

## DRAFT

# SUSITNA HYDRO AQUATIC STUDIES DRAFT PHASE II DATA REPORT

WINTER AQUATIC STUDIES (October 1982 - May 1983)



ALASKA DEPARTMENT OF FISH AND GAME
Susitna Hydro Aquatic Studies
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1983

#### PREFACE

This report was prepared by the Alaska Department of Fish and Game (ADF&G) for the Alaska Power Authority (APA) and its principal contractor, Harza-Ebasco Susitna Joint Venture. It is a product of the five year study plan initiated by ADF&G in November, 1980 to assess the feasibility of the proposed two dam Susitna Hydroelectric project. Basic goals of the five year plan (Acres 1980) are as follows:

- describe the fishery and aquatic habitat resources of the Susitna River;
- 2) assess the impacts of development and operation of the Su-Hydro project on these resources; and
- 3) propose mitigation measures to minimize adverse impacts.

Item 1 is entirely the responsibility of the ADF&G aquatic studies program while items 2 and 3 are primarily the responsibilities of other investigators with ADF&G providing most of the field data to address these items. To provide data that will assist in meeting each of the above goals, research responsibilities were subdivided into three major elements: Adult Anadromous Fish Studies (AA); Resident and Juvenile Anadromous Fish Studies (RJ) and Aquatic Habitat and Instream Flow Studies (AH). The primary objective for each section is as follows.

- Adult Anadromous determine the seasonal distribution and relative abundance of adult anadromous fish populations produced within the study area;
- 2) Resident/Juvenile determine the seasonal distribution and relative abundance of selected resident and juvenile anadromous fish populations within the study area; and
- 3) Aquatic Habitat characterize the seasonal habitat requirements of selected anadromous and resident fish species within the study area and the relationship between the availability of these habitat conditions and the mainstem discharge of the Susitna River.

This report contains four different types of data collected during the 1982-83 ice-covered season (September through May). The four data sets included are:

- 1) Continuous surface and intragravel temperature monitoring.
- Salmon incubation and emergence studies.
- 3) Timing and habitat conditions of burbot spawning in the lower river.
- 4) Winter progress report of radio telemetry investigations of resident species.

These data, as well as data from other ADF&G reports and sources are expected to be summarized and analyzed by the Arctic Environmental Information and Data Center (AEIDC) to evaluate post-project conditions.

Any questions concerning this report should be directed to:

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#### DRAFT

#### 1.0 INTRODUCTION

The winter investigations of 1982-1983 include four separate studies:

1) surface and intragravel water temperatures, 2) incubation and emergence of juvenile salmon and incubation habitat, 3) burbot spawning, and 4) radio telemetry investigations of resident fish.

The surface and intragravel water temperature study provided support for the incubation and emergence studies in addition to providing winter water temperatures for the physical temperature and ice modelling studies conducted by other investigators.

The salmon incubation and emergence studies were conducted to determine the timing of embryonic development and emergence of chum and sockeye salmon under natural conditions in the Susitna River and to determine the physical and chemical conditions of the surface and intragravel waters in which they develop. In addition, relationships of surface and intragravel water conditions and importance of upwelling water were considered.

Because burbot are thought to spawn in areas affected by mainstem flows and temperatures, a study of their spawning habitat and timing was initiated in areas where this species concentrates in the Susitna River drainage during the winter months. Prior to this study, little was known about where or when burbot spawn in the Susitna River or the habitat conditions under which spawning takes place.

The radio telemetry studies of rainbow trout, burbot, and Arctic grayling provided information on the location and habitat conditions of overwintering areas, timing of fall redistribution into the overwintering habitat, and the location and habitat of spawning areas.

In general, these studies provide new information on aspects of the biology of anadromous fish and on the important resident species not previously defined in earlier winter reports. These data provide an insight as to possible constraints of the winter habitat conditions on the species investigated.

#### 2.0 CONTINUOUS SURFACE AND INTRAGRAVEL WATER TEMPERATURE STUDY

Continuous monitoring of surface and intragravel water temperature was initiated during the winter of 1981-82. These studies were continued during the winter of 1982-83 to address the following objectives.

### 2.1 Objectives

Continuous surface and intragravel water temperature data were collected at thirteen sites within the Talkeetna to Devil Canyon reach of the Susitna River (Figure 2-1). These data were collected to accomplish three principal objectives:

- 1) Obtain baseline surface and integral water temperature data in slough and mainstem Susitna River (mainstem) habitats during the ice-covered season.
- 2) To compare surface and intragravel water temperatures in slough areas used by spawning chum salmon to those not used for spawning, and to provide data for calculating thermal units required in the incubation and emergence studies.
- 3) To provide a data base for calibration and evaluation of mainstem temperature modeling studies.

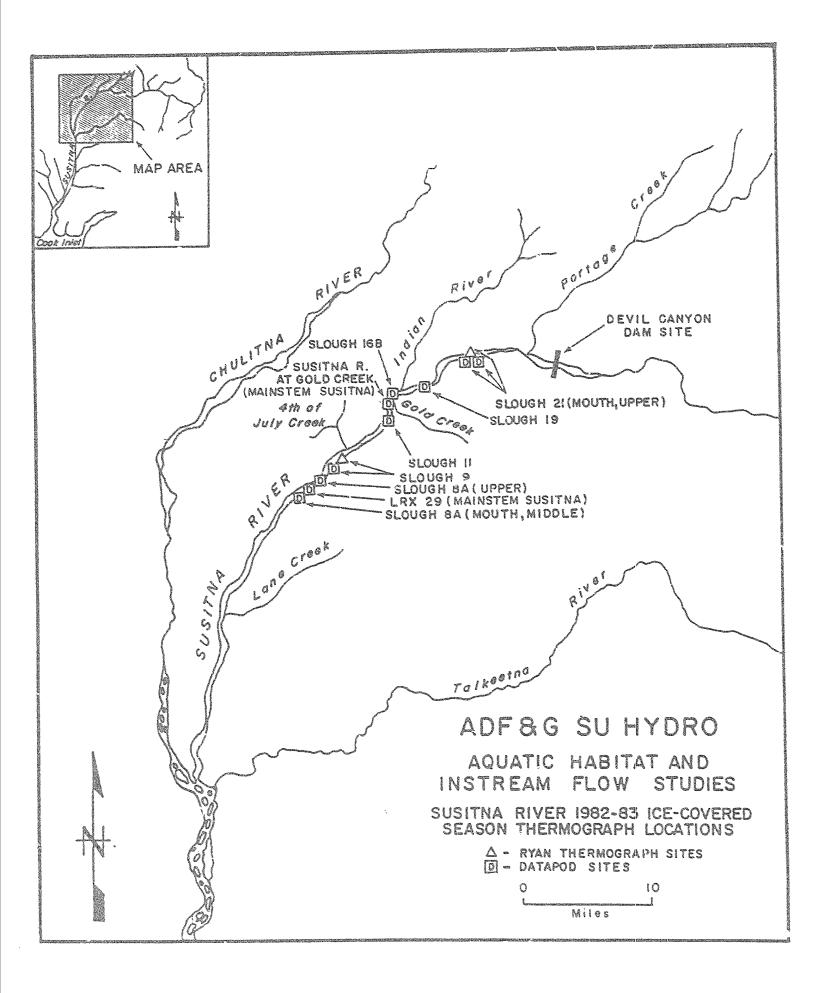


Figure 2-1. Location of Datapod temperature recorders and Ryan thermographs in the Susitna River, Chulitna River confluence to Devil Canyon reach, during the ice-covered season 1982-83.

#### 2.2 Methods

## 2.2.1 <u>Site selection</u>

Thermographs were placed within a slough to obtain temperature data from an area (spawning and non-spawning areas) representing typical conditions (substrate, water depth, and velocity) for the study site.

Thermographs were also placed along the margin of the mainstem in areas believed to provide representative temperature data.

Slough 21 Mouth, Slough 11, Slough 9, Slough 8A Mouth

One set of surface and intragravel datapod temperature probes were placed directly in a chum salmon redd observed in each slough during the fall of 1982.

## Middle Slough 8A

The datapod was installed in the middle Slough 8A site in a documented chum salmon spawning area on April 28, 1983 to replace the instrument at the mouth which lost its probe due to ice shearing.

## Upper Slough 8A, Upper Slough 21, Slough 19

Datapod temperature probes were installed in the approximate area of chum salmon redds observed in 1981. In 1982, salmon had no access to these reaches and no redds were observed.

Slough 19 is the only Upland Slough (ADF&G 1983a) in which continuous intragravel temperatures were obtained -- sloughs 8A, 9, 11, 16B, and 21 are Side Sloughs.

#### Slough 16B

This slough is representative of those sloughs not used by spawning salmon. Temperature probes were installed midway down the slough, in what appeared to be suitable spawning substrate and where intragravel flow was evident at the time of installation.

## Mainstem at LRX 29 and Mainstem at Gold Creek

Temperature data from these sites are the first continuous intragravel water temperatures collected in the mainstem Susitna River. Lower river cross section (LRX) 29 is a site adjacent to Slough 8A where continuous surface water temperatures have been monitored since the fall of 1981. The mainstem continuous surface and intragravel water temperature site was selected to obtain intragravel temperatures at this site and to supplement historical surface water temperature data collected by USGS.

as selected to

while Gold Week

When selecting a site, consideration was given to the safety of personnel and the somewhat fragile nature of instruments. Areas characteristic of high water velocity, debris, bank erosion, or shoreline ice action were avoided when possible.

### Thermograph locations in Slough 9 and Slough 21

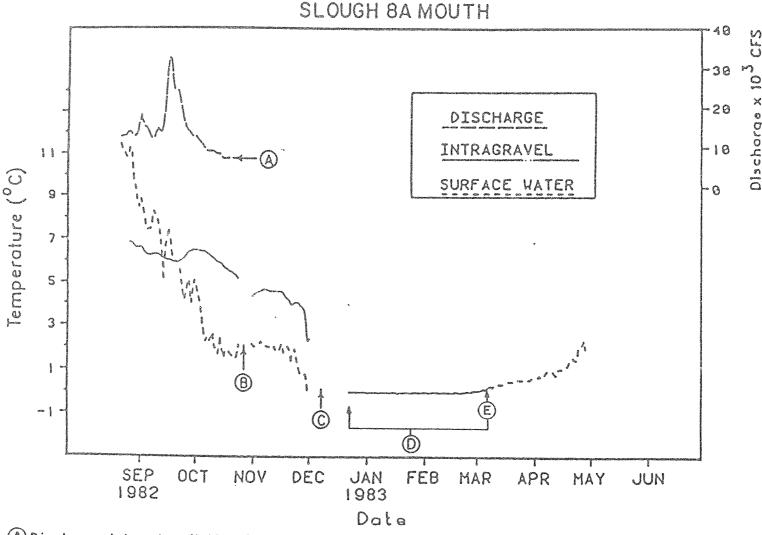
Thermographs were installed in sloughs 9 and 21 to extend the temperature record available from ADF&G's pilot study during the winter of 1981-82.

## 2.2.2 <u>Instrumentation</u>

Two types of thermographs, Omnidata DP2321 (datapods) and Ryan Model J, were used to continuously monitor surface water temperature; only datapods were used to continuously monitor intragravel temperatures. Intragravel datapod probes are installed one foot under the substrate surface using slotted, hollow steel spikes within which the thermister is installed. Detailed procedures are discussed in the ADF&G Phase I and Phase II Procedures Manuals (ADF&G 1981d and 1983e).

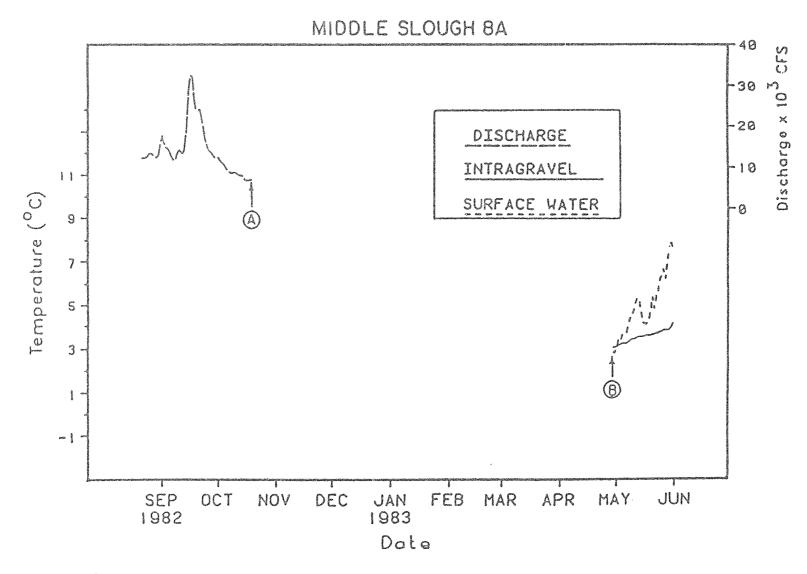
## 2.3 Results

The mean daily intragravel and surface water temperatures collected at the 13 sites during the period of late August, 1982 through early June, 1983 are presented in Figures 2-2 through 2-14. Appendix A of this report tabulates daily and monthly mean, minimum and maximum



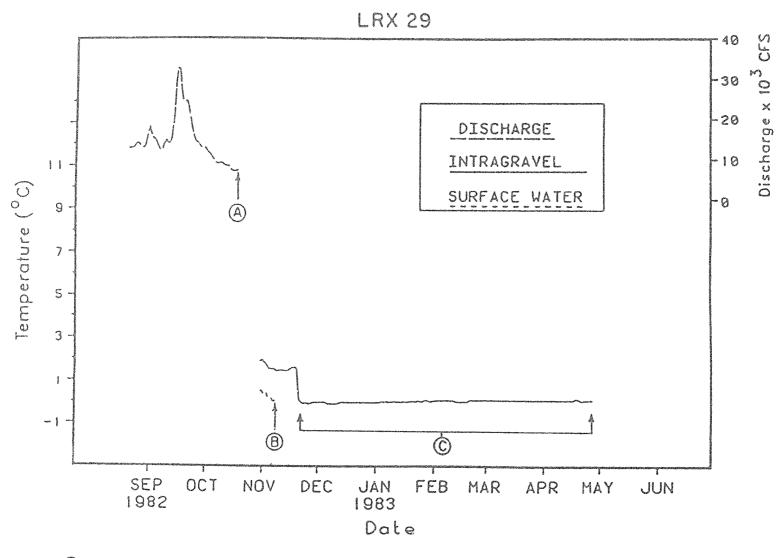
- A Discharge data not available after October 19.
- B Data gap due to chip change.
- © Equipment malfunction.
- D Surface and intragravel temperature superimposed.
- EIntragravel probe severed by ice movement along bank.

Figure 2-2. Mean daily intragravel and surface water temperatures, collected with Datapod recorders, at the mouth of Slough 8A from August 21, 1982 through March 10, 1982 and provisional Susitna River discharge data from the USGS Gold Creek gage, 15292000 (USGS 1982). Tick marks along the horizontal axis refers to the first day in respective months.



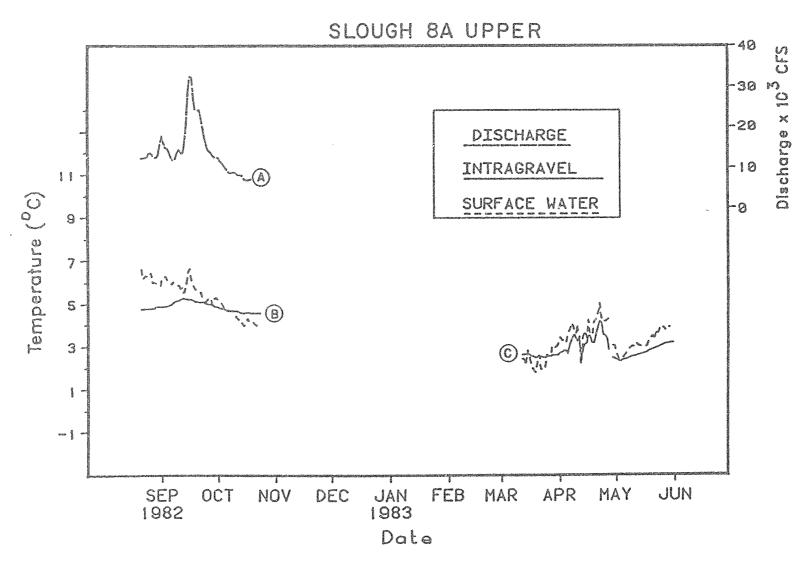
- (A) Discharge data not available after October 19.
- (B) New site installed 4/28/83, to replace Slough 8A mouth site. Site is located about 75 yards upstream of 8A mouth site.

