comm.).

Reproduction

In 1995, Klamath Tribal biologists captured mature Lost River suckers during late March at Kirk Springs, 128 km upstream from Upper Klamath Lake (L. Dunsmoor, Klamath Tribes, pers. comm.). Mature Lost River suckers were again collected in this location in 1996. Unit 5 of the proposed sucker critical habitat extends to just downstream of this location (Service 1994). Klamath Tribes collected 157 shortnose suckers and 139 Lost River suckers at the Sprague River Dam fish ladder during 1996 (L. Dunsmoor, Klamath Tribes, pers. comm.). These data verify that some individuals of this species successfully negotiate the Sprague River Dam fish ladder and migrate long distances upstream to spawn. Previous scientific literature indicates only Klamath largescale suckers as having migrated through the ladder and spawning at Kirk Springs (Buettner and Scoppettone 1990), although Klamath Tribes biologists have recorded shortnose and Lost River sucker passage at the Sprague River Dam in past years (L. Dunsmoor, Klamath Tribes, pers. comm.). Of additional interest are data collected at Sprague River Dam in 1996 that indicate a temporal spawning separation between largescale sucker upstream migration (migration in March) and shortnose/Lost River suckers upstream migration (migration in April/May) (L. Dunsmoor, Klamath Tribes, pers. comm.). Lost River and shortnose suckers were collected during downstream migration at the Sprague River Dam in 1996; numerous individuals had completed spawning, verifying spawning was occurring upstream of the Sprague River Dam (L. Dunsmoor, Klamath Tribes, pers. comm.).

Intensified monitoring of lake spawning since 1993 by Reclamation and the Klamath Tribes have identified Lost River sucker spawning at six spring and two non-spring sites along the east shoreline of Upper Klamath Lake. Shortnose sucker spawning has been identified since 1992 at three sites: Sucker Springs, Silver Building Spring, and Ouxy Springs. Since 1993, small numbers of shortnose and Lost River suckers have been observed spawning in gravelly shoreline sites with no detectable spring influence.

The Klamath Tribes has been qualitatively monitoring spawning runs in the Williamson and Sprague Rivers since 1988 (L. Dunsmoor pers. comm., cited in Reclamation 1996a). Beginning in 1992, a substantial increase in small Lost River and shortnose suckers was observed. During May 1993, small-sized shortnose and Lost River suckers dominated the catch on the Williamson and Sprague Rivers. Radiotracking studies indicated suckers were spawning in historic sites in the lower Williamson River and the Sprague River below Sprague River Dam (M. Buettner, Reclamation, pers. comm.). Presumed pre-spawning aggregations of suckers have been collected at the mouth of the Williamson River (M. Buettner, Reclamation, pers. comm.). During 1995, adult shortnose and Lost River suckers were collected at the mouth of the Williamson River beginning February 23, whereas in 1996 few adult suckers were collected at this location until April.

During March to mid-May, 1996, Reclamation sampled Agency Lake at the mouth of the Wood River (M. Buettner, Reclamation, pers. comm.). A total of three adult Lost River and 15 adult shortnose suckers were captured. One Lost River and six shortnose suckers were implanted with radiotags. Most radiotagged suckers migrated into the lower Wood River in May and early June, presumably to spawn. On May 17, 1996, Reclamation, assisted by ODFW, conducted an electrofishing survey of the lower Wood River and captured 11 adult shortnose suckers. Larval suckers were collected in late June and early July, 1996, in the lower Wood River (M. Green, Reclamation, pers. comm.).

Population Status

Monitoring of distinct Lost River spawning aggregations at Sucker Springs in Upper Klamath Lake has resulted in updated population estimates since 1992. In 1993, 900 Lost River sucker adults were estimated to be using this spring complex. This estimate is similar to estimates in 1987 (1,038 adults), 1988 (817 adults), and 1989 (960 adults). Recaptured suckers comprised approximately 46% of all suckers collected at Sucker Springs in 1993.

Reclamation has captured, tagged and released several hundred juvenile and adult shortnose and Lost River suckers in Upper Klamath Lake between 1993 and 1995. Specifically, 305 shortnose suckers have been PIT and/or Floy anchor-tagged and 15 radio-tagged. Twelve Lost River suckers were radio-tagged and 355 PIT and/or Floy tagged. During the spring of 1995, NBS PIT tagged 60 Lost River sucker adults and 405 shortnose sucker adults at the mouth of the Williamson River, and approximately 1,300 additional Lost River and shortnose suckers

were collected in 1996. Recapture rate for both these marked groups has been extremely low. Reclamation recaptured one PIT tagged Lost River sucker in 1994 and one in 1995. One PIT tagged shortnose sucker was recaptured at Ouxy Springs in 1995. Out of the approximately 900 adult shortnose and Lost River suckers collected at the mouth of the Williamson River in 1996, only one 1995 shortnose sucker recapture occurred. Suckers collected at the Sprague River Dam fish ladder in 1996 could not be checked for PIT tags due to equipment failure (L. Dunsmoor, Klamath Tribes, pers. comm.). In 1993, 60 Lost River suckers were recaptured at Sucker Springs; all these fish had been tagged with Floy anchor tags. Preliminary 1996 data indicates a 30% recapture rate at Sucker Springs (M. Buettner, Reclamation, pers. comm.).

A widespread sucker die-off (described below) provided some insight regarding current population levels in Upper Klamath Lake. A total of 526 suckers, including 378 Lost River suckers (72% of total collected), 124 shortnose suckers (24% of total collected), and 24 unidentified (5% of total collected), were recovered. No recaptures of previously tagged fish were recorded from the carcasses collected. These data indicate the 1990 and 1991 age classes were successful; approximately 42% of the Lost River suckers and 62% of the shortnose suckers were age 4 (1991 cohort) and 29% of the Lost River suckers and 15% of the shortnose suckers were age 5 (1990 cohort). These data from smaller-sized shortnose and Lost River suckers suggests that their population numbers are at least in the thousands of fish. However, a carcass condition index, identifying the relative decomposition state for each sucker, revealed approximately 35% of the carcasses were badly decomposed, increasing the chance of tag loss (M. Green, Reclamation, pers. comm.). These data may indicate bias in utilizing a mark-recapture method of estimating Upper Klamath Lake sucker populations exclusively from sucker die-off data. Additionally, it is noted that three of 14 radiotagged fish perished during the die-off event, indicating substantial mortality in the overall sucker population and providing a conflicting cross reference to the above mark-recapture population estimate. Additional research and further analyses of these data are necessary, such as stratification of mark-recapture analysis based on size of fish recaptured, not on total fish recaptured, comparison of sampling methodologies to standard mark-recapture assumptions, and determination of total recapture sampling effort required, before definitive statements on current sucker abundance in Upper Klamath Lake can be made.

Population monitoring conducted in the 1980's (Buettner and Scoppettone 1990; Bienz and Ziller 1987) indicated that recruitment of Lost River and shortnose suckers to adult-size age classes was inconsistent, as evidenced by gaps in known year classes of spawning adults. Reclamation's Assessment discusses continued, recent losses of older sucker cohorts, and increases in relative abundance of younger (1990 and 1991) cohorts. These recent data are discussed in more detail under Reproduction (above) and Sucker Die-Offs (below).

Condition

Fulton condition factors were calculated for younger age shortnose and Lost River suckers to assess interannual differences during spring and fall in wet and critically dry years. In general,

shortnose and Lost River suckers exhibited minor condition factor differences between these two water year types. These data might indicate the suckers maintain "condition" regardless of water year. Alternatively, two biases may be occurring in these condition factor data. First, environmental stressors can cause up to 25% weight gain, due to osmoregulatory imbalances causing water retention, which would result in higher condition factor values (R. Goede, UDWR, pers. comm.). Second, if mortality is occurring during stressful water quality periods, density dependant mechanisms could be effecting the condition of surviving fish, thereby providing the perception of similar condition factors between water year types. A better and less biased measure of sucker condition would be based on physiological and "abnormality" indices (R. Goede, UDWR, pers. comm.). These data are currently unavailable. Another less biased measure of condition would be based on relative weight; however, a "standard weight" calculation for various sizes of Lost River and shortnose sucker has not been developed.

Sucker Die-offs

Between mid-September through late October, 1995, a widespread fish die-off occurred in Upper Klamath Lake, from which 378 Lost River suckers and 124 shortnose suckers were collected. Suckers collected during the die-off included mostly young fish (ages determined using opercle bones, M. Buettner, Reclamation, pers. comm.). Several suckers displaying lethargic and unresponsive behavior were collected during the die-off event and taken to Oregon State University (OSU) for pathological examination. All were acutely infected by a bacterial disease, columnaris (*Flexibacter columnaris*) (Banner 1995). This pathogen was also documented as a primary causative agent in the death of suckers collected during the 1971 and 1986 die-offs (Logan and Markle 1993). Ninety-five percent of the Lost River and shortnose suckers from the 1995 die-off event were age 7 years and younger. A total of only 14 and 9 year classes were documented for Lost River and shortnose suckers, respectively. For comparison, a similar fish die-off in 1986 reflected 26 Lost River sucker age classes represented. Only eight shortnose suckers were collected during the 1986 die off. Lost River suckers have been aged to 43 years while shortnose have been aged to 33 years (Scoppettone 1988); these data indicate many more cohorts should be present in a healthy population than were collected in recent die-off events. In 1995, Age 4 and 5 fish, representing the 1991 and 1990 year classes respectively, numerically dominated the collection for both species. Population surveys conducted on Upper Klamath Lake using trap nets and trammel nets from 1993-1995 has documented very few large adults, and Williamson and Sprague River spawning data during this same time period also have noted a similar decline in larger sized suckers. These data seem to substantiate 1995 fish die-off data which suggest loss of numerous, older age classes of both sucker species. Reclamation's Assessment provides these cohort-loss data in graphical form; these data are incorporated herein by reference.

Recent large-scale Upper Klamath Lake fish die-offs have been documented from 1971, 1986, 1994, and 1995. Because of the long history of blooms of blue-green algae (*Aphanizomenon flos-aquae*) and associated poor water quality conditions, other fish kills most certainly have occurred. Fish kills involving native, non-game fish, including chubs and suckers, may have not

been reported by the public. Also, with the large populations of fish eating birds (cormorants, gulls, pelicans, grebes, terns) present at Upper Klamath Lake, sick and dead fish can be quickly consumed leaving no evidence of a fish kill. Large concentrations of fish eating birds were observed feeding on local fish kills during summer 1994 (L. Dunsmoor pers. comm., cited in Reclamation 1996a) and 1995 (D. Simon pers. comm., cited in Reclamation 1996a).

Entrainment

Entrainment of all Upper Klamath Lake endangered sucker life stages occurs at Reclamation's A-Canal, and PacifiCorp's East and Westside diversions, Link River Dam. Juvenile suckers have been salvaged from Klamath Project canals receiving water from Upper Klamath Lake yearly since 1991. The number of suckers salvaged from 1991-1995 were 3,166; 2,618; 788; 334; and 4,072, respectively. Most suckers salvaged were small juveniles less than 250 mm FL. Canal salvage data represent only a qualitative index of year class strength in Upper Klamath Lake for the following reasons: 1) Since some irrigation water originates from the Lost River, suckers from Gerber, Clear Lake, and the Lost River are likely included in the salvage sample. 2) Many irrigation canals are treated with Acrolein during the summer to control aquatic plants and this herbicide is highly toxic to fish. 3) Several practices have been implemented since 1992 to reduce the number of suckers that have to be salvaged. Most of these practices lead to draining of canals into the Lost River or Klamath River. 4) Patchy distribution of stranded suckers can also effect salvage success since not all potential holding habitat is sampled. 5) Sampling effort and personnel has also varied during annual salvage operations.

The large salvage collection in 1991 (3,166 suckers) supports OSU juvenile sucker survival data for the same year indicating establishment of a 1991 year class. In 1992, although the overall catch was high (2,618 suckers), about 95% of suckers collected, based on length frequency, were 1991 year class fish. This lack of age 0 suckers in salvage collections also correlated with OSU juvenile sucker survey data indicating Lost River and shortnose sucker year class failure in 1992. In 1993, only 788 juvenile suckers were salvaged even though sampling effort was similar to 1992. However, OSU survey data from 1993 indicated that survival for both juvenile shortnose and Lost River suckers occurred. This is the only year since salvage operations began where salvage numbers and annual recruitment data didn't correlate. Possible explanations for lower numbers of entrained suckers include better quality habitat maintained by higher lake levels reduced larval sucker emigration; lower A-Canal entrainment occurred due to lower irrigation demands; biased canal sampling methods; and successful canal "flushing" methods (Reclamation 1996a). In 1994 low numbers of suckers were salvaged (334), with about 90% age 0. This low number was consistent with OSU recruitment data from Upper Klamath Lake indicate poor 1994 year class survival. In 1995, over 4,000 suckers were salvaged, the largest salvage total numbers for the 5 years of effort, including about 50% age 0 and 50% age 1. OSU juvenile sucker recruitment estimates were high in the fall, relative to other years, from cast net and trawl surveys indicating year class establishment.

In 1995, The New Earth Company intermittently monitored sucker entrainment at the C-Canal Drop for a period of about 8 weeks (July and August). This sampling period was too late to intercept the earlier, and greater magnitude, sucker migration. Seven larval suckers were collected during several sample days. These data further substantiate entrainment of suckers into the A-Canal, as was first documented in 1990 and 1991 (Markle and Simon 1993), and discussed in detail within the 1992 LTBO.

No larval entrainment work has been conducted at Eastside or Westside Diversions since 1992. On May 11, 1995, PacifiCorp dewatered the Eastside forebay. A total of 41 juvenile suckers (3 Lost River, 37 shortnose and 1 Klamath largescale sucker) were collected from the forebay and returned to Upper Klamath Lake. All fish were less than 200 mm FL. On December 11, 1995, the Eastside forebay was again dewatered. A fish salvage collected 78 suckers. All suckers were less than 200 mm FL, and were not identified to species.

Freshwater Inflow Area Use

Reclamation's Assessment summarizes sucker "refugial" habitat use and water quality measurements in tributaries to and freshwater interfaces within Upper Klamath Lake. These data are incorporated by reference. Previously, researchers believed freshwater "refugial" areas served as a place of sanctuary during poor water quality events (Service 1992; 1994); these freshwater sources are important to maintenance of water quality in the northern portion of Upper Klamath Lake (J. Kann, Klamath Tribes, pers. comm.). Recent investigations indicate freshwater inflow areas are infrequently used by adult suckers, unless these fish are stressed or dying (M. Buettner, Reclamation, pers. comm.). Mobile and fixed-station radiotelemetry studies described in Reclamation's Assessment did not identify, other than for spawning migration purposes, any use of freshwater "refugial" areas by adult suckers. However, adult suckers have been observed utilizing the low-visibility interface between Upper Klamath Lake and freshwater inflow areas, including the mouth of Pelican Bay and Fish Banks. A review of movements by radiotagged suckers indicates, during extremely poor water quality events, even areas such as Fish Banks, a low-visibility interface area, are abandoned, further invalidating the original belief that freshwater inflow areas provide consistent "refugial" habitat (L. Dunsmoor, Klamath Tribes, pers. comm.).

Larval suckers utilize the freshwater inflow area in the lower Williamson River for rearing habitat (Markle and Simon 1994, Simon et al. 1995; Logan and Markle 1993; Klamath Tribes 1992, 1995). The above studies generally indicate juvenile suckers utilize shoreline habitats in Upper Klamath Lake instead of inflow areas. Reclamation's Assessment cites lack of food, cooler water temperatures, and increased susceptibility to predation by avian and fish predators, including rainbow trout and yellow perch, in the clear water inflow areas as likely factors limiting use of these areas by juvenile suckers. However, clearwater shoreline areas influenced by Barkley Springs are occupied by both larval and juvenile sucker life stages (Reclamation 1996a).

Upper Klamath Lake Water Quality

Annual occurrences of blue-green alga blooms within Upper Klamath Lake have been associated with poor water quality conditions (Kann and Smith 1993). Likely causes for this increase in eutrophication include agricultural practices, loss of wetlands, and elevated background levels of nutrients in surface and groundwater (Gearhart et al. 1995). Effects of algal blooms include photosynthetically-elevated pH during bloom events, both supersaturated and low dissolved oxygen concentrations (Kann 1993a,b), and increased ammonia concentrations (Bortelson and Fretwell 1993). Water quality impacts to endangered sucker early life stages are addressed in Larval and Juvenile Water Quality Tolerances, below.

Significant water quality data have been reported for Upper Klamath Lake since 1992 (Bortelson and Fretwell 1993; Kann 1993a,b; Kann and Smith 1993; Jassby and Goldman 1995; Kann 1995; Laenen and LeTourneau 1995; Gearhart et al. 1995). Kann (1995) identified relationships between low Upper Klamath Lake elevations and poor water quality conditions. Investigations by Gearhart et al. (1995) and Jassby and Goldman (1995) support Kann's observations. Reclamation contracted with U.S. Geological Survey to analyze pertinent Upper Klamath Lake water quality data, collected between 1990 and 1994, to determine if year-to-year differences in water quality parameters are correlated with year-to-year differences in lake elevation. Results of this analysis are provided in Wood et al. (1996). Significant findings by Wood et al. (1996) include: 1) periods of poor water quality occurred between June and September for all study years; 2) no apparent relation between lake level and water quality was obvious when dates were analyzed on a season-long (May through October) basis; 3) lake level was related to timing of initiation of first algae bloom, which created poorer June water quality conditions; 4) climatic events also exhibited significant relationship with water quality during the early season period. Further analyses and review of these and other water quality data is currently ongoing and will be addressed in the upcoming Upper Klamath Lake water elevations consultation.

Larval and Juvenile Water Quality Tolerances

Larval and juvenile suckers are less water quality tolerant, and, especially for the larval life stage, less able to avoid poor water quality events than adult suckers (based on adult radio telemetry and associated water quality measurements, M. Buettner, Reclamation, pers. comm.). Monda and Saiki (1993, 1994) and Bellerud and Saiki (1995) conducted water quality tolerance tests to assess acutely toxic levels of temperature, dissolved oxygen (DO), pH, and un-ionized ammonia on larval and juvenile shortnose and Lost River suckers. The 96-hr LC50 values (lethal concentration where 50% of the test organisms die within 96 hours, lower 95% confidence interval for pH, un-ionized ammonia, and temperature, upper 95% confidence interval DO) for larval and juvenile shortnose and Lost River suckers is provided (Table 1). It is important to note that sub-lethal effects commonly occur prior to reaching the lethal levels provided below (Kann and Smith 1993; Markle and Simon 1994). It also is important to note that these tests were "single parameter" tests; it is currently unknown what LC50 values would result from combined testing of pH, DO, temperature, and un-ionized ammonia.

Table 1. Acute water quality tolerance levels from 96 hour LC50 studies (from Monda and Saiki 1993, 1994; and Bellerud and Saiki 1995).

Water Quality Parameter	Shortnose Sucker Larval	Shortnose Sucker Juvenile	Lost River Sucker Larval	Lost River Sucker Juvenile
Temperature °C	31.2	29.4	30.5	29.9
Dissolved Oxygen (mg/l)	1.7	2.4	2.3	2.0
pH	10.01	9.76	9.77	9.87
Un-ionized Ammonia (mg/l)	0.73	0.32	0.43	0.70

Of these four water quality parameters, only temperature is not a significant threat to larval and juvenile suckers based on current water quality conditions in Upper Klamath Lake. Bellerud and Saiki (1995) concluded that current DO and pH levels in Upper Klamath Lake can be acutely lethal to larval and juvenile Lost River and shortnose suckers. Moreover, stressful water quality conditions that curtail successful survival of early life stages could explain the long-term decline of sucker populations in Upper Klamath Lake.

