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Est. 1997

## CHAKACHAMNA HYDROELECTRIC PROJECT INTERIM FEASIBILITY ASSESSMENT REPORT

VOLUME IV ADDENDUM

## BECHTEL CIVIL & MINERALS INC.

ENGINEERS-CONSTRUCTORS



OCTOBER 1983

**ALASKA POWER AUTHORITY** 

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# VOLUME IV ADDENDUM

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#### CHAKACHAMNA HYDROELECTRIC PROJECT INTERIM FEASIBILITY ASSESSMENT REPORT MARCH 1983

VOLUME IV ADDENDUM - OCTOBER 1983

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#### CHAKACHAMNA HYDROELECTRIC PROJECT INTERIM FEASIBILITY ASSESSMENT REPORT MARCH 1983

<u>VOLUME IV</u> ADDENDUM - OCTOBER 1983

#### 3.0 PROJECT DEVELOPMENT STUDIES

#### 3.5.3 Upstream Migrants Facility

The upstream migrants facility has been revised in response to comments received from the fishery agencies. Figures 3-9 Rev. 1 and 3-10 Rev. 1 included herewith in this Addendum supersede the original Figures 3-9 and 3-10 appearing in Volume 1, Section 3.0, after page 3-32.

The written responses to the agency comments appear in Section 10.3.3.2 of this Addendum.





SECTION A 3-9



EVATION 

#### 4.0 HYDROLOGICAL AND POWER STUDIES

#### 4.6 Results

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Page 4-22, Volume I, Errata. The first three lines of the last paragraph should read as follows:

"Alternatives A through D can firmly support the capacities determined from the ll years of inflow during the 1981 studies. The recommended"

#### 10.0 COORDINATION

#### 10.3 Biological Studies

10.3.3 <u>Meeting - December 9, 1982</u>

10.3.3.1 Response

See Volume I page 10-48. 10.3.3.2 Further Response - September 1983.

Following receipt of the NMFS February 1, 1983 letter and the U.S. Fish and Wildlife Service March 9, 1983 letter, the conceptual designs for the proposed fish passage facilities near the present outlet of Chakachamna Lake have been reviewed and certain revisions have been made at this In particular, the layout of the upstream migrant time. facility has been revised to increase the length of the turn pools at all ladder turns to at least 10 feet in compliance with the comments of both agencies. All ladders and channels will be lighted, this having been the original intent, but details are not shown on the drawings. The objective is to illustrate a concept for the movement of water and fish through the system. Full details of mechanical and electrical equipment will be developed in final design.

Flow of water through the upstream passage facility could be controlled by throttling gates (not shown) installed a short distance downstream from the inlet bulkhead gates presently shown. Closure of the inlet bulkhead gates would enable dewatering to be performed for maintenance or repair of the throttling gates. Access to the various levels of the upstream passage facility would be provided via the elevator and stairwell. Grating type walkways would be provided over all weirs and pools to give access by foot.

The ladder exits to the lake, as presently shown are 60 feet minimum from the lakeside entry to the downstream passage facility. This distance could be increased if considered necessary, at the cost of increasing the volume of open cut excavation in the vicinity of the portals to the fish passage facilities.

It is evident from the comments on the proposed schemes for the downstream passage of juveniles, that additional conceptual evaluation will be required and present funding limitations do not permit that to be done at the present The provision of conventional spillway crests time. downstream from the gates was purposely avoided in the proposed layouts because of reported heavy losses of fingerlings. For example, in a paper entitled "Fish Handling Facilities for Baker River Project" published in the November 1961 Journal of the Power Division of the American Society of Civil Engineers, it was reported that 64% of the sockeye fingerlings passing over the Lower Baker In a subsequent test, it was found spillway were killed. that 85% survival rate was achieved under conditions approximating free fall between the reservoir and tailwater, a drop of about 160 feet. Our consultants leaned toward the view that provided a sufficient depth of plunge pool were provided, some fish might be temporarily stunned when passing through the 80 foot free fall but that adequate time would be available for their recovery while passing through the 1-1/2 mile long flume in the tunnel to

the downstream portal where they would return to the river. Because of the divergences, it is considered advisable to defer resolution of this issue until such time as the project studies are resumed.

For the time being, the breakwater in the lake has been deleted. It is to be noted, however, that waves of 5 feet to 6 feet in height have been observed on the lake during times of strong wind and for this reason, some form of wave protection may be necessary to prevent damage to the approach channel.

With the parameters established for project studies, the maximum flow of water diverted for power generation would be approximately double the average annual inflow to the lake or 7200 cfs. The intake opening for power diversions is at depth to avoid, within practical limits, the attraction of fish into the power tunnel.

New studies of ablation and ice movement in the Barrier Glacier near the lake outlet are planned to be performed when project studies are resumed.

Flows in the vicinity of the rockfill fish barrier should be determined in the final design stage.

The recommended fishway baffle design parameters have been noted for further consideration during the final design stage.

Gates and their operating mechanisms would be simple and robust in order to give best assurance of trouble free operation. The proposed fish ladder concept is based on a peak daily run of 4,000 fish, and a maximum hourly run of 1,000 fish and a rate of ascent of 5 minutes per pool. With 72 pools between maximum reservoir operating level, elevation 1155, and the bottom of the ladder, elevation 1183, the average number of fish per pool is 69, say 70. If 4 cubic feet of water is provided for each fish, the required pool volume is 280 cubic feet, and if the depth of the water in the pool is 6 feet, the required surface area is 47 sq. feet. For conservatism 60 sq. feet is provided in the layouts.

The passage of ice through the system or its prevention are problems that may require special considerations in addition to those already given. The suggestion for an angled vertical rack in place of the horizontal grating shown is noted and will be considered in future studies.

#### 10.3.4 Meeting - June 8, 1983

Representatives of interested agencies were invited to attend a meeting in Anchorage, Alaska on June 8, 1983 to discuss the proposed study plan for the Chakachamna Hydroelectric Project. At this meeting, representatives of Alaska Power Authority, Bechtel Civil & Minerals, Inc. and Woodward-Clyde Consultants summarized the results of Volumes I, II, and III of the March 1983 Chakachamna Hydroelectric Project Interim Feasibility Assessment Report and described a proposed scope of continuing studies designed to meet the requirements of filing a Federal Energy Regulatory Commission Application for a license to construct the project.

A copy of the invitation letter follows. The agencies invited are listed on the attachment to that letter which is then followed by a copy of the notes of record covering the meeting.

## **ALASKA POWER AUTHORITY**

334 WEST 5th AVENUE - ANCHORAGE, ALASKA 99501

Phone: (907) 277-7641 (907) 276-0001

RECEIVED

MAY 3 1 1983

R. T. LODER

May 25, 1983

The Honorable Esther Wunnicke Commissioner Department of Natural Resources Pouch M Juneau, Alaska 99811

Dear Ms. Wunnicke:

Please reference my February 9, 1983, letter which transmitted a summary of our meeting with your staff on December 9, 1982. During the meeting, it was agreed that the Power Authority through its contractors, Bechtel Civil & Minerals and Woodward-Clyde, would develop a study plan which would encompass the necessary data collection and analysis on the Chakachamna hydroelectric project in order to meet the requirements of filing a Federal Energy Regulatory Commission (FERC) Application.

I have attached a <u>draft</u> copy of the proposed study plan for the Chakachamna hydroelectric project for your review. The budget and scope of work are included in this plan. This is the first draft and will be modified as necessary. I must stress that total funding for this plan in the upcoming year is unlikely and that a prioritization of the items will be required in order to make the best use of available funding.

I would like to invite you and your staff to a meeting on Wednesday, June 8, 1983, to discuss this study plan. The meeting will be held at the Alaska Power Authority in the downstairs conference room at 1:30 p.m.

If you have any questions prior to the meeting, please feel free to contact me or Mr. Eric Marchegiani of my staff.

Sincerely,

Eric P. Yould Executive Director

Attachment as stated.

cc: Apple: Robert Loder, Bechtel, San Francisco
Mr. Wayne Lifton, Woodward-Clyde, Anchorage

- Mr. Roland Shanks, DNR, Anchorage
- Mr. Ty Dilliplane, Division of Parks, Anchorage

Ms. Kay Brown, Division of Minerals and Energy Management, Anchorage

#### DISTRIBUTION LIST FOR THE CHAKACHAMNA STUDY PLAN

The Honorable Esther Wunnicke Commissioner Department of Natural Resources Pouch M Juneau, Alaska 99811

cc: Mr. Roland Shanks, DNR, Anchorage Division of Research & Development 555 Cordova Street Pouch 7-005 Anchorage, Alaska 99510

> Mr. Ty Dilliplane, Division of Parks, Anchorage State Historic Preservation Officer 619 Warehouse Drive, Suite 210 Anchorage, Alaska 99510

Ms. Kay Brown, Director Division of Minerals and Energy Management Pouch 7-034 Anchorage, Alaska 99510 ATT: Ms. Karen Oakley

Mr. Keith Schreiner U.S. Fish & Wildlife Service 1011 E. Tudor Road Anchorage, Alaska 99501

cc: Mr. Gary Stackhouse, USF&WS, Anchorage 1011 East Tudor Road Anchorage, Alaska 99507

> Mr. Lenny Corin, USF&WS, Anchorage 605 West Fourth Avenue, Suite G-81 Anchorage, Alaska 99507

Mr. Roger J. Contor Regional Director National Park Service 540 West Fifth Avenue Anchorage, Alaska 99501

cc: Mr. Larry Wright, National Park Service, Anchorage 540 West Fifth Avenue Anchorage, Alaska 99501

Mr. Paul Haertel Superintendent Lake Clark National Park 701 "C" Street, Box 61 Anchorage, Alaska 99513

10-6

The Honorable Richard Neve Commissioner Department of Environmental Conservation Pouch O Juneau, Alaska 99811

cc: Mr. Robert Martin, Dept. of Environmental Conservation, Anchorage Regional Supervisor 437 E Street Anchorage, Alaska 99501

Honorable Mark Lewis Commissioner Department of Community & Regional Affairs Pouch B Juneau, Alaska 99811

cc: Mr. Mark Stephens, DC&RA, Anchorage 225 Cordova, Bldg. B Anchorage, Alaska 99501

The Honorable Richard A. Lyon Commissioner Department of Commerce & Economic Development Pouch D Juneau, Alaska 99811

cc: Mr. Edward Eboch, DEPD, Juneau Director Pouch D Juneau, Alaska 99811 Mr. Robert McVey, Director Alaska Region National Marine Fisheries Service P.O. Box 1668 Juneau, Alaska 99802

cc: Mr. Ronald Morris, National Marine Fisheries Service, Anchorage 701 C Street Anchorage, Alaska 99513

Mr. Brad Smith, National Marine Fisheries Service, Anchorage 701 C Street Anchorage, Alaska 99513

The Honorable Donald W. Collingsworth Commissioner Alaska Department of Fish & Game P.O. Box 3-2000 Juneau, Alaska 99811

cc: Mr. Carl Yanagawa, ADF&G, Anchorage Regional Supervisor 333 Raspberry Road Anchorage, Alaska 99503

> Mr. Don McKay, ADF&G, Anchorage Habitat Division 333 Raspberry Road Anchorage, Alaska 99503

Mr. Phil Brna Habitat Division 333 Raspberry Road Anchorage, Alaska 99503

Mr. Ken Tarbox Alaska Department of Fish & Game P.O. Box 3150 Soldotna, Alaska 99669

Mr. Keven Delaney Sport Fish ADF&G 333 Raspberry Road Anchorage, Alaska 99502 Mr. Curtis McVey U.S. Department of the Interior U.S. Bureau of Land Management 701 C Street, P.O. Box 13 Anchorage, Alaska 99513

cc: Mr. John Benson, U.S. Dept. of the Interior, Anchorage U.S. Bureau of Land Management 701 C Street, P.O. Box 13 Anchorage, Alaska 99513

Mr. Don Hendrickson Pennisula Resource Area U.S. Department of the Interior Bureau of Land Management 4700 East 72nd Street Anchorage, Alaska 99507

Mr. Wayne Bowden Bureau of Land Management Anchorage District Office Manager 4700 East 72nd Street Anchorage, Alaska 99507

Mr. Fred Lohse Bureau of Land Management 4700 East 72nd Street Anchorage, Alaska 99507

Director of Indian Affairs, Dept. of Interior, Juneau P.O. Box 3-8000 Juneau, Alaska 99802

#### CHAKACHAMNA HYDROELECTRIC PROJECT

MEETING NOTES

DATE: June 8, 1983

LOCATION: Alaska Power Authority Office Anchorage, Alaska

SUBJECT: Chakachamna Project Review and Scoping Meeting

PARTICIPANTS:

<u>A</u>	laska Power Authority	National Park Service
E	ric Marchegiani	Floyd Sharrock Larry Wright
<u>A</u>	laska Dept. of Fish and Game	Bureau of Land Management
B M K	ruce King ike Kasterin evin Delaney	Don McKay
<u>A</u>	laska Dept. of Natural Resources	Bureau of Indian Affairs
S	am Murray	Don Barrett
<u>U</u>	.S. Fish and Wildlife Service	Bechtel
G	ary Stackhouse	Bob Loder Jock Langbein Dudley Reiser
N	ational Marine Fisheries Service	<u>Woodward - Clyde Consultants</u>
В	rad Smith	Wayne Lifton Larry Rundouist

Wayne Lifton Larry Rundquist Mike Joyce Paul Hampton Jon Issacs

Representatives from the Alaska Power Authority, Bechtel Civil and Minerals, and Woodward-Clyde Consultants (WCC) met with representatives of various state and federal agencies to review and discuss the proposed environmental program for FY 1984 and the results of the 1983 Interim Feasibility Report. The purpose of the meeting was to present the individual components of the proposed program and to solicit and receive agency comments concerning the proposed studies. Eric Marchegiani of the

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Alaska Power Authority (APA) initiated the meeting with introductions of those present. Eric reviewed the funding prospects for FY 1984 and indicated that total funding was unlikely. Therefore, he wanted to use the meeting as a workshop in an effort to prioritize the various program elements. Eric noted that this would not be the only meeting for this purpose.

- Gary Stackhouse (USFWS) asked about the present schedule for completing the FERC license application.
  - Eric Marchegiani (APA) responded by noting that if funding becomes available it would be about 1-2 years before the application would be filed.
- <sup>°</sup> Gary Stackhouse (USFWS) inquired as to how long it would be before filing an application if sufficient funding is not obtained.
  - Eric Marchegiani (APA) noted that an additional 1-1/2 years would probably be required.

Wayne Lifton (WCC) then presented the aquatic biological studies proposed for FY-84 as contained in the Scope of Services document. This document had been distributed to the various agencies about two weeks prior to the meeting. Wayne briefly reviewed the major components of the program: <u>Adult Anadromous</u> studies would include the installation and operation of four fishwheels (3 on the McArthur River and one on the Chakachatna River), tag recovery operations, aerial surveys, mainstream electrofishing operations, and studies of Chakachamna Lake spawning; <u>Outmigrant</u> studies would include the use of two inclined plane smolt traps (one on the McArthur River and one on the Middle River) <u>Resident</u> and <u>Juvenile Anadromous</u> studies would include minnow trapping, electrofishing, Fyke nettings, and for Chakachamna Lake, electrofishing, gill netting, twawling and hydroacoustic surveys; <u>Habitat</u> studies would include the characterization of juvenile, spawning and egg incubation habitat.

- Bruce King (ADF&G) requested the locations of the fish wheels.
  - Wayne Lifton (WCC) noted that fish wheels would be located at Station 1D (3 wheels) and Station 6 (1 wheel); fyke nets would also be set in these areas.
- Brad Smith (NMFS) asked if the program described was for license application (i.e. no priorization of study components).
  - Wayne Lifton (WCC) acknowledged that the entire scope of work was being presented and that studies had not been prioritized.

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- Bruce King (ADF&G) asked if the level of hydroacoustic surveys proposed for the winter were the same as for the summer.
  - Wayne Lifton (WCC) noted that the winter studies would be at a lower level of effort. Lifton replied that the winter studies were designed to statistically describe the distribution of fish under the ice and near the proposed intake, however, it would not be possible to tow the transducers around on the ice.

Larry Rundquist (WCC) then presented the hydrology and instream flow studies program and the proposed sampling schedule. Rundquist noted that two continuous recording gages would be operated, one at the location of the former U.S. Geological Survey gage on the Chakachatna River, and one on the upper McArthur River below the power house location. Staff gages would also be installed in various drainages to provide additional streamflow information.

Rundquist described the proposed instream flow studies and indicated a preference for conducting the studies in the spring on an ascending limb of the hydrograph. He noted that the U.S.F.W.S. Instream Flow Incremental Methodology (IFIM) was being proposed for the instream flow studies. Rundquist stated that presently 10 representative reaches and 5 critical reaches (for passage) had been selected for study based on various channel configurations. Rundquist also briefly described the ground water program which was proposed between the Chakachatna and McArthur River.

- Gary Stackhouse (USFWS) asked where tidal influence occurs in the system and whether it might affect spawning.
  - Larry Rundquist (WCC) noted that tidal influence does not extend very far upstream on the Middle River and that the subtrate in the lower reaches of the system was poor for spawning. Rundquist indicated that the reaches for instream flow studies would be above tidal influence.
  - Wayne Lifton (WCC) added that to date the only species of fish using the lower reach of the system for rearing was stickleback.

Mike Joyce (WCC) followed this discussion with a presentation of the wildlife program. Joyce reviewed the major wildlife issues which need to be addressed, including the effects of altered flows on moose and swan habitat, and the impacts of altered fish escapement and distribution on eagle and bear populations. Joyce then introduced and described the proposed use of the Habitat Evaluation Procedure (HEP) for the wildlife studies. He stated that the existing models for the HEP model would be reviewed and appropriately modified to more accurately depict the wildlife species present in the Chakachamna Project area. Joyce noted that for this HEP study, no attempt would be made to evaluate the cumulative

impacts of other projects in conjunction with the Chakachamna Project; impact analysis would be limited to only the Chakachamna Project. Indicator species proposed for HEP analysis included: moose, trumpeter swan, bald eagle, brown bear, beaver and wolf. Joyce then reviewed other programs proposed for study including vegetarian mapping, bird studies (waterfowl nesting, and migration and staging activities) and mammal studies (bear denning and feeding; moose winter range and seasonal studies).

Jon Issacs (WCC) then presented the proposed Human Resources program. He noted that the major components of the program as listed in the FERC requirements included evaluations of the project areas historic and archeological value, land use, socioeconomic structure, aesthetics and recreational use. Major project related issues identified by Issacs included regulatory compliance, construction and access impacts, effects of the project on Lake Clark National Park, project effects on the commercial and subsistence fishing, and project effects on viewer access and aesthetics.

Issacs stated that, at the request of Eric Marchegiani (APA), the proposed study also included a public participation program which would involve 1-2 sets of meetings to occur in Tyonek, Soldotna and Anchorage.

- Don Barrett (BIA) asked whether a specific time had been set for the meetings in Tyonek.
  - Jon Issacs (WCC) stated that the meetings would be scheduled when subsistence activities slow down, probably in the fall when villagers are present.
- Don Barrett (BIA) questioned whether ADF&G had done previous subsistence studies in the area.
  - Jon Issacs (WCC) noted that the Subsistence Division of ADF&G had been conducting studies in the area, as had Darbyshire and Associates for a coal development study.

Eric Marchegiani (APA) commented that the question had been raised as to whether a fly-over of the area could be arranged. He noted that this had been done before, with the agency personnel providing their own transportation to Shirleyville and APA providing helicopter transport from there. He added that a site visit would be contingent upon receiving funding for the project.

Eric Marchegiani (APA) then opened the meeting for discussion and asked about the suitability of the programs. He stated that four areas of study had been identified including aquatic biology, hydrology, terrestrial wildlife and human resources. He requested that any comments concerning the programs be brought out now for discussion, and that formal written comments could be submitted later.

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- \* Kevin Delaney (ADF&G) asked what type of studies were being proposed for pink and chum salmon?
  - Wayne Lifton (WCC) replied that outmigrant traps would be used to determine the timing and numbers of outmigrants.
  - Kevin Delaney (ADF&G) stated that for the Susitna Project, Fyke nets had been successfully used to monitor downstream migrants, and therefore suggested they be used for the project. He cited the work of Dana Schmidt (ADF&G) which indicated that Fyke nets were more effective than minnow traps and electrofishing.
    - Wayne Lifton (WCC) indicated that use of this method would be investigated if funding becomes available. Kevin Delaney (ADF&G) also noted that from a priority standpoint, more years of aquatic information would be needed than for terrestrial studies. He stated that the objectives of the juvenile studies were right on line, including the studies of distribution, abundance, timing, smolting and habitat.
- <sup>°</sup> Bruce King (ADF&G) concurred with the objectives of the program. In terms of priorities, King felt that primary emphasis should be on adult enumeration and spawning distribution studies (last to be cut from the program). He believed that the smolt outmigration studies could be puton hold since outmigration is already ocurring. He recommended that outmigrant studies be postponed until next spring when the entire smolt outmigration could be monitored. As an alternative, he suggested looking at Chakachamna Lake fry.
- Kevin Delaney (ADF&G) agreed with these priorities and noted that the objectives of the resident and juvenile anadromous fish studies would be to define the extent of their distribution throughout the season.
- <sup>°</sup> Brad Smith (NMFS) asked whether one winter trip would be sufficient for the studies.
- <sup>°</sup> Kevin Delaney (ADF&G) indicated that if money is to be spent, it would be better to use it during the summer, at or prior to breakup, rather than on exploratory winter studies. He felt that during the winter, sample sizes are too small and therefore no conclusions can be made. Delaney felt that winter studies were best reserved for looking at habitat.

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- Brad Smith (NMFS) noted that nothing specific was shown related to fish passage in the study plan and asked whether studies were planned.
  - Bob Loder (Bechtel) stated that the best way to address the problems of fish passage would be to meet with the appropriate agencies. He stated that the passage criteria would be based on the peak run with the facilities designed to meet the criteria. Loder noted that comments had been received concerning the proposed facility but that recommended changes had not yet been incorporated into the design. He stated that the changes would be addressed in the next few weeks and will be included in an addendum report.
  - Eric Marchegiani (APA) agreed that the best way to establish criteria is to sit down with the agencies. He then requested comments specific to the Hydrology and/or the Terrestrial programs.
- Don McKay (ADF&G) recommended that the terrestrial wildlife program proceed using a planned approach. He stated that their (ADF&G) comments would probably increase the scope of work, and recommended a scoping session to pinpoint details. McKay felt that the intent of the study for FERC is to complete all required components. He thus felt somewhat uneasy about prioritizing the studies since the entire results would be needed at some time.
  - Eric Marchegiani (APA) explained the potential funding limitation for the Chakachamna Project, and stated that APA had been criticized in the past for wasting money on studies which had not been prioritized properly. He then asked if the National Park Service had any comments?
- Floyd Sharrock (NPS) stated he detected, in the presentation on human resources, some uncertainty as to whether FERC dictates requirements for inventory and analysis, or whether the Advisory Council on Historic Preservation has a say in the FERC requirements. Sharrock recommended that the Advisory Council be approached first and ask them for what they will require. He noted that the Advisory Council will comment at any time and that they should have already been contacted. Sharrock felt that a statement of intent may be adequate and that it can make this whole process more simple and straightforward with less money being spent. He stated that the Compliance Officer for the western states is located in Denver and that he should be contacted. Sharrock asked Jon Issacs (WCC) how the Anchorage (WCC) office related to the San Francisco office, specifically to Ruth Ann Knudson?

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- Jon Issacs (WCC) noted that Ruth Ann Knudson is the cultural resource specialist on the project and the project and that she wrote the human resources section. Issacs stated that Knudson would oversee the program.
- Don Barrett (BIA) asked several specific questions concerning the elevation of the lake, nature of the terrain downstream of the lake, and land ownership.
  - Larry Rundquist (WCC) indicated the lake elevation to be 1142 ft; terrain downstream of the lake is relatively flat although the rivers are very steep in the Canyon.
  - Jon Issacs (WCC) added that the area around the lake and 1/4 mile from the river floodplain is a federal power withdrawl area. Issacs noted that the remaining area belongs to a mixture of landowners.

Eric Marchegiani (APA) reiterated the importance of providing comments which will be used in prioritizing the program. He stated that before going too far in defining and finalizing the program, another meeting would be held to better define priorities. He stressed however, that the availability of funds would largely dictate whether or not specific comments could be addressed. The meeting was adjourned at 3:30 p.m.

#### 10.6 Distribution of Report - Comments and Responses

The distribution for this Addendum, Volume IV, will be similar to that for Volumes I, II and III of the Chakachamna Hydroelectric Project Interim Feasibility Assessment Report.

Comments on Volumes I, II and III were received from the following agencies by letters dated as indicated.

National Park Service, 20 May 1983; Department of the Army, 23 May 1983; Department of Environmental Conservation, 25 May 1983; Department of Fish and Game, 26 May 1983; Community & Regional Affairs, 31 May 1983; Department of Natural Resources, 9 June 1983; Department of Natural Resources, 14 June 1983.

Copies of the above letters are reproduced on the pages following together with copies of the Power Authority's responses to the Agencies' comments.



### United States Department of the Interior

NATIONAL PARK SERVICE Alaska Regional Office 540 West Fifth Avenue Anchorage, Alaska 99501

IN REPLY REFER TO:

L3031 (ARO-P)

2 0 MAY 1983

Mr. Eric P. Yould Executive Director Alaska Power Authority 334 West 5th Avenue Anchorage, Alaska 99501

Dear Mr. Yould:

Staff of this office and the Lake Clark National Park and Preserve have reviewed the Chakachamna Hydroelectric Project Interim Feasibility Assessment Report. We have the following comments.

The cultural resources section is composed of a brief overview of the prehistory and history of the project area, an evaluation that few factual data were (are) available for reconstructions or for estimating impacts, and a recognition of the need for field investigation prior to project activity. It would be desirable and beneficial for analytical purposes to also include a statement outlining the process that will be followed to inventory and evaluate cultural resources, including coordination with the appropriate state and federal agencies (the State Historic Preservation Officer and the Advisory Council on Historic Preservation) should the project proceed.

We are pleased to note the attention being given to coordination with the staff of the Lake Clark National Park and Preserve and to the analysis of existing recreational use within the project area. While the study report does recognize the close proximity of the project to the park, it does not attempt to identify the potential primary and secondary impacts to park (wilderness) resources. Perhaps the most obvious questions that should be addressed are: What effects, if any, will occur as a result of the project construction and operation to the fish and wildlife resources that normally gain access to the park from the project area? And what effect(s), if any, will result from an increased level of public use within the park as a result of improved road access via the project roads which might later be linked to the Matanuska Valley and Anchorage via a road from the lower Susitna River Valley to Tyonek? Future study reports should attempt to quantify the potential project impacts to park resources.

Thank you for the opportunity to comment.

Sincerely,

Associate Regional Director Planning, Recreation and Cultural Resources

cc: Superintendent, Lake Clark

## **ALASKA POWER AUTHORITY**

334 WEST 5th AVENUE - ANCHORAGE, ALASKA 99501

Phone: (907) 277-7641 (907) 276-0001

September 7, 1983

Mr. Hugh L. Watson Associate Regional Director U.S. Department of the Interior National Park Service 540 West Fifth Avenue Anchorage, Alaska 99501

Subject: Chakachamna Hydroelectric Project

Dear Mr. Watson:

Receipt is acknowledged of your May 20, 1983, letter conveying comments of your staff and that the Lake Clark National Park and Presence on the March 1983, Interim Feasibility Assessment Report of the above-referenced project.

When funding permits, a study plan for the cultural resources studies to be performed in future project studies will be finalized. A first draft of the proposed study plan was transmitted to you with our letter dated May 25, 1983, and discussed at the meeting in our offices on June 8, 1983. We are pleased to note that you were represented and participated in those discussions.

The final study plan will include revisions to reflect your comments regarding the processes to be followed to inventory and evaluate cultural resources and to coordinate with the State Historic Preservation Officer and Advisory Council on Historic Preservation.

Potential primary and secondary impacts on park resources will be addressed, particularly those on fish and wildlife arising from construction and operation of the project, and the effects resulting from increased public use created by improved overland access.

We appreciate having received your comments on the March 1983, report and look forward to working closely with your staff when funding permits some of these studies to proceed.

Sincerely Eric P. Yould

Executive Director

cc:\* Mr. Robert Loder, Bechtel, San Francisco
 Mr. Wayne Lifton, Woodward-Clyde, Anchorage



#### DEPARTMENT OF THE ARMY

ALASKA DISTRICT, CORPS OF ENGINEERS POUCH 898 ANCHORAGE, ALASKA 99506 May 23, 1983

REPLY TO ATTENTION OF Hydropower and Comprehensive Planning Section AEOEIVED 19424 1983 ALISKA FORER AUTIONITY

Mr. Eric P. Yould Executive Director Alaska Power Authority 334 West 5th Avenue Anchorage, Alaska 99501

Dear Mr. Yould:

I appreciate the opportunity to review the Chakachamna Hydroelectric Project Interim Feasibility Assessment Report furnished to this office on 12 April 1983.

Much time and effort has obviously gone into the preparation of this interim assessment report. I agree with you and other interested parties that there are some problem areas where more information and study are needed to permit a determination of project economic feasibility. Such studies would include the considered outlet dike proposal, which would be very sensitive to possible dike failure, and the most effective movement of fishery resources through the outlet barrier. Also, I presume a rock trap would be provided to prevent blasted rock from being washed into the power tunnel. Figure 3-4 of Volume I is unclear on this feature.

If further assistance is required, please do not hesitate to contact Mr. Carl Borash of Planning Branch at 552-3461.

Sincerely, Nevi E. Saling

Colonel, Corps of Engineers District Engineer

## **ALASKA POWER AUTHORITY**

#### 334 WEST 5th AVENUE - ANCHORAGE, ALASKA 99501

Phone: (907) 277-7641 (907) 276-0001

September 7, 1983

Mr. Neil E. Saling, Colonel Alaska District Corps of Engineers Department of the Army Pouch 898 Anchorage, Alaska 99506

Subject: Chakachamna Hydroelectric Project

Dear Colonel Saling:

Receipt of your May 23, 1983, letter is acknowledged. Your comments on the Feasibility Assessment Report for the project are very much appreciated.

You cited the proposed outlet dike as an area where more information and study are needed. We and our consulting engineers fully agree in this regard and plans for future studies of the project provide for additional surface and subsurface explorations to be performed in this area. We are thinking in terms of designing this dike as an "overflow" or "flow through" type rockfill dike in order to reduce its sensitivity to the possibility of a dike failure. The provision of a spillway will limit the depth of overflow that can occur and thus prevent the onset of conditions that could lead to that type of failure.

In the natural process presently working at the lake outlet, melting of the ice at the toe of Barrier Glacier causes the sand, gravel and boulders being carried along in the ice flow to be deposited in the outlet channel. A bar of gravel and boulders builds up until the lake water level reaches Elev. 1,155 feet, or thereabouts, after which a condition arrives where the gravel bar is overtopped to a sufficient degree to cause a significant part of it to be swept away and a lake outbreak flood such as the August 12, 1971, event occurs. The process then repeats itself.

A barrier formed, as described above, would be composed of a random assortment of particle sizes, and being deposited without control, would be more sensitive to failure than an artificial barrier constructed of selected materials under controlled conditions. Subsurface explorations would be oriented to provide information that would enable the design to guard against a piping or blowout-type of failure. It should be borne in mind that dike failure would cause a downstream flood no greater than has occurred naturally with the breakout type of flood such as occurred in 1971. Mr. Saling September 7, 1983 Page 2

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No attempt has been made to finalize details of the rock traps for the lake tapping. Traditionally, the geometry selected would have been based on a trap below the tunnel, but it was noted that this arrangement may possess a number of disadvantages. When details are carried further forward, it was planned to engage Christian Groner as a special consultant in this field. He has been involved in a significant number of lake taps.

It is intended to further study the provisions of fish passage facilities past the outlet barrier in response to a number of comments received from the State and Federal fishery agencies. These will be covered in an addendum to the report schedule to be issued in the near future.

Stricerely, Eric P. Yould Executive Director

cc: Mr. Robert Loder, Bechtel, San Francisco Mr. Wayne Lifton, Woodward-Clyde, Anchorage

# MEMORANDUM

437 E Street/Suite 200

## State of Alaska

Anchorage, Alaska 99501

DATE: May 25, 1983

TO: Mr. Eric Yould, Director Alaska Power Authority

Bob Martin, P. FROM: Deputy Director, EQO

| FILE NO:      | Chakachamna | MAY 3 1 198      |
|---------------|-------------|------------------|
| TELEPHONE NO: | 274-2533    | MUNSKA POWER AUT |

RECEIVE

SUBJECT: Chakachamna Iterim Feasibility Report March 1983

In reviewing the Chakachmna Iterim Feasibility Report, March, 1983, the study provides an interesting overview of potential project scenarios. However, in terms of detailed analysis, the report poses more questions than answers. The environmental field studies are extremely limited, providing a preliminary "reconnaisance level only" review of possible project impacts. Considering that the Department of Environmental field study scoping process," it would appear that what has been done to date was not intended to provide a detailed project assessment.

Potential problems noted which would require a mitigation strategy are as follows:

- Exposure of the entire McArthur River stream delta during maximum drawdown (45'below pre-project minimum flow);
- Inundation of lower stream reaches currently unaffected;
- Increased turbidity during winter months in the McArthur River;
- Possible gas saturation in excess of 100% at powerhouse location;
- Increase in water temperature by .9° C at powerhouse, above ambient temperature in McArthur River;
- Possible turbidity increase due to increased glacial meltwater;
- Increased bed scour and bank erosion due to increased flooding of the McArthur River.

In contrast to the excellent coordination and environmental field effort for the Silver Lake Hydroelectric project, the Chakachamna project effort has been minimal at best. At such time as the Alaska Power Authority decides to give serious consideration to the Chakachamna project, the Department would be happy to work with you in scoping out an effective environmental studies program.

DW/BM/jfr

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## **ALASKA POWER AUTHORITY**

#### 334 WEST 5th AVENUE - ANCHORAGE, ALASKA 99501

. ,..... Phone: (907) 277-7641 (907) 276-0001

September 7, 1983

Mr. Robert Martin, P.E. Deputy Director, EQO State of Alaska Dept. of Environmental Conservation 437 E. Street - Suite 200 Anchorage, Alaska 99501

Subject: Chakachamna Hydroelectric Project

Dear Mr. Martin:

Receipt is acknowledged of your May 25, 1983, letter conveying comments on the March 1983, Interim Feasibility Assessment Report for the subject project.

You are entirely correct in noting that the project studies have thus far been quite limited in scope and consequently the report gives only a review of possible project impacts rather than a detailed impact assessment.

The draft copy of the proposed study plan for the project transmitted with my May 25, 1983, letter contains study elements that will address the problems you noted requiring mitigation strategy. We regret that you were unable to be represented at the June 8, 1983, meeting when these plans for future studies were discussed in an open workshop.

We shall be sure to notify you when further activities are contemplated and shall look forward to your participation when funding permits further studies of the project to go forward.

sincerely, Eric P. Yould

/ <u>-</u>:

Executive Director

cc: Ar. Robert Loder, Bechtel, San Francisco Mr. Wayne Lifton, Woodward-Clyde, Anchorage
#### DEPARTMENT OF FISH AND GAME

OFFICE OF THE COMMISSIONER

BENE LE

P.O.BOX 3-2000 JUNEAU, ALASKA 99802 PHONE: (907) 465-4100

May 26, 1983

Alaska Power Authority 334 West 5th Avenue Anchorage, Alaska 99501

Attention: Mr. Eric P. Yould, Executive Director

Gentlemen:

1-K12LH

Re: Chakachamna Hydroelectric Project Interim Feasibility Assessment Report

The Alaska Department of Fish and Game (ADF&G) has reviewed the Chakachamna Hydroelectric Project Interim Feasibility Assessment Report dated March 1983 and offers the following comments for your consideration:

A. General

Overall, the paucity of quantitative data and general conclusions presented in this Interim Feasibility Report confirm the need for a far more encompassing and detailed level of study effort designed to document fully fish and wildlife species and their use of habitats within the study area. The minimal field studies accomplished to date evidence the need for more detailed, site-specific and longer term inventory data before a thorough understanding of the pre-project and post-project conditions can be attained.

Additional study elements which are needed include the collection of sufficient physical and biological environmental information to accomplish an instream flow analysis. This analysis would quantify the optimum flows required to maintain spawning, rearing, migration and incubation habitat for resident and anadromous fish species present within the Chakachamna and McArthur Rivers.

In addition to the instream flow analysis, information sufficient to quantify potential impacts to fish and wildlife resources and public use attributable to the proposed project should be presented. This information should be developed in enough detail to provide for the development of an effective mitigation plan.

We understand that a study plan for the 1983/84 field study program has been drafted and will soon be available for agency review and comment. We look forward to the opportunity to review and provide comments/recommendations on this study plan.

- B. Aquatic Biology
  - It does not appear that the study objectives outlined on page 6-28 have been accomplished. Specifically the text does not:
    - a. evaluate those species and habitats potentially vulnerable to impacts that might occur during the construction and operation of one of the proposed alternatives;
    - b. provide an evaluation of the nature and extent of studies that would be necessary to assess the minimum amount of water necessary to maintain a viable salmon fishery,
    - c. identify critical habitats and life functions occurring within the system in sufficient detail for use in evaluating potential impacts to such areas or life functions,
    - d. address in adequate detail the morphologic, hydraulic and biological studies required to initiate the proposed Instream Flow Analysis using the IFG Incremental Methodology.

#### C. Juvenile Salmon Studies

- 1. The winter-spring sampling program was very sporadic. The information presented does not appear to be based upon a field program designed to sample systematically those stations in stream reaches which are believed to be important overwintering areas.
- 2. Presentation of the field data lacks pertinent analysis parameters including the omission of sample size data and the electrofishing and seining data are not addressed in terms of catch per unit effort (CPUE). The text discusses data without reference to tables or by referencing the wrong tables; and the report contains no summarization of juvenile catch data comparing seasonal variation by sampling station.

Mr. Eric Yould

- 3. Conclusions drawn about habitat utilization by juveniles during the winter and spring period are based on limited and inadequate sample sizes. It appears that no effort has been made to analyze the raw data to determine if hypothesized changes are statistically significant or simply a function of sample variability.
- Techniques used to survey and evaluate smolt outmigration (use of plankton nets) are inappropriate. More effective and standard methods include the use of fyke nets, inclined plane traps, and rigid smolt traps.
- 5. Hydroacoustic sampling on Chakachamna Lake was very superficial and inadequate due to:
  - a. Use of only one sampling period for the study duration;
  - b. Inadequate number of transects;
  - c. Species composition was not verified by other sampling means (tow-netting, etc.);
  - d. Evaluation of juvenile presence and near surface water column fisheries use was not performed. An upward looking transducer would provide this information.

#### D. Adult Salmon Studies

- 1. For the most part, fyke nets are not suitable for obtaining a representative sample of adult salmon migrating past sampling stations. Nets can only be placed in areas of minimal current and as such do not capture species which do not exhibit shore oriented behavior.
- 2. Some of the techniques used (overflights and netting) do not seem suitable for identification of potential mainstem spawning in glacially occluded areas (and subsequent enumeration of spawners). As a result, very little effort has been made to evaluate the extent of spawning in the mainstem Chakachamna and McArthur rivers. Further, the discussion assumes all spawning occurred in clearwater areas and, therefore, habitat requirements for spawning are limited to those areas. The ADF&G, through the Susitna Hydro Study, has developed highly successful and efficient electroshocking sampling techniques which would have application for the McArthur and Chakchamna River inventories.

Mr. Eric Yould

- 3. Potential lake spawning was addressed only superficially and in no way represents an adequate evaluation of that possibility.
- 4. No data are presented concerning the "correcting" of aerial counts by ground truthing (how much of each spawning area worked, how often repeated, how did counts compare, etc.).
- 5. No streamlife data are presented in this report (number tagged fish observed, frequency of observation, etc.). This information directly affects escapement estimates and should be well documented.

#### E. Terrestrial Vegetation and Wildlife - Mammals

The information presented in this report pertaining to wildlife and human use of wildlife does not meet the study "...to identify objective on page 6-59 which states: important wildlife resources in the study area, their use of the area, and the importance of identified vegetative and aquatic communities to these resources." The data and conclusions presented will not enable a meaningful assessment of the potential project impacts on the wildlife resources, their habitats or the secondary effects of public use of these resources. The ADF&G believes that the level of effort used to define existing wildlife use was not adequate to evaluate fully wildlife use of the area. A two-week field program does not allow enough time to quantify terrestrial mammal use of such a large area displaying such a wide range of habitat types. The species list compiled lacks several species known to occur in this area including fox, hare, martin and weasel. Table 6.2, page 6-7 should be amended to include these species. Gray wolves are occasional users of this area and should not be considered common users as indicated in table 6.2. Moose, bear and furbearer harvest statistics for the study area should be included or summarized in this report.

The limited aerial survey data are suspect due to seasonal and nocturnal variations. Methodologies used to identify moose calving and wintering areas are also questionable. The presence of juvenile skeletal remains should not be construed to confirm a calving area nor should shed antlers be relied upon to denote a moose wintering area.

In summary, while there are a significant amount of new data in this report, they are not properly presented, and in some cases the conclusions based on the data are questionable. In addition, given the unplanned and sporadic nature of the data collection, conclusions drawn based on this information may be of little value in determining the potential effects of the proposed project on the anadromous fish resources of the two drainages studied. We suggest that the report data

Mr. Eric Yould

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be used as background for preparing a more detailed study plan which will meet the objectives necessary to evaluate the project. We look forward to working with the APA and its contractors to develop a study plan to collect the information necessary to quantify impacts attributable to the project and to develop an acceptable mitigation plan.

Should you have questions or require clarification regarding our comments, please contact Habitat Division Staff in Anchorage.

Sincerely, low Don W. Collinsworth

Commissioner

## ALASKA POWER AUTHORITY

#### 334 WEST 5th AVENUE - ANCHORAGE, ALASKA 99501

Phone: (907) 277-7641 (907) 276-0001

September 12, 1983

The Honorable Don W. Collinsworth Commissioner State of Alaska Dept. of Fish and Game P.O. Box 3-2000 Juneau, Alaska 99802

Subject: Chakachamna Hydroelectric Project

Dear Commissioner Collinsworth:

Receipt is acknowledged of your May 26, 1983, letter conveying the comments of your Department on the Interim Feasibility Assessment Report for the subject project.

During our December 9, 1983, meeting in Anchorage, it was agreed that the Alaska Power Authority would develop a study plan as considered necessary to meet Federal Energy Regulatory Commission (FERC) license application filing requirements. Our consulting engineers and environmental advisors developed such a study plan and it was transmitted to the various resource agencies by letter dated May 25, 1983.

Subsequently, a meeting was called in our Anchorage office on June 8, 1983. At this meeting a brief presentation covering the study plan was made and representatives of the resource agencies were then invited to participate in a workshop during which much useful dialogue ensued. The study plan specifically addressed collection of data that will provide the level of information needed for detailed impact assessment and mitigation planning. Commencement of the study plan is, however, dependent upon the allocation of funds for its implementation.

We were pleased to receive your comments on the March 1983, Interim Feasibility Assessment Report and offer the responses discussed below by heading:

(B) Aquatic Biology - The initial studies conducted in 1981 and winter/spring 1982, were designed to address and to meet the objectives mentioned insofar as the timing, budgets, and authorization of the studies allowed. It is recognized that such reconnaissance studies are not sufficient by themselves to meet all of the study objectives. The proposed studies for 1983-84 are an expansion of those conducted in the summer/fall Don Collinsworth September 12, 1983 Page 2

of 1982, and are described in the recently prepared study plan which was presented to representatives of your agency on June 8, 1983. Instream flow studies have been identified as important to meeting the project objectives, and baseline data have been collected on the morphology, hydraulics, and aquatic biology of the Chakachatna and McArthur River systems. This has led to a selection of river segments within which instream flow study reaches will be selected. As stated in the study plan, it is proposed to collect data in these study reaches for analysis using the IFG Incremental methodology.

(C) Juvenile Salmon Studies -

1. The winter/spring 1982 sampling was conducted at a reconnaissance level and on an ad hoc basis as funds became available during the spring of 1982. These studies were primarily exploratory in nature, with most field programs of limited duration. The primary purpose of the winter studies was to discover areas of potential fisheries over-wintering habitat.

2. Since the data collected in winter/spring 1982 were basically exploratory in nature, seasonal comparisons with more detailed data collections were not warranted. Equal sampling efforts for seining and electrofishing were used at each station; catch per unit effort data for these techniques were presented in Volume III, Appendix A5 of the March 1983 report. An errata sheet for incorrect table references will be prepared and issued with the Addendum to the report in the near future.

3. Because the study was largely exploratory in nature, no detailed prior statistical comparisons were planned and we do not believe they were warranted at that time. The data were purposely presented as observations related to species presence and timing so that the reader would not confuse the results with those of more detailed studies to be conducted later.

4. Outmigrant sampling, as stated in the text, was conducted briefly in different areas of the river systems and by helicopter to aid in evaluating timing of outmigration during a one-day investigation. We concur that an inclined plane trap is a superior method for conducting full-scale programs; an inclined plan trap was utilized in the spring 1983 work, and provision for this methodology is included in our 1983-84 study plan.

5. Weather and safety conditions during September 1983, limited the type and extent of hydroacoustic studies that

Don Collinsworth September 12, 1983 Page 3

> could be done. The studies were originally planned to be far more detailed. The hydroacoustic surveys proposed for 1983-84 and presented in the study plan, address all stated concerns.

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D. Adult Salmon Studies -

1. During 1982, fyke nets were the only gear available to the project. The nets provided useful data and, in some instances, fished 50 to 100 percent of the stream. As stated in the 1983 study plan, a combination of fish wheels and fyke nets will be used for more detailed studies.

2. Relatively low levels of effort were expended to sample for mainstem spawning in areas where there was no suitable substrate. Many areas of both rivers are also unsuitable due to velocity or depth. Such areas include the vast majority of both the McArthur and Chakachatna River mainstem areas. We concur that electrofishing is an efficient sampling technique in mainstem areas, and we have used it for that purpose in both rivers. An expanded electrofishing program is included in the 1983-84 study plan.

3. Lake spawning was only investigated in areas with substrate suitable for sockeye salmon spawning. The 1983-84 study plan calls for more intensive studies in the future.

4 & 5. These data will be supplied in a future report.

E. Terrestrial Vegetation and Wildlife - During September 1981, a two-week reconnaissance level survey was conducted on the vegetation and wildlife at Chakachatna area. The intent of this survey was to gain a basic understanding of species presence and distribution, or absence. The results of the survey were to be used for planning the scope and level of effort for future studies. To date, funding for additional terrestrial studies has not been available.

A description of future studies was prepared and was discussed with ADF&G representative at our June 8, 1983, meeting. These studies included:

- ° The preparation of vegetation maps;
- Aerial and ground transects to quantitatively describe the wildlife resources; and

Don Collinsworth September 12, 1983 Page 4

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The use of a modified Habitat Evaluation Procedures analysis to quantitatively describe anticipated project impacts.

This program will be conducted during the course of a year to identify seasonal changes in habitat availability and use when funds become available.

Again, thank you for your comments on the March 1983, report. We look forward to the continuing cooperation of your staff in the implementation of our future studies for this project.

If you have any further questions, please feel free to contact me or Mr. Eric Marchegiani.

incerely, Eric P. Yould Executive Director

cc: Mr. Robert Loder, Bechtel, San Francisco Mr. Wayne Lifton, Woodward-Clyde, Anchorage Mr. Don McKay, ADF&G, Anchorage

MEMORANDUM State of Alaska Community and Regional Affairs TO: Eric P. Yould, Executive Director DATE 31 May 1983 Alaska Power Authority Department of Commerce and Economico. Development RECEIVED FROM: Commissioner Chakachamna Interim Mark SUBJECT: Companity and Regional Feasibility Study JUN 0 9 1983 Affairs ALASKA POWER AUTHORITY

Thank you for the opportunity to review the Chakachamna Interim Feasibility Study. With regard to the study, and the major hydroelectric project which it presents, this Department submits the following comments for your consideration.

The report's introduction (p. 1-1) presents a study objective: "...to provide a preliminary assessment of the effects that the project would have on the environment". Further in the report, the study environment is defined to include a component of "Human Resources", as well as hydrology and biology. In reading the study, we therefore anticipated the presentation of a preliminary assessment of the effects of the development on the human environment. In this case, the potentiallya@ffected human environment is represented at four different levels; by the village of Tyonek; by the Kenai Borough; by the Matanuska-Susitna Borough; and by the Municipality of Anchorage.

However, while this feasibility study did include reasonably thorough baseline portraits of these four human habitats, it stopped short of any actual assessment of the potential effects of project development, either beneficial or detrimental, on the human resource.

A final feasibility study for this proposed project should include specific assessments of the effects of the development on the human resource. Such assessments should be undertaken and presented in such detail and manner so as to permit the potentially a ffected populations and their representatives to clearly understand the implications of the development relevant to their community (ies).

An example of the kind of further assessment that should be undertaken is a comparison of the existing and potential relationship between the wildlife resource and the use of that resource for subsistance and commercial purposes. The Interim feasibility study presents a detailed account of the area's wildlife, particularly its fisheries resources. The study also Mr. Eric P. Yould 31 May 1983 Page Two

indicates that the residents of Tyonek have a strong subsistance relationship to that resource. However, a next step should be taken which specifically relates the acquired data on fisheries to the data on human use of that resource. That is, who fishes for what kind of fish, when and where, and how is the fish used? Knowing this, a further step should be taken which would superimpose the various development scenerios onto the existing framework; assessing the possible range of effects that the development could produce.

The final feasibility study should carry the human resource assessments at least to this point. However, a further useful step in the feasibility process would be the formulation and assessment of possible strategies that a ffected populations could employ to obtain the maximum benefit (and minimum detriment) from the development, should it actually occur.

Most importantly, the above described assessment and strategy formulation process should include effective participation opportunities for potentially\_affected populations.

Three areas of concern for which the above process should be employed are: 1) Tyonek village subsistance activity; 2) the economics of commercial fisheries interests in Upper Cook Inlet; and 3) increased service demands on the Kenai Peninsula Borough resulting from construction and operations phases of the project. We feel that it is appropriate and necessary that the final feasibility study reflect a fundamental understanding of the potential futures of these areas of concern relative to the proposed hydroelectric project.

Again, thank you for the opportunity to comment on the study.

## ALASKA POWER AUTHORITY

#### 334 WEST 5th AVENUE - ANCHORAGE, ALASKA 99501

Phone: (907) 277-7641 (907) 276-0001

September 7, 1983

The Honorable Mark Lewis Commissioner State of Alaska Community & Regional Affairs Pouch B Juneau, Alaska 99811

Subject: Chakachamna Hydroelectric Project

Dear Commissioner Lewis:

Receipt is acknowledged of your memorandum dated May 31, 1983. We were pleased to receive your comments on the March 1983, Interim Feasibility Assessment Report for the subject project and have carefully reviewed them. The Report had a limited set of objectives which included:

- Identify issues and conflicts to be addressed by project studies;
- Summarize available environmental data with additional data gathered dependent on funding priorities;
- ° Identify potential impacts without detailed analysis;
- <sup>°</sup> Compare project alternatives from engineering, economic and environmental perspectives.

When sufficient funds can be allocated to this project, it is intended to prepare baseline data for a Federal Energy Regulatory Commission License application. At that time, impacts and mitigation measures, including those cited in your memorandum, will be examined. Your concerns such as impacts on Tyonek, the Kenai Peninsula and Mat-Su Boroughs and the Municipality of Anchorage will be addressed as will the impacts on commercial fishing and Tyonek subsistence activities. The preparation of development scenarios, mitigation measures and public participation programs and the definition of project benefits, would also take place at that time. The draft of a proposed study plan for that work was transmitted to you with our letter dated May 25, 1983. It is regretted that you were unable to be represented at the June 8, 1983, meeting when that study plan was discussed. The Honorable Mark Lewis September 7, 1983 Page 2

We shall look forward to your participation and cooperation when funding considerations permit some of these studies to proceed.

Sincerely, I

Eric P. Yould Executive Director

cc:

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Mr. Robert Loder, Bechtel, San Francisco Mr. Wayne Lifton, Woodward-Clyde, Anchorage

## MEMORANDUM

DEPARTMENT OF NATURAL RESOURCES

TO: Eric Yould Executive Director Alaska Power Authority

State of Alaska

DIVISION OF RESEARCH AND DEVELOPMENT

DATE: June 9, 1983

FILE NO:

TELEPHONE NO: 276-2653

RECEIVED JUN 15 1983 ALASKA POWER AUTHORITY

SUBJECT: Chakachamna Hydro

FROM: Roland Shanks Director

The Department of Natural Resources has reviewed the Chackachamna Hydroelectric Project Interim Feasibility Assessment Report. The department's clearinghouse, which is located in this division, has received the following information.

The geologic hazards associated with this project are immense and difficult to predict. Effects of an eruption of Mt. Spurr on the Barrior Glacier and Chakachamna Lake could be devastating to attempts to produce hydropower. The project's proximity to the Castle Mountain Fault also needs to be considered.

I hope that the tardiness of these comments does not affect their usefulness. The delay was due to problems with the postal service and was beyond our control.

cc: Gary Prokosch, SCDO Gail March, DGGS

LW:rh

## ALASKA POWER AUTHORITY

#### 334 WEST 5th AVENUE - ANCHORAGE, ALASKA 99501

Phone: (907) 277-7641 (907) 276-0001

September 7, 1983

Mr. Roland Shanks Director Department of Natural Resources Division of Research & Development 555 Cordova Pouch 7-0005 Anchorage, Alaska 99501

Subject: Chakachamna Hydroelectric Project

Dear Mr. Shanks:

Thank you for your June 9, 1983, memorandum conveying your comments on the Interim Feasibility Assessment Report for the above referenced project.