Figure 2-3. Mean daily intragravel and surface water temperatures, collected with Datapod recorders, at the middle Slough 8A site from April 29 through June 2, 1983 and provisional Susitna River discharge data from the USGS Gold Creek gage, 15292000 (USGS 1982). Tick marks along the horizontal axis refers to the first day in respective months.



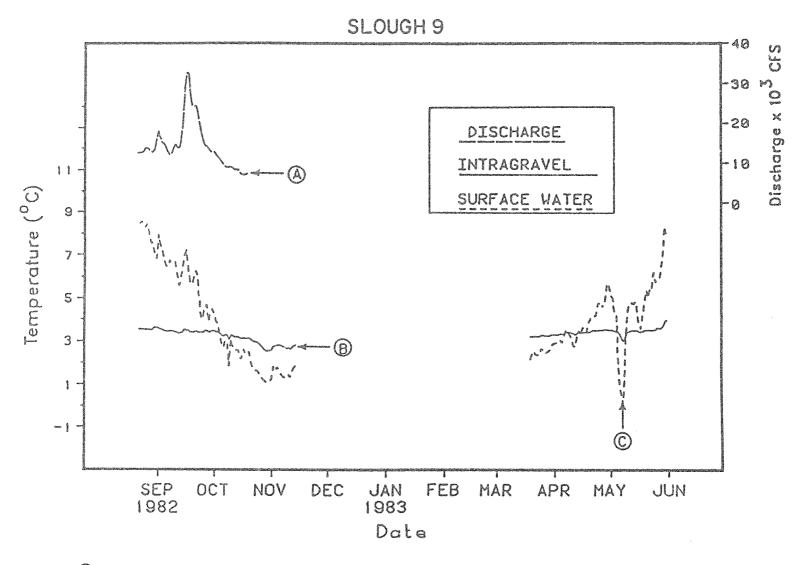
- A Discharge data not available after October 19.
- B Probe severed by ice movement along bank.
- C introgravel temperature affected by surface water.

Figure 2-4. Mean daily intragravel and surface water temperatures, collected with Datapod recorders, at LRX 29 from October 31, 1982 through April 27, 1983 and provisional Susitna River discharge from the USGS Gold Creek gage, 15292000 (USGS 1982). Tick marks along the horizontal axis refers to the first day in respective months.



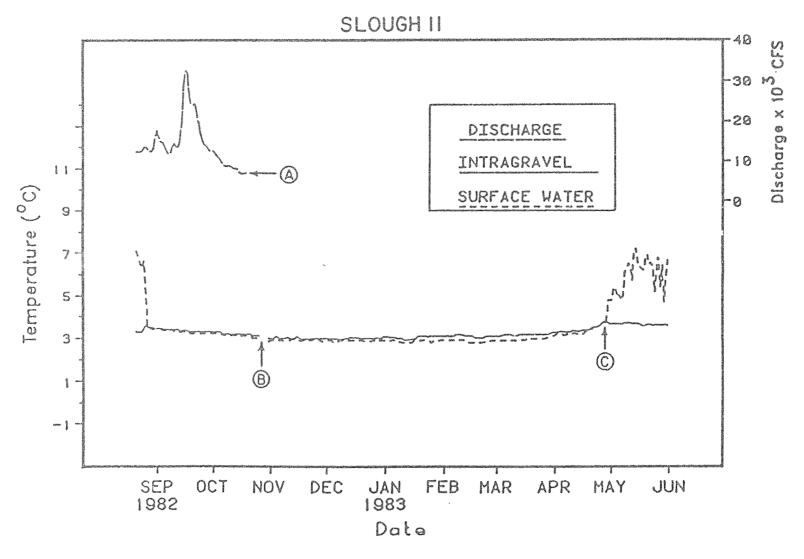
- (A) Discharge data not available after October 19.
- B) Probes severed by ice movement along bank edge.
- (C) New probes installed approximately 30 yards upstream of old (Aug-Nov.) site.

Figure 2-5. Mean daily intragravel and surface water temperatures, collected with Datapod recorders, at upper Slough 8A from August 21, 1982 through April 27, 1983, and provisional Susitna River discharge data from the USGS Gold Creek gage, 15292000 (USGS 1982) (Interruption of temperature data due to ice related damage of temperature probe). Tick marks along the horizontal axis refers to the first day in respective months.



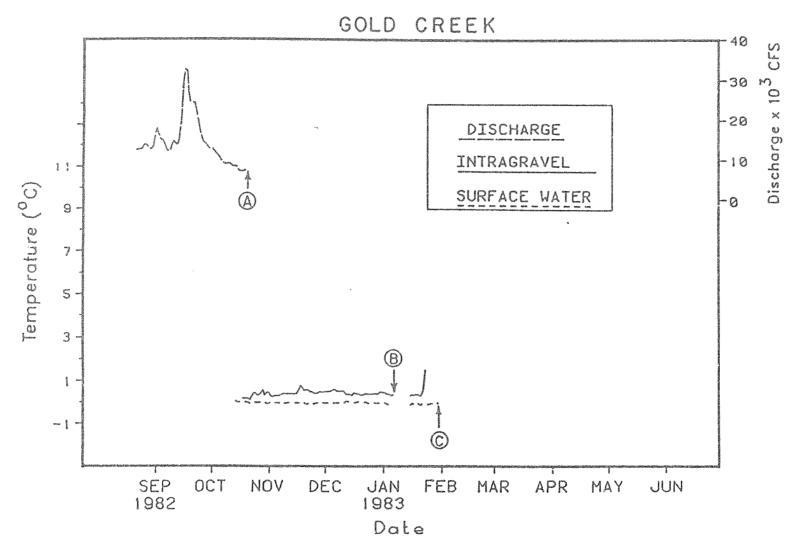
- A Discharge data not available after October 19.
- B Equipment malfunctioned.
- © Slough breached during breakup.

Figure 2-6. Mean daily intragravel and surface water temperatures, collected with Datapod recorders, at Slough 9 from August 22, 1982 through April 28, 1983, and provisional Susitna River discharge data from the USGS Gold Creek gage, 15292000 (USGS 1982). Tick marks along the horizontal axis refers to the first day in respective months.



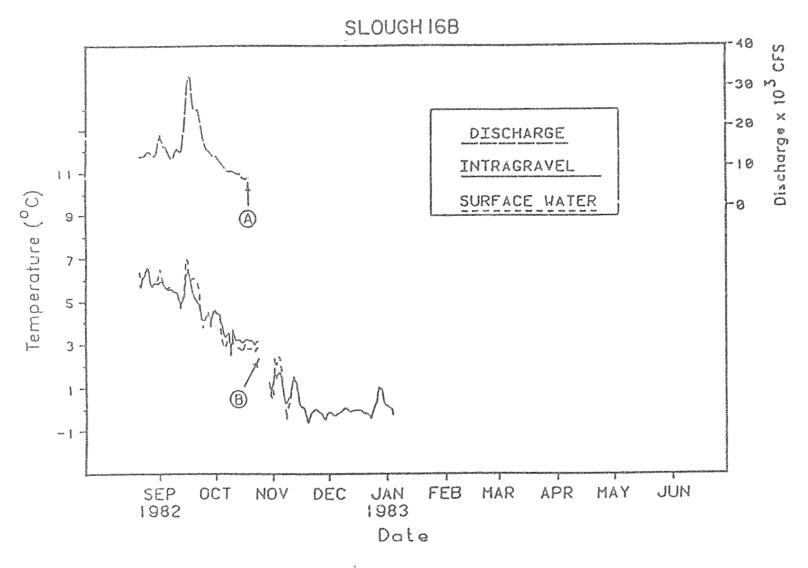
- (A) Discharge data not available after October 19.
- (B) Dolo gop due to chip change. can we assume surface water probe wo not buried here?
- © April 29,1983 surface water probe found buried in 1" of silt, when uncovered temperature rose to true surface water temperature.

Figure 2-7. Mean daily intragravel and surface water temperatures, collected with Datapod recorders, at Slough 11 from August 21, 1982 through April 28, 1983, and provisional Susitna River discharge data from the USGS Gold Creek gage, 15292000 (USGS 1982). Tick marks along the horizontal axis refers to the first day in respective months.



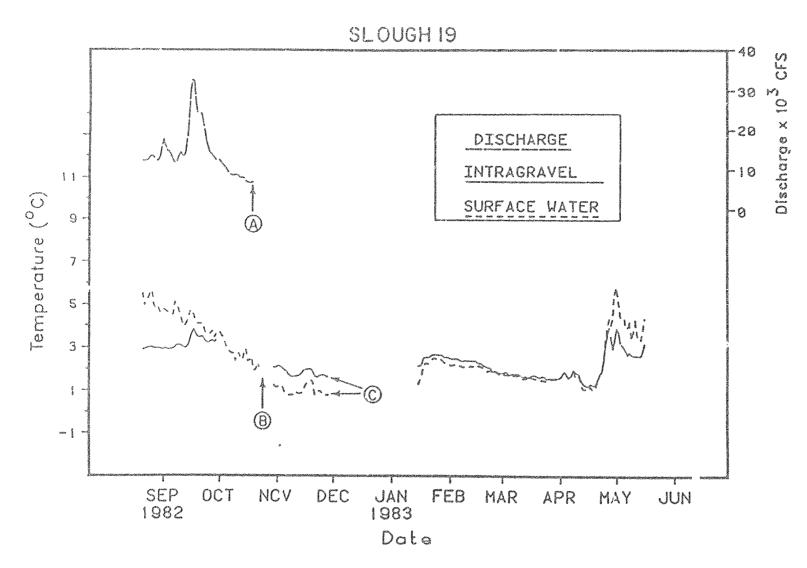
- (A) Discharge data not available after October 19.
- B Data chip (DSM) filled before field crew removal.
- © Probes severed from ice movement.

Figure 2-8. Mean daily intragravel and surface water temperatures, collected with Datapod recorders, at Gold Creek from October 18, 1982 through January 30, 1983, and provisional Susitna River discharge data from the USGS Gold Creek gage, 15292000 (USGS 1982). Tick marks along the horizontal axis refers to the first day in respective months.



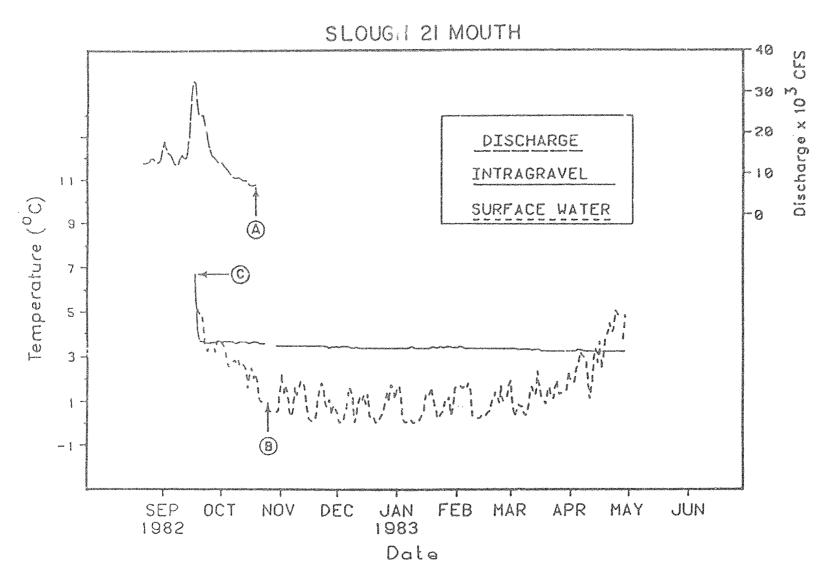
- (A) Discharge data not available after October 19.
- (8) Data gap due to chip change.

Figure 2-9. Mean daily intragravel and surface water temperatures, collected with Datapsd recorders, at Slough 16B from August 21, 1982 through January 4, 1983, and provisional Susitna River discharge data from the USGS Gold Creek gage, 15292000 (USGS 1982). Tick marks along the horizontal axis refers to the first day in respective months.



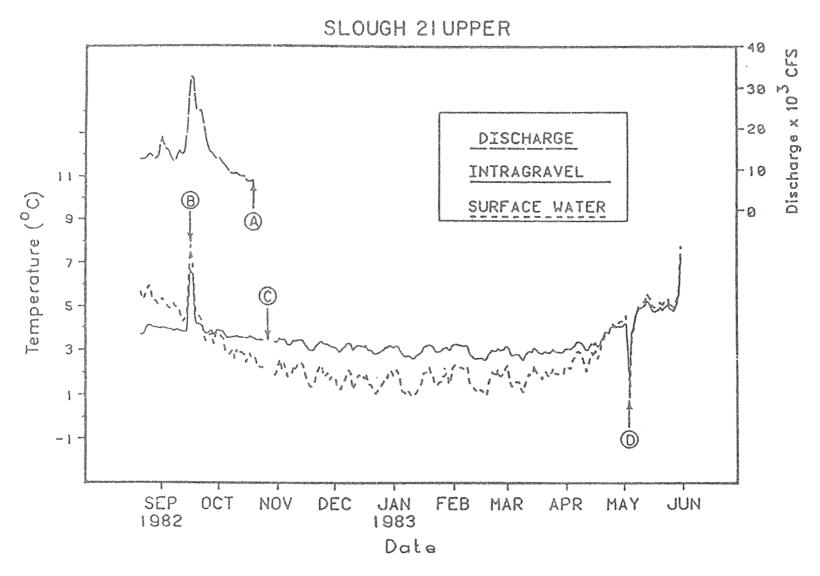
- (A) Discharge data not available after October 19.
- (B) Data gap due to chip change.
- © Equipment malfunction.

Figure 2-10. Mean daily intragravel and surface water temperatures, collected with Datapod recorders, at Slough 19 from August 21, 1982 through August 27, 1983, and provisional Susitna River discharge data from the USGS Gold Creek gage, 15292000 (USGS 1982). Tick marks along the horizontal axis refers to the first day in the respective months.



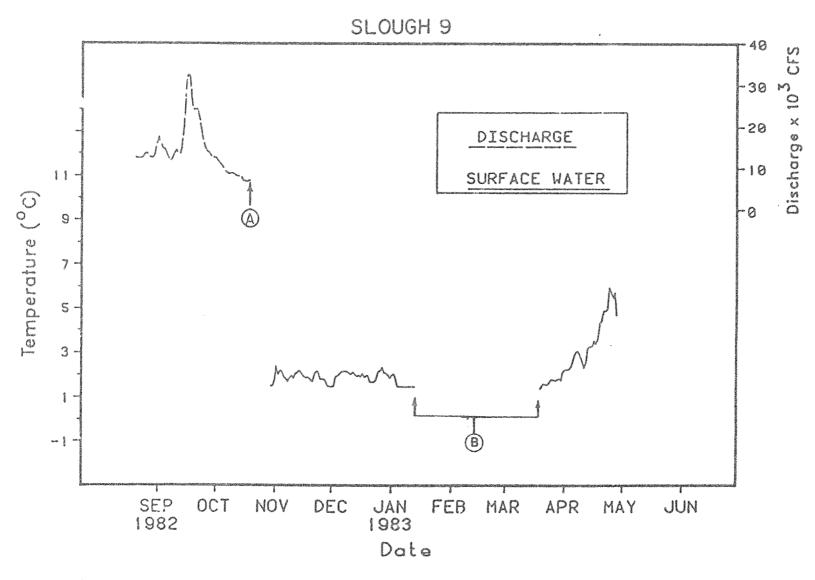
- (A) Discharge data not available after October 19.
- (B) Data gap due to chip change.
- (C) Slough breached in September.

Mean daily intragravel and surface water temperatures, collected with Data recorders, at the igure 2-11. mouth of Slough 21 from September 17, 1982 through April 27, 1983, and provisional Susitna River discharge data from the USGS Gold Creek gage, 15292000 (USGS 1982). Tick marks along the horizontal axis refers to the first day in respective months.



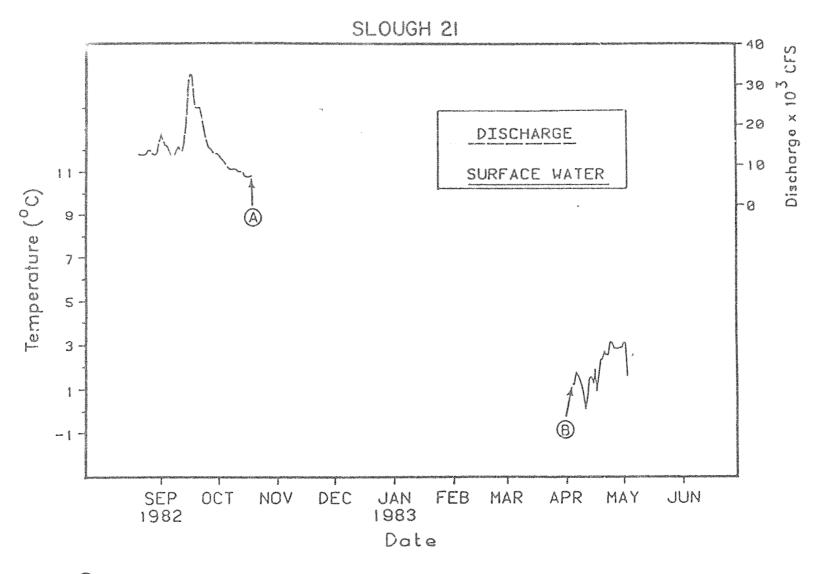
- (A) Discharge data not available after October 19.
- (B) Slough breached in September 1982.
- © Data gap due to chip change.
- (1) Slough breached during breakup.