Water quality associations with larval sucker distribution were monitored in 1995 by OSU during larval fish towing and larval searches. Larval suckers were found in pH ranging from 7 to 10 (Simon pers. comm., cited in Reclamation's Assessment). Larval suckers were captured at DO ranging from 4.5-14.5 mg/l. A Hydrolab Datasonde 3 was placed at Goose Bay from June 15 to August 11, 1995 (The Klamath Tribes 1995). Goose Bay water quality seldom exceeded acute toxicity thresholds in the *Polygonum* beds where abundant sucker larvae were located. DO infrequently decreased below 4 mg/l or 50% saturation and pH seldom rose above 9.7. However, pH values of 9.6 were very common and are only slightly below the 96 hr LC 50 for larval and juvenile suckers (Bellerud and Saiki 1995). DO concentrations at the Goose Bay location exceeded saturation in almost half of the measurements (The Klamath Tribes 1995). Chronic effects of poor water quality are most likely occurring at these locations; presence of suckers in these instantaneous samples collected from poor water quality areas noted in the OSU and Klamath Tribes data does not necessarily mean those fish survived the ambient conditions. Acute and chronic toxicity to early sucker life stages from supersaturated water have not been evaluated, however, loss of appetite and reduction in growth during supersaturated conditions has

been noted in other fish species (Stewart et al. 1967). Stewart et al. (1967) also noted decreased growth in dissolved oxygen <70% saturation.

Water quality associations with Age 0 juvenile sucker distribution were monitored in 1994 and 1995 by OSU researchers (Simon et al. 1995; Reclamation 1996a). Generally, juvenile suckers were collected in DO concentrations between 6.0 and 15 mg/l, with the greatest number collected at approximately 8.0 mg/l. DO concentrations in study sites often ranged from 4-6 mg/l, however, very few juveniles were collected in this lower DO range. Juvenile suckers appear to avoid DO concentrations less than 6.0 mg/l. Juvenile suckers were collected over the entire range of recorded pH values, with the majority of 1995 captures occurring in pH of 9-10. Juvenile suckers were regularly collected in pH within the lethal ranges for juvenile shortnose and Lost River suckers (> 9.8). However, instantaneous sampling occurred when diel pH levels are at maximum levels, whereas diel fluctuations in pH in Upper Klamath Lake can be as high as 1 pH unit (Kann and Smith 1993). Chronic effects are expected to occur at these lower pH levels, however, the juvenile suckers may not experience immediately lethal effects. Reclamation's Assessment indicates juvenile sucker near-shore abundance in 1995 decreased between August and October samples, whereas offshore sample abundance remained high. These data may reflect chronic effects to juvenile suckers in areas experiencing non-acute pH levels, or simply ontogenetic movement to offshore rearing areas with an increase in fish size.

Larval Ecology

Klamath Tribes (1995) investigated flatworm predation on sucker larvae. Past monitoring of incubating embryos in several springs within Upper Klamath Lake indicated low embryo survival and high concentrations of flatworms present. Additional experimental data indicates flatworm predation on sucker embryos does occur. Substrate may play a significant role in reducing flatworm predation; Tribal biologists determined that flatworms were less effective in preying upon embryos placed in fine substrate vs. medium and coarse substrates (Klamath Tribes 1995).

Dunsmoor (1993) determined that introduced fathead minnow (*Pimephales promelas*) readily prey on larval suckers in a laboratory experiment. Dunsmoor (1993) also determined that vegetative structure reduced the predation rate in shallow water. Klamath Tribes (1995) therefore expanded the Dunsmoor (1993) studies to investigate micro-distributional dynamics of, and interaction between, sucker larvae and fathead minnows. Laboratory results indicated fathead predation on sucker larvae: a) increases with decreasing water depth; b) increases in the absence of structure in shallow water; and, c) decreases with age/size of larvae. Klamath Tribes (1995) laboratory studies conclude, using various depth and vegetation treatments using experimental stocking rates of 10 sucker larvae and 20 fathead minnows per tank, fathead minnows were capable of consuming up to 90% of sucker larvae present in less than 24 hours, with an average of 80% consumed for all trials where structure was absent, water depth was 0.3 m, and larvae were less than 30 days old. These predation rates are significantly reduced when simple structure is present or when water depths are greater than 0.6 m. Field validation of these

data has not occurred. However, these preliminary data indicate strong associations between water elevation, structure, and the ability of larval suckers to avoid potentially-significant fathead minnow predation.

Larval Habitat

Vogel (pers. comm., cited in Reclamation's Assessment) and OSU (Markle and Simon 1994) report similar observation of larval sucker habitat use. These researchers noted, in the lower Williamson River area, that larvae oriented in, or adjacent to, emergent vegetation, submerged aquatic plants and instream woody debris. Within Upper Klamath Lake, larval suckers occupied habitats in and near vegetation and physical structures, such as logs or rocks. Larval suckers generally are surface-oriented (Reclamation 1996a). Klamath Tribes (1995) found larval suckers in emergent vegetation consisting of *Scirpus*, *Polygonum*, *Sparganium*, and willows. Additionally, higher densities of larval suckers were found in emergent vegetation than in open water areas (Goose Bay) or submergent vegetation (lower Williamson River)(Klamath Tribes 1995). These data are especially strong for the lower Williamson River, where very few sucker larvae were collected outside of emergent vegetation habitats.

Klamath Tribes (1995) investigated relationships between Upper Klamath Lake elevation and availability of emergent vegetation. Tribal investigators quantified the amount of emergent habitat available at different water elevations in Goose Bay and in the Lower Williamson River. These data indicate important relationships between Reclamation and PacifiCorp's water operations and the quality of larval habitat in Upper Klamath Lake. These data will be further addressed during the Upper Klamath Lake water elevations consultation in spring 1997.

Larval sucker utilization of offshore habitats has not been investigated thoroughly, due to sampling problems created by blue-green algae abundances. However, Klamath Tribes (1995) determined that larval suckers were several times more abundant in vegetated habitats than immediately adjacent open water, non-vegetated habitats of similar depth.

Temporal and spatial larval sucker distribution in Upper Klamath and Agency Lakes has been documented by OSU (Markle and Simon 1993, 1994; Simon et al. 1995). Lower Williamson River contained the most larvae (emigration densities), with larvae found distributed along shoreline areas throughout Upper Klamath Lake during 1994 and 1995 (post-emigration densities). Higher numbers of sucker larvae were captured on the east shore of Upper Klamath Lake; west shore and Agency Lake sampling locations had few larvae. Most larvae were collected in May and June. Klamath Tribes (1995) determined that the majority of larvae had developed into juvenile life stage by mid to late July.

Juvenile Ecology

Preliminary investigations between 1990 and 1993 indicated frequent trematode infestation in young suckers from Upper Klamath Lake. Simon et al. (1995) reported on an infestation of

juvenile suckers in 1994 by trematodes, possibly of the genus *Neascus*. Further review, described in Reclamation's Assessment, indicates infestation rates of 12.5-14% for juveniles < 49 mm and 2.2 % for juveniles 50-125 mm. Of concern is the life cycle of the trematode, which may spend several years in a fish. Based on the infestation rates provided above, researchers expect infestation rates to be similar between sucker size classes or greater as fish mature. Because of infestation rate differences, negative effects might be experienced by young suckers from trematode infestation. Other stressors, such as annual chronic and lethal water quality conditions, may reduce suckers' ability to resist trematode infestations (Reclamation 1996a). Additional research is necessary to address these concerns.

Shortnose and Lost River suckers transform from larvae to juveniles between 17 and 25 mm (Buettner and Scoppettone 1990). In 1993, OSU determined larval suckers were present during early June, whereas, by mid-July, small juvenile suckers were collected (Reclamation 1996a). Additional data from Klamath Tribes (1995) indicates the majority of suckers collected in late July were juveniles. Inter-annual differences in transformation from larval to juvenile stage are possible, however, a conservative approach would indicate mid-July as the period when larval transformation is complete.

Markle and Simon (1993) determined that larval and juvenile sucker otoliths could potentially be used to distinguish between cohorts, determine date of birth, and document growth. Additionally, preliminary research indicates these techniques can be used to distinguish between lake and river-spawned individuals. Additional verification of these techniques has been completed recently, including validation experiments that determined otolith rings were deposited daily and depositional patterns were constant (Hoff, OSU, pers. comm., cited in Reclamation 1996a). Interesting application of these otolith techniques has led to further experimentation and review, including determination of larval and juvenile sucker ages, date of birth, and growth (Logan pers. comm., cited in Reclamation 1996a). One important discovery, utilizing otolith techniques developed at OSU, was documentation that age 0 juvenile suckers collected in fall 1994 were all late-spawned fish. These late-spawned fish were most likely river-spawned, but without additional information, such as otolith microchemistry, there is less certainty of natal origin.

Juvenile Habitat

During the summer, juvenile suckers are most commonly collected in shoreline habitats (Simon et al. 1995). Greatest density occurred at the mouth of and within a few miles (east shore of Upper Klamath Lake) of the Williamson River. Juvenile distribution is patchy elsewhere, including Agency Lake. Juvenile suckers are generally less surface-oriented during the summer period than larval forms, however, both are mainly found associated with aquatic vegetation habitat features (D. Simon, OSU, pers. comm.). Klamath Tribes (1995) found juvenile suckers associated with emergent vegetation through late July, when sampling techniques and vegetative conditions precluded further efforts in emergent zone. However, researchers continued to capture juveniles with dip nets in emergent vegetation after late July. Juvenile suckers appear to

gradually occupy deeper, off-shore habitats as they grow larger (approximately 80 mm for shortnose suckers and 90 mm for Lost River suckers). Simon et al. (1995) noted that juveniles collected during fall sampling in offshore trawls were larger than those juveniles collected in inshore cast nets. In 1991, offshore sampling began in early September and continued through mid-October. During these fall trawling efforts, juvenile suckers were first collected in late September, and increased in density through the October sampling period (Simon et al. 1995).

Juvenile suckers exhibit a relationship between density and substrate type. Excluding emergent vegetation, where high numbers of juveniles occur, juveniles in open water areas were most associated with gravel or muck (unconsolidated organic material, silt, etc.) substrates (Markle and Simon 1994). In 1995, highest densities of age 0 suckers were found on small-sized mixture of substrates, gravels, and cobbles (Simon et al. 1996).

Age 0 juvenile sucker survival has been monitored by OSU since 1991 (Simon et al. 1995). Both cast nets (shoreline occupation) and trawls (offshore, deepwater) have been used in the monitoring effort. Cast nets have been more consistent and successful in capturing juvenile suckers. Cast net data indicate year class survival during 1991, 1993, and 1995 for both Lost River and shortnose suckers, while no juveniles were collected in 1992 and very few were collected in 1994. Trawl data correlate poorly with cast net data, with trawl data only corresponding to cast net data during 1991. Trawl and cast net data, when combined, indicate year class survival through fall during 1991, 1993, 1994, and 1995 (Lost River suckers) and 1991, 1993, and 1995 (shortnose suckers). These data, however, do not reflect sucker recruitment to a reproductive age.

Adult Habitat and Ecology

Reclamation's Assessment is the first document to describe the following radiotelemetry and trammel netting data. All information, except for personal communication, was described in the Assessment.

Reclamation has implanted radiotags into shortnose and Lost River suckers, captured mainly in pre-spawning aggregations from Sucker Springs and mouth of Williamson River, between 1993 and 1996. Radiotracking methodology varied by season, with more intensive efforts occurring between June and October. Fish locations were initially determined by plane with boats used to establish more exact locations. Geographic coordinates, water quality, depth, and substrate were determined for each instantaneous fish location. Preliminary data analysis has occurred to establish spatial and temporal distribution and associated water quality parameters in Upper Klamath and Agency lakes and their tributaries (Reclamation 1996a). Further analysis of water quality data and fish location relationships throughout Upper Klamath Lake is ongoing and will be reported in the Upper Klamath Lake water elevations consultation. The radiotracking data have not been analyzed in reference to sucker movements based on water surface elevation changes. A trammel net survey was conducted throughout Upper Klamath Lake in fall, 1994. Water elevations during this trammel net survey were at a historic low (4,136.8 ft).

Trammel net data revealed suckers occupying the northern 2/3 of Upper Klamath Lake; only one adult sucker was collected in the southern end of the lake. Ball Bay had the highest capture rates. Sucker catch rates were similar between near-shore and open water sites, and suckers were captured in a wide range of total water column depths, from 1 m to 12 m. Suckers were captured at and above the lake bottom, indicating a water column orientation that is variable; these data may be reflective of sucker avoidance of poor water quality conditions near the bottom. Unfortunately, lake-wide trammel net surveys have not been conducted during different periods of the year, specifically during spring run-off, when juvenile and adult sucker movement and migration is believed to be at its greatest activity level (G. Scoppettone, NBS, pers. comm.). Further investigations may reveal a greater movement of suckers in the lower 1/3 of Upper Klamath Lake.

Similar to trammel net data, telemetry data also indicated adult sucker occupation of the northern 2/3 of Upper Klamath Lake (north of Howard Bay). No fish were radiotracked from Agency Lake, freshwater inflow areas, Pelican Bay, or the Williamson River (except for spawning migrations up the Williamson River). During 1996, Reclamation captured and implanted radiotags in seven shortnose suckers and one Lost River sucker from Agency Lake and Wood River (M. Green, Reclamation, pers. comm.). Data collected from these fish should expand knowledge of suckers occupying Agency Lake and its tributaries.

Post-spawning suckers displayed movements to Shoalwater Bay (45%) and near the Williamson River mouth (27%). In June, Shoalwater Bay continued to exhibit the greatest use by radiotagged suckers (34%). By July, suckers later moved from Shoalwater Bay and other areas to locations associated with the mouth of Pelican Bay and Fish Banks. This is believed to be a result of *Aphanizomenon* blooms and associated poor water quality during summer and early fall months. The low-visibility interface areas of Pelican Bay and Fish Banks contained the most radiotagged suckers during August as well. Shoalwater Bay was not used between July and October, whereas Ball Bay was occasionally used between July and August. By September, radiotagged suckers began to occupy a wider area, and by October, radiotagged suckers were distributed throughout the northern 2/3 of Upper Klamath Lake. Wood et al. (1996) believe that frequent degraded water quality conditions in Agency Lake and the southern portion of Upper Klamath Lake might be related to limited fish occurrences in these locations.

Reclamation (1996a) provided a brief summary of water quality parameters associated with radiotagged suckers. Results indicated adult radiotagged suckers generally occupied habitats with dissolved oxygen > 4.0 mg/l and pH < 10.0. Thirteen of 39 radiotagged suckers died two to six months after implantation. Reclamation (1996a) believes this mortality is due to infection developed during or after exposure to poor water quality or from poor water quality conditions. Water quality data in relation to sucker distribution will be further analyzed during the Upper Klamath Lake water elevations consultation.

Unlike trammel net data, telemetry data indicated adult suckers occupying more open water habitats. Total water column depths ranged from 1-9 m, with most fish occupying areas with

depths of 2-3 m. Reclamation (1996a) indicated that areas with depths < 1 m and > 5 m are generally avoided by suckers. This may be due, in part to bird predation in shallow depths and generally poorer water quality in deeper areas.

Telemetry validated occurrence of Williamson River spawning areas where previously identified in Bienz and Ziller (1987) and Buettner and Scoppettone (1990). No radiotagged fish were tracked above Sprague River Dam. Telemetry also revealed that individual suckers often repeat spawning on an annual basis. Fidelity to initial tagging location was exhibited by all fish.

Fish Passage

PacifiCorp currently operates fish ladders on the following facilities: Link River Dam, Keno Dam, and J.C. Boyle Dam. Suckers have been observed utilizing both the Link River and Keno ladders. The Link River ladder is a pool and weir type structure, approximately 105 feet long, gaining 13 feet in elevation, with 11 pools. Flow through the ladder is approximately 15 cfs. The weir exits into Upper Klamath Lake at elevation 4,138.5 ft. When lake elevations are below 4,138.5 ft, passage is unavailable.

Between 1988 and 1991, fish passage through the ladders at Link River, Keno, and J.C. Boyle dams were monitored (F. Shrier, PacifiCorp, pers. comm.). During the study period, only four adult shortnose suckers and two adult Lost River suckers were collected at Link River ladder. All six were collected in April and May, 1989. Seven adult Lost River suckers and five adult shortnose suckers were collected at the Keno Dam ladder during the study period. Olson (PacifiCorp, pers. comm.) noted one adult shortnose sucker and several other large, unidentified suckers in the Link River Dam ladder on June 4, 1996.

Effects of Action

Reclamation's Assessment identified entrainment, spill termination at Link River Dam, peaking power operations at J.C. Boyle, fish passage, instream flow, reservoir fluctuations, Klamath River water quality, exotic fish, and habitat modification as PacifiCorp's endangered sucker effects. Reclamation's Assessment identified entrainment as The New Earth Company's endangered sucker effect. The following includes a summary of direct, including interrelated and interdependent effects, and indirect effects of the proposed action. Reclamation's effects analysis for this consultation is supplemented herein with additional analysis including effects of Reclamation and PacifiCorp's Upper Klamath Lake water operations and impacts to specific endangered sucker life stages. The effects addressed in the Assessment are incorporated by reference, with additional citations from other sources provided to complement the Assessment's information.

The Service summarizes PacifiCorp and The New Earth Company's effects under the following seven categories: entrainment; Upper Klamath Lake water elevations, Klamath River reservoir

operations; sucker population segregation; other effects to the species; proposed critical habitat; and jeopardy avoidance measures.

Entrainment

Entrainment at PacifiCorp and The New Earth Company's facilities has the potential to significantly impact all life stages of endangered suckers. Currently, only PacifiCorp's J.C. Boyle facility has effective fish screening devices; this location has lower abundance of endangered suckers than upstream, especially Upper Klamath Lake. Other PacifiCorp facilities have few records of endangered suckers, therefore, the Service believes minor chance of entrainment exists at Keno, PacifiCorp ranchlands, Copco, and Iron Gate facilities. Link River Dam and its associated powerhouses have not been outfitted with entrainment reduction devices. Neither has Reclamation's A-Canal diversion.

In this proposed action, The New Earth Company will construct and operate entrainment reduction devices, comparable to the debris reduction devices used on the B- and C-Canals, during algae harvest season at PacifiCorp's Eastside and Westside diversions. Operations for all New Earth Company facilities would commence, depending upon length of annual harvest season, on or before June 1 each year, with full deployment until or after October 15, and, for Link River Eastside and Westside diversions, occur for 10 years or the life of the FERC license. Under the current proposal, no additional entrainment reduction activities would occur during non-algae harvest periods at PacifiCorp's Eastside and Westside facilities. Reclamation is responsible to implement entrainment reduction methodology at the A-Canal under the 1992 LTBO.

All life stages have been collected in both Reclamation's canal system and in association with PacifiCorp's Link River Dam and powerhouse facilities. These data are summarized in Reclamation's Assessment and incorporated by reference herein. Of note are the 40 juvenile suckers collected May 11, 1995, and 78 juvenile suckers collected December 11, 1995, during dewatering events at the Eastside facility (barrier net in place to reduce entrainment during salvage). Both these dates are outside the period (June 1-October 15) when The New Earth Company is proposing to operate its entrainment reduction devices. In contrast, the only dewatering salvage activity occurring during the proposed entrainment reduction period (June 1-October 15) took place in September, 1989. Four different Eastside forebay dewatering events occurred in September, 1989, with a total of 87 juvenile and one adult sucker collected (no barrier net in place during salvage).

The East- and Westside powerhouses utilize Francis-type turbines. According to Reclamation's entrainment mortality analysis, based on Eicher Associates (1987), between 10 and 26 percent of entrained fish at Eastside and 20 to 26 percent of entrained fish at Westside will perish. Mortality is related to size, with larger fish generally suffering higher rates of turbine mortality. Entrainment injury rates and delayed mortality are unknown. Later mortality is likely for most fish entrained at PacifiCorp's facility and passing downstream due to poor downstream water

quality and habitat conditions in Link River and Lake Ewauna. Relatively better water quality (Campbell 1995) and habitat condition occur in the Klamath River and its reservoirs than in the Link River and Lake Ewauna (T. Olson, PacifiCorp, pers. comm.). Upstream passage, while provided at Link River Dam, is rarely used by suckers and other fish species (Reclamation 1996a). Immediate turbine mortality, poor downstream conditions immediately downstream of Link River Dam, and almost-complete lack of passage activity by fish upstream into Upper Klamath Lake, indicates an almost complete loss of suckers entrained in the East- and Westside facilities from the Upper Klamath Lake populations. Entrainment and associated direct or later mortality at these facilities can cause near-term effects, such as loss of a certain percentage of a cohort, and have the potential to create more indirect, long-term effects from loss of individuals, such as inbreeding and hybridization.