Please rest assured that the Alaska Power Authority staff, and our consulting engineers studying the project, are well apprized of the hazards associated with an eruption of Mt. Spurr, and with the seismic risk posed by the proximity of the Castle Mountain Fault. The underground arrangement presently proposed for the project should be less vulnerable than surface structures to seismic damage. For example, a surface powerhouse in the McArthur Valley would be subject to rock falls from the high valley walls above the powerhouse during a seismic event.

Your comments are well taken and further investigations of these phenomena are planned when funding permits that to be done.

Eric P. Yould Executive Director

cc: *Mr. Robert Loder*, Bechtel, San Francisco Mr. Wayne Lifton, Woodward-Clyde, Anchorage

# MEMORANDUM

# State of Alaska

DEPARTMENT OF NATURAL RESOURCES

TO: ERIC MARCHEGIANI Alaska Power Authority

| DIVISION | OF | RESEARCH | AND | DEVELOPMENT |  |
|----------|----|----------|-----|-------------|--|
|          |    |          |     |             |  |

DATE: June 14, 1983 RECEIVED FILE NO: DNR 83053102

TELEPHONE NO: 276-2653 UN 2 0 1983

276-2653

SUBJECT: ALASK POWER AUTHORITY Chakachamna Hydro Project

FROM: ROLAND SHANKS

The Department of Natural Resources has received the draft study plan of the proposed hydroelectric project. Reviewers have two concerns:

- Page B-8 What is the purpose of building a dike at the end of the lake? If the dike is intended to raise the water level, this may create problems by making Barrier Glacier unstable.
- Page 13 We recommend that the study plan include an evaluation of whether the glacier is thickening or thinning. Barrier Glacier holds back the lake. If the glacier moves, then the lake moves also.

Please contact Gail March at the Division of Geological and Geophysical Survey, 474-7147, if you have any questions.

RS/LW/dpj

### **ALASKA POWER AUTHORITY**

334 WEST 5th AVENUE - ANCHORAGE, ALASKA 99501

September 7, 1983

Phone: (907) 277-7641 (907) 276-0001

Mr. Roland Shanks, Director Department of Natural Resources Division of Research & Development 555 Cordova Pouch 7-0005 Anchorage, Alaska 99501

SEP 1 9 1983

R. T. LODER

Subject: Chakachamna Hydroelectric Project

Dear Mr. Shanks:

Receipt is acknowledged of your memorandum dated June 14, 1983, conveying two comments on the Interim Feasibility Assessment Report. Our response is as follows:

- (1) Page B-8. Building a dike at the end of the lake, near its present outlet, is proposed for several reasons, principal among which is the need to develop regulatory storage that will enable surplus water to be stored during the high runoff months and then be diverted for power generation during the low runoff months. The dike would not cause the water level in the lake to rise above the maximum level to which it has risen in the past under natural conditions. Thus, the Barrier Glacier would not be exposed to lake water levels any higher than it has in the past. As may be seen by reference to the Appendix to Section 4.0, Power Studies, in Volume I of the report, Alternative E, Page 1, the mean lake level during operation of the power plant in the 30-year period study would have been Elev. 1,130 feet. According to the U.S. Geological Survey (USGS) records, the mean water level at the lake outlet gauge was 1,139 feet so that operation of the lake for power generation would have caused a net lowering of about 9 feet in the mean water level during that period.
- (2) <u>Page 13</u>. Plans for future studies of the project provide for measurements of ablation, advance or retreat of the glacial ice in the vicinity of the lake outlet. Ice thicknesses were measured by the USGS in 1981, but the results have not yet been released.

Sincerely Eric P. Yould

Executive Director

cc:

Nr. Robert Loder, Bechtel, San Francisco Mr. Wayne Lifton, Woodward-Clyde, Anchorage

# ADDENDUM TO VOLUME II

#### 6.0 ENVIRONMENTAL STUDIES

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Volume II, Errata

- 6.8.3.1.4 Spring Studies June 8-11, 1982
  - Page 6-170, <u>Chilligan River</u>, third line "Table 19" should read "Table 20."
  - Page 6-171, <u>Chakachatna River</u>, second paragraph, third line, "Table 22" should read "Table 23."
  - Page 6-173, <u>McArthur River Drainage</u>, second paragraph, first line, "Table 33" should read "Tables 32 and 33."

#### Supplementary Table References

| Page No. | Location                                 | Volume III Table Reference           |
|----------|------------------------------------------|--------------------------------------|
| 6-167    | Straight Creek                           | Appendix A3 - Table 13               |
| 6-170    | Another River                            | Appendix A3 - Table 18               |
| 6-172    | Lower Chakachatna<br>River               | Appendix A3 - Table 26               |
| 6-173    | Straight Creek                           | Appendix A3 - Table 31               |
| 6-174    | McArthur R. Sta. 11.5                    | Appendix A3 - Table 36               |
| 6-174    | McArthur R. Sta. 11                      | Appendix A3 - Table 37               |
| 6-175    | Chakachatna R. Sta. 1                    | 7 Appendix A3 - Table 39             |
| 6-175    | Middle River                             | Appendix A3 - Tables 40<br>& 41      |
| 6-175    | Straight Creek Clear-<br>water Tributary | Appendix A3 - Table 42               |
| 6-176    | McArthur River                           | Appendix A3 - Tables 43,<br>44, & 45 |

#### 6.10 ENVIRONMENTAL HYDROLOGY - 1983

#### 6.10.1 Introduction

The purpose of this section is to describe the hydrologic studies conducted in the late fall, winter, and spring of 1982-83 (FY83) in support of the environmental program leading toward the feasibility assessment of the Chakachamna Lake Hydroelectric Project. The overall objective of the environmental hydrology studies was to collect baseline data to assist in future evaluation of the physical processes of the Chakachatna and McArthur River systems, correlation of these processes with fish and wildlife habitats, and to aid in the design of future studies. Previous environmental hydrology studies are summarized in Volume II, Sections 6.2 and 6.7 of the 1983 Interim Feasibility Assessment (1983 IFAR) Report.

The study area is described in Volume II, Sections 6.1 and 6.2 (1983 IFAR). The FY83 winter/spring hydrologic studies were conducted on the Chakachatna River at the Chakachamna Lake outlet and on the McArthur River downstream of the powerhouse location. The studies at these sites concentrated on baseline data collection of stream flow and water temperature. Two recording gages (Datapod Model DP211SG dual channel recorders) were used to record water stage and temperature at the two study sites. The installation and initial data collection of these recorders is discussed in Volume II, Section 6.7.2 of the 1983 IFAR.

#### 6.10.2 Stream Flow Characteristics

Collection of streamflow data was initiated in 1982 with the installation of two recording gages and numerous staff gages distributed through the Chakachatna and McArthur River systems. A single discharge measurement was taken in October at a number of the sites to form the basis of preliminary rating curves. These discharges, along with comparable discharges measured in September 1981, were presented in Section 6.7 of the report. Additional discharge measurements were made in Spring of 1983 at five sites in the project area (Table 6.85). Two of these measurements were used to improve the reliability of the rating curves at these sites.

Chakachatna River. The preliminary rating curve used to calculate the Chakachatna River discharges reported in Section 6.7 (1983 IFAR) was revised based on the additional discharge measurement conducted in spring of 1983 and on a review of U.S.G.S. rating curves. The stages corresponding to the two discharges were adjusted to approximately the same reference elevation as the U.S.G.S. gage reference elevation by adding 7 ft. to the datapod readings. The zero datapod reading does not correspond to a zero discharge because the datapod was installed in the existing U.S.G.S. gage stilling well, which did not extend all the way to the bottom of the channel. The adjustment shifts the stage corresponding to a zero discharge on the datapod to 7 ft. below the datapod, close to the actual stage for zero flow. The two measured discharges and corresponding

adjusted stages were found to fit closely to the rating curve developed for the period June 1959 to May 1960 by the U.S.G.S. This curve was based on six discharge measurements and was considered by the U.S.G.S. to be fairly well defined between 800 cfs and 14,000 cfs. Although the U.S.G.S. rating curves shifted from one year to the next, they tended to have similar shapes. It was assumed that using the U.S.G.S. rating curve for the 1959-60 period would be preferable to using a rating curve based on only two measurements in 1982-83. The resulting rating equations are:

Q = 1.09  $(S_d + 7)^{3.28}$ for 0 \_ S\_d \_ 6.2 and Q = 12.26  $(S_d + 7)^{2.34}$ for 6.2 S\_d 15 where

> Q = computed discharge, in cfs and  $S_d$  = stage recorded on the datapod, in ft.

The rating curve equations were applied to the stage values recorded by the datapod from its installation on 11 August 1982 through 17 May 1983. The resulting mean daily discharges are presented in Table 6.86, which supersedes the Chakachatna River values presented in Table 6.26 (1983 IFAR) based on the preliminary rating curve. The discharge hydrograph for this period is shown in Figure 6.144. Discharge records for the period August through September are considered poor due to the lack of discharge measurements to verify the rating curve. Discharge records after November are considered very poor due to lack of discharge measurements and insufficient depth of water over the gage.

The stilling well housing of the Chakachatna River gage was destroyed by ice and/or rock falls on or about 17 May 1983. The lower sections of the stilling well were severed from the upper sections at a level roughly 10 to 12 ft. above the level of the gage. The transducer and connector cable for the datapod unit were damaged in the process. The unit was retrieved on 26 May 1983 for repair. The repaired unit was reinstalled on 18 June 1983 on the opposite bank with the pressure transducer at a lower The damaged unit precluded the opportunity to level. check the unit for drift of the transducer readings.

<u>McArthur River</u>. The preliminary rating curve used to calculate the McArthur River discharges presented in Volume II, Section 6.7 (1983 IFAR) does not need to be revised based on the discharge measured in April of 1983. The measured discharge fit the straight line log-log relationship defined by a single field measurement, which was supplemented by a number of values computed using the Manning equation. The equation for this rating curve, which is applicable to the condition of having sand dunes in the channel (see Volume II, Section 6.7.3 1983 IFAR) for a discussion of these dunes), is as follows:

 $Q = 6.59 S_{d}^{3.85}$ where

> Q = computed discharge, in cfs, and  $S_d$  = stage recorded on the datapod, in ft.

A rating curve was also developed for the period prior to the mid-September 1982 flood when there were no sand dunes in the cross section at the gage. This

curve was based only on discharge values calculated from the Manning equation. There were no measured discharges at this cross section prior to the mid-September flood. The resulting rating curve can be written:

$$Q = 141.1 s_d^{1.81}$$

where Q and S<sub>d</sub> are as defined above. It is assumed for both curves that the discharge is zero when the gage is zero (no offset constant); this assumption appears reasonable based on observations at the site. Surveyed water surface elevations were compared with datapod readings to check for drift on the datapod's pressure transducer; a drift of almost 1.5 ft. was calculated from June 1983 measurements. Adjustments to the datapod readings were made assuming linear drift at a rate equal to that during the period from 6 April to 19 June 1983. Based on these assumptions, the datapod readings were adjusted by a constant amount each day beginning on 24 September 1982.

The Adjusted stage values were input to the applicable rating curve equation to compute the corresponding mean daily discharges (Table 6.87). This table supersedes the McArthur River values presented in Table 6.26 (Volume II, 1983 IFAR). The discharge hydrograph for this period is shown in Figure 6.145. Discharge records are considered poor due to the lack of discharge measurements defining the rating curves and the shifting bed.

The datapod gage was replaced on 29 June 1983 to allow for servicing of the drift in the old

transducer. The new datapod unit was installed a short distance upstream of the previous gage. Selection of the new gage site was based on (1) the desire to install the gage in a way that it could more easily be removed for servicing and (2) finding a cross section with a lower potential for sediment deposition.

#### 6.10.3 Water Temperature

Water temperatures were measured on a continuous basis at the recording gage locations on the Chakachatna and McArthur Rivers. The daily fluctuations during the late summer and fall are presented in Section 6.7.4, Volume II, 1983 IFAR. Water temperature data for the late fall and winter period at the Chakachatna and McArthur River gage locations are presented in Tables 6.88 and 6.89, respectively of this addendum.

Water temperature in the Chakachatna River decreased to near 0°C by early December. Insufficient depth of water over the transducer limits the usefulness of the temperature data after that time. Water temperatures in the McArthur River decreased to 0°C by early November, began to increase in early April and exceeded 4.0°C by mid-May.

#### 6.11 AQUATIC BIOLOGY - 1983

#### 6.11.1 Introduction and Objectives

Two aquatic biology studies were conducted during 1983; one during winter 1983, and the other during spring 1983.

#### 6.11.1.1 Winter Study

During April 1983 a brief winter field study was carried out with a limited scope of work. This study was carried out in conjunction with environmental hydrology studies and was designed to supplement work carried out during the fall of 1982 (Volume II, 1983 IFAR). The objectives of this study were:

- ¶ Extend the data base on habitat use and seasonal distribution of fish;
- ¶ Examine the success of spawning and incubation at selected sites;
- ¶ Extend the data base on habitat characteristics and water quality including water temperatures in salmon incubation areas.

#### 6.11.1.2 Spring 1983 Study

This study was carried out in the period of mid-June to early July, with the start date based upon permit authorization. Studies were carried out under FY83 funds and were terminated when the authorized scope-of-work had been met. These studies were

conducted to the extent feasible, (and authorized) at the level of effort described in the 1983 study plan (Alaska Power Authority, 1983).

This level of effort included more stations than sampled during 1982 and more sample replicates. The study program objectives are described below by program task.

#### 6.11.1.2.1 Adult Anadromous Fish

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Although this program was not included in the original scope of work, the presence of adult anadromous fish within the river systems allowed opportunistic data collection to increase the information available about the early migration of salmon into the Chakachatna and McArthur River Systems. The objectives of the program were:

- ¶ Determine the timing of upstream migrations by adult anadromous fish;
- ¶ Determine migratory pathways within the Chakachatna and McArthur River Systems as efforts permitted; and
- ¶ Estimate the escapement to spawning areas in sloughs, tributaries, and mainstream areas as time permitted.

#### 6.11.1.2.2 Resident and Juvenile Anadromous Fish

This program was carried out at a greater level of effort than in previous studies (see Section 6.11.2).

Since the program consisted of only one time period it was designed to <u>contribute</u> to meeting the following objectives:

- ¶ Determine the relative seasonal distribution and abundance of R&JA fish;
- ¶ Identify important rearing areas of R&JA fish; and
- ¶ Identify movement patterns of R&JA fish.

Outmigrants were also studied. Due to the timing and duration of the study, a limited amount of data was collected to meet the overall objectives of:

- ¶ Determine the timing of outmigration of salmon juveniles; and
- ¶ Quantify the number of juveniles migrating to sea.

6.11.1.2.3 Habitat Data Collection

This program was directed at measuring the physical characteristics of habitats at each sampling station. The overall objective was to Determine the use and characteristics of important habitats and characterize these in terms of stream-flow variables.

#### 6.11.2 <u>Methodology</u>

Methodologies used during the winter and spring 1983 studies were basically similar to those used during the 1982 summer-fall fisheries program. Where methods used were the same these have been referenced

to Volume II, 1983 IFAR. Where methods or intensity differed, the differences are discussed below. The study periods during which each gear was operated are noted in Tables 6.90 and 6.91. The sampling stations used in this study are shown in Figure 6.146 with details of the McArthur tributaries shown in Figures 6.147 and 6.148.

6.11.2.1 <u>Salmon Spawning Escapement</u>. Although estimation of salmon spawning escapement during the spring (June-July) 1983 studies was not included in the scope of work, observations and counts were made on an opportunistic basis. Methodology generally followed that used during 1982 (see Volume II, Section 6.8.2.1, 1983 IFAR). Ground-truthing was performed for species identification at each site, but counts were not ground-truthed during these surveys.

#### 6.11.2.2 Fyke Nets

During the spring 1983 study, fyke nets were set as a supplement to electrofishing and minnow trap sampling. Nets were initially set at stations 1D, 4, and 6 for dates shown in Table 6.91. The methodology used to fish and sample these nets was the same as that used during the summer-fall 1982 program (Volume II, Section 6.8.2.2 1983 IFAR). Difficulties with heavy debris loads associated with increasing flows occurred at all three stations, and moving sand dunes in the McArthur River were a problem at station 1D. These problems resulted in early removal of the nets.

#### 6.11.2.3 Minnow Traps

Minnow trap methodology for the winter 1983 study was the same as that employed during the 1982 studies (Volume II, Section 6.8.2.3, 1983 IFAR). Four replicate traps were set at each station listed in Table 6.90.

For the spring 1983 study, the methodology was altered in accordance with the draft Chakachamna Hydroelectric Project Feasibility Study Environmental Study Plan (APA, 1983). As stated in that plan, the number of sampling stations below Chakachamna Lake was increased from 26 to 40 (Figure 6.147). Ten baited minnow traps were set at each station (Table 6.91). The minnow traps used were 43.2 x 22.9 cm (17 x 9 in), with 1.6 mm (0.063) in mesh. These traps were set overnight (24 hours) and each set was considered a unit of effort.

#### 6.11.2.4 <u>Electrofishing</u>

Electrofishing during the April and spring studies generally followed the same methodology used during 1982 (Volume II, Section 6.8.2.6, 1983 IFAR). During the April study, electrofishing was used to supplement minnow trap collections, particularly in those areas where turbidity, cover objects, or depth did not allow an adequate determination of fish abundance by observation.

During the spring 1983 study, electrofishing was used at all stations sampled (Table 6.91). Three replicate collections were made at each of the resident and juvenile anadromous fish sampling stations below Chakachmna Lake. Electrofishing was generally used by means of localized intermittent application of electrodes to avoid the effect of "driving" the fish. Electrofishing collections were standarized to a catch-per-effort of number of fish/100 shocking-seconds/replicate (100/s-S).

#### 6.11.2.5 <u>Gill Nets</u>

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Vertical experimental gill nets were used for sampling fish in Chakachamna Lake during the winter 1983 study. The nets consisted of vertically oriented panels of nylon monofilament netting of varying mesh sizes. The mesh sizes on each net were ordered on the basis of a randomized block design with each mesh size appearing twice on each net. The nets were 3.0 m wide by 51.2 m long (10 by 168 ft). Meshes used were 1.3 cm (0.5 in), 2.5 cm (1 in), 3.8 cm (1 1/2 in), 5.1 cm (2 in), 6.4 cm (2 1/2 in), 7.6 cm (3 in), and 8.9 cm (3.5 in). Each net was made to be deployed using a weighted pipe at the bottom with rigid horizontal spreaders set perpendicular to the vertical axis along the length of the net. The top of the net was floated and anchored to the ice cover with ice screws. Net effort consisted of a 24 hour set. No fish were caught by this technique during the April study.

#### 6.11.2.6 Inclined Plane Trap Outmigrant Sampling

An inclined plane trap was utilized to sample for outmigrants during the spring 1983 study. The trap was deployed at station 1D and operated from mid-June through early July (Table 6.91). The inclined plane smolt trap is similar in design to that used by ADF&G Commercial Fisheries Division at Crescent Creek. Similar designs have been shown to be effective for sampling the downstream migration of salmon smolt in turbid glacial rivers in Alaska (Meehan, 1964).

The trap (Figure 6.149) is suspended in the water column on each side by floats (pontoons) made of styrofoam and plywood 2.2 m (86 in) long. A frame located slightly in front of the trap center supports a winch system to raise and lower the front of the trap. The trap consists of a perforated aluminum plate floor (0.8 cm, 0.3 in dia. holes) 2.4 m (9.6 in) long and 1.2 m (4 ft) wide at the mouth tapering to the rear where it attaches to the live box. This floor is inside an aluminum frame to which 1.3 cm (0.5 in) mesh wire netting is attached forming the trap sides. The live box is suspended in the water by adjustable styrofoam and plywood floats. The 1.2 m (4.0 ft) long, 0.9 m (3 ft) wide, and 0.6 m (2 ft) deep box has a plywood bottom and perforated aluminum plate sides (0.3 cm, 0.125 in diameter holes). A 10.3 cm (4.1 in) mesh net held in place by a frame is placed inside the box. This net is removable for fish collection. The entire assembly is anchored in place.

Fish were removed daily from the live box and processed, water depth and velocity were also measured to estimate flow through the trap. The trap was cleaned daily and moved if the water depth had changed due to rising water or bed load movement. Such changes were not unusual due to the increasing flow and shifting sand in that portion of the river.

#### 6.11.2.7 Habitat Data Collection

Habitat data were collected in the same manner as described in Volume II, Section 6.8.3, 1983 IFAR. In addition to those data previously collected, measurements of incubation habitat were made during the winter 1983 field trip. Incubation data were collected by means of 2.5 cm (1.0 in) inner diameter, 1.0-2.0 m (3.3-6.6 ft.) long standpipes installed in previously identified spawning areas. These standpipes were installed with their openings as deep as 0.4-1.0 m (1.5-3 ft) below the surface of the substrate. The standpipes were "bailed-out" by means of a hand pump and intergravel water temperature was measured within the standpipe.

#### 6.11.2.8 Data Management and Analysis

Data management and analysis for the winter and spring 1983 studies had the same objectives and were generally similar to these reported in Volume II, Section 6.8.2.11, 1983 IFAR. Data management was conducted using the INFO database management system on the Prime computer. Statistical analyses were carried out using the Statpro and BMDP statistical packages. The basic analysis used was Analysis of Variance (ANOVA) with individual comparisons made by group variance-adjusted (Bonneferoni) probabilities.

Habitat utilization data were summarized by Woodward-Clyde Consultant's computer programs following methodologies described by Baldridge (1981) and Bovee and Cochnauer (1977).

#### 6.11.3 Results

The two studies conducted in 1983, were carried out at different levels of effort using a somewhat different set of stations and are therefore presented separately below.

#### 6.11.3.1 Winter 1983 Study

Winter studies were carried out during April 5-11, 1983 primarily to provide supplementary information on the seasonal distribution and habitat use of fish in the study area. Site specific data collection on incubation and overwintering habitats were emphasized. Sampling was generally conducted where site access was available and at a reduced level of effort as compared to that used during the summer-fall 1982 studies. Data collections were made on an opportunistic basis and emphasized those areas where spawning was observed or where potential overwintering sites had been located based on previous data (see Volume II, Section 6.8.3.2., 1983 IFAR).

#### 6.11.3.1.1 Resident and Juvenile Anadromous Fish

Studies of seasonal fish distribution and examinations for successful incubation were conducted using a variety of methods including minnow traps, electrofishing, observation, dip netting and vertical gill netting. Stations were selected for sampling on the basis of accessibility, time, and budget constraints. Results of collections made by these methods are presented in Appendix B2, catch per effort (c/f) data for these results are presented in

Appendix B3. Vertical gill net results are not presented because no fish was caught using this method. Dates of gear deployment for this study are presented in Table 6.90.

Results of the studies are discussed by species below.

<u>Dolly Varden</u>. During April, age  $0^+$  Dolly Varden had generally reached the stage of complete yolk-sac resorption. In some sloughs and tributaries, the age  $0^+$  fish were found to be free-swimming in the water column, while in other areas they appeared to remain within the interstices of the substrate and could only be observed or collected by the use of electrofishing. Incubation was apparently complete at that time.

Other Dolly Varden collected were limited to those fish no older than age II<sup>+</sup>. Older Dolly Varden had apparently moved to areas of the river systems that were still ice covered, or they moved into marine waters. There was mark-recapture evidence that at least one adult fish had moved through marine waters.

Dolly Varden were widely dispersed throughout the river systems. Largest numbers of Dolly Varden collected by minnow traps were found in the upper Chakachatna River, Noaukta Slough, and the upper McArthur River. This distribution was similar to that found during the October 1982 sampling (Volume II, Section 6.8.3.2.2, 1983 IFAR). At that time, the largest catches of Dolly Varden were made in the Upper McArthur River, Noaukta Slough and mid-Chakachatna River reaches (Table 6.63, Volume II, IFAR).

Dolly Varden were sampled at accessible sampling stations by means of observation, minnow traps, and electrofishing (Appendices B2 and B3). Minnow trap sampling indicated that Dolly Varden collections (Table 6.92) were not significantly different in c/f (p|0.90). Examination of the distribution of Dolly Varden caught by minnow traps among reaches (Table 6.93) indicated that the differences in c/f by reach were of marginal significance (p 0.09). However, the largest c/f for Dolly Varden, 2.25 fish/trap/day occurred in the upper Chakachatna River reach. The c/f was approximately twice as great as at any other station and was significantly greater than most stations (p 0.07 to 0.01). The exceptions were the Noaukta Slough (p 0.14) and the Upper McArthur River (p 0.18) reaches. The catches at those stations were 1.08 and 1.13 fish/trap/day, respectively.

Electrofishing (Table B3-1, Appendix B3) conducted at the same time indicated the general absence of large Dolly Varden as were observed during the October 1982 field program. It is likely that the larger anadromous Dolly Varden had moved downstream to deeper, ice-covered waters, or had left fresh water by that time. The reduced turbidity present during the study period allowed aerial observations to be conducted to confirm the absence of these larger fish in the upper McArthur River. The recapture of an adult Dolly Varden tagged during August 1982 outside of the McArthur and Chakachatna River drainages during this period suggested movement of adult Dolly Varden into marine and other fresh waters.
Electrofishing operations resulted in the collection of age 0<sup>+</sup> Dolly Varden that were apparently not vulnerable to minnow trap collections. The collection of small age 0<sup>+</sup> Dolly Varden from the substrate interstices was evidence of successful spawning and incubation in those areas. Collections of such Dolly Varden were made at stations 15, 17 (by dip net alone, Table B2-3, Appendix B2), 40A and 42.

The distribution of Dolly Varden as collected by all sampling methods is shown in Table 6.94. The percentage occurrence of Dolly Varden at stations sampled during April was 66.7 percent (Table 6.95), which was only matched by coho salmon.

Examination of Dolly Varden occurrence on a reach basis (Table 6.96) indicated that they occurred in all reaches sampled during this study.

<u>Coho Salmon</u>. Coho salmon were widely dispersed in lower portions of both river systems. The greatest numbers of older fish (age II<sup>+</sup>) were collected in the Noaukta Slough and Middle River. Fry were found at varying stages of development in the spawning areas examined. These were found ranging from fry with prominent yolk-sacs to free-swimming juveniles with fully resorbed yolk-sacs.

Coho salmon were widely dispersed during the winter. They were found at 66.7 percent of all sampling stations (Table 6.95) but were not found in all reaches (Table 6.96). Coho salmon have not been found in the Chakachatna River Canyon during any study, nor have they been observed to spawn above this area.

Analysis of collections of coho salmon juveniles made by means of minnow traps indicated that there were statistically significant differences between stations (p 0.0001). Significantly greater (p 0.001) numbers of juvenile coho salmon were found in station 4 in the Middle River (c/f of 4.50 fish/trap/day) than at any other station. Collections of coho salmon from stations 8 and 16A in the Noaukta Slough were significantly (p 0.01) larger than those found at the remaining stations with c/f's of 1.75, and 1.25 fish/trap/day, respectively.

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Coho salmon collected at station 4 (Middle River) consisted primarily of a mix of age  $I^+$  and  $II^+$  fish. Coho collected from stations 8 and 16A were primarily age  $II^+$  fish. Coho collected from other locations were primarily age  $I^+$  fish.

Examination of coho salmon captures by reach (Table 6.93) did not show a significant difference between reaches (p|0.66). This is likely attributable to the high variability in captures among stations within reaches.

Comparison of the distribution of coho juveniles collected by minnow traps by reach between April 1983 and October 1982 (Volume II, Table 6.63, 1983 1FAR) shows some differences in c/f among reaches. The absence of significant differences between reaches precludes any meaningful interpretation of the numerical differences.

Electrofishing was successful in collecting age  $0^+$ and  $1^+$  coho from most other stations (Appendix B2) sampled. The presence of age 0<sup>+</sup> coho fry and parr at station 15, 17, and 42 suggested that successful spawning and incubation had occurred in these areas. At the time of collection, many coho had not completed yolk-sac resorption, while others had and were free-swimming in the water column.

<u>Chinook Salmon</u>. Chinook salmon were caught at only two sampling stations; station 15 in the McArthur River Canyon (one age  $0^+$  fry) and station 19 (one age I<sup>+</sup> parr) in the clearwater tributary to Straight Creek (Figure 6.146).

Some juvenile chinook salmon have been collected from station 15 previously (Volume II, 1983 IFAR), suggesting the probable presence of some limited spawning there. Extensive electrofishing at station 19 failed to detect any other chinook juveniles. Electrofishing in station 19 was conducted in an area where many chinook salmon had been observed spawning. Since this area was subject to a major channel alteration during September 1982 flooding (Volume II, 1983 IFAR), it is likely that a significant loss of juvenile production may have occurred as a result of that flood (extensive sampling was also conducted through this area during spring 1983, see Section 6.11.3.2.2).

<u>Sockeye Salmon</u>. As in previous studies (Volume II, 1983 IFAR), sockeye salmon juveniles were not vulnerable to capture by minnow traps. Sampling by means of electrofishing and dip nets (Appendix B2) resulted in collection of age 0<sup>+</sup> sockeye at stations 15 (upper McArthur River), 17 (sloughs near

DNR bridge site, Chakachatna River) and 42 (Stream 12.1, tributary to the McArthur River, Figure 6.146). The sockeye collected, consisted of fish in varying stages of yolk-sac resorption, ranging from those with prominent yolk-sacs to those with yolk-sacs fully resorbed (button-up stage). At each location sampled, full development of sockeye fry was still incomplete.

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<u>Chum Salmon</u>. Juvenile chum salmon were collected at station 17 (Figure 6.146) in sloughs of the Chakachatna River. Chum salmon were collected by dip net and electrofishing. The age  $0^+$  chum salmon were found in varying stages of yolk-sac resorption, although many of the chum salmon had fully resorbed their yolk-sacs. Chum juveniles, in general, were more fully developed than other salmon species. The mean length of chum salmon collected ranged between 3.90 and 4.05 cm (Appendix B2).

<u>Rainbow Trout</u>. One rainbow trout juvenile was collected during the April study. This was an age I<sup>+</sup> juvenile found in station 40A (Stream 13u, Figure 6.147).

<u>Pygmy Whitefish</u>. Pygmy whitefish have generally been abundant and widely dispersed in collections made in these river systems. However, during the April study only one juvenile pygmy whitefish was collected at station 22 (Table 6.94). The reason for the paucity of pygmy whitefish in collections is unclear.

## 6.11.3.1.2 Habitat Data Collection

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Detailed habitat observations and measurements were routinely made in conjunction with electrofishing and minnow trap collections to aid in establishing a data base for characterizing fish habitat relationships.

Habitat data collected included water temperature, dissolved oxygen, conductivity, turbidity, water depth, water velocity, river stage (staff gage reading), substrate, cover and the presence/absence of upwelling or slough flow. Measurements were taken at the same locations at which fish sampling was conducted. The methodology employed in collecting habitat data was discussed in Section 6.8.2 (Volume II, 1983 IFAR).

<u>Water Quality</u>. This section summarizes water quality for the April field trip at collecting stations (including Chakachamna Lake) during the time of sampling. As stated in Section 6.8.2 (Volume II, 1983 IFAR), water quality data were collected at each station at the time fish were sampled.

A water quality profile was also taken in Chakachamna Lake near mid-lake (Table 6.97). At the time of sampling, there was a 0.6m (2.0 ft) ice cover present. Data collected from Chakachamna Lake indicated considerable variability among certain parameters. The water temperature profile indicated that the highest water temperature occurred close to the bottom, this was also observed during the March 1982 study (Table 6.34, Volume II, 1983 IFAR). Nearsurface water temperature as measured may have been anomalously higher than temperatures at similar depths under the ice during the April survey due to high air temperatures and the large size of the sampling hole. Dissolved oxygen values were well below saturation near the surface (Hutchinson, 1957) and well below gas saturation at greater depths.

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Water quality is presented for each river/stream station sampled in Table 6.98. Water temperatures varied extensively between stations and appeared to be greatly affected by the presence of local ice and other sources of inflow.

The intergravel water temperatures present in salmon egg incubation areas were also studied (Table 6.99). Eleven salmon spawning areas were investigated including sloughs, side channels, tributaries to the McArthur River, and tributaries to the Chakachatna River. Water temperatures in all areas were well above freezing, even those areas with negligible water depths. Differences between intergravel waters and surface waters varied with location. With the exception of one area (station 42A), intergravel water temperatures were similar to or lower than surface water temperatures. The lowest intergravel temperatures were measured in the Chilligan River and in the clearwater tributary to Straight Creek (station 19). Both of these areas had extensive ice and snow present.

#### 6.11.3.2 Spring 1983 Studies

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6.11.3.2.1 Adult Anadromous Fish

During the spring of 1983, the collection and observation of adult anadromous fish were conducted on an opportunistic basis (see Section 6.11.1.2.1).

Chinook Salmon. Chinook salmon were observed in fresh water at the start of the spring study. Milling chinook were observed in areas near the mouth of Streams 13x and 12.1 (Figure 6.150, Area A) on June 17. A total of 22 chinook salmon were observed in the Noaukta Slough/stream mouth area (Area B, Figure 6.150). No salmon was observed in spawning areas of Stream 13x at that time (Appendix B1). By June 22, 180 chinook salmon were observed in the milling area near the mouths of Streams 13x and 12.1 (Area A, Figure 6.150) and 89 chinook salmon were observed further into the slough near the mouths of Streams 12.2 to 12.4 (Area B, Figure 6.150). No chinook salmon was observed upstream in any of the McArthur River tributaries during this period. An overflight made on July 20 resulted in the observation of chinook salmon in upstream areas of Stream 13x. Approximately one third of the stream was overflown and 72 chinook salmon observed (Appendix Bl). During that same overflight, about 100 milling chinook salmon were observed at the mouth of Stream 13u (Figure 6.151).

Tributaries of the Chakachatna River were examined for the presence of salmon. On June 22, only one chinook salmon was observed near the mouth of the

clearwater tributary to Straight Creek. One chinook salmon was collected moving upstream in the Chakachatna River (station 6) on the same date (Figure 6.146). On July 20, 335 chinook salmon were observed well upstream in the clearwater tributary to Straight Creek (station 19). No chinook was observed at any other location in the Chakachatna River.

<u>Sockeye Salmon</u>. Aerial reconnaissance conducted on June 17, 1983 resulted in the observation of two groups of sockeye milling in the mouth area of Streams 13x and 12.1 (Area A, Figure 6.150). Approximately 750 sockeye salmon were estimated further to the northeast (Area B, Figure 6.150) near the mouths of Streams 12.2, 12.3, and to 12.4, another 93 sockeye were observed at area C (Figure 6.150). The milling sockeye were generally "fresh" showing little or no spawning coloration. No sockeye was present near the mouth of Stream 13u (Figure 6.147) at that time. No sockeye salmon was observed in upstream areas of any of the McArthur tributaries during that period.

On June 22, 650 sockeye were observed milling in the mouth area of Streams 13x and 12.1 (Figure 6.150, Area A) and 950 sockeye were noted in the mouth area of Streams 12.2, 12.3, and 12.4 (Figure 6.150, near B and C). By June 24, approximately 900 sockeye were also milling near Area A (Figure 6.150).

By July 20, sockeye had begun to ascend the McArthur River tributaries and 70 sockeye were observed in Stream 13x. Over 1,000 sockeye were observed in milling areas A and B at the same time. Many of the

fish showed spawning coloration. While other relatively "fresh" fish were also present, at that time, 16 sockeye were observed in upstream areas of Stream 13u, and approximately 300 were observed milling in the mouth area (Figure 6.151).

Fyke net sampling (Table B2-8, Appendix B2) resulted in the collection of sockeye salmon at station 1D at the mouth of the McArthur River (Figure 6.146). Sockeye were collected starting on June 18, these fish were "fresh" and copepods were sometimes attached indicating recent entry to fresh water. The sockeye were tagged and some were later observed in milling areas A, B, and C, shown on Figure 6.150.

None of the overflights of the sloughs or tributaries of the Chakachatna River resulted in the observation of any sockeye. Only one sockeye salmon was collected by a fyke net set at station 4 in the Middle River on June 22.

#### 6.11.3.2.2 Resident and Juvenile Anadromous Fish

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As stated in Section 6.11.2, the intensity of sampling used in the spring 1983 study was greater than in previous studies. This greater intensity increased the sensitivity of statistical testing as well as increasing areal coverage. Results reported here consist primarily of minnow trap and electrofishing collections as supplemented by fyke nets.

<u>Dolly Varden</u>. Dolly Varden were abundant and widely dispersed in the study area during the spring study. Dolly Varden juveniles were collected throughout both

river systems and younger age classes (0<sup>+</sup> and I<sup>+</sup>) were found at high catch per effort (c/f) in areas where Dolly Varden spawning had occurred during 1982. This included the upper McArthur and middle Chakachatna Rivers. The Noaukta Slough also contained abundant younger Dolly Varden. Older juvenile Dolly Varden (age II<sup>+</sup> and older) were found at higher c/f's in the upper Chakachatna River, the Noaukta Slough, and lower portions of the Chakachatna and McArthur Rivers. Adult Dolly Varden were only collected at stations 1D and 4 by fyke nets.

Dolly Varden were abundant and widely dispersed during the spring study being collected at 95.1 percent of all sampling stations below Chakachamna Lake (Table 6.100 and 6.101). The majority of Dolly Varden collected were juveniles. Adults were collected by fyke nets at stations 1D, and 4. No movement of marked fish was detected between stations based on recaptures. By July, adult Dolly Varden were observed in the vicinity of salmon milling and spawning areas at Streams 13x, 13u, and the clearwater tributary to Straight Creek (station 19).

Collections of juvenile (parr or smolting juvenile) Dolly Varden from minnow traps (Table B2-4, Appendix B2) were tested by analysis of variance (ANOVA) and found to be significantly different (p 0.001) among stations sampled. The c/f at station 13 (upper McArthur River), 5.33 fish/trap day, was significantly greater (p 0.003, maximum among stations) than all other stations except station 10 (Noaukta Slough), c/f of 3.80 fish/trap/day, (p\_0.09, marginally significant). The c/f at station 10 was

greater than most other remaining stations (p 0.05, maximum) except station 12 (lower McArthur River near the Noaukta Slough), c/f of 2.40 fish/trap/day and station 40 (Stream 13u, downstream area), with a c/f of 2.60 fish/trap/day. Dolly Varden minnow trap c/f's tested by ANOVA among reaches were also significantly different (p 0.008). Data in Table 6.102 indicated that the largest c/f for a reach (2.18 fish/trap/day) occurred in the upper McArthur The c/f was significantly greater (p 0.009) River. than all other reaches except the Noaukta Slough (p = 0.29). The c/f in the Noaukta Slough, 1.64 fish/trap/day, was significantly greater (p\_0.06) than the remaining reaches except the lower Chakachatna River (p\_0.49), c/f of 1.37 fish/trap/day, and the lower McArthur River (p 0.65), c/f of 1.42 fish/trap/day.

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The Dolly Varden collected by minnow traps in the upper McArthur River were primarily age  $0^+$  and age  $I^+$ , with age  $II^+$  fish found primarily in the lower part of the reach. The Dolly Varden at station 12, just below that reach, were also mostly age  $II^+$  and  $I^+$ . The Dolly Varden collected in the Noaukta Slough were primarily age  $II^+$  with some age  $I^+$  and few age  $0^+$  fish.

Dolly Varden c/f's collected by electrofishing varied significantly (p\_0.0004) among the sampling stations. The largest c/f's were at stations 16A (Noaukta Slough), 17D (middle Chakachatna River), and 13 (upper McArthur River), c/f's of 5.48, 4.84, and 3.66 fish/100 shocking-seconds (s-s), respectively. Catch per effort at station 16A was significantly greater

p 0.03, maximum) than all other stations except station 17D (p|0.54). C/f at station 17D was significantly greater than most of the remaining stations ( $p_0.04$ ) with the exception of stations 13, 10 and 21 (p|0.20), c/f's of 3.66, 3.41 and 2.21 fish/100 s-s, respectively.

Electrofishing c/f's were significantly different (p 0.0001) among reaches (Table 6.103). The largest c/f's were found in the middle Chakachatna River (stations 17, 17D, 20 and 21), the Noaukta Slough (stations 8, 9, 10, 16, and 16A), and the upper McArthur River (stations 13, 14, and 15), 2.56, 2.56, and 2.25 fish/100 s-s, respectively. The c/f for the middle Chakachatna River (2.56 fish/100 s-s) was significantly greater (p 0.003, maximum) than the lower Chakachatna, lower McArthur, and tributary reaches but not significantly greater than the upper Chakachatna River reach. The Noaukta Slough reach c/f was the same as that for the mid-Chakachatna It was not significantly different from the Reach. upper McArthur reach (p 0.37) or the upper Chakachatna reach (p 0.26), but was significantly larger than the remaining reaches (p\_0.002). upper McArthur reach had a c/f of 2.25 fish/100 s-s, which was not significantly different from the above reaches or the upper Chakachatna reach (p 0.83), but was significantly larger (p\_0.05) than the other reaches (Table 6.103).

Dolly Varden collected by electrofishing included age  $0^+$  through III<sup>+</sup> fish, with age I<sup>+</sup> and II<sup>+</sup> making up the majority, overall. Fish collected from the middle Chakachatna River reach were generally

dominated by age I<sup>+</sup> with both age 0<sup>+</sup> and II<sup>+</sup> fish present. In the Noaukta Slough, age 0<sup>+</sup> and I<sup>+</sup> made up the majority of the collection although fish to age III<sup>+</sup> were present. Collections from the upper McArthur reach consisted entirely of age 0<sup>+</sup> and I<sup>+</sup> fish. Dolly Varden collected from the upper Chakachatna River reach consisted of approximately 2/3 age I<sup>+</sup> fish and 1/3 age II<sup>+</sup> or older.

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<u>Coho Salmon</u>. Coho salmon juveniles (parr and smolting juveniles) were widely distributed in the Chakachatna and McArthur River systems during the spring study. Large numbers of coho were collected from the upper McArthur River, Noaukta Slough, while fewer were captured in the lower river systems. Coho found in upstream areas were generally age  $0^+$  fish, with older fish found in downstream locations. Age  $0^+$  and  $I^+$  coho were found in the Noaukta Slough, and age  $II^+$  were more common in downstream areas. Outmigrants, as determined from inclined plane trap sampling, included age  $0^+$  to  $II^+$  fish.

Coho salmon juveniles were widely dispersed during the spring study and were found at most collection stations (Table 6.100). The percentage incidence of coho juveniles collected by all sampling methods was 68.3 percent (Table 6.101).

Analysis of minnow trap collections of coho juveniles (Appendix B2) by ANOVA indicated that there were significant (p\_0.0001) differences between stations. The largest minnow trap c/f (6.3 fish/trap/day) occurred at station 16A in the Noaukta Slough. This

was significantly larger  $(p_{0.0002})$  than c/f at any other station. The second largest c/f, 3.11 fish/trap/day, occurred at station 14 in the upper McArthur River. This c/f was significantly greater  $(p_{0.01})$  than stations other than 16A, 13( $p_{0.10}$ ), or 12  $(p_{0.10})$ . Stations 13 and 12 are sequentially downstream of station 14 in the McArthur River. The c/f's at stations 13 and 12 were 1.67 and 1.40 fish/trap/day, respectively.

Examination of the minnow trap c/f's on a reach basis indicated that c/f's were significantly different among reaches ( $p_0.002$ ). The largest c/f (1.54 fish/trap/day) was found for the upper McArthur River which was significantly (p 0.05) greater than all other reaches except the Noaukta Slough. The Noaukta Slough had a c/f of 1.36 fish/trap/day, which was significantly greater than all but one of the remaining reaches ( $p_0.01$ , maximum) (lower McArthur River  $p_0.06$ , marginally significant).

The juvenile coho salmon collected by minnow traps in the upper McArthur River were primarily age  $0^+$ fish. These fish may have been produced in spawning areas in the McArthur River Canyon. Coho salmon collected in the Noaukta Slough were primarily age  $0^+$  and  $I^+$ . Age  $I^+$  and  $II^+$  fish were more common in collections from lower portions of both the Chakachatna and McArthur rivers.

Examination of electrofishing c/f's indicated results similar to those obtained from minnow trap collections. Electrofishing captures were significantly different (p\_0.0001) between stations.

The largest c/f for coho salmon was found at station 14 with a c/f of 14.91 fish/100 shocking-seconds (s-s). This was significantly greater (p\_0.0001) than any other station. The c/f for station 16A in the Noaukta Slough, 5.03 fish/100 s-s, was the second largest. It was significantly larger (p\_0.05, maximum) than c/f's at all remaining stations except  $20(p_0.08 \text{ marginally significant, c/f} = 1.79)$ ,  $4(p_0.11, \text{ marginally significant, c/f} = 1.82)$  and  $5(p_0.51, c/f = 3.93)$ .

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Examination of electrofishing c/f by reach (Table 6.103) showed that there were statistically significant (p\_0.0008) differences between reaches. The largest c/f was for the upper McArthur River, 4.97 fish/100 s-s. This was significantly greater (p 0.006) than c/f's for other reaches. The second largest c/f was for the lower Chakachatna reach with a c/f of 1.23 fish/100 s-s, and the third for the Noaukta Slough with a c/f of 1.18 fish/100 s-s. However, these were not significantly greater than the c/f's for the other reaches (p|0.15).

Coho salmon collected by electrofishing in the upper McArthur River were all age  $0^+$  fish caught at station 14 (lower McArthur River Canyon, Figure 6.146). Coho collected in the lower Chakachatna River consisted of a mix of age  $I^+$  and  $0^+$  fish. Coho collected in the Noaukta Slough were primarily age  $0^+$  with few age  $I^+$  fish present. Larger, older coho were generally poorly represented in electrofishing collections. Collections from inclined plane trap outmigrant sampling at station 1D (Appendix B2, Table B2-7) indicated that some older (age  $I^+$  and  $II^+$ ) coho may have been migrating to sea. Age  $0^+$  coho were also represented in these collections. Sampling did not extend for a sufficiently long duration to determine if the peak outmigration occurs in spring or in the fall.

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<u>Chinook Salmon</u>. Chinook salmon juveniles were found in a limited number of locations during the spring study. Most chinook were age  $0^+$  and were found in the tributaries to the McArthur River. Since all of the lower tributaries (13x, 12.1 through 12.5) share a common confluence area it is unclear what movements of chinook juveniles may have occurred subsequent to emergence. Only one age I<sup>+</sup> chinook was collected, this was found in the lower river system. One age  $0^+$  chinook was collected in the outmigrant trap. No chinook was collected from the clearwater tributary to Straight Creek, despite observation of extensive spawning in that location. This may have been a result of the flooding and channel changes caused by the September 1982 storm.

During the spring study, although chinook salmon juveniles were found at relatively few stations, these were many more stations than were found during previous studies (Table 6.100), 26.9 percent of the stations sampled (Table 6.101). However, this was the first study in which the McArthur River tributaries were intensively sampled. Examination of minnow trap collections of chinook salmon indicated that there were significant differences (p\_0.05) between collections made at the sampling stations. The largest c/f (14.60 fish/trap/ day) occurred at station 43A (upstream area of Stream 12.2, see Figures 6.146 and 6.148). This was significantly larger (p\_0.025) than other stations. The next largest c/f, 7.60 fish/trap/day, occurred at station 42 (Stream 12.1, downstream area) this was significantly larger (p\_0.01) than at stations other than 42A (Stream 12.1, upstream area), 44A (Stream 12.3, upstream area), and 44 (Stream 12.3, downstream area), c/f's of 4.00, 5.88, and 3.40 fish/trap/day, respectively.

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When examined on a per reach basis (Table 6.102), the c/f (3.26 fish/trap/day) for the McArthur tributaries was significantly (p\_0.05) larger than any other reach. Only a few chinook salmon (c/f = 0.03) were collected in the lower Chakachatna system.

All of the chinook salmon collected by minnow traps in the McArthur River tributaries were age  $0^+$  fish. One age I<sup>+</sup> chinook was collected at station 1 in the lower Chakachatna River.

Electrofishing results for chinook salmon juveniles did not indicate a significant difference (p\_0.31) by ANOVA between stations. The larger electrofishing c/f's were found at station 44A (Stream 12.3, upstream area; 9.65 fish/100 s-s), 43A (Stream 12.2, upstream area; 5.83 fish/100 s-s), and 42A (Stream 12.1, upstream area; 3.09 fish/100 s-s).

Electrofishing c/f examined by reach showed a marginally significant (p\_0.12) difference. The c/f, 1.89 fish/100 s-s, of the McArthur tributaries was significantly (p\_0.05) larger than the other reaches.

Electrofishing resulted in the collection of exclusively age  $0^+$  fish at each station. One age  $0^+$  chinook salmon was collected during outmigrant sampling at station 1D on June 23, 1983. This was an insufficient sample from which to draw any conclusions concerning Chinook outmigrant patterns.

Sockeye Salmon. Sockeye salmon were found in several areas of the river systems. The largest numbers were collected from Chakachamna Lake, which was also the location where age I<sup>+</sup> and age II<sup>+</sup> fish made up the largest percentage of the collection. Downstream of the lake at station 22 (the downstream end of the Chakachatna River Canyon), age I<sup>+</sup> fish made up the majority of sockeye salmon collected. In other locations, age 0<sup>+</sup> dominated the collections. Age 0<sup>+</sup> sockeye were caught consistantly in areas near the confluence of the Chakachatna with the McArthur River, stations 1, 1D, and 2. These stations are located in the vicinity of the outmigrant sampling station (near 1D) which caught age 0<sup>+</sup> and 1<sup>+</sup> sockeye juveniles. Based upon the outmigrant collections, it appeared that the number of sockeye outmigrants was decreasing during the course of sampling. This indicated that the peak outmigation may have occurred prior to the sampling period. The apparent low numbers of younger age classes in the lower river system also suggests an earlier outmigration. The apparent movement of older fish

from Chakachamna Lake to station 22 (Figure 6.146), may be an indication that further outmigrations of sockeye may occur later in the year.

Sockeye salmon juveniles were collected at 29.3 percent of the samples (Table 6.101) during the spring study.

As in previous studies, minnow traps were a relatively inefficient method of collecting sockeye salmon (Table B2-4, Appendix B2). There were significant differences (p 0.001, by ANOVA) between c/f's at the sampling stations. The largest c/f (1.10 fish/trap/day) was found at station 20 in the middle Chakachatna reach; the c/f was not significantly different from the other stations (p\_0.15).

Examination of sockeye minnow trap c/f by reach (Table 6.102) indicated that the largest c/f (0.28 fish/trap/day) occurred in the mid-Chakachatna River reach. The only other reach where sockeye were collected by minnow traps (all age 0+ fish) was the lower McArthur River reach with a c/f of 0.09 fish/trap/day.

Electrofishing resulted in the collection of sockeye salmon in more stations than minnow traps, a total of 12 as compared to four. There was not a significant difference ( $p_0.45$ ) between c/f at the stations. The largest c/f (7.56 fish/100 s-s) was obtained from station 26 near the Nagishlamina River delta in Chakachamna Lake (Figure 6.146). The second largest c/f (3.03 fish/100 s-s) was collected at station 1

(Figure 6.146), c/f's of 1.43 and 1.41 fish/100 s-s occurred at stations 22 and 20, respectively.

Analysis of c/f by reach including Chakachamna Lake indicated that there was not a significant difference among reaches (p\_0.19). The largest c/f was 1.89 fish/100 s-s in Chakachamna Lake, followed by the upper, lower, and mid-Chakachatna River reaches with c/f's of 0.59, 0.53, and 0.43 fish/100 s-s, respectively.

The sockeye collected from Chakachamna Lake were primarily age I<sup>+</sup> and II<sup>+</sup>. Sockeye found downstream of the lake at station 22 were age I<sup>+</sup>. Sockeye juveniles collected at station 1 were age 0<sup>+</sup>, as were the sockeye at station 20.

Outmigrant sampling at station 1D resulted in the collection of numerous sockeye. The largest number (16 fish) were collected on June 19 (Table B2-7, Appendix B), these were age  $0^+$  and  $I^+$  fish. The numbers of sockeye collected after that dropped off. All sockeye collected were age  $0^+$  and  $I^+$ .

In general, the age 0<sup>+</sup> sockeye appeared to have grown 5 to 10 mm since the winter study. However, since there were length differences between juveniles originating in different areas of the system it is difficult to ascertain the change after these groups have "mixed".

<u>Chum Salmon</u>. Chum salmon were collected in numerous locations in the lower portions of the Chakachatna, Middle and McArthur rivers. Although some chum juveniles were found in upstream areas, the majority were downstream. The mean lengths of the chum juveniles varied considerably, but were generally larger than fish collected during the winter study. Chum outmigration took place during the study but it is likely that the peak outmigration occurred prior to the sampling period.

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Chum salmon were caught in a limited number of stations (Table 6.100) during the spring study, occurring at 29.3 percent of the stations below Chakachamna Lake (Table 6.101).

Minnow traps were relatively ineffective for collecting chum salmon juveniles (Table B2-4, Appendix B). Chum salmon were collected at stations 1D (lower McArthur River), 8 (Noaukta Slough), and 13 (upper McArthur River) with c/f's of 0.22, 0.20, and 0.11 fish/trap/day, respectively. All three areas are located downstream of areas where chum salmon were observed to spawn in 1982 (Volume II, Section 6.8.3, 1983 IFAR).