Figure 2-12. Mean daily intragravel and surface water temperatures, collected with Datapod recorders, at upper Slough 21 from August 21, 1982 through April 27, 1983, and provisional Susitna River discharge data from the USGS Gold Creek gage, 15292000 (USGS 1982). Tick marks along the horizontal axis refers to the first day in respective months.



- (A) Discharge data not available after October 19.
- B Equipment malfunction.

Figure 2-15. Mean daily surface water temperatures, collected with Ryan thermograph, in Slough 9 from October 30, 1982 through April 28, 1983, and provisional Susitna River discharge data from the USGS Gold Creek gage, 15292000 (USGS 1982). Tick marks along the horizontal axis refers to the first day in respective months.



- (A) Discharge data not available after October 19.
- (B) Site established April 3,1983.

Figure 2-14. Mean daily surface water temperatures, collected with Ryan thermograph, in Slough 21 from April 3 through May 7, 1983, and provisional Susitna River discharge data from the USGS Gold Creek gage, 15292000 (USGS 1982). Tick marks along the horizontal axis refers to the first day in respective months.

temperatures for surface and intragravel water temperatures recorded with datapods. The thermograph data presented in Appendix A include mean, minimum and maximum temperatures for three intervals; six-hour, daily and monthly.

The data indicate that the intragravel temperatures in the sloughs are warmer and more stable during the ice-covered season than the surface water temperatures. The plots for Slough 21 (Figures 2-11 and 2-12) and Slough 3 (Figure 2-6) show this phenomenon well. Figure 2-7 shows that this stabilizing effect is occurring even when only one inch of silt is present. For example, when the surface water probe was silted in, the surface and intragravel temperature are nearly the same, but they changed as soon as the probe was uncovered. The temperature plots for the mainstem site, LRX 29 (Figure 2-4) and Susitna River at Gold Creek (Figure 2-8) illustrate that, at the depths measured, this warming and stabilizing effect is very weak or absent in mainstem intragravel water.

Although intragravel water temperatures were generally warmer in winter than were surface water temperatures, the relationship between the two water sources varied between sloughs. For example, at the mouth of Slough 21 (Figure 2-11) there was considerable variation in surface water temperatures but relatively little variation in the intragravel water temperatures. In contrast, there was a close correspondence between both the temperature and the pattern of variation in surface and intragravel water temperatures in Slough 8A Upper (Figure 2-5) and Slough 19 (Figure 2-10). Reasons for differences in the relationship of surface to intragravel water temperature in different sloughs may be

related to the relative magnitude of, and the proximity of individual datapod probes to upwelling groundwater sources. Probes placed directly in a groundwater upwelling source would undoubtedly be less variable and show a weaker relationship to surface water temperatures than would intragravel temperatures obtained from a datapod located in an area with little or no upwelling groundwater present.

#### 2.4 Discussion

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Temperatures monitored at spawning sites within the sloughs were found to have warmer intragravel temperatures than surface water temperatures during the winter. This phenomenon allows more rapid development of alevins and eggs because of the additional available thermal units. Mainstem intragravel temperatures more closely resembled the mainstem surface temperatures with intragravel temperatures near zero during most the winter. This difference may explain the limited mainstem spawning and the use of sloughs by chum and sockeye salmon although other factors such as substrate stability, velocities, sediment deposition, etc. may also be important factors. Altered post project temperatures need to be evaluated as to their effect on the sloughs (indirect effects) as well as determining their effect on the potential  $\varsigma$ for mainstem spawning of the slough spawning species as well as the tributary spawners. This analysis will aid in determining the extent of the temperature related impacts on each salmon species, both negative and positive.

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The effect of surface water temperatures on intragravel temperatures during overtopping events is an area that needs to be more rigorously quantified. If cold water from the mainstem Susitna River overtops the heads of sloughs and depresses the temperature of the intragravel water, this could lead to delayed hatching and emergence of alevins. In Sloughs 9 and 21 (upper) (Figures 2-6 and 2-12) the overtopping event in May, 1983 resulted in lowered intragravel temperatures. However, the magnitude of the effect in Slough 9 (Figure 2-6) was relatively small compared to that in Slough 21 (upper).

#### 3.0 SALMON INCUBATION AND EMERGENCE STUDIES

when an adult salmon selects a site for spawning, it is selecting an environment defined by a composite of physical, chemical, and hydraulic variables, each of which may influence the incubation process independently or in combination with other variables. Some primary physical variables known to influence incubation include temperature and dissolved oxygen as well as size composition, permeability, and porosity of the substrate (Reiser and Bjornn 1979). Additional factors such as channel gradient and configuration which affect water depth and velocities may also influence the incubating environment, depending upon the degree of exchange between surface water and intragravel water (Reiser and Bjornn 1979).

Because chum salmon (<u>Oncorhynchus keta</u>) and sockeye salmon (<u>O. nerka</u>) generally deposit their eggs less than one foot deep in the substrate, the incubation environment is influenced by both extragravel and intragravel conditions with the relative influence of either set of variables being dependent upon the degree of exchange of water between them. Factors which control the exchange of water include stream surface profile, gravel permeability, gravel bed depth, and irregularity of the streambed surface (Vaux 1962).

Because of the interrelationships of many physical and chemical variables, construction of the Susitna hydroelectric dams may impact spawning, incubation, and overwintering environments of fish indigenous to the Susitna River drainage. Hydrological changes which are expected

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to result from the proposed project include decreased and stabilized flows during the open water periods, increased flows in the winter, and a marked change in seasonal water temperatures. These alterations could affect sand bar formation, sedimentation layering in sloughs and side channels, and water levels in existing sloughs. Such alterations could potentially destroy spawning sites and/or incubating embryos (Cooper 1965; Baxter and Glaude 1980). In addition, changes in micro-habitat such as lower or higher intragravel temperatures and changes in the concentration of dissolved gases during this incubation life stage could affect development rates (Combs 1965; Childerhose and Trim 1979; Baxter and Glaude 1980; Heming 1982), the amount of time required for completion of incubation of salmon embryos (Velson 1980), and the timing (Burgner 1958). emergence Increases in post-project temperatures during winter could accelerate development and cause the emergence of salmon fry before the environment is favorable for their Changes in stage caused by increased discharge or by ice processes may also alter temperatures in slough or side channel spawning grounds by causing mainstem water to breach slough heads.

Because of these and other potential impacts on the survival of the early life stages of the upper Susitna River salmon stocks, incubation conditions were studied at spawning sites in selected sloughs and side channels of the Susitna River above the Chulitna River confluence (Figure 3-1). Chum and sockeye salmon are the primary users of sloughs for spawning (ADF&G 1983a). Chum salmon are reported to actively select upwelling areas for spawning (Kogl 1965; Bakkala 1970). The 1981-82

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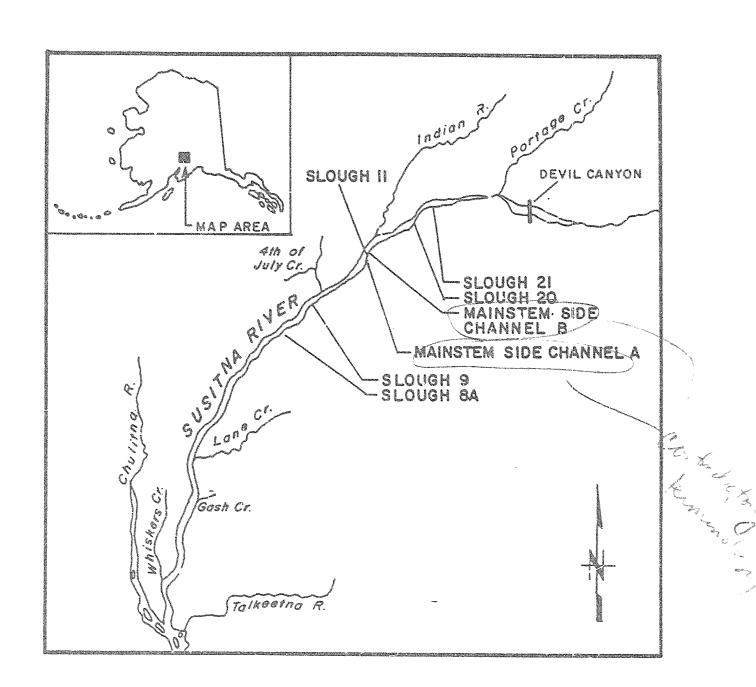


Figure 3-1. The location of seven incubation and emergence study sites on the Susitna River between the Chulitna River confluence and Devil Canyon, August 1982 through April 1983.

winter studies provided preliminary data on the emergence time of chum salmon and sockeye salmon. A more detailed study was implemented during the 1982-83 winter program to address the following objectives.

#### 3.1 Objectives

- 1) Measure levels of intragravel and surface water temperature, dissolved oxygen, pH, and specific conductance at chum and sockeye salmon redds and in upwelling areas of sloughs where chum salmon spawned in 1982.
- 2) Determine the timing of embryonic development and emergence under natural conditions for chum and sockeye salmon.

In conjunction with this project, the U.S. Fish and Wildlife Service (USFWS) conducted a related study in a laboratory environment to document rates and stages of development of chum and sockeye salmon embryos at four different temperature regimes (Wangaard and Burger 1983). The eggs used in the USFWS lab study were collected from Slough 11 (RM 135.3).

# 3.2 <u>Methods</u>

Certain environmental variables known to affect salmon incubation were monitored at several spawning sites. Salmon incubation and emergence studies were conducted at some, but not all, of these sites. Analysis

of the habitat data with regard to incubation rates was restricted to thermal effects.

#### 3.2.1 Study sites

Sampling sites for incubation and emergence studies were selected during September, 1982, utilizing the following criteria:

- 1) documented salmon spawning;
- 2) site accessibility during the winter survey period;
- 3) water depth shallow enough for good visibility and for ease of sample collection;
- 4) areas where open water was present during past winters.

Sites included sloughs 8A (RM 125.3), 9 (RM 129.2), 11 (RM 135.3), 20 (RM 140.1), and 21 (RM 142.0), and Mainstem side channels A (RM 136.2) and B (RM 137.3) (Figures 3-2 to 3-8). Indian River (RM 138.6) was sampled once during the fall, but ice formation and re-channeling prevented further sampling. Four of these sloughs (8A, 9, 11, and 21) have been heavily utilized by spawning chum and sockeye salmon during the last two years.

Standpipes were installed in these same four sloughs to allow sampling of the intragravel environment. Standpipe locations were selected to

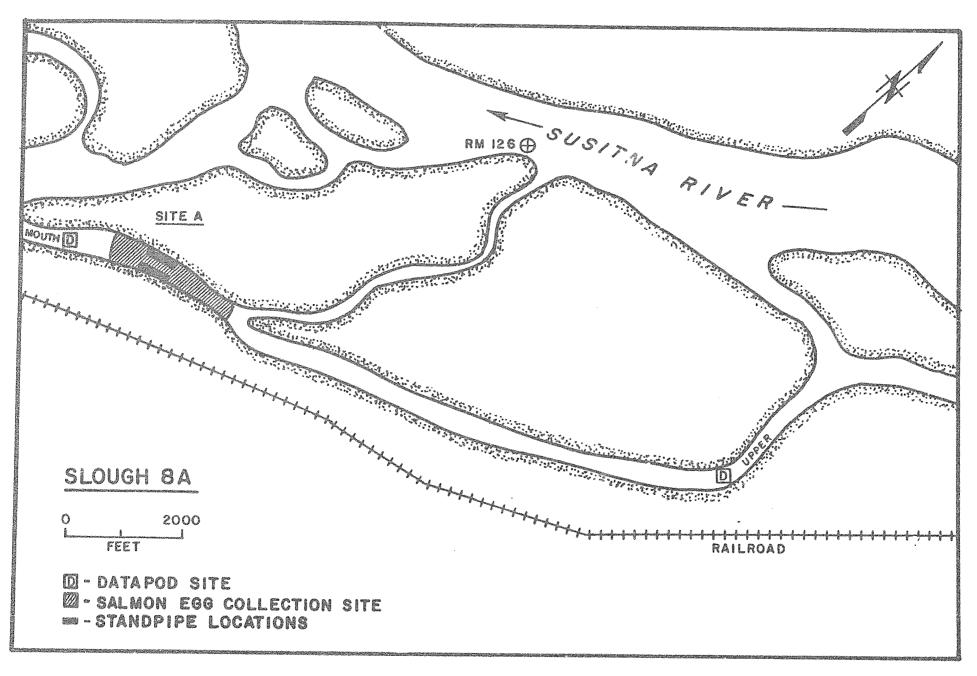


Figure 3-2. Incubation and emergence study site at Slough 8A (RM 125.3).

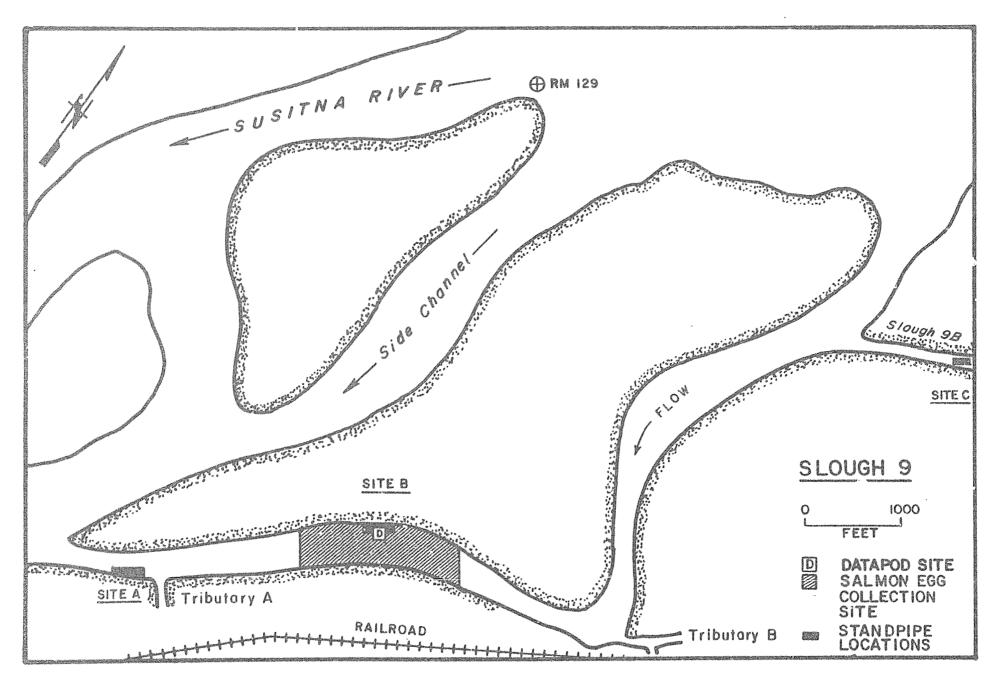


Figure 3-3. Incubation and emergence study site at Slough 9 (RM 129.2).