In 1989, approximately 70 million larval suckers were estimated to migrate past river mile 6 on the Williamson River and 5 million larval suckers were estimated to survive and enter Upper Klamath Lake (Klamath Tribes 1993). Markle and Simon (1993) estimated approximately 800,000 larvae and early juvenile suckers entrained into the A-Canal, equating to approximately 16% of the 5 million larvae entering Upper Klamath Lake. Link River Dam diverts a greater volume of water than A-Canal (approximately 1,000 cfs in Eastside and 200 cfs in Westside diversions vs. 750 cfs for A-Canal), and thus may entrain more larvae. Reclamation's Assessment estimates larval entrainment for Link River Dam at these average flows to equal approximately 1,300,000 larvae annually. Total entrainment at these two features is estimated at approximately 2,100,000 larvae, or approximately 40% of larvae that were estimated to migrate into Upper Klamath Lake from the Williamson River during 1989. Under the proposed action, no operational or physical measures would be taken to reduce larval and early juvenile sucker entrainment at the Link River Dam diversions.

Larval suckers can appear as early in the year as March (M. Buettner, Reclamation, pers. comm.), indicating larval entrainment occurs at Reclamation's A-Canal and PacifiCorp's Eastside and Westside facilities during non-algae harvest periods (March through May). Both PacifiCorp and The New Earth Company's operations will entrain larval and early juvenile suckers during algae harvest season. Larval and early juvenile suckers will be entrained during algae harvest operations (approximately June 1 - October 15, depending on the quality and quantity of available algae) by The New Earth Company's pumps located on the B-Canal, pumps at the Eastside and Westside hydrofacilities, and at the C-Canal. Total entrainment of all larvae and early juveniles entering the C-Canal during this time period is anticipated. However, based on harvest facility configuration, larvae and early juveniles may successfully avoid pumps at the B-Canal, and Eastside and Westside facilities. Those avoiding The New Earth Company's pumping plant entrainment at Eastside and Westside facilities will be entrained in PacifiCorp's hydroelectric facilities. Individuals avoiding entrainment at B-Canal most likely perish in agricultural diversions, however, a few may be transported to the Lost River, be salvaged at the end of irrigation season in the B-Canal, or eventually be transported to Tule Lake or the Klamath River (M. Buettner, Reclamation, pers. comm.). Prior to full installation of The New Earth Company's algae harvest screens at B- and C-Canals, all A-Canal larval and early juvenile

mortality occurred downstream in Reclamation's canal system. The New Earth Company's proposed activities simply isolate a portion of the mortality at one quantifiable location. In the sense that larval and early juvenile entrainment into the A-Canal likely leads to eventual mortality, regardless of the cause of mortality, Reclamation is still ultimately responsible for addressing larval and early juvenile sucker take in the A-Canal not resulting from The New Earth Company's operations (including those individuals entrained in the A-Canal prior to annual algae harvest, and those that avoid entrainment in The New Earth Company's B-Canal facility during harvest activities).

Juvenile and adult suckers may be entrained into the Link River Dam diversion throughout the year, whereas, entrainment of these life stages into the A-Canal occurs only during A-Canal operations (approximately April 1-October 15). The employment of Debris Reduction Devices across the C-Canal drop, pumps at the B-Canal, and Entrainment Reduction Devices at the Eastside and Westside hydrofacilities by The New Earth Company, from June 1-October 15, may incidentally reduce the entry of these life stages into the C-Canal and the Link River powerhouses during that operating period. Similar to larval and early juvenile forms addressed above, B-Canal harvest facility configuration may allow some older suckers to avoid entrainment. However, impingement of age 1 and older sucker life stages on screens may still occur at all facilities. During a large portion of the period representing highest sucker movement (generally spring run-off event and post-spawning)(G. Scoppettone, NBS, pers. comm.), no entrainment reduction activities will occur at Link River diversions or the B- and C-Canals. As noted elsewhere in these opinions, The New Earth Company's debris reduction devices at B- and C-Canals may not function to eliminate fish entrainment, further, their location downstream of the initial diversion point from Upper Klamath Lake is not effective to promote maximum entrainment reduction goals to retain these sucker life stages in Upper Klamath Lake. The location for entrainment reduction must occur at the source of entrainment, the A-Canal headworks, to maximize entrainment reduction activity benefits. Reclamation is still ultimately responsible for addressing juvenile and adult sucker take in the A-Canal.

The New Earth Company's proposed debris and entrainment reduction devices may or may not be of an effective mesh size or configuration to be effective fish entrainment reduction devices. Preliminary investigations by The New Earth Company in 1995 did not collect any fish greater than 75 mm downstream of the debris reduction devices installed at the C-Canal. However, no observations were made of the timing or magnitude of impingement by juvenile and adult suckers on the 3/8" mesh debris reduction devices. Reclamation is currently working with the Klamath Irrigation District to develop plans for reducing entrainment at the A-Canal headworks. The plans will utilize sucker life history and swimming speed data and site specific physical information from Upper Klamath Lake and the A-Canal to define effective entrainment reduction and impingement avoidance methods for the A-Canal. These data and plans were requested by The New Earth Company prior to development of proposed entrainment reduction plans, however the analysis and final report was not complete and no preliminary findings were provided. The Service therefore anticipates, as per the New Earth Company's proposed action, that The New Earth Company shall use the Klamath Irrigation District's A-Canal entrainment

reduction planning document, when it becomes available, to modify its existing proposed action to effectively exclude fish greater than 75 mm.

Proposed entrainment research activities will involve intentional take of individual suckers. Because the PacifiCorp entrainment study and The New Earth Company entrainment monitoring efforts occur in areas where entrainment has already or will likely ultimately occur (ie, B- and C-Canals, and the Eastside and Westside hydrofacilities), intentional take of suckers related to proposed research activities is not expected to increase the effect to shortnose and Lost River suckers above those impacts identified above.

The entrainment effect of greatest concern to the Service is loss of age 1 and older suckers. These fish have survived the age 0 mortality "bottleneck" and are critical to future reproduction and population stability of Upper Klamath Lake suckers. This entrainment impact is of immediate concern due to recent data indicating a substantial loss of older sucker age classes (Reclamation 1996a) and almost-complete loss of 1992 and 1994 cohorts (Simon et al. 1996). Larval and early juvenile entrainment, while greater in magnitude than that for age 1 and older suckers and therefore of significant concern to the Service, is more readily offset through mitigative actions, as proposed by PacifiCorp and The New Earth Company. In the interim between reestablishment of historic larval habitat features in areas such as the Lower Williamson River and associated reduction of annual lethal water quality events, the Service believes preservation of age 1 and older suckers is critical to the continued survival and future recovery of these two species.

Upper Klamath Lake Water Elevations

Operation of Link River Dam has the ability to effect Upper Klamath Lake water elevations, thereby having the ability to both negatively and positively effect endangered suckers and their habitats. Direct, indirect, positive, and negative effects from Link River Dam operations may include, but is not limited to, the following: availability and quality of in-lake habitat (emergent, littoral, riverine or other freshwater inflow, spawning, etc), water quality and quantity, winter kill, predation, sucker distribution; and sucker passage. As noted in prior chapters, Reclamation will reinitiate and complete consultation on Upper Klamath Lake water elevations by spring 1997. These and other Upper Klamath Lake water management effects will be fully analyzed and jeopardy avoidance measures determined within the Upper Klamath Lake water elevations consultation.

Interrelated with PacifiCorp's Upper Klamath Lake operations are PacifiCorp's contractual agreements with certain landowners around Upper Klamath Lake. These agreements delegate responsibility for certain dike maintenance activities and require PacifiCorp to compensate for flood damage events. PacifiCorp's current flood control plan is designed to minimize flooding events and resultant compensation. These effects will be fully analyzed within the Upper Klamath Lake water elevations consultation.

Klamath River and Reservoir Operations

PacifiCorp operates its' Klamath River reservoirs to generate hydropower; this action requires fluctuations in both reservoir water elevations and river discharges. Fluctuation in reservoir water elevations may affect early sucker life stages by increasing or reducing available emergent habitat. Reservoir fluctuation at J.C. Boyle averages 1-2.5 ft per day. The Assessment did not indicate similar daily fluctuations at any other Klamath River reservoir. These elevation fluctuations may effect the amount of emergent vegetation available to larval and juvenile suckers. As determined by the Klamath Tribes (1995), emergent habitat serves to reduce non-native fish predation on larval suckers. Aquatic habitat in J.C. Boyle Reservoir experiences large daily fluctuations, with associated impacts to sucker larvae (Reclamation 1996a). Impacts include increased predation by numerous non-native fish, loss of sucker food organisms, loss of cover, and stranding.

J.C. Boyle is a power peaking facility. Shortnose sucker spawning has been documented below J.C. Boyle powerhouse, in the vicinity of Copco Reservoir (M. Buettner, pers. obs., as cited in Assessment). Daily power peaking activities (restricted to a 9 inch per hour ramp rate) would be most detrimental to suckers during spring spawning activity. Reclamation identified potential and observed effects including desiccation of eggs, movement of eggs by high flows, fish predation on eggs and larvae, and stranding of suckers. Stranding of larvae has been observed in this reach, with Beak Consultants (1987) estimating that less than 10% of the Klamath River from the Oregon-California state line to Copco Reservoir was subject to stranding events during peaking. Beak Consultants (1987) concluded that stranding was a minor impact.

Instream flows, as required by FERC license, are identified in the Assessment. Minimum flows, including accretions, in known sucker spawning areas below J.C. Boyle average approximately 400 cfs. No research has been conducted in the Klamath River to determine the relationship between flow and fish habitat. Low flows in the Klamath River were experienced during the drought of 1992. No dead or dying fish were observed, however, as with salvage operations, bird predation in shallow water can be extensive, biasing these observations.

Introduced non-native fish occupy the Klamath River and its reservoirs. Reclamation (1996a) reported high percentages of predaceous non-native fishes, including yellow perch, largemouth bass, and pumpkinseed, occupying mainstem reservoirs; of specific concern is the similar timing of sucker larvae emigration and yellow perch spawning migrations upstream from Copco Reservoir into the Klamath River. Reclamation (1992) suspected high predation on larval suckers by yellow perch. Non-native fish introductions are a major cause of native fish endangerment throughout the western United States (Williams et al. 1989).

PacifiCorp's operational impacts to Klamath River and reservoirs' water quality is poorly understood. The Klamath River Basin Fisheries Task Force (1991) indicated that impoundment of nutrient-rich waters in Klamath River reservoirs is known to contribute to algal blooms and associated poor water quality conditions in the reservoirs. Little data, other than temperature and

flow, has been recorded near hydrofacilities. Water surface temperature in Klamath River reservoirs is similar to Upper Klamath Lake; these temperatures are not considered problematic to endangered suckers. Water quality conditions of concern to sucker survival in the Klamath River include dissolved oxygen, pH, ammonia, and high levels of ortho-phosphorus, an algal growth stimulant (Campbell 1995). Overall Klamath River water quality conditions appear to be most affected by Upper Klamath Lake conditions (Bartholow 1995). Reservoir water quality conditions were not discussed in detail within the Assessment. Depth of water withdrawal inlets in reservoirs might have influence on downstream water quality in both river and reservoirs.

Proposed reservoir research activities may involve intentional take of individual suckers. The Service estimates the amount of intentional take related to the proposed lower Klamath River reservoirs study to be 5,000 larval, 1,000 juvenile, and 500 adult shortnose and Lost River suckers combined. Juvenile and adult sucker take will occur in the form of handling. All larval forms are considered taken from direct sampling mortality, due to their fragile nature. The Service believes that intentional take of these various life stages, though either direct mortality or handling stress, is necessary to the long-term management of these species in the lower Klamath River reservoirs. Additionally, because intentional take of adults and juveniles is anticipated to occur in a non-lethal fashion, the Service anticipates the overall effect of this research action to the continued survival and eventual recovery of these species will be negligible.

Sucker Population Segregation

Fish population segregation has been identified as a causative factor in endangerment of western fish faunas (Williams et al. 1989). PacifiCorp's construction and operation of facilities on the Link and Klamath rivers has created sucker population segregation for Lost River and shortnose suckers (Reclamation 1996a). Limited definitive data are available to quantify the impact of sucker population segregation from construction and operation of the Link and Klamath River facilities, however, Reclamation (1996a) identified reduced passage opportunities and potential for long-term population impacts from genetic isolation as impacts. Under the Act, and as addressed in the Recovery Plan (Service 1993), the Service strives to maintain a well distributed population; sucker population segregation effects Lost River and shortnose sucker distribution.

As noted in Reclamation (1996a), PacifiCorp's sucker population segregation may be one cause of genetic isolation within the Lost River and shortnose sucker populations. Location of PacifiCorp's features and lack of effective passage may isolate portions of the population, increasing the probability of hybridization, introgression, and inbreeding (Klamath Tribes 1996). Finally, operations may effect genetic makeup of Upper Klamath Lake populations of shortnose and Lost River suckers via water level manipulations during spawning, and entrainment of various life stages into downstream locations.

New information provided in Reclamation (1996a) and in the Baseline, Species Account section of these opinions, indicates endangered sucker passage at PacifiCorp's facilities may be limited. While sucker population numbers are believed to be low at Keno and J.C. Boyle facilities,

perhaps explaining low numbers of suckers observed utilizing these two passage features, the Link River ladder is adjacent to the main endangered sucker populations in the Klamath River drainage. Passage is unavailable at the Link River ladder during periods when Upper Klamath Lake elevations are below 4,138.5 ft. Water levels were below this elevation in 1992 (August - October) and 1994 (August - December) (Reclamation 1996a). Review of Reclamation (1992) end of month water elevation data for Upper Klamath Lake indicates lake elevations were below 4,138.5 ft for at least one period of the year in 1926, 1928-1931, 1934, 1939-1940, 1942, 1944-1947, 1949, 1979, 1981, and 1991. Combined, these data indicate lack of passage for a period each year during 18 years between construction of the ladder in 1926 and present. Using end of month elevation calculations probably underestimates the number of times Upper Klamath Lake elevations were below 4,138.5 ft each year. Nine years additionally exhibited end of month elevations between 4,138.5 and 4,139.0 (1927, 1936, 1941, 1959-1961, 1968, 1988, and 1990), indicating less than ½ ft of water for fish passage from the ladder during that period. Using 4,139.0 ft as an elevation that also precludes ladder use, Link river Dam fish passage has been restricted or precluded for a period of time in 27 of 70 years.

Based on past research, successful Link River ladder use appears minimal (only 6 suckers were observed using the Link River ladder during 1988-1991 study). However, PacifiCorp biologists observed an adult shortnose sucker and several other large, unidentified suckers in the Link River Dam ladder on June 4, 1996. No information is currently available to identify cause of lack of Link River ladder use by endangered suckers. Lack of use could be caused by inadequate design, steep gradient, sucker avoidance, low sucker numbers in the Link River, lack of upstream migratory behavior (Reclamation 1996a), or natural Link River migration barriers below the Link River ladder. Cui-ui passage experts indicate suitable slope for cui-ui passage is at least 1 on 20, with a pool and orifice or slotted weir design (M. Buettner, Reclamation, pers. comm.); Link River ladder has an approximately 1 on 8 slope with a pool and weir design, suggesting potential design problems for sucker passage.

Future collection and potential sacrifice of shortnose and Lost River suckers is proposed for genetic studies. These studies will be, in part, funded by PacifiCorp. A total of 200 shortnose suckers (9 different locations) and 135 Lost River suckers (8 different locations) are needed for these studies to augment existing specimens. All these individuals will be sacrificed. An additional total of 100 shortnose suckers (7 locations) and 135 Lost River suckers (7 locations) will have tissue samples removed using non-lethal techniques. The Service anticipates, due to the small number of specimens collected at a large number sample locations across the range of these species, that the overall effect of this research action to the continued survival and eventual recovery of these species will be discountable.

Other Effects to Species

PacifiCorp and The New Earth Company will construct proposed features and conduct routine and unplanned maintenance on their facilities. These activities often necessitate dewatering of occupied canals or diversion features. Currently, PacifiCorp salvages endangered suckers during

dewatering and spill cessation events. Reclamation is responsible for end-of-irrigation salvage efforts at the B- and C-Canals. PacifiCorp's salvage efforts have regularly captured suckers at the Link River facilities, however, only two small suckers have been observed in the diversion canal at the J.C. Boyle facility. Dewatering activities affect suckers through increased incidence of bird predation, stranding, and entrainment (however, as of 1995, a block net is placed over the intake structure to reduce entrainment of larger fish prior to forebay closure and dewatering). Impacts associated with salvage operations include injury or death from collection gear, especially electro-fishing equipment, and other handling impacts.

Ramp rates to avoid fish stranding during flow reduction and dewatering events are provided at all PacifiCorp facilities. Reclamation's Assessment reported that the incidence of Link River stranding became greater as length of spill increased. However, these data do not justify increased incidence of shorter-duration spills.

Hydrofacility operations may experience spills of hazardous chemicals or liquids. No information was provided in the Assessment that addressed spill avoidance or spill response methods.

Reclamation's Assessment addressed potential benefits of The New Earth Company's algae harvest operations on water quality below harvest facilities. Removal of algae during harvest season from the majority or all flows leaving Upper Klamath Lake should result in beneficial effects to aquatic habitat and its inhabitants in the Link River, Lake Ewauna, the Klamath River and its reservoirs, the Lost River, and Tule Lake.

Proposed Critical Habitat

On December 1, 1994, the Service published a proposed rule for Lost River and shortnose suckers critical habitat (59 FR 61744). The proposed action has effects within or adjacent to three of the proposed critical habitat units: Unit #3 (Klamath River); Unit #4 (Upper Klamath Lake and Watershed); and Unit #5 (Williamson and Sprague Rivers). Primary constituent elements associated directly and indirectly with the proposed action for these units are as follows:

Klamath River: Unit #3's primary constituent elements might be affected by PacifiCorp's operations through alterations in flow timing, magnitude, and duration; establishment of non-native fish species; and water quality degradation (temperatures, pH, dissolved oxygen). Additionally, peaking releases from downstream reservoirs might impact sucker spawning and subsequent larval/juvenile life stage activities. These impacts were specifically addressed elsewhere in this consultation.

Upper Klamath Lake and Watershed: PacifiCorp and Reclamation's management of Upper Klamath Lake's water surface elevations has numerous potential direct and indirect affects to Unit #4's primary constituent elements. Of greatest concern are potential impacts to spawning

areas near in-lake spring sources, water quality degradation (pH, dissolved oxygen), fish kills, loss of water quality refugial areas, impacts to young-of-the-year rearing areas, fragmentation of habitats, and impacts (predation, competition) from non-native fish species. These impacts will be addressed in detail within the Upper Klamath Lake water elevations consultation.

Williamson and Sprague Rivers: The proposed action's relationship to Unit #5's primary constituent elements would be water level management and its associated impacts on the lower Williamson River restoration efforts, and the mainly beneficial activities surrounding PacifiCorp's and The New Earth Company's proposed habitat restoration effort. Beneficial effects should include increased habitat availability, increased food availability, and improved water quality.

Jeopardy Avoidance Measures

Implementation of these jeopardy avoidance measures should have an overall positive effect, especially the long-term habitat restoration, to endangered suckers. However, implementation of jeopardy avoidance measures may lead to additional effects to suckers from handling stress or direct mortality during research or restoration activities, habitat impacts during restoration activities, effects to suckers and/or habitat during agricultural activities, or impingement of suckers during Entrainment Reduction Device operation.

Impacts anticipated from restoration activities include short-term increases in sedimentation and turbidity from earth-moving activities, nutrient loading from draining fields, stranding of various life stages during water manipulation, colonization of restoration features by non-native fishes, increased predation in the restoration area, and direct mortality during restoration activities. PacifiCorp, The New Earth Company, and TNC, or some combination of these parties, may hold an interest in the agricultural inholdings within Tulana Farms. Agricultural activities could impact the suckers from nutrient loading during draining of agricultural fields, application of chemicals (fertilizers and pesticides), and entrainment of suckers into the irrigation system.

Cumulative Effects

Cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of ESA.

The 1992 LTBO reviewed cumulative effects throughout the Klamath Project area, including those identified in the current action area. Those action area cumulative effects are still reasonably certain to occur in the future, and are incorporated herein by reference.