Electrofishing resulted in the collection of chum juveniles in many more locations. Comparison of c/f's among stations did not indicate a significant difference (p\_0.14) among the group of stations. Pair-wise t-testing did indicate that stations 4 and 5 (Middle River, lower Chakachatna River reach, Figure 6.146) had significantly (p\_0.04) larger c/f's (2.45 and 2.31 fish/100 s-s, respectively) than all other stations except stations 2 (p\_0.09) and 21 (p\_0.18) (with c/f's of 1.23 and 1.64 fish/100 s-s, respectively). Examination of c/f by reach (Table 6.103), indicated that there were significant  $(p_0.005)$  differences between the reaches. The largest c/f was in the lower Chakachatna River reach (0.99 fish/100 s-s) which was significantly larger (p 0.04, maximum) than all other reaches. The middle Chakachatna River reach had the next largest c/f (0.41 fish/100 s-s) but this was not significantly different  $(p_0.36)$ than the other reaches. The only other reach chum salmon were collected from was the Noaukta Slough (c/f of 0.17 fish/100 s-s).

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> Inclined plane trap sampling for outmigrants at station 1D (Table B2-7) resulted in the collection of numerous chum outmigrants. The number of outmigrants decreased during the period of sampling from a high of 10 fish/day to 0 fish/day. The mean length of the outmigrants varied from 3.97 cm to 4.74 cm in length.

> <u>Pink Salmon</u>. Pink salmon juveniles were collected at station 40 (Stream 13u, downstream area; Figure 6.147) by electrofishing (Table B2-5) and by means of the outmigrant trap at station 1D. Pink salmon outmigrants were collected during the first week of sampling with the numbers caught declining during that period. This indicates that the peak outmigration of pink salmon juveniles had occurred prior to mid-June. The pink salmon outmigrants were under 4.0 cm in length.

<u>Rainbow Trout</u>. Rainbow trout were only collected by means of fyke nets (Table B2-8) at stations 1D, 4, and 6 during the study. During this period, adult fish dominated the catch. Marked rainbow trout were recaptured in other area of Trading Bay during the study. Three rainbow trout tagged at station 4 (Middle River) during 1982 were recovered in the Chuitna River during 1983. One adult tagged at station 6 (Chakachatna River) on June 20, 1983 was recovered in Chuit Creek on June 30, 1983. Another rainbow trout adult was recaptured having moved from station 6 to station 4, downstream. Such data suggest considerable coastal movement of rainbow trout between streams entering Cook Inlet.

<u>Pygmy Whitefish</u>. Very few pygmy whitefish were collected during the spring study. None was collected by minnow traps and only two, one each at stations 6A and 12, were collected by electrofishing. One pygmy whitefish was collected by a fyke net at station 4 and three very small (less than 3.30 cm total length) pygmy whitefish parr were also collected by the inclined plane trap. As in the winter study, the reason for the small c/f of pygmy whitefish is unknown.

## 6.11.3.2.3 Habitat Data Collection

Habitat data were collected in conjunction with fish sampling at most sites. Detailed habitat observations and measurements were routinely made with electrofishing and minnow trap collects to add to the data base characterizing fish habitat relationships.

<u>Water Quality</u>. Water quality data were collected at 41 stations in the spring study (Table 6.104). There was considerable variation in water quality among the stations. This is understandable as different

stations are subject to differing flows, riparian growth, and stream gradient conditions. Areas influenced by meltwater such as stations 15, 13, and 18A (Figure 6.146) had lower water temperatures. Sloughs and tributary streams generally had low turbidity, since they were not influenced by mainstem conditions.

A water quality profile was obtained of selected parameters in Chakachamna Lake. These data are presented in Table 6.105. There was evidence of surface heating of the lake's surface with apparent mixing in deeper water. The turbidity data indicated the presence of extremely low turbidity water near the bottom (83.8 meters, 275.0 ft).

Water temperatures were also measured for incubation areas at station 17 (see Section 6.11.3.1.2). Intergravel water temperatures (Table 6.106) in the leftmost (LB+0) slough were 0.7-0.8°C lower than surface water temperatures. In the Chakachatna River side channel (LB+2) downstream of a slough area, intergravel water temperatures were similar to the surface water temperature.

#### 6.11.3.3 Habitat Utilization

One of the objectives of the habitat data collection is to obtain information about the relationship of fish distribution to stream-flow related variables such as depth and velocity. These data would eventually be incorporated into the preparation of habitat utilization curves (Bovee and Cochnauer, 1981) for analyzing project effects (APA, 1983).

The present analysis is a summarization of habitat utilization for those species and life-stages for which sufficient data have been collected. These are Dolly Varden juveniles, Coho salmon juveniles, Chinook salmon juveniles, and sockeye salmon juveniles. For ease of discussion, English units will be listed first. Observation (and collections) of these groups at various depths and velocities have been compiled and tabulated in intervals of 0.2 ft/s (0.5 cm/s) velocity and 0.3 ft (0.8 cm) depth. A statistically significant correlation of r = 0.09 (p\_.006) exists between velocity and depth in the data base used to analyze habitat utilization. This is a result of lower velocities being found at the shallow edges of the streams studied, and higher velocities being found in the deeper mid-channel areas (relatively few, low velocity deep pools were present). The correlation between velocity and depth somewhat confounds the combined analysis of both.

#### 6.11.3.3.1 Dolly Varden

Table 6.107 presents the distribution of observations of Dolly Varden among velocity intervals. The majority of Dolly Varden observed utilized velocities of 0.6 ft/s (18.3 cm/s) or less with 32.2 percent found in velocities of less than 0.2 ft/s (6.1 cm/s) and a total of 50.2 percent observed at velocities less than 0.5 ft/s (15.2 cm/s). The maximum water velocity used by juvenile Dolly Varden was in the interval 3.2-3.4 ft/s (97.5-103.6 cm/s). A plot of the number of observations versus velocity is shown in Figure 6.152. The shape of the plot clearly indicates that although juvenile Dolly Varden were

observed at velocities up to 3.4 ft/s (103.6 cm/s). Relatively high velocity waters were readily available as observed in the field, however, lower velocity waters were apparently used preferentially.

The distribution of juvenile Dolly Varden at velocity intervals was also examined to determine the effect of object cover on velocity utilization (Bovee, 1982). Data were sorted by the presence or absence of cover. Rank order tests were used and it was found that higher velocities were used to a significantly greater extent when object cover was present (0.1 p 0.05).

Observations of depth utilization by Dolly Varden (Table 6.108) indicated that 72.1 percent of the fish utilized depths between 0.3 and 1.2 ft (9.1 cm and 36.6 cm). Juvenile Dolly Varden, however, were found in each depth interval examined.

Kruger's (1981) review of the available literature concerning velocity and depth utilization by juvenile Dolly Varden indicated a general preference for shallow areas and low velocity currents. Work performed at Terror Lake by Baldrige (1981) resulted in the development of habitat suitability criteria for juvenile Dolly Varden. The criteria derived were based upon frequency analysis of data resulting from a total of 344 observations (as compared with 1042 in this study). In the Terror Lake study, juvenile Dolly Varden were observed to primarily utilize lower velocities of 1.0 ft/s (30.5 cm/s) or less. The suitability curves in that case represented the frequency analysis corrected by the amount of each

habitat actually available to the fish. Apparent depth use in the Terror Lake study was greatest for depths of approximately 0.2 to 2.0 ft (6.1 to 61.0 cm). The data from this (Chakachamna) study indicated that utilization dropped off at depths greater than 1.2 ft (36.6 cm), and few juvenile Dolly Varden were found in depths in excess of 2.1 ft (64.0 cm).

6.11.3.3.2 <u>Coho Salmon</u>. Coho salmon juveniles were observed to utilize the lower velocities found. 77.5 percent utilized velocities of 0.6 ft/s (18.3 cm/s) or less and 90.8 percent utilized velocities of less than 1.0 ft/s (30.5 cm/s, Table 6.109). Of the 422 fish observed, only one fish was found at velocities in excess of 2.0 ft/s (61.0 cm/s). A plot of the distribution of these observations is shown in Figure 6.154.

> The effect of the presence of object cover on velocity utilization by coho salmon was examined. No significant (p|0.1) difference was found in velocity utilization with or without the presence of object cover.

Observations of depth utilization by coho salmon juveniles are tabulated in Table 6.110. The majority of fish (77.4 percent) were observed in the depth interval 0.3 to 1.2 ft (9.1 to 36.6 cm), 96.6 percent of the coho occurred in depth of less than 2.1 ft (64.0 cm) (Figure 6.155).

Juvenile coho salmon habitat suitability curves from the Terror Lake study (Baldridge, 1981) indicated apparent preferred utilization of velocities of approximately 0.0 to 0.5 ft/s (15.2 cm/s) based upon 199 observations. Results from this study were similar, however, maximum utilization occurred in the 0.0 to 0.3 ft/s (9.1 cm/s) range, with considerably lower utilization of velocities in excess of 0.5 ft/s (15.2 cm/s). Water depth utilization from Baldridge (1981) for the Terror Lake study indicated preferred depths of up to 2.0 ft (61.0 cm). Peak utilization for this study occurred in a smaller interval, as discussed above.

6.11.3.3.3 <u>Chinook Salmon</u>. Observations of velocities utilized by juvenile chinook salmon are presented in Table 6.111. There is preferential utilization of lower velocities, with 69.0 percent of the chinook juveniles observed, using velocities of less than 0.2 ft/s (6.1 cm/s) and 90.7 percent using velocities of less than 0.6 ft/s (18.3 cm/s). The utilization of velocities is depicted in Figure 6.156.

> Velocity utilization in the presence of object cover was also examined for chinook salmon juveniles. There was no significant difference (p||0.1) in velocity utilization in the presence or absence of object cover.

Depth utilization by juvenile chinook salmon is presented in table 6.112. Peak utilization of water depth occurred in the interval 0.6 to 1.5 ft (18.3 to 45.7 cm), in which 69.2 percent of the chinook salmon were observed. Another 26.1 percent of the chinook were observed in depths in excess of 1.5 ft (45.7 cm). A plot of depth utilization is shown in Figure 6.157.

Generalized probability of use criteria derived by Bovee (1978) for juvenile chinook salmon indicated a high probability of use of velocities around 0.5 ft/s (15.2 cm/s). This is somewhat higher than indicated by the present study. Bovee's (1978) curves also indicated a high probability of use of depths in excess of 1.2 ft (36.6 cm), while the present study indicates preferential utilization of depths of 0.9 to 1.8 ft (27.4 to 54.9 cm). It is probable that Bovee's (1978) generalized curves are not applicable to the present study, based upon the 399 observations tabulated here.

6.11.3.3.4 <u>Sockeye Salmon</u>. Observations of juvenile sockeye salmon velocity utilization are listed in Table 6.113. There appeared to be a preferred utilization of lower velocities, 64.8 percent of the sockeye juveniles observed used velocities of 0.4 ft/s (12.2 cm/s) or less. Over 80 percent of the sockeye observed occurred at velocities less than 1.2 ft/s (36.6 cm/s). No sockeye was observed at a velocity in excess of 1.8 ft/s (54.9 cm/s).

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Examination of the effect of object cover on utilization of velocities resulted in no statistically significant (p||0.1) difference in velocity utilization in the presence or absence of object cover.

Utilization of water depth by sockeye salmon juveniles is presented for observations not including Chakachamna Lake. Hydroacoustic observations (Volume II, 1983 IFAR) indicated that juvenile sockeye probably occur to depths of more than 100 ft (30.5 m) at times and such data would not be applicable in analysis of sockeye behavior in a riverine situation. Table 6.114 presents the water depth utilization data for sockeye juveniles as determined by observations in rivers and streams. A plot of this data is shown in Figure 6.159, and it clearly appears to be bimodal. However, this may be an artifact due to an insufficient number (138) of observations (Table 6.114). If more observations are added through additional studies, the distribution may change.

Sockeye utilization of depths of 0.3 to 1.2 ft (9.1 to 36.6 cm) represented 63.0 percent of the total and utilization of depths of 1.8 to 2.1 ft (54.9 to 64.0 cm) represented 23.9 percent. Sockeye juveniles did not appear to utilize depths of less than 0.3 ft (9.1 cm) or over 2.1 ft (64.0 cm) to any great extent in riverine waters.

# 6.11.4 Discussion

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The 1983 winter and spring studies provided additional information concerning the fish distribution and abundance in the Chakachatna and McArthur River systems. For various species, the data provide clarification of habitat use and timing of life history events. The following section provides a discussion of the new information.

## 6.11.4.1 Sockeye Salmon

During 1983 adult sockeye salmon entered the McArthur River prior to June 18. Sockeye continued to enter the McArthur River through early July and gathered at

the mouths of tributaries to the McArthur River in milling areas identified during 1982 and 1983 (Volume II, Sections 6.8.3.2.1, 1983 IFAR; 6.11.3.2.1). Fish continued to enter these areas to mill and mature through July 20 (the last date of sampling). During the period July 9-20, 1983, sockeye salmon ascended Streams 13x and 13u which are tributaries to the McArthur River (Figures 6.146, 6,147, and 6.148). Other sockeye salmon were observed milling in the mouth areas of those streams at the same time. The fish observed milling varied from those newly arrived from salt water to those of stage IV maturity (Nikolsky, 1963). Although the timing of the entry of sockeye into fresh water in the McArthur River appeared to occur earlier than during 1982, their ascent of Streams 13x and 13u was probably no more than seven days earlier than the comparable event the year before (Volume III, Tables A2-7, A2-8, 1983 IFR).

During that same period, sockeye salmon were not observed in any of the known milling or spawning areas in the Chakachatna River drainage. This appears to be in agreement with data gathered during 1982 (Volume III, Appendix A, 1983 IFR). During 1982, sockeye adults were not observed in streams of the Chakachatna River drainage prior to July 31. The collection of only one sockeye adult in the Middle River during the sampling period, by a net blocking the entire stream, suggests that sockeye adults entering the Chakachatna River may ascend the Middle River subsequent to the period sampled. The majority of adult sockeye may also enter through the McArthur River where sockeye adults were caught regularly by a net blocking less than 5 percent of the river width.

Information on the timing of emergence and outmigration of sockeye was also gathered during the studies. Sockeye fry were in the process of emergence during early April 1983. In the incubation areas examined, both yolk-sac fry and fully emergent "button-up" fry were present.

By mid-June the emergent sockeye fry had left their incubation areas below Chakachamna Lake and were found in mainstream areas of the middle Chakachatna and lower Chakachatna and McArthur River reaches. Outmigration of juvenile sockeye salmon occurred during mid- to late June; most likely prior to that period. Age  $0^+$  and  $I^+$  outmigrants were observed. Older juveniles including age  $I^+$  and  $II^+$  sockeye were observed in and below Chakachamna Lake which suggests that at least some of these juveniles migrate to sea later in the year. Data compiled on habitat utilization suggest that juvenile sockeye prefer slow velocity, shallow water habitats.

# 6.11.4.2 Chinook Salmon

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> Chinook salmon adults had entered the McArthur River prior to June 17, 1983 when they were observed milling near the mouth area of Stream 13x (Figure 6.150, Area A). Numbers of milling chinook in that area increased through late June, but adults were not observed to have ascended the streams (specifically 13x) prior to early July. By July 20 chinook salmon adults were present in Stream 13x. This represents migration times comparable to 1982 (Volume III, Table A2-7, 1983 IFR). Chinook adults were not observed milling at Stream 13u until July 20. At that time,

no chinook had ascended the stream. This represents a delay in timing over 1982, when spawning chinook adults were observed in the stream on July 17.

One chinook salmon was collected migrating up the Chakachatna River on June 22. This fish apparently entered fresh water in the McArthur River, since the Middle River was blocked by a fyke net and no chinook salmon had been caught. In the Chakachatna River drainage, one chinook salmon adult was observed in a spawning area in the clearwater tributary to Straight Creek on June 22, 1983. No other chinook salmon was observed either in the stream or in the milling area at the stream confluence with Straight Creek until July 20. At that time 335 chinook salmon were observed spawning. This timing was similar to that observed during 1982 when chinook salmon were first observed in this stream on July 22.

Successful incubation of chinook salmon occurred in the McArthur River tributaries and to at least a limited extent in the McArthur River Canyon. No evidence of successful chinook incubation or fry production was found in the clearwater tributary to Straight Creek. It is likely that the stream channel changes which occurred during September 1982 may have seriously decreased chinook juvenile production from that stream. It is unclear if there was successful chinook fry production from Stream 13u, since no fry or juveniles was collected from there during 1983.

The age  $0^{\top}$  chinook juveniles appeared to be rearing in many areas in the downstream areas of the McArthur tributary streams. Since these streams interconnect at their mouths, it suggests that there may be considerable interstream movement. Age  $I^+$  fish apparently leave these streams at some point and either migrate to sea or rear in portions of the lower Chakachatna and McArthur Rivers. The age  $I^+$ chinook found in the lower river systems may however be outmigrants rather than rearing juveniles. However, the only chinook collected by means of the outmigrant trap was an age  $O^+$  fish. Only one age  $I^+$  chinook was collected from the clearwater tributary to Straight Creek during April, and no chinook was collected during the spring study, indicating both a paucity of juveniles and possible downstream movement of those present.

Data compiled on habitat utilization suggest that juvenile chinook preferentially use relatively low velocities and relatively shallow water depths.

# 6.11.4.3 Pink Salmon

Pink salmon adults were not observed during the 1983 sampling programs. The first milling pinks observed during 1982 were found on the July 22 weekly survey. This may indicate a somewhat later entry into fresh water for the 1983 run in these rivers.

Pink salmon fry were not collected during the April study in areas where pink salmon spawning had been observed (stations 13, 18, 19, 40A, and 42). However, during the spring study, pink juveniles were found in station 40 (Stream 13u) downstream of the April sampling area; and pink juveniles were collected by the outmigrant trap. Data from outmigrant trap

sampling suggested that the peak outmigration of pink salmon juveniles probably occurred prior to mid-June.

# 6.11.4.4 Chum Salmon

Chum salmon fry were found at varying stages of development during early April 1983. Many of the fry collected had fully resorbed their yolk-sacs and were free-swimming in the water column while others had prominent yolk-sacs present. By June, the chum salmon juveniles had migrated from their incubation areas and were found in the downstream areas of the system including the Middle River, lower Chakachatna River, and lower McArthur River. Outmigrant sampling results suggested that the peak chum outmigration probably occurred prior to mid-June.

Analysis of lengths of juvenile chum collected during April and June suggested that growth of emergent fry occurs in fresh water. This supports similar observations made during 1982.

## 6.11.4.5 Coho Salmon

Development of coho salmon fry was still taking place during early April 1983. Many fry had fully resorbed their yolk-sacs while others had not. Age  $0^+$  fish generally appeared to remain in the vicinity of their incubation areas at that time. Older juveniles were prevalent in the Noaukta Slough and Middle River. By June, coho juveniles were abundant and well dispersed, with age  $0^+$  and  $I^+$  fish found in upstream areas of the McArthur River and the Noaukta Slough. Age  $I^+$  and  $II^+$  fish were most abundant in the McArthur River tributaries and downstream areas of the Chakachatna, McArthur and Middle Rivers. Juveniles appeared to preferentially utilize very low velocities and relatively shallow depths.

Outmigrant trap sampling indicated that age  $0^+$ ,  $I^+$ , and  $II^+$  fish were migrating to salt water. Data were not sufficient to determine timing.

## 6.11.4.6 Dolly Varden

Dolly Varden continued to be the most widely distributed and abundant species collected. Development of Dolly Varden fry was completed earlier than the other species studied, and during early April all Dolly Varden collected had fully resorbed their yolk-sacs. During late winter, Dolly Varden juveniles (age 0<sup>+</sup>-II<sup>+</sup>) were generally more abundant in upstream areas of the McArthur and Chakachatna Rivers and the Noaukta Slough. Most III<sup>+</sup> and older fish apparently move to downstream areas of the river or enter salt water some time between October and April.

By June, Dolly Varden have become more widely dispersed, particularly age 0<sup>+</sup> and 1<sup>+</sup> fish. Older juveniles (age II<sup>+</sup>) were found in the same reaches as in April but had also dispersed further downstream. Adult Dolly Varden were also collected in the Middle River and lower McArthur Rivers, and in July were found in the vicinity of salmon spawning and milling areas in both the Chakachatna and McArthur River systems. Juvenile Dolly Varden appeared to preferentially utilize relatively low
velocities, but may utilize higher velocities when cover is present. The juvenile Dolly Varden also appeared to utilize relatively shallow water.

#### 6.11.4.7 Pygmy Whitefish

Few pygmy whitefish were collected during 1983. The reason for the paucity of this species compared to 1981 or 1982 collections remains unknown.

Collections made by the outmigrant trap indicated that age 0<sup>+</sup> juveniles were present in the lower McArthur River by mid-June. This supports preliminary observations made during 1982 about the timing of the completion of pygmy whitefish fry development (Volume II, Section 6.8.4.7, 1983 IFAR).

#### 6.11.4.8 Rainbow Trout

As in 1982, few young rainbow trout juveniles were collected in areas of either the McArthur or Chakachatna River drainages.

Mark-recapture information on adult rainbow trout suggested that there is considerable interdrainage movement between rainbow trout found in the Chakachatna and McArthur Rivers and the Chuitna River and its tributaries.

#### 6.11.5 Summary and Conclusions

The 1983 studies provided additional information on the fisheries of the Chakachatna and McArthur River systems. These studies have also provided an

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improvement in our understanding of the system. The findings of these studies include:

- o The movement of adult sockeye and chinook salmon into freshwater apparently occurred earlier in the season in 1983 than in 1982.
- o The timing of adult sockeye and chinook salmon ascents of spawning streams was similar to that of 1982, and in some cases slightly earlier in the season.
- Spring rearing and distribution areas of resident and juvenile anadromous fish were identified.
- Chinook salmon juvenile rearing areas were identified in the McArthur River tributaries.
- Outmigrations of sockeye, chum, pink, and coho salmon were identified as taking place. The peak outmigration apparently took place prior to mid-June.

Other findings summarized in the text include:

- Habitats utilized by juvenile Dolly Varden and coho, sockeye, and chinook salmon were characterized.
- Interdrainage movements of rainbow trout were identified.
- Fish habitats were characterized including incubation areas.

#### 6.12 REFERENCES

#### Aquatic Biology

- Alaska Power Authority. 1983. Chakachamna Hydroelectric Feasibility Study Environmental Study Plans FY 1984. Prepared by Woodward-Clyde Consultants. Anchorage, AK.
- Baldridge, J. 1981. Habitat Suitability Curves, <u>In</u> Wilson, W.,
  E. Trihey, J. Baldridge, C. Evans, J. Thiele and D. Trudgen.
  1981. An assessment of environmental effects of construction and operation of the proposed Terror Lake hydroelectric facility, Kodiak, Alaska. Instream flow studies final report. Arctic Environmental Information and Data Center.
  University of Alaska, Anchorage, Alaska. 419 p.
- Bovee, K. D. 1978. Probability of use criteria for the family salmonidae. Instream Flow Information Paper 4. U.S. Fish Wild. Serv. FWS/OBS-78/07. Ft. Collins. Co.
- Bovee, K. D. 1982. A guide to stream habitat analysis using the instream flow incremental methodology. Instream Flow Information Paper 12. U.S. Fish Wild. Serv. FWS/OBS-82/16. 248 pp.
- Bovee, K. D., and T. Cochnauer. 1977. Development and evaluation of weighted criteria, probability-of-use curves for instream flow assessments: fisheries. Instream Flow Information Paper 3. U.S. Fish Wild. Serv. FWS/OBS-77/63. 38 pp.

Hutchinson, G. S. 1957. A Treatise on Limnology, Vol. 1. John-Wiley and Sons. N. Y.

6-57

Krueger, S. W. 1981. Freshwater habitat relationships - Dolly Varden Char (<u>Salvelinus malma</u>) (Walbaum). Alaska Dept. of Fish and Game. Habitat Division. Anchorage, Alaska. 38 pp.

Meehan, W. R. 1964. A modified scoop trap for sampling downstream migrant salmon in turbid glacial rivers. Prog. Fish. Cult. 42-46.

Nikolsky, G. V. 1963. The Ecology of Fishes. Academic Press. N.Y.

# TABLES

Table 6.85. Measured discharges in spring 1983.

| Site <sup>a</sup> | Description                                                    | Date<br>1983               | Discharge<br>cfs   |  |
|-------------------|----------------------------------------------------------------|----------------------------|--------------------|--|
| 6                 | Lower Chakachatna above Middle                                 | 6 April                    | 71                 |  |
| 13.5              | Upper McArthur at Rapids                                       | 6 April                    | 45                 |  |
| 17                | Spawning Channel at Source<br>Spawning Channel<br>Side Channel | 26 May<br>26 May<br>26 May | 0.79<br>2.3<br>2.3 |  |
| 22                | Chakachatna below Canyon                                       | 6 April                    | 440                |  |
| С                 | Chakachatna at Lake Outlet                                     | 26 May                     | 1610               |  |

<sup>a</sup>For location of sites refer to Figure 6.30.

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Table 6.86 Mean daily discharges in cfs of the Chakachatna River at the Chakachamna Lake outlet for the period August 1982 through May 1983.<sup>a</sup>

| Day | Aug   | Sept  | Oct  | Nov     | Dec              | Jan              | Feb              | Mar              | Apr              | May              |
|-----|-------|-------|------|---------|------------------|------------------|------------------|------------------|------------------|------------------|
| 1   |       | 7760  | 6180 | 1280    | 770              | 700              | 680              | 710              | 670              | 740              |
| 2   |       | 7570  | 5820 | 1280    | 710              | 700              | /50              | 920              | 710              | 770              |
| 3   |       | 7340  | 5570 | 1240    | 700              | 660              | 770              | 1020             | 700              | 840              |
| 4   |       | 7010  | 5300 | 1220    | 700              | 660              | 840              | 1030             | 780              | 660              |
| 5   |       | 6800  | 5070 | 1180    | 680              | 670              | 970              | 970              | 660              | 640 <sup>b</sup> |
| 6   |       | 7110  | 4660 | 1140    | 670              | 980              | 870              | 930              | 660              | 740              |
| 7   |       | 7290  | 4270 | 1090    | 680              | 900              | 700              | 970              | 700              | 680              |
| 8   |       | 7290  | 4000 | 1070    | 700              | 750              | 720              | 900              | 750              | 700              |
| 9   |       | 7070  | 3820 | 1090    | 700              | 930              | 870              | 710              | 700              | 660              |
| 10  |       | 6880  | 3520 | 1020    | 700              | 950              | 920              | 740              | 740              | 640 <sup>b</sup> |
| 11  | 8870  | 6660  | 3320 | 1020    | 660              | 670              | 870              | 720              | 700              | 640 <sup>b</sup> |
| 12  | 9710  | 6280  | 3210 | 1000    | 680              | 770              | 750              | 660              | 710              | 640 <sup>b</sup> |
| 13  | 9830  | 6010  | 2980 | 1030    | 700              | 900              | 1030             | 640 <sup>b</sup> | 640 <sup>b</sup> | 660              |
| 14  | 9710  | 5780  | 2810 | 1070    | 700              | 890              | 1360             | 670              | 670              | 720              |
| 15  | 9940  | 5850  | 2630 | 1000    | 700              | 820              | 1340             | 810              | 680              | 790              |
| 16  | 10160 | 7630  | 2500 | 1000    | 700              | 740              | 1160             | 890              | 780              | 900              |
| 17  | 9940  | 8920  | 2440 | 950     | 700              | 680              | 950              | 890              | 740              | 1000             |
| 18  | 9610  | 9830  | 2280 | 930     | 680              | 810              | 850              | 890              | 900              |                  |
| 19  | 9390  | 10380 | 2200 | 920     | 640 <sup>b</sup> | 700              | 710              | 840              | 890              |                  |
| 20  | 9130  | 10380 | 2170 | 870     | 640 <sup>b</sup> | 700              | 640 <sup>b</sup> | 770              | 860              |                  |
| 21  | 8970  | 10450 | 2020 | 870     | 640 <sup>b</sup> | 660              | 680              | 670              | 700              |                  |
| 22  | 8870  | 10500 | 1940 | 870     | 640 <sup>b</sup> | 720              | 660              | 710              | 640              |                  |
| 23  | 8760  | 9990  | 1840 | 870     | 640 <sup>b</sup> | 810              | 810              | 710              | 680              |                  |
| 24  | 8660  | 9390  | 1760 | 870     | 680              | 710              | 750              | 670              | 700              |                  |
| 25  | 8610  | 8820  | 1650 | 870     | 640 <sup>b</sup> | 710              | 670              | 640 <sup>b</sup> | 680              |                  |
| 26  | 8450  | 8260  | 1590 | 870     | 640 <sup>b</sup> | 920              | 670              | 680              | 670              |                  |
| 27  | 8260  | 7810  | 1450 | 840     | 640 <sup>b</sup> | 890              | 660              | 770              | 750              |                  |
| 28  | 8140  | 7290  | 1410 | 810     | 640 <sup>b</sup> | 700              | 670              | 770              | 700              |                  |
| 29  | 8060  | 6930  | 1380 | 810     | 680              | 680              |                  | 790              | 640 <sup>b</sup> |                  |
| 30  | 8060  | 6580  | 1300 | 810     | 700              | 660              | . 🗕              | 710              | 640 <sup>b</sup> |                  |
| 31  | 7960  | _     | 1280 | <u></u> | 700              | 640 <sup>b</sup> | <u></u>          | 640 <sup>b</sup> |                  |                  |

<sup>a</sup> Records are poor during August and September and very poor after November.

<sup>b</sup> Corresponds to 0.0 data pad reading.

| Day | Aug  | Sept | Oct                                   | Nov                                   | Dec  | Jan | Feb | Mar                                   | Apr | Мау | June    |
|-----|------|------|---------------------------------------|---------------------------------------|------|-----|-----|---------------------------------------|-----|-----|---------|
|     |      |      | · · · · · · · · · · · · · · · · · · · | · · · · · · · · · · · · · · · · · · · |      | 1   |     | · · · · · · · · · · · · · · · · · · · |     |     | <u></u> |
| 1   | •    | 743  | 319                                   | 738                                   | 341  | 720 | 364 | 61                                    | 40  | 123 | 859     |
| 2   |      | 791  | 301 /                                 | 783                                   | 452  | 481 | 273 | 57                                    | 51. | 129 | 716     |
| 3   |      | 839  | 278                                   | 743                                   | 504  | 291 | 192 | 89                                    | 43  | 126 | 691     |
| 4   |      | 887  | 257                                   | 609                                   | 516  | 217 | 148 | 117                                   | 51  | 131 | 559     |
| 5   |      | 935  | 265                                   | 499                                   | 497  | 327 | 118 | 74                                    | 52  | 137 | 596     |
| 6   |      | 983  | 236                                   | 528                                   | 377  | 920 | 98  | 53                                    | 50  | 136 | 640     |
| 7   |      | 1031 | 219                                   | 535                                   | 387  | 147 | 93  | 55                                    | 47  | 143 | 649     |
| 8   |      | 1079 | 207                                   | 588                                   | 239  | 437 | 123 | 89                                    | 49  | 145 | 651     |
| 9   |      | 1127 | 203                                   | 481                                   | 168  | 389 | 258 | 145                                   | 55  | 155 | 610     |
| 10  |      | 1175 | 189                                   | 420                                   | 207  | 330 | 469 | 178                                   | 54  | 155 | 565     |
| 11  |      | 1223 | 189                                   | 373                                   | 168  | 320 | 590 | 101                                   | 51  | 150 | 550     |
| 12  |      | 1271 | 197                                   | 428                                   | 159  | 265 | 610 | 63                                    | 53  | 159 | 552     |
| 13  |      | 1319 | 180                                   | 458                                   | 167  | 232 | 588 | 44                                    | 55  | 186 | 577     |
| 14  |      | 1367 | 173                                   | 326                                   | 245  | 239 | 539 | 44                                    | 56  | 187 | 633     |
| 15  |      | 1415 | 167                                   | 291                                   | 201  | 262 | 463 | 42                                    | 55  | 193 | 641     |
| 16  |      | 1463 | 157                                   | 348                                   | 167  | 273 | 307 | 40                                    | 55  | 235 | 625     |
| 17  | 23   | 1511 | 147                                   | 387                                   | 142  | 150 | 210 | 44                                    | 52  | 231 | 697     |
| 18  | 71   | 1543 | 156                                   | 388                                   | 111  | 166 | 173 | 45                                    | 54  | 212 | 1       |
| 19  | -119 |      | 144                                   | 416                                   | 101  | 139 | 209 | 49                                    | 51  | 210 |         |
| 20  | 167  |      | 160                                   | 418                                   | 91   | 120 | 174 | 45                                    | 52  | 243 |         |
| 21  | 215  | •    | 222                                   | 328                                   | 84   | 117 | 134 | 37                                    | 57  | 238 |         |
| 22  | 263  | •    | 404                                   | 225                                   | 230  | 113 | 114 | 48                                    | 65  | 242 |         |
| 23  | 311  |      | 697                                   | 254                                   | 519  | 113 | 108 | 39                                    | 67  | 268 |         |
| 24  | 359* | 545  | 954                                   | 228                                   | 662  | 114 | 112 | 29                                    | 78  | 263 |         |
| -25 | 407  | 472  | . 907                                 | 223                                   | 615  | 108 | 96  | 31                                    | 90  | 242 |         |
| 26  | 455  | 533  | 759                                   | 174                                   | 525  | 107 | 98  | 32                                    | 98  | 259 |         |
| 27  | 503  | 427  | 827                                   | 122                                   | 63'1 | 119 | 93  | 32                                    | 107 | 273 |         |
| 28  | 551  | 407  | 837                                   | 134                                   | 759  | 105 | 69  | 35                                    | 105 | 291 |         |
| 29  | 599  | 397  | 766                                   | 177                                   | 1665 | 100 |     | 40                                    | 115 | 531 |         |
| 30  | 647  | 368  | 727                                   | 203                                   | 1186 | 118 |     | 48                                    | 126 | 778 |         |
| 31  | 695  |      | 729                                   |                                       | 856  | 150 |     | 56                                    |     | 928 |         |

Table 6.87 Mean daily discharges in cfs of the McArthur River at the rapids for the period August 1982 through June 1983.

<sup>a</sup>Records for the entire period are poor.

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Table 6.88

Mean daily water temperatures in °C of the Chakachatna River at the Chakachamna Lake outlet for the period August 1982 through November 1982.

| Day           | Aug        | Sept       | Oct        | Nov        | Dec <sup>a</sup> | Jan <sup>a</sup> | Feb <sup>a</sup> | Mar <sup>a</sup> | Apr <sup>a</sup> | May <sup>a</sup> |
|---------------|------------|------------|------------|------------|------------------|------------------|------------------|------------------|------------------|------------------|
| 4             |            |            | 7 0        | 4 0        | 0.9              |                  |                  | -1 0             | - 1 /            |                  |
| -<br>-        |            | 7.9        | 1.0        | 4.0        | -0.3             | -0.6             | -1 4             | -10 2            | -4.0             | -0.1             |
| -             |            | 9.1        | 6 0        | 4.0        | 1.1              | -0.0             | -1.6             | -12.1            | -0.0             | 0.1              |
| 1             |            | 8.0        | 6.6        | 4.0        | _1 5             |                  | -1.0             | -10 3            | -7.5             | -27 6            |
| -T<br>5       |            | 6.0<br>6 4 | 0.0<br>6 5 | 3.8        | -0.8             |                  | -1.0             | -7.1             | -24.0            |                  |
| 6             |            | 5 /        | 6.0        | 3.4        | -12 5            | -8/3             | -1.1             |                  | -12.4            | -24.7            |
| . 7           |            | 9.0        | 6.0        | 3.5        | 0.5              | -12 6            |                  |                  | -13.0            | -0.1             |
| 0<br>0        |            | 2.5        | 6.0        | 3.4        | 1 2              | -14.5            |                  | -11 1            | -1.3             | -0.1             |
| 0<br>0        |            | 7 0        | 6.1<br>4 0 | 3.0        | -01              | -12.4            | -17.0            | -11 /            | -1.0             | 0.3              |
| 10            |            | 7.7        | 6.0        | 3.5        | -0.1             | -12.1            | -14.0            |                  | -2.0             | -24 5            |
| 10            | 1 E        | 7.0        | 6.0        | 3.5        | -1.0<br>         | -20 0            |                  | -11.3            | -3.1             | -24.0            |
| 11            | 0.0        | 7.0        | 6.0        | 35         | -0.0             | -11 0            | -10.1            | -7.0             | -14.8            | -30.0            |
| که از<br>د به | 0.1        | 0.0        | 2.9        | 2.5        | 0.0              |                  | -13.1            | -28.8            | -2.4             | -37.0            |
| 13            | 8.1        | 3.1        | 0.0        | С.<br>С. Д | 0.0              | -12.0            | -15.6            | -50.0            | -38.1            | -23.1            |
| 14            | 8.U<br>2 F | ·          | 5.5        | 0.T        | 0.7              | -12.0            | -17.0            | -16.6            | -15.3            | 2.0              |
| 15            | 8.0        | 6.5        | 5.5        | 0.0<br>0.5 | 0.5              | -7.6             | -17.4            | -5.0             | -13.5            | 1.4              |
| 16            | 8.4        | 6.5        | 5.5        | 2.J        | 0.0              |                  | -16.4            | -4.9             | -1.1             | ت.ا.<br>م ا      |
| 17            | 8.5        | 6.5        | 5.5        | 2.0        | -0.1             | -7.0             | -15.6            | -6.0             | -2.0             | 1.3              |
| 18            | 8.4        | 6.5        | 5.5        | 1.0        | -0.5             | -7.1             | -14.0            | -6.0             | -1.3             |                  |
| 19            | 8.1        | 6.5        | 5.5        | 1.1        | -12.8            | -16.0            | -10.0            | -5.9             | -0.8             |                  |
| 20            | 8.3        | 6.9        | 5.0        | 1.9        | -12.3            | -3.0             | -19.1            | -4.6             | -1.1             |                  |
| 21            | 8.0        | 6.6        | 5.0        | 1.5        | -25.1            | -14.3            | -7.3             | -4.6             | -0.9             |                  |
| 22            | 7.6        | 6.6        | 5.0        | 2.3        | -50.'0           | -4.5             | -17.5            | -5.9             | -37.5            |                  |
| 23            | 7.1        | 7.0        | 4.8        | 3.4        | -38.8            | -9.6             | -5.5             | -6.0             | 0.0              |                  |
| 24            | 6.8        | 6.9        | 4.5        | 3.0        | -15.9            | -9.9             | -5.0             | -16.3            | 0.0              |                  |
| 25            | 7.5        | 7.0        | 4.5        | 3.0        | -38.5            | -17.5            | -6.3             | -26.8            | 0.0              |                  |
| 26            | 8.5        | 7.0        | 4.0        | 3.0        | -37.6            | -5.0             | -6.1             | -3.1             | -25.1            |                  |
| 27            | 8.9        | 7.0        | 4.3        | 2.8        | -37.6            | -3.4             | -27.4            | -3.0             | 0.0              |                  |
| 28            | 7.9        | 7.0        | 4.3        | 2.1        | -50.0            | -3.1             | -15.5            | -2.5             | 0.0              |                  |
| 29            | 6.1        | 7.0        | 4.0        | 1.9        | 1.3              | -5.6             |                  | -3.1             | -37.5            |                  |
| 30            | 7.6        | 7.0        | 4.0        | 1.0        | 0.6              | -39.5            |                  | -5.3             | -25.0            |                  |
| 31            | 8.5        |            | 4.0        |            | -0.8             | -50.0            |                  | -5.6             |                  |                  |

<sup>a</sup>Insufficient water depth over transducer.

Table 6.89

Mean daily water temperatures in °C of the McArthur River at the rapids for the period August 1982 through June 1983.

| Day | Aug                                      | Sept | Oct | Nov | Dec | Jan | Feb              | Mar  | Apr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Мау     | June |
|-----|------------------------------------------|------|-----|-----|-----|-----|------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------|
|     |                                          | 5.2  | 3.8 | 0.5 | 0.0 | 0.0 | 0.0              | 0.0  | 1.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 3.9'    | 3.3  |
| 2   |                                          | 4.5  | 3.8 | 0.6 | 0.0 | 0.0 | 0.0              | 0.0  | 1.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 3 A     | 4.0  |
| 3   |                                          | 4.9  | 3.6 | 1.0 | 0.0 | 0.0 | 0.0              | 0.0  | 1.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 3.8     | 3.1  |
| 4   |                                          | 4.3  | 3.3 | 0.9 | 0.0 | 0.0 | 0.0              | 0.0  | 1.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 20      | 3.1  |
| 5   |                                          | 4.5  | 3.0 | 0.5 | 0.0 | 0.0 | 0.0              | 0.0  | 0.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | . 3 . 9 | 4.0  |
| • 6 | a                                        | 4.1  | 1.6 | 0.0 | 0.0 | 0.0 | 0.0              | 0.0  | 0.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2.0     | 5.4  |
| 7   |                                          | 4.0  | 2.5 | 0.0 | 0.0 | 0.0 | 0.0              | 0.0  | 0.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.1     | 4.3  |
| ŝ   | 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1 | 4.0  | 2.5 | 0.0 | 0.0 | 0.0 | 0.0              | 0.0  | 0.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.1     | 4-1- |
| 9   |                                          | 3.9  | 2.5 | 0.0 | 0.0 | 0.0 | 0.0              | 0.0  | 0.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.3     | 4.4  |
| 10  |                                          | 4.0  | 2.5 | 0.0 | 0.0 | 0.0 | 0.0              | 0.0  | 1.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.0     | 4.1  |
| 11  |                                          | 4.7  | 2.2 | 0.0 | 0.0 | 0.0 | 0.0              | 0.0  | 1.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.0     | 5.1  |
| 12  |                                          | 3.0  | 2.1 | 0.0 | 0.0 | 0.0 | 0.0              | 0.0  | 1.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.0     | 4.5  |
| 13  |                                          | 4.2  | 2.1 | 0.0 | 0.0 | 0.0 | 0.0              | 0.0  | 1.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.0     | 4.5  |
| 14  |                                          | 4.4  | 2.0 | 0.0 | õ.õ | 0.0 | 0.0              | 0.0  | 1.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.0     | 4.6  |
| 15  | •                                        | 5.4  | 1.7 | 0.0 | 0.0 | 0.0 | 0.0              | .0.0 | 1.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.0     | 4.0  |
| 16  | •                                        | 4.8  | 1.9 | 0.0 | 0.0 | 0.0 | 0.0              | 0.0  | 1.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.Ŭ     | 3.9  |
| 17  | 5.9                                      | 6.3  | 2.0 | 0.0 | 0.0 | 0.0 | 0.0              | 0.0  | 1.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.3     | 5.1  |
| 18  | 5.8                                      | 6.6  | 1.0 | 0.0 | 0.0 | 0.0 | 0.0              | 0.0  | 1.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.4     | 5.0  |
| 19  | 5.7                                      |      | 1.5 | 0.0 | 0.0 | 0.0 | 0.0              | 0.0  | 1.9.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 4.5     | 4.5  |
| 20  | 5.8                                      |      | 1.1 | 0.0 | 0.0 | 0.0 | 0.0              | 0.0  | 1.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.8     |      |
| 21  | 5.6                                      |      | 0.8 | 0.0 | 0.1 | 0.0 | 0.0              | 0.0  | 1.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.6     |      |
| 22  | 4.9                                      |      | 0.9 | 0.0 | 0.0 | 0.0 | 0.0              | 0.0  | 2.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.5     |      |
| 23  | 5.3                                      |      | 0.3 | 0.0 | 0.0 | 0.0 | 0.0              | 0.0  | 2.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.4     |      |
| 24  | 4.6                                      | 4.0  | 0.8 | 0.0 | 0.0 | 0.0 | 0.0              | 0.0  | 3.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.5     |      |
| 25  | 4.8                                      | 3.1  | 1.0 | 0.0 | 0.0 | 0.0 | 0.0              | 0.1  | 3.5-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 4.5     |      |
| 26  | 5.2                                      | 3.9  | 1.0 | 0.0 | 0.0 | 0.0 | 0.0              | 0.3  | 3.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.5     |      |
| 27  | 5.4                                      | 3.7  | 1.0 | 0.0 | 0.0 | 0.0 | 0.0              | 0.0  | 3.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.4     |      |
| 28  | 4.3                                      | 3.6  | 0.9 | 0.0 | 0.0 | 0.0 | 0.0              | 0.1  | 3.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | .4.4    |      |
| 29  | 5.0                                      | 3.6  | 0.9 | 0.0 | 0.0 | 0.0 | *#* <b>#</b> *#* | 0.6  | 3.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.1     |      |
| 30  | 4.2                                      | 4.0  | 0.5 | 0.0 | 0.0 | 0.0 |                  | 0.8  | 3.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 3.4     |      |
| 31  | 4.9                                      |      | 0.5 |     | 0.0 | 0.0 |                  | 0.8  | - <b>19</b> 1 - <b>19</b> | 3.0     |      |

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| Station     | Minnow<br>Trap | Electro-<br>Shock | Dip<br>Net | Gill<br>Net  |
|-------------|----------------|-------------------|------------|--------------|
| 1           | 4-10-83        |                   |            |              |
| 2           | 4-10-83        |                   |            |              |
| 3           | 4-9-83         |                   |            |              |
| 4           | 4-9-83         |                   |            |              |
| 5           | 4-9-83         |                   |            |              |
| 6           | 4-9-83         |                   |            |              |
| 8           | 4-9-83         |                   |            |              |
| 11          | 4-10-83        |                   |            |              |
| 12.1        |                | 4-5-83            |            |              |
| 13          |                | 4-5-83            |            |              |
| 13u         |                | 4-8-83            |            |              |
| 14          | 4-10-83        |                   |            |              |
| 15          | 4-10-83        | 4-5-83            |            |              |
| 16          | 4-10-83        |                   |            |              |
| 16 <b>A</b> | 4-10-83        |                   |            |              |
| 17          | 4-10-83        | 4-10-83           | 4-10-83    |              |
| 22          | 4-10-83        | 4-05-83           |            |              |
| 25 Mid Lake | · .            |                   |            | 4-09-83      |
|             |                |                   |            | -<br>4-10-83 |
|             |                |                   |            |              |

# Table 6.90. Stations sampled by gear type and date for April 1983 field program

| Station     | Minnow<br>Trap | Electro-<br>Shock | Fyke<br>Net         | Dip<br>Net       | Inclined<br>Plane<br>Trap |
|-------------|----------------|-------------------|---------------------|------------------|---------------------------|
| 1           | 6-23-83        | 6-29-83           |                     | <del></del>      |                           |
| 1D          | 6-19-83        | 6-23-83           | 6-18-83<br>-6-28-83 |                  |                           |
| 2           | 6-24-83        | 6-30-83           |                     | ÷,               |                           |
| 3           | 6-26-83        | 6-30-83           |                     |                  |                           |
| 4           | 6-20-83        | 7-3-83            | 6-19-83<br>-6-28-83 | 6-20-83          | 3 6-19-83<br>-7-5-83      |
| 5           | 6-20-83        | 7-4-83            |                     |                  |                           |
| 6           | 6-20-83        | 7-30-83           | 6-19-83<br>-6-28-83 |                  |                           |
| 6 <b>A</b>  | 6-29-83        | 7-4-83            |                     |                  |                           |
| 8           | 6-22-83        | 7-4-83            |                     |                  |                           |
| 9           | 6-28-83        | 7-4-83            |                     |                  |                           |
| 10          | 6-22-83        | 6-29-83           |                     |                  |                           |
| 11          | 6-23-83        | 6-29-83           |                     |                  |                           |
| 11.5        | 6-28-83        |                   |                     |                  |                           |
| 12          | 6-27-83        | 6-29-83           |                     |                  |                           |
| 13          | 6-25-83        | 7-4-83            |                     |                  |                           |
| 14          | 6-26-83        | 6-23-83           |                     |                  |                           |
| 15          | 6-27-83        | 6-23-83           |                     |                  |                           |
| 16          | 6-22-83        | 7-4-83            |                     |                  |                           |
| 16 <b>A</b> | 6-22-83        | 7-4-83            |                     |                  |                           |
| 17D         | 6-29-83        | 7-2-83            |                     | a<br>An an an an |                           |
| 18          | 6-30-83        | 6-30-83           |                     |                  |                           |
| 18 <b>A</b> | 7-1-83         | 7-1-83            |                     |                  |                           |

Table 6.91. Stations sampled by gear type and date for June/July 1983 field program

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| _  |   | -  | -  |    |   | _ |
|----|---|----|----|----|---|---|
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| Station     | Minnow<br>Trap | Electro-<br>Shock | Fyke<br>Net                            | Dip<br>Net | Inclined<br>Plane<br>Trap                                                                                                                                                                                                           |
|-------------|----------------|-------------------|----------------------------------------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 19          | 6-30-83        | 6-30-83           | ······································ |            | · · · · · · · · · · · · · · · · · · ·                                                                                                                                                                                               |
| 19 <b>A</b> | 7-01-83        | 7-01-83           |                                        |            |                                                                                                                                                                                                                                     |
| 20          | 6-30-83        | 6-30-83           | . •                                    |            | •                                                                                                                                                                                                                                   |
| 21          | 6-30-83        | 7-04-83           |                                        |            |                                                                                                                                                                                                                                     |
| 22          | 7-01-83        | 7-02-83           |                                        |            |                                                                                                                                                                                                                                     |
| 23          | 7-01-83        | 7-01-83           |                                        |            |                                                                                                                                                                                                                                     |
| 24          | 7-02-83        | 7-02-83           |                                        |            |                                                                                                                                                                                                                                     |
| 25          |                | 7-02-83           |                                        |            |                                                                                                                                                                                                                                     |
| 26          |                | 7-02-83           |                                        |            |                                                                                                                                                                                                                                     |
| 27          |                | 7-02-83           |                                        |            | tan di karangan di karanga<br>Karangan di karangan di kara  |
| 28          |                | 7-02-83           |                                        |            |                                                                                                                                                                                                                                     |
| 40          | 6-26-83        | 7-03-83           |                                        |            |                                                                                                                                                                                                                                     |
| 40 <b>A</b> | 6-26-83        | 7-03-83           |                                        |            |                                                                                                                                                                                                                                     |
| 41          | 6-23-83        | 7-03-83           |                                        |            |                                                                                                                                                                                                                                     |
| 41 <b>A</b> | 6-24-83        | 7-03-83           |                                        |            |                                                                                                                                                                                                                                     |
| 42          | 6-25-83        | 7-03-83           |                                        |            |                                                                                                                                                                                                                                     |
| 43          | 6-27-83        | 7-03-83           |                                        |            | e de la companya de l<br>La companya de la comp |
| 43 <b>A</b> | 6-27-83        | 7-03-83           |                                        |            |                                                                                                                                                                                                                                     |
| 44          | 6-28-83        | 704-83            |                                        |            |                                                                                                                                                                                                                                     |
| 44 <b>A</b> | 6-28-83        | 7-04-83           |                                        |            |                                                                                                                                                                                                                                     |
| 45          | 6-29-83        | 6-29-83           |                                        |            |                                                                                                                                                                                                                                     |

Table 6.91. Stations sampled by gear type and date for June/July 1983 field program (concluded)

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| Station | Dolly<br>Varden | Coho<br>Salmon | Pygmy<br>Whitefish |
|---------|-----------------|----------------|--------------------|
| 1       | 0.00            | 0.00           | 0.00               |
| 2       | 0.00            | 0.00           | 0.00               |
| 3       | 0.00            | 0.50           | 0.00               |
| 4       | 1.00            | 4.50           | 0.00               |
| 5       | 0.00            | 0.25           | 0.00               |
| 6       | 0.00            | 0.00           | 0.00               |
| 8       | 1.00            | 1.75           | 0.00               |
| 11      | 0.00            | 0.50           | 0.00               |
| 14      | 1.50            | 0.00           | 0.00               |
| 15      | 0.75            | 0.00           | 0.00               |
| 16      | 1.00            | 0.00           | 0.00               |
| 16A     | 1.25            | 1.25           | 0.00               |
| 17      | 0.50            | 0.75           | 0.00               |
| 19      | 0.00            | 0.00           | 0.00               |
| 22      | 2.25            | 0.00           | 0.25               |

Table 6.92. Catch/effort by station for minnow traps - April 1983

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|                                                                                                                                                                              | Dolly Varden<br>(parr & juveniles                                                                   | Coho Salmon<br>s) (parr)                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Upper Chakachatna<br>River (Canyon)                                                                                                                                          | 2.25                                                                                                | 0.00                                                                                                                |
| Mid-Chakachatna River                                                                                                                                                        | 0.50                                                                                                | 1.25                                                                                                                |
| Noaukta Slough                                                                                                                                                               | 1.08                                                                                                | 1.08                                                                                                                |
| Lower Chakachatna River                                                                                                                                                      | 0.17                                                                                                | 0.91                                                                                                                |
| Upper McArthur River                                                                                                                                                         | 1.13                                                                                                | 0.00                                                                                                                |
| Lower McArthur River                                                                                                                                                         | 0.00                                                                                                | 0.29                                                                                                                |
| Chakachatna Tributaries                                                                                                                                                      | 0.00                                                                                                | 0.00                                                                                                                |
| Upper Chakachatna River (Ca<br>Mid-Chakachatna River<br>Noaukta Slough<br>Lower Chakachatna River<br>Upper McArthur River<br>Lower McArthur River<br>Chakachatna Tributaries | anyon) Stations<br>Stations<br>Stations<br>Stations<br>Stations<br>Stations<br>Stations<br>Stations | 22, 23, 24<br>17, 17D, 20, 21<br>8, 9, 10, 16, 16A<br>1, 2, 3, 4, 5, 6, 6A<br>13, 14, 15<br>1D(1), 11, 12<br>18, 19 |