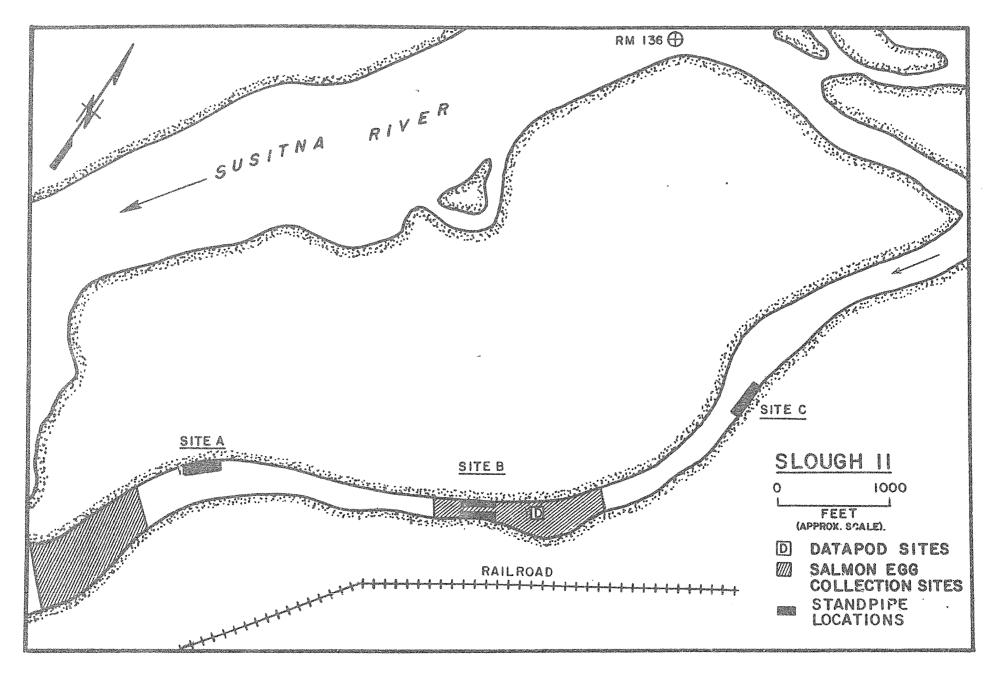


Figure 3-4. Incubation and emergence study site at Slough 11 (RM 135.3).

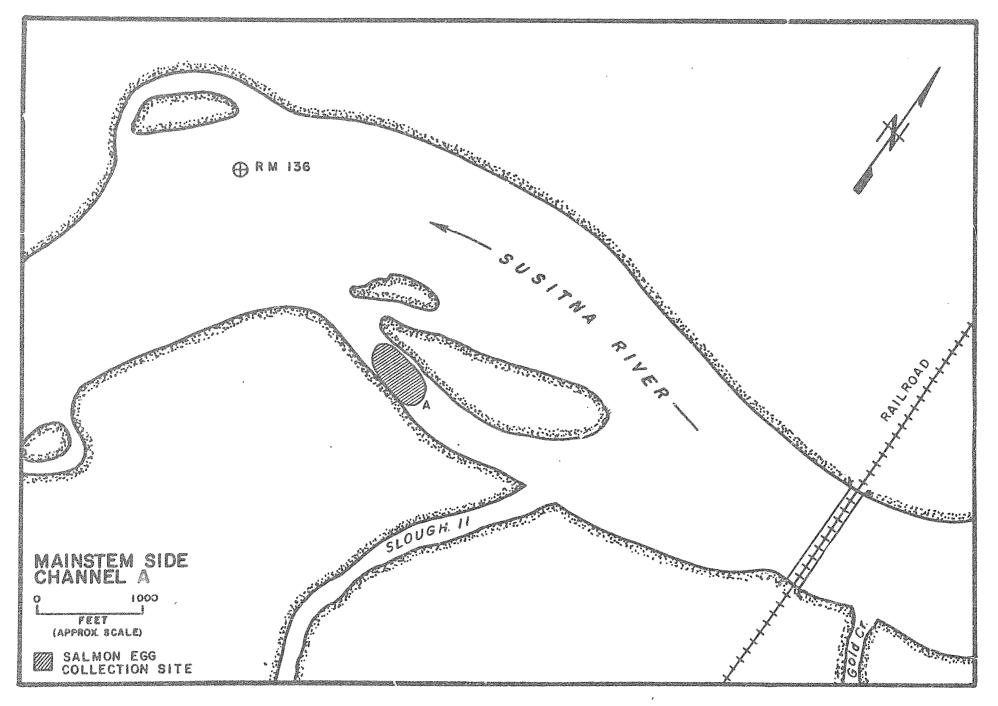
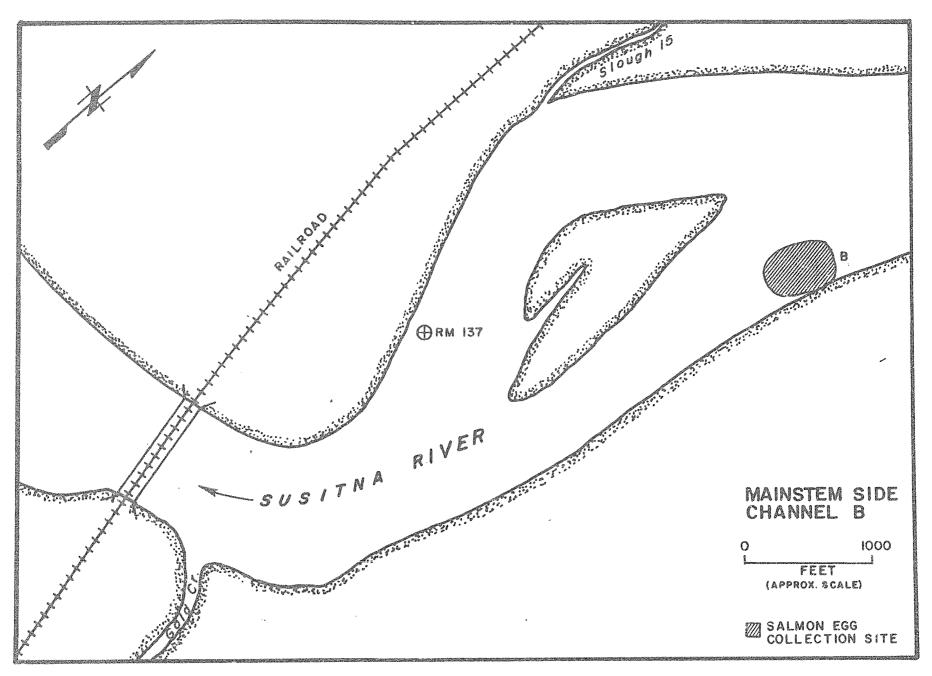


Figure 3-5. Incubation and emergence study site at Mainstem Side Channel A (RM 136.2).



Figuer 3-6. Incubation and emergence study site at Mainstem Side Channel B (RM 137.3).

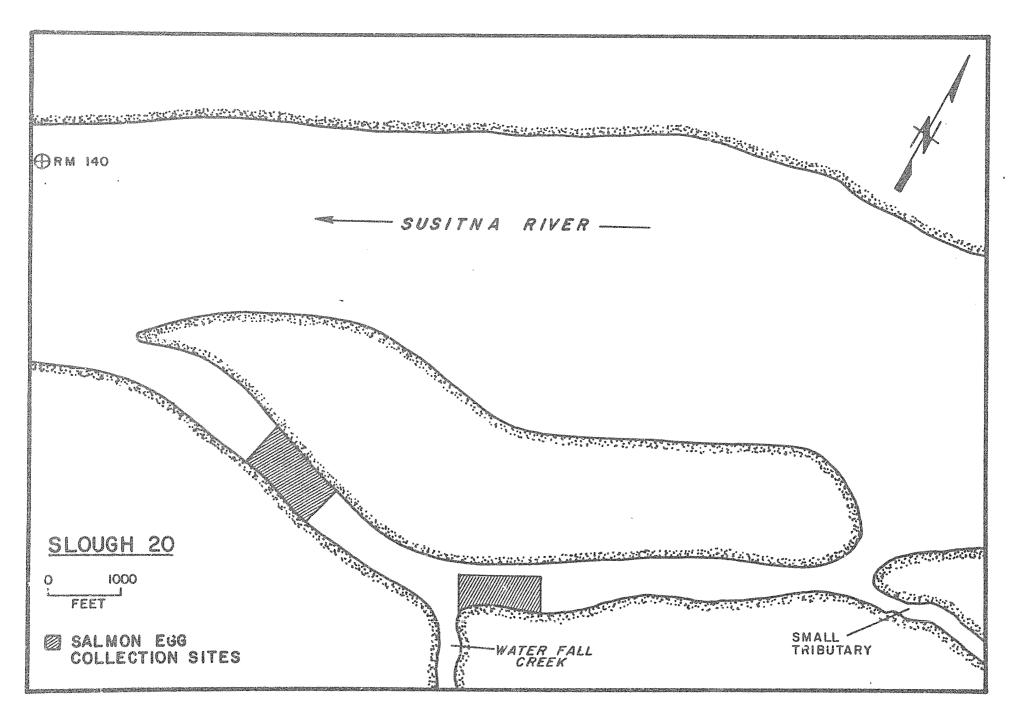


Figure 3-7. Incubation and emergence study sites at Slough 20 (RM 140.1).

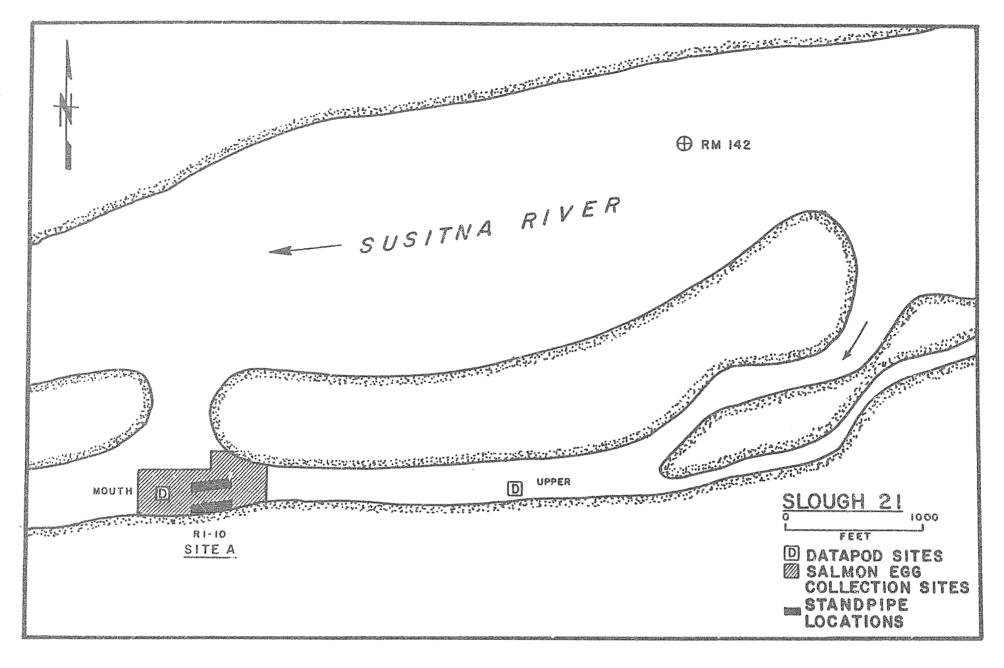


Figure 3-8. Incubation and emergence study site at Slough 21 (RM 142.0).

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compare intragravel water quality conditions among study sloughs and between left and right banks within study sloughs. Because the origin of the water upwelling to respective banks of sloughs is presently unknown, standpipes were placed in narrow strips (5.0 feet wide) along the banks of each slough to test for water quality differences between the respective banks. Differences in water quality between banks was assumed to represent differences in water sources. Placement of standpipes in this manner allowed data collected to be used to describe fish spawning habitat and to test for differences in water quality between banks. All of these sloughs are located on the right bank (facing upstream) of the mainstem Susitna River. This presents the possibility of slough left bank ground water sources originating from the river and right bank ground water originating from the mountains.

In March of 1983, 10 standpipes were placed in each of the two sampling locations (one sampling location on each bank) in sloughs 8A, 9, 11, and 21 (Figures 3-2, 3-3, 3-4, and 3-5, respectively). Additional standpipes were later placed in sloughs 11 and 9B. (For purposes of this study, Slough 9B is considered to be a part of Slough 9). Each sampling site was a rectangular area 50 to 100 feet in length (measured along the slough bank) and five feet in width (measured from the water's edge at time of sampling). Pipes were installed at random locations within each designated sampling site, provided that the water depth was within the range of 0.2 - 1.8 ft. The criteria used to select each sampling location within a slough included the above criteria, with the following additions: at least one sampling location per slough was located in a pool habitat where fish had spawned during the fall of

1982, and where upwelling groundwater was known to occur. Generally, these areas were totally free of ice or contained localized patches of open water (Plate 3-1). If upwelling groundwater occurred along both banks of a slough at a single spawning area, a sampling location was established along each bank. If upwelling groundwater did not occur along both banks of a slough at a single spawning area, but was only present along one bank (as in Slough 9, site B), a sampling location was established in the nearest suitable location on the opposite bank where upwelling occurred.

#### 3.2.2 Sampling techniques for habitat measurements

#### 3.2.2.1 Water Temperature

Continuous intragravel and surface water temperatures were recorded in the sloughs from August, 1982 through May, 1983. Locations of the recording instruments and methods are described in Section 2.0.

# 3.2.2.2 Standpipes

Standpipes were used to sample the intragravel environment during two sampling periods; the first period was April 15-18, and the second period was April 29 - May 2.

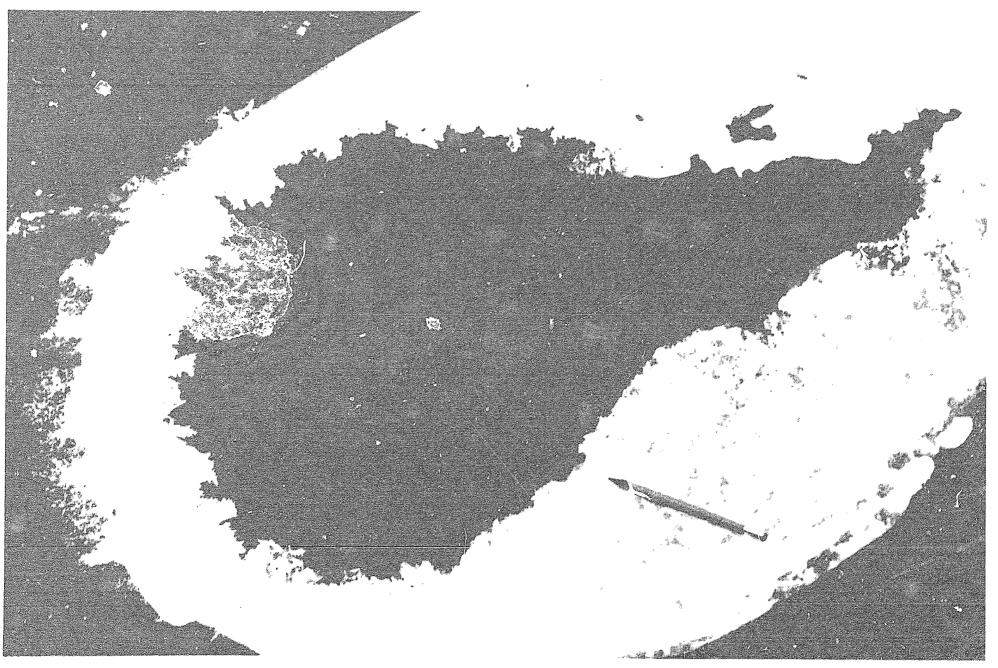


Plate 3-1. Upwelling area in slough. Opening in ice cover indicates higher temperature of upwelling water.

#### Standpipe design and installation

Measurements of dissolved oxygen, temperature, specific conductance and pH were made inside and outside of plastic polyvinyl chloride (PVC) standpipes that were driven into the streambeds (Plate 3-2). Standpipes were driven into the substrate to a uniform depth of ten inches using a driving rod and sledge hammer (Plate 3-3). The design of the driving rod and standpipe were modified from previous designs (Gangmark and Bakkala 1959; McNeil 1962). The standpipes had the advantages of being relatively inexpensive and easy to install (Figures 3-9 and 3-10). The inside diameter of each standpipe was 1.5 inches (3.8 cm) and contained 48 holes (1/8-inch-diameter; 0.3 cm) that were evenly spaced in four bands (12 holes per band). The four bands were spaced one inch (2.5 cm) apart with the lowest band being placed three inches (7.6 cm) from the bottom of the standpipe.

Each standpipe was pounded into the substrate to a maximum depth of 14.5 inches (36.8 cm), centering the (bands of) holes ten inches (25.4 cm) into the substrate. This depth was selected because ten inches (25 cm) is the estimated mean depth at which chum (Kogl 1965; Merritt and Raymond 1982; Kent Roth pers. comm.) and sockeye salmon (Cooper 1965; Olsen 1968) place their eggs.