As new data are generated and analyzed, further concern is placed upon cumulative effects as key impacts to the continued survival and recovery of endangered suckers. Of specific concern are high levels of nutrient loading to Agency and Upper Klamath lakes. New information is currently available (for instance, Gearhart et al. 1995; Wood et al. 1996) that document sources and amount of nutrients from various geographic locations and land use practices. These data validate concerns listed in the 1992 LTBO regarding nutrient loading, hydrologic cycle, and loss of habitat in the action area. Nutrient loading is comprised of external loading (land use impacts and naturally-high nutrient loads in water) and internal loading (nutrients released due to high pH and wind-induced suspension of bed materials). Cumulative effects which increase external loading, and past external loads that exist as bed materials or in suspension in Upper Klamath and Agency lakes, add to the annual magnitude, duration, and initial timing of blue-green algae blooms and associated poor water quality events in Upper Klamath and Agency lakes. These poor water quality events have been closely tied to chronic and lethal effects including loss of individual suckers and/or complete mortality of young-of-the-year cohorts (Reclamation 1996a; D. Markle, OSU, pers. comm.).

CONCLUSION

Lost River and shortnose sucker are highly fecund, long-lived species. The current sucker populations are distributed throughout the Upper Klamath and Lost River basins, but are generally isolated by upstream and downstream impediments to migration. While some populations (ie, Clear Lake and Gerber Reservoir) appear to have multiple age classes indicating regular, successful recruitment, these populations are isolated, occupying habitats altered from historic conditions, and are vulnerable to stochastic events. Additionally, Gerber Reservoir and Clear Lake populations of shortnose suckers are of questionable taxonomic status, and are currently considered shortnose due to conservative taxonomic classifications of the past. While it is comforting to know these populations exist, indicating the overall extinction probability for these species is reduced, the stability of these species across their range is still highly endangered by, at a minimum, existing degraded habitat conditions, restricted spawning distribution, chance events, inbreeding depression from low population numbers, and additional environmental disturbance. Any one of these broad impact categories could irreversibly lower these species' population sizes to a point where it can no longer recover. The Service therefore desires, in the short-term, to protect the wide diversity of shortnose and Lost River suckers' characteristics and behaviors as well as maintain a well distributed population across species range, while, in the long-term, restoring as much connectivity and historic form, function, and composition to important sucker habitat features as possible.

Within Upper Klamath Lake, the Service is concerned that adult sucker age class distribution is greatly diminished since listing in 1988. Early loss of multiple adult suckers cohorts can have significant impacts to the long-term viability and persistence of these species. Additionally, based on new data, bottlenecks to sucker recruitment occur at the larval life stage. Annual poor water quality events and reduced habitat complexity probably have a great influence on both

adult age class stability and larval survival. Long-term habitat restoration and short-term water level management are two key actions that must be implemented to ensure the survival of Upper Klamath Lake populations. Additionally, until adult populations are reestablished and stabilized, and larval survival is increased through amelioration of water quality and habitat issues, all suckers that have successfully survived their first year in the wild must be protected from other impacts to allow them to recruit and spawn multiple times.

PacifiCorp and The New Earth Company operations have specific impacts on specific life stages of endangered suckers. The Service has worked with PacifiCorp, The New Earth Company, and Reclamation to progressively identify specific jeopardy avoidance measures to attempt to offset operational impacts. These jeopardy avoidance measures address the need for increased larval survival via long-term habitat restoration, and preservation of age 1 and older suckers via entrainment reduction devices. Additionally, research will be conducted to determine if operational impacts are greater than currently identified. It is believed by participants in this consultation that restoration of important lower Williamson River wetland habitat will benefit all sucker life stages, and may provide, in the long-term, benefits that equal or exceed current impacts.

After reviewing the current status of the Lost River and shortnose suckers, the environmental baseline for the action area, the effects of PacifiCorp and The New Earth Company's proposed actions and jeopardy-avoidance activities, and the cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Lost River and shortnose suckers, and is not likely to adversely modify or destroy proposed critical habitat.

INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of ESA, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be implemented by Reclamation so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. Reclamation has a continuing duty to regulate the activity covered by this incidental take statement. If Reclamation (1) fails to require the applicants to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to The New Earth Company's permit or PacifiCorp's contract, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. Additionally, this incidental take statement applies to the applicants' actions and does not negate or reduce Reclamation's existing responsibilities to implement existing terms and conditions provided in Reclamation's previous consultations (identified in the Consultation History section).

Amount or Extent of Take:

Under the proposed action, a Lower Williamson River habitat restoration project will be accomplished that is believed to be beneficial to all life stages of the endangered suckers. At some point in the future, as defined by monitoring of habitat and larval sucker production goals developed by the LWRRT, and approved by the Service, this restoration project is believed to be able to greatly offset PacifiCorp's and The New Earth Company's impacts. In the short-term, until these production goals are met, actions beneficial to endangered suckers must be accomplished. Such actions include protective water levels in Upper Klamath Lake (such as those identified in Reclamation 1996b), and initiation of studies and reviews as proposed in this consultation. Additionally, as required by the Act, incidental take levels from this proposed action must be identified and Reasonable and Prudent Measures provided to minimize the incidental take.

Endangered sucker incidental take due to entrainment from PacifiCorp's Link River hydrofacility and New Earth Company's harvest operations, based on movement and migration data, larval

and early juvenile drift and entrainment studies, and sucker salvage records, can be reasonably estimated, however, incidental take due to PacifiCorp's Upper Klamath Lake water elevation management, habitat segregation, and Klamath River and reservoirs operations, is more difficult to quantify. Because of the inherent biological characteristics of these aquatic species, the likelihood of discovering an individual death or other taking attributable to habitat segregation and operations of Upper Klamath Lake, Klamath River, and Klamath River reservoirs is small. For example, small size of younger sucker life stages, abundance of piscivorous birds, rapid rates of decomposition, presence of algae and aquatic vegetation, and remote locations make finding an incidentally taken sucker extremely unlikely. Furthermore, some effects of water project operations are largely unquantifiable in the short-term, and may only be measurable in the long-term as effects on species' habitat, genetic integrity, and age structure. Therefore, even though the Service expects incidental take to occur for Upper Klamath Lake water elevation management, habitat fragmentation, and Klamath River and reservoirs operations, the best scientific and commercial data available are not sufficient to allow the Service to estimate a specific amount of incidental take to the species themselves. In instances such as this, incidental take may be quantified in terms other than numbers of individuals.

Entrainment

Reclamation (1996a) estimated entrainment of larval and early juvenile suckers into the Eastside diversion to be 1,012,200 individuals and Westside diversion to be 202,400 individuals. Larval and early juvenile sucker incidental take from entrainment may occur at Link River hydrofacility from March through mid-July. Entrainment is defined as those fish that are passed through the respective powerhouses. The Service therefore anticipates an annual total of 1,214,600 larval and early juvenile suckers may be entrained by the Eastside and Westside hydrofacilities.

Entrainment of larvae and early juveniles attributable to The New Earth Company's proposed operations on the B- and C- Canals is based on harvest period and percentage of A-Canal flow harvested. Larval entrainment in the A-Canal may occur as early as annual operations commencement (approximately April 1)(Reclamation 1992). The New Earth Company's algae harvest operations commence approximately June 1. The New Earth Company's entrainment of larvae and early juveniles is therefore anticipated to occur between June 1 and mid-July. Under the proposed action, some larvae and early juveniles may escape entrainment at the B-Canal. Therefore, based on harvest period, timing of entrainment described in Markle and Simon (1993), and percent of canal volume harvested, a large percentage of the overall annual larval and early juvenile entrainment into the A-Canal will be attributable to The New Earth Company's operations. Markle and Simon (1993) estimated, from May 13 to July 15, a total of 759,150 larvae and early juveniles were entrained, with an initial peak from late May through mid-June (majority of larvae were Lost River suckers) and a second peak in early July (shortnose suckers). Researchers did not collect larvae between mid-April and early May, however, larvae are present in Upper Klamath Lake during this period. Additional sampling will be necessary to refine early season entrainment rates. Reclamation's Assessment attributed all larval take to The New Earth Company and estimated between 400,000 and 800,000 larvae and early juveniles annually

entrained into the A-Canal. Using the Markle and Simon (1993) estimate of 759,150 larvae and early juveniles, the Service believes approximately 600,000 of the entrained larvae and early juveniles are attributable to The New Earth Company's operations, with the remainder attributable to Reclamations' A-Canal operations.

Entrainment of adult and juvenile (post-July 15 and older) suckers into the Eastside and Westside hydrofacilities may occur year round. Reclamation (1996a) believes high mortality to entrained suckers occurs based on turbine impacts, poor downstream water quality, lack of habitat, and upstream passage impediments. Entrainment is expected to be greater during spring run-off events, when older juvenile and adult suckers appear to be more active. Limited salvage data in Reclamation's Assessment cannot be related to actual entrainment, therefore the Service must estimate take of juvenile and adult suckers based on relative abundance during salvage operations, and inferences from juvenile and adult sucker movement and migration data. The Service believes minimal adult sucker entrainment occurs, based on radiotelemetry and trammel nets surveys that indicate a northern distribution for adults in Upper Klamath Lake, and a total of one adult Lost River sucker collected in seven different forebay salvage operations. The Service therefore anticipates a combined annual total of 100 adult Lost River and shortnose suckers may be entrained by the Eastside and Westside hydrofacilities. Older juvenile suckers are more widespread, occurring relatively more frequently in the lower portions of Upper Klamath Lake (Markle and Simon 1994; Simon et al. 1995, 1996) and were captured in higher relative numbers during forebay dewatering activities. The Service therefore anticipates a combined annual total of 5,000 juvenile (post-July 15 and older) Lost River and shortnose suckers may be entrained by the Eastside and Westside hydrofacilities.

Juvenile and adult entrainment into the A-Canal is currently addressed under the 1992 LTBO, with a requirement for Reclamation to reduce entrainment at the A-Canal within five years of 1992. The debris reduction devices at the B- and C-Canals are not located to effectively reduce juvenile and adult entrainment from Upper Klamath Lake, and therefore do not serve to reduce the need for entrainment reduction at the A-Canal headworks. The Service does not anticipate any older juvenile or adult take from The New Earth Company's operations at the B- and C-Canal harvest facilities, therefore all age 1 and older juvenile and adult sucker take is still attributable to Reclamation's A-Canal operations.

Upper Klamath Lake Water Elevations

The Service assumed, for purposes of analysis of effects for these opinions, Reclamation and PacifiCorp would cooperatively implement Reclamation's "low range elevations" proposal (Reclamation 1996b), and, after completion of the Upper Klamath Lake water elevation consultation, Reclamation and PacifiCorp would cooperatively implement the new protective lake elevation requirements. Therefore the Service will assume that any Upper Klamath Lake water operation that fulfills the above Service water operations assumptions shall have resulted in incidental take allowed under the Act's section 7(o)(2) exception to the section 9 prohibition against take of a listed species. This amount of take will apply to PacifiCorp's operations until

the Upper Klamath Lake water elevation consultation is completed in spring 1997, wherein a new Upper Klamath Lake water elevation incidental take analysis will be provided to Reclamation that amends PacifiCorp's authorization on this requirement. The Service understands that Reclamation will be involved in future consultations and that Reclamation and PacifiCorp will address operational limitations at those times.

Klamath River and Reservoir Operations

Klamath River and reservoir data pertaining to endangered suckers is limited, however, small populations are known to occur, especially in Copco and J.C. Boyle reservoirs, with limited spawning occurring in the Klamath River above Copco Reservoir and possibly elsewhere. Larval suckers and their emergent habitats that occur in these facilities may be affected by daily reservoir elevation fluctuations and, during spawning, adult fish and their progeny may be affected by peaking flows. Due to low adult population numbers, the Service anticipates low levels of take in the Klamath River and reservoirs due to changes in reservoir elevations, stranding, egg desiccation, flushing of larvae during peaking flows, water quality impacts, and predaceous fish impacts due to non-native fish occupation in PacifiCorp's facilities. The Service anticipates an unquantifiable level of take from Klamath River and reservoir operations.

Sucker Population Segregation

Construction and operation of facilities on the Link and Klamath rivers has resulted in sucker population segregation for Lost River and shortnose suckers. The Service believes take occurs at the structures that inhibit sucker movement and migration. Additionally, the Service believes take occurs at the Link River, Keno, and J.C. Boyle fish ladders. Passage under current conditions is limited at Link River during periods when Upper Klamath Lake elevations are below approximately 4,139.0 ft. Based on past research, Link River ladder use appears minimal (only 6 suckers were observed using the Link River ladder during a three year study, and several suckers were observed in the fish ladder in 1996), possibly indicating passage restrictions. Greater take could be occurring from reduced passage opportunities at these ladders. The Service anticipates an unquantifiable level of take due to inhibited sucker movement and passage impacts.

Incidental take in the form of genetic isolation may occur due to PacifiCorp's project sucker population segregation, passage, and operations. Passage at these ladders, described above, may isolate populations, increasing the probability of hybridization, introgression, and inbreeding (Klamath Tribes 1996). Buth and Haglund (1994) determined that populations of shortnose suckers above Link River Dam were genetically separate from lower Klamath River reservoir and Lost River reservoir populations. Finally, operations may effect Upper Klamath Lake populations via water level manipulations during spawning, and entrainment of various life stages into downstream locations. The Service anticipates an unquantifiable level of take due to genetic isolation impacts.

Jeopardy Avoidance Measures

Restoration of property on the lower Williamson River, while beneficial to endangered suckers in the long-term, will have specific, short-term impacts. The Service anticipates, based on Reclamation's Assessment and communication with the LWRRT, incidental take during restoration and operations on the property to include short-term increases in sedimentation and turbidity from earth-moving activities, nutrient loading from draining fields, stranding of various life stages during water manipulation, colonization of restoration features by non-native fishes, increased predation in the restoration area, and direct mortality during restoration activities. The above types of incidental take from restoration and operation activities would occur under the direction of the Long Range or Annual Restoration Plans. These types of incidental take would occur from the LWRRT, PacifiCorp, The New Earth Company, TNC, NRCS, or their contractors' restoration activities. PacifiCorp, The New Earth Company, and TNC, or some combination of these parties, may hold an interest in the agricultural inholdings within the proposed property. Incidental take from agricultural activities could occur in the form of nutrient loading from draining agricultural fields, application of chemicals (fertilizers and pesticides), and entrainment of suckers into the irrigation system. The Service anticipates an unquantifiable level of take from lower Williamson River restoration activities.

Operations and Maintenance

Down ramping flows below PacifiCorp's facilities has the ability to incidentally take suckers through stranding. Ramp rates for PacifiCorp's hydroproject operations were described in Reclamation's Assessment. These rates were designed to minimize fish stranding events during flow-reduction activities. The Service anticipates an unquantifiable level of incidental take from ramping activities. Fish salvage during normal and unscheduled operations and maintenance activities has the ability to incidentally take suckers through handling. A salvage plan is in place that directs salvage operations and disposition of salvaged fish. Past salvage efforts have collected minor numbers of adult and juvenile suckers, therefore the Service anticipates 1,000 adult and juvenile shortnose and Lost River suckers combined will be taken during annual salvage activities.

Effect of the Take:

In the accompanying biological and conference opinions, the Service determined that these levels of anticipated take are not likely to result in jeopardy to the species or destruction or adverse modification to proposed critical habitat.

Reasonable and Prudent Measures

As noted above, the proposed action includes project operations, habitat restoration (long-term timescale), and short-term research and review activities. The Service believes that the proposed habitat restoration will ultimately offset a a major portion of PacifiCorp and The New Earth

Company's impacts. Take of individual fish, as identified above, is not believed to result in jeopardy to the species as a whole. However, in the short-term, effective minimization of incidental take, as required by the Act, must be implemented within the ITS. These measures are consistent with the proposed action and its' associated impacts, and are based on current Service concerns regarding recent loss of numerous, older sucker age classes and ongoing annual poor water quality events, including stressful dissolved oxygen, pH, and ammonia levels, leading to loss of young sucker age classes in Upper Klamath Lake.

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize incidental take of Lost River and shortnose suckers.

1. Monitor incidence of sucker entrainment and review effectiveness of Entrainment Reduction Devices at PacifiCorp and The New Earth Company facilities.

2. Develop methods for PacifiCorp and Reclamation to cooperatively implement Upper Klamath Lake water operations for the benefit of endangered suckers.

3. Cooperatively develop methods to reduce sucker population segregation impacts from the Link River and Klamath River facilities.

4. Determine status of endangered suckers in PacifiCorp's Klamath River reservoirs.

5. Restore Lower Williamson River property to benefit larval suckers and Upper Klamath Lake water quality with an emphasis on historic habitat form (habitat configuration), function (habitat benefits), and composition (community structure), within unalterable constraints, using the best science and adequate protective measures.

6. Implement PacifiCorp and The New Earth Company operation and maintenance activities in a fashion that protects endangered species.

Terms and Conditions

To be exempt from the prohibitions of section 9 of the Act, PacifiCorp and The New Earth Company must comply with the following Terms and Conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary. Numbers correspond to Reasonable and Prudent Measures listed above.

1.1. **PacifiCorp** shall develop the Link River Dam entrainment study plan, using Service-approved methodology, by August 31, 1996. This completion date will allow, if possible, an October 16, 1996, initiation of studies. The study plan shall identify methodology that quantifies entrainment of larval (March 1-May 31 only), juvenile, and adult fish (October 16 to May 31). Larval sampling will be conducted at locations immediately above hydrofacilities in the Eastside and Westside Canals, whereas juvenile

and adult sampling will occur at locations immediately below the hydrofacilities. Additional study design will be developed to identify "pulses" of fish or other migratory behavior that wouldn't be identified through standard random sampling schemes.

1.2. To ensure the Service can continually review effectiveness of Entrainment Reduction Devices at the Link River diversions, **The New Earth Company** shall implement Service-approved entrainment and impingement monitoring for all age classes of suckers at both B- and C- Canals and Link River diversions. Monitoring activities shall be conducted during the algae harvest period (June 1-October 15). These monitoring efforts will supplement and compliment monitoring studies already proposed by The New Earth Company at their facilities. The New Earth Company shall strive to coordinate Link River entrainment and impingement studies with PacifiCorp's Term and Condition 1.1 studies above.

1.3. **PacifiCorp** shall provide annual entrainment study reports by October 15 for each year's activities. A final report shall be submitted six months after completion of the two season study. **The New Earth Company** shall annually submit, by February 28, a report of larval, juvenile, and adult entrainment and impingement occurrences for the previous year at B- and C-Canals and the Link River diversions.

2.1. **PacifiCorp** shall re-evaluate its flood operations plan by October 31, 1996. **PacifiCorp shall** request input from the Service and Reclamation on analysis methodologies. Copies of the updated flood operations plan shall be provided to the Service and Reclamation for use in the Upper Klamath Lake water elevation consultation.

2.2. During the Upper Klamath Lake water elevation consultation, **PacifiCorp** shall cooperate with the Service and Reclamation to analyze the relationships between the new flood operations plan, various project operational constraints, hydropower, and habitat and water quality benefits to endangered species.

2.3. **PacifiCorp** will assist Reclamation to implement, in 1996, water levels as defined by Reclamation's "low range elevations" proposal (Reclamation 1996b). In the future, after Reclamation's consultation on Upper Klamath Lake water levels is complete, **PacifiCorp** shall assist Reclamation to implement new protective water elevations. The Service understands that Reclamation will be involved in future consultations and that Reclamation and PacifiCorp will address operational limitations at those times.

3.1. **PacifiCorp** and Reclamation shall determine ownership of the Link River fish ladder by December 31, 1996 and report ownership responsibility to the Service. The responsible entity shall implement a Service-approved study to identify reasons for lack of use of Link River fish ladder by endangered suckers. ODFW shall be involved in

study design and implementation. The study should take into account current ladder and entry/exit configurations, gradient, velocities, and juvenile and adult sucker behavior, including swimming attributes, and any other measures determined to contribute to lack of use by endangered suckers.

3.2. The responsible entity, as determined in 3.1 above, shall submit a final report documenting results of the study (3.1 above), and identifying alternatives to increase passage, to the Service by December 31, 1998.

4.1. **PacifiCorp** shall submit a final report on lower Klamath River reservoirs study by December 31, 1999. The report shall document distribution and abundance, age class structure, recruitment success, and habitat use by different life stages of shortnose and Lost River suckers in J.C. Boyle, Copco, and Iron Gate reservoirs. Data collected shall be related to actual water elevations and discharges at the time of study. The report also shall qualitatively identify alternative operations or enhancements that would reduce incidental take in Klamath River and reservoirs' sucker populations.