### Table 6.93. Mean minnow trap c/f for each reach for juvenile Dolly Varden and coho salmon - April 1983

| 04 | 0 | 0 | C |  | 5 |
|----|---|---|---|--|---|
|----|---|---|---|--|---|

| Station<br>Number | Dolly<br>Varden | Coho<br>Salmon | Chinoo <b>k</b><br>Salmon | Sockeye<br>Salmon | Chum<br>Salmon | Rainbow<br>Trout | Pygmy<br>Whitefish |
|-------------------|-----------------|----------------|---------------------------|-------------------|----------------|------------------|--------------------|
| 1                 |                 |                |                           | _                 |                |                  |                    |
| 2                 |                 |                |                           |                   |                |                  |                    |
| 3                 | ÷ .             | +              |                           |                   |                |                  |                    |
| 4                 | +               | · + .          |                           |                   |                |                  |                    |
| 5                 |                 | +              |                           |                   |                |                  |                    |
| 6                 | •<br>•          |                | •                         |                   |                |                  |                    |
| 8                 | <b>+</b> .      | +              |                           |                   |                |                  |                    |
| 11                |                 | +              |                           |                   |                |                  |                    |
| 13                | +               | +              |                           |                   |                |                  |                    |
| 14                | +               |                |                           |                   |                | . ÷              |                    |
| 15                | +               | +              | +                         | +                 |                |                  |                    |
| 16                | +               |                |                           |                   |                |                  |                    |
| 16A               | + 1             | ÷              |                           |                   |                |                  |                    |
| 17                | +               | +              |                           | +                 | • +            |                  | . · ·              |
| 19                | +               | +              | +                         |                   |                |                  |                    |
| 22                | +               |                |                           |                   |                |                  | +                  |
| 40 <b>A</b>       | +               | +              |                           |                   |                | +                |                    |
| 42                | +               | +              |                           | +                 |                |                  |                    |
|                   |                 | :              |                           |                   |                |                  |                    |
|                   |                 |                |                           |                   |                |                  |                    |
|                   |                 |                |                           |                   |                |                  |                    |
|                   |                 |                |                           |                   |                |                  |                    |
|                   |                 | •              |                           |                   |                |                  |                    |
|                   |                 |                |                           |                   |                |                  |                    |

| Table 6.94. | Incidence of fish at sampling | stations - | April | 1983 |
|-------------|-------------------------------|------------|-------|------|
|             | all collection methods        |            |       |      |

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| Species         | Percentage |  |
|-----------------|------------|--|
| Dolly Varden    | 66.7       |  |
| Coho Salmon     | 66.7       |  |
| Chinook Salmon  | 11.1       |  |
| Sockeye Salmon  | 16.7       |  |
| Chum Salmon     | 5.6        |  |
| Rainbow Trout   | 5.6        |  |
| Pygmy Whitefish | 5.6        |  |
|                 |            |  |

# Table 6.95. Percentage incidence of fish species at sampling stations - April 1983

| D<br>V                                                                                                                                                                 | olly<br>arden      | Coho<br>Salmon | Chino<br>Salmo                                           | ook Soc<br>on Sal                                                            | keye<br>mon                                                                | Chum<br>Salmon                                                        | Rainbow<br>Trout               | Pygmy<br>Whitefish |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------|----------------------------------------------------------|------------------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------|--------------------------------|--------------------|
| Upper Chakachatna<br>River (Canyon)                                                                                                                                    | +                  |                |                                                          |                                                                              |                                                                            | ·                                                                     | · · ·                          | +                  |
| Mid-Chakachatna River                                                                                                                                                  | +                  | -1             |                                                          |                                                                              | +                                                                          | . <b>+</b> ·                                                          |                                |                    |
| Noaukta Slough                                                                                                                                                         | +                  | · +            |                                                          |                                                                              |                                                                            |                                                                       |                                |                    |
| Lower Chakachatna River                                                                                                                                                | +                  | +              |                                                          |                                                                              |                                                                            |                                                                       |                                |                    |
| Upper McArthur River                                                                                                                                                   | +                  | +              |                                                          |                                                                              | +                                                                          |                                                                       |                                |                    |
| Lower McArthur River                                                                                                                                                   |                    | +              |                                                          |                                                                              |                                                                            |                                                                       |                                |                    |
| Chakachatna Tributaries                                                                                                                                                | +                  | +              | t.                                                       |                                                                              |                                                                            | •                                                                     |                                |                    |
| McArthur Tributaries                                                                                                                                                   | +                  | ÷              |                                                          | · · · · · · · · · · · · · · · · · · ·                                        | +                                                                          |                                                                       | +                              |                    |
| Upper Chakachatna Rive<br>Mid-Chakachatna River<br>Noaukta Slough<br>Lower Chakachatna Rive<br>Upper McArthur River<br>Lower McArthur River<br>Chakachatna Tributaries | r (Canyo<br>r<br>s | on)            | 51<br>51<br>51<br>51<br>51<br>51<br>51<br>51<br>51<br>51 | ations<br>ations<br>ations<br>ations<br>ations<br>ations<br>ations<br>ations | 22, 23<br>17, 17<br>8, 9,<br>1, 2,<br>13, 14<br>10(1),<br>18, 19<br>40, 40 | , 24<br>D, 20, 2<br>10, 16,<br>3, 4, 5,<br>, 15<br>11, 12<br>A, 41, 4 | 1<br>16A<br>6, 6A<br>1A. 42. 4 | 24. 43. 434.       |

Table 6.96. Collection by reach for juvenile salmonids by all methods - April 1983

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| Dep                   | th <sup>1</sup> | Temperature | Dissolved<br>Oxygen | Turbidity   | Specific<br>Conductivity | pH <sup>4</sup> |
|-----------------------|-----------------|-------------|---------------------|-------------|--------------------------|-----------------|
| (meters)              | (feet)          | (°C)        | (mg/1)              | (ppm)(mg/1) | (umhos/cm)               |                 |
| 02                    | 02              | 0.8         | 10.8                | 57          | 42                       | 4.94            |
| 0.32                  | 12              | 0.8         | 11.5                | 55          | 35                       | 4.64            |
| 0.62                  | 22              | 0.7         | 11.9                | 56          | 31                       | 4.04            |
| 0.9                   | 3               | 0.7         | 12.3                | 58          | 28                       | 4.14            |
| 1.2                   | 4               | 0.7         | 12.4                | 63          | 27                       | 3.94            |
| 1.5                   | 5               | 0.6         | 12.6                | 63          | 22                       | 3.74            |
| 3.0                   | 10              | 0.6         | 12.4                | 64          | 27                       | 3.94            |
| 4.5                   | 15              | 0.6         | 12.5                | 66          | 22                       | 3.94            |
| 6.1                   | 20              | 0.6         | 12.5                | 69          | 21                       | 3.94            |
| 7.6                   | 25              | 0.6         | 12.4                | 73          | 20                       | 4.04            |
| 9.1                   | 30              | 0.6         | 15.0                | 67          | 20                       | 7.0             |
| 15.2                  | 50              | 0.6         | 15.2                | 69          | 19                       | 7.0             |
| 22.9                  | 75              | 0.7         | 16.1                | 67          | 23                       | 7.0             |
| 30.5                  | 100             | 0.7         | 20.5                | 65          | 21                       | 7.0             |
| 45.7                  | 150             | 1.3         | 20.9                | 64          | 20                       | 7.0             |
| 61.0                  | 200             | 1.5         | 14.3                | 65          | 21                       | 7.1             |
| 76.2                  | 250             | 1.7         | 14.2                | 62          | 20                       | 7.2             |
| 85.3                  | 280             | 1.8         | 22.1                | 74          | 20                       | 7.2             |
| 86.93                 | 2853            |             |                     |             | · · · · ·                |                 |
| 1                     | <u> </u>        |             | <u></u>             | <u> </u>    | <u> </u>                 |                 |
| - 1 ft of             | snow on to      | p or ice    |                     |             |                          |                 |
| <sup>2</sup> ice grea | ter than 2      | ft in depth |                     |             |                          |                 |
| 3 bottom              |                 |             |                     |             |                          |                 |

Table 6.97. Water quality profile of Chakachamna Lake - April 1983

<sup>4</sup> possible instrument malfunction

|                   | Wat<br>Temper | er<br>ature | Dissol<br>Oxyg | ved       | Conduct        | tivity      | Turbi       | dity       |
|-------------------|---------------|-------------|----------------|-----------|----------------|-------------|-------------|------------|
| Station           | Mean<br>(°)   | SD<br>C)    | Mean<br>(mg/   | SD<br>(1) | Mean<br>(umho) | SD<br>s/cm) | Mean<br>(mg | SD<br>;/1) |
| 1                 | 2.7           | 1.57        | 10.9           | 1.59      | 166.8          | 11.65       | 205.8       | 48.98      |
| 2                 | 4.6           | .12         | 12.6           | .31       | 107.3          | .83         | 104.3       | 4.92       |
| 3                 | 3.9           | .12         | 13.0           | .11       | 103.0          | 1.23        | 61.5        | 6.10       |
| 4                 | 4.5           | .08         | 10.3           | . 96      | 93.0           | 1.0         | 75.5        | 11.86      |
| 5                 | . 4           |             | 12.7           | .80       | 41.0           | 18.0        | 73.5        | 25.5       |
| 6                 | 3.6           | .45         | 12.0           | .75       | 104.3          | .47         | 61.3        | 5.71       |
| 8                 | 1.68          | .11         | 12.9           | .14       | 15.0           | -           | 15.0        | 2.00       |
| 11                | .77           | .09         | 13.8           | · .<br>—— | 99.0           |             | 71.7        | 15.09      |
| 13                | 3.3           | .85         | 11.05          | 1.55      | 39.0           | 19.0        | 56.0        | 2.00       |
| 130               | 1.8           |             | 12.5           |           | 13.0           |             | 2.0         |            |
| 14                | 3.5           | .36         | 12.2           | .51       | 15.8           | .44         | 24.8        | 6.83       |
| 15                | 2.8           | .52         | 12.3           | .51       | 16.6           | 3.32        | 9.4         | 12.40      |
| 16                | 3.68          | .18         | 12.4           | .39       | 101.8          | .74         | 43.8        | 3.42       |
| 16A               | 2.4           | .43         | 12.5           | .42       | 15.0           | 7.18        | 24.3        | 7.50       |
| 17                | 4.1           | .09         | 12.7           | .15       | 73.8           | 1.17        | 7.08        | 3.42       |
| 19                | 0.15          | .09         | 13.9           | .38       | 20.3           | 1.79        | 25.5        | 6.80       |
| 22                | 1.4           | .55         | 14.0           | .68       | 117.6          | 7.78        | 34.9        | 14.22      |
| 24.1 <sup>1</sup> | 16.4          | <b></b>     | 8.3            |           | 27.0           |             | 83.0        |            |
| 24.2              | 14.2          |             | 7.9            |           | 855.0          |             | 84.0        |            |

Table 6.98. Water quality data by station - April 1983

<sup>1</sup> Feeder stream from Mt. Spurr into Chakachatna River near Station 24.

 $^2$  Another feeder stream from Mt. Spurr into Chakachatna River near Station 24.

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| · · · · · · · · · · · · · · · · · · · | Descri                        | ption              |              |                            |                 |                 |                              |                            |                                     |
|---------------------------------------|-------------------------------|--------------------|--------------|----------------------------|-----------------|-----------------|------------------------------|----------------------------|-------------------------------------|
|                                       | Side of<br>Bank<br>(Facing Up | Dist<br>From       | ance<br>Bank | <u>Temperat</u><br>Surface | ure °C<br>Stand | De<br>Sur<br>Wa | epth<br>rface<br><u>iter</u> | Velo<br>0.6 Tot<br>Surface | city<br>tal Depth<br><u>e Water</u> |
| Station                               | Stream)                       | (m)                | (ft)         | Water                      | Pipe            | (m)             | (ft)                         | (cm/s)                     | (ft/s)                              |
| 42A                                   | ·····                         | 0.9                | 3            | 3.5                        | 4.7             | 0.5             | 5                            | 39.6                       | 1.3                                 |
| 42                                    | 2 <sub>MC</sub>               |                    |              | 4.7                        | 4.4             | 0.3             | 1.1                          | 42.7                       | 1.4                                 |
| 43                                    | MC                            |                    |              | 6.1                        | 4.3             | 0.2             | 0.8                          | 27.4                       | 0.9                                 |
| 44                                    | 3 <sub>RB</sub>               | 0.9                | 3            | 5.0                        | 3.7             | 0.1             | 0.4                          | 35.1                       | 1.15                                |
| 45                                    | 4 <sub>1.8</sub>              | 1.5                | 5            | 4.2                        | 3.9             | 0.2             | 0.5                          | 12.2                       | 0.4                                 |
| 15                                    | MC                            |                    |              | 3.9                        | 3.7             | 0.1             | 0.3                          | 24.4                       | 0.8                                 |
| 154                                   | 41 B                          | 15                 | 5            | 39                         | 39              | 0 1             | 0 4                          | 21.3                       | 0.7                                 |
| 174 (18+0) North                      | I R                           | 0.2                | 0.5          | 4 2                        | 4 1             | 0.1             | 0 4                          | 6 1                        | 0.2                                 |
| End Left Most                         |                               | <b>V</b> ·L        | 0.0          |                            |                 | 0.1             | •••                          | v.,                        | U.L                                 |
| Channel                               |                               |                    |              |                            |                 |                 |                              |                            |                                     |
| 17 (18+0) North                       | I R                           | 0.2                | 5            | 4 0                        | 31              | 0.2             | 0.5                          | 6 1                        | 0.2                                 |
| End Loft Most                         | LU                            | 0.2                | 5            | <b>T.V</b>                 | 5.1             | 0.2             |                              | 0.1                        | 0.2                                 |
| Channel                               |                               |                    |              |                            |                 |                 |                              |                            |                                     |
|                                       | 500                           | 10 02              | <b>~</b> 0 1 | 6.0                        | 2 1             |                 |                              | _                          | _                                   |
| I/ (LD+U) LU<br>South End of Lof      | -KD                           | 10.03              |              | 0.9                        | 3.1             |                 | -                            |                            | -                                   |
| South End of Ler                      | <b>L</b>                      |                    |              |                            |                 |                 |                              |                            |                                     |
| MOSL UNANNEL                          | DD                            | 0.0                | n            | 6 0                        | 4 2             | 0 1             | <b>∧</b> 2                   | <2 0                       | -0 1                                |
| I/ (LB+U) SOULI                       | KD                            | 0.9                | 3            | 0.0                        | 4.2             | 0.1             | 0.3                          | <b>~3.0</b>                | NU.1                                |
| End of Left Most                      |                               |                    |              |                            |                 |                 |                              |                            |                                     |
|                                       | 5.0                           | <0 <sup>0</sup> 00 | < 01         |                            | 2 7             |                 | •                            |                            |                                     |
| 1/ (LB+2)                             | LB                            | <0.03              | <.01         | 4.1                        | 3.1             |                 | -                            | · -                        | -                                   |
| Adjacent Unannel                      |                               |                    |              |                            |                 |                 |                              |                            |                                     |
| Upposite I/A                          |                               | • •                | <b>• •</b>   |                            | 0 7             |                 | 0 0                          | 10 D                       | -0.7                                |
| 1/ (LB+2)                             | LB                            | 0.8                | 2.5          | 4.4                        | 3.1             | 0.2             | 0.8                          | <3.0                       | <u.1< td=""></u.1<>                 |
| Adjacent Channel                      |                               |                    |              |                            |                 |                 |                              |                            |                                     |
| Opposite 17A                          |                               | 1                  |              | 1                          |                 |                 |                              |                            |                                     |

Table 6.99. Standpipe readings for selected incubation locations - April 1983

|                                                | De                 | escrip | tion |      |                 |        |           |             | -              |                          |
|------------------------------------------------|--------------------|--------|------|------|-----------------|--------|-----------|-------------|----------------|--------------------------|
|                                                | Side of<br>Bank    |        | Dist | ance | <u>Temperat</u> | ure °C | De<br>Sur | pth<br>face | Velo<br>0.6 To | city<br>tal Depth        |
| Station <sup>1</sup>                           | (Facing<br>Stream) | υp     | (m)  | (ft) | Water           | Pipe   | (m)       | (ft)        | (cm/s)         | <u>e water</u><br>(ft/s) |
| 19                                             | LB                 |        | 0.6  | 2    | 1.6             | 1.4    | 0.1       | 0.4         | 21.7           | 0.7                      |
| 19A 2 miles<br>North of 19                     | LB                 |        | 1.2  | 4    | 1.8             | 1.7    | 0.1       | 0.3         | 30.5           | 1.0                      |
| Chilligan River<br>Slough -                    | MC                 |        |      |      | 3.2             | 3.1    | 0.1       | 0.3         | 18.3           | 0.6                      |
| Upstream Portion                               | n                  |        |      |      |                 |        |           |             |                |                          |
| Chilligan River<br>Slough -<br>Downstream Port | LB<br>ion          |        | 0.9  | 3    | 1.4             | 0.9    | 0.1       | 0.2         | 9.1            | 0.3                      |

Table 6.99. Standpipe readings for selected incubation locations - April 1983 (concluded)

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<sup>1</sup>See Figure 6

 $^{2}MC = Mid-channel$ 

 $^{3}$ RR = Right Bank

 $^{4}LB = Left Bank$ 

 $^{5}WE = Waters Edge$ 

| Station     | Dolly<br>Varden                       | Coho<br>Salmon | Chinook<br>Salmon | Sockeye<br>Salmon | Chum<br>Salmon | Rainbow<br>Trout                           | Pygmy<br>Whitefish | Pink<br>Salmon |
|-------------|---------------------------------------|----------------|-------------------|-------------------|----------------|--------------------------------------------|--------------------|----------------|
|             | · · · · · · · · · · · · · · · · · · · |                | •                 |                   |                | ······                                     | <u> </u>           |                |
| י ב<br>חר   | · • •                                 | + -,           | +                 | +                 | +              | +                                          | +                  | Ť              |
| 2           | +                                     | т.<br>Т.       | <b>T</b> .        | +                 | <b>T</b>       |                                            |                    |                |
| 2           | . <b>+</b>                            | т<br>1         |                   | <b></b>           | T              |                                            |                    |                |
| Δ           | <b>–</b>                              | т<br>-         | Α                 | A                 | т<br>±         | +                                          | +                  | . •            |
| - 5         | +                                     | +              | +                 | ••                | <b>.</b>       | •                                          | · ·                |                |
| 6           | . <b>.</b>                            | • ·            | •                 |                   | •              | +                                          |                    |                |
| 6A          | +                                     | +              |                   | +                 |                | · •                                        | +                  |                |
| 8           | +                                     | +              |                   | •                 | +              |                                            |                    |                |
| 9           | +                                     | · •            |                   |                   | •              |                                            |                    |                |
| 10          | +                                     | +              |                   |                   |                |                                            |                    |                |
| 11          | +                                     | +              |                   |                   |                | ter en |                    |                |
| 11.5        | +                                     |                |                   |                   | 4              |                                            |                    |                |
| 12          | +                                     | ÷              |                   | +                 | - M            |                                            | +                  |                |
| 13          | · · +                                 | + .            |                   |                   |                |                                            |                    |                |
| 14          | +                                     | +              |                   |                   | · · · ·        |                                            |                    |                |
| 15          | +                                     |                |                   | +                 |                |                                            |                    |                |
| 16          | +                                     | +              |                   | +                 |                |                                            |                    |                |
| 16A         | +                                     | +              |                   |                   | +              |                                            |                    |                |
| 17          | +                                     | +              |                   | +                 |                |                                            |                    |                |
| 17D         | +                                     |                | + '               |                   |                |                                            | · ·                |                |
| 18          | +                                     | +              |                   |                   |                |                                            |                    |                |
| 18A         | +                                     |                |                   |                   |                |                                            |                    |                |
| 19          | +                                     |                |                   | · ·               |                |                                            |                    |                |
| 19A         | +                                     |                |                   |                   |                |                                            |                    |                |
| 20          | +                                     | +              |                   | +                 |                |                                            |                    |                |
| 21          | +                                     | + .            |                   |                   | e 🖡 🦾          | •                                          |                    |                |
| 22          | +                                     |                |                   | +                 |                |                                            |                    |                |
| 23          | +                                     | -<br>-         |                   |                   |                |                                            |                    |                |
| 24          | +                                     |                |                   | +                 |                |                                            |                    |                |
| 40          | +                                     |                |                   |                   |                | ·                                          |                    | +              |
| 40 <b>A</b> | +                                     | +              | +                 |                   |                |                                            |                    |                |
| 41          | +                                     | +              |                   |                   |                | · .                                        |                    |                |
| 41 <b>A</b> | +                                     |                |                   |                   |                |                                            |                    |                |
| 42          | · +                                   | ·+ ·           | +                 |                   |                | 1. 1.                                      | · .                |                |
| 42 <b>A</b> | +                                     | +              | + -               |                   |                |                                            |                    |                |
| 43          | · <b>+</b>                            | +              | +                 |                   |                |                                            |                    |                |
| 43 <b>A</b> |                                       | +              | + '               |                   |                |                                            |                    |                |
| 44          | +                                     | · + .          | · +               |                   |                |                                            |                    |                |
| 44 <b>A</b> | +                                     | +              | +                 |                   |                |                                            |                    | -<br>          |
| 45          |                                       |                |                   |                   |                | · · · · ·                                  |                    |                |
| 25          |                                       |                |                   |                   |                |                                            |                    |                |
| 26          | +                                     |                |                   | +                 |                |                                            |                    |                |
| 27          |                                       |                |                   |                   |                |                                            |                    |                |
|             |                                       |                |                   |                   |                |                                            |                    |                |

Table 6.100. Incidence of fish at sampling stations: all collection methods

A = Adults only + = Juveniles with or without adults

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| Species         | Percentage               |
|-----------------|--------------------------|
| Dolly Varden    | 95.1                     |
| Coho Salmon     | 68.3                     |
| Chinook Salmon  | 29.3 (26.9) <sup>1</sup> |
| Sockeye Salmon  | 31.7 (29.3) <sup>1</sup> |
| Chum Salmon     | 29.3                     |
| Pink Salmon     | 4.9                      |
| Rainbow Trout   | 7.3                      |
| Pygmy Whitefish | 9.8                      |

Table 6.101.Percentage incidence of fish species at sampling<br/>station below Chakachamna Lake - June/July 1983

<sup>1</sup> Juveniles only

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|                                                                                                                                                                        | Dolly Varden<br>(parr & juveniles) | Coho Salmo<br>(parr)                                                                           | on Chinook<br>(parr)                                                                                                          | Soc <b>keye</b><br>(parr)                           |    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|----|
| Upper Chakachatna<br>River (Canyon)                                                                                                                                    | 0.34                               | 0.00                                                                                           | 0.00                                                                                                                          | 0.00                                                |    |
| Mid-Chakachatna<br>River                                                                                                                                               | 0.81                               | 0.28                                                                                           | 0.00                                                                                                                          | 0.28                                                |    |
| Noaukta Slough                                                                                                                                                         | 1.64                               | 1.36                                                                                           | 0.00                                                                                                                          | 0.00                                                |    |
| Lower Chakachatna<br>River                                                                                                                                             | 1.37                               | 0.37                                                                                           | 0.03                                                                                                                          | 0.00                                                |    |
| Upper McArthur River                                                                                                                                                   | 2.18                               | 1.54                                                                                           | 0.00                                                                                                                          | 0.00                                                |    |
| Lower McArthur River                                                                                                                                                   | 1.42                               | 0.51                                                                                           | 0.00                                                                                                                          | 0.09                                                |    |
| Chakachatna Tributarie                                                                                                                                                 | es 0.63                            | 0.00                                                                                           | 0.00                                                                                                                          | 0.00                                                |    |
| McArthur Tributaries                                                                                                                                                   | 0.88                               | 0.22                                                                                           | 3.26                                                                                                                          | 0.00                                                |    |
| Upper Chakachatna Rive<br>Mid-Chakachatna River<br>Noaukta Slough<br>Lower Chakachatna Rive<br>Upper McArthur River<br>Lower McArthur River<br>Chakachatna Tributaries | er (Canyon)<br>er                  | Stations 2<br>Stations 1<br>Stations 8<br>Stations 1<br>Stations 1<br>Stations 1<br>Stations 4 | 22, 23, 24<br>17, 17D, 20, 13<br>3, 9, 10, 16,<br>1, 2, 3, 4, 5<br>13, 14, 15<br>1D(1), 11, 11<br>18, 19, 18A,<br>40, 40A, 41 | 21<br>16A<br>, 6, 6A<br>.5, 12<br>19A<br>41A, 42, 4 | 24 |

Table 6.102. Mean minnow trap c/f for each reach for juvenile salmonids - Spring 1983

.

|                                     | Dolly<br>Varden | Coho<br>Salmon | Chinook<br>Salmon | Sockeye<br>Salmon | Chum<br>Salmon                  | Pygmy<br>White-<br>fish | Round<br>White-<br>fish |
|-------------------------------------|-----------------|----------------|-------------------|-------------------|---------------------------------|-------------------------|-------------------------|
| Upper Chakachatna<br>River (Canyon) | 1.45            | 0.00           | 0.00              | 0.59              | 0.00                            | 0.00                    | 0.00                    |
| Mid-Chakachatna<br>River            | 2.56            | 0.52           | 0.11              | 0.43              | 0.41                            | 0.00                    | 0.00                    |
| Noaukta Slough                      | 2.56            | 1.18           | 0.00              | 0.05              | 0.17                            | 0.00                    | 0.00                    |
| Lower Chakachatna<br>River          | 0.55            | 1.23           | 0.04              | 0.53              | 0.99                            | 0.03                    | 0.37                    |
| Upper McArthur River                | 2.25            | 4.97           | 0.00              | 0.08              | 0.00                            | 0.00                    | 0.00                    |
| Lower McArthur River                | 0.66            | 0.68           | 0.00              | 0.22              | 0.00                            | 0.06                    | 0.06                    |
| Chakachatna Tributarie:             | s 0.54          | 0.12           | 0.00              | 0.00              | 0.00                            | 0.00                    | 0.00                    |
| McArthur Tributaries                | 0.30            | 0.03           | 1.89              | 0.00              | 0.00                            | 0.00                    | 0.00                    |
| Upper Chakachatna Rive              | r (Canyo        | on)            | Sta               | tions 22          | , 23, 24                        |                         |                         |
| Mid-Chakachatna River               |                 |                | Sta               | tions 17          | , 17D, 20                       | ), 21<br>6 16 <b>4</b>  |                         |
| Lower Chakachatna Rive              | C               |                | Sta               | tions 1,          | 2, 3, 4,                        | 5, 6,                   | 6 <b>A</b>              |
| Upper McArthur River                |                 |                | Sta               | tions 13          | , 14, 15                        |                         |                         |
| Lower McArthur River                |                 |                | Sta               | tions 1D          | (1), 11,                        | 11.5, 1                 | 2                       |
| Unakachatha Tributaries             | 5               |                | Sta<br>Sta        | tions 18          | , 19, 188<br>. 40 <b>a</b> . 41 | 1, 19A                  | 42. 47A                 |
| Mont Chur II I Dubat 169            |                 |                |                   | 43                | , 43 <b>A</b> , 44              | 44A.                    | 45                      |

Table 6.103. Mean electrofishing c/f for each reach for juvenile salmonids - Spring 1983

| Station   | Water<br><u>Temperature</u><br>Mean SD<br>(°C) |             | Dissolved<br><u>Oxygen</u><br>Mean SD<br>(mg/l) |                                       | <u>Conductivity</u><br>Mean SD<br>(umhos/cm) |           | <u>Turbidity</u><br>Mean SD<br>(mg/l) |                         |
|-----------|------------------------------------------------|-------------|-------------------------------------------------|---------------------------------------|----------------------------------------------|-----------|---------------------------------------|-------------------------|
|           | 9.8                                            |             | 10.8                                            |                                       | 41                                           |           | 83                                    |                         |
| 10        | 9.0                                            |             | 12.5                                            |                                       | 29                                           |           | 155                                   |                         |
| 2         | 5.4                                            | · · · · · · | 12.8                                            |                                       | 30                                           | <b></b> , | 133                                   |                         |
| 3         | 5.4                                            |             | 12.3                                            |                                       | 33                                           |           | 82                                    |                         |
| 4         | 8.2                                            |             | 12.6                                            |                                       | 47                                           |           | 95                                    |                         |
| 5         | 9.7                                            | 2.22        | 10.5                                            | 1.98                                  | 54.7                                         | 24.99     | 85.7                                  | 49.98                   |
| 6         | 1.4                                            |             | 12.8                                            |                                       | 39                                           |           | 92                                    |                         |
| 6A        | 6.5                                            |             | 12.2                                            |                                       | 32                                           |           | 93                                    |                         |
| 8         | · /.2                                          |             | 13.0                                            |                                       | 35                                           |           | /4                                    |                         |
| 9         | 0.8                                            | *           | 12.0                                            |                                       | 33                                           |           | 90                                    |                         |
| 10        | 9.0                                            | 0 21        | 11.2                                            |                                       | 30                                           | 1 2       | 02 0                                  | 6 2                     |
| 11 5      | 7 0                                            | 0.21        | 11.35                                           | .15                                   | 22                                           | 1.2       | 93.9                                  | 0.3                     |
| 12        | 1.0                                            |             | 12.5                                            |                                       | 33                                           |           | 220                                   |                         |
| 13        | 4.5                                            |             | 11 1                                            |                                       | 7.2                                          |           | 160                                   |                         |
| 14        | 9.6                                            |             | 9.4                                             |                                       | 16                                           |           | 19                                    |                         |
| 15        | 3.5                                            | · · · ·     | 12.7                                            |                                       | 12                                           |           | 194                                   | · · ·                   |
| 16        | 5.3                                            | <b></b> '   | 13.2                                            | · · · ·                               | 31                                           |           | 86                                    | · · · · · · · · · · · · |
| 16A       | 11.7                                           | 3.06        | 10.3                                            | 1.96                                  | 70.3                                         | 24.42     | 54.1                                  | 18.32                   |
| 17        | 5.9                                            |             | 10.5                                            | · · · · · ·                           | 31                                           | · · ·     | 74                                    | 30.00                   |
| 170       | 5.7                                            |             | 12.3                                            |                                       | 31                                           |           | 112                                   |                         |
| 18        | 6.7                                            |             | 10.7                                            |                                       | 42                                           |           | 51                                    |                         |
| 18A       | 3.2                                            |             | 12.9                                            |                                       | 33                                           |           | 180                                   |                         |
| 19        | 9.4                                            |             | 10.8                                            |                                       | 12                                           |           | 8                                     |                         |
| 19A       | 5.8                                            |             | 12.3                                            | . ——                                  | 8                                            |           | 11                                    |                         |
| 20        | 11.3                                           |             | 11.7                                            |                                       | 65                                           |           | 3                                     |                         |
| 21        | 6.1                                            | ·           | 12.9                                            |                                       | 39                                           | '         | 59                                    |                         |
| 22        | 5.1                                            |             | 12.0                                            | · · · · ·                             | 21                                           |           | 63                                    |                         |
| 23        | 4.1                                            |             | 12.1                                            |                                       | 20                                           |           | 50                                    |                         |
| 24        | 5.1                                            |             | 15.5                                            | · · · · · · · · · · · · · · · · · · · | 28                                           |           | 21                                    |                         |
| 40        | 5.5                                            |             | 12.2                                            |                                       | 1                                            |           | 1                                     |                         |
| 40A<br>41 | 5.2                                            |             | 12.4                                            |                                       | ו<br>ר                                       |           | 16                                    |                         |
| 41        | 5 2                                            |             | 12.0                                            |                                       | 6                                            |           | 34                                    |                         |
| 418       | 10 7                                           |             | 10.7                                            |                                       | 74                                           |           | 7                                     |                         |
| 424       | 7.2                                            |             | 12 1                                            |                                       | 64                                           |           | 12                                    |                         |
| 43        | 9.3                                            |             | 13.3                                            | · · · · ·                             | 76                                           |           | 1                                     |                         |
| 43A       | 7.6                                            |             | 10.6                                            | <b></b>                               | 75                                           | ·         | 5                                     | · ·                     |
| 44        | 7.9                                            | <b>—</b> —  | 11.2                                            |                                       | 102                                          |           | 6                                     |                         |
| 44A       | 7.0                                            |             | 12.5                                            |                                       | 102                                          |           | 12                                    | · · · ·                 |
| 45        | 9.2                                            | -           | 7.0                                             |                                       | 46                                           |           | 18                                    |                         |
|           |                                                |             |                                                 |                                       |                                              |           |                                       |                         |

Table 6.104. Water quality data by station - Spring 1983

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| Der<br>(meters) | oth<br>(feet) | Temperature<br>(°C) | Dissolved<br>Oxygen<br>(mg/l) | Conductivity<br>(umhos/cm) | Turbidity<br>(mg/l) |
|-----------------|---------------|---------------------|-------------------------------|----------------------------|---------------------|
| 0.0             | 0.0           | 11.1                | 10.8                          | 35                         | 36                  |
| 0.3             | 1.0           | 9.5                 | 11.3                          | 35                         | 40                  |
| 0.6             | 2.0           | 9.1                 | 11.2                          | 35                         | 39                  |
| 0.9             | 3.0           | 8.9                 | 11.1                          | 33                         | 40                  |
| 1.2             | 4.0           | 8.9                 | 11.1                          | 33                         | 40                  |
| 1.5             | 5.0           | 8.9                 | 11.1                          | 31                         | 35                  |
| 3.0             | 10.0          | 8.2                 | 11.3                          | 29                         | 35                  |
| 4.6             | 15.0          | 7.8                 | 11.3                          | 27                         | 38                  |
| 6.1             | 20.0          | 7.7                 | 11.4                          | 26                         | 36                  |
| 9.1             | 30.0          | 7.1                 | 11.3                          | 25                         | 31                  |
| 15.2            | 50.0          | 7.0                 | 11.6                          | 25                         | 14                  |
| 30.5            | 100.0         | 6.9                 | 11.1                          | 32                         | 17                  |
| 83.8            | 27.0          | 6.5                 | 12.3                          | 28                         | 3                   |

Table 6.105. Water quality profiles of Chakachamna Lake, July 1983

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## Table 6.106. Standpipe readings for station 17 July 1983

SIDE CHANNEL (LB+2)

| Upstream Standpipe        | 5.4°C |
|---------------------------|-------|
| Downstream Standpipe      | 5.9°C |
| Surface Water Temperature | 5.7°C |

LEFT- SIDE CHANNEL - (LB+O)

| Left Standpipe                   | 4.6°C |
|----------------------------------|-------|
| Right Standpipe (closes to bank) | 4.7°C |
| Surface Water Temperature        | 5.4°C |

## TABLE 5.107. DISTRIBUTION OF CESERVATIONS OF DOLLY VAPOEN BY VELOCITY INTERVAL (IN 0.2 FT/S INTERVALS)

| VELOCIT<br>(Ft | Y I<br>S/S | NTERVAL<br>) | NUMB<br>Observ | ER OF<br>ATIONS | PERCENT<br>OF TOT | TAGE<br>TAL |
|----------------|------------|--------------|----------------|-----------------|-------------------|-------------|
|                |            |              |                |                 |                   |             |
| 0.0            | -          | 0.2          | 335            |                 | 32.15             |             |
| <b>0 • 2</b>   | -          | 0.4          | 131            |                 | 12.57             |             |
| 0.4            | -          | 0.6          | 119            |                 | 11.42             |             |
| 0.5            | -          | 0.8          | 120            |                 | 11.52             |             |
| 0.3            | -          | 1.0          | 78             |                 | 7.49              |             |
| 1.0            | -          | 1.2          | 60             |                 | 5.76              |             |
| 1.2            | -          | 1.4          | 45             |                 | 4.32              |             |
| 1.4            | -          | 1.5          | 52             |                 | 5.75              |             |
| 1.5            | -          | 1.8          | 55             |                 | 5.28              |             |
| 1.3            | -          | 2.0          | Э.             |                 | 0.85              |             |
| 2.0            | с.<br>Ф    | 2.2          | 4              | •               | 0.38              |             |
| 2.2            | -          | 2.4          | 5              |                 | 0.43              |             |
| 2.4            | · .        | 2.6          | . 3            |                 | 0.27              |             |
| 2.5            | -          | 2.8          | 8              |                 | 0.77              |             |
| 2.8            |            | 3.0          | 4              |                 | 0.38              |             |
| 3.0            | -          | 3.2          | 3              |                 | 6.27              |             |
| 3.2            | -          | 3.4          | 1              |                 | 0.10              |             |
| 3.4            | -          | 3.6          | 0              |                 | 0.00              |             |
| 3.5            | -          | 3.8          | . ° û          |                 | 0.00              |             |
| 3.9            | -          | 4.0          | 0              |                 | 0.00              |             |
|                |            |              | TOTAL =        | 1042            | TOT               | PER         |

TOT PER =

100.01

#### TABLE 6.108. DISTRIBUTION OF OBSERVATIONS OF DOLLY VARDEN BY DEPTH INTERVAL (IN 0.3 FT INTERVALS)

| ЭЕРТН<br>(       | FT) | TERVAL | NUMBER OF<br>Observations | PERCENTAGE<br>OF TOTAL |
|------------------|-----|--------|---------------------------|------------------------|
|                  |     |        |                           |                        |
| 0.0              | -   | 0.3    | 14                        | 1.26                   |
| 0.3              | -   | 0.6    | 236                       | 21.26                  |
| 0.5              | ÷   | 0.9    | 234                       | 25.59                  |
| 0 • <del>3</del> | -   | 1.2    | 290                       | 25.23                  |
| 1.2              | -   | 1.5    | 77                        | 8.74                   |
| 1.5              | -   | 1.3    | 93                        | 8.33                   |
| 1.8              | -   | 2.1    | 59                        | 5.32                   |
| 2.1              | -   | 2.4    | 4                         | 0.36                   |
| 2.4              | -   | 2.7    | 15                        | 1.35                   |
| 2.7              | -   | 3.0    | 14                        | 1.26                   |
| 3.0              | -   | 3.3    | 9                         | 0.31                   |
| 3.3              | -   | 3.5    | 2                         | 0.18                   |
| 3.5              | -   | 3.9    | 3                         | 0.27                   |

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TAL = 1

TTTO

= 100.01

| TABL | E 6.109. | DISTRIBU | TION OF | 09SER | VATIONS  | 0 <b>F</b> |
|------|----------|----------|---------|-------|----------|------------|
|      |          | COHO     | SALMON  | •     |          |            |
| BY   | VELOCITY | INTERVAL | (IN 0.2 | FT/S  | INTERVAL | S)         |

| VELOCIT<br>(FT | Y I<br>S/S | NTERVAL<br>) | NUMBE<br>Observa                         | R OF<br>TIONS       | PERCENT<br>OF TOT | TAGE<br>TAL |
|----------------|------------|--------------|------------------------------------------|---------------------|-------------------|-------------|
|                |            |              |                                          | مقد جو مند مند منده |                   | <b> </b>    |
| 0.0            | -          | 0.2          | 205                                      |                     | 48.82             |             |
| 0.2            | -          | 0.4          | 78                                       |                     | 18.48             |             |
| 0.4            | -          | 0.6          | 43                                       |                     | 10.19             |             |
| 0.5            | -          | 0.3          | 32                                       |                     | 7.58              |             |
| 0.3            | -          | 1.0          | 24                                       |                     | 5.67              |             |
| 1.0            |            | 1.2          | 21                                       |                     | 4.73              |             |
| 1.2            | -          | 1.4          | 7                                        |                     | 1.55              | <b>)</b>    |
| 1.4            | -          | 1.5          | 5                                        |                     | 1.19              |             |
| 1.5            | -          | 1.8          | G                                        |                     | 0.00              |             |
| 1.8            | -          | 2.0          | 5                                        |                     | 1.15              |             |
| 2.0            | -          | 2.2          | · Č                                      |                     | 0.00              |             |
| 2.2            | -          | 2.4          |                                          |                     | 0.24              |             |
| 2.4            | -          | 2.0          | n n                                      |                     | 0.00              |             |
| 2.5            | -          | 2.3          | 0                                        |                     | 0.00              |             |
| 2.8            | _          | 3.1          | · .                                      |                     | 0.00              |             |
| 3.3            |            | 3.2          | С. С |                     | 0.00              |             |
| 3.2            | -          | 3.4          | 0                                        |                     | 0.00              |             |
| 3.4            | _          | 3.6          |                                          |                     | 0.00              |             |
| 3.4            |            | 3.8          |                                          |                     | 0.00              |             |
| ं उक्ता<br>रूप |            |              |                                          |                     | 0.00              |             |
|                | _          | T . J        | U U                                      |                     |                   |             |
|                |            |              | TOTAL =                                  | 422                 | тот               | PER =       |

100.00

| DEPTH INTERVAL<br>(FT) |      |          | TERVAL | NUMBER<br>Observat    | OF             | PERCENT<br>OF TOT | FAGE<br>FAL |
|------------------------|------|----------|--------|-----------------------|----------------|-------------------|-------------|
|                        |      |          |        |                       |                |                   |             |
|                        |      |          |        |                       |                | •<br>•            |             |
|                        | 0.0  | -        | 0.3    | 2                     |                | 0.45              |             |
|                        | 0.03 | -        | 0.6    | - 36 -                |                | 17.24             |             |
|                        | 0.6  | -        | 0.9    | 153                   |                | 34.23             |             |
|                        | 0.7  | -        | 1.2    | 107                   |                | 23.94             | •           |
|                        | 1.2  | -        | 1.5    | 26                    |                | 5.82              |             |
|                        | 1.5  |          | 1.3    | 41                    |                | 9.17              | . •         |
|                        | 1.8  | -        | 2.1    | 17                    |                | 3.80              |             |
|                        | 2.1  |          | 2.4    | 1                     |                | 0.22              |             |
|                        | 2.4  | -        | 2.7    | 10                    |                | 2.24              |             |
|                        | 2.7  | -        | 3.0    | - 7                   |                | 0.57              |             |
|                        | 3.0  | <b>.</b> | 3 3    | 1                     |                | 1.22              |             |
|                        | 3.3  | -        | 3.5    | ີ<br>ເ                |                | 0.00              |             |
|                        | 3.5  | · _      | 3.9    | G                     |                | .0.00             |             |
|                        |      |          |        | <b>* &gt; * i i =</b> | · · · <b>·</b> |                   | 0.70        |
|                        |      |          |        | IUTAL =               | 447            | 1.34              | HIR F       |

TABLE 6.110. DISTRIBUTION OF DESERVATIONS OF COHO SALMON BY DEPTH INTERVAL (IN 0.3 FT INTERVALS)

TOTAL =

100.00

#### TABLE 6.111. DISTRIBUTION OF OBSERVATIONS OF CHINOOK SALMON BY VELOCITY INTERVAL (IN 0.2 FT/S INTERVALS)

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| VE | LOCIT<br>(FT | Y IN<br>S/SI | TERVAL | NUMBER OF<br>Observations               | PERCENTAGE<br>OF TOTAL |
|----|--------------|--------------|--------|-----------------------------------------|------------------------|
|    |              |              |        |                                         |                        |
|    |              |              |        |                                         |                        |
|    | 0 • 0        | -            | 0.2    | 260                                     | 68.97                  |
|    | 0.2          | -            | 0.4    | 21                                      | 5.57                   |
|    | 3.4          | -            | 0.5    | 51                                      | 16.18                  |
|    | 0.5          | -            | 0.8    | 8                                       | 2.12                   |
|    | · G • 3      | -            | 1.0    | Ō                                       | 1.33                   |
|    | 1.0          | -            | 1.2    | 17                                      | 4.51                   |
|    | 1.2          | -            | 1.4    | 3                                       | 0.50                   |
|    | 1.4          | -            | 1.5    | 0                                       | 0.00                   |
|    | 1.5          | -            | 1.3    | 1                                       | 0.27                   |
|    | 1.8          |              | 2.0    | 1 · · · · · · · · · · · · · · · · · · · | 0.27                   |
|    | 2.0          | -            | 2.2    | 0                                       | 0.00                   |
|    | 2.2          | -            | 2.4    | 0                                       | 0.00                   |
|    | 2.4          | -            | 2.5    | C                                       | 0.00                   |
|    | 2.5          | -            | 2.3    | 0                                       | 0.00                   |
|    | 2.3          | -            | 3.0    | C                                       | 0.00                   |
|    | 3.0          | -            | 3.2    | 0                                       | 0.00                   |
|    | 3.2          |              | 3.4    | 0                                       | 0.00                   |
|    | 3.4          | +            | 3.6    | 0                                       | 0.00                   |
|    | 3.6          | -            | 3.8    | 0                                       | 0.00                   |
|    | 3.3          | -            | 4 . 0  | . <b>j</b> .                            | 0.00                   |

TOTAL =

377

TOT PER = 100.02

#### DISTRIBUTION OF OBSERVATIONS OF TABLE 6.112. CHINOOK SALMON BY DEPTH INTERVAL (IN 0.3 FT INTERVALS)

 $\sum_{i=1}^{n}$ 

| DEPTH INTERVAL<br>(FT) | NUMBER OF<br>Observations | PERCENTAGE<br>OF TOTAL |
|------------------------|---------------------------|------------------------|
|                        |                           |                        |
| 0.0 - 0.3              | 1                         | 0.25                   |
| 0.3 - 0.6              | 18                        | 4.51                   |
| 0.6 - 0.9              | 95                        | 23.81                  |
| 0.7 - 1.2              | 65                        | 16.29                  |
| 1.2 - 1.5              | 116                       | 29.07                  |
| 1.5 - 1.8              | 21                        | 5.26                   |
| 1.3 - 2.1              | 42                        | 10.53                  |
| 2.1 - 2.4              | 10                        | 2.51                   |
| 2.4 - 2.7              | 3                         | 0.75                   |
| 2.7 - 3.0              | 7                         | 1.75                   |
| 3.0 - 3.3              | 0                         | 0.00                   |
| 3.3 - 3.6              | 21                        | 5.25                   |
| 3.6 - 3.9              | 0                         | 0.00                   |
|                        |                           |                        |

TOTAL

599

99.99

### TABLE 6.113. DISTRIBUTION OF OBSERVATIONS OF SOCKEYE SALMON BY VELOCITY INTERVAL (IN 0.2 FT/S INTERVALS)

| VELOCITY IN<br>(FTS/S) | TERVAL         | NUMBER OF<br>Observations | PERCENTAGE<br>OF TOTAL |
|------------------------|----------------|---------------------------|------------------------|
|                        |                |                           |                        |
| 0 0° –                 | 0 0            | 77                        | 54 60                  |
|                        | 0.02           | 16                        | 34.58                  |
| J•∠ =                  | 0.4            | 14                        | 10.07                  |
| 0.4 -                  | <b>U</b> • 6   | 12                        | 3.53                   |
| 0.6 -                  | 0.8            | 1                         | 0.72                   |
| 0•3 <del>-</del>       | 1.0            | 11                        | 7.91                   |
| 1.0 -                  | 1.2            | 9                         | 6.47                   |
| 1.2 -                  | 1.4            | 1                         | 0.72                   |
| 1.4 -                  | 1.5            | 7                         | 5.04                   |
| 1.5 -                  | 1.3            | 8                         | 5.76                   |
| 1.3 -                  | 2.0            | 0                         | 0.00                   |
| 2.0 -                  | 2.2            | С <sup>1</sup>            | 0.00                   |
| 2.2                    | 2.4            | 0                         | 0.00                   |
| 2.4 -                  | 2.5            | - 0                       | 0.00                   |
| 2.6 -                  | 2.8            | 0                         | 0.00                   |
| 2.8 -                  | 3.0            | n                         | 3-00                   |
| 3-0 -                  | 3.2            | n                         | 0 0 0                  |
| 3.2 -                  | 5.4            |                           | 0.08                   |
| 3.4                    | 3:4            | C C                       | 0 0 0                  |
| 3 4 -                  |                | 0                         |                        |
| 3.83 -                 | 3.65           | · U                       |                        |
| J•1 -                  | ° <b>™ ⊕</b> U | U U                       |                        |
|                        | T              | DTAL = 139                | TOT PER =              |

100.00
## TABLE 6.114. DISTRIBUTION OF OBSERVATIONS OF SOCKEYE SALMON BY DEPTH INTERVAL (IN 0.3 FT INTERVALS)

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| DEPT  | H INC<br>(FT) | TERVAL | NUMBER OF<br>Observations | PERCENTASE<br>OF TOTAL |
|-------|---------------|--------|---------------------------|------------------------|
|       |               |        | -                         |                        |
| 0 • 0 |               | 0.3    | 2                         | 1.45                   |
| 0.3   | -             | J.6    | 29                        | 21.01                  |
| 0.5   | · 🛥           | 0.9    | 23                        | 15.57                  |
| Э.Э   | -             | 1.2    | 35                        | 25.36                  |
| 1.2   | -             | 1.5    | 5                         | 3.52                   |
| 1.5   | -             | 1.8    | 9                         | 6.52                   |
| 1.9   | · · ·         | 2.1    | 33                        | 23.91                  |
| 2.1   |               | 2.4    | 0                         | 0.00                   |
| 2.4   | -             | 2.7    | 1                         | 0.72                   |
| 2.7   | -             | 3.0    | 1                         | 0.72                   |
| 3.0   |               | 3.3    | Ō                         | 0.00                   |
| 3.3   | -             | 3.6    | Ō                         | 0.00                   |
| . 3.5 | -             | 3.7    | Ō                         | 0.00                   |
|       |               |        | TATAL - 170               | THT OFF                |

TOTAL =

138

TOT PER =

-9.42

## FIGURES













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Figure 6.152 Percentage of Observations of Dolly Varden Juveniles by velocity intervals 1982 and 1983 data

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Figure 6.153 Percentage of Observations of Dolly Varden Juveniles by depth intervals 1982 and 1983 data



Figure 6.154 Percentage of Observations of Coho Salmon Juveniles by velocity intervals 1982 and 1983 data

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Figure 6.156 Percentage of Observations of Chinook Salmon Juveniles by velocity intervals 1982 and 1983 data

1982 and 19



Figure 6.157 Percentage of Observations of Chinook Salmon Juveniles by depth intervals 1982 and 1983 data



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Figure 6.158 Percentage of Observations of Sockeye Salmon Juveniles by velocity intervals 1982 and 1983 data





## **APPENDIXES**

APPENDIX B

B1. ESCAPEMENT COUNTS BY STREAM

|      | Chino |      | inook   | Sc   | ockeve  | Water     | Percen  |
|------|-------|------|---------|------|---------|-----------|---------|
| Date |       | live | Carcass | live | carcass | Clarity   | Surveye |
| June | 18    | 0    | 0       | 0    | 0       | Excellent | 100     |
| . •  | 22    | 0    | 0       | 0    | 0       | Excellent | 100     |
| July | 20    | 0    | 0       | 0    | 0       | Excellent | 100     |

|         | Ch   | Chinook |      | ckeye   | Water          | Percent  |  |
|---------|------|---------|------|---------|----------------|----------|--|
| Date    | live | carcass | live | carcass | Clarity        | Surveyed |  |
| June 22 | Ő    | 0       | 0    | 0       | Good           | 100      |  |
|         |      |         |      |         |                |          |  |
| July 20 | 0    | 0       | 0    | 0       | Good-Excellent | 100      |  |
|         |      |         |      |         |                |          |  |

TABLE B1-2. Chakachatna Canyon Sloughs Escapement Surveys

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| Date    | Ch | inook | Water | Percent |
|---------|----|-------|-------|---------|
| Dace    |    |       |       |         |
| June 18 | 0  | 0     | Fair  | 100     |
| 22      | 0  | 0     | Good  | 100     |
|         |    |       |       |         |
| July 20 | 0  | 0     | Good  | 100     |
|         |    |       |       |         |

| TABLE B1-3. | Straight | Creek M | louth | and | Sloughs | Escapement | Surveys |
|-------------|----------|---------|-------|-----|---------|------------|---------|
|             |          |         |       |     | •••••   |            |         |

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|             | Ch   | inook   | So     | ckeye   | Water     | Percent  |  |
|-------------|------|---------|--------|---------|-----------|----------|--|
| Date        | live | carcass | live   | carcass | Clarity   | Surveyed |  |
| June 18     | 0    | 0       | 0      | 0       | Excellent | 100      |  |
| 22          | 0    | 0       | 0      | 0       | Excellent | 100      |  |
|             |      |         |        |         |           |          |  |
| July 20     | 0    | 0       | 0      | 0       | Excellent | 100      |  |
| 1. J. C. M. |      |         | •<br>• |         |           |          |  |

TABLE B1-4. Chakachatna Tributary C1, Escapement Surveys

|         | Ch   | inook   | Sc   | ockeye  | Water     | Percent  |  |
|---------|------|---------|------|---------|-----------|----------|--|
| Date    | live | carcass | live | carcass | Clarity   | Surveyed |  |
| June 22 | 0    | 0       | 0    | 0       | Good      | 100      |  |
| July 20 | 72   | 0       | 70   | 0       | Excellent | 33       |  |

TABLE B1-5. McArthur Tributary 13x Escapement Surveys

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| Date    |    | <u>Chi</u><br>live | nook | So<br>live | ckeye | Water<br>Clarity | Percent |  |
|---------|----|--------------------|------|------------|-------|------------------|---------|--|
|         |    |                    |      |            |       |                  |         |  |
| June    | 17 | 0                  | 0    | 0          | 0     | Excellent        | 100     |  |
|         | 24 | 0                  | 0    | 0          | 0     | Excellent        | 100     |  |
|         |    |                    |      |            |       |                  |         |  |
| July    | 20 | 0                  | 0    | 16         | 0     | Excellent        | 100     |  |
| ан<br>1 |    |                    |      |            |       |                  |         |  |

TABLE B1-6. McArthur Tributary 13u Escapement Survey

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|         | Chinook |         | So   | ckeye   | Water     | Percent  |  |
|---------|---------|---------|------|---------|-----------|----------|--|
| Date    | live    | carcass | live | carcass | Clarity   | Surveyed |  |
| June 17 | 0       | 0       | 0    | 0       | Excellent | 100      |  |
| 24      | 0       | 0       | 0    | 0       | Excellent | 100      |  |
|         |         |         |      |         |           |          |  |