After the standpipes were properly installed, a cork/weight assembly was placed inside each standpipe to aid in removal of ice plugs formed during freezing weather conditions (Figure 3-10). This assembly consisted of a weight and cork that was attached by a nylon cord to a

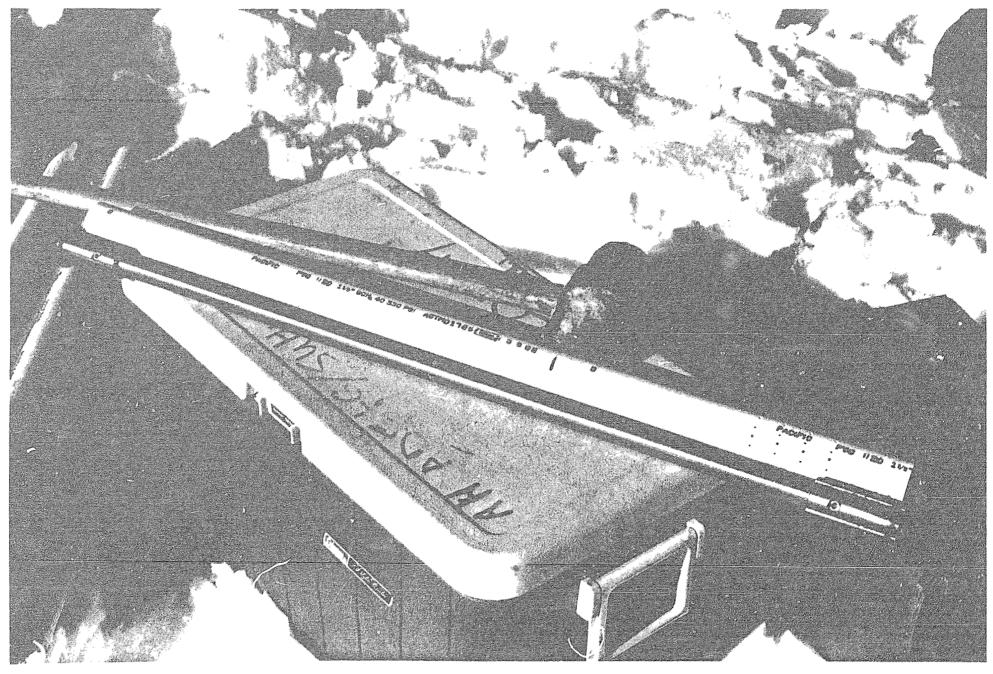


Plate 3-2. Standpipe (with 48 one-eighth inch holes) used for monitoring intragravel water quality and driver used for installation.



Plate 3-3. Installation of standpipes for monitoring of intragravel water quality in Slough 11.

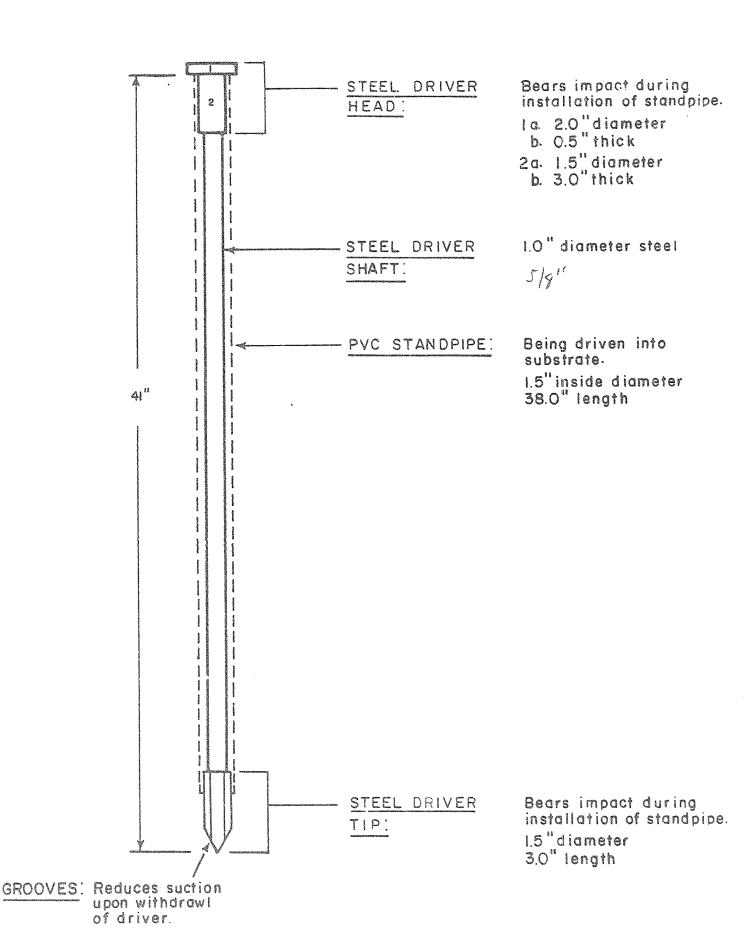


Figure 3-9. Scaled drawing of the steel driver used to install polyvinyl chloride (PVC) standpipes into gravel substrates.

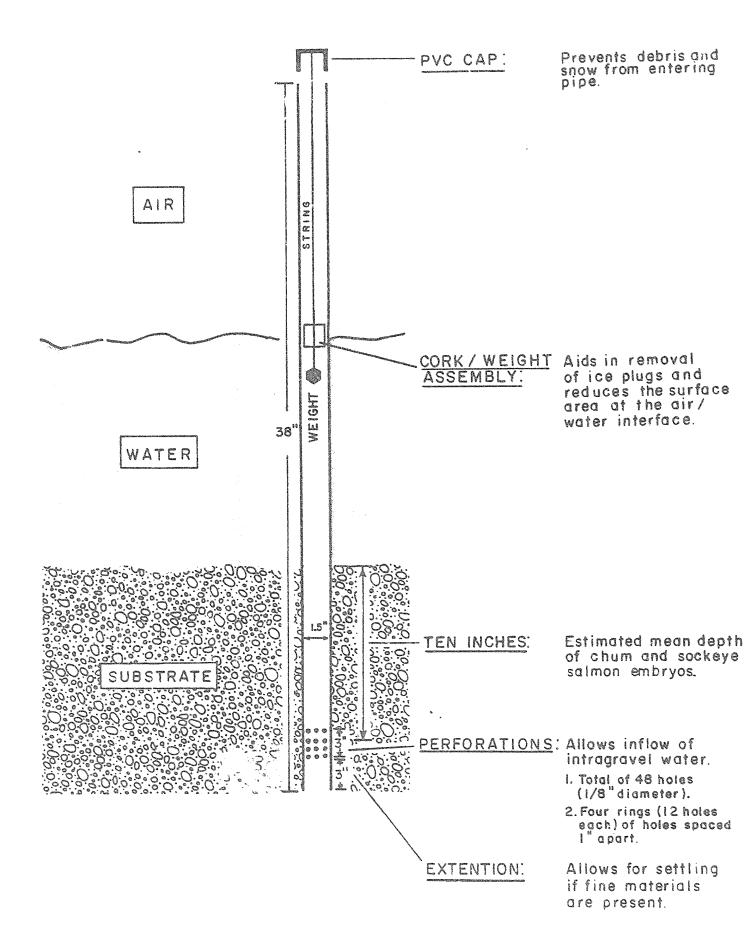


Figure 3-10. Diagram of a polyvinyl chloride (PVC) standpipe installed in substrate.

cap which covered the exposed end of the pipe. The cork floated at the air/water interface and reduced the amount of surface area available for oxygen transfer. It also served to station the weight in a position that caused it to be frozen in the ice plug. Ice plugs were removed by gently heating the exterior of the PVC pipe at the water surface with a propane torch while exerting upward pressure on the pipe cap. After a few minutes of heating the cork/weight assembly and attached ice plug was easily withdrawn.

# Procedures for the measurement of water quality

Following the initial installation of standpipes, sampling was delayed for a minimum of 24 hours. This allowed substrate materials to resettle. Following the resettling period, sampling at each standpipe was conducted after the interior of the standpipe was pumped out using a hand-diaphragm pump (manufactured by PAK of JABSCO; Springfield, Ohio 45501; mor 5800-000) to remove fine sediments that settled inside the standpipe. This procedure ensured that the water that refilled the standpipes was from a fresh source and that the water samples could be obtained at the desired depth in all standpipes.

After water refilled the standpipes and a minimum of one hour had elapsed, measurements of temperature, dissolved oxygen (DO), specific conductance and pH were obtained within each standpipe. In addition, corresponding measurements were obtained approximately halfway between the substrate and water surface beside each standpipe. The minimal elapse time (one hour after pumping standpipes) was allowed to ensure

that all standpipes refilled to their original level. Preliminary tests invicated that there were no differences between concentrations of DO collected inside standpipes before pumping and after one, two, and four hours after pumping.

The following procedures were used to obtain measurements of water temperature, DO, specific conductance, and pH.

#### <u>Temperature</u>

Temperature measurements in standpipes were obtained with the Yellowsprings Instrument (YSI) model 57 dissolved oxygen/temperature meter according to procedures presented in the manufacturer's operations manual.

# Dissolved oxygen

Dissolved oxygen measurements were obtained using a YSI model 57 dissolved oxygen/temperature meter. The meter was calibrated following the procedure described in the procedures manual (ADF&G 1983e).

Preliminary data indicated that calibration of the YSI meter was only accurate to  $\pm$  0.5 mg/l. This level of accuracy applies to comparisons of data obtained at different sampling locations within a given sampling period and between data sets obtained at the same location during different sampling periods. For a given sampling location and a given

sampling period, the error is estimated to be  $\pm$  0.1 mg/l. Results should be interpreted accordingly.

After the meter was calibrated, measurements were collected by lowering the probe inside the standpipe to the desired depth (10.0 inches). After lowering to the proper depth the probe was gently agitated to ensure circulation of water over the membrane and measurements were recorded when the meter indicator stabilized.

The meter and all chemicals were kept inside an ice chest equipped with handwarmers to prevent them from freezing. If movement of the meter was required to sample standpipes at another location, the meter was hand carried by foot or in a helicopter. If transport was required by snowmachine, the instrument was recalibrated upon arrival at the next sampling location.

# Specific conductance

Specific conductance were measured with a YSI model 33 S-C-T meter according to procedures presented in the manufacturer's operations manual. Because factory calibration of this meter was not always reliable or possible prior to field use, a calibration curve was developed over the full range of values expected to be encountered during measurement. The calibration curve was developed by comparing specific conductance values obtained with the YSI meter to those obtained with a calibrated Hydrolap meter, model 4041. All values measured in the field were later adjusted on the basis of the calibration curve.

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Because readings obtained with the YSI meter are not temperature-compensated to 25°C, all readings were temperature-compensated to 25°C using procedures presented in Standard Methods (APHA 198 $^\circ$ ).

Specific conductance data were used to compare water quality between sloughs and between left and right banks within sloughs. Specific conductance was selected for this purpose because it is generally regarded as an index to total concentration of dissolved ionic matter, which in turn is related to water fertility (Lind 1974). Therefore, it is useful to detect water originating from different sources. In addition, this variable had a much larger range in variation than other variables measured and therefore was expected to be more sensitive to differences in water quality between locations. A two way analysis of variance (ANOVA) was performed on specific conductance data using a statistical program provided by the Statistical Package for Social Sciences (SPSS) (Nie et al. 1975; Hull and Nie 1981). Data collected at different sampling sites within a given slough were merged. Only data obtained from intragravel water was used because the primary interest was to evaluate water sources. Only data from the second sampling period (April 29 - May 2) was used because it was the most complete.

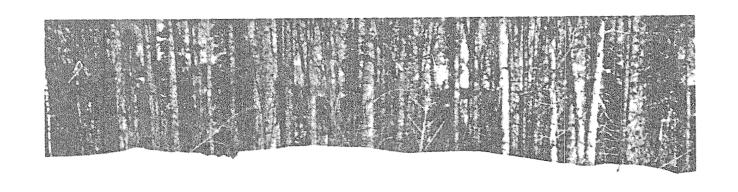
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Measurements of pH were obtained at a substrate depth of 10.0 inches with a YSI model 5985-40 pH meter. Standard procedures presented in the manufacturers operations manual were used. The meter was calibrated prior to use using buffer standards of pH 4.0 and 7.0.

#### 3.2.3 Sampling techniques for embryo development study

Egg sampling was conducted once a month, from September, 1982, through May, 1983. A Homelite gas-powered water pump was modified into an egg pump for sampling the redd sites. A two-foot high by two-foot diameter circular screen, open on both ends with an attached \(\frac{1}{4}\)-inch mesh catch sack, was used to \(\cap \) lect the eggs and alevins during the pumping operation (Plate 3-4). A shovel was used in addition to the egg pump to collect samples at some sites. Samples were preserved in five percent formalin for later visual determination of developmental stages through use of a dissecting scope.

Intragr vel and surface water temperatures were also measured at salmon redds, beginning in December, using a YSI 400 series semi-solid insertion probe (3.0 feet in length) attached to a hand-held Digi-Sense thermometer which enables a temperature measurement at the precise location of the tip of the probe. Each intragravel temperature was obtained by inserting the probe tip approximately six inches into the substrate (at the point where embryos were sampled) and noting the displayed temperature. Three to five readings were taken and the mean reading recorded.



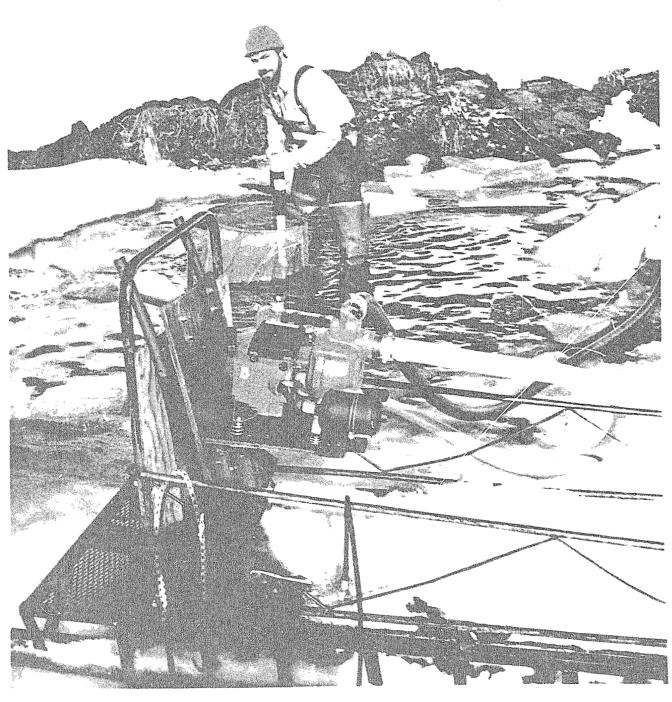


Plate 3-4. Egg pumping for chum and sockeye salmon eggs during the winter studies at Slough 21 (RM 142.0).

#### 3.3 Results

# 3.3.1 <u>Temperature and other habitat data</u>

Continuous surface and intragravel temperature data from the Datapod recorders were presented in Section 2.

Preliminary scatter plots were made to allow preliminary comparison of data obtained within standpipes to data obtained from corresponding surface water samples. Comparisons were made for each variable by slough and sampling period. These plots were used to determine if a relationship existed between the two water sources. Although a clear relationship could not be demonstrated in every plot, in several instances there appeared to be a direct relationship between the two water sources. These plots have not been presented in this document due to their preliminary nature, but are available upon request from the ADF&G Su Hydro Office, Anchorage, AK.

The strength of the various relationships are undoubtedly influenced by the magnitude of water exchange between the surface and intragravel environments. This in turn is influenced by the relative amount of downwelling or upwelling at the specific sampling sites. For the purposes of this report, it is sufficient to note that the two water sources are related to varying degrees, and that the placement of standpipes in future studies should take this into account.

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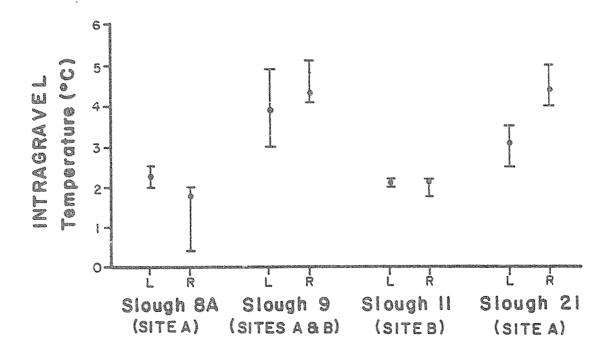
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#### 3.3.1.1 Temperature

In each of the four sloughs, mean intragravel temperatures collected in standpipes during a given sampling period, were consistently lower than means of surface water. Considering all sloughs for both sampling periods (first sampling period was April 15-18 and second sampling period was April 29 - May 2) (Appendix Table B-4), mean values for intragravel waters ranged from a low of 2.0°C (first period; Slough 8A) to a high of 4.3°C (second period; Slough 11). Corresponding surface water temperatures were higher, ranging from a low of 3.0°C (first period; Slough 8A) to a high of 8.2°C (second period; Slough 11). This relationship is inverse to the general winter trend of intragravel water temperatures being higher than surface water temperatures. This is because these data were collected during late April and early May when surface water temperatures were beginning to increase, see Figures 2-2 through 2-14 for graphic illustrations of this.