5.1. **PacifiCorp and The New Earth Company** shall participate in the LWRRT, with membership as defined in the Description of Proposed Action section. LWRRT's main purpose is to develop a Long Range Restoration Plan, to be recommended to the Management Committee. The goal of the plan is restoration of the property with a focus on historic form (habitat configuration), function (habitat benefits), and composition (community structure), within unalterable constraints, for the specific objective of increasing larval endangered sucker survival via habitat creation and water quality enhancement.

5.2. The Management Team shall identify and communicate all "unalterable constraints" to the LWRRT. The **LWRRT** shall subsequently complete a draft Long Range Restoration Plan by December 31, 1996, and submit a final recommended Long Range Restoration Plan to the Management Committee by April, 1997. The **LWRRT** shall use outside experts to assist in development of Restoration Plan. The Restoration Plan shall include specific information on endangered fish needs, historic form, function, and composition, of the lower Williamson River and surrounding area, constraints to return to historic conditions, phased plans and timelines for restoration, specific incidental take reduction activities during restoration activities, research needs, monitoring plans, and specific production targets for larval survival and habitat features (emergent and submerged habitat; woody features; riverine habitat). **LWRRT** decisions shall be made by consensus, with abstaining opinions provided in an appendix to the Restoration Plan. The Restoration Plan will be reviewed by the Service to assure it meets the intent of these biological and conference opinions and ITS.

5.3. The **LWRRT** shall develop annual restoration work/research/monitoring plans for submission to property managers and the Management Committee. Annual restoration plans must have Service review and concurrence to assure they meet the intent of these biological and conference opinions and ITS.

5.4. If restoration funds become available and must be spent prior to completion of the Long Range Restoration Plan, proposed activities shall be reviewed by the LWRRT and the Service prior to implementation. Review shall ensure that unplanned activities do not preclude long range activities.

5.5. If PacifiCorp, The New Earth Company, and TNC, or some combination of these parties, hold an interest in the agricultural inholdings, this entity(s) shall develop, in cooperation with the Service, annual operating plans designed to reduce impacts to endangered species and surrounding restoration activities. Plans should specifically address pesticide/herbicide use, entrainment reduction, and draining/pumping plans, and seek to minimize the impacts of such actions on endangered suckers and their ecosystem. Annual operating plans shall be developed prior to annual activities on agricultural lands.

5.6. The **LWRRT** shall provide the Management Committee and Service with an annual activity report by December 31.

6.1. **PacifiCorp** shall develop a Service-approved endangered species operations and maintenance plan for PacifiCorp's Klamath hydrofacilities' activities, including handling and storage of hazardous materials, hydrofacility ramp rates, and fish salvage operations. This plan shall be developed and implemented by September 30, 1996.

6.2. **PacifiCorp** shall document its annual operations, as related to endangered species decisions, in a report due by December 31 of each water year. The report shall identify actions taken to benefit endangered suckers (coordination points with the Service and/or Reclamation, lake and reservoir elevations, discharges, and key operational decisions), for the following life history periods (as defined in Reclamation 1996b): 1) spring spawning period (Feb 15-April 15); 2) larval habitat occupation (April 16-July 15); 3) juvenile and adult habitat occupation (July 16-September 30); and winter period (October 1-February 14). The report also shall report annual actions taken under Term and Condition 6.1, including number of suckers collected and their disposition during salvage, identify date and magnitude of spill and ramping activities, and any hazardous spills, and remedial actions taken.

6.3. In the event that The New Earth Company is required to dewater algae harvest facilities on the Eastside or Westside canals, **The New Earth Company** shall salvage canal facilities under the guidelines of the PacifiCorp salvage plan identified in 6.1 above.

A report shall be completed by December 31 following each dewatering event that documents the date(s) of the event, number of fish salvaged, and disposition of fish.

Review Requirement

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. With implementation of these measures the Service believes that no more than the above-described amounts will be incidentally taken. If, during the course of the action, this minimized level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for reinitiation and possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of ESA directs Federal agencies to utilize their authorities to further the purposes of ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. Reduction of nutrient loading is an important tool in minimizing water quality-induced impacts to native aquatic species, including suckers, in Upper Klamath Lake. Nutrient loading reduction is identified in the Recovery Plan for Lost River and shortnose suckers as a critical recovery need. One method of implementing the Recovery Plan's priority of reducing nutrient loading is through creation of "wetland cells" (Gearhart et al. 1995). The **New Earth Company and PacifiCorp** should retain qualified researchers to help develop wetland cell pilot projects in high priority nutrient loading source areas. Results of these efforts will be important in reducing the long-term need for strict protective measures for endangered species.

2. Restoration of habitat at the lower Williamson River for native species, including suckers, could be enhanced in the future by purchase and eventual conversion of additional historic wetland areas. Wetland restoration is identified in the Recovery Plan for Lost River and shortnose suckers as a critical need. **PacifiCorp and The New Earth Company** should investigate opportunities to cooperate in acquisition and restoration of other important properties along the lower Williamson River for the benefits of the Klamath Basin's native wildlife populations.

3. Protection of the greatest genetic diversity within the endangered suckers is of paramount importance to the continued survival of the species as a whole. The Recovery Plan for Lost River and shortnose suckers defines the need for studies involving genetic structuring of Klamath

Basin suckers. Given The New Earth Company's plans for expansion of algae harvest to other areas within Upper Klamath Lake, and associated increased potential of wider impact to these species, it is important to understand the relative impacts to sucker populations between harvest locations. The Service recommends **The New Earth Company** should actively assist in funding genetic studies to increase the overall knowledge and future operational sensitivity.

4. Entrainment of various sucker life stages may, in part, be a result of lack of suitable water quality and vegetated habitat in lower portions of Upper Klamath Lake. **PacifiCorp and The New Earth Company** should investigate methods to enhance larval and juvenile habitat in the Link River Dam area to benefit suckers. These actions would supplement The New Earth Company's Fremont Bridge wetland site. Methods may include artificial floating habitat structures (see Reclamation's review of artificial structures), submerged shoreline woody structure, and shoreline emergent habitat creation. Water quality enhancement should be investigated; aeration or other enhancements may be beneficial at certain periods of the year for maintaining water quality attributes, thereby reducing entrainment incidents.

5. Larval suckers may annually occupy Klamath River reservoirs from March to July. These vulnerable life stages require, especially in environments densely populated with predaceous non-native fishes, vegetated nursery habitat, such as emergent shoreline marsh areas. Stabilization of reservoir elevations, especially in Keno, J.C. Boyle, and Copco reservoirs, would benefit colonization of emergent vegetation habitats, and increase larval survival. The Recovery Plan for Lost River and shortnose suckers identifies offsetting lack of recruitment in Klamath River reservoirs as a high recovery priority. **PacifiCorp** should investigate operational opportunities to enhance emergent vegetation habitats in Klamath River reservoirs via water level management or other actions.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests PacifiCorp and/or The New Earth Company notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the action outlined in Reclamation's Assessment. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. Additionally, if assumptions presented in the

Introduction section should prove to not be valid, the analyses for these biological and conference opinions also are invalid, and consultation should therefore be reinitiated by Reclamation, on the behalf of the applicants, PacifiCorp and The New Earth Company.

We appreciate your efforts to conserve Federally listed species and proposed critical habitat. If you have any questions regarding this biological opinion, please contact Doug Young, Marcus Horton, or Steve Lewis at (541) 885-8481.

Sincerely,

Steven Alan Lewis
Project Leader

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Personal Communication

Mark Buettner, Fisheries Biologist, Reclamation, Klamath Falls, Oregon.

Larry Dunsmoor, Fisheries Biologist, The Klamath Tribes, Chiloquin, Oregon.

Ron Goede, Fish Health Specialist, Utah Division of Wildlife Resources, Logan, Utah.

Mike Green, Fisheries Biologist, Reclamation, Klamath Falls, Oregon.

Jacob Kann, Aquatic Ecologist, The Klamath Tribes, Chiloquin, Oregon.

Douglas Markle, Professor, Oregon State University, Corvallis, Oregon.

Dave Mauser, Fish and Wildlife Biologist, Klamath Basin National Wildlife Refuges, Tulelake, California.

Todd Olson, Biologist, PacifiCorp, Portland, Oregon.

Gary Scoppettone, Lead Scientist, National Biological Survey, Reno, Nevada.

Frank Shrier, Biologist, PacifiCorp, Portland, Oregon.

David Simon, Research Associate, Oregon State University, Corvallis, Oregon.

CERTIFICATE OF SERVICE AND FILING

I certify that I served a true and correct copy of the foregoing Protest by mailing it in a sealed envelope, with first class postage prepaid, on October 11, 1996, to the following person:

Mr. Al Mirati
Oregon Department of Fish & Wildlife
2501 SW First Avenue
Portland, OR 97207

I also certify that I filed the original of the foregoing Protest by hand delivering it in a sealed envelope on October 11, 1996, to:

Dwight French
Administrator, Water Rights and Adjudications Division
Oregon Water Resources Department
158 12th Street, N.E.
Salem, OR 97310-0210

STOEL RIVES LLP

By: _____
Peter L. Serrurier, OSB No. 90150
Of Attorneys for Protestants
PacifiCorp

De CUIR & SOMACH
A Professional Corporation
PAUL S. SIMMONS, ESQ. (CA Bar #127920)
DONALD B. MOONEY, ESQ. (OR Bar #90030; CA Bar #153721)
400 Capitol Mall, Suite 1900
Sacramento, California 95814
Telephone: (916) 446-7979

Attorneys for Protestants
Klamath Water Users Association
and Tulelake Irrigation District

WILLIAM M. GANONG, ESQ. (OR Bar #78213)
635 Main Street
Klamath Falls, Oregon 97601
Telephone: (541) 884-1721

Attorney for Protestant
Klamath Irrigation District

BEFORE THE WATER RESOURCES DEPARTMENT

OF THE STATE OF OREGON

In the Matter of Surface Water Application IS 70813.)	PROTEST TO PROPOSED FINAL ORDER

I.

SUMMARY OF PROTEST

Protestants Klamath Water Users Association (KWUA), Tulelake Irrigation District (TID), and Klamath Irrigation District (KID) assert that the Proposed Final Order is defective and in error, and contrary to the public interest, as follows:

A. The proposed order is inconsistent with the provisions of the Klamath River Basin Compact and other laws.

B. The flow rates in the proposed order are arbitrary and unsupported by technical data.

C. The proposed order would breach the Director's obligation *to determine* the level of flow *actually necessary* to support uses.

D. The proposed order would promote an unequal and inequitable treatment of water users.

E. The proposed order is insensitive to adverse precedential effects of decisions related to in-stream flows.

These points and others are discussed further below.

II.

PROTESTANTS AND INTERESTS

Protestants Klamath Water Users Association, Tulelake Irrigation District, and Klamath Irrigation District, in accordance with Oregon Revised Statutes section 537.153(6) and Oregon Administrative Rule 690-77-043, and other applicable laws, submit the following protest to Proposed Final Order IS 70813. Protestant KWUA is a non-profit organization formed and existing under the laws of the United States and the State of Oregon. Its purposes include the protection of the present and future beneficial use of water for domestic and irrigation use in the Klamath Project and other areas of the Klamath River basin. Most or all of the members of KWUA have vested rights to the use of water in the Klamath River system. All have direct and indirect interests in future use and development of water resources within the Klamath River system. KWUA represents, directly and indirectly, approximately 20 irrigation districts and over 12,000 persons whose livelihood and well-being are affected by the uses of water in the Klamath River system. Protestant KWUA's address is 2455 Patterson Street, Suite 3, Klamath Falls, OR 97603, and its telephone number is (541) 883-6100.

Protestant TID is a political subdivision of the State of California, formed and existing under the California Irrigation District Law, California Water Code section 20500 *et seq.* Protestant TID delivers water to approximately 60,000 acres for irrigation under vested rights, including rights in the Klamath River from diversions at Link River, Upper Klamath Lake, the Lost River Division Channel and the Lost River. TID is interested in the continued and expanded use of water for irrigation beneficial use. TID is a member of the KWUA. TID's address is P.O. Box 699, Tulelake, CA 96134, and its telephone number is (916) 667-2249.

Protestant KID is a political subdivision of the State of Oregon, formed and existing under Oregon Revised Statutes chapter 545. Protestant KID delivers irrigation water to approximately 45,000 acres of land within the boundaries of KID and for an additional 25,000 acres located within the Klamath Reclamation Project but outside the boundaries of KID, all under vested rights. KID diverts water from Link River, a tributary of the Klamath River, Upper Klamath Lake and the Lost River. KID supplements the flows in the Lost River with water diverted from Link River and Upper Klamath Lake. KID is interested in the continued and expanded use of water for irrigation and other beneficial uses within and without KID. KID and its water user members are members of KWUA. KID's address is 6640 KID Lane, Klamath Falls, OR 97603, and its telephone number is (541) 882-6661.

III.

INCONSISTENCY WITH KLAMATH RIVER BASIN COMPACT

The States of Oregon and California, and the United States, have approved the Klamath River Basin Compact. Or. Rev. Stat. § 542.620. The Compact's purposes include, among other things, providing preferential rights to irrigation uses in the Upper Klamath River Basin. *Id.* at Art. I. The Compact recognizes vested rights established by 1957 within the Klamath Project and rights for future uses within the Klamath Project as defined in the Compact. *Id.* at Art. III.A. Further, certain additional domestic and irrigation use have a superior right over all other uses, regardless of priority in time of other uses. *Id.* at Art. III.B., C.

The proposed order is inconsistent with these rights and priorities. In fact, these and other provisions of the Compact are not acknowledged or discussed at all in the proposed order. Aside from all other bases for the protests discussed below, protestants urge that the requirements and limitations of the Compact be addressed.

Other legal issues are identified in the discussion that follows.[1]

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[1] Maintenance of the proposed flow rates would also, to the extent they could ever be achieved, require the release of water from storage. There is no agreement for the use of stored water. *See* Or. Rev. Stat. § 537.336(4) (requiring documentary evidence of agreement for any flow to be supplied from stored water).

IV.

PROPOSED FLOW RATES ARE IN EXCESS OF MINIMUM QUANTITY NECESSARY

The proposed flow rates are inconsistent with statutory and regulatory standards. Oregon Revised Statutes section 537.332 defines "in-stream flow" as the "*minimum quantity* of water *necessary* to support the public use requested by an agency." The high flow rates in the proposed order are greater than the minimum quantity necessary for the public use and are, therefore, contrary to the statutory definition of "in-stream flow."

The flow rates proposed are excessive and unnecessary for the use applied for. Water use under the in-stream right, if approved, would adversely affect the protestants and other potential water users from the stream by appropriating excess quantities of water and preventing any other new appropriations of water.

V.

THE APPLICATIONS ARE NOT SUPPORTED BY COMPETENT TECHNICAL DATA

Application IS 70813, as submitted by the Oregon Department of Fish & Wildlife (ODF&W) to the Water Resources Department (WRD), failed to include technical data or information to support the flow rates requested by said agency, as required by Oregon Administrative Rule 690-77-020 and Oregon Revised Statute section 537.336.

Protestants requested and received all "material" cited in the proposed order as being provided by the applicant. None of this material meets the requirements of Oregon Administrative Rule 690-77-020 that an application include "a description of the *technical data and methods* used to determine the requested amounts." The only record in support of the application consists of extremely general publications that may or may not have any relevance to the specific stream, conditions, and species in issue. Ultimately, it appears that the applicant proposes to offer one conclusory paragraph in a letter as a substitute for the data required by law.

To the extent that it can be argued that the application is supported by either data or an approved method, the data and method are inadequate to establish the need for the proposed

flows. In addition, the requested flows are inconsistent with prior statements by ODF&W and other agencies respecting flow needs in the affected stream segments. *See* Attachments 1 and 2.

Further, neither the application nor materials in support of the application take into account potential adverse effects of high flows at certain times of year. For example, water in the system may be too warm for fishes in the stretches affected by the proposed order and in downstream reaches. Requesting high volumes of water at this time thus may amount to a "futile call" or, more precisely, a *detrimental* call. These factors should be analyzed and considered.

VI.

THE PROPOSED ORDER IS INCONSISTENT WITH WRD'S OBLIGATIONS TO DETERMINE INSTREAM FLOW NEEDS

Oregon Revised Statute section 537.343 provides that the *Director* determines the in-stream flow necessary to protect the uses. Protestants respectfully submit that the proposed order represents an acceptance at face value of the amounts requested in the application. There is no critical analysis. There is no discernible effort even to review the basis on which the request was made. To proceed in this manner would abdicate the statutory obligations of the Director. It would also diminish substantially the confidence of water users in the quality of water rights administration in the state.

To the extent that the proposed order is based on an applied methodology, the methodology is flawed.

In addition, the hydrologic assumptions (estimated average natural flow) are inaccurate. The record does not reveal the specific methods by which the EANF was derived. To the extent average natural flow is relevant, estimates must be improved.

VII.

THE APPLICATIONS UNDERLYING THE PROPOSED ORDER IS UNLAWFUL

Protestants are informed that certain flows requested by the applicant are recreation flows. Such requests are unlawful and must be summarily rejected.

ODF&W has authority to request in-stream flows for fish, wildlife and aquatic habitat. The State Parks and Recreation Department, not ODF&W, has authority to request in-stream flows

for recreation. Or. Rev. Stat. § 537.336. Protestants are informed that certain flows requested by ODF&W in the Klamath River system relate to recreation, and, in turn, that certain proposed orders may include such flows. Protestants understand, for example, that one of the two sets of flows in Application IS 70094 is a recreation flow. The proposed order on IS 70094 includes only one of the two flows in the application. It is the higher flow, which protestants believe to be the recreation flow. It is unclear from the proposed final order whether WRD understands this to be the case, and thus the extent to which this legal defect may affect all of the orders is unknown. In any event, there is no record or technical data that supports these flows for any purpose.

VIII.

THE PROPOSED ORDER DISCRIMINATES AGAINST CONSUMPTIVE USES OF WATER

The proposed order would dedicate water to one use, at the expense of others. Yet, it is not based on any careful analysis of need. This situation contrasts with the standards to which other uses are held. For example, WRD would not likely grant a permit for new consumptive use based exclusively on a conclusory statement that the applicant needs the amount of water requested. As WRD is aware, irrigation use is subject to careful and ever-increasing scrutiny, to ensure that no more water is devoted to the use than is reasonably needed. The proposed order would apply a different standard to in-stream use, basing the right on a request rather than on a need. To ensure equity and to prevent against the overallocation of water to one use at the expense of others, WRD should not create a lesser standard for in-stream use. WRD must apply the same standards to all uses of water.

IX.

THE PROPOSED ORDER FAILS TO TAKE INTO ACCOUNT THE PRECEDENTIAL AND OTHER CONSEQUENCES OF ANY DETERMINATION REGARDING IN-STREAM FLOWS

The proposed order would have adverse precedential effects. For example, the applicant's April 5, 1996, letter suggests that approving the flows will help prevent species from becoming listed under the Endangered Species Act. If the order is issued, as proposed, and if some species

is some day listed, it is certain that it will be argued that irrigators must give up water to meet the in-stream flows, irrespective of priority.[2] This is especially a concern for irrigators who receive water through federal facilities.

There already exists a specific example to demonstrate this point. The FERC license for the hydroelectricity facilities at Iron Gate Dam on the Klamath River in California specifies minimum flow releases. These flows are subordinate to use of water in the Klamath Project. They were not based on science. Yet, political and regulatory pressure is applied, with considerable success, to force the Klamath Project to supply water to meet these flows. As of the date of this Protest, the adherence to those arbitrary flows is depleting available supplies.

In short, numbers take on a life of their own. Actions have consequences. Uncritical and unthinking adoption of flows proposed by the applicant is unacceptable.

X.

CONCLUSION

The Director should deny the application and return it to the applicant. In the alternative, the issues raised here should be considered part of a contested case hearing.

Respectfully submitted,

De CUIR & SOMACH
A Professional Corporation

DATED: 10/9/96.

By _____
Donald B. Mooney

Attorneys for Klamath Water Users Association and Tulelake Irrigation District

DATED: 10/10/96.

_____
William M. Ganong

Attorney for Klamath Irrigation District

---

[2] The flows could have implications for other statutes such as significance determinations under the National Environmental Policy Act, or similar statutes.