TABLE B1-7. McArthur Tributary 12.1-12.5 Escapement Surveys

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|         | Ch   | ninook                                   | So   | ckeye   | Water     | Percent  |  |
|---------|------|------------------------------------------|------|---------|-----------|----------|--|
| Date    | live | carcass                                  | live | carcass | Clarity   | Surveyed |  |
| June 22 | 1    | 0                                        | 0    | 0       | Good      | 100      |  |
|         |      |                                          |      |         |           |          |  |
| July 20 | 335  | 0                                        | 0    | 0       | Excellent | 100      |  |
|         |      | an a |      |         |           |          |  |

TABLE B1-8. Clearwater Tributary to Straight Creek (19)

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APPENDIX B B2. CATCH SUMMARIES

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8/ 2/83

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SUMMARY OF RESULTS: MINNOJ TRAP SAMPLES APRIL: 1983 TABLE B2-1.

| £ I | E١ | N. | G | T | Н | - 1 | ( ) | С | м | ) |
|-----|----|----|---|---|---|-----|-----|---|---|---|

|         |             |           | ••••••••••             |            |           | LENGT        | H (CM)  |        |
|---------|-------------|-----------|------------------------|------------|-----------|--------------|---------|--------|
| STATION | DATE        | REPLICATE | SPECIES                | LIFE STAGE | NUMBER    | MEAN         | S.D.    | N      |
| 1       | 100433      | 01        | NINE-SPINE STICKLEBACK | JUVENILE   | 1         |              |         | 0      |
| -       | 200,00      | 0.2       | NINE-SPINE STICKLEBACK | JUVENTLE   | Ę         | 5-20         | 0.54    | 5      |
|         |             | 03        | VINELODINE STICKLEBACK | UNVENTLE   | Š.        | 5.49         | 0 30    | 5      |
|         |             | 0.3       | VINE_ODINE STICKLEACK  | ADULT      |           | 5.470        | 0.00    | - C    |
|         |             | 03        | NINE SPINE STICKLEBACK | AUGEI      | · · · · · | .0.00        | 0.42    |        |
|         |             | 0.4       | NINE COINE STICKLEDACK | AD ULT     | 7         | 0.0b<br>7.70 |         | 7      |
|         |             | 04        | NINE-SPINE STICKLEDACK | AUJLI      | . 1       | 1.50         | 0.00    | T      |
| 2       | 1 3 0 4 9 3 | 01        | NO FISH                |            | 1         |              |         | 0      |
|         |             | 02        | NOFISH                 |            | 1         |              |         | 0      |
|         |             | 0.3       | NO FISH                |            | 1         |              |         | û      |
|         |             | 04        | NO FISH                |            | 1         |              |         | C      |
| 3       | 090493      | 01        | COHO SALMON            | PARR       | 1         | 7.60         | 0.00    | 1      |
| -       |             | 0.2       | SLIMY SCHLPIN          | AD HIT     | 1 .       | 9.30         | 0.00    | 1      |
|         |             | 03        | COHO SALMON            | PAR        | 1         | 12.30        | 0.00    | 1      |
|         |             | 03        | SETWY SCHEDTN          |            | 1         | 6.00         | 0.00    | 1      |
|         |             | 04        | NO FISH                | 004231122  | 1         |              |         | Ō      |
|         | 220422      |           | COHO, CALMON           | 0 4 2 B    | 2         | 10 75        | 0 10    | -      |
| 4       | 070450      | 01        | LUHU SALHUN            | PAIR       | 2         | 10.35        | 010     | 2.     |
|         |             | 02        | COHO SALMON            | PARR       | . 8       | 7.81         | 2.41    |        |
|         |             | .0.3      | DOLLY VARDEN           | PARR       | 5         | 10.30        | 1.54    | - 3    |
| - 1     |             | 03        | COHO SALMON            | PARR       | 5         | 8.38         | 2.42    | 5      |
|         |             | 04        | DOLLY VARDEN           | PARR       | · 1       | S•10         | 0.00    | 1      |
|         |             | 04        | COHO SALMON            | PARR       | 3         | 7.00         | 1.51    | 5      |
|         | · · ·       | 04        | SLIMY SCULPIN          | ADULT      | . 1       | 9.70         | C • C C | 1      |
| 5       | 0 9 0 4 3 3 | 01        | TRAP OUT OF WATER      |            | . 0       |              |         |        |
|         |             | 02        | NO FISH                |            | 1         |              |         | . 0    |
|         |             | 03        | NO FISH                |            | 1         |              |         | r<br>r |
|         |             | 04        | COHO SALMON            | PARR       | . 1       | 5.20         | 0.00    | 1      |
| 5       | 111493      | 0.1       | NO ETCH                |            | 1         |              |         | ſ      |
|         | 110410      | 0.2       | NO ETCH -              |            | 1         |              |         | r G    |
|         |             | 02        | 40 6120                |            | 1         |              |         | e e    |
| 6       | 070483      | 01        | NO FISH                |            | 1         |              |         | 6      |
|         |             | 12        | TRAP MISSING           |            | n<br>N    |              |         | -      |
|         |             | 03        | NO FISH                |            | 1         |              |         | ſ      |
|         |             | 04        | NINE-SPINE STICKLEBACK | ADULT      | 1         | 6.60         | 0.00    | 1      |
| ~       |             |           |                        |            | _         |              | 0 FF    |        |
| 8       | 100433      | UI        | JULLT VARUEN           | PARK       | 2         | 8.00         | 2.00    | . 4    |
|         | · .         | 01        | COHO SALMON            | PARK       | - 1       | 11.80        | 0.00    | 1      |
|         |             | 01        | COHO SALMON            | JUVENILE   | 1         | 12.80        | 0.00    | _ 1    |
|         |             | 01        | SLIMY SCULPIN          | JUVENILE   | 1         | 6.00         | 0.00    | 1      |
|         |             | 01        | VINE-SPINE STICKLEBACK | JUVENILE   | 3         | 6.00         | 0.80    | . 3    |
|         |             | 01        | NINE-SPINE STICKLEBACK | ADULT      | 1         | 7.10         | 0.00    | 1      |
|         |             | 02        | DOLLY VARDEN           | JUVENILE   | 1         | 13.70        | 0.00    | 1      |
|         |             | 02        | COHO SALMON            | PARR       | 3         | 7.80         | 3.04    | . 3    |
|         |             | 02        | VINE-SPINE STICKLEBACK | ADULT      | 2         | 7.10         | 0.14    | 2      |
|         |             | 03        | COHO SALMON            | PARR       | 1         | 7.30         | 0.00    | 1      |
|         |             | 03        | SLIMY SCULPIN          | ADULT      | 1         | 9.40         | 0.00    | 1      |

| 8/2/   | 83                                        | •<br>•     |                          | <ul> <li>A start strange water water water water to be a start strange water start st</li></ul> | · .       | •              | PAGE      | 2    |
|--------|-------------------------------------------|------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------------|-----------|------|
|        |                                           | TARIF      | RO-1 - SUMMARY OF RESULT | S. WINNOW TR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | AD CAMPLE | <i>د</i>       |           |      |
|        |                                           | THOLE      | APRIL 19                 | 83                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | AF SAAFLE | .3             |           |      |
|        |                                           |            |                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           | LENGTI         | H (CM)    |      |
| STATIO | N DATE                                    | REPLICATE  | SPECIES                  | LIFE STAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | NUMBER    | MEAN           | S∙,D∙     | 4    |
|        | 110423                                    |            | NINE-SDINE STICKLEDACK   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           | 7 90           |           |      |
| 0      | 100430                                    | 0.9        | DOLLY VARDEN             | PARR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2         | 12.70          | 0.00      | - 1  |
|        |                                           | 04         | COHO SALMON              | PASR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1         | 5.30           | 0.00      |      |
|        |                                           | 04         | VINE-SPINE STICKLEBACK   | JUVENTLE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 4         | 6.07           | 0.81      |      |
|        |                                           | 04         | NINE-SPINE STICKLEBACK   | ADULT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | · 1       | 6.90           | 0.00      |      |
| 11     | 100493                                    | n 1        | NINE-SPINE STICKLEBACK   | JUVENTLE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1         | 5.40           | 0.00      |      |
| 11     | 100 430                                   | 02         | COHO SALMON              | PARR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2         | 5.60           | 0.42      |      |
|        |                                           | 03         | NO FISH                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1         |                | 0012      | ĺ    |
|        |                                           |            |                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |                |           |      |
| 14     | . 100433                                  | 01         | DOLLY VARDEN             | PAR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 4         | 10.05          | 3.33      | . 4  |
|        | 1. A. | 02         | NO FISH                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1         | ~              |           |      |
|        |                                           | 02         | DOLLY VARDEN             | PARR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2         | 9.40           | . 3.82    |      |
|        |                                           | 0.5        |                          | DADD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1         |                | 2 10      |      |
|        |                                           | 04         | SLIMY SCULPIN            | JUVENILE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1         | 7.70           | 2.19      |      |
|        |                                           |            |                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |                |           |      |
| 15     | 100433                                    | 01         | DOLLY VARDEN             | PARR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2         | 6.95           | 0.64      |      |
|        |                                           | 01         | SLIMY SCULPIN            | JUVENILE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1         | <b>€</b> • 4 0 | 0.00      |      |
|        |                                           | 02         | DOLLY VARDEN             | PARR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1         | 6.00           | 0.00      |      |
|        |                                           | 03         | NO FISH                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1         |                |           |      |
|        |                                           | U.4        | NO FISH                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1         |                |           | ·. · |
| 16     | 100433                                    | 01         | NO FISH                  | and the second                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1         |                |           |      |
|        |                                           | 02         | DOLLY VARDEN             | PARR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4         | 9.52           | 0.56      |      |
|        |                                           | 03         | NO FISH                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1         |                |           |      |
|        |                                           | 04         | NO FISH                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | . 1       |                |           |      |
| 17     | 100483                                    | 0.1        | DOLLY VARDEN             | DADR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1         | 9.20           | 0.00      |      |
|        | 100730                                    | 01         | COHO SALMON              | PARR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | -<br>     | 3.93           | 0.52      |      |
|        |                                           | 02         | DOLLY VARDEN             | PARR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1         | 00,00          |           |      |
|        |                                           | 03         | NO FISH                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1.        | 1              |           |      |
|        |                                           | 04         | NO FISH                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1         |                | · · · · · |      |
| 1 -    | 1 3 6 6 6 7                               | ••         |                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |                |           |      |
| T 3    | 100483                                    | 01         | TRAP FROZEN              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | C ·       |                | •         |      |
|        |                                           | 02         | IKAP FRUZEN              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | U<br>I    | 0 <b>0</b>     | 0 00      |      |
|        |                                           | 04         | NO FISH                  | JUVENILL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1         | 0.00           | U • U.U   |      |
|        |                                           | · · ·      |                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | •         | 1.             |           |      |
| 2.2    | 100493                                    | 01         | DOLLY VARDEN             | PARR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1         | 11.40          | 0.00.     |      |
|        |                                           | 02         | DOLLY VARDEN             | PARR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1         | 11.30          | 0.00      |      |
|        |                                           | 03         | NO FISH                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1         |                |           |      |
|        |                                           | 04         | DULLY VARDEN             | PARR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 6         | 10.27          | 1.62      |      |
|        |                                           | 0.4        | DULLY VARDEN             | JUVENILE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | . 1       | 11 10          |           |      |
|        |                                           | U <b>1</b> | FIGHT WHILE FISH         | UUVENILE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Ţ         | TT + IU        | 0.00      |      |
| 16 A   | 100433                                    | 01         | NO FISH                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1         |                |           |      |
|        |                                           | 02         | COHO SALMON              | PARR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2         | 8.65           | 2.76      | 1    |
|        |                                           | 03         | DOLLY VARDEN             | PARR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4         | 10.35          | - 3.03    |      |
|        |                                           | 0.5        | DOLLY VARDEN             | JUVENILE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1         | 9.70           | 0.00      |      |

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SUMMARY OF RESULTS: MINNOW TRAP SAMPLES. April, 1983 TABLE 32-1.

|   |         |        |                      | APRIL • 1983                                                                              |                                    |                  | LENGTH (CM)                   |                                      |
|---|---------|--------|----------------------|-------------------------------------------------------------------------------------------|------------------------------------|------------------|-------------------------------|--------------------------------------|
| • | STATION | DATE   | REPLICATE            | SPECIES                                                                                   | LIFE STAGE                         | NUMBER           | MEAN                          | S • E • •                            |
|   | 16 A    | 100493 | 03<br>03<br>03<br>04 | COHO SALMON<br>NINE-SPINE STICKLEBACK<br>NINE-SPINE STICKLEBACK<br>NINE-SPINE STICKLEBACK | PARR<br>JUVENILE<br>Adult<br>Adult | 3<br>5<br>3<br>2 | 10.10<br>5.52<br>6.30<br>7.55 | 0.78 3<br>1.00 5<br>0.17 3<br>C.50 2 |
|   |         | •      |                      |                                                                                           |                                    |                  |                               |                                      |
|   |         |        |                      |                                                                                           |                                    |                  |                               |                                      |
|   |         |        |                      |                                                                                           |                                    |                  |                               |                                      |
|   | ·<br>·  |        |                      |                                                                                           |                                    |                  |                               |                                      |
|   |         |        |                      |                                                                                           |                                    |                  |                               |                                      |
|   |         |        |                      |                                                                                           |                                    |                  |                               |                                      |

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TABLE 82-2.

MMARY OF RESULTS: ELECTROFISHING SAMPLES APRIL+ 1983 รม

|           |        |           |                        |            |        | LENGTI | H (CM) |          |
|-----------|--------|-----------|------------------------|------------|--------|--------|--------|----------|
| STATION   | DATE   | REPLICATE | SPECIES                | LIFE STAGE | NUMBER | MEAN   | S.D.   |          |
| 13        | 030433 | 91        | DOLLY VARDEN           | PARR       | 17     | 5.82   | 0.96   | 1        |
|           |        | 01        | SLIMY SCULPIN          | JUVENILE   | 1      | 6.00   | 0.00   |          |
|           |        | 02        | DOLLY VARDEN           | PAR        | 7      | 5.72   | 1.46   |          |
|           |        | 02        | COHO SALMON            | PARR       | 1      |        |        | ļ        |
| 15        | 050433 | 01        | DOLLY VARDEN           | PARR       | 3      | 3.93   | 1.21   | •        |
|           |        | 01        | COHO SALMON            | PARR       | 8      | 3.20   | 0.22   | · 1      |
|           |        | 01        | SOCKEYE SALMON         | FRY        | 1      | 3.30   | 0.00   |          |
|           |        | 01        | SOCKEYE SALMON         | PARR       | 2      | 3.15   | 0.10   | <u> </u> |
|           |        | 01        | CHINOOK SALMON         | PARR       | 1      | 3.80   | 0.00   |          |
| 17        | 100433 | 01        | COHO SALMON            | FRY        | 2      | 3.00   | 0.28   | î        |
|           |        | 01        | COHO SALMON            | PARR       | 9      | 3.66   | 0.66   | (        |
|           |        | 01        | SLIMY SCULPIN          | JUVENILE   | . 5    | 4.42   | 1.96   | 1        |
|           |        | 01        | CHUM SALMON            | PARR       | 2      | 4.05   | 0.36   | i        |
| 19        | 100483 | 01        | DOLLY VARDEN           | PARR       | 9      | 8.00   | 2.73   | ,        |
|           |        | 01        | COHO SALMON            | PARR       | 1      | 7.50   | 0.00   |          |
|           |        | 01        | CHINOOK SALMON         | PARR       | 1      | 7.20   | 0.00   |          |
|           |        | 01        | SLIMY SCULPIN          | JUVENILE   | 1      | 6.40   | 0.00   |          |
|           |        | 01        | SLIMY SCULPIN          | ADULT      | 1      | 8.30   | 0.00   |          |
| 22        | 050433 | 01        | DOLLY VARDEN           | PARR       | 3      | 8.10   | 3.38   |          |
|           |        | 02        | DOLLY VARDEN           | PARR       | 5      | 11.42  | 2.13   |          |
|           |        | 03        | DOLLY VARDEN           | PARR       | 2      | 10.85  | 0.10   |          |
| · · · · · |        | 03        | DOLLY VARDEN           | JUVENILE   | . 4    | 12.45  | 1.77   |          |
| 42        | 050433 | 01        | DOLLY VARDEN           | PARR       | 7.     | 5.29   | 0.52   |          |
|           |        | 01        | COHO SALMON            | FRY        | 1      | 3.10   | 3.00   |          |
|           |        | 01        | COHO SALMON            | PARR       | 1      | 3.20   | 0.00   |          |
|           |        | 01        | SOCKEYE SALMON         | FRY        | 1      | 3.10   | 0.00   |          |
| 40A       | 030433 | 01        | DOLLY VARDEN           | PARR       | 6      | 5.23   | 1.10   |          |
|           |        | 01        | COHO SALMON            | PARR       | · 3    | 6.20   | 1.82   |          |
|           |        | 01        | RAINBOW TROUT          | PARR       | 1      | 5.30   | 0.00   |          |
|           |        | 01        | SLIMY SCULPIN          | JUVENILE   | 3      | 5.63   | 2.58   |          |
|           | · · ·  | 01        | SLIMY SCULPIN          | ADULT      | 1      |        |        |          |
|           |        | 01        | VINE-SPINE STICKLEBACK | JUVENILE   | 3      | 4.47   | 0.81   |          |

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TABLE B2-3. SUMMARY OF RESULTS: DIP NET SAMPLES APRIL, 1983

| LENGTH | (CM)    |
|--------|---------|
|        |         |
| AFAN   | S . D . |

|           | ~                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------|
| 4.10 0.00 | 1                                                                                                               |
| 3.72 0.42 | 4                                                                                                               |
|           | · C                                                                                                             |
| 4.01 0.20 | 3                                                                                                               |
| 3.92 0.30 | 4                                                                                                               |
| 3.90 0.22 | 22                                                                                                              |
|           |                                                                                                                 |
|           |                                                                                                                 |
|           |                                                                                                                 |
|           |                                                                                                                 |
|           | 4.10       0.00         3.72       0.42         4.01       0.20         3.92       0.30         3.90       0.22 |

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SUMMARY OF RESULTS: MINNOW TRAP SAMPLES JUNE: 1983 TABLE B2-4.

|                                                                                                                 |        |           |                         |            |        | LENGTH (CM) |         |                                       |
|-----------------------------------------------------------------------------------------------------------------|--------|-----------|-------------------------|------------|--------|-------------|---------|---------------------------------------|
| STATION                                                                                                         | DATE   | REPLICATE | SPECIES                 | LIFE STAGE | NUMBER | MEAN        | S•D•    | N                                     |
| 1                                                                                                               | 230633 | 01        | THREE-SPINE STICKLEBACK | ADULT      |        | 8.00        | 1.11    | ـــــــــــــــــــــــــــــــــــــ |
|                                                                                                                 |        | 02        | THREE-SPINE STICKLEBACK | ADULT      | 2      | 8.35        | 0.36    | 2                                     |
|                                                                                                                 |        | 03        | COHO SALMON             | PARR       | 1      | 9.70        | 6.00    | 1                                     |
|                                                                                                                 |        | 0.3       | DOLLY VARDEN            | PARR       | 1      | 12.20       | 0.00    | 1                                     |
|                                                                                                                 |        | 04        | DOLLY VARDEN            | DADD       | 2      | 13.50       | 6 14    |                                       |
|                                                                                                                 |        | n 4       | DOLLY VARDEN            | THAR       | 2      | 13.10       | 1 30    |                                       |
|                                                                                                                 |        | 14        | THREE-CRIVE STICKLERACK | ADDE T     | · ~    | 10010       | 10 40   | <u>د</u>                              |
|                                                                                                                 |        | 0=        | TAREC-SPINE STICKLEDAGK |            | 4      | 8.20        | 0 42    |                                       |
|                                                                                                                 |        | 0.5       | OULLY VARUEN            | PAXK       | 2      | 11.80       | 0.71    | ć                                     |
|                                                                                                                 |        | 0.5       | LOHU SALMON             | PARR       | 2      | 9.80        | 1.10    | č                                     |
|                                                                                                                 |        | 05        | DOLLY VARDEN            | JUVENILE   | 2      | 14.70       | 1.98    | 2                                     |
|                                                                                                                 |        | 05        | THREE-SPINE STICKLEBACK | ADULT      | 12     | 8.15        | 0.42    | 12                                    |
|                                                                                                                 |        | 06        | DOLLY VARDEN            | PARR       | .5     | 11.35       | 1.06    | 2                                     |
|                                                                                                                 |        | 05        | DOLLY VARDEN            | JUVENILE   | 2      | 14.10       | 1.13    | 2                                     |
|                                                                                                                 |        | 06        | THREE-SPINE STICKLEBACK | ADULT      | 10     | 8.53        | 0.39    | 1 (                                   |
|                                                                                                                 |        | 07        | DOLLY VARDEN            | JUVENILE   | 2      | 15.15       | 1.49    |                                       |
|                                                                                                                 |        | 07        | THREE-SPINE STICKLEBACK | ADULT      | 10     | 8.37        | 0.24    | 1                                     |
|                                                                                                                 |        | 09        | NINE-SPINE STICKLEBACK  | HIVENTIE   | 1      | 4.70        | 0.00    | ·                                     |
|                                                                                                                 |        | <u> </u>  | DOLLY VARDEN            | JUVENTLE   | 1      | 13-10       | 0.00    |                                       |
|                                                                                                                 |        | 00        | THREE-SPINE STICKLERACK | ADULT      | 5      | 10.23       | 0.00    |                                       |
|                                                                                                                 |        | 0.0       | CLINK COULDIN           | ADULT      | 5 7    | 0.07        | 0.00    |                                       |
|                                                                                                                 |        | 05        |                         | AUULI      | 3      | C • C /     | 0 • 41  |                                       |
|                                                                                                                 |        | 09        | SLIMT SCULPIN           | JUVENILE   | 2      | 2.80        | 0.71    | Ż                                     |
|                                                                                                                 |        | 0.9       | THREE-SPINE STICKLEBACK | ADULT      | 1      | 7.60        | 0.00    |                                       |
|                                                                                                                 |        | 10        | CHINOOK SALMON          | PARR       | 1      | 9.10        | 0 • C O | : 1                                   |
|                                                                                                                 |        | 10        | DOLLY VARDEN            | JUVENILE   | 2      | 14.10       | 0.00    | 2                                     |
|                                                                                                                 |        | 10        | THREE-SPINE STICKLEBACK | ADULT      | 11     | 8.41        | 0.37    | 11                                    |
| 2                                                                                                               | 230693 | 02        | DOLLY VARDEN            | PARR       | . 1    | 7.50        | 6.0     | Ĵ                                     |
|                                                                                                                 |        | 02        | COHO SALMON             | PARR       | 1.1    | 10.00       | 0.00    | •                                     |
|                                                                                                                 |        | 02        | JOLLY VARDEN            | JUVENILE   | 3      | 11.23       | 1.52    |                                       |
| 2                                                                                                               | 240593 | 01        | NO FISH                 |            | . 1    |             |         |                                       |
|                                                                                                                 |        | 02        | COLLY VARDEN            | PARR       | 3      | 46.80       | 51.27   |                                       |
|                                                                                                                 |        | 02        | DOLLY VARDEN            | JUVENILE   | - 5    | 12.44       | 1.44    |                                       |
|                                                                                                                 |        | 03        | DOLLY VARDEN            | PARR       | 2      | 9.35        | 0.78    |                                       |
|                                                                                                                 |        | 03        | DOLLY VARDEN            | JUVENILE   | 1      | 13.50       | 0.00    |                                       |
|                                                                                                                 |        | 03        | SLIMY SCULPIN           | JUVENTLE   | 1      | 6.10        | 0.00    |                                       |
|                                                                                                                 |        | 0.3       | SLIMY SCHIPIN           |            | 1      | 8.30        | 0.00    |                                       |
|                                                                                                                 |        | 14        | DOLLY VARDEN            | HIVENTLE   | 1      | 11.30       | 0.00    |                                       |
|                                                                                                                 |        | 0 A       | SI TMY SCHIDTM          | UNENTIE    | . 1    | 6.70        | 0.00    |                                       |
|                                                                                                                 |        | 05        | SETHY COLLETH           | ADIU T     | 1      | 7 90        | 0.00    |                                       |
|                                                                                                                 |        | 0.0       | NO FICH                 | ADULI      | 1      | 1.70        | 0.00    |                                       |
|                                                                                                                 |        | 00        |                         |            | 1      |             |         |                                       |
|                                                                                                                 |        | 07        | TUDELT VARUEN           | JUVENILE   | . 1.   | 10.10       | 0.00    |                                       |
|                                                                                                                 |        | 05        | INKEL-SPINE STICKLEBACK | JUVENILE   | 1      | 8.20        | 0.00    |                                       |
|                                                                                                                 |        | 08        | SLIMY SCULPIN           | ADULT      | 2      | 8.30        | 0.28    |                                       |
|                                                                                                                 |        | 09        | NO FISH                 |            | -1     |             |         |                                       |
|                                                                                                                 |        | 10        | COHO SALMON             | PARR       | 1      | 3.30        | 0.00    |                                       |
|                                                                                                                 |        | 10        | DOLLY VARDEN            | JUVENILE   | 2      | 13.15       | 0.10    | :                                     |
| e de la composición d |        | 10        | SLIMY SCULPIN           | JUVENILE   | 1      | 4.30        | 0.00    |                                       |
|                                                                                                                 |        | 10        | THREE-COTHE STICKLERACK | A 3 11 T   |        | 0 1 6       | 0 10    |                                       |

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SUMMARY OF RESULTS: MINNOU TRAP SAMPLES JUNE: 1983 TABLE 32-4.

|         |        |            |                             |            | 1      | LENGT   | H (CM)         |   |
|---------|--------|------------|-----------------------------|------------|--------|---------|----------------|---|
| STATION | DATE   | REPLICATE  | SPECIES                     | LIFE STAGE | NUMBER | MEAN    | S.D.           |   |
| 3       | 250683 | 01         | DOLLY VARDEN                | PARR       | 2      | 9.45    | 0.10           |   |
|         |        | 02         | DOLLY VARDEN                | PARR       | 2      | 11.55   | 0.10           |   |
|         |        | 02         | DOLLY VARDEN                | JUVENTLE   | - 2    | 12.25   | 2.33           |   |
|         |        | 03         | NO FISH                     |            | 1      |         |                |   |
|         |        | 04         | NO FISH                     |            | ĩ      |         |                |   |
|         |        | 05         | DOLLY VARDEN                | PARR       | ī      | 9.80    | 0.00           |   |
|         |        | 05         | SLIMY SCULPIN               | ADULT      | 1      | 7.10    | 0.00           |   |
|         |        | 05         | TRAP BURIED                 |            | 0      |         |                |   |
|         |        | 07         | DOLLY VARDEN                | JUVENILE   | 2      | 11.45   | 1.63           |   |
|         |        | 07         | THREE-SPINE STICKLEBACK     | ADULT      | 1      | 8.00    | 0.00           |   |
|         |        | 08         | NO FISH                     |            | 1      |         |                |   |
|         |        | 09         | DOLLY VARDEN                | PARR       | 1      | 9.50    | 0.00           |   |
|         |        | 09         | SLIMY SCULPIN               | ADULT      | 1      | 10.60   | 0.20           |   |
|         |        | 10         | NO FISH                     |            | 1      |         |                |   |
| 4       | 200693 | 0.1        | DOLLY VARDEN                | PAR        |        | 9.45    | 1 - 91         |   |
|         | 200000 | 01         | THREE-SPINE STICKLEBACK     |            |        | 8,00    | 0 - 00         |   |
|         |        | 02         | DOLLY VARDEN                | PAR        | 3      | 8,13    | 0 - 79         |   |
|         |        | 03 .       | ODILY VARDEN                | DARR       | 4      | 11.45   | 2.37           |   |
|         |        | 03         | SLITHY SCHLETN              | HUVENTLE   | 1      | 9.10    | - 0 60         |   |
|         |        | 00<br>0A   | NO ETCH                     | BOVENILL   | 1      | 0.10    | U • U U        |   |
|         |        | 05 .       |                             |            | . 1    |         |                |   |
|         |        | 05         | DOLLY VARDEN                | DA 3 B     | . 1    | 11 10   | 0 00           |   |
|         |        | 0.5        | SITHY SCULDTN               |            | . 1    |         |                |   |
|         |        | 00 .<br>07 | DOLLY VADOEN                |            | 1      | 10.70   | 0.00           |   |
|         |        | 07         |                             |            | 1      | 0 70    | 0.00.          |   |
|         |        | 07         | DOLLY VAROEN                |            | 1      | 12 20   | 0.00           |   |
|         |        | 07         |                             |            | 1      | 13.20   |                |   |
|         |        | 07         |                             |            | 1      | 7.50    | 0.00           |   |
|         |        | 07<br>10   | DALLY VARDEN                | AUULI      | 1      | 17 70   | 0.00           |   |
|         |        | 00         | SLIMM SOULDIN               | PARK       | 1      | 13.30   | 0.00           |   |
|         |        | 00         | NU ELCH<br>Setal Scofath    | AUULI      | 1      | 8.50    | U • L U        |   |
|         |        | 10         | 00H0 641 NOV                | 0120       | 1      | E 10    | 0 00           |   |
|         |        | 10         | CUTU SALAUN<br>Cethy Compth |            | ь      | 5+12    | 0.92           |   |
|         |        | TO .       | SETLEL SEAFLU               | AUDET      | 1      | 9.30    | U <b>6</b> U U |   |
| 5       | 200533 | 01         | COHO SALMON                 | PARR       | 2      | 11.00   | 4 • 38         |   |
|         |        | 01         | THREE-SPINE STICKLEBACK     | ADULT      | 3      | 8.53    | 0.65           |   |
|         |        | 02         | COHO SALMON                 | PARR       | 5      | 12.04   | 1.46           |   |
|         |        | 02         | THREE-SPINE STICKLEBACK     | ADULT      | 35     | 8.45    | 0.65           | 3 |
|         |        | 03         | SOCKEYE SALMON              | PARR       | 1      | 5.60    | 0.00           |   |
|         |        | 03         | SLIMY SCULPIN               | JUVENILE   | 1      | 3.50    | C . 00         |   |
|         |        | 03         | THREE-SPINE STICKLEBACK     | ADULT      | 2      | 8•65    | 0.10           |   |
| · · · · |        | 04         | THREE-SPINE STICKLEBACK     | ADULT      | 1      | 8 • 4 0 | Û • 0 C        |   |
|         |        | 05         | THREE-SPINE STICKLEBACK     | ADULT      | 2      | 8.35    | 0.50           |   |
|         |        | 05         | SLIMY SCULPIN               | ADULT      | 1      | 9.70    | 0.00           |   |
|         |        | 05         | THREE-SPINE STICKLEBACK     | ADULT      | 1      | 8 • 2 0 | 0.00           |   |
|         |        | 06         | COHO SALMON                 | PARR       | 1      | 8.10    | 0.00           |   |
|         |        | 06         | THREE-SPINE STICKLEBACK     | ADULT      | 4      | 7.07    | 1.72           |   |
|         |        | 07         | THREE-SPINE STICKLEBACK     | ADULT      | 1      | 8.30    | 0.00           |   |
|         |        | 08         | DOLLY VARDEN                | PARR       | 2      | 10.85   | 2•48           |   |
|         |        |            |                             |            |        |         |                |   |
|         |        |            |                             |            |        |         |                |   |

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SUMMARY OF RESULTS: MINNOW TRAP SAMPLES JUNE, 1983 TABLE 82-4.

| <b>_</b>   |                                                                                                                                                                                                                                    |        |           | JUNE 198                | 3          |            |             |         |         |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-----------|-------------------------|------------|------------|-------------|---------|---------|
| _          |                                                                                                                                                                                                                                    |        |           |                         |            |            | LENGTH (CM) |         |         |
| Ċ          | STATION                                                                                                                                                                                                                            | DATE   | REPLICATE | SPECIES                 | LIFE STAGE | NUMBER     | MEAN        | S.D.    | N       |
|            | 5                                                                                                                                                                                                                                  | 200633 | 09        | SLIMY SCULPIN           | JUVENILE   |            | 4.60        | 0.00    |         |
|            |                                                                                                                                                                                                                                    |        | 0.8       | THREE-SPINE STICKLEBACK |            | 1          | 8.30        | 0.00    | 1       |
|            |                                                                                                                                                                                                                                    |        | 09        | THREE-SPINE STICKLEBACK | ADULT      | 4          | 8.05        | 0.20    | 4       |
| 1          |                                                                                                                                                                                                                                    |        | 10        | TRAP MANGLED BY BEAR    |            | 0          |             | ••20    | •       |
|            | 6                                                                                                                                                                                                                                  | 200633 | 01        | DOLLY VARDEN            | PARR       | 2          | 10.90       | 1.98    | 2       |
| •          |                                                                                                                                                                                                                                    |        | 01        | SLIMY SCULPIN           | ADULT      | 1          | 10.89       | 0.00    | 1       |
| <u>771</u> |                                                                                                                                                                                                                                    |        | 0.5       | DOLLY VARDEN            | PARR       | 1          | 12.00       | 0.00    | 1       |
|            |                                                                                                                                                                                                                                    |        | 03.       | DOLLY VARDEN            | PARR       | 5          | 11.30       | 2.26    | 5       |
| J          |                                                                                                                                                                                                                                    |        | 04        | SLIMY SCULPIN           | JUVENILE   | . 2        | 5.40        | 0.14    | 2       |
|            |                                                                                                                                                                                                                                    |        | 04        | THREE-SPINE STICKLEBACK | ADULT      | 1          | 8.70        | 0.00    | 1       |
|            |                                                                                                                                                                                                                                    |        | 05        | NO FISH                 |            | 1          |             |         | C       |
| r P        |                                                                                                                                                                                                                                    |        | 06        | DOLLY VARDEN            | PARR       | 1          | 12.90       | 0.00    | 1       |
|            |                                                                                                                                                                                                                                    |        | 06        | COHO SALMON             | PARR       | 1          | 9.40        | 0.00    | 1       |
| <u></u>    |                                                                                                                                                                                                                                    |        | 05        | SLIMY SCULPIN           | JUVENILE   | 1          | 5.60        | 0.00    | 1       |
|            |                                                                                                                                                                                                                                    |        | 07        | DOLLY VARDEN            | PARR       | 1          | 10.20       | 0.00    | 1       |
| 1          |                                                                                                                                                                                                                                    |        | 07        | COHO SALMON             | PARR       | 5          | 5.75        | 3.18    | 2       |
|            |                                                                                                                                                                                                                                    |        | 07        | SLIMY SCULPIN           | ADULT      | 1          | 8.60        | 0.00    | 1       |
| $\square$  |                                                                                                                                                                                                                                    |        | 08 -      | DOLLY VARDEN            | PARR       |            | 11.35       | 3.65    | 4       |
| -          |                                                                                                                                                                                                                                    |        | 09        | SLIMY SCULPIN           | JUVENILE   | 1          | 5.00        | 0.00    | 1       |
| <b>\</b>   |                                                                                                                                                                                                                                    |        | 09        | DOLLY VARDEN            | PARR       | . 1        | 9.00        | 0.00    | 1       |
| 1          |                                                                                                                                                                                                                                    |        | 09        | THREE-SPINE STICKLEBACK | ADULT      | 2          | 8.25        | 0.10    | 2       |
| U          |                                                                                                                                                                                                                                    |        | 09        | SLIMY SCULPIN           | ADULT      | 1          | 8.50        | C • 0 O | 1       |
| C          |                                                                                                                                                                                                                                    |        | 10        | NO FISH                 |            | 1          |             |         | 0       |
| - Ē        | Ŕ                                                                                                                                                                                                                                  | 220593 | 01        | CHUM SALMON             | PAR        | · 1        | 3,30        | 0.00    | 1       |
|            |                                                                                                                                                                                                                                    |        | 01        | SETMY SCHEPTN           | JEW ENTER  | 1          | 6.50        | 6.00    | 1       |
| <b>_</b>   |                                                                                                                                                                                                                                    |        | 0.2       | COHO SALMON             | DAPP       | 1          | 4.10        | 0 00    | 1       |
|            |                                                                                                                                                                                                                                    |        | 03        | THREE-SPINE STICKLEBACK | ADILIT     | 1          | 9.20        | 0.00    | 1       |
| <u> </u>   |                                                                                                                                                                                                                                    |        | 0.4       | NO FISH                 | ADDET      | 1          | 0020        | 0.00    | 1       |
|            |                                                                                                                                                                                                                                    |        | 05        | THREE-SPINE STICKLEBACK | ADUL T     |            | 6.10        | 0 00    | 1       |
|            |                                                                                                                                                                                                                                    |        | 0.5       | ADLLY VARDEN            | DARE       | 1          | 11.20       | 0.00    | 1       |
|            |                                                                                                                                                                                                                                    |        | 37        | NO FISH                 | F 9 X A    | 1          | 11.020      | 0.00    | · · ·   |
|            |                                                                                                                                                                                                                                    |        | 08        |                         | DARR       | 1          | 4.68        | 0.60    | · ĭ     |
| { }        |                                                                                                                                                                                                                                    |        | 0.9       | NO FISH                 | 1 4.00     | 1          | 1000        | 0.00    | 1       |
|            |                                                                                                                                                                                                                                    |        | 10        | COHO SALMON             | PA 3 3     | - 1<br>//  | 4 95        | 0 49    | . 0     |
| · 🛫 ا      |                                                                                                                                                                                                                                    | . *    | 10        | SLIMY SCULPIN           | ADULT      | 1          | 8.40        | 0.00    | · 1     |
| [-]        | <br>                                                                                                                                                                                                                               | 230633 | 0.1       | DOLLY VARDEN            |            | ٨          | 5 97        | 1 7 7   | · •     |
|            |                                                                                                                                                                                                                                    | 2,5053 | 02        | DOLLY VARDEN            | DADD       |            | 0 75        | 1.01    |         |
|            |                                                                                                                                                                                                                                    |        | 03        | NO ETCH                 | EMAN       | 1          | 7.15        |         | 2       |
|            |                                                                                                                                                                                                                                    |        | 0.4       | DOLLY VARDEN            | D130       | . <u>1</u> | C 75        | 1 70    | . 0     |
| <b>A</b>   | 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -<br>1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - |        | 14        | SETMY SCHLOTY           | THANK      | 1          | 70J         |         | -+      |
|            |                                                                                                                                                                                                                                    |        | 0.5       | DOLLY VARDEN            | DA2P       | 1          | 11.00       |         | 1       |
|            |                                                                                                                                                                                                                                    |        | 06        | NO FISH                 | E MININ    | 1          | TT O U U    | 0.00    | 0.<br>T |
| C          |                                                                                                                                                                                                                                    |        | 07        | SI TMY SCHIPTN          | HIVENTIE   | 1          | 5 10        | 0 0 0   | 1       |
| -          |                                                                                                                                                                                                                                    |        | 08        | NO FISH                 | 00164166   | 1          | 100         | 0.00    | U<br>T  |
|            |                                                                                                                                                                                                                                    |        | 0.9       | SLIMY SCHEPTN           | HIVENTIE   | . 1        | 4.90        | 0.00    | 1       |
|            |                                                                                                                                                                                                                                    |        | 0.9       | SLIMY SCULPTN           |            | 1          | 11.30       | 0.00    | 1       |
| المنسلة    |                                                                                                                                                                                                                                    |        | 10        | NO FISH                 |            | i          | 110,00      | 000     | Ô       |
|            |                                                                                                                                                                                                                                    |        | -         |                         |            | -          |             |         | ~       |

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### SUMMARY OF RESULTS: MINNON TRAP SAMPLES JUNE: 1983 TABLE 32-4.

|          |        |            |       |                         |            |        | LENGT       | H (CM)       |  |
|----------|--------|------------|-------|-------------------------|------------|--------|-------------|--------------|--|
| STATION  | DATE   | REPL       | ICATE | SPECIES                 | LIFE STAGE | NUMBER | MEAN        | S.D.         |  |
|          |        |            |       |                         |            |        |             |              |  |
| 10       | 220633 | 91         |       | DOLLY VARDEN            | PARR       | 2      | 10.30       | 4 • 38       |  |
|          |        | 02         |       | DOLLY VARDEN            | PARR       | 4      | 13.30       | 1.41         |  |
|          |        | 0.3        |       | DOLLY VARDEN            | PARR       | 3      | 9.50        | 2.00         |  |
|          |        | 04         |       | NO FISH                 | •          | · · 1  |             |              |  |
|          |        | 05         |       | DOLLY VARDEN            | PARR       | 7      | 10.57       | 2:28         |  |
|          |        | 06         |       | DOLLY VARDEN            | PAR        | Ŗ      | 3.81        | 1.60         |  |
|          |        | 05         |       | THREE-SPINE STICKLEBACK | ADULT      | 2      | 8.40        | 0.14         |  |
|          |        | 07         |       | DOLLY VARDEN            | PARR       | 4      | 11.42       | 0.67         |  |
|          |        | ÓЗ         |       | DOLLY VARDEN            | PARR       | 1      | 11.60       | 0.00         |  |
|          |        | ÛЭ         |       | DOLLY VARDEN            | PAR        | 2      | 8.90        | 1.98         |  |
|          |        | 10         | 1.1   | DOLLY VARDEN            | PAR        | 7      | 9.64        | 1.26         |  |
|          |        | 10         |       | THREE-SPINE STICKLEBACK |            | 2      | 8.75        | 0.22         |  |
|          |        |            |       | TIREL-SFIRE STICKLEDAGR | AUGET      | ۲.     |             | 0.022        |  |
| 11       | 230693 | 01         |       | NO FISH                 |            | 1      |             |              |  |
|          |        | 02         |       | THREE-SPINE STICKLEBACK | ADULT      | · 1    | 8.30        | $0 \cdot 00$ |  |
|          |        | 03         |       | COHO SALMON             | PARR       | 5      | 9.00        | 1.01         |  |
|          |        | 03         |       | DOLLY VARDEN            | PARR       | 1      | 10.80       | 0.00         |  |
|          |        | 03         |       | COHO SALMON             | PARR       | - 1    | 9.60.       | 0.00         |  |
|          |        | 03         |       | JOLLY VARDEN            | PARR       | 1      | 10.90       | 0.00         |  |
|          |        | 03         |       | THREE-SPINE STICKLEBACK | PARR       | 1      | 8.50        | 0.00         |  |
|          |        | 03         |       | COHO SALMON             | PARR       | 1      | 6.20        | 0.00         |  |
|          |        | 03         |       | SLINY SCULPIN           | PARR       | 1      | 2.60        | 0.00         |  |
|          |        | 03         |       | VINE-SPINE STICKLEBACK  | JUVENTLE   | 1      | 5.30        | 0.00         |  |
|          |        | 33         |       | THREE-SPINE STICKLEBACK | ADULT      | - 3    | 8.33        | 0.32         |  |
|          |        | 04         |       | DOLLY VARDEN            | ADULT      | 1      | 9.40        | 0.02         |  |
| 1. A. A. |        | 05         |       | NO ETSH                 |            | 1      | 2010        |              |  |
|          |        | 25         |       | NO FISH                 |            | 1      |             |              |  |
|          |        | 03<br>07   |       |                         | D4 3 0     | 4      | 17 00       | 0 00         |  |
|          |        | 07         |       | DOLLY VARDEN            |            | 1      | 13.90       |              |  |
|          |        | 0.0        |       | NO FICH                 | JUVENILE   | 1      | 14.00       | 0.60         |  |
|          |        | 08         |       | NU FISH                 |            | 1      | · · · · · · |              |  |
|          |        | 09         |       | THREE-SPINE STICKLEBACK | ADULT      | 1      | 8.50        | . ù.⊕£0      |  |
|          |        | 10         |       | TRAP MISSING            |            | 0      |             |              |  |
| 12       | 270533 | 91         |       | TRAP BURIED             |            | D      |             |              |  |
|          |        | 02         |       | DOLLY VARDEN            | PARR       | 1      | 7.70        | 0.00         |  |
|          |        | 02         |       | DOLLY VARDEN            | JUVENILE   | 2      | 11.90       | 1.27         |  |
|          |        | 03         |       | TRAP BURIED             |            | 0      | · ·         |              |  |
|          |        | 04         |       | COHO SALMON             | PARR       | 3      | 6.73        | 1.47         |  |
|          |        | 04         |       | DOLLY VARDEN            | PAR        | 1      | 10-20       | 0.00         |  |
|          |        | 04         |       | COHO SAL YON            | PAR        | 1      | 7.70        | 0.00         |  |
|          |        | <u>n</u> 4 |       | DOLLY VARDEN            | PARR       | 1      | 10-10       | 0.00         |  |
|          |        | 14         |       | COHO SALVON             | 0199       | 1<br>Z | 5-00        | 0.96         |  |
|          |        | Π Δ        |       | DOLLY VARDEN            |            |        | 10 75       | 1 10         |  |
|          |        | n <b>A</b> |       | THREFLODING STICKLERASH | ADHLT      | 1      | 12010       | 1.10         |  |
|          |        | 05         |       | DOLLY VADDEN            | AUULI      | 1      | 0.00U       | 0.00         |  |
|          |        | 0.0        |       | TURES OFFICE OFFICE     | PAKK       | 1      | 10.50       | 0.00         |  |
|          |        | .05        |       | INKLE-SPINE STICKLEBACK | ADULT      | 1      | 8.50        | 0.00         |  |
|          |        | 05         |       | SLIMY SCULPIN           | ADULT      | 1      | 6.20        | 0.00         |  |
|          |        | 06         |       | UULLY VARDEN            | PARR       | 1      | . 10.80     | 0.00         |  |
|          |        | <b>n 6</b> |       | DOLEY VARDEN            | BIVENTLE   | 1      | 13.40       | 0.00         |  |

|      |      |        |           |                             | JUNE 1983           |                                                       |          |               |            |
|------|------|--------|-----------|-----------------------------|---------------------|-------------------------------------------------------|----------|---------------|------------|
|      |      |        |           |                             |                     |                                                       |          | LENGT         | H (CM) ··· |
| STAT | FION | DATE   | REPLICATE | SPECIES                     |                     | LIFE STAGE                                            | NUMBER   | MEAN          | S.D.       |
| 12   | 2 .  | 270693 | 06        | SLIMY SCULPIN               |                     | ADULT                                                 | 1        | 9.20          | 0.00       |
|      |      |        | 07        | SOCKEYE SALMON              |                     | PARR                                                  | 1        | 3.50          | 0 • 0 0    |
|      |      |        | 09        | TRAP MISSING                |                     |                                                       | 0        |               |            |
|      |      |        | 10        | TRAP MISSING                |                     |                                                       | 0.0      |               |            |
| 13   | 3    | 250683 | 01        | DOLLY VARDEN                |                     | PARR                                                  | 4        | 6.50          | 2.13       |
|      |      |        | 02        | CHUM SALMON                 |                     | PAR                                                   | 1        | 3.50          | 0.00       |
|      |      |        | 02        | DOLLY VARDEN                |                     | PA ( K                                                | 1        | B ● 7 U       | 00.00      |
|      |      |        | . 3 4     | DOLLY VARDEN                |                     | PARR                                                  | 2        | 5.35          | 1.63       |
|      |      |        | 05        | NO FISH                     |                     |                                                       | 1        |               |            |
|      |      |        | 06        | NO FISH                     |                     |                                                       | 1        |               |            |
|      |      |        | 07        | TRAP OUT OF WAT             | TER                 | <b>D4 3 C</b>                                         | 0        |               | ÷ ••       |
|      |      |        | 08<br>08  | CUHU SALMON<br>Dolly Vaporn |                     |                                                       | 1        | 6.30          |            |
|      |      |        | 08        | COHO SALMON                 |                     | PAR                                                   | 2        | 0.00<br>4.30  | 1.04       |
|      |      |        | 03        | DOLLY VARDEN                |                     | PARR                                                  | 1        | 6.30          | 0.00       |
|      |      |        | 0 8       | COHO SALMON                 |                     | PARR                                                  | <b>1</b> | 3.90          | 0.00       |
|      |      |        | 0.9       | DOLLY VARDEN                |                     | PARR                                                  | 4        | 5.82          | 1.14       |
|      |      |        | 03        | COHO SALMON                 |                     | PARR                                                  | 4        | 4.35          | 0.26       |
|      |      |        | 08        | COHO SALMON                 |                     | PARR                                                  | 7        | 4.39          | 0.00       |
|      |      | · .    | 08        | DOLLY VARDEN                |                     | JUVENILE                                              | 1        | 11.20         | 0.00       |
|      | •    | 1      | 09        | DOLLY VARDEN                |                     | PARR                                                  | 14       | 8.25          | 1.03       |
|      |      |        | 07        | DOLLY VARDEN                |                     | JUVENILE                                              | . 8      | 11.25         | 0.97       |
|      |      |        | 10        | DOLLY VARDEN                |                     | PARR                                                  | 1        | 9.40<br>10.20 | 0.00       |
| 14   | ¥    | 250693 | 01        | COHD SALMON                 |                     | PARR                                                  | . 7      | 5.59          | 3.35       |
|      |      |        | 01        | DOLLY VARDEN                |                     | PARR                                                  | 3        | 4.47          | 0.14       |
|      |      |        | 01        | COHO SALMON                 |                     | PARR                                                  | 1        | 3.70          | 0.60       |
|      |      |        | 01        | DOLLY VARDEN                |                     | PARR                                                  | 1        | 4.30          | 0.00       |
|      |      |        | 02        | NO FISH                     |                     | PATR                                                  | 1        | 1.50          | 0.00       |
|      |      |        | 04        | DOLLY VARDEN                |                     | JUVENILE                                              | 1        | 12.40         | 0.00       |
|      |      |        | 05        | COHO SALMON                 |                     | PARR                                                  | 1        | 6.90          | 0.00       |
|      |      |        | 05        | DOLLY VARDEN                |                     | PARR                                                  | : 1      | 6.30          | 0.00       |
|      |      |        | 05        | DOLLY VARDEN                |                     | JUVENILE                                              | 2        | 11.35         | 0.10       |
|      |      |        | 05        | NO ETSH                     |                     | PARK                                                  | 1        | 3.30          | 0.00       |
|      |      |        | 0.9       | COHO SALMON                 |                     | PARR                                                  | 17       | 4.49          | 0.30       |
| 1 A. |      |        | 09        | DOLLY VARDEN                |                     | PARR                                                  | 1        | 2.50          | 0.00       |
|      |      |        | 08        | COHO SALMON                 |                     | PARR                                                  | 1        | 4.19          | 0.00       |
|      |      |        | 07        | NO FISH<br>TRAP MISSING     |                     |                                                       | 1<br>0   |               |            |
| 15   | 5    | 270633 | 01        | DOLLY VARDEN                |                     | JUVENILE                                              | 1        | 7.00          | 0.00       |
|      |      |        | 02        | NO FISH                     |                     |                                                       | 1        |               |            |
|      |      |        | 03        | NO FISH                     |                     |                                                       | 1        |               |            |
|      |      |        |           |                             |                     |                                                       |          |               |            |
|      |      |        |           | · · · · ·                   |                     |                                                       |          |               |            |
|      |      |        | -<br>     |                             | و و ورواند و و مارو | n an chaichtean ann ann an |          |               | ·          |
|      | •    |        | •         |                             |                     |                                                       |          |               |            |
|      |      |        | et a      |                             |                     |                                                       |          | -             |            |
|      |      |        |           |                             |                     |                                                       |          |               |            |
|      |      |        |           |                             |                     |                                                       |          |               |            |

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TABLE B2-4.