Relatively large differences between early and late sampling periods for both surface and intragravel water are undoubtedly related to the variable environmental conditions at the time these data were collected. Spring thaw conditions were beginning during the first period and were well advanced during the second sampling period. The ranges of intragravel temperatures are much greater than the ranges of surface water temperatures as well as being lower as seen in Figures 3-11 and 3-12. This indicates that water inside the standpipes contained a mixture of ground water and surface water.

# WATER TEMPERATURE (APRIL 15-18, 1983)



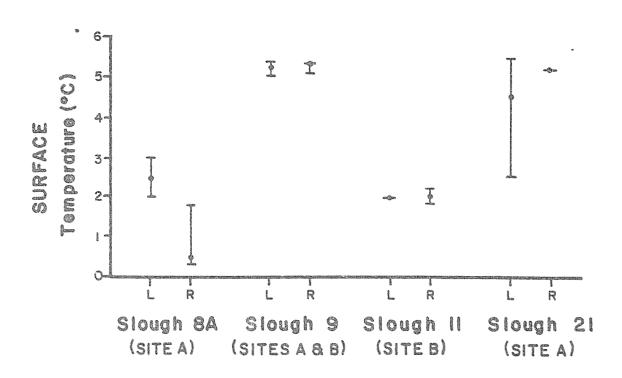
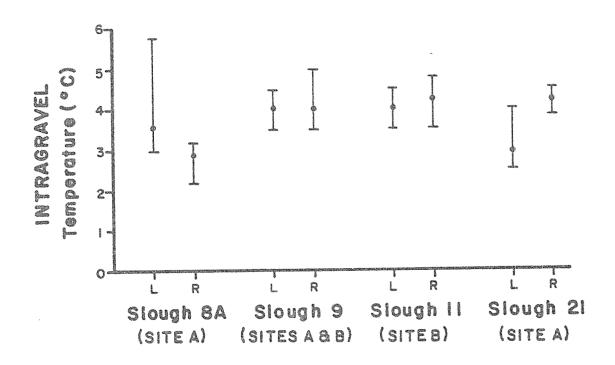


Figure 3-11. Summary (mean and range; n=10) of intragravel and corresponding surface water temperature data collected along left (L) and right (R) banks (looking upstream) of sloughs 8A, 9, 11 and 21, Susitna River, Alaska, spring (April 15-18), 1983.

# WATER TEMPERATURE (APRIL 29 - MAY, 1983)



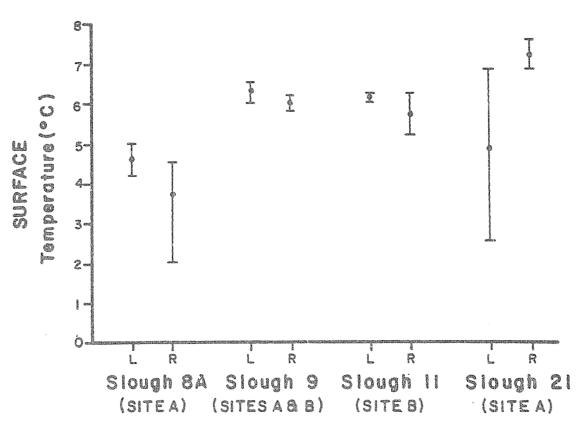


Figure 3-12. Summary (mean and range) of intragravel and corresponding surface water temperature data collected along left (L) and right (R) banks (looking upstream) of sloughs 8A, 9, 11 and 21, Susitna River, Alaska, spring (April 29- May 2), 1983. (n=10 for each mean except for Slough 21, left bank, where n=9).

Summaries of the mean water temperature data for the two sampling periods are presented in Figures 3-11 and 3-12. There appears to be no consistent relationship between the mean temperatures obtained at left bank sites compared to right bank sites. In some instances means for right bank sites were higher (e.g. Figure 3-12; Slough 21) and in other sloughs the reverse was true (e.g. Figure 3-12; Slough 8A). However, with the exception of Slough 11 during the second sampling period (Figure 3-12) the relative positions (higher or lower) of mean temperatures for both banks within a given slough remained the same for both intragravel and surface waters and between sampling periods.

With the possible exception of the mean temperature for the right bank site in Slough 8A during the first sampling period (Figure 3-11), all remaining temperature values are within acceptable ranges for salmonid incubation. The atypical temperatures at the Slough 8A site were probably due to the influence of melting ice. Standpipes in Slough 8A were located along the edge of a thick (12-18 inches) ice sheet that was thawing at the time of sampling.

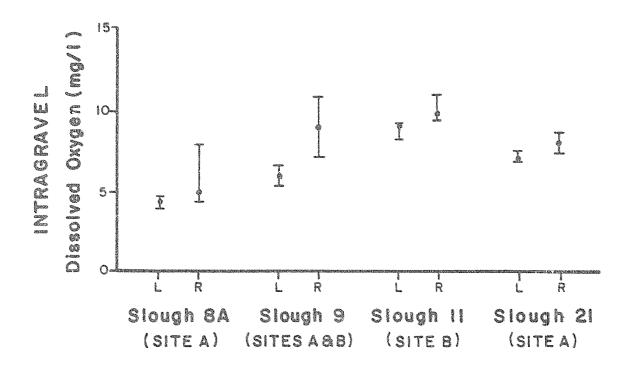
# 3.3.1.2 Dissolved oxygen

In each of the four sloughs, mean concentrations of intragravel dissolved oxygen (DO) collected within a given sampling period were consistently lower than mean concentrations for surface water (Appendix Table B-4). Considering all sloughs for both sampling periods, DO concentrations in surface waters in each slough ranged from a low of 9.1 mg/1 (April 15-18 period; Slough 21) to a high of 11.2 mg/1 (April 29 - May 2 period; Slough 8A). Means for intragravel measurements ranged from a low of 4.6 mg/l (first and second periods; Slough 8A) to a high of 8.5 mg/l (first period; Slough 11). In each case, the difference in mean DO concentrations between the first and second periods was much less than the difference between means for intragravel and surface waters. These trends are summarized in Figures 3-13 and 3-14 for the first and second sampling periods, respectively.

In Figures 3-13 and 3-14, DO levels are shown for left and right banks within each slough. With the exception of Slough 9 (refer to Figure 3-14) mean values for intragra.el water collected along the right bank, were consistently higher than those collected along the left bank.

Mean concentrations of DO for surface water were nearly the same between all sloughs and between sampling periods (Figures 3-13 and 3-14). In contrast, mean intragravel water DO concentrations were variable between sloughs, being lowest in Slough 8A and highest in Slough 11. Intragravel DO concentrations were also more variable at a given location than those of the corresponding surface water. Intragravel DO levels in sloughs 9 (left bank) and 21 appear to be adequate for successful incubation of salmonids according to the threshold of 6.0 mg/l recommended by McNeil and Bailey (1975) for artificial incubation conditions. However, DO concentrations in Slough 8A and at the right bank site in Slough 9 are below this recommended level.

# DISSOLVED OXYGEN (APRIL 15-18, 1983)



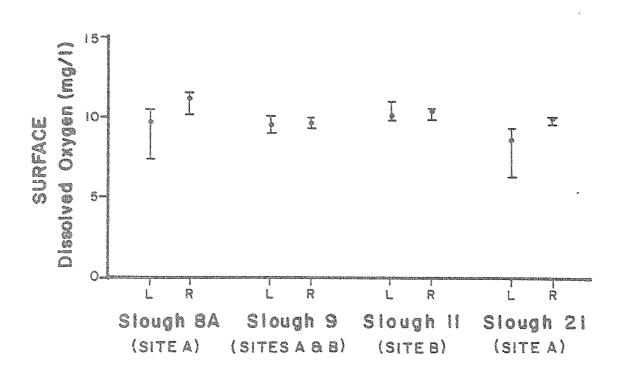
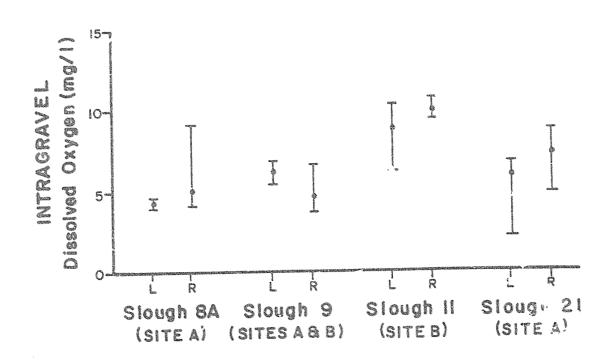


Figure 3-13. Summary (mean and range; n=10) of intragrave! and corresponding surface water dissolved oxygen data collected along left (L) and right (R) banks (looking upstream) of sloughs 8A, 9, 11 and 21, Susitna River, Alaska, spring (April 15-18), 1983.

### DISSOLVED OXYGEN (APRIL 29-MAY 2, 1983)



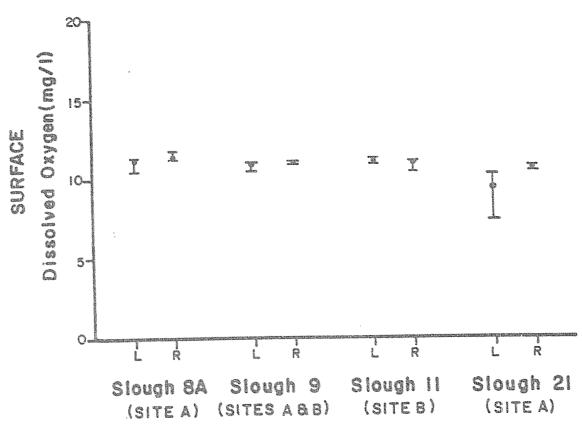


Figure 3-14. Summary (mean and range) of intragravel and corresponding surface water dissolved oxygen data collected along left (L) and right (R) banks (looking upstream) of sloughs 8A, 9, 11 and 21, Susitna River, Alaska, spring (April 29- May 2), 1983. (n=10 for each mean except for Slough 21, left bank, where n=9).

#### 3.3.1.3 pm

Mean pH values for all sites ranged within one pH unit, from approximately 6.5 to 7.5 (Appendix B). These values are within acceptable limits for successful salmonid incubation.

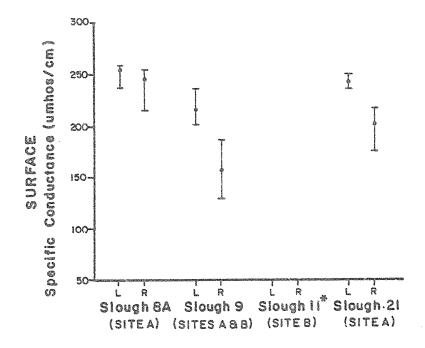
#### 3.3.1.4 Specific Conductance

Due to meter malfunction, complete data sets for the two sampling periods were not possible. However, from the available data base for three sloughs, the following patterns emerged. Mean values of specific conductance for sloughs (Appendix Table B-4) ranged from a low of 160 umhos/cm (April 15-18 period; Slough 9) to a high of 270 umhos/cm (April 29 - May 2 period; Slough 11). There did not appear to be a consistent relationship between mean values of intragravel and surface water samples. For both sampling periods in sloughs 8A and 9 and the first sample period in Slough 11, means for specific conductance were lower for surface water samples than for intragravel samples. However, the reverse was true for the second sample period in Slough 11 and for both periods in Sloughs 21. There was a consistent pattern between means of left and right banks (Figure 3-15) with right bank means being consistently lower than left bank means. This was true for both surface and intragravel samples.

Specific conductance data were used to compare water quality between sloughs and between left and right banks within sloughs. Specific conductance was selected for this purpose because it is generally

ho

## SPECIFIC CONDUCTANCE (APRIL 29-MAY 2, 1983)



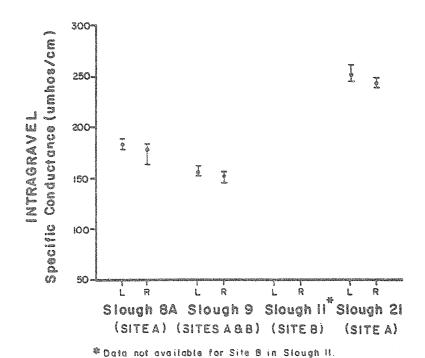


Figure 3-15. Summary (mean and range) of intragravel and corresponding surface specific conductance data

collected along left (L) and right(R) banks (looking upstream) of sloughs 8A, 9, 11 and 21, Susitna River, Alaska, spring (April 29 - May 2), 1983. (n=10 for each mean except for Slough 21,

left bank, where n=9).

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regarded as an index to total concentration of dissolved ionic matter, which in turn is related to water fertility (Lind 1974). Therefore, it is useful to detect water originating from different sources. In addition, this variable had a much larger range in variation than other variables measured and therefore was expected to be more sensitive to differences in water quality between locations. Specifically, the following hypotheses were tested.

1.  $H_0$ : Specific conductance values are the same in sloughs 8A, 9, 11 and 21; while controlling for bank effects.

Ha: Not equal.

2. H<sub>o</sub>: Specific conductance values are the same at left and right bank sites of sloughs; while controlling for slough effects.

Ha: Not equal

Table 3-1 is a summary of a two way analysis of variance (ANOVA) testing the above hypotheses. There were significant difference at the p<0.001 level for main effects, bank, slough and interaction effects. Therefore, the null hypotheses of equality are rejected. This suggests that there was more than one source of water contributing to intragravel water in sloughs. However, the significant difference for the interaction effect indicates that the individual effects of slough and bank are not independent. These differences are shown in Table 3-2. The magnitude of the bank effect depends upon which slough is

Table 3-1. Summary of two-way analysis of variance (ANOVA) on specific conductance data obtained inside standpipes located along left and right banks of sloughs 8A, 9, 11 and 21, Susitna River Alaska, April 29 - May 2, 1983.

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F	Significance of F
lode l	85394.4	7	12199.2	52.47	0.001
Main Effects	74214.6	<i>L</i> <sub>‡</sub>	18553.6	79.79	0.001
Bank	35757.1	1	35757.1	153.77	0.001
S1ough	38968.7	3	12989.6	55.86	0.001
Interactions Bank X Slough	11179.8	3	3726.6	16.03	0.001
esi dua l	15812.1	68	232.5		
otal	101201.4	75			

Table 3-2. Summary of mean specific conductance values obtained inside standpipes in sloughs 8A, 9, 11 and 21, Susitna River Alaska, April 29 - May 2, 1983.

			conductance (umhos/ln) loughs		
Slough Bank	entreviers de la constitución de l EA	na disamban sa mangarikan pakagan panasa sa	entrenon in meneral processor meneral contract contract contract of the contract con	en menanananana erra arabahan menananan menananan kerasa peranana sara peranana sara beranan kerasa peranan ma 21 sekonen menenanan . seben menenumunan menanan menanan peranan menanan menanan menanan menanan menanan menanan	Total
Left	254 (N=10) (Site A)	223 (N=13) (Site B and C)	260 (N=10) (Site A)	242 (N=9) (Site A)	243 (N=42)
Right	246 (N=10) (Site A)	156 (N=10) (Site A)	191 N=4) (Site C)	201 (N=10) (Site A)	200 (N=34)
Left + Right Mean Difference	250 8 ( N=20)	194 67 (N=23)	240 69 (N=14)	221 41 (N=19)	224 43 (N=76)

specific For example. the difference between mean considered. conductance values in Slough 8A are very slight compared to those in Slough 9. Also, the variation between mean specific conductance values for left bank of sloughs is much less than for right banks. pattern would be expected if water entering the left bank of sloughs is originating from a common source (i.e., the Susitna River). Therefore, it is not possible to make simple statements regarding the effects of either factor (slough or bank) without considering the effects of the It is noteworthy that means for specific conductance are consistently higher at left bank sites in each slough than at right bank sites. (Table 3-2). This suggests that the contribution of water into sloughs by the different sources follows a consistent left bank/right bank trend. This pattern is likely to be related to different hydraulic relationships governing the drainage patterns of water into the left (Susitna River side) and right (mountainous side) side of sloughs.

#### 3.3.2 <u>Development and emergence data</u>

Peak spawning for chum and sockeye salmon occurred in late August and early September of 1982 (ADF&G 1983a). The embryonic developmental stages following this spawning period consists of three phases: cleavage, gastrulation, and organogenesis. The cleavage phase begins after fertilization and ends with the proliferation of cells. In the gastrulation phase, the cells develop into tissues to produce the basic structure of the embryo. Organogenesis is characterized by the appearance of fins and formation of the internal organs and circulatory system. The eyed stage develops during the early portion of the

organogenesis phase. Hatching occurs about two weeks after organogenesis is completed. These phases are described in detail by Velsen (1980). In this report, post-hatching stages of embryonic development are evaluated in terms of percent yolk sac absorption and time of emergence. Plate 3-5 shows several stages of salmon development from the beginning of fertilization to just before emergence.