CERTIFICATE OF SERVICE

I hereby certify that on the 10th day of October, 1996, I served a true and accurate copy of the foregoing Protest to the Proposed Final Order on the applicant by mailing said copy by first class mail, postage prepaid, by depositing said copy in the United States Post Office in Klamath Falls, Oregon, addressed as set forth below:

Oregon Department of Fish & Wildlife
2501 SW First Avenue
P.O. Box 59
Portland, Oregon 97207

By _____
William M. Ganong

Oregon

DEPARTMENT O
FISH AND
WILDLIFE

Klamath District Offic

1-23-92

Mr. Jim Bryant
Klamath Project
Bureau of Reclamation
6600 Washburn Way
Klamath Falls, OR 97603

Dear Jim:

With the ongoing drought conditions, I understand your problem in trying to achieve the lake level objective on Upper Klamath Lake to meet the needs of spawning Lost River suckers in March. I have considered your inquiry on whether the flow could be further reduced in the Keno reach of Klamath River. As you know, the Department's recommendation has been for a minimum of 250 cfs. In last year's deliberations, we did suggest that 200 cfs was probably acceptable during the "cool spring months". Our main concern has been for the effects of the low flows during the warmer months. We haven't had experience with such low flows in the winter when there could be concerns with low temperatures, habitat impacts and trout migration.

In the interest of the trade-off to meet the objectives for sucker spawning, I agree to temporary reduction of flow in the Keno reach of Klamath River to as low as 200 cfs from the present through the month of March of this year. I would like to reserve the option to reconsider that position should we detect a problem with the wild trout population as a result of that lower flow.

I appreciate your effort to meet objectives for fish resources. I hope these adjustments get the job done. Please keep me posted on the flows and operations as the season goes on.

Sincerely,

John Fortune
District Fish Biologist
Klamath District

1400 Miller Island Rd
Klamath Falls, OR 97
(503) 883-5732

EXHIBIT 9

STATE OF CALIFORNIA—THE RESOURCES AGENCY GEORGE DEUKMEJIAN, Governor

DEPARTMENT OF FISH AND GAME
601 LOCUST STREET
REDDING, CA 96001
(916) 225-2300

May 9, 1988

54

Mr. Kirk C. Rodgers
Klamath Project Manager
U. S. Bureau of Reclamation
6600 Washburn Way
Klamath Falls, OR 97603-9365

Dear Mr. Rodgers:

This is in response to your request for Department of Fish and Game recommendations with regard to your proposal to reduce flows in the Klamath River below Iron Gate Dam below that required by the California water rights permit and the Federal Energy Regulatory Commission. This request was conveyed to staff biologists Phil Baker and David Hoopaugh at the meeting held in your office on April 27, 1988.

According to your April 8, 1988 letter to Stan deSousa of Pacific Power, it is your objective to "...conserve up to 100,000 acre-feet in the Upper Klamath Lake..." during the remainder of this irrigation season. It is my understanding that you proposed on April 27, four alternatives which would save from 110,000 to 170,200 acre-feet of water. We have reviewed these proposals and developed the following recommendations based on your stated objective of conserving 100,000 acre-feet and your "Case 1" proposal which is closest to this objective.

Unfortunately, there is virtually no data available regarding the relationship between streamflow and various fishery habitat conditions in the Klamath River downstream from Iron Gate. After discussing your proposed 30% reduction with several state and federal biologists, we have developed the following recommended flow schedule which, we hope, will best facilitate downstream migration of juvenile salmon in May and upstream migration and spawning of adults in August, September and October:

May	June	July	Aug	Sep	Oct
700	400	300	1000	1000	1000

October release flows may be reduced to 800 cfs if drought conditions continue at that time.

We also recommend that release flows be returned to normal if water storage in Upper Klamath Lake reenters your acceptable storage "envelope" at any time after August 1.

While we recognize the Bureau's responsibilities under the provisions of the Klamath River Basin Compact to serve domestic and irrigation uses as the highest priority, we emphasize that recreational use, including fish and wildlife, is third priority. In the future, it would seem that such drastic reductions in downstream flow releases would be more palatable if higher uses also shared whatever shortages in water may occur. A 30% reduction in flows, for example,

would be far more acceptable if it were accompanied by a reduction of 15% in irrigation deliveries.

We have one other thought with respect to dealing with future water shortages that may occur. That would be for the Bureau to require the reservation of the 25,400 acre-feet of water (between elevations 4143.0 and 4143.3) that is normally provided to Pacific Power for its purposes. Since power generation is fifth in priority under the Compact, it seems prudent to us to save that block of water in dry years for higher uses.

Finally, as I noted above, there is a serious shortage of information with respect to streamflow in the Klamath River and fish habitat conditions. With the recent development of instream flow assessment methodologies, it seems the time is ripe to conduct such a study to evaluate all biological aspects of stream flow releases from the Upper Klamath Basin. Could we interest you in beginning discussions of such a study?

Thank you, Mr. Rodgers, for the opportunity to review your proposal and to make these recommendations. If you have any questions regarding our comments, please feel free to contact Mr. Hoopaugh at (916) 225-2373. In the meantime, I hope you will give our recommendations every consideration. Hopefully, we can get through this year without catastrophic consequences and perhaps even gain some information that can be used to more intelligently make future decisions regarding streamflow releases. We look forward to hearing from you about the possibility of undertaking a Klamath River instream flow study.

Sincerely,

for A. E. Naylor
Regional Manager

cc: U. S. Fish and Wildlife Service
Portland, Sacramento

National Marine Fisheries Service
Santa Rosa

Pacific Power
Portland

State Water Resources Control Board
Division of Water Rights
Sacramento

Federal Energy Regulatory Commission
Portland

R. Iverson - U. S. Fish and Wildlife Service
Yreka

BEFORE THE WATER RESOURCES DEPARTMENT OF OREGON
WATER RIGHTS DIVISION

In The Matter Of Surface Water Application IS 70813 in the Name of Oregon Department of Fish and Wildlife for Water Use, Klamath County	))))	PROTEST TO PROPOSED FINAL ORDER

Protestant Klamath Drainage District, a drainage district formed according to the laws of the state of Oregon, in accordance with ORS 537.153 (6) and OAR 690-77-043, submits the following Protest to Proposed Final Order for Application IS 70813.

1. INTRODUCTION

Protestant's address for purposes of this Protest is 280 Main Street, Klamath Falls, Oregon, 97601; phone number for purposes of this application is (541)882-4436. Protestant's landowners are provided water for irrigation from the Klamath River and from Upper Klamath Lake. Reference is made to Oregon Permit #43334, Application #55748.

Protestant asserts that the Proposed Final Order by the Water Resources Department ("WRD" or "Department") is defective and in error and that there are elements of the water right as approved that will impair or be detrimental to the public interest, based on the facts and issues set forth below.

II. PROPOSED ORDER DETRIMENTAL TO PROTESTANTS

If flow rates of the amounts proposed were required, then the ability of the Protestant to receive and divert water to support irrigation could be interfered with.

III. PROPOSED ORDER IS IN CONFLICT WITH THE KLAMATH RIVER COMPACT

The Proposed Order fails to recognize the provisions of the Klamath River Basin Compact (Compact). ORS 542.620. The Compact was enacted by the states of Oregon and California and approved by the Unites States. Compact terms apply directly to the waters in question, as Compact jurisdiction includes the waters in the Proposed Order. See official map of the Upper Klamath River Basin approved on September 6, 1956, by the commissions negotiating the Compact and filed with the Secretaries of the states of Oregon and California and the General Services Administration of the United States, and incorporated into the Compact. ORS 542.620, Art. II. B. The terms of the Compact include priorities for the appropriation of water which the Proposed Order fails to enumerate or recognize. ORS 542.620, Art. III. B. and C. Compact priorities place domestic and irrigation uses ahead of the proposed use of fish and wildlife. Any final order for the proposed use must recognize that such proposed right is inferior to present and future rights for domestic and irrigation purposes, as well as other provisions of the Compact.

IV. PROPOSED ORDER FAILS TO CONSIDER TEMPERATURE TOXICITY, RETURN FLOWS OF HYDROELECTRIC PROJECTS, KLAMATH PROJECT AND WILDLIFE REFUGES

Along the stretch of the river mentioned, the flows of the river are supplemented and influenced by several flows, including hydroelectric projects, the Klamath Project (U.S. Bureau of Reclamation), national wildlife refuges (U.S. Fish and Wildlife Service), and private users. These factors likely have a considerable impact on the flow requirements of fish. In addition, water quality factors, including temperature, are likely to have a considerable impact. It is understood that water temperatures in the Upper Klamath Lake may adversely affect fish populations. Straight flow requirements, as contained in the Proposed Order, could prove to be toxic, rather than beneficial as is implied by the application and Proposed Order. Determination of these factors should be pursued and completed prior to issuance of any order regarding flows, and the OWRD should therefore withhold any order pending information regarding this.

V. PROPOSED FLOW RATES ARE IN EXCESS OF MINIMUM QUANTITY NECESSARY

The instream water right flow rates proposed are excessive and unnecessary for the use applied for. The flow rates proposed are higher than the minimum quantity necessary for the public use of the instream water right, and are, therefore, contrary to the definition of "In-stream flow" of ORS 537.332(2) and OAR 690-77-010 (14). Water use of the instream right, if approved, would adversely affect the Protestant and other potential water users from the stream by appropriating excess quantities of water and preventing any other new appropriations of water.

VI. INADEQUATE TECHNICAL DATA OR INFORMATION SUBMITTED BY ODFW

The above referred to application, as submitted by the Oregon Department of Fish & Wildlife to the Water Resources Department, failed to include sufficient technical data or information to support the flow rates requested by said agency, as required by OAR 690-77-020 and ORS 537.336.

OAR 690-770-020 (3)(g) requires an application to include at a minimum "a description of the technical data and methods used to determine the requested amounts;" (emphasis added). The only information submitted in support of the application is a flow rate conclusion included in an appendix in the Basin Investigation or Environmental Investigation for the river basin; no "technical data" nor any of the factual data used to arrive at the flow rate conclusions was submitted with the application.

No analysis of supporting data, or the lack thereof, appears in the WRD file for this application. The Proposed Final Order is defective in that the WRD did not

evaluate whether the level of instream flow requested was "based on methods of determining instream flow needs that have been approved by administrative rule of the agencies submitting the applications." (OAR 690-77-020 (3)).

Apparently the flow levels applied for are based on an appendix in the Basin Investigation or Environmental Investigation for recommended flows. It is impossible to tell, however, what factual data said recommendation was based on. No data has been submitted to support the flows requested and the application should therefore be rejected.

ODFW does not have specific files for their instream water right applications. The original data supporting the Basin Investigation and Environmental Investigation has apparently been lost or misplaced. No other supporting data or "technical data" was submitted by the applicant as required by OAR 690-77-020 (4)(g). Since no technical data was included with ODFW's application, the application should be returned to the applicant for curing of defects or resubmittal.

VII. WRD FAILED TO ANALYZE FLOW NEEDS

The flow levels approved by the Proposed Final Order are not based on any analysis of the need for the flows requested. ORS 537.332(2) sets out the definition of "in-stream flow" which the Department is supposed to follow when determining instream water rights: the "minimum quantity of water necessary to support the public use requested by an agency." The Proposed Final Order does not address the minimum quantity of water or flow levels necessary to support the uses applied for. A review of the WRD file shows that no such analysis has occurred. The only review undertaken by the WRD was a check to see if the requested flows are less than the average estimate natural flow ("EANF"; OAR 690-77-015 (4)).

VIII. OREGON METHOD IS INHERENTLY FLAWED

The methodology used for this application, the "Oregon Method", is inherently flawed in that it is based on a methodology that has been superseded and is not reliable, and is based on outdated or insufficient information (testimony is cited by Al Mirati of the Oregon Department of Fish and Wildlife regarding the "Oregon Method", to the Oregon Water Resources Commission, on December 6, 1990). The determinations made from the Oregon Method are not reliable and should therefore be rejected by the WRD or the Commission as the final authority in determining the level of instream flows necessary to protect the public use (ORS 537.343 (2)).

IX. OREGON METHOD IS INHERENTLY FLAWED - WRD SHOULD REJECT APPLICATION

One of the requirements of the Department's application review is contained in OAR 690-77-020 (3): "...all applications for instream water rights shall be based on

the methods of determining instream flow needs that have been approved by administrative rule of the agencies submitting the applications." (See also part V. above). This requirement does not mean that the Department can simply accept ODFW's assertion that the "Oregon Method" is the basis for the requested flows. The Department must actively review the application to see if the Oregon Method and ODFW's instream rules are being followed. Where applicable, ODFW must also submit supporting data to show that the standards and criteria contained in their rules have been followed.

The actual measurements used by ODFW to set requested flow levels are totally inadequate to validate those amounts; these measurements were made by ODFW's predecessor, the Oregon State Game Commission, as shown in the Appendices to the Basin Investigations and the Environmental Investigations. Actual measurements of streamflow were not made at times when key life stages occurred and, in fact, the severe limitations of the date available show that they are inadequate to validate the requested flows: "Actual measurement of streamflow made at or near recommended instream flow requirements and made at times when key life stages occur are important to validate the methodology used, and to validate that the recommended instream flow requirements provide desirable habitat conditions." Instream Flow Methodologies. Louis C. Fredd, Oregon Department of Fish and Wildlife (1989), page 12.

X. 'EANF' CALCULATIONS ARE DEFECTIVE OR INCOMPLETE

There are no calculations for information in the WRD file to show what "ratios" were used or how adjustments were made to any gauged flows to determine the 50% exceedance flows, and there is also no information in the technical review to show the type of statistics used (see "Methods for Determining Streamflows and Water Availability in Oregon", Robison, P22 and 23) The EANF calculations are defective resulting in high EANF levels and thus allowing excessive recommended flows by the WRD.

CONCLUSION

This protest is filed in accordance with OAR 690-77-043. The issues raised should be considered as part of a contested case hearing. The WRD's Proposed Final Order is inadequate and defective and has failed to follow applicable rules. A thorough review of the Application is necessary to determine the minimum quantity of water necessary to support the public uses applied for.

The Proposed Final Order fails to consider and note the superiority of priorities as enumerated in the Klamath River Compact, and other provisions contained therein.

For the reasons set forth above, the Protestant asserts that the application is defective and should be returned to the applicants. The flow levels requested are excessive and are not necessary to support the public uses proposed. Flow levels set at the rates proposed will interfere with future maximum economic development of the waters of the State of Oregon. Excessive flow rates for instream water rights represent a wasteful and unreasonable use of the water involved. (ORS 537.170 (8)(e)). If approved, an exception for stockwater use should be added as a condition of the right.

Based on the points discussed above, the Proposed Final Order should deny the application for a permit or modify the Proposed Final Order accordingly

Respectfully submitted this 9th day of October, 1996.

KLAMATH DRAINAGE DISTRICT, by:

Curtis Hornby, Vice President

CERTIFICATE OF SERVICE

I hereby certify that on the 10th day of October, 1996, I served a true and accurate copy of the foregoing Protest to the Proposed Final Order on the applicant by mailing said copy by first class mail, postage prepaid, by depositing said copy in the United States Post Office in Klamath Falls, Oregon addressed as set forth below:

Oregon Department of Fish & Wildlife
2501 SW First Avenue
P.O. Box 59
Portland Oregon 97207

By: _____
For Protestants

RUNNING Y RANCH
10500 HWY 140 WEST
KLAMATH FALLS OR 97601

OREGON WATER RESOURCES DEPARTMENT
COMMERCE BUILDING
158 - 12TH STREET NE
SALEM OREGON 97310-0210

STATE OF OREGON
WATER RESOURCES DEPARTMENT
158 12TH ST. N.E.
SALEM, OR 97310-0210
378-8455 / 378-8130 (FAX)

RECEIPT # 7394 INVOICE #

RECEIVED FROM: Donald Hagglund
BY:

APPLICATION	70813
PERMIT	
TRANSFER	

CASH: ☐ CHECK: # ☒ 24-12 OTHER: (IDENTIFY) ☐

TOTAL REC'D $ 280.

0417 WRD MISC CASH ACCT

	ADJUDICATIONS	$
	PUBLICATIONS / MAPS	$
____	OTHER: (IDENTIFY) ____	$
____	OTHER: (IDENTIFY) ____	$

REDUCTION OF EXPENSE CASH ACCT. $

PCA AND OBJECT CLASS VOUCHER #

0427 WRD OPERATING ACCT

	MISCELLANEOUS			
0407	COPY & TAPE FEES			$
0410	RESEARCH FEES			$
0408	MISC REVENUE: (IDENTIFY) ____			$
TC165	DEPOSIT LIAB. (IDENTIFY) ____			$
	WATER RIGHTS:	**EXAM FEE**		**RECORD FEE**
0201	SURFACE WATER	$	0202	$
0203	GROUND WATER	$	0204	$
0205	TRANSFER	$	0206	$
	WELL CONSTRUCTION	**EXAM FEE**		**LICENSE FEE**
0218	WELL DRILL CONSTRUCTOR	$	0219	$
	LANDOWNER'S PERMIT		0220	$
0223	OTHER (IDENTIFY) Protest #280.-			PCA 72235

0437 WELL CONST. START FEE

0211	WELL CONST START FEE	$	CARD #	
0210	MONITORING WELLS	$	CARD #	
____	OTHER (IDENTIFY) ____			

0539 LOTTERY PROCEEDS

1302	LOTTERY PROCEEDS	$

0467 HYDRO ACTIVITY

		LIC NUMBER	
0233	POWER LICENSE FEE (FW/WRD)		$
0231	HYDRO LICENSE FEE (FW/WRD)		$
____	HRDRO APPLICATION ____		$

RECEIPT # 7394 DATED: 10-10-96 BY: D. Buckwell

Distribution-White Copy-Customer, Yellow Copy-Fiscal, Blue Copy-File, Buff Copy-Fiscal

United States Department of the Interior

BUREAU OF RECLAMATION
Klamath Basin Area Office
6600 Washburn Way
Klamath Falls, Oregon 97603

IN REPLY REFER TO:
KO-400
WTR 4.10

OCT 10 1996

RECEIVED
OCT 11 1996
WATER RESOURCES DEPT.
SALEM, OREGON

Oregon Water Resources Department
Water Rights and Adjudications Branch
Steven P. Applegate, Administrator
158 12 th Street NE
Salem, OR 97310

Subject: Protest of Proposed Final Order - Water Right Application 70813

Dear Mr Applegate:

As you are aware, the Klamath River Adjudication is well underway. Reclamation fully intends to file for both a storage and a use right for waters of the Klamath River and Upper Klamath Lake. Granting the subject right to the State for instream flow at this time would be premature and should be held until after the present adjudication is completed. We are concerned that sufficient study of the proposed action has not been completed.

Flows below John C. Boyle Power Plant are dependant upon upstream releases and downstream requirements at Iron Gate Dam. Meeting the flow schedule in the proposed certificate would, or could, place increased demands on Upper Klamath Lake. During a low water year we understand that upstream needs may dictate a lower flow below Boyle. However, during normal operations, Reclamation does not directly dictate to PacifiCorp operational decisions. We are concerned that PacifiCorp would be directed to comply with the instream flow, and that would result in flows below Iron Gate in excess of Federal Energy Regulatory Commission requirements.

Bob Main indicated that the flows shown in the proposed Certificate are minimum instantaneous flows. Periodically, flows in this reach are less than the amount in the proposed final order.

We suggest that a meeting be held in the near future to discuss the instream flow right being requested. PacifiCorp and Reclamation should be included in this meeting, along with appropriate State agencies.

Enclosed is a money order for $200 to cover fees associated with this protest action. If you have any questions, please contact Jim Bryant at (541) 883-6935.

Sincerely,

John F. Cook
Acting Area Manager

Enclosure

cc: (w/o enc.) MP-105, MP-440, Sol (S. Palmer)

United States Department of the Interior

BUREAU OF RECLAMATION
Klamath Basin Area Office
6600 Washburn Way
Klamath Falls, Oregon 97603

IN REPLY REFER TO:

KO-400
WTR 4.10

OCT 10 1996

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Sincerely,

John F. Cook
Acting Area Manager

Enclosure

cc: (w/o enc.) MP-105, MP-440, Sol (S. Palmer)

BEFORE THE WATER RESOURCES DEPARTMENT OF OREGON
WATER RIGHTS DIVISION

In The Matter Of Surface Water Application	)	
IS 70813 in the Name of Oregon Department	)	PROTEST TO
of Fish and Wildlife for Water Use,	)	PROPOSED FINAL
Klamath County	)	ORDER

Protestant Running Y Ranch, in accordance with ORS 537.153 (6) and OAR 690-77-043, submits the following Protest to Proposed Final Order for Application IS 70813.