SUMMARY OF RESULTS: MINNOW TRAP SAMPLES JUNE: 1983

LENGTH (CM)

|                   | STATION | DATE   | REPLICATE | SPECIES              | LIFE STAGE | NUMBER     | MEAN      | S.D.    | . N        |
|-------------------|---------|--------|-----------|----------------------|------------|------------|-----------|---------|------------|
| 2                 | 15      | 270693 | 04        | NO FTSH              |            | 1          |           |         | <br>0      |
| L J               |         | 2      | 05        | NO FISH              |            | 1          |           |         | õ          |
|                   |         |        | 06        | NO FISH              |            | 1          |           |         | , č        |
| - 1               |         |        | a 7       | VO ETSH              |            | 1          |           |         | č          |
| E.                |         |        | 0.8       | NO ETCH              |            | 1          |           |         | - 0<br>- 0 |
|                   |         |        | 0.0       |                      | 0430       | . 1        | 4 10      | 0 30    | ्<br>•     |
|                   |         |        | 09        | DULLY VARUEN         | PARR       | 1          | 4 • I U   | 0.00    | 1          |
| Ē                 |         |        | TU        | NU FISH              |            | 1          |           |         | 0          |
|                   | 15      | 220533 | 01        | NO FISH              |            | · 1.       |           |         | 0.         |
|                   |         |        | 02        | DOLLY VARDEN         | PARR       | 1 .        | 8.20      | 0 • 0 0 | 1          |
|                   |         |        | 03        | NO FISH              |            | 1          |           |         | D          |
|                   |         |        | 04        | DOLLY VARDEN         | PARR       | 1          | 9.10      | 0.00    | 1          |
| ſſ                |         |        | 05        | NO FISH              |            | 1          |           |         | Û          |
|                   |         |        | 05        | SLIMY SCULPIN        | ADULT      | 1          | 12.00     | 0.00    | 1          |
| الب ا             |         |        | 07        | DOLLY VARDEN         | JUVENILE   | 1          | 13.80     | 0.00    | 1          |
| 6                 |         |        | 0.9       | DOLLY VARDEN         | PAR        | 4          | 10.85     | 1 - 44  | 4          |
| m                 |         |        | 0.9       | DOLLY VARDEN         | PAR        | 2          | 10.45     | 0.92    | 2          |
|                   |         |        | 10        | DOLLY VARDEN         | PAR        | ·          | 9.40      | 1,15    | <u>ح</u>   |
|                   |         |        | 10        |                      | HIVENTIE   | 1          | 13 00     | 0 00    | 1          |
|                   |         |        |           | JULLI VARDEN         | UCALNILL   | · <b>·</b> | 13.00     | 0.00    | .1         |
| Ē,                | 17      | 290683 | 01        | DOLLY VARDEN         | PARR       | 1          | 9.90      | 0.00    | . 1        |
|                   |         |        | 01        | DOLLY VARDEN         | JUVENILE   | 1          | 10.20     | 0.00    | 1          |
|                   |         |        | 02        | DOLLY VARDEN         | PARR       | 1          | 9.60      | 0.00    | 1          |
| -                 |         |        | 0.3       | NO FISH              |            | 1          |           | • . •   | . 0        |
| •                 |         |        | 04        | COHO SALMON          | PAR        | 1          | 4.70      | 0.00    | i          |
|                   |         |        | 05        | NO FISH              |            | 1          |           |         | -<br>n     |
|                   |         |        | 0.5       | DOLLY VARDEN         | PARR       | . 1        | 9.30      | 0.00    | ĩ          |
| <b>_</b>          |         |        | 0.6       | DOLLY VARDEN         |            | 1          | 11.50     | 3.00    | 1          |
|                   |         |        | 07        |                      | DEVENTLE   | 1          | 11 00     | 0.00    | -          |
| ~~- <sup>`</sup>  |         |        | 39        | DOLLY VARDEN         | DABB       |            |           | 0.00    | 1          |
|                   |         |        | 0.5       | DOLLY VARDEN         | PATR       | 1          | 7.00      | 0.00    | 1          |
|                   |         |        | 05        | DULLY VARDEN         | JUVENILE   | . 1        | 14.30     | 0.00    | 1          |
| المتودية          |         |        | 09        | JULLY VARUEN         | JUVENILE   | 2          | 11.15     | 1.20    | 2          |
|                   |         |        | 09        | SLIMY SCULPIN        | ADULT      | 1          | 5.90      | 0.00    | 1          |
|                   |         |        | 10        | VO FISH              |            | 1          | н т.<br>Н |         | 0          |
|                   | 18      | 300633 | 01        | NO FISH              |            | 1          |           |         | 0          |
|                   |         |        | 02        | NO FISH              |            | 1          |           |         | ۵<br>ا     |
|                   |         |        | 03        | NO FISH              |            | 1          |           |         | n          |
| []])              |         |        | 14        | DOLLY VARDEN         | DAPP       | 1          | 5.10      | 0.00    | ĩ          |
|                   |         |        | 05        | ST THY SCHLOTN       |            | 1          | 7 70      | 0.00    | 1          |
|                   |         |        | 0.0       | SCINT SCUEPIN        | ADULI      | · L        | 1.10      | 0.00    |            |
|                   |         |        | 08        |                      |            |            |           | • • •   | . 0        |
| A                 |         |        | 07        | DULLY VARDEN         | JUVENILE   | 1          | 12.20     | 0.90    | 1          |
|                   |         |        | 08        | DULLY VARDEN         | PARK       | 1          | 9.90      | 0.00    | 1          |
|                   |         |        | 09        | NO FISH              |            | 1          |           |         | 0          |
|                   |         |        | 10        | ND FISH              |            | 1          |           |         | - 0        |
| $\overline{\Box}$ | 19      | 300533 | 01        | TRAP MANGLED BY BEAR |            | 0          |           |         |            |
|                   |         |        | 02        | NO FISH              |            | 1          |           |         | . 0        |
|                   |         |        | 03        | NO FISH              |            | 1          |           |         | . G        |
|                   |         |        | 04        | NO FISH              |            | 1          |           |         | Û          |
|                   |         |        |           |                      |            |            |           |         |            |

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TABLE 32-4. SUMMARY OF RESULTS: MINNOW TRAP SAMPLES JUNE, 1983

"LENGTH (CM)

|               | STATION | DATE                                      | REPLICATE | SPECIES                 | LIFE STAGE | NUMBER     | MEAN    | S.D.    | N          |
|---------------|---------|-------------------------------------------|-----------|-------------------------|------------|------------|---------|---------|------------|
| 1             | 19      | 300633                                    | 05        | DOLLY VARDEN            | JUVENTLE   |            | 11.20   | 0.00    |            |
| J             |         |                                           | 06        | VO FISH                 |            | 1          |         |         | Ō          |
|               |         |                                           | 07        | NO FISH                 |            | 1          |         |         | Õ          |
| ę.,           |         |                                           | 0.9       | DOLLY VARDEN            | JUVENILE   | 1          | 12.60   | 0.00    | 1          |
|               |         |                                           | 39        | NO FISH                 |            | 1          |         |         | . 6        |
|               |         |                                           | 10        | NO FISH                 |            | 1          |         |         | 0          |
| с.<br>- т     | 10      | 190633                                    | 01        | TRAP BURIED             |            | 0          |         |         |            |
|               |         |                                           | 02        | DOLLY VARDEN            | PARR       | 1          | 9.10    | 0.00    | 1          |
|               |         |                                           | 02        | SOCKEYE SALMON          | PARR       | 1          | 4.40    | 0.00    | 1          |
|               |         |                                           | 02        | THREE-SPINE STICKLEBACK | ADULT      | 4          | 8.02    | 0.49    | 4          |
|               |         |                                           | 03        | THREE-SPINE STICKLEBACK | ADULT      | 2          | 8.50    | ũ • 0 Ö | 2          |
| ٦.            |         | •                                         | 04        | THREE-SPINE STICKLEBACK | ADJLT      | 20         | 7.99    | 0.39    | 20         |
|               |         |                                           | 05        | CHUM SALMON             | PARR       | - 1        |         |         | 0          |
| _i            |         |                                           | 05        | NINE-SPINE STICKLEBACK  | JUVENILE   | 1          | 3,90    | 0.00    | 1          |
|               |         |                                           | 05        | THREE-SPINE STICKLEBACK | ADULT      | 3          | 8.13    | 0.55    | 3          |
| 7             |         |                                           | 06        | DOLLY VARDEN            | PARR       | 4          | 11.12   | 2.32    | 4          |
|               |         |                                           | 05        | COHO SALMON             | PARR       | 1          | 3.90    | 0.00    | 1          |
|               |         |                                           | 06        | THREE-SPINE STICKLEBACK | ADULT      | 5          | 7.82    | 0.50    | 5          |
|               |         |                                           | 07        | DOLLY VARDEN            | PARR       | 3          | 9.87    | 0.99    | 3          |
| -             |         |                                           | 37        | COHO SALMON             | PARR       | 1          | 4.10    | 0.00    | 1          |
|               |         |                                           | 07        | THREE-SPINE STICKLEBACK | ADULT      | 9          | 8.14    | 0.40    | 9          |
|               |         |                                           | 07        | SLIMY SCULPIN           | ADULT      | 1          | 7.00    | 0.00    | 1          |
| -1            |         |                                           | 07        | THREE-SPINE STICKLEBACK | ADULT      | 2          | 8.35    | 0.92    | 2          |
|               |         |                                           | 0.9       | DOLLY VARDEN            | PARR       | 1          | 10.60   | 0.00    | 1          |
| 7             |         |                                           | 08        | THREE-SPINE STICKLEBACK | PARR       | 1          | 9.50    | 2.00    | 1          |
|               |         |                                           | 0 9       | COHO SAL YON            | PARR       | ī          | 8.10    | 0.00    | 1          |
| 1             |         | 1. A. | 0.8       | DOLLY VARDEN            | PARR       | 1          | 8.00    | 0.00    | 1          |
|               |         |                                           | 08        | CHUM SALMON             | PARR       | 1          | 4.90    | 0.00    | 1          |
| 7             |         |                                           | 0.8       | THREE-SPINE STICKLEBACK | ADULT      | 6          | 8.08    | 0.32    | - <u>-</u> |
| ].            |         |                                           | 07        | DOLLY VARDEN            | PARR       | 2          | 10.35   | 1.06    | 2          |
|               |         |                                           | 09        | DOLLY VARDEN            | JUVENTÉE   | 1          | 13.00   | 0.00    | 1          |
| _             |         |                                           | 09        | THREE-SPINE STICKLEBACK | ADULT      | 1          | 8.50    | 0.00    | ī          |
| Ľ             |         |                                           | 10        | DOLLY VARDEN            | PARR       | 5          | 11.00   | 1.48    | 5          |
|               |         |                                           | 10        | SLIMY SCULPIN           | JUVENILE   | 1          | 2.50    | 0.00    | 1          |
| 4             | 20      | 300533                                    | 31        | SLIMY SCULPIN           | ADJLT      | 1          | 8.80    | 0.00    | 1          |
|               |         |                                           | 02        | COHO SALMON             | PARR       | 3          | 4.80    | 0.72    | 3          |
| <sup></sup> ] | •       |                                           | 02        | SOCKEYE SALMON          | PARR       | ĩ          | 4.20    | 0.00    | 1          |
| 1             |         |                                           | 03        | DOLLY VARDEN            | PARR       | 1          | 9.90    | 0.00    | 1          |
| 1             |         |                                           | 03        | SOCKEYE SALMON          | PARR       | 7          | 4.23    | 0.77    | 7          |
|               |         |                                           | 04        | DOLLY VARDEN            | PARR       | 1          | 8.60    | 0.00    | 1          |
| <b>,</b>      |         |                                           | 04        | SOCKEYE SALMON          | PARR       | 2          | 4.30    | 0.00    | 2          |
|               |         |                                           | 04        | COHO SALMON             | PARR       | 1          | 3,90    | 0.00    | . 1        |
|               |         |                                           | 04        | SLIMY SCULPIN           | ADULT      | ĩ          | 7.90    | 0_00    | 1          |
|               |         |                                           | 05        | SETMY SCULPIN           | ADULT      | 1          | 6.60    | 0.00    | 1          |
|               |         |                                           | 0.6       | NO FISH                 |            | 1          |         |         | n          |
| 7             |         |                                           | 07        | NO FISH                 |            | 1          | · · · · |         | ñ          |
|               |         |                                           | 0.8       | SOCKEYE SALMON          | PAR        | • 1        | 4,20    | 0.00    | · 1        |
|               |         |                                           | 0.8       | COHOLSALMON             | PARR       | 1          | 3.60    | 0.00    | 1          |
| .1            |         |                                           |           |                         |            | <b>⊥</b> . |         |         | •          |

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| -<br>-  |        |                  |                         | •<br>• • • • • • • • • • •                                                                                      | ·<br>·       |           |         |                     |
|---------|--------|------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------|--------------|-----------|---------|---------------------|
| 8/ 2/8  | 3      |                  |                         |                                                                                                                 |              |           |         | PAGE                |
| •       |        | TABLE            | 82-4. SUMMARY OF<br>Ju  | RESULTS:<br>JNE: 1983                                                                                           | : MINNOW TR/ | AP SAMPLE | S       |                     |
|         |        |                  |                         |                                                                                                                 |              |           | LENGTH  | (M)                 |
| STATION | DATE   | REPLICATE        | SPECIES                 |                                                                                                                 | LIFE STAGE   | NUMBER    | MEAN    | S.D.                |
| 20      | 300683 | 08               | SLIMY SCULPIN           |                                                                                                                 | ADULT        | 1         | 8.20    | 0.00                |
|         |        | 09<br>10         | NO FISH<br>NO FISH      |                                                                                                                 |              | 1         |         |                     |
| · · · · |        |                  |                         |                                                                                                                 |              |           |         |                     |
| 21      | 300633 | 02               | NU FISH                 |                                                                                                                 |              | 1         |         |                     |
|         |        | 03               | NO FISH                 |                                                                                                                 |              | 1         | , · ·   |                     |
|         |        | 04               | NO FISH<br>COHO SALMON  |                                                                                                                 | DAPP         | 1         | 3.66    | 0.14                |
|         |        | 06               | NO FISH                 |                                                                                                                 |              | 1         |         | 0414                |
|         |        | 07               | NO FISH<br>DOLLY VARDEN |                                                                                                                 | HIVENTLE     | 1         | 12.90   | 2.26                |
|         |        | 09               | DOLLY VARDEN            |                                                                                                                 | JUVENILE     | 3         | 13.40   | 2.14                |
|         |        | 10               | DOLLY VARDEN            |                                                                                                                 | PARR         | 1         | 9.90    | 0.00                |
| 22      | 010733 | 0,1              | NO FISH                 |                                                                                                                 |              | 1         |         |                     |
|         |        | 02               | NO FISH<br>DOLLY VARDEN |                                                                                                                 | D190         | 1         | 4 - 0.0 | 0.00                |
|         |        | 04               | DOLLY VARDEN            |                                                                                                                 | PARR         | 1         | 3.80    | 0.00                |
|         |        | 05               | NO FISH                 | )                                                                                                               |              | 1         |         |                     |
|         |        | 07               | NO.FISH                 | (                                                                                                               |              | 1         |         | an an Arab<br>Maria |
|         |        | 03               | NO FISH                 |                                                                                                                 |              | 1         | 1       |                     |
|         |        | 10               | VO FISH                 | in the second |              | 1         |         |                     |
| 23      | 010733 | A1               | NO EISH                 |                                                                                                                 |              | 1         |         | 1 A.<br>-           |
| 20      | 010700 | 02               | DOLLY VARDEN            |                                                                                                                 | PAR          | 1         | 11.90   | 0.00                |
|         |        | 02               | DOLLY VARDEN            | · · · ·                                                                                                         | JUVENILE     | 1         | 13.50   | 0.00                |
| ,<br>;  |        | 04               | DOLLY VARDEN            | ÷                                                                                                               | PARR         | 1         | 7.80    | 0.00                |
| ·       |        | 05               | DOLLY VARDEN            |                                                                                                                 | PARR         | 2         | 3.45    | 0.22                |
|         |        | 07               | NO FISH                 | e                                                                                                               |              | 1         |         |                     |
| · ·     |        | 08               | NO FISH                 |                                                                                                                 | UNCNT -      | 1         | 12 20   |                     |
| 4       |        | 10               | DOLLY VARDEN            |                                                                                                                 | PARR         | 1         | 9.50    | 0.00                |
| 24      | 020793 | <b>N1</b>        | NO ETSH                 |                                                                                                                 | •            | •         |         |                     |
|         | 020,35 | 02               | NO FISH                 |                                                                                                                 |              | 1         |         |                     |
|         |        | 03               | NO EISH                 |                                                                                                                 |              | 1         |         |                     |
|         |        | 05               | NO FISH                 |                                                                                                                 |              | 1         |         |                     |
|         |        | 0 <u>6</u><br>07 | NO FISH<br>NO FISH      |                                                                                                                 |              | 1         |         |                     |
| •       |        | 08               | DOLLY VARDEN            |                                                                                                                 | JUVENILE     | 1         | 10.80   | 0.00                |
|         |        | U9<br>10         | NO FISH<br>NO FISH      |                                                                                                                 |              | 1         |         |                     |
| 6.0     |        |                  |                         |                                                                                                                 |              | ÷         |         |                     |
| 4 U     | 230633 | U.1              | UULLT VARDEN            |                                                                                                                 | PAKK         | 1         | 6.10    | U • C O             |
|         |        |                  |                         |                                                                                                                 |              |           |         |                     |
|         |        |                  |                         |                                                                                                                 |              |           |         |                     |

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## TABLE B2-4. SUMMARY OF RESULTS: MINNOW TRAP SAMPLES JUNE: 1983

| r         |           |        | TABLE            | B2-4. SUMMARY OF RESULT: | SI MINNDU TR | AP SAMPLE | S S              |               |      |
|-----------|-----------|--------|------------------|--------------------------|--------------|-----------|------------------|---------------|------|
| <u>–</u>  |           |        |                  | JUNE • 198               | 3            |           |                  |               |      |
|           |           |        |                  |                          |              |           | LENGTI           | H (CM)        |      |
| र         | STATION   | DATE   | REPLICATE        | SPECIES                  | LIFE STAGE   | NUMBER    | MEAN             | S.D.          | N    |
|           | <br>4 0   | 250653 | 01               | THREE-SPINE STICKLEBACK  | ADULT        |           | 8.45             | 0.10          |      |
| L.        |           |        | 02               | NO FISH                  |              | 1         |                  |               | C    |
| ŕ         |           |        | 03               | DOLLY VARDEN             | PARR         | 1         | 11.30            | 0.00          | 1    |
| ി         |           |        | 03               | DOLLY VARDEN             | JUVENILE     | 1         | 12.20            | 0.00          | 1    |
|           |           |        | 04               | DOLLY VARDEN             | JUVENILE     | 4         | 12.67            | 0 <b>-</b> 80 | 4    |
| Ļ         |           |        | 34               | THREE-SPINE STICKLEBACK  | ADULT        | 1         | 8 • 7 0          | 0.00          | 1    |
| •         |           |        | 05               | DOLLY VARDEN             | PARR         | 3         | 7.83             | 1.77          | 3    |
| []        |           |        | 05               | DULLY VARDEN             | JUVENILE     | 7         | 12.69            | 1.90          | 7    |
|           |           |        | 05               | THREE-SPINE STICKLEBACK  | JUVENILE     | 1         | 9.00             | 0.00          | 1    |
|           |           |        | 05               | THREE-SPINE STICKLEBACK  | ADUET        | 11        | 8.32             | 0.17          | 11   |
|           |           |        | 05               | NINE-SPINE STICKLEBACK   | ADULT        | 1         | 6.20             | 0.00          | 1    |
| ć-1       |           |        | 05               | THREE-SPINE STICKLEBACK  | AUULT        | 1         | 8.70             | 0.0           | 1    |
|           |           |        | 05               | DOLLY VARDEN             | PARK         | 2         | 9.20             | 0.14          | 2    |
|           |           |        | 05               | DOLLY VARDEN             | JUVENILE     | 2         | 13.090           | 1.70          | 2    |
| Ē         |           |        | ม <i>า</i><br>ถล | NO EISH                  | PARR         | 2         | 7.50             | 1.13          | 5    |
|           |           |        | 0.5              | DOLLY VARDEN             | PARR         | 1         | 5.10             | 0.00          | 1    |
|           |           |        | 0.9              | DOLLY VARDEN             | JUVENTLE     | 1         | 13.10            | 0.00          | 1    |
|           |           |        | 09               | SLIMY SCHIPIN            |              | 1         | 7.90             | 0.00          | 1    |
|           |           |        | 0.9              | THREE-SPINE STICKLEBACK  |              | 1         | 7.80             | 0.60          | . 1  |
|           |           | · ·    | 10               | DOLLY VARDEN             | PAR          | 1         | 7.60             | 0.00          | · 1. |
|           |           |        |                  |                          |              | -         |                  |               | -    |
|           | 41        | 230533 | 01               | NO FISH                  |              | 1         |                  |               | 6    |
| 1         |           |        | 02               | NO FISH                  |              | 1         |                  |               | Ċ    |
| E         |           |        | 03               | DOLLY VARDEN             | PARR         | . 1       | 7.40             | 0.00          | 1    |
| $\square$ | · · · · · |        | 03               | JOLLY VARDEN             | JUVENILE     | 2         | 13.40            | 0.14          | 2    |
| : E       |           |        | 64               | SLIMY SCULPIN            | JUVENILE     | 1         | 6.70             | 0.00          | 1    |
| J         |           |        | 05               | DOLLY VARDEN             | PARR         | 1         | 7.70             | 0.00          | 1    |
|           |           |        | 95               | SLIMY SCULPIN            | ADULT        | 2         | 8.70             | 1.27          | 2    |
| $\square$ |           |        | 05               | COHO SALMON              | PARR         | 2         | 4.50             | 0.42          | -2   |
|           |           |        | 05               | DOLLY VARDEN             | PARR         | 2         | 8.05             | 1.77          | 2    |
|           |           |        | 05               | COHO SALMON              | PARR         | 3         | 5.80             | 1.61          | 3    |
|           |           |        | 07               | DOLLY VARDEN             | JUVENILE     | 1         | 14.10            | 0.00          | . 1  |
| 2         |           |        | 08               | COHO SAL YON             | PARR         | 1         | 3.70             | 0.00          | 1    |
|           |           |        | 09               | JOLLY VARDEN             | PARR         | 2         | 9.10             | 1.56          | 2    |
|           |           |        | 09               | DOLLY VARDEN             | JUVENILE     | 2         | 12.05            | 0.22          | 2    |
|           |           |        | 10               | NO FISH                  |              | · 1       |                  |               | C    |
| ÷         |           |        | <u>.</u>         |                          |              |           |                  |               |      |
|           | 42        | 200533 | UI               | CHINCOK SALMON           | PARR         | 4         | 5.05             | 1.26          | 4    |
|           |           |        | UI ·             | COHO SALMON              | PARR         | 1         | 7.70             | 0.00          | 1    |
| <b>Na</b> |           |        | 01               | CHINOUK SALMON           | PARR         | 3         | 4 • 4 0          | 0 • 40        | - 3  |
| •         |           |        | 01               | THE SPINE STICKLEBACK    | AUULT        | 1         | 9.10             | 0.00          | 1    |
| $\square$ |           |        | 0.0<br>L         | NINE-SPINE STICKLEBACK   | AUULT        | 1         | 4 • 70           | 0.00          | 1    |
|           |           |        | 02               | CHINUUK SALMUN           | PAKK         | • 1       | 4.70             | 0.00          | 1    |
| - 📕       |           |        | 02               | SELTT SCULPIN            |              | 1         | 5.50             | 0.00          | 1    |
|           |           |        | 03               | DOLLY VARDEN             | PAKK         | 1         | 5.70             | U • UU        | 1    |
| $\square$ |           |        | 03               | CHINGOR CALMON           | 2435<br>0433 | 1         | 1.490            | 0.00          | . 1  |
|           |           |        | 03               | COHO SALMON              | CA15         | . 1       | 1010<br>         | 0.00          | 1    |
| 1         |           |        | 03               | CHINGOK SALMON           |              | 2         | 5 • 7 D<br>4 3 G |               | 5    |
|           |           |        |                  | COTROOM SWEADU           | - FAAR       | T U.      | · +•37           | U + 44        | 10   |

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#### TABLE B2-4. SUMMARY OF RESULTS: MINNOW TRAP SAMPLES JUNE: 1983

|             |         |        | TABLE          | B2-4. SUMMARY OF RESULT<br>JUNE 198 | 'S\$ MINNO¥ TR∣<br>I3 | AP SAMPLE | S       |         |              |
|-------------|---------|--------|----------------|-------------------------------------|-----------------------|-----------|---------|---------|--------------|
| <b>[</b> ]. |         |        |                |                                     |                       |           | LENGT   | H (CM)  |              |
|             | STATION | DATE   | REPLICATE      | SPECIES                             | LIFE STAGE            | NUMBER    | MEAN    | S • D • | N            |
|             | 42      | 250693 | 04             | CHINOOK SALMON                      | PARR                  | 3         | 4.03    | 0.28    | 3            |
|             |         |        | 0.4            | SLIMY SCULPIN                       | JUVENILE              | 3         | 5.63    | 6.59    | • 3          |
|             |         |        | 05             | CHINOOK SALMON                      | PARR                  | 10        | 8.15    | 2.46    | 16           |
| - <b>P</b>  |         |        | 05             | NINE-SPINE STICKLEBACK              | JUVENTLE              | 2         | 4.20    | 0.71    | . 2          |
|             |         |        | 05             | NINE-SPINE STICKLEBACK              | ADJLT                 | 4         | 5.47    | 1.02    | 4            |
|             |         |        | 05             | CHINOOK SALMON                      | PARR                  | 21        | 4.46    | 0 - 71  | 21           |
| - ¢         |         |        | 05             | NINE-SPINE STICKLEBACK              | ADULT                 | 6         | 5.25    | 1.32    | 6            |
| , <b>\</b>  |         |        | 07             | NO FISH                             |                       | 1         |         |         | Ď            |
|             |         |        | 08             | CHINOOK SALMON                      | PARR                  | 12        | 4.42    | 1.08    | 12           |
|             |         |        | 08             | VINE-SPINE STICKLEBACK              | ADULT                 | 1         | 7.50    | 0.00    | 1            |
| المريب      |         |        | 0 9            | COHO SALMON                         | PARR                  | 1         | 9.50    | 0.00    | 1            |
|             |         |        | 09             | CHINOOK SALMON                      | PARR                  | 5         | 4.02    | 0.37    | 5            |
| T           |         |        | 10             | CHINOOK SALMON                      | PARR                  | 5         | 6.56    | 3.10    | 5            |
|             |         |        | 10             | DOLLY VARDEN                        | PARR                  | 1         | 4.20    | 0.00    | . 1          |
|             |         |        | 10             | CHINOOK SALMON                      | PARR                  | 1         | 4.20    | 0.00.   | 1            |
|             | 1       |        | 10             | DOLLY VARDEN                        | JUVENILE              | 4         | 11.65   | 2.42    | 4            |
|             | 43      | 270683 | 01             | COHO SALMON                         | PARR                  | 1         | 9.30    | C • 00  | 1            |
| ₽           |         |        | 91             | CHINOOK SALMON                      | PARR                  | 1         | 4.20    | 0.00    | 1            |
|             |         |        | 01             | DOLLY VARDEN                        | JUVENILE              | 1         | 13.70   | 0.00    | - 1          |
| <b></b> _   |         |        | 02             | DOLLY VARDEN                        | PARR                  | 1         | 9.70    | 0.00    | 1            |
|             |         |        | 02             | DOLLY VARDEN                        | JUVENILE              | 2         | 12.90   | 0.28    | 2            |
|             |         |        | 03             | CHINOOK SALMON                      | PARR                  | 4         | 4.52    | 0.35    | 4            |
|             |         |        | 03             | SLIMY SCULPIN                       | JUVENILE              | 2         | 3.05    | 0.10    | 5            |
|             |         |        | 04             | SLIMY SCULPIN                       | JUVENILE              | 1         | 6.60    | 03.5    | 1            |
|             |         | · .    | 05             | COLLY VARDEN                        | PARR                  | 3         | 9.60    | 2.77    | 3            |
|             |         |        | 06             | JOLLY VARDEN                        | PARR                  | 2         | 8.35    | 0.10    | 2            |
| -           |         |        | 07             | DOLLY VARDEN                        | PARR                  | 1         | 10.60   | 0.00    | 1            |
|             |         |        | 07             | DOLLY VARDEN                        | JUVENILE              | 1         | 14.10   | 0.00    | 1            |
|             |         |        | 08             | DOLLY VARDEN                        | PARR                  | 2         | 8.90    | 0.35    | 2            |
|             |         |        | 0 <del>7</del> | NO FISH                             |                       | 1         |         |         | · 6          |
| تيا         |         |        | 10             | NO FISH                             |                       | 1         |         |         | 0            |
| <b>_</b>    | 44      | 230633 | 01             | CHINOOK SALMON                      | PARR                  | 5         | 4.08    | 0.40    | 5            |
|             |         |        | 02             | CHINOOK SALMON                      | PARR                  | 5         | 3.70    | 0.56    | 5            |
| L           |         |        | 02             | VINE-SPINE STICKLEBACK              | ADULT                 | 3         | 5.87    | 0 • 24  | 3            |
|             |         |        | 03             | CHINOOK SALMON                      | PARR                  | 5         | 3 • 8 4 | 0.33    | 5            |
| <u></u>     |         |        | 34             | CHINOOK SALMON                      | PARR                  | 2         | 4.15    | 0 • 64  | 2            |
| -           |         |        | 05             | COHO SALMON                         | PARR                  | 1         | 10.50   | 0.00    | - <b>1</b> , |
|             |         |        | 05             | CHINOOK SALMON                      | PARR                  | 12        | 4.00    | 0.49    | 12           |
|             |         |        | 05             | SLIMY SCULPIN                       | ADULT                 | 1         | 6.90    | 0.00    | 1            |
|             |         |        | 05             | COHO SALMON                         | PARR                  | 1         | 7.10    | 0 • 00  | 1            |
|             |         |        | 06             | CHINOUK SALMON                      | PARR                  | 2         | 4.05    | 0.22    | 2            |
|             |         |        | U /            | NU FISH                             | 0400                  | 1         | 7. 67   |         | 0            |
|             | . •     |        | 00             | NO FICH                             | PARK                  | 3         | 3.87    | 0.60    | 5            |
| -           |         |        | 10             |                                     | HINCHTLE              | 1         | 10 00   | 0 00    |              |
|             |         |        | 10             | DULLT VARUEN                        | JUVENILL              | 1         | T0•80   | . U. UU | 1            |
|             | 45      | 270533 | 01             | MINE-SPINE STICKLEBACK              | JUVENILE              | 4         | 2.65    | 0.14    | . 4          |
|             |         |        | 01             | NINE-SPINE STICKLEBACK              | ADULT                 | 3         | 4.73    | 0.95    | 3            |

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8/ 2/93 PAGE 11 TABLE 32-4. SUMMARY OF RESULTS: MINNOW TRAP SAMPLES JUNE: 1983 LENGTH (CM) REPLICATE SPECIES LIFE STAGE NUMBER STATION DATE MEAN M S . L . 45 270583 02 NINE-SPINE STICKLEBACK ADULT 3 5.80 1.21 3 0.3 NINE-SPINE STICKLEBACK ADULT 12 4.90 0.30 12 04 VINE-SPINE STICKLEBACK ADULT 5.21 0.47 12 12 0.5 NO FISH n 1 35 NO FISH 0 1 NO FISH 07 1 0 08 THREE-SPINE STICKLEBACK ADULT 5.80 0.00 1 1 08 NINE-SPINE STICKLEBACK ADULT 40 5.58 88.0 4 G NO FISH 07 1 £ 10 COHO SALMON PARR 4 8.85 0.72 4 6 A 250633 09 NO FISH 1 n NO FISH 6 A 270533 01 1 0 DOLLY VARDEN DOLLY VARDEN 02 PARR 10.00 0.00 1 1 02 JUVENILE 1 11.90 0.601 03 NO FISH 1 D 04 DOLLY VARDEN PARR 1 9.70 0.00 1 JUVENILE 04 DOLLY VARDEN 0.83 5 5 12.56 DOLLY VARDEN 05 PARR 2 9.10 1.70 2 DOLLY VARDEN 0.6 PARR 2 1.35 8.95 2 07 DOLLY VARDEN PARR 1 9.70 0.00 1 09 DOLLY VARDEN JUVENILE 3 . 8. 37 0.71 3 08 SLIMY SCULPIN 0.00 ADJLT 1 9.70 1 NO FISH 10 1 0 16A 220633 01 COHO SALMON 0.00 PARR 1 3.60 1 02 SLIMY SCULPIN ADULT 1 8.20 0.00 .1 SLIMY SCULPIN 03 JUVENILE 2 5.90 0.42 2 03 SLIMY SCULPIN ADULT 1 7.70 0.00 1 0.4 DOLLY VARDEN PARR 7.70 0.00 1 1 04 DOLLY VARDEN JUVENILE 1 10.73 0.00 1 SLIMY SCULPIN 04 ADULT 4 9.00 0.54 4 05 DOLLY VARDEN PARR 4 9.22 4 2.21 05 COHO SALMON 5.45 PARR 6 1.19 6 05 THREE-SPINE STICKLEBACK ADULT 8.80 0.00 1 1 COHO SALMON 06 PARR 3 8.37 0.57 3 06 DOLLY VARDEN PARR 9.00 0.00 1 1 06 COHO SALYON PARR 11 4.59 0.51 11 05 THREE-SPINE STICKLEBACK ADULT 8.30 0.00 1 1 07 DOLLY VARDEN PARR 1 9.10 0.00 1 07 COHO SALMON PARR 8 5.05 1.10 8 07 THREE-SPINE STICKLEBACK ADULT 1 7.60 0.00 1 07 SLIMY SCULPIN ADULT 8.20 1 0.00 1 08 COHO SALMON PARR 4 4.32 0.45 4 08 JOLLY VARDEN PARR 5.55 2 2.19 2 0.8 COHO SALMON PARR 8 4.35 0.47 8 08 DOLLY VARDEN PARR 3.80 0 ن 🛛 0 1 1 COHO SALMON 0.8 PARR 2 3.95 0.42 2 03 DOLLY VARDEN PARR 0.00 1 1 4.10

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|               |           |        | - n <u>a</u> - 1 | JUNE, 198                | 3 .                       |           | LENGT  | 1 (CM)       |          |
|---------------|-----------|--------|------------------|--------------------------|---------------------------|-----------|--------|--------------|----------|
|               |           |        |                  |                          |                           |           | 22.001 |              |          |
|               | STATION   | DATE   | REPLICATE        | SPECIES                  | LIFE STAGE                | NUMBER    | MEAN   | S.D.         | N        |
|               | 164       | 220693 | 0.8              |                          | PARR                      | _ <b></b> | 3-83   | n.49         |          |
| Ļ             |           |        | 0.8              | NINE-SPINE STICKLEBACK   | PARP                      | 1         | 4.50   | 0.00         | 1        |
|               |           |        | 18               | COHO SALMON              | PARR                      | 1         | 4.30   | 0.00         | 1        |
| ٦.            |           |        | 0.8              | THREE-SPINE STICKLEBACK  |                           | 1         | 8.30   | 0.00         | 1        |
| l             |           | 1      | 0.9              | SLIMY SCULPIN            |                           | . 5       | 8-68   | 1.18         | 5        |
| j             |           |        | 09               | THREE-SPINE STICKLEBACK  | AD.H T                    | 2         | 8.40   | 0.14         | 2        |
|               |           |        | 0 <del>)</del>   | COHO SALMON              | PARR                      | 3         | 5.23   | 0.40         | 3        |
| -             |           |        | 0 9              | SLIMY SCULPIN            | JUVENILE                  | 2         | 7.45   | 0.22         | 2        |
| 1             |           |        | 10               | COHO SALMON              | PARR                      | 10        | 4.72   | 0.51         | 10       |
|               |           |        | 10               | SLIMY SCULPIN            | ADULT                     | 1         | 7.10   | 0.00         | 1        |
|               | 17D       | 270693 | 01               | TRAP OUT OF WATER        |                           | 0         |        |              |          |
|               |           |        | 02               | NO FISH                  |                           | 1         |        |              | 0        |
|               |           |        | 03               | SLINY SCULPIN<br>No fish | ADULT                     | 1         | 9.30   | 0.00         | - 1      |
|               |           |        | 05               | DOLLY VARDEN             | PARR                      | 1         | 8.40   | 0.00         | 1        |
| ٦             |           |        | 05               | DOLLY VARDEN             | JUVENILE                  | 3         | 11.40  | 2.10         | 3        |
|               |           |        | 06               | DOLLY VARDEN             | JÜVENILE                  | 1         | 10.50  | 9.00         | 1        |
| Ļ             |           |        | 07               | DOLLY VARDEN             | PAR                       | 1         | 9.70   | 0.00         | · ī      |
|               |           |        | 0.7              | DOLLY VARDEN             | JUVENILE                  | 2         | 13.70  | 2.40         | 2        |
| · - 7         |           |        | 0.8              | NO FISH                  |                           | 1         |        |              | Ģ        |
|               |           |        | 07               | DOLLY VARDEN             | PAR                       | 2         | 10.80  | 0.57         | 2        |
|               |           | •.     | 0 7              | DOLLY VARDEN             | JUVENILE                  | 3         | 12.63  | 1.56         | 3        |
| •             |           | · .    | 10               | NO FISH                  |                           | 1         |        |              | <u>ງ</u> |
| ן             | 1 S A     | 010733 | 01               | TRAP OUT OF WATER        |                           | <br>C     |        |              |          |
|               |           |        | 02               | DOLLY VARDEN             | PARR                      | 2         | 8.80   | 1.24         | 2        |
| i.            |           |        | 03               | NO FISH                  |                           | 1         |        |              | - G      |
|               |           |        | 04               | DOLLY VARDEN             | PARR                      | ÷1        | 7.20   | 0.00         | 1        |
|               |           |        | 04               | DOLLY VARDEN             | JUVENILE                  | 3         | 11.10  | 0 • 79       | 3        |
| ļ             |           |        | 05               | DOLLY VARDEN             | PARR                      | 1         | 10.30  | 0.00         | 1        |
|               |           |        | <u> 15</u>       | DOLLY VARDEN             | PARR                      | 1         | 10.90  | 0.00         | 1        |
|               | 1. A.     |        | 07               | DOLLY VARDEN             | PARR                      | 2         | 10.95  | $0 \cdot 10$ | 2        |
| ٦             |           |        | 19               | IRAP OUT OF WATER        |                           | Ű         |        |              | _        |
|               |           |        | 10               | NOFISH                   |                           | 1         |        |              | C .      |
|               | 19A       | 010733 | 01               | DOLLY VARDEN             | PARR                      | 2         | 6.50   | 0.28         | 2        |
|               |           |        | 02               | SLIMY SCULPIN            | ADULT                     | · 1       | 8.10   | 0.00         | . 1      |
|               |           |        | 03               | TRAP OUT OF WATER        |                           | 0         |        |              |          |
|               | · · · · · |        | 84               | NO FISH                  |                           | 1         |        |              | . C      |
|               |           |        | 05               | NO FISH                  | All and the second second | 1         |        |              | 0        |
|               |           | •      | 05               | NO FISH                  |                           | 1         |        |              | 0        |
|               |           |        | 07               | DOLLY VARDEN             | PARR                      | 5         | 8.32   | 1.85         | 5        |
|               |           |        | 08               | NO FISH                  |                           | 1         |        |              | C        |
| -1            |           |        | 09               | NO FISH                  |                           | 1         |        |              | 0        |
| <b>i</b><br>, |           |        | 10               | NO FISH                  |                           | 1         |        |              | 0        |
|               | 4 J A     | 250683 | 01               | DOLLY VARDEN             | JUVENILE                  | 2         | 14.55  | 0.54         | 2        |
|               |           |        | 0 2              | DOLLY VARDEN             | PARR                      | 2         | 9.55   | 0.22         | 2        |
|               |           |        | 02               | DOLLY VARDEN             | JUVENILE                  | 5         | 12.06  | 1.31         | 5        |

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| 8/ 2/8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 33     |            |                        |                   |            |                  | PAGE         | 1 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------------|------------------------|-------------------|------------|------------------|--------------|---|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | T 48L      | E B2-4. SUMMARY OF RES | ULTS: MINNOW TRAP | SAMPLES    | <b>i</b>         | 5            |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        |            | JUNE+                  | 1983              |            | LENGT            | H (CM)       |   |
| STATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | DATE   | REPLICAT   | E SPECIES              | LIFE STAGE NU     | MBER       | MEAN             | S.D.         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        |            |                        |                   |            |                  |              |   |
| 4 0 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 250633 | 03         | COHO SALMON            | PARR              | 2          | 3.30             | 0.28         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 03         | DOLLY VARDEN           | PARR              | 1          | 3.30             | 0.00         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 04         | NO FISH                |                   | 1          |                  |              |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 05         | DOLLY VARDEN           | PARR              | 2          | 8.35             | 2.05         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 05         | DOLLY VARDEN           | JUVENILE          | 1          | 12.00            | 0.00         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 05         | NO FISH                |                   | 1          |                  |              |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 07         | DOLLY VARDEN           | JUVENILE          | 1          | 13.80            | 0.00         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 08         | DOLLY VARDEN           | PARR              | 2          | 8.85             | 0.92         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 08         | DOLLY VARDEN           | JUVENILE          | 2          | 11.20            | 1.27         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 08         | SLIMY SCULPIN          | ADULT             | 1          | 8.50             | 0.00         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 09         | JOLLY VARDEN           | PARR              | 3          | 6.43             | 0.30         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 09         | CHINOOK SALMON         | PARR              | 1          | 3.90             | 0.00         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 10         | NO FISH                |                   | 1          |                  |              |   |
| 41A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 240633 | 01         | NO FISH                |                   | 1          |                  |              |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 02         | NO FISH                |                   | 1          |                  |              |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 03         | VQ FISH                |                   | ī          |                  |              |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 04         | NO FISH                |                   | 1          |                  |              |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 05         | NO FISH                | •<br>             | 1          |                  |              |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 0.6        | TRAP OUT OF WATER      |                   | n          |                  |              |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 07         | NO FISH                |                   | 1          |                  |              |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 0.9        | NO FISH                |                   | 1          |                  |              |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 0.9        | DOLLY VARDEN           | PARR              | 2          | 6.15             | 0 - 64       |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 10         | NO FISH                |                   | 1          |                  |              |   |
| 424                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 241693 | л <b>1</b> | NO FISH                |                   | 1          |                  |              |   |
| 164                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 240033 | 02         | DOLLY VARDEN           | DADD              | 1          | 7.10             | 0.00         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 07         | VO ETCH                | FRAN              | 1          | 7.010            | 0.00         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 04         | CHINOOK SALMON         | PAR               | 1          | 3,50             | n - c n      |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 04         | DOLLY VARDEN           |                   | . 1        | 5 <b>5 5 5 5</b> | 0_60         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | กร         | DOLLY VARDEN           | PARR              |            | 7.45             | 0.90         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 06         | COHO SALMON            | PA39              | 1          | 1975<br>9,90     | 2            |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 16         | DOLLY VARDEN           | LANN FNTEE        | · 1        | 11.70            | 0.00<br>0.00 |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 07         | DOLLY VARDEN           | DADA              | . <u>1</u> | 7,90             | 0.00         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | n <b>7</b> | CHINOOK SALMON         |                   | 1          | 3.00             | 0.00         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 07<br>08   | TRAD ANT AR SALTON     | FARR              | 1          | 3.70             | 0.00         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 00<br>na   | CHINGON SALMON         |                   | 1          | 3.00             | 0 00         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 10         | CHINDOK SALMON         |                   | ۲ ۱<br>۲   | 5 00<br>5 00     | 1 44         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 10         | CUTHOON SAFAOM         |                   | 1          | 000<br>4 Zh      | 1.00         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | . •    | 10 1       | CUTNOOK SALMON         |                   | 1          | 7 .JU<br>. 47    | 1 20         |   |
| 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 19 |        | 10         | DOLLA VADDEN           |                   | י די<br>ס  | 7071             | 1.27         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 10         | CHINOOK SALMON         |                   | <u>د</u>   | 3.00             | 0 76         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 10.        | DOLLA NADDEN           |                   | J 1        | 3.00<br>z an     | .V. 20       |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 10         | CUTYOON CALMON         |                   | 1          | 2070             |              |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 1.0        | CUTHOON SYFWON         |                   | 1          | 3.67             | · U.+4b      |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | -      | 10         | CHINGON SALHON         |                   | 1          | 3.90             |              |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 10         | DOLLY VARCEN           |                   | · 3        | 3.13             | 0.45         |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | 1U .       | SULLT VARUEN           | PARK              | 2          | 4+15             | V•22         |   |

PARR

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4.38

37

0.57

CHINOOK SALMON

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43A

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SUMMARY OF RESULTS: MINNOW TRAP SAMPLES JUNE, 1983

TABLE 92-4.

LENGTH (CM)

PAGE

| STATION   | DATE                                                                                                                                                                                                                                | REPLICATE | SPECIES                | LIFE STAGE | NUMBER       | MEAN  | S•D•    | N    |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------------------|------------|--------------|-------|---------|------|
| 43A       | 270633                                                                                                                                                                                                                              | 02        | CHINOOK SALMON         | PARR       |              | 4.50  | 0.48    | 99   |
|           |                                                                                                                                                                                                                                     | 0.2       | VINE-SPINE STICKLEBACK | ADULT      | 1            | 7.00  | 0.00    | 1    |
|           |                                                                                                                                                                                                                                     | 0.5       | COHO SALMON            | PARR       | · · · 1      | 11.20 | 0.00    | 1    |
|           |                                                                                                                                                                                                                                     | 04        | CHINOOK SALMON         | PARR       | 3.           | 3.67  | 0.45    | 3    |
|           |                                                                                                                                                                                                                                     | 05        | NO FISH                |            | 1            |       |         | . 0  |
|           |                                                                                                                                                                                                                                     | 05        | COHO SALMON            | PARR       | 2            | 9.80  | 0.99    | 2    |
|           |                                                                                                                                                                                                                                     | 07        | NO FISH                |            | 1            |       |         | 0    |
|           |                                                                                                                                                                                                                                     | 0 5       | SLIMY SCULPIN          | ADULT      | 1            | 9.00  | 0.00    | 1    |
|           |                                                                                                                                                                                                                                     | 09        | SEIMY SCULPIN          | ADULT      | 1            | 10.30 | 0.00    | 1    |
|           | ана на селото на село<br>По селото на | 10        | CHINOOK SALMON         | PARR       | 7            | 3.67  | 0.50    | 7    |
| 44A       | 230693                                                                                                                                                                                                                              | 01        | NO FISH                |            | 1            |       |         | . 0  |
|           |                                                                                                                                                                                                                                     | 02        | CHINOOK SALMON         | PARR       | 13           | 3.88  | 0.69    | 13   |
|           |                                                                                                                                                                                                                                     | 02        | SLIMY SCULPIN          | ADULT      | 1            | 8.60  | 0 • 0 0 | 1    |
|           |                                                                                                                                                                                                                                     | 03        | NO FISH                |            | 1            |       |         | Û    |
|           |                                                                                                                                                                                                                                     | 04        | CHINOOK SALMON         | PARR       | 3            | 4.47  | 0.42    | 3    |
|           |                                                                                                                                                                                                                                     | 04        | SLIMY SCULPIN          | ADULT      | 1            | 8.30  | C.00    | 1    |
|           |                                                                                                                                                                                                                                     | 0.5       | CHINOOK SALMON         | PARR       | 1 🕔          | 4.70  | 0.00    | 1    |
|           |                                                                                                                                                                                                                                     | 05        | DOLLY VARDEN           | JUVENILE   | 1            | 14.00 | 0.00    | · 1, |
|           |                                                                                                                                                                                                                                     | 05        | NO FISH                | 1 A.       | 1            |       |         | · 0  |
|           |                                                                                                                                                                                                                                     | 07        | CHINGOK SALMON         | PARR       | 3            | 4.53  | 0.84    | 3.   |
|           |                                                                                                                                                                                                                                     | 07        | SLIMY SCULPIN          | ADULT      | - <b>1</b> * | 9.50  | 0.00    | 1    |
|           |                                                                                                                                                                                                                                     | 0.8       | CHINOOK SALMON         | PARR       | 16           | 3.72  | 0.47    | 16   |
|           |                                                                                                                                                                                                                                     | 08        | VINE-SPINE STICKLEBACK | PARR       | 1            | 4.50  | 0.00    | . 1  |
|           |                                                                                                                                                                                                                                     | 03        | CHINGOK SALMON         | PARR       | 17           | 3.40  | 0 • 2E  | . 17 |
|           |                                                                                                                                                                                                                                     | 0.8       | NINE-SPINE STICKLEBACK | ADULT      | 1            | 6.30  | 0.00    | 1    |
| · · · · · |                                                                                                                                                                                                                                     | 09        | SLIMY SCULPIN          | ADULT      | 1            | 7.70  | 0.00    | 1    |
|           |                                                                                                                                                                                                                                     | 10        | TRAP MISSING           |            | Ŋ            |       |         |      |
| 11.5      | 230633                                                                                                                                                                                                                              | 01        | DOLLY VARDEN           | PARR       | 3            | 9.50  | 2.82    | 3    |
|           |                                                                                                                                                                                                                                     | 02        | DOLLY VARDEN           | PARR       | 2            | 9.65  | 0.22    | 5    |
| 1         |                                                                                                                                                                                                                                     | 03        | NO FISH                |            | 1            |       |         | C    |
|           |                                                                                                                                                                                                                                     | 04        | SLIMY SCULPIN          | ADULT      | 1            | 6.30  | 0.00    | 1    |
|           |                                                                                                                                                                                                                                     | 05        | DOLLY VARDEN           | PARR       | 3            | 7.23  | 0.49    | 5    |
|           |                                                                                                                                                                                                                                     | 06        | DOLLY VARDEN           | PARR       | 2            | 8.15  | 0.10    | . 2  |
|           |                                                                                                                                                                                                                                     | 07        | DOLLY VARDEN           | PARR       | 1            | 6.90  | 6.00    | 1    |
|           |                                                                                                                                                                                                                                     | 08        | SLIMY SCULPIN          | JUVENILE   | 2            | 5.50  | 0.28    | 2    |
|           |                                                                                                                                                                                                                                     | .09 .     | DOLLY VARDEN           | PARR       | 1            | 8.40  | 0.00    | 1    |
|           |                                                                                                                                                                                                                                     |           |                        |            |              |       |         |      |

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SUMMARY OF RESULTS: ELECTROFISHING SAFPLES JUNE, 1983 TABLE 82-5.

|                |         |        | TABLE 1   | 32-5. SUMMARY OF RESU | LTS: ELECTROFIS  | HING SAFE  | PLES                                    |                |        |
|----------------|---------|--------|-----------|-----------------------|------------------|------------|-----------------------------------------|----------------|--------|
|                |         |        |           |                       | 1700             |            | LENGTI                                  | 4 (CM) .       |        |
| -              | STATION | DATE   | REPLICATE | SPECIES               | LIFE STAGE       | NUMBER     | MEAN                                    | S.D.           | Ŋ      |
|                | 1       | 290633 | 01        | SOCKEYE SALMON        | PARR             | 1          | 4.70                                    | 0.00           | 1      |
|                |         |        | 01        | CHUM SALMON           | PAR              | 1          | 5.00                                    | 0.0            | 1      |
|                |         |        | 01        | COHO SALMON           | PARR             | . 1        | 4-60                                    | 0.00           | 1      |
| -5             |         |        | 01        | SOCKEYE SALMON        | PAR              | . 6        | 4.55                                    | 0.55           | · ć    |
|                |         |        | 01.       | TOLLY VARDEN          | JUVENTLE         | · 1        | 14.20                                   | 0.00           | 1      |
| }              |         |        | 0.2       | SOCKEYE SALMON        | DADD             | ·          | 4.90                                    | 6.00           | 2      |
| C              |         |        | 02        | COHO SALMON           | PARR             | . 1        | 4 90                                    | 0.00           | 1      |
|                |         |        | 02        | SOCKEVE SALMON        | 0120             | 1          | - = = = = = = = = = = = = = = = = = = = | 0.00           | 1      |
|                |         |        | 02        | COHO SALMON           |                  | . 1        | 4 90                                    |                | 1      |
| - E 🚺          |         |        | 02        | CORE SALMON           |                  | 1          | 4 C U                                   | 0.00           | 1      |
| لأسبأ          |         |        | 02        | COUD CALMON           |                  | 2          | 4.00                                    | U + 71         | 2      |
|                |         |        | 02        | NO FICH               | PAXR             | 1          | 4.60                                    | <b>U +</b> U U | 1<br>C |
|                |         |        | ຳວ .      | NU FISH               |                  | · 1.       |                                         |                | U      |
|                | ^       | 200623 | <b>01</b> | DANNE LATTE ETCH      | 0420             | · · · ·    | 7 (0                                    |                |        |
|                | 6       | 200922 | 01        | RUUND WHITE FISH      | PAIR             | . <u>1</u> | 7.60                                    | 0.00           | 1      |
| ¥.,            |         |        | 01        | CHUM SALMUN           | PARR             | 3          | 5.33                                    | 0.22           | 5      |
|                |         |        | 01        | COHU SALMON           | PAR              | 1.         | 4.50                                    | 0.00           | 1      |
|                |         |        | 01        | SOUREYE SALMON        | PARR             | 2          | 4.45                                    | 0.22           | 2      |
| - : )          |         |        | 81        | ROUND WHITE FISH      | JUVENILE         | 1          | 11.20                                   | 6.00           | 1      |
| فسيط           |         |        | 01        | DOLLY VARDEN          | JUVENILE         | 1          | 11.50                                   | 0 • C O        | 1      |
|                |         |        | 01        | ROUND WHITE FISH      | JUVENILE         | · 1        | 11.7.0                                  | 0.00           | 1      |
|                |         |        | 01        | SLIMY SCULPIN         | ADJLT            | - 1        | 7.20                                    | 0.00           | 1      |
|                |         |        | 25        | DOLLY VARDEN          | PARR             | 2          | 870                                     | 0.99           | 2      |
|                |         |        | 92        | CHUM SALMON           | PARR             | . 1        | 4.30                                    | 0.00           | 1      |
|                |         |        | 02        | CHINOOK SALMON        | PARR             | . 1        | 4.80                                    | 0 <b>.</b> 6 0 | 1      |
|                |         |        | 02        | CHUM SALMON           | PARR             | 1          | 5.10                                    | 03 • 3         | · 1    |
|                |         |        | 02        | ROUND WHITE FISH      | JUVENILE         | 2          | 12.55                                   | 0.78           | 2      |
| 1 L <b>}</b>   |         |        | 02        | DOLLY VARDEN          | JUVENILE         | 1          | 12.60                                   | 0.00           | 1      |
| ۲ <b>۵</b>     |         |        | 02        | ROUND WHITE FISH      | JUVENILE         | 1          | 8.70                                    | 0.00           | 1      |
|                |         |        | 02        | SLIMY SCULPIN         | JUVENILE         | 1          | 5.00                                    | 0.00           | 1      |
|                |         |        | 02        | SLIMY SCULPIN         | ADULT            | 2          | 6.85                                    | 6.22           | 2      |
|                |         |        | 03        | NO FISH               |                  | 1          |                                         |                | C      |
|                | . 3     | 300693 | 01        | DOLLY VARDEN          | PARR             | 1          | 12.20                                   | 0.00           | • •    |
| E.             |         |        | 01        | COHO SAL MON.         |                  | 1          | 7.10                                    | 0.00           | 1      |
| []             |         |        | 01        | CHIM SAL YON          |                  | 1          | 3 90                                    | 0.00           | 1      |
|                |         |        | 01        |                       | FARR<br>DIVENTIE | 1          | 10 00                                   | 0.00           | . 1    |
| - 🖌 -          |         |        | 01        | DOUND SHITE FICH      |                  | 1          | 12.00                                   | 0.00           | 1      |
|                |         |        | 01        | CITWY CONDIN          |                  | 27         | 700                                     | 2.000          | 2      |
| []]            |         |        | 01        | SLIMY SCHOTN          | JOVENILL         |            | D • 2 · 0                               | 0.36           | 5      |
|                |         |        | 03        | SCIME SCOLPIN         | ADULI            | 1          | 7.60                                    | 6.00           | 1      |
| -L}            |         |        | 02        |                       | ~ • • •          | 1          |                                         |                | U      |
|                |         |        | J D 7     | DUELT VARDEN          | PARK             | 1          | 8.30                                    | 0.00           | L.     |
| Æ.             |         |        | 0.5       | CHUM SALMON           | PARR             |            | 3.87                                    | 0.14           | . 3    |
|                |         |        | 03        | DULLY VARDEN          | JUVENILE         | 1          | 11.53                                   | C • C C        | 1      |
|                |         |        | U.S.      | SLIMY SCULPIN         | ADULT            | 2          | 8.25                                    | 0.10           | 2      |
| •              | 4       | 030793 | 01        | COHO SALMON           | PARR             | 1          | 4.60                                    | 0.00           | 1      |
| ·              |         |        | 01        | CHUM SALMON           | PARR             | 4          | 4.50                                    | ũ.62           | 4      |
|                |         |        | 01        | ROUND WHITE FISH      | PARR             | 1          | 8.00                                    | 0.10           | 1      |
| - i }.         |         | 141    | 01        | CHUM SAL YON          | PARR             | 1          | 4.60                                    | 0.00           | ī      |
| <b>ن</b> ــــا |         |        | 01        | DOLLY VARDEN          | PARR             | 2          | 4.10                                    | 0.00           | 2      |
|                |         |        | -         |                       |                  | •-         |                                         |                | -      |