Temperatures recorded within the redds by the intragravel probes are listed in Table 3-3.

#### 3.3.2.1 Chum salmon

Table 3-4 contains the development and emergence data for chum salmon on the Susitna River between the Chulitna River confluence and Devil Canyon. The data for three of the sloughs are also presented graphically in Figure 3-16. Chum salmon egg fertilization occurred in late August and early September at all sampling sites. Chum embryos were developing from the cleavage phase into the early gastrulation stage through September. By November, eggs collected at all sites except Slough 20 were well into organogenesis and had reached the eyed stage. The embryos in Slough 20 at this time were just beginning early organogenesis. Eyes were not noticeable in chum salmon embryos at Slough 20 until mid December.

The first hatching observed at the study sites occurred at Sloughs 11 and 21 during late January. In February, alevins with up to 25 percent yolk sac absorption were present at all the sites sampled; unhatched

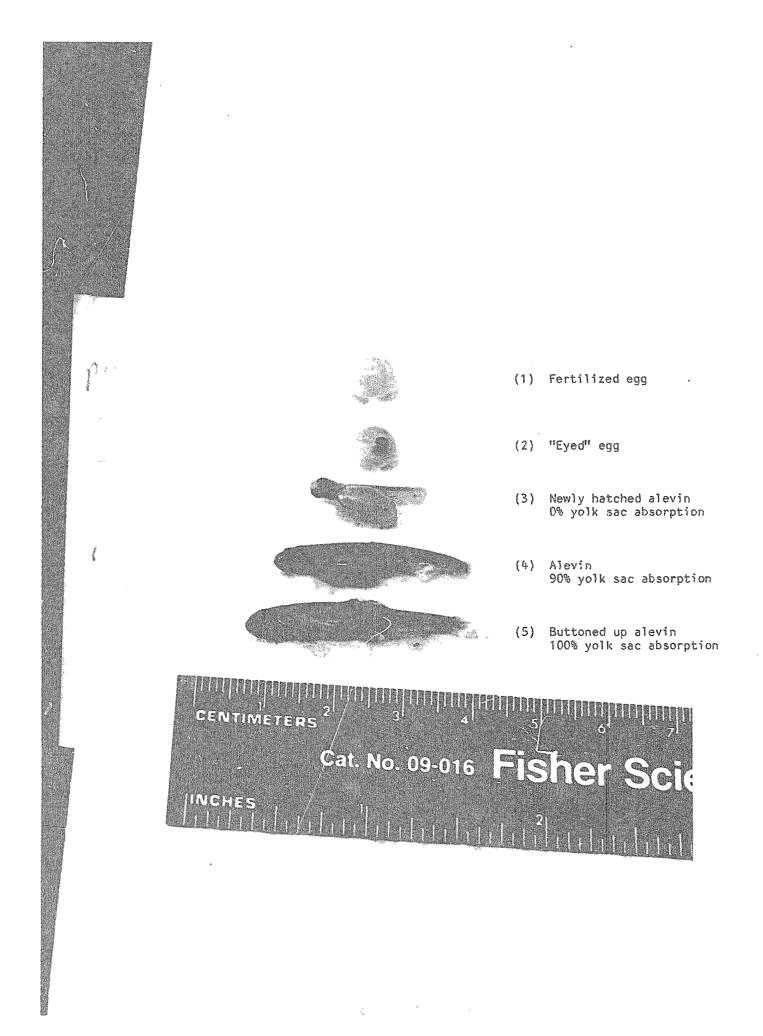


Plate 3-5. Stages of salmon egg and alevin development from beginning of fertilization to just before emergence.

Table 3-3. Temperatures (°C) recorded within chum and sockeye salmon redds by YSI intragravel probe and Digi-Sense thermometer from December 1982, through April, 1983.

Date	Slough 8A	Slough 9	Slough 11	Mainstem <u>Sidechannel A</u>	Mainstem Sidechannel B	Slough 20	Slough 21
Chum Redds							
December 16-21 January 26			3.0 3.1	3.1		0.3	2.0
February 22-23 March 24	0.9	2.0	1.4	2.1			2.1 2.2
April 20-21	7.1	3. i	3.4	3.0	2.7		2.5
Sockeye Redds							
December 16-18 January 26			3.2 3.1	3.1		0.3	2.0
February 22-23	0.1		1.9 2.0				2.2
March 24 April 20-21	# * #		2.9				2.6 2.5

Average T ?

Table 3-4. Development and emergence data for chum salmon on the Susitna River between the Chulitna River confluence and Devil Canyon, August 1982 to April 1983.

	schemistischer unverschieße Amerikanischen zwischen stebel einschieden wer	killendirakillen olan on- askilassion koosilasannansaksaksiainin nigis mamakana, siinee	Sloug	<u>ıhs &amp; Mainstem Sid</u>	e Channels	On the Part St. And St.	e Names – Rassillone, sedvalednik od doderate kastenin astronom et sum et kastusus kastus kastus k
Sampling Date	S1cugh 8A	Slough	Slough 11	Sidechannel A	Sidechannel B	S1ough 20	Slough 21
August 1982	Adults Spawning	Adults Spawning	Adults Spawning	~	60h	colo	409
September 6-7, 1982	Adults Spawning	Adults Spawning	Adults Spawning	N = 3 100% end of cleavage	N = 5 100% early gastrulation	N = 5 100% gastrulation	N = 10 100% end of cleavage
October 22, . 1982	-	-	N = 9 100% final stage gastrulation	-	~	~	N = 18 100% early Organogenesi
November 17-18, 1982	N ≃ 33 100% Organogenesis Eyed	N = 12 100% Organogenesis Eyed	N = 9 100% Organogenests Eyed	**	w	N = 2 100% early Organogenesis	N = 4 100% Organogenesi All Eyed
December 16-21, 1982	60a	•	N = 4 100% Final Stage Organogenesis	N = 3 100% Organogenesis Eyed	~	N = 10 100% Organogenesis Eyed	N = 11 100% Late Organogenesi
January 26-30, 1983	-	N = 5 100% Late Organogenesis	N = 15 100% Close to hetching	-	~	ati	N = 12 50% Late Organogenes 50% hatcher zero % Yoll Sac Absor.
February 21-23, 1983	-	N = 35 94% at 25% Yolk Sac Absorption 6% Late Organogenesis	N = 14 100% at 25% Yolk Sac Absorption	N = 10 100% at 10% Yolk Sac Absorption	••	•	N = 37 22% at 25% Yolk Sa Absorption 78% at 10% Yolk Sac Absorption

Sloughs	& Ma	instem	Side	Channels	

	elektrick franklike om kleine av blev elektrick franklike franklike franklike franklike franklike franklike fr	Sloughs & Mainstem Side Channels							
Sampling Date	Slough 8A	Slough 9	Slough 11	Sidechannel A	Si dechannel B	Slough 20	Slough 21		
March 22-25, 1983	N = 26 50% Zero Yolk Sac Absorption 50% Late Organogenesis	N = 25 52% at 90% Yolk Sac Absorption 48% at 50% Yolk Sac Absorption	N = 12 100% at 50% Yolk Sac Absorption	***	ou .	-	N = 35 49 at 75% Yolk Sac Absorption 51% at 50% Yolk Sac Absorption		
April 20-23, 1983	N = 31 100% hatched 52% at 50% Yolk Sac Absorption 48% at 25% Yolk Sac Absorption	N = 43 75-90% Yolk Sac Absorption	N = 39 57% free Swimming 43% at 62% Yolk s Absor .n	N = 2 100% Free Swimming	N = 25 75-90% Yolk Sac Absorption Beginning Emergence	-	N ≈ 65 53% free Swimming 47% at 85% Yolk Sac Absorption		

- no data

e ty redds

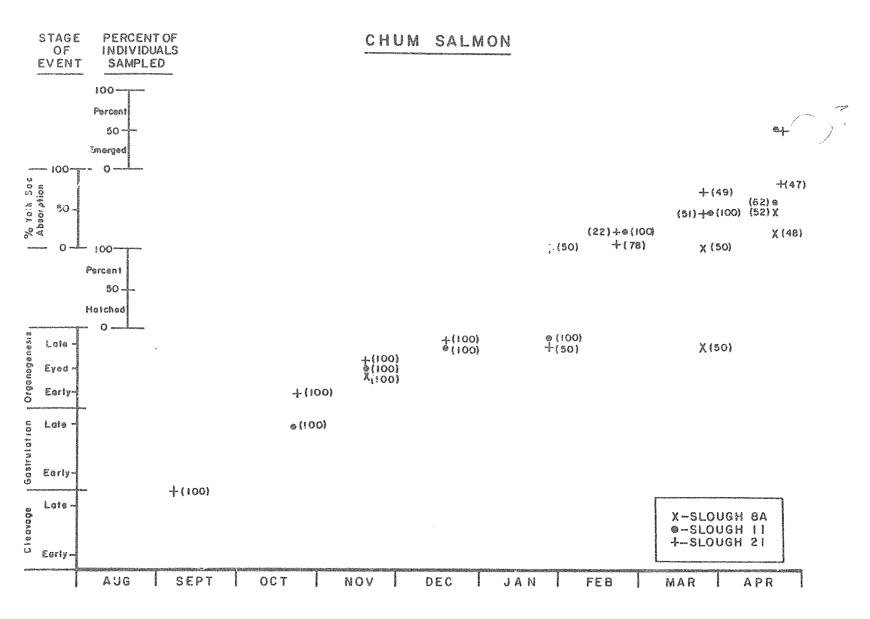


Figure 3-16. Embryonic development, hatching, yolk sac absorption, and emergence data for chum salmon at three sloughs, winter, 1982-1983. Numbers in parentheses are the percentages of individuals sampled which were at the indicated stage.

embryos were also present. Sampling in March revealed a wide range in development. Slough 8A had individuals ranging in developmental stages from late organogenesis to newly hatched alevins, while samples collected from sloughs 9, 11, and 21 showed alevins ranging from 50 to 90 percent yolk sac absorption. Emergence for chum salmon began in early April and continued through the end of May.

#### 3.3.2.2 Sockeye salmon

Development and emergence data for sockeye salmon on the Susitna River between the Chulitna River confluence and Devil Canyon are presented in Table 3-5. Data from three of the sloughs are presented graphically in Figure 3-17. Egg fertilization occurred for sockeye salmon in late August and early September. By late October, collected embryos were already developing from late gastrulation to early organogenesis. The first eyed embryos were found in November at Slough 11. By December, all sites sampled had eyed embryos which were well into organogenesis. Hatching sockeye salmon embryos were first observed at Slough 11 in late February. Sampling in March showed a wide range of embryo development from organogenesis at Slough 8A to 100 percent hatched and 25 percent yolk sac absorption at Slough 21. Emergence for sockeye salmon began in early April and continued through the end of May.

#### 3.4 <u>Discussion</u>

From the onset of incubation to the time of emergence, there are several major factors affecting development rates. These environmental vari-

Table 3-5. Development and emergence data for sockeye salmon on the Susitna River between the Chulitna River confluence and Devil Canyon, August 1982 to April 1983.

	en japakkara kolonnagan olga staljakkara – en novembol en vortinin olonisti kolonisti kolonisti kolonisti kolo	nyanyanan-mahaningi (heliodeochanani elek eleme e alike sandochadine) beradochadali senyanda mull andolek sambabili shekke	Sloughs & Mainstem Si	de Channels	na watan mwaka malalan aka icing ulawa Hamilina Malalani na malalani na malalani na malalani na malalani na ma
Sampling Date	Slough 8A	Slough 11	Sidechannel A	Slough 20	Slough 21
August 1982	*	•	-	-	m
September 6-7, 1982	Adults Spawning	Adults Spawning	-	-	Adults Spawning
October 22, 1982	~	N = 56 100% Final Stage Gastrulation	-	-	N = 4. 100% Early Organogenesi
November 17-18, 1982	-	N = 13 100% Organogenesis 54% Eyed	-	••	••
December 16-21, 1982	~	N = 5 100% Organogenesis All Eyed	N = 3 100% Organogenesis All Eyed	Organogenesis Eyed Eggs	N = 4 100% at Organogenesi All Eyed
January 26-30, 1983	-	N = 4 100% Late Organogenesis	-	~	-
February 21-23, 1983	100	N = 61 18% at zero % Yolk Sac Absorption 82% Late Organogenesis	••	***	N = 17 100% End Organogenes All Near Hatching

Table 3-5 (Continued).

	were a good to all continue and and flavour time a 1 to 1	Sloughs & Mainstem Side Channels						
Sampling Date	Slough 8A	Slough 11	Sidechannel A	\$1ough 	Slough 21			
March 22-25, 1983	N = 14 100% Organogenesis	N = 23 52% Newly Hatched 48% Late Organogenesis	es ·	-	N = 12 100% Hatched 25% Yolk Sad Absorption			
April 20-23, 1983	N = 13 100% Late Organogenesis	N = 77 38% Free Swimming 62% at 90% Yolk Sac Absorption	***		N - 32 100% Free Swimming			

<sup>-</sup> no data

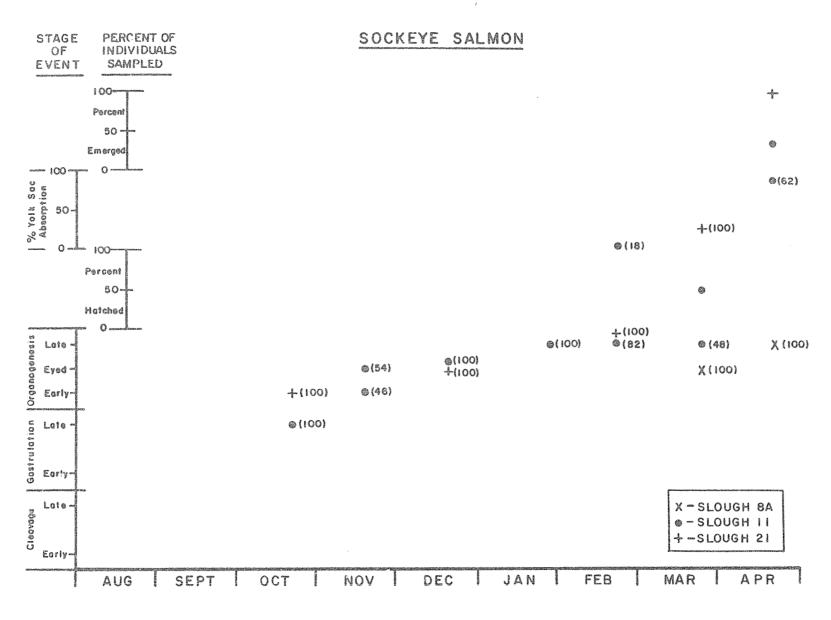


Figure 3-17. Embryonic development, hatching, yolk sac absorption, and emergence data for sockeye salmon at three sloughs, winter, 1982-1983. Numbers in parentheses are the percentages of individuals sampled which were at the indicated stage.

ables include: temperature, dissolved oxygen, water velocity, and siltation (Reiser and Bjornn 1979; Stikini 1979).

Temperature is a critical component in embryo incubation. From fertilization to the development of the eyed stage, salmon embrycs require ambient temperatures greater than four degrees centigrade (Peterson et 1977). Temperatures below this point can cause high mortality (Combs and Burrows 1957). Once the eyed stage of development is reached, low temperature is not such a limiting factor, but it will still slow down the development rate (Velsen 1980). In contrast, high temperatures can increase development rates and alter the order of morphological events. This can result in smaller alevins being produced because differentiation and the increased metabolism at temperatures takes precedence over growth (Haves 1949; Bams 1969). The upper temperature limit for incubation of salmon embryos is around 14 degrees centigrade (Reiser and Bjornn 1979).

Another important factor during the entire incubation period is dissolved oxygen. Oxygen is most critical during hatching and for a short time thereafter (Cooper 1965). Low levels of dissolved oxygen can reduce growth and survival rates; survivors could be reduced in size or result in an abnormal alevins (Silver et al. 1963). Optimum development during incubation occurs at concentrations of dissolved oxygen near saturation. There may be temporary reductions, but to a level no lower than five mg/l, for best survival rates (Reiser and Bjornn 1979). In this study, measurements of dissolved oxygen concentrations below this value were made in both Slough 8A and Slough 21 (Figures 3-13 and 3-14).

The interchange of surface and intragravel water is important in conducting dissolved oxygen to salmon embryos and alevins (Vaux 1962; Sheridan 1968; Reiser and Bjornn 1979). Fluctuation in flow may cause silt and stream sediment to be deposited over redds. Sediment deposited over incubating salmon eggs inhibits the exchange of oxygen-carrying surface water with intragravel water and lowers survival rates of embryos and alevins (Cooper 1965; Reiser and Bjornn 1979). An increase in water temperature also increases the amount of oxygen consumed. Thus, the factors affecting survival of developing embryos and newly hatched alevins to time of emergence are often interrelated (Alderdice et al. 1958).