I. INTRODUCTION

Protestant's address for purposes of this Protest is 10500 Highway 140 West, Klamath Falls, Oregon, 97601; phone number for purposes of this application is (541)882-6435. Protestant is a landowner which recieves water for irrigation from Upper Klamath Lake.

Protestant asserts that the Proposed Final Order by the Water Resources Department ("WRD" or "Department") is defective and in error and that there are elements of the water right as approved that will impair or be detrimental to the public interest, based on the facts and issues set forth below.

II. PROPOSED ORDER DETRIMENTAL TO PROTESTANTS

If flow rates of the amounts proposed were required, then the ability of the Protestant to receive and divert water to support irrigation would be interfered with.

III. PROPOSED ORDER IS IN CONFLICT WITH THE KLAMATH RIVER COMPACT

The Proposed Order fails to recognize the provisions of the Klamath River Basin Compact (Compact). ORS 542.620. The Compact was enacted by the states of Oregon and California and approved by the Unites States. Compact terms apply directly to the waters in question, as Compact jurisdiction includes the waters in the Proposed Order. See official map of the Upper Klamath River Basin approved on September 6, 1956, by the commissions negotiating the Compact and filed with the Secretaries of the states of Oregon and California and the General Services Administration of the United States, and incorporated into the Compact. ORS 542.620, Art. II. B. The terms of the Compact include priorities for the appropriation of water which the Proposed Order fails to enumerate or recognize. ORS 542.620, Art. III. B. and C. Compact priorities place domestic and irrigation uses ahead of the proposed use of fish and wildlife. Any final order for the proposed use must recognize that such proposed right is inferior to present and future rights for domestic and irrigation purposes, as well as other provisions of the Compact.

RB

IV. PROPOSED ORDER FAILS TO CONSIDER TEMPERATURE TOXICITY, RETURN FLOWS OF HYDROELECTRIC PROJECTS, KLAMATH PROJECT AND WILDLIFE REFUGES

Along the stretch of the river mentioned, the flows of the river are supplemented and influenced by several flows, including hydroelectric projects, the Klamath Project (U.S. Bureau of Reclamation), national wildlife refuges (U.S. Fish and Wildlife Service), and private users. These factors likely have a considerable impact on the flow requirements of fish. In addition, water quality factors, including temperature, are likely to have a considerable impact. It is understood that water temperatures in the Upper Klamath Lake may adversely affect fish populations. Straight flow requirements, as contained in the Proposed Order, could prove to be toxic, rather than beneficial as is implied by the application and Proposed Order. Determination of these factors should be pursued and completed prior to issuance of any order regarding flows, and the OWRD should therefore withhold any order pending information regarding this.

V. PROPOSED FLOW RATES ARE IN EXCESS OF MINIMUM QUANTITY NECESSARY

The instream water right flow rates proposed are excessive and unnecessary for the use applied for. The flow rates proposed are higher than the minimum quantity necessary for the public use of the instream water right, and are, therefore, contrary to the definition of "In-stream flow" of ORS 537.332(2) and OAR 690-77-010 (14). Water use of the instream right, if approved, would adversely affect the Protestant and other potential water users from the stream by appropriating excess quantities of water and preventing any other new appropriations of water.

VI. INADEQUATE TECHNICAL DATA OR INFORMATION SUBMITTED BY ODFW

The above referred to application, as submitted by the Oregon Department of Fish & Wildlife to the Water Resources Department, failed to include sufficient technical data or information to support the flow rates requested by said agency, as required by OAR 690-77-020 and ORS 537.336.

OAR 690-770-020 (3)(g) requires an application to include at a minimum "a description of the technical data and methods used to determine the requested amounts;" (emphasis added). The only information submitted in support of the application is a flow rate conclusion included in an appendix in the Basin Investigation or Environmental Investigation for the river basin; no "technical data" nor any of the factual data used to arrive at the flow rate conclusions was submitted with the application.

No analysis of supporting data, or the lack thereof, appears in the WRD file for this application. The Proposed Final Order is defective in that the WRD did not evaluate whether the level of instream flow requested was "based on methods of

determining instream flow needs that have been approved by administrative rule of the agencies submitting the applications." (OAR 690-77-020 (3)).

Apparently the flow levels applied for are based on an appendix in the Basin Investigation or Environmental Investigation for recommended flows. It is impossible to tell, however, what factual data said recommendation was based on. No data has been submitted to support the flows requested and the application should therefore be rejected.

ODFW does not have specific files for their instream water right applications. The original data supporting the Basin Investigation and Environmental Investigation has apparently been lost or misplaced. No other supporting data or "technical data" was submitted by the applicant as required by OAR 690-77-020 (4)(g). Since no technical data was included with ODFW's application, the application should be returned to the applicant for curing of defects or resubmittal.

VII. WRD FAILED TO ANALYZE FLOW NEEDS

The flow levels approved by the Proposed Final Order are not based on any analysis of the need for the flows requested. ORS 537.332(2) sets out the definition of "in-stream flow" which the Department is supposed to follow when determining instream water rights: the "minimum quantity of water necessary to support the public use requested by an agency." The Proposed Final Order does not address the minimum quantity of water or flow levels necessary to support the uses applied for. A review of the WRD file shows that no such analysis has occurred. The only review undertaken by the WRD was a check to see if the requested flows are less than the average estimate natural flow ("EANF"; OAR 690-77-015 (4)).

VIII. OREGON METHOD IS INHERENTLY FLAWED

The methodology used for this application, the "Oregon Method", is inherently flawed in that it is based on a methodology that has been superseded and is not reliable, and is based on outdated or insufficient information (testimony is cited by Al Mirati of the Oregon Department of Fish and Wildlife regarding the "Oregon Method", to the Oregon Water Resources Commission, on December 6, 1990). The determinations made from the Oregon Method are not reliable and should therefore be rejected by the WRD or the Commission as the final authority in determining the level of instream flows necessary to protect the public use (ORS 537.343 (2)).

IX. OREGON METHOD IS INHERENTLY FLAWED - WRD SHOULD REJECT APPLICATION

One of the requirements of the Department's application review is contained in OAR 690-77-020 (3): "...all applications for instream water rights shall be based on the methods of determining instream flow needs that have been approved by

administrative rule of the agencies submitting the applications." (See also part V. above). This requirement does not mean that the Department can simply accept ODFW's assertion that the "Oregon Method" is the basis for the requested flows. The Department must actively review the application to see if the Oregon Method and ODFW's instream rules are being followed. Where applicable, ODFW must also submit supporting data to show that the standards and criteria contained in their rules have been followed.

The actual measurements used by ODFW to set requested flow levels are totally inadequate to validate those amounts; these measurements were made by ODFW's predecessor, the Oregon State Game Commission, as shown in the Appendices to the Basin Investigations and the Environmental Investigations. Actual measurements of streamflow were not made at times when key life stages occurred and, in fact, the severe limitations of the date available show that they are inadequate to validate the requested flows: "Actual measurement of streamflow made at or near recommended instream flow requirements and made at times when key life stages occur are important to validate the methodology used, and to validate that the recommended instream flow requirements provide desirable habitat conditions." Instream Flow Methodologies. Louis C. Fredd, Oregon Department of Fish and Wildlife (1989), page 12.

X. 'EANF' CALCULATIONS ARE DEFECTIVE OR INCOMPLETE

There are no calculations for information in the WRD file to show what "ratios" were used or how adjustments were made to any gauged flows to determine the 50% exceedance flows, and there is also no information in the technical review to show the type of statistics used (see "Methods for Determining Streamflows and Water Availability in Oregon", Robison, P22 and 23) The EANF calculations are defective resulting in high EANF levels and thus allowing excessive recommended flows by the WRD.

CONCLUSION

This protest is filed in accordance with OAR 690-77-043. The issues raised should be considered as part of a contested case hearing. The WRD's Proposed Final Order is inadequate and defective and has failed to follow applicable rules. A thorough review of the Application is necessary to determine the minimum quantity of water necessary to support the public uses applied for.

The Proposed Final Order fails to consider and note the superiority of priorities as enumerated in the Klamath River Compact, and other provisions contained therein.

For the reasons set forth above, the Protestant asserts that the application is defective and should be returned to the applicants. The flow

levels requested are excessive and are not necessary to support the public uses proposed. Flow levels set at the rates proposed will interfere with future maximum economic development of the waters of the State of Oregon. Excessive flow rates for instream water rights represent a wasteful and unreasonable use of the water involved. (ORS 537.170 (8)(e)). If approved, an exception for stockwater use should be added as a condition of the right.

Based on the points discussed above, the Proposed Final Order should deny the application for a permit or modify the Proposed Final Order accordingly.

Respectfully submitted this 9th day of October 1996.

RUNNING Y RANCH

By: Donald Hoagland

CERTIFICATE OF SERVICE

I hereby certify that on the 9th day of October, 1996, I served a true and accurate copy of the foregoing Protest to the Proposed Final Order on the applicant by mailing said copy by first class mail, postage prepaid, by depositing said copy in the United States Post Office in Klamath Falls, Oregon addressed as set forth below:

Oregon Department of Fish & Wildlife
2501 SW First Avenue
P.O. Box 59
Portland Oregon 97207

By: Donald Hoagland
For Protestants

COPY CHECK-OFF SHEET FOR PROPOSED FINAL ORDERS

CC: FILE # IS 70813

WATERMASTER # DEL SPARKS

REGIONAL MANAGER: BOB MAIN

ODF&W - County: Klamath

DEQ

PARKS

OTHER STATE AGENCY IF NECESSARY:

DIVISION 33 LIST: ____ COLUMBIA RIVER INTERTRIBAL FISH COMMISSION; U.S. FISH & WILDLIFE;
(CHECK ONLY IF APPLICABLE) NORTHWEST POWER PLANNING COUNCIL & NATIONAL MARINE FISHERIES

POWER BUILDER UPDATER;

WATER FOR LIFE (TODD HEIDGERKEN)

OTHER ADDRESSES OF PEOPLE WHO PAID THE $10 FEE:

PEOPLE WITH OBJECTIONS, COMMENTS OR REQUESTED COPY W/O $10 (SEND THE $10 LETTER):

CASEWORKER : CINDY SMITH

STATE OF OREGON
WATER RESOURCES DEPARTMENT

RECEIPT # **7292**

158 12TH ST. N.E.
SALEM, OR 97310-0210
378-8455 / 378-8130 (FAX)

INVOICE # 70812, 70829

RECEIVED FROM: Fort Klamath Critical Habitat Landowners
BY:

APPLICATION	IS 70813
PERMIT	
TRANSFER	

CASH: ☐ CHECK: # ☒ 24-12 OTHER: (IDENTIFY) ☐ _____

TOTAL REC'D $ 450.00

0417 WRD MISC CASH ACCT

	ADJUDICATIONS		$
	PUBLICATIONS / MAPS		$
_____	OTHER: (IDENTIFY)		$
_____	OTHER: (IDENTIFY)		$

RECEIVED
OVER THE COUNTER

REDUCTION OF EXPENSE CASH ACCT. $

PCA AND OBJECT CLASS VOUCHER #

0427 WRD OPERATING ACCT

MISCELLANEOUS IS 70831, 70807, 70798

0407	COPY & TAPE FEES	70810, 70830, 70819	$
0410	RESEARCH FEES		$
0408	MISC REVENUE: (IDENTIFY)		$
TC165	DEPOSIT LIAB. (IDENTIFY)		$

	WATER RIGHTS:	EXAM FEE		RECORD FEE
0201	SURFACE WATER	$	0202	$
0203	GROUND WATER	$	0204	$
0205	TRANSFER	$	0206	$
	WELL CONSTRUCTION	**EXAM FEE**		**LICENSE FEE**
0218	WELL DRILL CONSTRUCTOR	$	0219	$
	LANDOWNER'S PERMIT PCA 77235		0220	$
0234	OTHER (IDENTIFY) Request for Standing			$ 450.00

0437 WELL CONST. START FEE

0211	WELL CONST START FEE	$	CARD #	
0210	MONITORING WELLS	$	CARD #	
_____	OTHER (IDENTIFY)			

0539 LOTTERY PROCEEDS

1302	LOTTERY PROCEEDS	$

0467	**HYDRO ACTIVITY**	**LIC NUMBER**	
0233	POWER LICENSE FEE (FW/WRD)		$
0231	HYDRO LICENSE FEE (FW/WRD)		$
_____	HRDRO APPLICATION		$

RECEIPT # 7292 DATED: 10-8-96 BY: J Mun

Distribution-White Copy-Customer, Yellow Copy-Fiscal, Blue Copy-File, Buff Copy-Fiscal

REQUEST FOR STANDING

Application Number IS 70813

Applicant's Name ODF&W

Name, address and telephone number of the party requesting standing:

Fort Klamath Critical Habitat Landowners.
Name

P.O. Box 503
Address

Ft. Klamath, OR 97626
City State Zip Code

(541) 381-2235
Telephone Number

I have included and submit with this Request, all reasonably ascertainable issues and all reasonably available arguments supporting my position.

I certify that the information I have provided in this Request is accurate, true and correct to the best of my knowledge.

Mary Scott Hayes
Signature of party requesting standing

10/8/96
Date

Instructions:

Any person may request standing for purposes of later participation in any contested case proceeding on the proposed final order. The fee required at the time of submitting this request is $50.00. You will be notified if a contested case hearing is scheduled. In order to be a party in the contested case proceeding, an additional fee of $150.00 would need to be submitted at that time. This Request must be submitted to the Water Resources Department, 158 12th Street NE, Salem, Oregon 97310, prior to the close of the period for receiving protests. Failure to raise a reasonably ascertainable issue in this Request or in a hearing or failure to provide sufficient specificity to afford the Department an opportunity to respond to any issue precludes judicial review based on that issue.

Water Resources Department Staff Use only	
Fees	Receipt Number
Entered into data base	Staff Reviewer
Received within filing period	Date

RD

FORT KLAMATH CRITICAL HABITAT LANDOWNERS
P.O. BOX 503
FORT KLAMATH, OREGON 97626

October 8, 1996

Oregon Water Resources Department
158 12th Street NE
Salem, Oregon 97310

Dear Sirs:

We, the undersigned Fort Klamath Critical Habitat Landowners (FKCHL) hereby request standing for the purposes of participating in any contested case proceeding on the proposed final order or for judicial review of a final order of the following instream water right applications:

Stream	Application Number
Annie Creek	IS 70831
Crooked Creek	IS 70807
Cherry Creek	IS 70798
Fort Creek	IS 70810
Sevenmile Creek	IS 70830
Sun Creek	IS 70819
Upper Klamath Lake	IS 70813
Klamath River	IS 70812
Wood River	IS 70829

In accordance with the requirements of OAR 690-310-160(3)(a-e) we submit the following:

(a) Mary Lou Thompson
Fort Klamath Critical Habitat Landowners
P.O. Box 503
Fort Klamath, OR 97626
(541) 381-2235

(b) Fort Klamath Critical Habitat Landowners
P.O. Box 503
Fort Klamath, OR 97626
(541) 381-2235

(c) The Fort Klamath Critical Habitat Landowners supports the proposed final order as issued.

(d) As landowners in the areas where instream water rights have been requested, we would be harmed if the conditions or parameters set out in the proposed final orders are modified. It is our position that there is not currently any

excess water for appropriation. Therefore, any increases in the amount of appropriation could be detrimental. In addition, OAR 690-77-015 (2) establishes a management objective for achieving the amounts of instream flows necessary to support the identified public uses. There is not a clear plan as to how this objective is to be met, and each stream will be different. Any modifications to the proposed final orders could be detrimental to our interests.

(e) Enclosed is a $50 fee for each instream water right application listed on this request for standing in accordance with ORS 536.050 (1)(p).

Thank you for your attention to our request.

Tulana Farms
32200 Modoc Pt Rd.
Chiloquin Ore

Harris & Wood Ranches
Ft. Klamath, OR

McAuliffe Ranches
Box 555
Ft. Klamath
J. P. McAuliffe

Joe McAuliffe Co
by Ambrose McAuliffe
Ambrose & Susan McAuliffe

M. J. Gail Danforth
Wm. L. Brander
5305 Walton Dr.
Klamath Falls, OR. 97603

Jeffy H Mathis
P.O. Box 571 Ft. Klamath
Mathis Ranches

Clay Charley
553 Glass Ln.
White City Or 97502
Charley Livestock Co.

Donald K Ranch
Klamath & Lottie MD
1696 COVE POINT RD
97601
KLAMATH FALLS ORE

Neil & Beyuny Richards
27431 Rocky Pt. Rd.
Klamath Falls, OR 97601

Lee & Edna Hunsaker
P.O. Box 528
Ft. Klamath, OR

Elaine G. Kerns
PO Box 482
Ft. Klamath Or 97626

Dorothy Nicholson
P.O., 458
Fort Klamath. Or. 97626

Roger Nicholson
Box 458
Fort Klamath, OR

Anita Nicholson
P O Box 465
Fort Klamath Or 97626

[illegible] Nicholson
Box 455
Ft. Klamath Oreg
97626

Jack Owens Rancher
John D Owens
B. B. 557
Fort Klamath Or.

Juliana Evans
by Mary Lou Mariposa, attn any.
32200 Modoc Pt Rd
Chiloquin OR 97624

GAIL & DENNY RICKARDS
Gail & Denny Rickards
27431 Rocky Pt. Rd.
Klamath Falls, 97601

Dorothy Nicholson
P.O. 458
Fort Klamath, Or. 97626

Elaine G. Kerns
P O Box 482
Ft Klamath Or 97626

ODFW COMMENTS AND RECOMMENDATIONS
INSTREAM WATER RIGHT PROPOSED FINAL ORDERS

WRD BASIN: **Klamath and Lake**
ODFW FISH DISTRICT: **Klamath**

Note: unless otherwise specified, all comments/changes apply to both the Proposed Final Order (PFO) and the draft Certificate.

1) **70094**

Two requested flow regimes are listed in the PFO, one for recreation and one for fish. Only one proposed flow regime is listed in the PFO, the higher one, for recreational use. On the draft Certificate, only fish use is specified, but the flow regime for recreational use is proposed. It seems both flow regimes and uses should be listed in the Certificate. It is unclear how WRD would regulated these rights, but it does seems necessary to have them clearly spelled out in the Certificate.

Further, in the case of requested flows for fish, EANF and unappropriated flows are greater in all months, and therefore, the statutory presumption is established for fish uses. There is are some months where requested recreation flows exceed EANF and this is where the presumption is not established, but it is only for one of the uses.

2) **70486**

The source name and reach descriptions are incorrect. The source name should be:
DREWS CREEK TRIB GOOSE LAKE.

The reach description should be:

DREWS CREEK FROM HEADWATERS RIVER MILE 0.0 (SECTION 34, T37S, R17E); TO QUARTZ CREEK (NESW, SECTION 18, T38S, R17E).

3) **70661**

The Range number in the upstream end of the reach description should be:
... (SENE, SECTION 8, T36S, R18E); ...

4) 70805

Requested flow in June and the Proposed flow in June on the draft Certificate should be: 120 cfs.

5) 70813

The source name should be: LINK RIVER TRIB TO KLAMATH R.

6) **70814**

The county should be: Klamath.

7) **70829**

The source name should be: WOOD R tributary to AGENCY LK

8) **70817**

The source name should be: PARADISE CR TRIB SYCAN R.

9) **70818**

The source name and reach description are incorrect. The source name should be: SPRING CR tributary to WILLIAMSON R.

The reach description should be:

SPRING CREEK FROM SPRING CREEK SPRINGS AT RIVER MILE 3.0 (SENW, SECTION 33, TOWNSHIP 33S, RANGE 7E WM); TO THE MOUTH AT RIVER MILE 0.0 (SENE, SECTION 9, TOWNSHIP 34S, RANGE 7E WM)

The requested flow regime is incorrect, apparently from the also incorrect source. The correct requested flows are:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
300	300	300	300	300	300	300	300	300	300	300	300

Accordingly, the proposed flows would change to:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
300	300	300	300	298	270	277	296	300	300	300	300

10) **70820**

The county should be: Klamath.

11) **70830**

The source name should be: SEVEMILE CR TRIB AGENCY LK .