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TABLE B2-5. SUMMARY OF RESULTS: ELECTROFISHING SAMPLES JUNE, 1983

|            |         |                                         | TABLE     | B2-5. SUMMARY OF RESU | LTS: ELECT | ROFISHING SA                          | MPLES  |         |          |
|------------|---------|-----------------------------------------|-----------|-----------------------|------------|---------------------------------------|--------|---------|----------|
| Ţ          |         |                                         |           | JUNE¢                 | 1983       |                                       | LENG   | TH (CM) |          |
| ł          | STATION | DATE                                    | REPLICATE | SPECIES               | LIFE       | STAGE NUMBER                          | MEAN   | S•D•    | ĥ        |
| ┣          | 4       |                                         | 01        |                       | DADD       |                                       | · ·    | ·       |          |
| ſ          | -       | 050135                                  | 01        | CHEM SALMON           |            | 1                                     | 4 + 40 | 0.00    | 1        |
|            |         |                                         | 01        | DAHAR HUTTE ETCH      |            | UT U E 0                              | 3.00   | 0.10    | . 4      |
|            |         |                                         | 01        | CETMV CONDIN          | JUVEN      |                                       | 11 50  | 0.11    | 2        |
| 7          |         |                                         | 01        |                       |            | 1                                     | 11+30  | U + UU  | 1        |
|            |         |                                         | 02        | DOLLY VARDEN          | PARK       | 3                                     | 8+13   | 2.88    | 5        |
| ÷.         |         |                                         | 02        | CHUN SALNON           | PATR       | L                                     | 9.60   | 0.00    | 1        |
| <b>4</b> . |         | •                                       | 02        | COND CALMON           | PARK       | 1                                     | 5.10   | 0.00    | 1        |
| 1          |         |                                         | 02        | COHO SALMON           | PARK       | · · · · · · · · · · · · · · · · · · · |        | 0.00    | . 1      |
| ł          |         |                                         | 03        | CURU SALRUN           | PARK       |                                       | 4.20   | 0.00    | 1        |
|            |         |                                         | 0.5       | SLIMT SCULPIN         | JUVEN      |                                       | 4.10   | U.∎UU   | · 1      |
|            | 5       | 040783                                  | 01        | COHO SALVON           | PARR       | 1                                     | 4.90   | 0.00    | 1        |
| ĩ          | -       |                                         | 01        | SETMY SCHEPTN         | PAR        | 1                                     | 4.60   | 0.00    | 1        |
|            |         |                                         | 01        | COHO SALMON           | PAR        | 1<br>1                                | 4.45   | 0.33    | 4        |
|            |         |                                         | 02        | COHO SALWON           |            | 7                                     | 4.40   | 0.26    | 7        |
| C          |         |                                         | 0.2       | CHIM SALMON           |            | 1                                     | 4.30   | 0.00    | · •      |
|            |         |                                         | 02        | COHO SALMON           | DADD       |                                       |        | 00.00   | 4.<br>1  |
|            |         |                                         | 02        | CHUM SALMON           |            | 1                                     |        | 0.00    | ג.<br>ז  |
| Ì          |         |                                         | 02        | COHO SALMON           | DAPP       |                                       | 5.10   | 0 74    | 2        |
|            |         |                                         | 02        | CHIM SAL YON          | DADD       | 1                                     | J - 10 | 0 0 0   | 1        |
|            |         |                                         | 03        | COHO SALMON           | 0830       | 1                                     | 3.70   | 0.00    | ر ا<br>1 |
| 1          |         |                                         | 03        | CHUM SALMON           | PARR       | 7                                     | 4.14   | 0.42    | . 7      |
|            |         |                                         |           |                       |            |                                       |        |         |          |
| F          | - 6     | 030793                                  | 01        | COHO SALMON           | PARR       | 1                                     | 3.40   | 0.00    | 1        |
| e.         |         |                                         | 02        | COHOSALMON            | PARR       | 1                                     | 4.30   | 0.00    | 1        |
| 1          |         |                                         | 02        | DOLLY VARDEN          | PARR       | 1                                     | 8.50   | 6 • C 0 | - 1      |
| ł          |         |                                         | 33        | COHO SALMON           | PARR       | 2                                     | 4.05   | 0.36    |          |
|            | 8       | 040733                                  | 01        | DOLLY VARDEN          | PARR       |                                       | 11.03  | 0.39    |          |
| - <b>-</b> |         |                                         | 01        | DOLLY VARDEN          | JUVEN      | ITLE 1                                | 14.80  | 0.00    | . 1      |
| F          |         |                                         | 01        | SLIMY SCULPIN         | JUVEN      | ITLE 2                                | 5.65   | 0.10    | 2        |
| }          |         |                                         | 02        | CHUM SALMON           | PAR        | 1                                     | 4.20   | 0.00    | 1        |
|            |         |                                         | 03        | NO FISH               |            | ī                                     |        |         | . {      |
| 7          | ٩       | 010723                                  | 11        |                       |            |                                       | 2 20   | 0 00    |          |
|            |         | 5 - 6 - 6 - 6 - 6 - 6 - 6 - 6 - 6 - 6 - | 01        |                       |            | 1                                     | 9.20   | 0.00    |          |
| 1          |         |                                         | n1        | SLIMY SCULOIN         |            | 1. T T                                | 4.70   |         |          |
|            |         |                                         | 01        | SEINT SCULPIN         | DUVEN      |                                       | 2.60   | 0.00    | -        |
|            |         |                                         | 02<br>13  | DOLLY VARDEN          | PARR       | J                                     | 5+07   | 1.44    |          |
|            |         |                                         | 13        | SITMV SCHIDTN         |            | (T) E 1                               | 7.35   | . Ueb/  |          |
| _]         |         |                                         |           | SEIM SCOLFIN          | JUVEN      | 17FC 7                                | 1.00   | 0.00    |          |
|            | 10      | 290683                                  | 01        | DOLLY VARDEN          | PARR       | 5                                     | 7•60   | 1.98    | Ę        |
|            |         |                                         | 01        | SLIMY SCULPIN         | JUVEN      | ILE 1                                 | 4.40   | 0.00    | - 1      |
|            |         |                                         | 01        | SLIMY SCULPIN         | ADULT      | 1                                     | 7.40   | 0.00    | 1        |
|            |         |                                         | 02        | NO FISH               |            | 1                                     |        |         | (        |
|            |         |                                         | 03        | DOLLY VARDEN          | PARR       | 2                                     | 8.65   | 0.64    | 2        |
|            |         |                                         | 03        | COHO SALMON           | PARR       | 1                                     | 6.90   | 0.00    | 1        |
|            |         |                                         | 03        | DOLLY VARDEN          | PARR       | 5                                     | 5.96   | 1.73    | Ę        |
|            |         |                                         | 07        | CLIMY COULDIN         |            |                                       |        |         |          |

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SUMMARY OF RESULTS: ELECTROFISHING SAPPLES JUNE, 1983 TABLE B2-5.

|                                        |         |        |           | 00014 1900              |            |        | LENGTH | (CM)     |     |
|----------------------------------------|---------|--------|-----------|-------------------------|------------|--------|--------|----------|-----|
| 7                                      | STATION | DATE   | REPLICATE | SPECIES                 | LIFE STAGE | NUMBER | MEAN   | S.D.     | N   |
|                                        | 11      | 270633 | 01        | DOLLY VARDEN            | PARR       | 1      | 7.30   | 0.00     | 1   |
| <u> </u>                               |         |        | 01        | COHO SALMON             | PAR        | 1      | 4.40   | 0.00     | 1   |
|                                        |         |        | 02        | DOLLY VARDEN            | PARR       | 1      | 7.30   | 0.00     | . 1 |
| n l                                    |         |        | 02        | COHO SALHON             | PARR       | 1      | 4.40   | 0.00     | î   |
| - E                                    | ÷       |        | 03        | DOLLY VARDEN            | PARR       | 2      | 5.55   | 2.48     | 2   |
| $\begin{bmatrix} 1 \\ c \end{bmatrix}$ |         |        | 03        | DOLLY VARDEN            | JUVENILE   | . 1    | 10.50  | 0.00     | 1   |
|                                        | 12      | 270633 | 01        | NO FISH                 |            | 1      |        | 5 - L.   | 0   |
| 1                                      |         |        | 02        | COHO SAL YON            | PARR       | 1      | 5.80   | 0.00     | 1   |
| $\Box$                                 |         |        | 02        | DOLLY VARDEN            | PARR       | - 2    | 8.70   | 3.54     | . 2 |
|                                        |         |        | 02        | THREE-SPINE STICKLEBACK | ADULT      | .3     | 8.07   | 0.26     | 3   |
| <u>cn</u>                              |         |        | 03        | SOCKEYE SALMON          | PARR       | 1      | 4.50   | 0.00     | 1   |
|                                        |         |        | 03        | COHO SALMON             | PARR       | 1      | 7.60   | 0.00     | 1   |
|                                        |         |        | 03        | SOCKEYE SALMON          | PARR       | 1      | 4.20   | 0.00     | 1   |
| C                                      |         |        | .0.3      | COHO SALMON             | PARR       | 4      | 4.92   | 1.34     | 4   |
| <u>ر</u>                               |         |        | 03        | SLIMY SCULPIN           | PARR       | 1      | 2.60   | 0.00     | 1   |
| $\square$                              |         |        | 03        | ROUND WHITE FISH        | JUVENILE   | . 1    | 11.20  | 0.00     | 1   |
|                                        |         |        | 03        | SLIMY SCULPIN           | JUVENILE   | 4      | 3.40   | .0 • 6:1 | 4   |
| المحيط                                 |         |        | 03        | PYGMY WHITE FISH        | ADULT      | 1      | 5.20   | 0.00     | 1   |
| ;}                                     | 13      | 040733 | 01        | DOLLY VARDEN            | PARR       | 3      | 8.33   | 0.75     | - 3 |
|                                        |         |        | 02        | DOLLY VARDEN            | PARR       | 4      | 8.07   | 1.71     | 4   |
|                                        |         |        | 03        | DOLLY VARDEN            | PARR       | 6      | 5.87   | 0.35     | 6   |
| ς.                                     | 14      | 230693 | 01        | COHO SALMON             | PARR       | 2      | 3.75   | 0.10     | 2   |
|                                        |         |        | 02        | COHO SALMON             | PARR       | 38     | 3.79   | 0.36     | 37  |
| - (L.)                                 |         |        | 03        | COHO SALMON             | PARR       | 6      | 3.98   | 0.47     | 6   |
| 5                                      |         |        | 03        | DOLLY VARDEN            | PARR       | 2      | 10.05  | 3.18     | 2   |
|                                        |         |        | 03        | COHO SALMON             | PARR       | 5      | 3.94   | 0.20     | 5   |
| $\square$                              |         |        | 03        | DOLLY VARDEN            | PARR       | 1      | 5.30   | 0.00     | 1   |
|                                        |         |        | 03        | COHO SALMON             | PARR       | 3      | 4.57   | 0.72     | 3   |
|                                        | 15      | 230693 | 01        | DOLLY VARDEN            | PARR       | 3      | 7.93   | 2.46     | 3   |
| - Fig.                                 |         |        | 02        | DOLLY VARDEN            | PARR       | - 3    | 7.10   | 1.71     | 3   |
|                                        |         |        | 03        | DOLLY VARDEN            | PARR       | 1      | 3.69   | 0.00     | 1   |
| <u> </u>                               |         |        | 03        | SLIMY SCULPIN           | JUVENILE   | 1      | 3.90   | .0.00    | .1  |
|                                        |         |        | 04        | DOLLY VARDEN            | PARR       | 1      |        |          | . 0 |
| $\Box$                                 | 1.      |        | 04        | SOCKEYE SALMON          | PARR       | 1      |        |          | 0   |
|                                        | 16      | 040793 | 01        | COHO SALMON             | PARR       | 1      | 3.40   | 0.00     | 1   |
|                                        |         |        | 02        | DOLLY VARDEN            | PARR       | 2      | 7.20   | 0.28     | 2   |
| -                                      |         |        | 03        | DOLLY VARDEN            | PARR       | 1      | 8.10   | 0.00     | 1   |
|                                        |         |        | 03        | SOCKEYE SALMON          | PAR        | 1      | 7.10   | 0.00     | . 1 |
|                                        | 17      | 020783 | 01        | NO FISH                 |            | 1      |        |          | 0   |
|                                        |         |        | 02        | COHO SALMON             | PARR       | . 1    | 5.50   | 0.00     | .1  |
| 53                                     |         |        | 02        | DOLLY VARDEN            | PARR       | 3      | 6.07   | 2.81     | 3   |
|                                        |         |        | 02        | DOLLY VARDEN            | JUVENILE   | 5      | 11.72  | 1.89     | 5   |
|                                        |         |        | 03        | DOLLY VARDEN            | PARR       | 2      | . 8.30 | 0.14     | 2   |
|                                        |         |        | 03        | SUCKEYE SALMON          | PARR       | 1      | 5.20   | 0.00     | 1   |

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| C              |         |          | TABLE     | B2-5. SUMMARY               | OF RESULTS:<br>JUNE: 1983 | ELECTROFISH                                                                                                      | IING SAMP | LES          |                              |          |
|----------------|---------|----------|-----------|-----------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------|-----------|--------------|------------------------------|----------|
|                | ,       |          |           |                             |                           |                                                                                                                  |           | LENGT        | H (CM)                       |          |
|                | STATION | DATE     | REPLICATE | SPECIES                     |                           | LIFE STAGE                                                                                                       | NUMBER    | MEAN         | S.D.                         | N        |
|                | 17      | 020733   | 03        | DOLLY VARDEN                |                           | PARR                                                                                                             | 1         | 3.60         | 0.00                         | 1        |
| _              |         |          | 03        | DULLY VARDEN                |                           | JUVENILE                                                                                                         | 1         | 13.10        | 0.00                         | 1        |
| 1              | 18      | 300533   | 01<br>02  | COHO SALMON<br>No Fish      |                           | PARR                                                                                                             | 1         | 4.40         | 0.00                         | 1<br>6   |
| e              |         | •<br>•   | 03        | COHO SALMON<br>Dolly Varden |                           | PARR<br>PARR                                                                                                     | 1         | 6•70<br>6•40 | $0 \cdot 00$<br>$0 \cdot 00$ | 1<br>1   |
| 77             | 19      | 310423   | 0.1       |                             |                           |                                                                                                                  |           |              |                              |          |
| ľ              | 17      | 010110   | 02        | NO FISH                     |                           |                                                                                                                  | 1         |              |                              | ÷.<br>Č  |
| <u> </u>       |         |          | 03        | NO FISH                     | . ,                       |                                                                                                                  | 1         |              |                              | 0        |
| · · · ·        |         |          |           |                             |                           |                                                                                                                  |           |              |                              |          |
| $(\mathbf{T})$ | 1 D     | 230533   | 01        | DOLLY VARDEN                |                           | PARR                                                                                                             | 1         |              |                              | Ó        |
|                |         |          | 01        | SOCKEYE SALMON              | V                         | PARR                                                                                                             | 1         | 3.60         | 0.00                         | 1        |
| <br>#          |         |          | 02        | DOLLY VARDEN                |                           | PARR                                                                                                             | · 1       |              |                              | 0        |
| <b>S</b>       |         |          | 02        | COHO SALMON                 |                           | PARR                                                                                                             | 1         |              |                              | 0        |
| Π              |         | -        | 05        | NO FISH                     |                           |                                                                                                                  | 1         |              |                              | 0        |
|                | 20      | 300633   | 01        | NO FISH                     |                           |                                                                                                                  | 1         |              | . · · ·                      | C        |
|                |         |          | 0.2       | SOCKEYE SALMO               | 4                         | PARR                                                                                                             | 3         | 3.07         | 0.14                         | 3        |
|                |         |          | 02        | COHO SALMON                 | . /                       | PARR                                                                                                             | 1         | 5.40         | 0.00                         | 1        |
|                |         |          | 02        | SOCKEYE SALMO               | V                         | PARR                                                                                                             | - 1       | 3.50         | 0.00                         | 1        |
|                |         |          | 02        | SLIMY SCULPIN               |                           | JUVENILE                                                                                                         | 1         | 4.90         | 0.00                         | 1        |
| -              |         |          | .0.3      | COHO SALMON                 |                           | PARR                                                                                                             | 4         | 5.55         | G.37                         | 4        |
|                |         |          | 03        | SOCKEYE SALMON              | ¥ .                       | PARR                                                                                                             | 1         | 3.10         | 0.00                         | 1        |
|                |         |          | 0.3       | COHO SALMON                 |                           | PARR                                                                                                             | 1         | 4.80         | 0.00                         | 1        |
|                |         |          | 03        | DOLLY VARDEN                |                           | JUVENILE                                                                                                         | - 1       | 13.10        | 0 <b>0 0 • 0 0</b> •         | 1        |
|                |         |          | 03        | SLIMY SCULPIN               |                           | ADULT                                                                                                            | . 3       | 8.70         | 0.30                         | 3        |
| <u> </u>       | 21      | 040733   | 01        | DOLLY VARDEN                |                           | PARR                                                                                                             | 8         | 7.97         | 0.54                         | 8        |
|                |         |          | 01        | JOLLY VARDEN                |                           | JUVENILE                                                                                                         | . 3       | 14.43        | C.64                         | 3        |
|                |         |          | 02        | CHUM SALMON                 |                           | PARR                                                                                                             | 5         | 4.27         | 0.63                         | 6        |
|                |         |          | 03        | DOLLY VARDEN                |                           | PARR                                                                                                             | 1         | 7.60         | 0.00                         | 1        |
| Ĩ              | 22      | 020793   | 01        | SOCKEYE SALMON              | 4                         | PARR                                                                                                             | 3         | 6.93         | 1.93                         | 3        |
|                |         |          | 02        | SOCKEYE SALMO               | N                         | PARR                                                                                                             | . 2       | 7.35         | 0.22                         | . 2      |
| -              |         |          | 0.3       | DOLLY VARDEN                |                           | JUVENILE                                                                                                         | 4         | 12.20        | 0.41                         | 4        |
| , <b>1</b>     |         | с.<br>С. | 03        | SLIMY SCULPIN               | •                         | ADULT                                                                                                            | 2         | 8.85         | 0.22                         | 2        |
|                | 23      | 010793   | 01        | SETMY SCHEPTN               |                           | HIVENTLE                                                                                                         | 1         | 4.60         | 0.00                         | ,        |
| . LJ           |         |          | 01        | SLIMY SCHLPIN               |                           | ADULT                                                                                                            | 1         | 6.60         | 0.00                         | 1        |
|                |         |          | 02        | DOLLY VARDEN                |                           | PARR                                                                                                             | 3         | 6.50         | 1.14                         | 3        |
| - <b>A</b>     |         |          | 02        | DOLLY VARDEN                |                           | JUVENILE                                                                                                         | 1         | 13.00        | 0.00                         | <u> </u> |
|                |         |          | 02        | SLIMY SCULPIN               |                           | ADULT                                                                                                            | 1         | 10.10        | 0.00                         | 1        |
|                |         |          | 03        | DOLLY VARDEN                |                           | PARR                                                                                                             | 4         | 9.40         | 0.89                         | 4        |
| •              | 24      | 020733   | 01        | NO FISH                     |                           |                                                                                                                  | 1         |              |                              | n        |
| $\square$      |         |          | 02        | SOCKEYE SALMO               | <br>V                     | PAR                                                                                                              | 2         | 5-45         | 0.10                         |          |
|                |         |          | 02        | DOLLY VARDEN                | •                         | JUVENTIE                                                                                                         | 1         | 12.20        | 0.0                          | . 1      |
| ··             |         |          | 03        | DOLLY VARDEN                |                           | PARR                                                                                                             | 7         | 8.30         | 1.60                         | 7        |
|                |         |          |           |                             |                           | and the second | •         |              |                              |          |

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TABLE B2-5. SUMMARY OF RESULTS: ELECTROFISHING SAMPLES JUNE, 1983

|                                           |        |           |                        | -          |        | LENGT | (CM)     |       |
|-------------------------------------------|--------|-----------|------------------------|------------|--------|-------|----------|-------|
| STATION                                   | DATE   | REPLICATE | SPECIES                | LIFE STAGE | NUMBER | MEAN  | S.D.     | ħ     |
| 24                                        | 020733 | 03        | SLIMY SCULPIN          | JUVENILE   | 2      | 6.30  | 0.28     | 2     |
|                                           |        | 03        | DOLLY VARDEN           | JUVENILE   | 1      | 11.30 | 0.00     | 1     |
|                                           |        | 03        | SLIMY SCULPIN          | ADULT      | 4      | 9.00  | 0.48     | 4     |
| 25                                        | 020733 | 01        | NO FISH                |            | 1      |       |          | G     |
|                                           |        | 02        | NO FISH                |            | 1      |       |          | C     |
| 26                                        | 020733 | 01        | SOCKEYE SALMON         | PARR       | 6      | 3.93  | 0.65     | 6     |
|                                           |        | 01        | SLIMY SCULPIN          | PARR       | 1      | 3.40  | -C • C O | 1     |
|                                           |        | 01        | SOCKEYE SALMON         | PARR       | 19     | 4.25  | 0.78     | 19    |
|                                           |        | 01        | SLIMY SCULPIN          | PARR       | 1      | 2.80  | 0.00     | 1     |
|                                           |        | 01        | SOCKEYE SALMON         | PARR       | 2      | 4.40  | 0.14     | 2     |
| 1. A. |        | 01        | SLIMY SCULPIN          | JUVENILE   | . 3    | 3.87  | 0.85     | 5     |
|                                           |        | 02        | LAKE TROUT             |            | 1      | 30.00 | 0.00     | 1     |
|                                           |        | 03        | JOLLY VARDEN           | PARR       | 3      | 6.40  | 1.59     | 3     |
|                                           |        | 03        | SLIMY SCULPIN          | PARR       | 1      | 5.30  | 0.00     | 1     |
|                                           |        | 03        | SLIMY SCULPIN          | ADULT      | 2      | 4.90  | 0.•2d    | 2     |
|                                           |        | 03        | LAKE TROUT             | ADJLT      | 1      | 37.70 | 0.00     | 1     |
| 27                                        | 020733 | 01        | NO FISH                |            | 1      |       |          | C     |
|                                           |        | 02        | NJ FISH                |            | 1      |       |          | 0     |
| 28                                        | 020733 | 01        | YO FISH                |            | 1      |       |          | C     |
|                                           |        | 02        | DOLLY VARDEN           | PARR       | 1      | 9.30  | 0.00     | 1     |
| 40                                        | 030793 | 01        | DOLLY VARDEN           | PARR       | 4      | 7.22  | 2.01     | 4     |
|                                           |        | 01        | PINK SALMON            | PARR       | 1      | 4.50  | 0.00     | 1     |
|                                           |        | 01        | DOLLY VARDEN           | JUVENTLE   | -<br>1 | 15.10 | 0.00     | 1     |
| * · · ·                                   |        | 01        | SLIMY SCULPIN          | ADULT      | 1      | 10.80 | 0.00     | 1     |
|                                           |        | 0.2       | NO FISH                |            | 1      |       |          | · ΄ Ε |
|                                           |        | 03        | SETMY SCHEPTN          | JUVENTLE   | 1      | 6.60  | 6.06     | 1     |
|                                           |        | 03        | SLIMY SCHEPIN          |            | 1      | 7.10  | 0.00     | · 1   |
|                                           |        | 03        | NINE-SPINE STICKLEBACK | ADJLT      | ī      | 4.70  | 0.00     | 1     |
| 41                                        | 030733 | 01        | NO FISH                |            | 1      |       | ·        | , u   |
|                                           | 0,0,00 | n 2       | COHO SALMON            | PAR        | 1      | 5.40  | 0110     | 1     |
|                                           |        | 02        |                        |            | 1      | 7.20  | 0.00     | 1     |
|                                           |        | N 3       | NO ETCH                | HUGEI      | 1      | 1420  | 0.00     | ŕ     |
|                                           |        |           | 10 1 131               |            |        |       |          |       |
| 42                                        | 030733 | 01        | NO FISH                |            | 1      |       |          | Ċ     |
|                                           |        | 02        | NO FISH                |            | 1      |       |          | C     |
|                                           |        | 03        | SLIMY SCULPIN          | JUVENILE   | 1      | 5.10  | 0.00     | 1     |
| 4 3                                       | 030733 | 01        | CHINOOK SALMON         | PARR       | 4      | 4.82  | 0.33     | 4     |
| - <u>1</u>                                |        | 01        | SLIMY SCULPIN          | ADULT      | 3      | 7.83  | 0.97     | . 3   |
|                                           |        | 02        | NO FISH                | ······     | ī      |       |          | - 0   |
|                                           |        | 0.3       | CHINOOK SALMON         | PARR       | 1      | 4.50  | 0.00     |       |
|                                           |        | 03        | SLIMY SCULPIN          | JUVENILE   | 2      | 6.00  | 0.14     | 2     |
|                                           |        | 1.1       |                        |            |        |       |          |       |

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## TABLE 82-5.SUMMARY OF RESULTS: ELECTROFISHING SAMPLESJUNE, 1983

| STATION                               | DATE    | REPLICATE | SPECIES          | LIFE STAGE | NUMBER         | MEAN   | S.D. | N  |
|---------------------------------------|---------|-----------|------------------|------------|----------------|--------|------|----|
| 44                                    | 040733  | 01        | CHINOOK SALMON   | PARR       | 2              | 3.95   | 0.64 | 2  |
| -                                     |         | 01        | DOLLY VARDEN     | PARR       | 2              | 5.75   | 2.05 | 2  |
| _                                     |         | 01        | CHINOOK SALMON   | PARR       | 2              | 4.20   | 0.14 | 2  |
| 1                                     |         | 01        | SLIMY SCULPIN    | JUVENILE   | 2              | 6.55   | 2.48 | 2  |
|                                       |         | 02        | CHINOOK SALMON   | PARR       | 2              | 3.70   | 0.28 | 2  |
| ]<br>[                                |         | 03        | NO FISH          |            | 1              |        |      | C  |
| 45                                    | 270683  | 01        | NO FISH          |            | 1              |        |      | 0  |
| 64                                    | 040733  | 01        | DOLLY VARDEN     | PARR       | 2              | 3.45   | 0.10 | 2  |
|                                       |         | 01        | SLIMY SCULPIN    | JUVENILE   | 1              | 3.20   | 0.00 | 1  |
| <b>n</b> 1.2                          |         | 01        | SLIMY SCULPIN    | ADULT      | _ <b>1</b>     | 7.80   | 0.00 | 1  |
|                                       |         | 02        | COHO SALMON      | PARR       | 1              | 4.10   | 0.00 | 1  |
| j                                     |         | 02        | SLIMY SCULPIN    | JUVENILE   | - 1            | 4.50   | 0.00 | 1  |
| r                                     |         | 02        | SLIMY SCULPIN    | ADULT      | . 3            | 9.80   | 1.61 | 3  |
| <b>K</b> .                            |         | 03        | DOLLY VARDEN     | PARR       | 1              | 3.90   | 0.00 | 1  |
|                                       |         | 03        | SOCKEYE SALMON   | PARR       | 1              | 4.30   | 0.00 | 1  |
| · · ·                                 |         | 03        | SLIMY SCULPIN    | JUVENILE   | - 3 -          | 4.53   | 1.51 | 3  |
| el.                                   |         | 03        | PYGMY WHITE FISH | ADULT      | 1              | 8.70   | 0.00 | 1  |
| -1                                    |         | 03        | SLIMY SCULPIN    | ADULT      | 2              | 8.65   | 0.36 | 2  |
| 16 A                                  | 040733  | 01        | DOLLY VARDEN     | PARR       | 3              | 4.20   | 0.10 | 3  |
| ]                                     |         | 01        | COHO SALMON      | PARR       | 1              | 5.50   | 6.00 | 1  |
| •                                     |         | 01        | DOLLY VARDEN     | PARR       | 3              | 4.97   | 1.03 | 3  |
|                                       |         | 01        | COHO SALMON      | PARR       | 1              | 3.80   | 0.00 | 1  |
|                                       |         | 01        | DOLLY VARDEN     | PARR       | 1              | 5.00   | 9.00 | 1  |
| <u>j</u>                              | · · · · | 01        | COHO SALMON      | PAR        | <u> </u>       | 5.17   | 0.20 | 3  |
|                                       |         | 01        | DOLLY VARDEN     | PARR       | . 4            | 5.65   | 2.32 | 4  |
| -                                     |         | 01        | COHO SALMON      | PARR       | 1              | 4.80   | 0.00 | 1  |
|                                       |         | 01        | SLIMY SCULPIN    | JUVENILE   | <b>1</b> .     | 3.40   | 0.00 | 1  |
|                                       |         | 02        | DOLLY VARDEN     | PARR       | 5              | 9.14   | 1.53 | 5  |
| -d .                                  |         | 02        | COHO SAL ION     | PARR       | 11             | 5 • 06 | 0.47 | 11 |
|                                       |         | 02        | SLIMY SCULPIN    | ADULT      | 1              | 8.30   | 0.00 | 1  |
| • • • • • • • • • • • • • • • • • • • |         | 03        | DOLLY VARDEN     | PARR       | 1 - <b>1</b> - | 3.50   | 0.00 | 1  |
|                                       |         | 03        | CHUM SALMON      | PARR       | . 1            | 4.00   | 0.00 | 1  |
|                                       |         | 03        | JOLLY VARDEN     | PARR       | 5              | 3.72   | 0.33 | 5  |
|                                       |         | 03        | COHO SALMON      | PARR       | 1              | 4.10   | 0.00 | 1  |
| 7                                     |         | 03        | CHUM SALMON      | PARR       | 1              | 4.40   | 0.00 | 1  |
|                                       |         | 0.5       | DOLLY VARDEN     | PARR       | 1              | 4.10   | 0.0  | 1  |
| J * .                                 |         | 0.5       | COHO SALMON      | PARR       | 1              | 3.30   | 0.00 | 1  |
| _                                     |         | U 5       | DOLLY VARDEN     | PARR       | 1              | 4.50   | 0.00 | 1  |
| 170                                   | 920733  | 01        | DOLLY VARDEN     | PARR       | 7              | 8.27   | 1.32 | 7  |
|                                       |         | UI        | DULLY VARDEN     | JUVENILE   | 3              | 12.73  | 1.29 | 3  |
|                                       |         | U1        | SLIMY SCULPIN    | ADULT      | - 2            | 7.80   | 0.71 | 2  |
| •                                     |         | 02        | DULLY VARDEN     | PARR       | 7              | 9.63   | 5.67 | 1  |
|                                       |         | 02        | DULLT VARDEN     | JUVENILE   | 2              | 10.10  | 5.52 | 2  |
|                                       |         | 02        | SLIMT SCULPIN    | AUULT      | 1              | 8.30   | 0.00 | 1  |
|                                       |         | 0.5       | CHINUUK SALMUN   | PAR        | 2              | 5.40   | 0.28 | ź  |
|                                       |         | US        | DULLT VAKUEN     | PARK       | 2              | 8.95   | 0.92 | 2  |

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TABLE B2-5. SUMMARY OF RESULTS: ELECTROFISHING SAMPLES JUNE, 1983

|         |        |           |                                 |                   |         | LENGTH (CM)  |              |        |
|---------|--------|-----------|---------------------------------|-------------------|---------|--------------|--------------|--------|
| STATION | 04TE   | REPLICATE | SPECIES                         | LIFE STAGE        | NUMBER  | MEAN         | S.D.         | Ň      |
| 170     | 020783 | 03        | ROUND WHITE FISH                | JUVENILE          | 1       | 18.50        | 6.60         | . 1    |
|         |        | 03<br>03  | SLIMY SCULPIN<br>SLIMY SCULPIN  | JUVENILE<br>Adult | 1<br>5  | 5.50<br>8.36 | C.CO<br>0.93 | 1<br>5 |
| 184     | 010733 | 01        | NO FISH                         |                   | 1       |              |              | C      |
|         |        | 02<br>03  | DOLLY VARDEN<br>NO FISH         | JUVENILE          | 1       | 10.30        | 0.00         | . 1    |
| 194     | 010733 | 01        | DOLLY VARDEN                    | PARR              | 4       | 7.52         | 1.59         |        |
|         |        | 01        | SLIMY SCULPIN                   | JUVENILE          | 1       | 8.70         | 0.00         | 1      |
|         |        | 01        | SLIMY SCULPIN                   | ADULT             | 1       | 9.10         | 0.00         | 1      |
|         |        | 03        | DOLLY VARDEN                    | PARR              | 2       | 5.70         | 0.71         |        |
| 40A     | 030733 | 01        | NO FISH                         |                   | 1       |              |              | . (    |
|         |        | 02        | NO FISH<br>Dolly Varden         | JUVENILE          | 1<br>1  | 4.00         | 0.00         | (<br>1 |
| 41A     | 030793 | 01        | DOLLY VARDEN                    | PAR               | 1       | 7.70         | 0.00         |        |
| -,.     |        | 02        | DOLLY VARDEN                    | PARR              | 2       | 6.75         | 2.05         | Z      |
|         |        | 02<br>03  | SLIMY SCULPIN<br>No FISH        | ADJLT             | 1<br>1  | 5.70         | 0.00         | 1      |
| 42 A    | 030733 | 01        | SLIMY SCULPIN                   | JUVENTLE          | 1       | 5.10         | 0.00         |        |
|         |        | 02        | DOLLY VARDEN                    | PARR              | 2       | 500          | 0.42         |        |
|         |        | 02        | SLIMY SCULPIN<br>Chinook salmon | ADJLT.<br>PARR    | 1 21    | 5.40<br>4.01 | 0.00<br>0.45 | 2      |
| 43A     | 030793 | 01        | CHINOOK SALMON                  | PARR              | 2       | 4 - 80       | 0.57         | :      |
|         |        | 02        | CHINOOK SALMON                  | PAR               | 11      | 4.35         | 0.28         | 1      |
|         |        | 02        | NINE-SPINE STICKLEBACK          | ADULT             | 1       | 6.80         | 0 • C D      |        |
|         |        | 03        | CHINDOK SALMON                  | PARR              | ģ       | 4.12         | 0.50         | • •    |
| 444     | 040733 | 01        | CHINOOK SALMON                  | PAR               | 36      | 3.90         | 0.56         | 31     |
|         |        | 01        | SLIMY SCULPIN                   | JUVENILE          | . 3     | 3.80         | 1 • / 4      |        |
| <i></i> |        | 03        | CHINOOK SALMON                  | PARR              | 1       | 4.30         | 0.00         |        |
|         |        |           |                                 |                   | e til i |              |              |        |

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TABLE B2-6. SUMMARY OF RESULTS: DIP NET SAMPLES JUNE, 1983

| STATION | DATE   | REPLICATE | SPECIES     |     | LIFE STAGE | NUMBER | MEAN | S.D. | N   |
|---------|--------|-----------|-------------|-----|------------|--------|------|------|-----|
|         |        |           |             |     |            |        |      |      |     |
| 4       | 200693 | 01        | COHO SALMON |     | PARR       | 7      | 3.89 | 0.39 | 7   |
|         |        | 01        | CHUM SALMON | · · | PARR       | 1      | 4.20 | 0.00 | . 1 |
|         |        |           |             |     |            |        |      |      |     |

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TABLE 82-7.

SUMMARY OF RESULTS: INCLINE PLANE TRAP SAMPLES JUNE, 1983

LENGTH (CM)

| •          | STATION | DATE    | REPLICATE | SPECIES                  | LIFE STAGE | NUMBER     | MEAN                     | S.D.              | N            |
|------------|---------|---------|-----------|--------------------------|------------|------------|--------------------------|-------------------|--------------|
|            | 10      | 020733  | 01        | NO FISH                  |            | 1          |                          |                   | с<br>С       |
| *          | 1 D     | 030733  | 01        | SOCKEYE SALMON           | PARR       | 1          | 4.00                     | 0.00              | 1            |
|            | 10      | 040793  | 01        | COHO SALMON              | PARR       | 1          | 4.20                     | 0 • 0 0           | 1            |
|            | 1 D     | 050733  | 01        | COHO SALMON              | PARR       | 1          | 6.90                     | 0.00              | 1            |
| ]          |         |         | 01        | THREE-SPINE STICKLEBACK  | ADULT      | , <b>1</b> | 7.30                     | 0.00              | 1            |
|            | 10      | 190633  | 01        | SOCKEYE SALMON           | JUVENILE   | 8          | 7.07                     | 0 • 77            | 8            |
|            |         |         | 01        | CHUM SALMON              | JUVENILE   | 5          | 4.10                     | 0.63              | 5            |
|            |         |         | 01        | EULACHON                 | JUVENILE   | - 1        | 3.40                     | 0.00              | 1            |
|            |         |         | 01        | CHUM SALMON              | JUVENILE   | 1          | 4.50                     | G • 0 0           | 1            |
| 1          |         |         | 01        | SOCKEYE SALMON           | JUVENILE   | 1          | 6.70                     | 0.00              | 1            |
|            |         |         | 01        | CHUM SALMON              | JUVENILE   | 2          | 4.80                     | 6.71              | 2            |
|            |         |         | 01        | SOCKEYE SALMON           | JUVENTUE   | 2          | 3.95                     | 0.50              | 2            |
| 7          |         |         | 01        | CHUM SALMON              | JUVENTLE   | 1          | 3.70                     | 0.00              | 1            |
|            |         |         | 01        | PINK SALMON              | JUVENTLE   | 2          | 3.05                     | 0.10              | . 2          |
|            |         |         | 01        | SOCKEVE SALMON           | UNENTLE    |            | 4 30                     | 0 0 10            | 2            |
| -          | 1       |         | 01        | CHUM SALMON              | UVENTLE    | · <u> </u> |                          | 0 00              | . <. 1       |
| ~          |         |         | 01        | CHORE SALINON            |            |            | 7.00                     | 0.00              | . 1          |
|            |         |         | 01        | DINK CALVON              | UUVENILE   |            | 3.60                     | 0.42              | 2            |
| ľ          |         |         | 01        | PINK SALTUN              | JUVENILE   | . 1        | 3.10                     | 0.00              | 1            |
| . <b>Г</b> |         |         | 01        | SULKETE SALMUN           | JUVENILE   | 1          | 3.60                     | 0.00              | 1            |
|            |         |         | 01        | PINK SALMUN              | JUVENILE   | 2          | 3.40                     | 0.00              | 2            |
| 1.         |         |         | 01        | NINE-SPINE STICKLEBACK   | ADULT      | 16         | ۥ07<br>4•30              | U • 42<br>D • C 0 | 15           |
|            | 1.0     |         |           |                          |            |            |                          |                   |              |
|            | 10      | 200633  | ή Γ       | COHO SALMON              | PARR       | 1          | 3.90                     | 0.00              | 1            |
| -          |         |         | UI        | CUHU SALMUN              | JUVENILE   | 1          | 11.50                    | 0.00              | 1            |
|            |         | · · · · | 01        | THREE-SPINE STICKLEBACK  | JUVENILE   | 1          | 7.60                     | 0.00              | 1            |
|            |         |         | 01        | SOCKEYE SALMON           | JUVENILE   | - 3        | 4.90                     | 0.60              | 3            |
| <b>l</b>   |         |         | 01        | CHUM SALMON              | JUVENILE   | 5          | 4.66                     | 0.56              | 5            |
| -          |         |         | 01        | SOCKEYE SALMON           | JUVENILE   | 1          | 6.90                     | 0.00              | 1            |
| 7          |         | · . · . | 01        | PINK SALMON              | JUVENILE   | 1          | 3.70                     | 0.00              | 1            |
| 1          |         |         | 01        | CHUM SALMON              | JUVENILE   | 1          | 4.10                     | 0.00              | 1            |
| 1          |         |         | 01        | SOCKEYE SALMON           | JUVENILE   | 2          | 4.15                     | 0.50              | 2            |
| Ψ.         |         |         | 01        | PINK SALMON              | JUVENILE   | 5          | 3.68                     | 0.22              | 5            |
| <u></u>    |         |         | 01        | EULACHON                 | ADULT      | 1          | 21.40                    | 0.00              | 1            |
| •          | 10      | 210693  | 01        | CHUM SALMON              | JUVENILE   | 2          | 5.45                     | 0.22              | 2            |
|            |         |         | 01        | SOCKEYE SALMON           | JUVENILE   | 1          | 7.70                     | 0.00              | 1            |
|            |         |         | 01        | PINK SALMON              | JUVENILE   | 1          | 3.80                     | 0.00              | 1            |
| 7          |         |         | 01        | SOCKEYE SALMON           | JUVENILE   | 1          | 6.80                     | 0.00              | 1            |
|            |         |         | 01        | CHUM SALMON              | JUVENILE   | 2          | 4.35                     | 0.50              | - 2          |
|            |         |         | 01        | SOCKEYE SALMON           | JUVENTLE   | 1          | 6.90                     | 0.00              | 1            |
|            |         |         | 01        | CHUM SALMON              | JUVENTLE   | 1          | 4.80                     | 0.00              | 1            |
| -<br>-     |         |         | 01        | SOCKEYE SALMON           | JUVENTLE   | 2          | 7.05                     | 0.10              | ż            |
|            |         |         | 01        | CHUM SALMON              | HIVENTIE   | <u>ک</u>   | 4.50                     | 0.35              | <u>्र</u> ्य |
| )          |         |         | 01        | SOCKEYE SALMON           | JHVENTLE   | 1          | · · 7.70                 | 0100              | 1            |
|            |         |         | .01       | THREE-SPINE STICKI FRACK |            |            | 7 <b>8</b> 7 0<br>6 11 0 | 6 47              | - <b>-</b>   |
|            |         |         | · • •     | THREE STARE STARKEDACK   | RUULI      | · •        | · • • • • • •            | U + 47            | J            |

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| ABLE | 82-7. | SUMMARY | 0 F | RESULTS: | INCLINE | PLANE | TRAP | SAMPLES |
|------|-------|---------|-----|----------|---------|-------|------|---------|
|      |       |         |     | JUNE 198 | 33      |       |      |         |

|        | . •     |        |           | JUNE, 19                                                   | 383                     |             | LENGT                      | + (CM)                     |             |
|--------|---------|--------|-----------|------------------------------------------------------------|-------------------------|-------------|----------------------------|----------------------------|-------------|
|        | STATION | DATE   | REPLICATE | SPECIES                                                    | LIFE STAGE              | NUMBER      | MEAN                       | S.D.                       | N           |
|        | 1D      | 220633 | 01<br>01  | CHUM SALMON<br>THREE-SPINE STICKLEBACK                     | JUVENILE<br>ADULT       | 1 3         | 3.20<br>7.63               | 0.00                       | 1           |
|        | 1 D     | 230633 | 01<br>01  | SOCKEYE SALMON<br>PINK SALMON                              |                         | 1           | 4.20                       | 0.00                       | 1           |
| C      |         |        | 01        | SOCKEYE SALMON<br>Chum salyon                              |                         | 1<br>3      | 3.90<br>3.97               | 0.00                       | 1           |
| ].     |         |        | 01<br>01  | PYGMY WHITE FISH<br>THREE-SPINE STICKLEBACH                | PARR<br>PARR<br>( ADULT | 1<br>2<br>4 | 3.60<br>2.65<br>7.80       | 0 • 00<br>0 • 10<br>0 • 36 | 1<br>2<br>4 |
| Ē      | 1 0     | 240633 | 01<br>01  | COHO SALMON<br>PYGMY WHITE FISH<br>THREE-SPINE STICKLEBACK |                         | 1<br>1      | 3 • 70<br>3 • 30<br>8 • 10 | 0.00                       | 1           |
| U<br>C | 10      | 250633 | 01        | NO FISH                                                    |                         | 1           | 0.10                       | 0.00                       | ۲<br>۲      |
|        | 1 D     | 270533 | 01        | THREE-SPINE STICKLEBAC                                     | ADULT                   | 1           | 8 • 5 0                    | 0.00                       | 1           |
|        | 10      | 230633 | 00        | THREE-SPINE STICKLEBACK                                    | ADULT<br>ADULT          | 1<br>1      | 5•30<br>4•30               | 0 • 0 0<br>0 • 0 0         | 1           |
| . ال   | 10      | 270693 | 01        | NO FISH                                                    |                         | <b>1</b>    |                            |                            | D           |
| •      | 1 D     | 300633 | 01        | COHO SALMON                                                | PARR                    | 1           | 10.80                      | 0.00                       | 1           |
|        | •       |        |           |                                                            |                         |             |                            |                            |             |
|        | •<br>•  |        |           |                                                            |                         |             |                            |                            |             |
| .¢     |         |        |           |                                                            |                         |             |                            |                            |             |
|        |         |        |           |                                                            |                         |             |                            |                            |             |
|        |         |        |           |                                                            |                         |             |                            |                            |             |
|        |         |        |           |                                                            |                         | . '         |                            |                            |             |
|        |         |        | •         |                                                            |                         |             | =                          |                            | •           |
|        | •       |        |           |                                                            |                         |             |                            |                            |             |

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SUMMARY OF RESULTS: FYKE NET SAMPLES JUNE, 1983 TABLE B2-8.

|         | •      |           |                  |            | LENGT      | H (CM)  |         |            |
|---------|--------|-----------|------------------|------------|------------|---------|---------|------------|
| STATION | DATE   | REPLICATE | SPECIES          | LIFE STAGE | NUMBER     | MEAN    | S•D•    | М          |
| 4       | 190633 | 01        | RAINBOW TROUT    | JUVENILE   |            | 20.10   | 0.00    |            |
| •       | 1,0000 | 01        | RAINBON TROUT    | ADULT      | 1          | 27.50   | 0.00    | 1          |
|         |        | 01        | PYGMY WHITE ETSH | ADULT      | · · · 1    | 2.000   |         | n          |
|         |        | 01        | ROUND WHITE FISH | ADULT      | 1          | 36.70   | 0.00    | 1          |
|         |        | 01        | RAINBOW TROUT    | ADULT      | , <b>ī</b> | 43.20   | 0.00    | 1          |
| 4       | 200683 | 01        | RAINBOW TROUT    | ADULT      | 1          | 44.70   | 0.00    | 1          |
|         |        | 01        | DOLLY VARDEN     | ADULT      | 1          | 37.60   | 0.00    | 1          |
|         |        | 01        | RAINBOW TROUT    | ADULT      | 1          | 41.20   | 0.00    | 1          |
| 4       | 220533 | 01        | ROUND WHITE FISH | JUVENILE   | 2          | 14.75   | 1.06    | 2          |
|         |        | 01        | RAINBOW TROUT    | ADULT      | 1          | 27.00   | 0.00    | 1          |
|         |        | 31        | SOCKEYE SALMÓN   | ADULT      | 1          | 63.70   | 0.00    | 1          |
|         |        | 01        | SLIMY SCULPIN    | ADULT      | 1          | 11.00   | 0.00    | 1          |
| 4       | 240683 | 01        | RAINBOW TROUT    | JUVENILE   | 1          | 26.50   | 0.00    | 1          |
|         |        | 01        | ROUND WHITE FISH | ADULT      | 1          | 32.50   | 0.00    | 1          |
|         |        | 01        | RAINBOW TROUT    | ADULT      | 4          | 32.62   | 9.08    | 4          |
| 4       | 250533 | 01        | TRAP BURIED      |            | 0          |         |         |            |
| 4       | 230533 | 01        | TRAP BURIED      |            | 0          |         | a an ta |            |
| 6       | 190693 | 0.1       | ROUND WHITE EISH | DIVENTIE   | 1          | 24.70   | 0.00    | 1          |
| 5       | 1,0000 | n1        | ROUND WHITE ETSH |            | 2          | 32.10   | 1.13    | 2          |
|         |        | 01        | RAINBOW TROUT    |            | · 5        | 38.38   | 3,15    | . <u> </u> |
|         |        | 01        | ROUND WHITE FISH | ADULT      | 2          | 35.50   | 4.24    | 2          |
| 6       | 200633 | 01        | ROUND WHITE FISH | ADULT      | 1          | 35.30   | 0.00    | . 1        |
|         |        | 01        | RAINBOW TROUT    | ADULT      | 2          | 43.45   | 6.29    | 2          |
| 6       | 220633 | 01        | ROUND WHITE FISH | JUVENILE   | 1          | 13.60   | 0.00    | 1          |
|         |        | 01        | ROUND WHITE FISH | ADULT      | 5          | 28.10   | 3.36    | 5          |
|         |        | 01        | RAINBOW TROUT    | ADULT      | 1          | 44 . 40 | 0.00    | 1          |
|         |        | 01        | CHINOOK SALMON   | ADULT      | 1          | 59.00   | 0.00    | -1         |
| 6       | 240633 | 01        | ROUND WHITE FISH | ADULT      | 7          | 23.57   | 11.55   | 7          |
| 6       | 250533 | 01        | TRAP BURIED      |            | 0          |         |         |            |
| 6       | 230633 | 01        | ROUND WHITE FISH | JUVENILE   | 2          | 16.15   | 0.22    | 2          |
|         |        | 01        | ROUND WHITE FISH | ADULT      | 1          | 25.20   | 0.00    | 1          |
|         |        | 01        | RAINBOW TROUT    | ADULT      | 3          | 41.47   | 2.59    | 3          |
| 10      | 130633 | 01        | DOLLY VARDEN     | JUVENILE   | 1          |         |         | :<br>0     |
|         |        | 01        | SOCKEYE SALMON   | ADULT      | 3          | 50.73   | 5.23    | . 3        |
|         |        | 01        | DOLLY VARDEN     | ADULT      | 1          | 47.60   | 0.00    | 1          |
|         |        | 01        | EULACHON         | ADULT      | 1          | 20.00   | 0.00    | . 1        |
| 10      | 190693 | 0.1       | SOCKEYE SALMON   | AD UL T    | 4          | 47 30   | .2 79   | 4          |

| TABLE B2-8. | SUMMARY | OF RESULTS: | FY⊀E | NET | SAMPLES |  |
|-------------|---------|-------------|------|-----|---------|--|
|             | JB      | NF. 1983    |      |     |         |  |

| <u> </u>   | 3/ 2/8  | 3 .    |           |                  |           |                                                                                                                                                                                                                                     |           |       | PAGE   | 2  |
|------------|---------|--------|-----------|------------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------|--------|----|
| . <u> </u> |         |        | TABI      | LE B2-8. SUMMARY | OF RESULT | S: FYKE NE                                                                                                                                                                                                                          | T SAMPLES |       |        |    |
|            |         |        |           |                  |           |                                                                                                                                                                                                                                     |           | LENGT | H (CM) |    |
| Ξc         | STATION | DATE   | REPLICATE | SPECIES          |           | LIFE STAGE                                                                                                                                                                                                                          | NUMBER    | MEAN  | S.D.   | N  |
|            | 10      | 200633 | 01        | SOCKEYE SALMON   |           | ADULT                                                                                                                                                                                                                               | 3         | 57.57 | 5.94   | 3  |
|            |         |        | 01        | EULACHON         |           | ADULT                                                                                                                                                                                                                               | 2         | 15.65 | 8.56   | 2  |
| 5          | 1 D     | 220633 | 01        | RAINBOW TROUT    |           | ADULT                                                                                                                                                                                                                               | 2         | 45.20 | 14.85  | 2  |
|            |         |        | 01        | DULLY VARUEN     |           |                                                                                                                                                                                                                                     |           | 42.27 | 5.32   | ు  |
| <b>[]</b>  |         | • .    | 01        | EULACHON         |           | ADULT                                                                                                                                                                                                                               | 1         | 21.00 | 0.00   | 1  |
| E D        | 19      | 230633 | 01        | DOLLY VARDEN     |           | ADJLT                                                                                                                                                                                                                               | 2         | 31.50 | 2.83   | 2  |
|            |         |        | 01        | SOCKEYE SALMON   |           | ADULT                                                                                                                                                                                                                               | 3         | 59.83 | 2.67   | 3  |
| (          |         |        | 01        | EULACHON         |           | ADULT                                                                                                                                                                                                                               | 3         | 19.90 | 0.69   | 3  |
| 5          | 19      | 250533 | 01        | EULACHON         |           | ADULT                                                                                                                                                                                                                               | 14        | 21.16 | 0.69   | 14 |
|            |         |        | 01        | RAINBOW TROUT    |           | ADULT                                                                                                                                                                                                                               | 2         | 25.10 | 2•69   | 2  |
| ų.         |         |        | 01        | DOLLY VARDEN     |           | ADULT                                                                                                                                                                                                                               | 1         | 42.50 | 0.00   | 1  |
|            | 1 D     | 270633 | 0,1       | TRAP BURIED      |           |                                                                                                                                                                                                                                     | 0         |       |        |    |
|            |         |        |           |                  |           | e de la composition d<br>Composition de la composition de la comp |           |       |        |    |
|            |         |        |           |                  |           |                                                                                                                                                                                                                                     |           |       |        |    |