Oregon

WATER
RESOURCES
DEPARTMENT

April 29, 1996

Director
Oregon Department of Fish and Wildlife
2501 SW First Ave
PO Box 59
Portland OR 97207

Reference: Instream water rights in the Klamath Basin, Files 70094, 70799, 70800, 70808, 70809, 70813-70815, 70817, 70819, 70820, 70830-70832

Dear Oregon Department of Fish and Wildlife:

This document, called an "Initial Review", is to inform you of the potential limitations to your proposed instream water right and to describe some of your options. Based on the information you have supplied, the Water Resources Department has made several determinations:

The referenced applications are complete and not defective.

The proposed use is not prohibited by law;

The instream use is allowed under ORS 542.620, the Klamath River Compact;

1. Application 70094 **Priority date:** 10/13/89
JOINT APPLICATION FROM ODFW AND OREGON PARKS AND RECREATION DEPT.
KLAMATH R TRIB PACIFIC OCEAN
KLAMATH COUNTY

KLAMATH R FM THE CONFLUENCE OF JC BOYLE POWERHOUSE TAILRACE & THE NATURAL CHANNEL AT R.M. 220.4 (NWNW, S 13, T40S, R6E WM); TO THE OREGON/CALIFORNIA BORDER R.M. 209.3 (NWNE,S13,T41S,R5E WM)

a. The amount of water requested for instream use:

Recreation

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500

Fish life and fish habitat

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
550	550	550	550	550	550	550	550	550	550	550	550

b. The estimated average natural flow:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2170	2290	2840	3390	3230	2780	1900	1330	1160	1260	1500	1810

Commerce Building
158 12th Street NE
Salem, OR 97310-0210
(503) 378-3739
FAX (503) 378-8130

c. Allowable water use

Recreation

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1500	1500	1500	1500	1500	1500	1500	1330	1160	1260	1500	1500

Fish life and fish habitat

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
550	550	550	550	550	550	550	550	550	550	550	550

2. Application 70799 **Priority date:** 10/26/90

S FK SPRAGUE R TRIB SPRAGUE R
LAKE COUNTY

SOUTH FORK SPRAGUE RIVER FROM CAMP CREEK AT RIVER MILE 28.7 (SESW, SECTION 14, TOWNSHIP 36S, RANGE 16E WM); CREEK RIVER MILE 21.6 (NWSW, SECTION 10, TOWNSHIP 37S, RANGE 16E WM)

a. The amount of water requested for instream use:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
40	40	40	40	40	20	10	10	10	40	40	40

b. The estimated average natural flow:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
11.9	12.9	17.6	54.4	92	37.1	9.61	6.58	7.68	9.72	11.5	12.5

c. Allowable water use

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
11.9	12.9	17.6	40	40	20	9.61	6.58	7.68	9.72	11.5	12.5

3. Application 70800 **Priority date:** 10/26/90

S FK SPRAGUE R TRIB SPRAGUE R
LAKE COUNTY

SOUTH FORK SPRAGUE RIVER FROM THE HEADWATERS AT RIVER MILE 32.0 (NENE, SECTION 2, TOWNSHIP 36S, RANGE 16E WM); TO CAMP CREEK AT RIVER MILE 28.7 (SESW, SECTION 14, TOWNSHIP 36S, RANGE 16E WM)

a. The amount of water requested for instream use:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
6	6	10	10	10	7	4	4	4	10	6	6

b. The estimated average natural flow:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
3.52	3.66	4.91	15.7	29.3	12.3	3.22	2.16	2.51	3.11	3.58	3.78

c. Allowable water use

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
3.52	3.66	4.91	10	10	7	3.22	2.16	2.51	3.11	3.58	3.78

4. Application 70808 **Priority date:** 10/26/90

DEMING CR TRIB S FK SPRAGUE R
KLAMATH COUNTY

DEMING CREEK FROM THE HEADWATERS (SECTION 1, TOWNSHIP 36S, RANGE 15E WM); TO ROCKY FLAT CREEK (DRAINING CAMPBELL RESERVOIR) (SENW, SECTION 24, TOWNSHIP 36S, RANGE 14E WM)

a. The amount of water requested for instream use:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
10	10	10	10	10	5	1	1	5	10	10	10

b. The estimated average natural flow:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
7.72	10.1	18	66.4	75.2	18.4	3.18	2.34	2.89	4.05	5.92	7.48

c. Allowable water use

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
7.72	10	10	10	10	5	1	1	2.89	4.05	5.92	7.48

5. Application 70809 **Priority date:** 10/26/90

FISHHOLE CR TRIB S FK SPRAGUE R
KLAMATH COUNTY

FISHHOLE CREEK FROM BRIGGS SPRINGS (NENW, SECTION 35, TOWNSHIP 38S, RANGE 15E WM); TO THE MOUTH AT RIVER MILE 0.0 (NWSE, SECTION 27, TOWNSHIP 36S, RANGE 14E WM)

a. The amount of water requested for instream use:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
10	10	10	10	10	7	4	4	4	10	6	6

b. The estimated average natural flow:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
11.5	25.6	48.2	55.1	33.3	23.5	10.9	5.02	4.81	5.43	5.35	8.08

c. Allowable water use

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
10	10	10	10	10	7	4	4	4	5.43	5.35	6

6. Application 70813 **Priority date:** 10/26/90

UPPER KLAMATH L TRIB KLAMATH R
KLAMATH COUNTY

LINK RIVER FROM LINK RIVER DAM (SECTION 30, TOWNSHIP 38S, RANGE 9E WM); TO LAKE EWAUNA AT RIVER MILE 0.0 (SECTION 32, TOWNSHIP 38S, RANGE 9E WM)

a. The amount of water requested for instream use:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
60	60	80	80	80	30	20	40	30	30	30	50

b. The estimated average natural flow:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2120	2210	2680	3210	3120	2740	1880	1310	1140	1240	1470	1760

c. Allowable water use

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
60	60	80	80	80	30	20	40	30	30	30	50

7. Application 70814 **Priority date:** 10/26/90

LONG CR TRIB SYCAN R
KLAMATH COUNTY

LONG CREEK FROM UNNAMED TRIBUTARY (SW1/4, SECTION 1, TOWNSHIP 33S, RANGE 15E WM); TO THE MOUTH AT RIVER MILE 0.0 (SENE, SECTION 36, TOWNSHIP 32S, RANGE 14E WM)

a. The amount of water requested for instream use:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
3	3	6	6	6	3	1	1	1	6	3	3

b. The estimated average natural flow:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
4	4.83	8.5	28.5	58.4	21.1	3.83	2.28	2.45	2.89	3.59	4.22

c. Allowable water use

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
3	3	6	6	6	3	1	1	1	2.89	3	3

8. Application 70815 **Priority date:** 10/26/90

N FK SPRAGUE R TRIB SPRAGUE R
LAKE COUNTY

NORTH FORK SPRAGUE RIVER FROM HEAD OF RIVER SPRING AT RIVER MILE 34.0 (SWSW, SECTION 15, TOWNSHIP 35S, RANGE 16E WM) TO SHEEPY CREEK AT RIVER MILE 17.5 (SENW, SECTION 15, TOWNSHIP 35S, RANGE 15E WM)

a. The amount of water requested for instream use:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
30	30	30	30	30	20	10	10	10	30	30	30

b. The estimated average natural flow:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
71.2	62.7	52.5	97.8	199	143	79	66.2	76.8	88.9	86.3	79.2

c. Allowable water use

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
30	30	30	30	30	20	10	10	10	30	30	30

9. Application 70817 **Priority date:** 10/26/90

PARADISE CR TRIB SKULL CR
KLAMATH COUNTY

PARADISE CREEK FROM HEADWATER SPRINGS (NENE, SECTION 21, TOWNSHIP 34S, RANGE 15E WM(; TO THE MOUTH AT RIVER MILE 0.0 (SWNE, SECTION 22, TOWNSHIP 33S, RANGE 15E WM)

a. The amount of water requested for instream use:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
3	3	6	6	6	3	1	1	1	6	3	3

b. The estimated average natural flow:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
3.15	3.82	6.91	24.3	49.2	17	2.94	1.75	1.89	2.23	2.81	3.32

c. Allowable water use

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
3	3	6	6	6	3	1	1	1	2.23	2.81	3

10. Application 70819 **Priority date:** 10/26/90

SUN CR TRIB ANNIE CR
KLAMATH COUNTY

SUN CREEK FROM CRATER LAKE NATIONAL PARK BOUNDARY (SENW, SECTION 17, TOWNSHIP 32S, RANGE 7.50E WM); TO THE MOUTH AT RIVER MILE 0.0 (SECTION 4, TOWNSHIP 33S, RANGE 7.50E WM)

a. The amount of water requested for instream use:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
10	10	10	10	10	10	8	8	8/15	15	15/10	10

b. The estimated average natural flow:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
10.3	9.49	9.86	14.9	26.6	32.8	27	16.9	13.4	16	12.7	13.8

c. Allowable water use

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
10	9.49	9.86	10	10	10	8	8	8/13.4	15	12.7/10	10

11. Application 70820 **Priority date:** 10/26/90

SYCAN R TRIB SPRAGUE R
LAKE COUNTY

SYCAN RIVER FROM SOUTH FORK SYCAN RIVER AT RIVER MILE 68.2 (SECTION 35, TOWNSHIP 33S, RANGE 16E WM); TO PARADISE CREEK AT RIVER MILE 58.2 (SWNE, SECTION 22, TOWNSHIP 33S, RANGE 15E WM)

a. The amount of water requested for instream use:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
15	15	20	20	20	15	12	10	10	20	15	15

b. The estimated average natural flow:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
10.5	12	18.2	50.9	116	54.8	13	7.42	7.95	8.99	10.2	11.3

c. Allowable water use

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
10.5	12	18.2	20	20	15	12	7.42	7.95	8.99	10.2	11.3

12. **Application 70830** **Priority date:** 10/26/90

SEVENMILE CR TRIB UPPER KLAMATH L
KLAMATH COUNTY

SEVENMILE CREEK FROM DRY CREEK AT RIVER MILE 17.9 (NWSW, SECTION 11, TOWNSHIP 33S, RANGE 6E WM); TO THE MOUTH AT RIVER MILE 0.0 (SWNE, SECTION 9, TOWNSHIP 35S, RANGE 7.50E WM)

a. The amount of water requested for instream use:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
15	15	15	15	15	12	10	10	8	15	15	15

b. The estimated average natural flow:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
90.3	93	97.3	102	106	105	71.1	59.9	64	73.2	88.7	90.5

c. Allowable water use

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
15	15	15	15	15	12	10	10	8	15	15	15

13. Application 70831 **Priority date:** 10/26/90

ANNIE CR TRIB WOOD R
KLAMATH COUNTY

ANNIE CREEK FROM EAST FORK ANNIE CREEK AT RIVER MILE 13.0 (SECTION 18, TOWNSHIP 31S, RANGE 6E WM); TO THE MOUTH AT RIVER MILE 0.0 (SESW, SECTION 10, TOWNSHIP 33S, RANGE 7.50E WM)

a. The amount of water requested for instream use:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
40	40	40	40	40	30	20	20	20	40	40	40

b. The estimated average natural flow:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
44.4	41.1	42.7	64.3	115	142	117	73	57.9	69.4	54.8	59.7

c. Allowable water use

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
40	40	40	40	40	30	20	20	20	40	40	40

14. Application 70832 **Priority date:** 10/26/90

BROWNSWORTH CR TRIB S FK SPRAGUE R
KLAMATH COUNTY

BROWNSWORTH CREEK FROM HAMMOND CREEK AT RIVER MILE 3.0 (NWNE, SECTION 31, TOWNSHIP 36S, RANGE 16E WM); TO THE MOUTH AT RIVER MILE 0.0 (SENW, SECTION 2, TOWNSHIP 37S, RANGE 15E WM)

a. The amount of water requested for instream use:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
10	10	10	10	10	6	3	1	1	3	10	10

b. The estimated average natural flow:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
8.36	9.64	14.2	45.1	66.5	23.2	5.39	3.81	4.52	5.91	7.46	8.55

c. Allowable water use

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
8.36	9.64	10	10	10	6	3	1	1	3	7.46	8.55

NOTE: Exceptions to the instream water right flows are likely to appear on the certificate if one is issued. The Department is working on the exact wording of the conditions. The conditions are likely to allow some amount of additional appropriations for human and livestock consumption.

Your applications can be moved to the next phase of the water rights application review process.

Please reference the application number when sending any correspondence regarding the conclusions of this initial review. Comments received within the comment period, will be evaluated at the next phase of the process.

At this time, you must decide whether to proceed or to withdraw your applications as described below.

Withdrawal:

If you choose not to proceed, you may withdraw your application. To accomplish this you must notify the Department in writing by **May 13, 1996**. For your convenience you may use the enclosed "STOP PROCESSING" form.

To Proceed With Your Application:

If you choose to proceed with an application, you do not have to notify the Department. Your applications will automatically be placed on the Department's Public Notice to allow others the opportunity to comment. After the comment period the Department will complete a public interest review and issue a proposed final order.

If you have any questions:

Feel free to call Michael Mattick at (503) 378-8455 ext. 276 or 1 (800) 624-3199 if you have any questions. Please have your application number(s) available if you call.

Sincerely,

Cindy Smith

Cindy Smith
Initial Review Team

cc: Regional Manager, Watermaster, Water Availability Section
enclosures: Stop Processing Form

70813

Oregon

WATER
RESOURCES
DEPARTMENT

August 18, 1994

Bernard L. Simonsen
Rocking AC Ranch
9390 Highway #140 East
Klamath Falls, OR 97498

Reference: File G-12868 - Rocking AC Ranch
File G-13712 - Robert and Helen Cheyne
Instream water right applications - IS-70094, IS-70799 through IS-70802, IS-70804, IS-70805, IS-70806, IS-70808, IS-70809, IS-70812 through IS-70817, IS-70820 through IS-70823 and IS-70832

Dear Mr. Simonsen:

Your letters of February 6, February 16, March 31 and July 21 were recently brought to my attention. I apologize for the delay in responding to your letters in a more timely fashion, however the demands on my time seem to exceed my ability to preform tasks as promptly as I would like.

In regards to Application G-12868, we have received, what we consider two letters of objections to the technical review report. One from WaterWatch of Oregon and your letter of February 6, 1994. Both of these letters will be addressed by staff as soon as time allows.

Application G-13712 in the name of Mr. and Mrs. Cheyne, filed on June 13, 1994, has yet to receive a review by staff and will receive a technical review report in the order it is was received with other requests. Your comment form was received on June 28, 1994 as an interested party and you will be placed on our distribution list to receive a copy of the technical review report when it is completed.

I am enclosing a list of instream water right applications that were submitted by the Oregon Department of Fish and Wildlife for the waters of the Klamath River Basin. I have highlighted the applications in which you expressed an interest in. These applications are referenced above. Please review the list. If there are any other instream water right applications you wish to receive a technical review report and have an opportunity to object, please notify me and I will include you as an interested party.

Commerce Building
158 12th Street NE
Salem, OR 97310-0210
(503) 378-3739
FAX (503) 378-8130

The process for instream water right applications is described by our Division 77 Administrative Rules (copy enclosed), and is similar to our out-of-stream or groundwater application process.

Again I apologize for the delay in responding to your request. Please feel free to contact me if you have any questions and I will be happy to address any concerns you may have.

Respectfully,

Steve Brown
Water Rights Program Analyst
Water Right/Adjudication Division

cc: files

1211

files 70799, 70800, 70801, 70802, 70808, 70809, 70815, 70816, 70832, 70812, 70813,

Rocking AC Ranch
9390 Highway #140 East
Klamath Falls, OR 97603

February 16, 1994

Mr. Steve Brown
Water Resources Department
3850 Portland Road, NE
Salem, OR 97310

Dear Mr. Brown,

I have been advised that you are beginning the technical review of the instream water rights for the Klamath Basin. Since I own property on the Sprague River and lease a ranch on the Klamath River, I am greatly interested in this review and its outcome.

Accordingly, I would like to be informed of the status of this review with regard to the following streams in Klamath County, and would like a copy of the technical review when it is available:

- North Fork of the Sprague River
- Tributaries of the North Fork of the Sprague River
- South Fork of the Sprague River
- Tributaries of the South Fork of the Sprague River
- Klamath River between Klamath Falls and Keno

Additionally, I would be interested in background data on these instream reviews and the process which will be followed in evaluating the requested flows.

I appreciate the opportunity to provide input into this process.

Sincerely,

Bernard L. Simonsen,
Owner

United States Department of the Interior

BUREAU OF RECLAMATION
MID-PACIFIC REGION
KLAMATH PROJECT
6600 WASHBURN WAY
KLAMATH FALLS, OREGON 97603-9365

TAKE PRIDE IN AMERICA

IN REPLY
REFER TO:

NOV 26 1990

KO-140
WTR-4.10

State of Oregon
Water Resources Department
Attention: Michael Mattick
3850 Portland Road NE
Salem OR 97310

Subject: Public Notice for Instream Water Right Filings Applications 70812 and 70813 (Water Rights)

We appreciate the opportunity to review the subject applications for instream water rights filed by the Oregon Department of Fish and Wildlife (ODF&W). Our comments are based on information in the weekly abstract of water rights applications provided by the Water Resources Department and not on actual copies of the applications which would normally be the case.

Since both of these applications request a minimum flow in a channel located directly below a controlled release, we find ourselves in the position of objecting to them unless certain provisions mentioned below are included in the permits. It is possible, although unlikely, that the flows could be 0 in these reaches of the Klamath and Link Rivers. We are concerned that a minimum flow could impair our operation of the Link River Dam and Keno Regulating Dam and may ultimately affect our water rights.

We are requesting formal review pursuant to ORS 690-77-000 et.seq. In addition, we would appreciate receiving any information on how the requested flows were arrived at. We assume that some procedure such as Instream Flow Incremental Methodology (IFIM) was used by the ODF&W.

Application 70812 An instream application for 250 to 400 ft^3/s between Keno Dam and the Head of the J.C. Boyle Reservoir, a distance of 4.5 miles.

Keno Dam is operated by Pacific Power & Light Company under a contract with the United States. The dam provides river elevation control on that part of the Klamath between Lake Ewauna and Keno. While not likely, it is conceivable that flows below Keno Dam could fall below the 250 ft^3/s minimum. This would be the result of drought conditions whereby release to the Klamath River system from Upper Klamath Lake would be curtailed to assure irrigation supplies for Klamath Project water users.

Any permit issued for an instream water right should clearly state that the permit is junior to irrigation water rights held by the Bureau of Reclamation and those rights recognized by the Klamath River Compact. The Compact clearly places the priority of use for Fish and Wildlife below that of irrigation.

Application 70813 An instream application for 20 to 80 ft^3/s between Link River Dam downstream to Lake Ewauna.

Link River Dam is the controlling structure for Upper Klamath Lake and is operated by Pacific Power & Light Company under a contract with the United States. Drought conditions may require the Bureau of Reclamation to take over control of the dam. If this condition occurred, the Bureau must retain the flexibility to operate the dam to protect irrigation supplies which may include lowering the flows in the Link River below the 20 ft^3/s minimum.

As stated in reference to application 70813, any permit issued for an instream water right should clearly state that the permit is junior to irrigation water rights held by the Bureau of Reclamation and those rights recognized by the Klamath River Compact. The Compact clearly places the priority of use for Fish & Wildlife below that of irrigation.

At this time, it does not appear that other instream flow applications mentioned in the abstract will have a detrimental effect on Klamath Project irrigation water supplies, however, we would also like to point out that the Klamath River Compact would apply to these applications as well. Any permits issued should clearly reference the Compact and its effects on Priorities.

Sincerely,

Kirk C. Rodgers
Project Manager

OCT 26 1990

Application No. IWR 70813

Permit No. .....

Name ORegon Dept Fish & Wildlife

Address PO Box 59 Portland OR 97207

Assigned .....

Address .....

Beginning construction .....

Completion of construction .....

Extended to .....

Complete application of water .....

Extended to .....

Form 111

NUMBER 8029

Check 200.- Mo_____ Cash_____

____ Surface Application

____ Reservoir Application

____ Ground Water Application

____ Transfer Application

____ PFO Request

____ Research

____ Hydroelectric Fees

____ Copying

____ Assignment

____ Extension of Time

__✓__ Protest adam

____ Other