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# APPENDIX B

### B3. CATCH PER EFFORT SUMMARIES

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### TABLE B3-1. CATCH PER EFFORT: ELECTROSHOCKING SAMPLES APRIL 1983

LENGTH

| STATION | SPECIES                     | LIFE<br>Stage | CATCH/<br>Effort | MEAN    | S.D.    | N   |
|---------|-----------------------------|---------------|------------------|---------|---------|-----|
| 13      | DOLLY VARDEN<br>COHD SALMON |               | 2.49<br>0.10     | 5.80    | 0.95    | 23  |
|         | SLIHT SCULPIN               | JUVENILL      | Uell             | 8.00    | 0.00    | T   |
| 15      | DOLLY VARDEN                | PARR          | 0.38             | 3.93    | 1.19    | 3   |
|         | COHO SALMON                 | PARR          | 1.02             | 3.20    | 0.21    | 8   |
|         | SJCKEYE SALMON              | FRY           | 0.13             | 3.30    | 0.00    | 1   |
|         | SJCKEYE SALMON              | PARR          | 0.25             | 3.15    | 0.07    | 2   |
|         | CHINDDK SALMON              | PARR          | 0.13             | 3.80    | 0 • 0 D | 1   |
| 17      | COHO SALMON                 | FRY           | 0.50             | 3.00    | 0.28    | 2   |
|         | COHO SALMON                 | PARR          | 2.26             | 3.66    | 0.70    | . 9 |
|         | SLIMY SCULPIN               | JUVENILE      | 1.25             | 4.42    | 1.96    | 5   |
|         | CHUM SALMON                 | PARR          | 0.50             | 4.05    | 0.35    | 2   |
| 19      | DOLLY VARDEN                | PARR          | 1.48             | 8.00    | 2.73    | 9   |
|         | COHO SALMON                 | PARR          | 0.16             | 7.30    | 0.00    | 1   |
|         | CHINDOK SALMON              | PARR          | 0.16             | 7.20    | 0 • 0 0 | 1   |
|         | SLIMY SCULPIN               | JUVENILE      | 0.16             | 6 • 4 0 | 0.00    | 1   |
| • · ·   | SLIMY SCULPIN               | ADULT         | 0.15             | 8 • 3 0 | 0.00    | 1   |
| 22      | DOLLY VARDEN                | PARR          | 3.66             | 10.31   | 2.63    | 10  |
|         | DOLLY VARDEN                | JUVENILE      | 1.01             | 12.45   | 1.77    | 4   |
| 42      | DOLLY VARDEN                | PARR          | 4.73             | 5.29    | 0.56    | 7   |
|         | COHO SALMON                 | FRY           | 0.58             | 3.10    | 0.00    | 1   |
|         | COHO SALMON                 | PARR          | 0.68             | 3.20    | 0.00    | 1   |
|         | SOCKEYE SALMON              | FRY           | 0.58             | 3.10    | 0.00    | 1   |
| 40A     | DOLLY VARDEN                | PARR          | 0.25             | 5.23    | 1.08    | 6   |
|         | COHO SALMON                 | PARR          | 0.12             | 6.20    | 1.82    | 3   |
|         | RAINBOW TROUT               | PARR          | 0.04             | 5.30    | 0.00    | . 1 |
|         | SLIMY SCULPIN               | JUVENILE      | 0.12             | 5.63    | 2.57    | - 3 |
|         | SLIMY SCULPIN               | ADULT         | 0.04             | •       |         | 0   |
|         | NINE-SPINE STICKLEBACK      | JUVENILE      | 0.12             | 4.47    | 0.83    | 3   |

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### TABLE B3-2. CATCH PER EFFORT: MINNOW TRAP SAMPLES APRIL 1983

| STATION | SPECIES                | LIFE<br>Stage | CATCH/<br>EFFORT | MEAN  | S.D.               | N      |
|---------|------------------------|---------------|------------------|-------|--------------------|--------|
| 1       | NINE-SPINE STICKLEBACK | JUVENILE      | 5.250<br>0.750   | 5.35  | 0.46               | 20     |
| · · ·   |                        |               |                  |       |                    | Ŭ      |
| 3       | COHO SALMON            | PARR          | 0.500            | 9.75  | 3.32               | 2      |
|         | SLIMY SCULPIN          | JUVENILE      | 0.250            | 6.00  | 0.00               | 1      |
|         | SLIMY SCULPIN          | ADULT         | 0.250            | 9.30  | $0 \bullet 0 0$    | 1      |
| 4       | DOLLY VARDEN           | PARR          | 1.000            | 10.00 | 1.61               | 4      |
|         | COHO SALMON            | PARR          | 4.500            | 8.12  | 2.21               | 18     |
|         | SLIMY SCULPIN          | ADULT         | 0.250            | 9.70  | 0.0.0              | 1      |
| 5       | COHO SALMON            | PARR          | 0.250            | 5.20  | 0.00               | 1      |
| . 6     | NIVE-SPINE STICKLEBACK | ADULT         | 0.333            | 6.50  | 0.00               | 1      |
| 8       | DOLLY VARDEN           | PARR          | 0.750            | 9.57  | 3.26               | 3      |
|         | DULLY VARDEN           | JUVENILE      | 0.250            | 13.70 | 0.00               | . 1    |
|         | COHO SALMON            | PARR          | 1.500            | 7.97  | 2.8F               | 6      |
|         | COHO SALMON            | JUVENILE      | 0.250            | 12.80 | 0.00               | 1      |
|         | SLIMY SCULPIN          | JUVENILE      | 0.250            | E.30  | 0.00               | Ĺ      |
|         | SLIMY SCULPIN          | ADULT         | 0.0250           | 9.40  | 0.00               | 1      |
|         | NINE-SPINE STICKLEBACK | JUVENILE      | 1.750            | 6.04  | 0.71               | 7      |
|         | NINE-SPINE STICKLEBACK | ADULT         | 1.500            | 7.30  | 0 • 4 0            | 6      |
| 11      | COHO SALMON            | PARR          | 0.666            | 5.60  | 0.42               | 2      |
|         | NINE-SPINE STICKLEBACK | JUVENILE      | 0.333            | 5.40  | 0.00               | . 1    |
| 14      | DOLLY VARDEN           | PARR          | 2.000            | 9.79  | 2 • 7 <del>C</del> | ۶      |
|         | SLIMY SCULPIN          | JUVENILE      | 0.250            | 7.70  | 0.00               | 1      |
| 15      | DOLLY VARDEN           | PARR          | 0.750            | 6.53  | 0 • 7 1            | . 3    |
|         | SLIMY SCULPIN          | JUVENILE      | 0.250            | 6.40  | 0.00               | 1      |
|         |                        |               |                  |       |                    |        |
| 16      | DJLLY VARDEN           | PARR          | 1.000            | 9.52  | 0.56               | . 4    |
| 17      | DJLLY VARDEN           | PARR          | 0.500            | 9.20  | 0.00               | 1      |
|         | COHO SA_MON            | PARR          | 0.750            | 3.73  | 0.58               | 3      |
| 19      | SLINY SCULPIN          | JUVENILE      | 0.500            | 8.60  | 0.00               | 1      |
| 22      | DOLLY VARDEN           | PARR          | 2.000            | 10.54 | 1.48               | 3      |
|         | DOLLY VARDEN           | JUVENILE      | 0.250            | 15.30 | 0.00               | 1      |
|         | PYGYY WHITE FISH       | JUVENILE      | 0.250            | 11.10 | 0.00               | 1      |
| 16A     | DOLLY VARDEN           | PARR          | 1.000            | 10.35 | 3.03               | 4      |
|         | DOLLY VARDEN           | JUVENILE      | 0.250            | 9.70  | 0.0                | 1      |
|         | CJHJ SALMON            | PARR          | 1.250            | 9.52  | 1.74               | 5      |
|         | VINE-SPINE STICKLEBACK | JUVENILE      | 1.250            | 5.52  | 1.01               | . 5    |
|         | NINE-SPINE STICKLEBACK | ADULT         | 1.250            | 6.80  | 0.74               | 5.<br> |
|         |                        |               |                  |       |                    |        |

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TABLE B3-3. CATCH PER EFFORT: ELECTROSHOCKING SAMPLES JUNE 1983

|         |                  | LIFE     | CATCH/ |       |      | •        |
|---------|------------------|----------|--------|-------|------|----------|
| STATION | SPECIES          | STAGE    | EFFORT | MEAN  | S.D. | - N      |
| 1       | DULLY VARDEN     | JUVENILE | 0.23   | 14.20 | 0.00 | - 1      |
|         | COHO SALMON      | PARR     | 1.07   | 4.75  | 0.10 | 4        |
|         | SOCKEYE SALMON   | PARR     | 3.03   | 4.63  | 0.49 | 12       |
|         | CHUM SALMON      | PARR     | 0.23   | 5.00  | 0.00 | 1        |
| 2       | DOLLY VARDEN     | PARR     | 0.53   | 8.70  | 0.99 | 2        |
|         | DOLLY VARDEN     | JUVENILE | 0.50   | 12.05 | 0.78 | 2        |
|         | COHO SALMON      | PARR     | 0.23   | 4.30  | 0.00 | 1        |
|         | SOCKEYE SALMON   | PARR     | 0.45   | 4.45  | 0.21 | 2        |
|         | CHINDOK SALMON   | PARR     | 0.27   | 4.50  | 0.00 | 1        |
|         | RJUNJ WHITE FISH | PARR     | 0.23   | 7.60  | 0.00 | 1        |
|         | ROUND WHITE FISH | JUVENILE | 1.26   | 11.34 | 1.63 | 5        |
|         | SLIMY SCULPIN    | JUVENILE | 0.27   | 5.00  | 0.00 | 1        |
|         | SLIMY SCULPIN    | ADULT    | 0.76   | 6.97  | 0.25 | 3        |
|         | CHUM SALMON      | PARR     | 1.23   | 5.08  | 0.45 | 5        |
| 3       | DOLLY VARDEN     | PARR     | 0.37   | 10.25 | 2.76 | 2        |
|         | DJLLY VARDEN     | JUVENILE | 0.37   | 12.15 | 0.92 | 2        |
|         | COHO SALMON      | PARR     | 0.20   | 7.10  | 0.00 | . 1      |
|         | ROUND WHITE FISH | JUVENILE | 0.40   | 9.30  | 2.83 | 2        |
|         | SLIMY SCULPIN    | JUVENILE | 0.59   | 5.20  | 0.36 | 3        |
| 1.      | SLIMY SCULPIN    | ADULT    | 0.55   | 8.03  | 0.38 | 3        |
|         | CHUM SALMON      | PARR     | 0.72   | 3.85  | 0.21 | 4        |
| 4       | DULLY VARDEN     | PARR     | 0.77   | 5.93  | 3.18 | . 3      |
|         | COHO SALMON      | PARR     | 1.82   | 6.81  | 2.81 | 7        |
|         | ROUND WHITE FISH | PARR     | 0.24   | 8.00  | 0.00 | 1        |
|         | ROUND WHITE FISH | JUVENILE | 0.48   | 7.60  | 0.71 | 2        |
|         | SLIMY SCULPIN    | JUVENILE | 0.18   | 4.10  | 0.00 | 1        |
|         | SLIMY SCULPIN    | ADULT    | 0.24   | 11.50 | 0.00 | 1        |
|         | CHUM SALMON      | PARR     | 2.45   | 4.77  | 0.45 | 10       |
| 5       | COHD SALMON      | PARR     | 3.93   | 4.64  | 0.56 | 14       |
|         | SLIMY SCULPIN    | PARR     | 0.31   | 4.60  | 0.00 | 1        |
|         | CHUM SALMON      | PARR     | 2.31   | 4.25  | 0.40 | 10       |
| 6       | DOLLY VARDEN     | PARR     | 0.36   | 8.50  | 0.00 | 1        |
|         | COHO SALMON      | PARR     | 1.10   | 3.95  | 0.44 | 4        |
| 8       | DOLLY VARDEN     | PARR     | 0.74   | 11.03 | 0.21 | 3        |
|         | DOLLY VARDEN     | JUVENILE | 0.25   | 14.80 | 0.00 | <b>1</b> |
|         | SLIMY SCULPIN    | JUVENILE | 0.49   | 5+65  | 0.07 | 2        |
|         | CHUM SALMON      | PARR     | 0.32   | 4.20  | 0.00 | . 1      |
| 9       | DOLLY VARDEN     | PARR     | 2.24   | 7.10  | 1.43 | 8        |
|         | COHO SALMON      | PARR     | 0.31   | 4.70  | 0.00 | 1        |
|         | SLIMY SCULPIN    | JUVENILE | 0.57   | 5.30  | 0.42 | 2        |
| 10      | DOLLY VARDEN     | PARR     | 3.41   | 7.09  | 1.92 | 12       |

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TABLE 33-3. CATCH PER EFFORT: ELECTROSHOCKING SAMPLES JUNE 1983 Length

| STATION                                                                                                         | SPECIES                 | LIFE<br>STAGE | CATCH/<br>Effort | MEAN  | S.D.  | N       |
|-----------------------------------------------------------------------------------------------------------------|-------------------------|---------------|------------------|-------|-------|---------|
| 10                                                                                                              | CDHD SAL40N             | PARR          | 0.32             | 6.90  | 0.00  |         |
| • •                                                                                                             | SLINY SCULPIN           | JUVENTLE      | 0.87             | 4.83  | 0.38  | -<br>र  |
|                                                                                                                 | SLIMY SCULPIN           | ADULT         | 0.24             | 7.40  | 0.00  | 1       |
|                                                                                                                 |                         |               |                  |       |       |         |
| 11                                                                                                              | DOLLY VARDEN            | PARR          | 1.09             | 6.42  | 1.75  |         |
| •                                                                                                               | DOLLY VARDEN            | JUVENILE      | 0.23             | 10.50 | 0.00  | 1       |
| •                                                                                                               | COHO SALMON             | PARR          | 0.63             | 4.40  | 0.00  | 2       |
| 12                                                                                                              | DULLY VARDEN            | PARR          | 0.42             | 8.70  | 3.54  | 2       |
|                                                                                                                 | COHOSALMON              | PARR          | 1.08             | 5.52  | 1.49  | 6       |
|                                                                                                                 | PYGMY WHITE FISH        | ADULT         | 0.17             | 5.20  | 0.0   | 1       |
| a de la companya de l | SJCKEYE SALMON          | PARR          | 0.35             | 4.35  | 0.21  | 2       |
|                                                                                                                 | ROUND WHITE FISH        | JUVENILE      | 0.17             | 11.20 | 0.00  | 1       |
|                                                                                                                 | SLIMY SCULPIN           | PARR          | 0.17             | 2.50  | 0.00  | 1       |
| •                                                                                                               | SLIMY SCULPIN           | JUVENILE      | 0.69             | 3.40  | 0.61  | . 4     |
|                                                                                                                 | THREE-SPINE STICKLEBACK | ADULT         | 0.64             | 8.07  | 0.05  | 3       |
| 13                                                                                                              | DJLLY VARDEN            | PARR          | 3.66             | 7.12  | 1.52  | 13      |
| 1.4                                                                                                             | DOLLY VARDEN            | PARR          | 0.94             | 8-47  | 3.55  | 3       |
|                                                                                                                 | COHO SAL YON            | PARR          | 14.91            | 3.87  | 0-39  | 53      |
|                                                                                                                 |                         |               |                  |       |       | . •••   |
| 15                                                                                                              | DJLLY VARDEN            | PARR          | 2.14             | 6.96  | 2.31  | 7       |
|                                                                                                                 | SJCKEYE SALMON          | PARR          | 0.25             |       |       | 0       |
|                                                                                                                 | SLIMY SCULPIN           | JUVENILE      | 0.22             | 3.90  | 0.00  | 1       |
| 16                                                                                                              | DJLLY VARDEN            | PARR          | 0.68             | 7.50  | 0.56  | . 3     |
|                                                                                                                 | COHO SALMON             | PARR          | 0.22             | 3.40  | 0.00  | 1       |
|                                                                                                                 | SJCKEYE SALMON          | PARR          | 0.23             | 7.10  | 0.00  | 1       |
| 17                                                                                                              | DOLLY VARDEN            | PARR          | 1.67             | 6-40  | 2.50  | 6       |
|                                                                                                                 | DOLLY VARDEN            | JUVENILE      | 1.62             | 11.95 | 1.79  | 6       |
|                                                                                                                 | COHO SALMON             | PARR          | 0.27             | 5.50  | 0.00  | 1       |
|                                                                                                                 | SJCKEYE SALMON          | PARR          | 0.29             | 5.20  | 0.00  | 1       |
| 18                                                                                                              | DOLLY VARDEN            | PARR          | 0.22             | 6-40  | 0.00  | . 1     |
|                                                                                                                 | COHO SALMON             | PARR          | 0.50             | 5.55  | 1.63  | 2       |
| 1 D                                                                                                             | DOLLY VARDEN            | PARR          | 0-65             |       | · · · | n       |
|                                                                                                                 | COHO SALMON             | PARR          | 0.34             |       |       | 0       |
|                                                                                                                 | SJCKEYE SALMON          | PARR          | 0.31             | 3.60  | 0.00  | 1       |
| 20                                                                                                              | DOLLY VARDEN            | JUVENTLE      | 0.30             | 13-10 | 0-00  | ۰.<br>1 |
|                                                                                                                 | COHO SALMON             | PARR          | 1.79             | 5-10  | 0-41  | 4       |
| . ·                                                                                                             | SJCKEYE SALHON          | PARR          | 1.41             | 3-16  | 0.24  | 5       |
|                                                                                                                 | S_IMY SCULPIN           | JUVENILF      | 0.28             | 4,90  | 0_00  | 1       |
|                                                                                                                 | SLINY SCULPIN           | ADULT         | 0.91             | 8-70  | 0.30  | 3       |
|                                                                                                                 |                         |               |                  |       |       | Ŭ       |
| 21                                                                                                              | DOLLY VARDEN            | PARR          | 1.70             | 7.93  | 0-43  | 9       |

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TABLE 33-3. CATCH PER EFFORT: ELECTROSHDCKING SAMPLES JUNE 1983

| STATION | SPECIES                | LIFE<br>Stage | CATCH/<br>Effort | MEAN  | S.D. | N            |
|---------|------------------------|---------------|------------------|-------|------|--------------|
| 21      | DOLLY VARDEN           | JUVENTLE      | 0.51             | 14.43 | 0.51 |              |
|         | CHUM SALMON            | PARR          | 1.64             | 4.27  | 0.65 | 6            |
| 22      | DOLLY VARDEN           | JUVENILE      | 0.86             | 12.20 | 0.41 | 4            |
|         | SJCKEYE SALMON         | PARR          | 1.43             | 7.10  | 1.38 | 5            |
|         | SLIMY SCULPIN          | ADULT         | 0.43             | 8.55  | 0.21 | 2            |
| 23      | DOLLY VARDEN           | PARR          | 1.78             | 8.16  | 1.80 | 7            |
|         | DOLLY VARDEN           | JUVENILE      | 0.24             | 13.00 | 0.00 | 1            |
|         | SLIMY SCULPIN          | JUVENILE      | 0.29             | 4.60  | 0.00 | 1            |
|         | SLIMY SCULPIN          | ADULT         | 0.53             | 8.35  | 2.47 | 2            |
| 24      | DOLLY VARDEN           | PARR          | 1.14             | 8.30  | 1.60 | 7            |
|         | DOLLY VARDEN           | JUVENILE      | 0.33             | 11.75 | 0.64 | . 2          |
|         | SJCKEYE SALMON         | PARR          | 0.33             | 5.45  | 0.07 | 2            |
|         | SLIMY SCULPIN          | JUVENILE      | 0.33             | 6.30  | 0.28 | 2            |
|         | SLIMY SCULPIN          | ADULT         | 0.65             | 9.00  | 0.48 | 4            |
| 25      | ND FISH                |               | 0.00             |       |      | 0            |
| 26      | DOLLY VARDEN           | PARR          | 0.62             | 6.40  | 1.59 | 3            |
|         | SJCKEYE SALMON         | PARR          | 7.55             | 4.19  | 0.71 | 27           |
|         | SLIMY SCULPIN          | PARR          | 0.77             | 3.83  | 1.30 | 3            |
|         | SLIMY SCULPIN          | JUVENILE      | 0.84             | 3.97  | 0.87 | 3            |
|         | SLIMY SCULPIN          | ADULT         | 0.41             | 4.90  | 0.28 | 2            |
|         | LAKE TROUT             | ADULT         | 0.21             | 37.70 | 0.00 | 1            |
|         | LAKE TROUT             |               | 0.28             | 30.00 | 0.00 | 1            |
| 27      | NJ FISH                |               | 0.00             |       |      | 0            |
| 28      | DULLY VARDEN           | PARR          | 0.38             | 9.30  | 0.00 | 1            |
| 4 0     | DOLLY VARDEN           | PARR          | 1.03             | 7.22  | 1.99 | 4            |
|         | DJLLY VARDEN           | JUVENILE      | 0.26             | 15.10 | 0.00 | 1            |
|         | SLIMY SCULPIN          | JUVENILE      | 0.24             | 6.60  | 0.0  | 1            |
|         | SLIMY SCULPIN          | ADULT         | 0.50             | 8.75  | 2.62 | 2            |
|         | NINE-SPINE STICKLEBACK | ADULT         | 0.24             | 4.70  | 0.00 | - 1          |
|         | PINK SALMON            | PARR          | 0.26             | 4.50  | 0.00 | 1            |
| 41      | COHO SALMON            | PARR          | 0.27             | 5.40  | 0.00 | 1            |
|         | SLIMY SCULPIN          | ADULT         | 0.27             | 7.20  | 0.00 | . • <b>1</b> |
| 42      | SLIMY SCULPIN          | JUVENILE      | 0.23             | 5.10  | 0.00 | 1            |
| 4 3     | CHINDOK SALMON         | PARR          | 1.09             | 4.76  | 0.23 | 5            |
|         | SLIMY SCULPIN          | JUVENILE      | 0.47             | 6.00  | 0.14 | 2            |
|         | SLIMY SCULPIN          | ADULT         | 0.87             | 8+65  | 1.80 | 4            |
| 4 4     | DJLLY VARDEN           | PARR          | 0.58             | 5.75  | 2.05 | 2            |

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TABLE 93-3. CATCH PER EFFORT: ELECTROSHOCKING SAMPLES JUNE 1983

| STATION | SPECIES                | LIFE<br>Stage | CATCH/<br>Effort | MEAN    | \$•D• | N  |
|---------|------------------------|---------------|------------------|---------|-------|----|
| 44      | CHINDOK SALMON         | PARR          | 1.77             | 3.95    | 0.39  |    |
|         | SLIMY SCULPIN          | JUVENILE      | 0.58             | 6.55    | 2.47  | 2  |
| 45      | NJ FISH                |               | 0.00             | · · · · |       | 0  |
| 6 A     | DOLLY VARDEN           | PARR          | 0.69             | 3.60    | 0.26  | 3  |
|         | COHO SALMON            | PARR          | 0.25             | 4.10    | 0.00  | 1  |
|         | PYSMY WHITE FISH       | ADULT         | 0.21             | 8.70    | 0.00  | 1  |
|         | SJCKEYE SALMON         | PARR          | 0.21             | 4.30    | 0.00  | 1  |
|         | SLIMY SCULPIN          | JUVENILE      | 1.12             | 4.26    | 1.21  | 5  |
|         | SLIMY SCULPIN          | ADULT         | 1.42             | 9.08    | 1.33  | 6  |
| 16A     | DJLLY VARDEN           | PARR          | 5.48             | 5.48    | 2.37  | 24 |
|         | COHD SALMON            | PARR          | 5.03             | 4.88    | 0.63  | 19 |
|         | SLIMY SCULPIN          | JUVENILE      | 0.15             | 3.40    | 0.00  | 1  |
|         | SLIMY SCULPIN          | ADULT         | 0.32             | 8.30    | 0.00  | 1  |
|         | CHUM SALMON            | PARR          | 0.54             | 4.20    | 0.28  | 2  |
| 17D     | DOLLY VARDEN           | PARR          | 3.70             | 8.95    | 2.57  | 16 |
|         | DOLLY VARDEN           | JUVENILE      | 1.14             | 11.58   | 3.23  | 5  |
| *       | CHINDOK SALMON         | PARR          | 0.46             | 5.40    | 0.28  | 2  |
|         | ROUND WHITE FISH       | JUVENILE      | 0.23             | 18.50   | 0.00  | 1  |
|         | SLIMY SCULPIN          | JUVENILE      | 0.23             | 5.50    | 0.00  | 1  |
|         | SLIMY SCULPIN          | ADULT         | 1.81             | 8.21    | 0.79  | 8  |
| 18A     | DOLLY VARDEN           | JUVENILE      | 0.20             | 10.30   | 0.00  | 1  |
| 19A     | DULLY VARDEN           | PARR          | 1.75             | 6.92    | 1.82  | 6  |
|         | SLIMY SCULPIN          | JUVENILE      | 0.33             | 8.70    | 0.00  | 1  |
|         | SLIMY SCULPIN          | ADULT         | 0.33             | 9.10    | 0.00  | 1  |
| 40A     | DJLLY VARDEN           | JUVENILE      | 0.30             | 4.00    | 0.00  | 1  |
| 41A     | DULLY VARDEN           | PARR          | 0.64             | 7.07    | 1.55  | 3  |
|         | SLIMY SCULPIN          | ADULT         | 0.21             | 5.70    | 0.00  | 1  |
| 42A     | DULLY VARDEN           | PARR          | 0.45             | 5.00    | 0.42  | 2  |
|         | CHINDOK SALMON         | PARR          | 3.09             | 4.01    | 0.40  | 21 |
|         | SLIMY SCULPIN          | JUVENILE      | 0.28             | 5.10    | 0.00  | 1  |
|         | SLIMY SCULPIN          | ADULT         | 0.22             | 5.40    | 0.00  | 1  |
| 43A     | CHINDOK SALMON         | PARR          | 5.83             | 4.30    | 0.44  | 22 |
|         | NINE-SPINE STICKLEBACK | ADULT         | 0.24             | 6.80    | 0.00  | 1  |
| 44 A    | CHINDOK SALMON         | PARR          | 9.65             | 3.91    | 0.58  | 37 |
|         | SLIMY SCULPIN          | JUVENILE      | 0.75             | 3.50    | 1.74  | 3  |
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### TABLE B3-4. CATCH PER EFFORT: MINNOW TRAP SAMPLES JUNE 1983

|         |                         | LIFE     | CATCH/  |         |       |     |
|---------|-------------------------|----------|---------|---------|-------|-----|
| STATION | SPECIES                 | STAGE    | EFFORT  | MEAN    | S.D.  | N   |
| 1       |                         | PADR     | 0.70    | 12.21   | 1.06  |     |
| • . •   | DOLLY VARDEN            | HIVENTIE | 1.10    | 14.13   | 1.31  | 11  |
|         | COHO SALVON             | DADD     | 1.10    | 9.77    | 1.20  |     |
|         | CATNOCK SALMON          |          | 0 10    | 7011    | 1.00  |     |
|         | CITWY CONLOTA           | FARR     | 0.20    | 5 00    |       | 1   |
|         | SLIMT SLULPIN           | JUVENILE | 0.20    | 5.50    | 0.071 | 2   |
|         | SLITI SUULPIN           | AUULI    | 0.50    | 8.5/    | 0.51  | 3   |
|         | NINE-SPINE STICKLEBACK  | JUVENILE | 0.10    | 4.70    | 0.00  | 1   |
|         | TAREI-SPINE STICKLEBACK | ADULI    | 6 • 3 U | 8.28    | 0.54  | 63  |
| 2       | DOLLY VARDEN            | PARR     | 0.60    | 24.77   | 36.88 | 6   |
|         | DOLLY VARDEN            | JUVENILE | 1.30    | 12.08   | 1.42  | 13  |
|         | COHO SALMON             | PARR     | 0.20    | 6.65    | 4.74  | 2   |
|         | SLIMY SCULPIN           | JUVENILE | 0.30    | 5.70    | 1.25  | 3   |
|         | SLIMY SCULPIN           | ADULT    | 0.40    | 8.20    | 0.26  | 4   |
| · · · · | THREE-SPINE STICKLEBACK | JUVENILE | 0.10    | 8.20    | 0.00  | 1   |
|         | THREE-SPINE STICKLEBACK | ADULT    | 0.10    | 8.10    | 0.00  | 1   |
| 3       | DOLLY VARDEN            | PARR     | 0.67    | 10.22   | 1.04  | 6   |
|         | DOLLY VARDEN            | JUVENILE | 0.44    | 11.85   | 1.71  | 4   |
|         | SLIMY SCULPIN           | ADULT    | 0.22    | 8.85    | 2.47  | 2   |
|         | THREE-SPINE STICKLEBACK | ADULT    | 0.11    | 8.00    | 0.00  | 1   |
| 4       | DOLLY VARDEN            | PARR     | 1.30    | 10.56   | 2.23  | 13  |
|         | COHO SALMON             | PARR     | 0.80    | 5.86    | 1.63  | 8   |
|         | SLIMY SCULPIN           | JUVENILE | 0.10    | 8.10    | 0.00  | 1   |
|         | SLIMY SCULPIN           | ADULT    | 0 • 4 0 | 9.55    | 0.83  | 4   |
|         | THREE-SPINE STICKLEBACK | ADULT    | 0.10    | 8 • 0 0 | 0.00  | 1   |
| 5       | DOLLY VARDEN            | PARR     | 0.22    | 10.85   | 2.47  | 2   |
| •       | COHO SALMON             | PARR     | 0.89    | 11.29   | 2.42  | 8   |
|         | SOCKEYE SALMON          | PARR     | 0.11    | 5.50    | 0.00  | 1   |
| •       | SLIMY SCULPIN           | JUVENILE | 0.22    | 4.05    | 0.78  | 2   |
|         | S_IMY SCULPIN           | ADULT    | 0.11    | 9.70    | 0.00  | 1   |
| ·       | THREE-SPINE STICKLEBACK | ADULT    | 5.99    | 8.32    | 0.74  | 54  |
| 6       | DOLLY VARDEN            | PARR     | 1.50    | 11.19   | 2.30  | 15  |
|         | COHO SALMON             | PARR     | 0.30    | 6.97    | 3.08  | 3   |
|         | SLIMY SCULPIN           | JUVENILE | 0 • 4 0 | 5.35    | 0.26  | 4   |
|         | SLIMY SCULPIN           | ADULT    | 0.30    | 9.30    | 1.30  | 3   |
|         | THREE-SPINE STICKLEBACK | ADULT    | 0.30    | 8.40    | 0.26  | 3   |
| 8       | DJLLY VARDEN            | PARR     | 0.10    | 11.20   | 0.00  | 1   |
|         | COHO SALMON             | PARR     | 0.50    | 4.78    | 0.70  | 5   |
|         | SLIMY SCULPIN           | JUVENILE | 0.10    | 6.50    | 000   | 1   |
|         | SLIMY SCULPIN           | ADULT    | 0.10    | 8.40    | 0.00  | - 1 |
|         | THREE-SPINE STICKLEBACK | ADULT    | 0.20    | 7.15    | 1.48  | 2   |
|         | CHUM SALMON             | PARR     | 0.20    | 3.95    | 0.92  | 2   |
| 9       | DOLLY VARDEN            | PARR     | 1.10    | 8.09    | 2.69  | 11  |

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TABLE B3-4. CATCH PER EFFORT: MINNOW TRAP SAMPLES JUNE 1983

| STATION | SPECIES                 | LIFE<br>STAGE | CATCH/<br>Effort | MEAN          | S.D. | N      |
|---------|-------------------------|---------------|------------------|---------------|------|--------|
|         |                         |               |                  |               |      |        |
|         | SLIMY SCULPIN           | ADULT         | 0.50             | 5.30<br>11.30 | 0-90 | 3<br>1 |
| 10      | DULLY VARDEN            | PARR          | 3.80             | 10.46         | 2.00 | 38     |
|         | THREE-SPINE STICKLEBACK | ADULT         | 0.40             | 8.57          | 0.25 | 4      |
| 11      | DOLLY VARDEN            | PARR          | 0.33             | 11.87         | 1.76 | 3      |
|         | DJLLY VARDEN            | JUVENILE      | 0.11             | 14.00         | 0.00 | 1      |
|         | DJLLY VARDEN            | ADULT         | 0.11             | 9.40          | 0.00 | 1      |
|         | COHO SALMON             | PARR          | 0.78             | 8.69          | 1.39 | 7      |
|         | SLIMY SCULPIN           | PARR          | 0.11             | 2.60          | 0.00 | 1      |
|         | NINE-SPINE STICKLEBACK  | JUVENILE      | 0.11             | 5.30          | 0.00 | 1      |
|         | THREE-SPINE STICKLEBACK | PARR          | 0.11             | 8.50          | 0.0  | 1      |
|         | THREE-SPINE STICKLEBACK | ADULT         | 0.55             | 8.36          | 0.13 | 5      |
| 12      | DOLLY VARDEN            | PARR          | 1.00             | 9.82          | 1.22 | 5      |
|         | DOLLY VARDEN            | JUVENILE      | 1.40             | 12.46         | 1.05 | - 7    |
|         | COHO SA, YON            | PARR          | 1.40             | 6.13          | 1.50 | 7      |
|         | SJCKEYE SALMON          | PARR          | 0.20             | 3.50          | 0.00 | 1      |
|         | SLIMY SCULPIN           | ADULT         | 0.40             | 7.70          | 2.12 | 2      |
|         | THREE-SPINE STICKLEBACK | ADULT         | 0.40             | 8.55          | 0.07 | 2      |
| 13      | DOLLY VARDEN            | PARR          | 4.33             | 6.90          | 1.65 | 39     |
|         | DOLLY VARDEN            | JUVENILE      | 1.00             | 11.24         | 0.91 | 9      |
|         | COHO SALMON             | PARR          | 1.66             | 4.46          | 0.60 | 15     |
|         | SLIMY SCULPIN           | ADULT         | 0.11             | 9.40          | 0.00 | 1      |
|         | CHUM SALMON             | PARR          | 0.11             | 3.50          | 0.00 | 1      |
| 14      | DULLY VARDEN            | PARR          | 0.78             | 4.93          | 1.55 | 7      |
|         | DOLLY VARDEN            | JUVENILE      | 0.33             | 11.70         | 0.61 | 3      |
|         | CDHD SALMON             | PARR          | 3.11             | 4.76          | 1.76 | 28     |
| 15      | DOLLY VARDEN            | PARR          | 0.10             | 4.10          | 0.00 | . 1    |
|         | DOLLY VARDEN            | JUVENILE      | 0.10             | 7.00          | 0.00 | 1      |
| 16      | DJLLY VARDEN            | PARR          | 1.10             | 9.98          | 1.35 | 11     |
|         | DJLLY VARDEN            | JUVENILE      | 0.20             | 13.80         | 0.00 | 2      |
|         | SLIMY SCULPIN           | ADULT         | 0.10             | 12.00         | 0.00 | 1      |
| 17      | DOLLY VARDEN            | PARR          | 0.40             | 9.55          | 0.26 | 4      |
|         | DOLLY VARDEN            | JUVENILE      | 0.60             | 11.55         | 1.51 | 6      |
| ·       | COHO SALMON             | PARR          | 0.10             | 4.70          | 0.00 | . 1    |
|         | SLIMY SCULPIN           | ADULT         | 0.10             | 5.90          | 0.00 | · . 1  |
| 18      | DJLLY VARDEN            | PARR          | 0.20             | 7.50          | 3.39 | 2      |
|         | DOLLY VARDEN            | JUVENILE      | 0.10             | 12.20         | 0.00 | . 1    |
|         | SLIMY SCULPIN           | ADULT         | 0.10             | 7.70          | 0.00 | 1      |
| 19      | DOLLY VARDEN            | JUVENILE      | 0.22             | 11.90         | 0.99 | 2      |

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### TABLE B3-4. CATCH PER EFFORT: MINNOW TRAP SAMPLES JUNE 1983

| STATION                                                                                                         | SPECIES                 | LIFE<br>STAGE | CATCH/<br>EFFORT | MEAN  | S.D.            | N   |
|-----------------------------------------------------------------------------------------------------------------|-------------------------|---------------|------------------|-------|-----------------|-----|
| 1 D                                                                                                             | DULLY VARDEN            | PARR          | 1.89             | 10.44 | 1.58            | 17  |
|                                                                                                                 | DJLLY VARDEN            | JUVENILE      | 0.11             | 13.00 | 0.00            | 1   |
|                                                                                                                 | CJHJ SALMON             | PARR          | 0.33             | 5.37  | 2.37            | 3   |
| 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - | SJEKEYE SALMON          | PARR          | 0.11             | 4.40  | 0.00            | 1   |
|                                                                                                                 | SLIMY SCULPIN           | JUVENILE      | 0.11             | 2.50  | 0.00            | 1   |
|                                                                                                                 | SLIMY SCULPIN           | ADULT         | 0.11             | 7.00  | 0.00            | 1   |
|                                                                                                                 | NINE-SPINE STICKLEBACK  | JUVENILE      | 0.11             | 3.70  | 0.00            | 1   |
|                                                                                                                 | THREE-SPINE STICKLEBACK | PARR          | 0.11             | 9.50  | 0.00            | 1   |
|                                                                                                                 | THREE-SPINE STICKLEBACK | ADULT         | 5.77             | 8.07  | 0.38            | 52  |
|                                                                                                                 | CHUM SALMON             | PARR          | 0.22             | 4.90  | 0.00            | 1   |
| 20                                                                                                              | DOLLY VARDEN            | PARR          | 0.20             | 9.25  | 0.92            | 2   |
|                                                                                                                 | COHO SALMON             | PARR          | 0.50             | 4.38  | 0.78            | 5   |
|                                                                                                                 | SJCKEYE SALMON          | PARR          | 1.10             | 4.24  | 0.61            | 11  |
|                                                                                                                 | SLIMY SCULPIN           | ADULT         | 0.40             | 7.87  | 0.93            | . 4 |
| 21                                                                                                              | DOLLY VARDEN            | PARR          | 0.10             | 9.90  | 0.00            | 1   |
|                                                                                                                 | DOLLY VARDEN            | JUVENILE      | 0.50             | 13.20 | 1.91            | 5   |
|                                                                                                                 | COHO SALMON             | PARR          | 0.50             | 3.66  | 0.17            | 5   |
| 22                                                                                                              | DOLLY VARDEN            | PARR          | 0.22             | 3.90  | 0.14            | 2   |
| 23                                                                                                              | DOLLY VARDEN            | PARR          | 0.50             | 7.22  | 3.74            | 5   |
| · ·                                                                                                             | DOLLY VARDEN            | JUVENILE      | 0.20             | 13.35 | 0.21            | 2   |
| 24                                                                                                              | DOLLY VARDEN            | JUVENILE      | 0.10             | 10.80 | 0.00            | 1   |
| 40                                                                                                              | DJLLY VARDEN            | PARR          | 1.10             | 7.71  | 1.84            | 11  |
|                                                                                                                 | DJLLY VARDEN            | JUVENILE      | 1.50             | 12.84 | 1.46            | 15  |
| •                                                                                                               | SLIMY SCULPIN           | ADULT         | 0.10             | 7.90  | 0.00            | 1   |
|                                                                                                                 | NINE-SPINE STICKLEBACK  | ADULT         | 0.10             | 6.20  | 0.00            | 1   |
|                                                                                                                 | THREE-SPINE STICKLEBACK | JUVENILE      | 0.10             | 9.00  | 0.00            | 1   |
|                                                                                                                 | THREE-SPINE STICKLEBACK | ADULT         | 1.80             | 8.36  | 0.27            | 18  |
| 41                                                                                                              | DOLLY VARDEN            | PARR          | 0.60             | 8.23  | 1.27            | 6   |
|                                                                                                                 | DOLLY VARDEN            | JUVENILE      | 0.50             | 13.00 | 0.92            | - 5 |
|                                                                                                                 | CJHJ SALMON             | PARR          | 0.60             | 5.02  | 1.38            | 6   |
|                                                                                                                 | SLIMY SCULPIN           | JUVENILE      | 0.10             | 6.70  | 0.00            | - 1 |
|                                                                                                                 | SLIMY SCULPIN           | ADULT         | 0.20             | 8.70  | 1.27            | 2   |
| 42                                                                                                              | DOLLY VARDEN            | PARR          | 0.20             | 6.05  | 2.62            | 2   |
|                                                                                                                 | DJLLY VARDEN            | JUVENILE      | 0.40             | 11.65 | 2.42            | 4   |
|                                                                                                                 | CJHJ SALMON             | PARR          | 0.50             | 7.56  | 1.17            | 5   |
| •                                                                                                               | CHINDOK SALMON          | PARR          | 7.60             | 5.05  | 1.86            | 76  |
|                                                                                                                 | SLIMY SCULPIN           | JUVENILE      | 0.30             | 5.63  | 0.55            | 3   |
|                                                                                                                 | SLIMY SCULPIN           | ADULT         | 0.10             | 5.50  | 0.00            | 1   |
|                                                                                                                 | NIVE-SPINE STICKLEBACK  | JUVENILE      | 0.20             | 4.20  | 0.71            | 2   |
|                                                                                                                 | NINE-SPINE STICKLEBACK  | ADULI         | 1.20             | 5.47  | 1.25            | 12  |
|                                                                                                                 | ITKEL-SPINE STICKLEBACK | ADULT         | 0.10             | 9.10  | $0 \bullet 0 0$ | · 1 |

TABLE B3-4. CATCH PER EFFORT: MINNOW TRAP SAMPLES JUNE 1983

LENGTH

|   | STATION                                  | SPECIES                 | LIFE<br>Stage | CATCH/<br>Effort | MEAN  | S.D.  | N          |
|---|------------------------------------------|-------------------------|---------------|------------------|-------|-------|------------|
|   |                                          | DALLY VARDEN            |               |                  | 0.14  | ·     |            |
|   |                                          | DOLLY VARDEN            | JUVENTLE      | 0.40             | 13.40 | 1.47  | 7          |
|   |                                          | COHO SAL MON            | DADD          | 0.10             | 9.30  | 0.00  |            |
|   |                                          | CHINDOK SALMON          | DIDD          | 0 50             | 7030  |       | 1          |
|   | •<br>•                                   | SLIMY SCULPIN           | JUVENILE      | 0.30             | 4.23  | 2.05  | 3          |
|   | 44                                       | DOLLY VARDEN            | JUVENILE      | 0.10             | 10.80 | 0.00  | 1          |
|   |                                          | CJHJ SALHUN             | PARR          | 0.20             | 8.50  | 2.40  | 2          |
|   |                                          | CHINJOK SALMON          | PARR          | 3.40             | 3.94  | 0.46  | - 34       |
|   |                                          | SLIMY SCULPIN           | ADULT         | 0.10             | 6.90  | 0.00. | 1          |
|   |                                          | NINE-SPINE STICKLEBACK  | ADULT         | 0.30             | 5.87  | 0.35  | 3          |
|   | 45                                       | COHO SALMON             | PARR          | 0.40             | 8.85  | 0.72  | 4          |
|   | • 1 · · ·                                | NINE-SPINE STICKLEBACK  | JUVENILE      | 0.40             | 2.65  | 0.13  | 4          |
|   |                                          | NINE-SPINE STICKLEBACK  | ADULT         | 7.00             | 5.38  | 0.79  | . 70       |
|   |                                          | THREE-SPINE STICKLEBACK | ADULT         | 0.10             | 5.50  | 0.00  | . 1        |
|   | 6 A                                      | DOLLY VARDEN            | PARR          | 0.70             | 9.36  | 0.98  | 7          |
|   |                                          | DOLLY VARDEN            | JUVENILE      | 0.90             | 11.09 | 2.17  | 9          |
|   | - · · ·                                  | S_IMY SCULPIN           | ADULT         | 0.10             | 9.70  | 0.00  | 1          |
|   | 16A                                      | DILLY VARDEN            | PARR          | 1.10             | 7.43  | 2.62  | 11         |
|   |                                          | DOLLY VARDEN            | JUVENILE      | 0.10             | 10.70 | 0.00  | 1          |
|   | • •                                      | COHO SALMON             | PARR          | 6.30             | 4.80  | 1.13  | 63         |
|   |                                          | SLIMY SCULPIN           | JUVENILE      | 0.40             | 6.57  | 0.94  | 4          |
|   |                                          | SLIMY SCULPIN           | ADULT         | 1.30             | 8.51  | 0.93  | 13         |
|   |                                          | NINE-SPINE STICKLEBACK  | PARR          | 0.10             | 4.50  | 0.00  | 1          |
|   | •                                        | THREE-SPINE STICKLEBACK | ADULT         | 0.60             | 8.30  | 0.39  | 6          |
|   | 17D                                      | DOLLY VARDEN            | PARR          | 0.44             | 9.92  | 1.19  | 4          |
|   |                                          | DJLLY VARDEN            | JUVENILE      | 1.00             | 12.22 | 1.93  | 9          |
|   |                                          | SLIMY SCULPIN           | ADULT         | 0.11             | 9.30  | 0.00  | 1          |
|   | 18A                                      | DOLLY VARDEN            | PARR          | 1.00             | 9.70  | 1.64  | 7          |
|   |                                          | DJELT VARDEN            | JUVENILE      | U • 4 3          | 11.10 | U.19  | 3          |
|   | 19A                                      | DOLLY VARDEN            | PARR          | 0.78             | 7.80  | 1.75  | . <b>7</b> |
|   |                                          | SLIMY SCULPIN           | ADULT         | 0.11             | 8.10  | 0.00  | 1          |
|   | 40A                                      | DOLLY VARDEN            | PARR          | 1.00             | 7.61  | 2.10  | 10         |
|   |                                          | DOLLY VARDEN            | JUVENILE      | 1.10             | 12.51 | 1.54  | 11         |
|   |                                          | COHO SALMON             | PARR          | 0.20             | 3.30  | 0.28  | 2          |
|   | *                                        | CHINDOK SALMON          | PARR          | 0.10             | 3.90  | 0.00  | - 1        |
|   | •                                        | SLIMY SCULPIN           | ADULT         | 0.10             | 8.50  | 0.00  | 1          |
|   | 41A                                      | DOLLY VARDEN            | PARR          | 0.22             | 6.15  | 0.64  | 2          |
| • | 42A                                      | DOLLY VARDEN            | PARR          | 1.33             | 5.18  | 1.74  | 12         |
|   | na an a | DJLLY VARDEN            | JUVENILE      | 0.11             | 11.70 | 0.00  | 1          |

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### TABLE B3-4. CATCH PER EFFORT: MINNOW TRAP SAMPLES June 1983

| STATION | SPECIES                | LIFE<br>Stage | CATCH/<br>EFFORT | MEAN  | S.D. | N          |
|---------|------------------------|---------------|------------------|-------|------|------------|
| 42 A    | COHO SALMON            | PARR          | 0.11             | 9.90  | 0.00 | 1          |
|         | CHINJUK SALHUN         | PAKK          |                  | 4.03  | 0.92 | 36         |
| 43A     | COHO SALMON            | PARR          | 0.30             | 10.27 | 1.07 | 3          |
|         | CHINDOK SALMON         | PARR          | 14.60            | 4.41  | 0.56 | 146        |
|         | SLIMY SCULPIN          | ADULT         | 0.20             | 9.65  | 0.92 | 2          |
|         | NINE-SPINE STICKLEBACK | ADULT         | 0.10             | 7.00  | 0.00 | 1          |
| 44A     | DJLLY VARDEN           | JUVENILE      | 0.11             | 14.00 | 0.00 | 1          |
|         | CHINDOK SALMON         | PARR          | 5.88             | 3.76  | 0.59 | 53         |
|         | SLIMY SCULPIN          | ADULT         | 0.44             | 8.52  | 0.75 | ` <b>4</b> |
|         | NINE-SPINE STICKLEBACK | PARR          | 0.11             | 4.50  | 0.00 | 1          |
|         | NINE-SPINE STICKLEBACK | ADULT         | 0.11             | 6.30  | 0.00 | 1          |
| 11.5    | DOLLY VARDEN           | PARR          | 1.20             | 8.42  | 1.64 | 12         |
|         | SLIMY SCULPIN          | JUVENILE      | 0.30             | 5.93  | 0.78 | 3          |
|         | SLIMY SCULPIN          | ADULT         | 0.10             | 6.30  | 0.00 | 1          |
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## TABLE B3-5.CATCH PER EFFORT: FYKE NET SAMPLESJUNE 1983

LENGTH

| STATION | SPECIES                                 | LIFE<br>STAGE       | CATCH/<br>Effort | MEAN   | S•D•  | Ņ   |
|---------|-----------------------------------------|---------------------|------------------|--------|-------|-----|
|         | * * * * * * * * * * * * * * * * * * * * | • • • • • • • • • • |                  |        |       |     |
| 4       | DJLLY VARDEN                            | ADULT               | 0.14             | 37.60  | 0.00  | 1   |
|         | PYGMY WHITE FISH                        | ADULT               | 0.14             |        |       | 0   |
|         | SJCKEYE SALMON                          | ADULT               | 0.14             | 63.70  | 0.00  | 1   |
|         | RAINBOW TROUT                           | JUVENILE            | 0.28             | 23.30  | 4.53  | 2   |
|         | RAINBOW TROUT                           | ADULT               | 1.28             | 34.70  | 8,58  | ç   |
|         | ROUND WHITE FISH                        | JUVENILE            | 0.29             | 14.75  | 1.06  | 2   |
|         | ROUND WHITE FISH                        | ADULT               | 0.28             | 34.50  | 2.97  | 2   |
|         | SLIMY SCJLPIN                           | ADULT               | 0.14             | 11.50  | 0.00  | 1   |
| 6       | CHINDOK SALMON                          | ADULT               | 0.11             | 59.00  | 0.00  | . 1 |
|         | RAINBOW TROUT                           | ADULT               | 1.21             | 40.69  | 3,89  | 11  |
|         | ROUND WHITE EISH                        | JUVENTLE            | 0.44             | 17.65  | 4.95  | 4   |
|         | RJUND WHITE FISH                        | ADULT               | 1.98             | 27.84  | 8.43  | 18  |
| 10      | DOLLY VARDEN                            | JUVENILE            | 0.11             |        |       | D   |
|         | DOLLY VARDEN                            | ADULT               | 9.78             | 39, 99 | 6.94  | 7   |
|         | SOCKEYE SALMON                          | ADHLT               | 1.57             | 58.46  | 6.19  | 15  |
|         | RAINSON TROUT                           |                     | 0.44             | 35,15  | 14.51 | - 4 |
|         | EULACHON                                | ADULT               | 2.34             | 20.39  | 2.61  | 21  |
|         |                                         |                     |                  |        |       |     |

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## TABLE B3-5. CATCH PER EFFORT: FYKE NET SAMPLES JUNE 1983

## LENGTH

| STATION | SPECIES                                 | LIFE<br>STAGE | CATCH/<br>EFFORT | MEAN  | S.D.  | N  |
|---------|-----------------------------------------|---------------|------------------|-------|-------|----|
|         | * * * * * * * * * * * * * * * * * * * * |               |                  |       |       |    |
| 4       | DJLLY VARDEN                            | ADULT         | 0.14             | 37.60 | 0.00  | 1  |
|         | PYGMY WHITE FISH                        | ADULT         | 0.14             |       |       | 0  |
|         | SJCKEYE SALMON                          | ADULT         | 0.14             | 63.70 | 0.00  | 1  |
|         | RAINBOW TROUT                           | JUVENILE      | 0.28             | 23.30 | 4.53  | 2  |
|         | RAINJOW TROUT                           | ADULT         | 1.28             | 34.90 | 8.58  | ç  |
|         | ROUND WHITE FISH                        | JUVENTLE      | 0.28             | 14.75 | 1.06  | 2  |
|         | ROUND WHITE FISH                        |               | 0.28             | 34.50 | 2.97  | 2  |
|         | SLIMY SCULPIN                           | ADULT         | 0.14             | 11.50 | 0.00  | 1  |
|         |                                         |               |                  |       |       |    |
| 6       | CHINDOK SALMON                          | ADULT         | 0.11             | 59.00 | 0.00  | 1  |
| -       | RAINBOW TROUT                           | ADULT         | 1.21             | 40.69 | 3.89  | 11 |
|         | ROUND WHITE FISH                        | JUVENILE      | 0 - 4 4          | 17.55 | 4.0=  | 4  |
|         | RJUND WHITE FISH                        | ADULT         | 1.78             | 27.84 | 8.43  | 18 |
|         |                                         |               |                  |       |       |    |
| 10      | DOLLY VARDEN                            | JUVENILE      | 0.11             |       |       | Ĉ  |
|         | DOLLY VARDEN                            | ADULT         | 0.78             | 39.99 | 6.94  | 7  |
|         | SOCKEYE SALMON                          | ADULT         | 1.57             | 58.46 | 6.19  | 15 |
|         | RAINBOW TROUT                           | ADULT         | 0.44             | 35-15 | 14.51 | 4  |
| •       | EULACHON                                | ADULT         | 2.34             | 20.39 | 2.61  | 21 |
|         |                                         |               |                  |       |       |    |