Time and temperature are directly related during salmon embryo incubation. The measure used when computing the length of time for each phase of embryonic development is the temperature unit (TU). This is the number of days incubated multiplied by the mean daily temperature above 0°C. Temperature units for the study sites were calculated from the continuous intragravel temperature data which were presented in Section 2.0.

The theory on development rate has been that development of the salmon egg stops at zero degrees centigrade. However, according to Seymour (1956, as cited by Raymond 1981), development does not stop at zero degrees centigrade, but at some other temperature, c. As the average temperature approaches c, development time becomes infinite. The equation is:

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$$t_h = \frac{k}{T-c}$$
 where:  $t_h = time to 50\% hatching (days)$ 

k = a calculated constant.

T = mean temperature in degrees
 centigrade,

c = temperature at which development ceases.

This equation can be re-written as:

$$\frac{1}{t_h} = \frac{1}{k} T - \frac{c}{k}$$

The constants c and k can then be determined from the data  $t_h$  and T by linear regression. Raymond (1981) obtained values of 628.4 for k and -1.53 for c using data from nine different incubation studies of northern chum stocks. Using the same equation to predict the time to 50 percent emergence ( $t_e$ ), Raymona calculated a value of 683.8 for k and -3.32 for c. Raymond obtained a weaker correlation between  $t_e$  and T than between  $t_h$  and T and suggested that alevins are exposed to, and affected by, more variables which are not accounted for by the formula than are embryos.

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$$t_{h} = \frac{k}{T-c}$$
 where:  $t_{h} = time to 50\% hatching (days)$ 

k = a calculated constant.

T = mean temperature in degrees centigrade,

c = temperature at which development ceases.

This equation can be re-written as:

$$\frac{1}{t_b} = \frac{1}{k} T - \frac{c}{k}$$

The constants c and k can then be determined from the data  $t_h$  and T by linear regression. Raymond (1981) obtained values of 628.4 for k and -1.53 for c using data from nine different incubation studies of northern chum stocks. Using the same equation to predict the time to 50 percent emergence ( $t_e$ ), Raymond calculated a value of 683.8 for k and -3.32 for c. Raymond obtained a weaker correlation between  $t_e$  and T than between  $t_h$  and T and suggested that alevins are exposed to, and affected by, more variables which are not accounted for by the formula than are embryos.

Two assumptions were made in this study when discussing development rates of chum and sockeye salmon embryos. The first is that salmon embryos and alevins were actually incubated at the temperatures recorded by the Datapod recorders (Appendix A). This is not a bad assumption, as the limited temperature readings actually taken within the redds (Table 3-3) were fairly close to those intragravel temperatures recorded by the Datapod recorders. The second assumption is that the embryos began incubation on the first of September. This date was chosen after reviewing the timing of the 1982 spawning data (ADF&G 1983a) and actual observations of incubating embryos.

Accumulated thermal units derived from the intragravel Datapod temperature recorders for three of the sites (the same sites plotted in Figures 3-16 and 3-17) are plotted in Figure 3-18. Slough 8A started to accumulate thermal units at a greater rate than the other two sites until an ice jam occurring in early December caused a large mainstem flow through Slough 8A. The cold mainstem water depressed the temperature of the intragravel water in this slough and there was little further accumulation of thermal units. The effect of this phenomenon on developing chum and sockeye embryos can be seen in Figure 3-16 and Figure 3-17, where salmon development and emergence in Slough 8A was delayed in comparison to the other two sloughs.

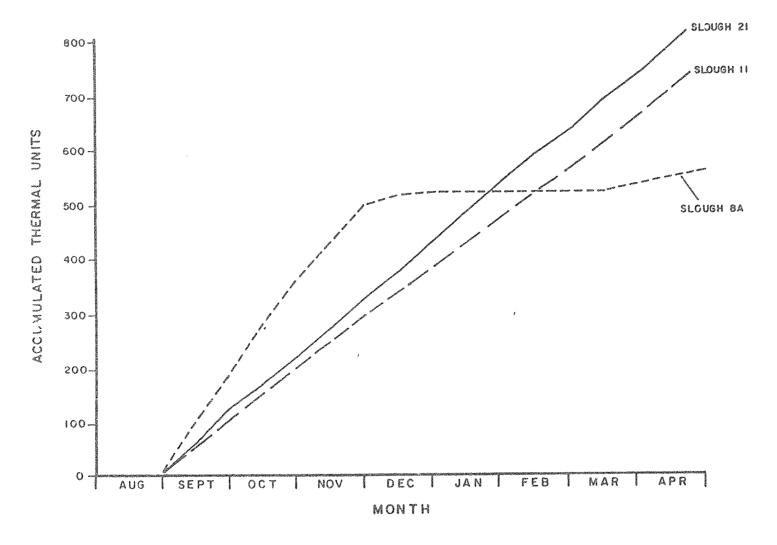


Figure 3-18. Accumulated temperature units for intragravel water at three sloughs, winter, 1982-1983. For both Slough 8A and Slough 21, the values were interpolated using data from two different Datapod recorders in these sloughs. Because of equipment loss or malfunction, a continuous record for any one of these recorders was not obtained.

#### 3.4.1 Chum salmon

The development of chum salmon embryos and alevins was uniform at all sampling sites except for Slough 8A. Embryo development at Slough 8A was retarded by low intragravel water temperatures which resulted from the ice jam in the mainstem diverting cold Susitna water through the head of Slough 8A from mid-December through mid-February. It is also possible that some incubation delay was caused by low levels of dissolved oxygen (DO) in the intragravel water of Slough 8A (see Figures 3-13 and 3-14). However, DO was not actually measured in the redds, so we do not know this to be the case.

Table 3-6 presents a comparison of accumulated TU's needed to produce 50 percent hatching of chum salmon embryos and 50 percent emergence of chum salmon alevins at selected sites on the Susitna River with other areas in Alaska. It appears that the TU's required by chum salmon on the Susitna River are comparable to values required in the other areas.

The times to 50 percent hatching for chum salmon from the three sloughs plotted in Figure 3-18 (Slough 8A, Slough 9, Slough 21) as a function of mean incubation temperature fall slightly above the regression line calculated by Raymond (1981) (Figure 3-19), but are essentially comparable to the other stocks used by Raymond in his regression. The dates for 50 percent hatching and 50 percent emergence were determined by extrapolating from one period of observation to the next period and taking the mean of the two (see Tables 3-4 and 3-5).

Table 3-6. Comparision of accumulated temperature units (TU's) and days needed to produce fifty percent hatching of chum salmon eggs and fifty percent emergence of chum salmon alevins at selected sites on the Susitna River with other areas in Alaska.

Location	Brood Year	Temp.(°C) min-max (mean)	TU's Ind (days) required for 50% hatching	Temp.(°C) min-max (mean)	TU's and (days) required for 50% emergence
Clear Hatchery <sup>1</sup>	1977	(3.0)	420 (140)	(3.0)	313 (108)
Clear Hatchery <sup>1</sup>	1978	(3.8)	455 (120)	(4.1)	393 (95)
Eklutna Hatchery <sup>2</sup>	1981	(5.0)	802 (160)	(4.5)	209 (46)
USFWS Laboratory <sup>3</sup> Anchorage	1982	0.5-8.0 (1.8)	306 (170)	করে বার	as es.
USFWS Laboratory <sup>3</sup> Anchorage	1982	2.0-6.5 (3.6)	448 (124)	<b>ශා</b> ජූව	on es
USFWS Laboratory <sup>3</sup> Anchorage	1982	3.0-5.9 (4.8)	489 (106)	425 CBp	Alb etp
USFWS Laboratory <sup>3</sup> Anchorage	1982	4.0-4.0 (4.0)	472 (118)	ನೂ ವಾ	w cs
Susitna River - Slough 8A	1982	0.0-6.8 (2.5)	539 (218)	0.0-6.8 (1.1)	Footnote #5
Susitna River - Slough 11	1982	2.9-3.5 (3.1)	501 (162)	2.9-3.6 (3.2)	232 (73)
Susitna River - Slough 21 Mouth	1982	3.4-7.4 (3.6)	534 (148)	3.3-7.4 (3.4)	283 (84)

<sup>&</sup>lt;sup>1</sup> Raymond (1981)

<sup>&</sup>lt;sup>2</sup> Loran Waldron, Eklutna Hatchery, personal communication

Adapted from Waangard and Burger (1983)

<sup>4</sup> Calculated from the time of 50 percent hatching to the time of 50 percent emergence

 $<sup>^{5}</sup>$  No emergence had occurred as of April 20.

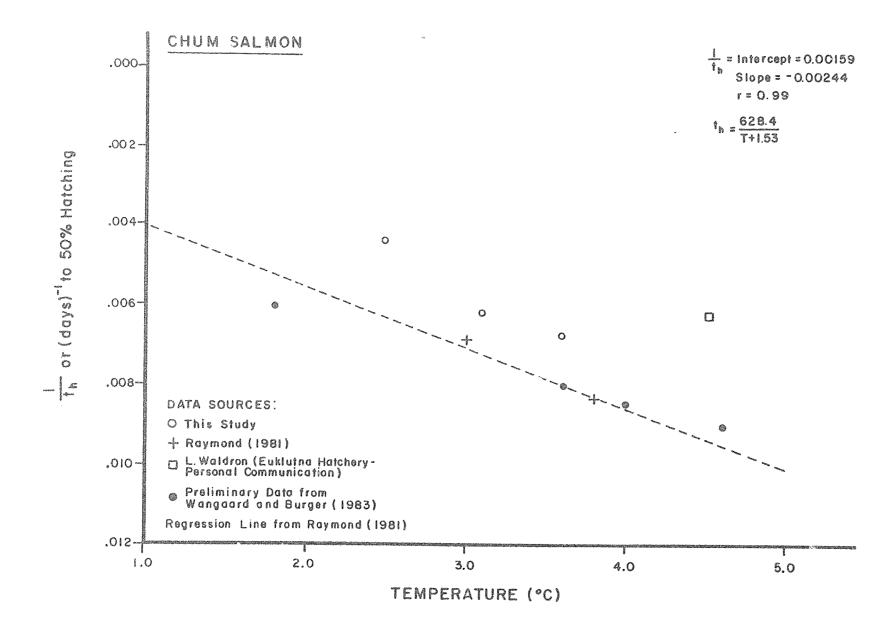


Figure 3-19. Effect of mean incubation temperature on time to 50 percent hatching for chum salmon. The regression line was calculated from several sources by Raymond (1981) and does not include the data plotted on this figure (except for the two Raymond, 1981 points).

#### 3.4.2 Sockeye salmon

As with chum salmon, all sites where sockeye salmon embryos and alevins were collected showed uniform development except Slough 8A. Development rates at Slough 8A were retarded because of low intragravel temperature. Up to hatching, sockeye salmon embryo development lagged behind chum salmon embryo development. This difference in maturation rate is similar to that found by other studies (Velsen 1980; Raymond 1981).

The TU's and time required for 50 percent hatching and 50 percent emergence of the Susitna River sockeye salmon and some other stocks are shown in Table 3-7. The times to 50 percent hatching for sockeye salmon as a function of mean incubation temperature in this study (Slough 11 and Slough 21) and from other studies are plotted in Figure 3-20. All of the data fall close to the regression line (r=0.99), so there is apparently no essential difference between the development of Susitna River sockeye salmon and the development of sockeye salmon elsewhere. The value for k (649.4) in the equation on this figure is greater than the k value for chum salmon (628.4) on Figure 3-19, which is in accordance with the literature (Velson 1980; Raymond 1981) stating that chum salmon development occurs at a greater rate than sockeye salmon development. These equations suggest that sockeye development ceases around  $0^{\circ}$ C (c=-0.25), while chum development will occur down to minus  $1.5^{\circ}$ C (c=-1.52).

Table 3-7. Comparision of accumulated temperature units (TU's) and days needed to produce fifty percent hatching of sockeye salmon eggs and fifty percent emergence of sockeye salmon alevins at selected sites on the Susitna River with other areas in Alaska and Canada.

	PALESTÁN A CALÍFORNIZA STANA ARTONOLÓ PROGRAMA A PROTESTA PALESTÁN A PROTESTA PALESTÁN A CALÓFORNIZA PALASTÁN	kultings - State to kalificative plays of the State of the grant of the State of th		CONSTRUCTOR CONTROL C BECOME AND ACTIVATION OF A STATE	and processing a state of the s
<u>Location</u>	Brood <u>Year</u>	Temp.(°C) min-max (mean)	TU's and (days) required for 50% hatching	Temp.(°C) min-max (mean	TU's and (days) required for 50% emergence
British Columbia <sup>1</sup>	1980	(5.0)	595 (119)		
		(8.0)	640 (80)		
		(11.0)	627 (57)		
Lake Iliamna <sup>2</sup>	1962	(9.0)	643 (71)	an en	40 KG
USFWS Laboratory <sup>3</sup> Anchorage	1982	2.0-6.5 (3.1)	523 (169)	sub eva	es es
USFWS Laboratory <sup>3</sup> Anchorage	1982	3.0-5.9 (4.3)	612 (142)	an es	as we
USFWS Laboratory <sup>3</sup> Anchorage	1982	4.0-4.0 (4.0)	614 (154)	OUP -1993	eo en
Susitna River Slough 11	1982	2.9-3.5 (3.1)	633 (204)	2.9-3.9 (3.3)	123 (37)
Susitna River Slough 21 Mouth	1982	3.3-7.4 (3.5)	678 (194)	3.3-7.4 (3.3)	103 (31)

<sup>&</sup>lt;sup>1</sup> Velsen (1980)

<sup>&</sup>lt;sup>2</sup> Olsen (1968)

<sup>3</sup> Adapted from preliminary unpublished report, (Waangard and Burger 1983)

 $<sup>^{4}</sup>$  Calculated from the time of 50 percent hatching to the time of 50 percent emergence

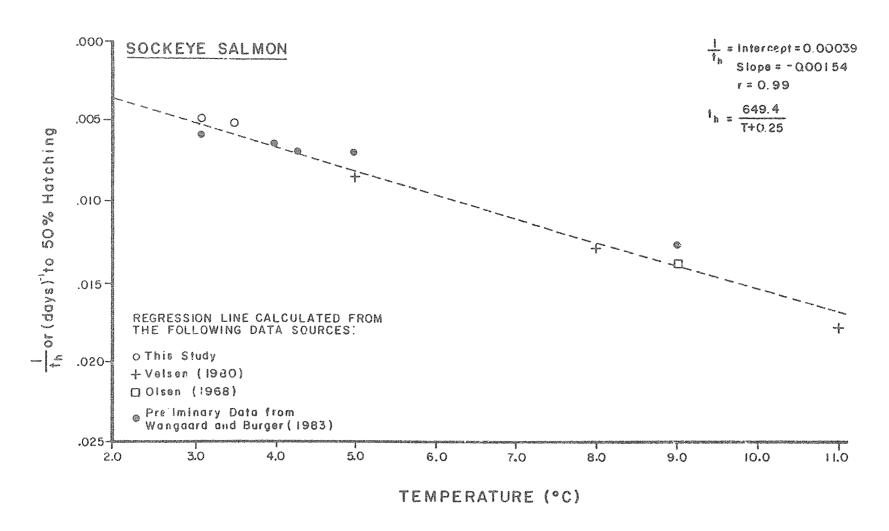


Figure 3-20. Effect of mean incubation temperature on time to 50 percent hatching for sockeye salmon.

#### 3.4.3 Conclusions

The temperature units and times required for 50 percent hatching and 50 percent emergence for chum and sockeye salmon in the Susitna River appear to be basically the same as that required by other stocks of these species. The data provide a basis to compare laboratory incubation studies with the actual rates of development observed in the field that, together, can be used to predict temperature effects on development.

The differences in developmental rates among different sites suggest that the temperature changes which occurred in the system when the mainstem flow overtopped the head of Slough 8A produced substantial changes in developmental rates in the chum embryos incubating at this site. Observations of embryos collected in Slough 8A suggest that an increased mortality may have occurred, as evidenced by larger numbers of dead embryos as compared with other sites that were sampled. We do not have a sufficient sample size to ascertain if this observation reflects actual differences in survival.

The dominant effects of mainstem flows and temperature on development of incubating salmon embryos and alevins in sloughs and sidechannels during the fall and winter occur when high water produced by floods or ice processes causes mainstem water to flow over redds. Otherwise, the intragravel temperatures in the redds are not directly influenced by mainstem flow, but rather by ground water or upwelling water. In this case, the only effect of mainstem water is heat input transferred by upwelling.

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An analysis of impacts of altered flow or thermal regimes should consider these factors as possible components that may alter the natural timing of the incubation and development processes of juvenile sockeye and chum salmon from the sloughs and side channels of the Susitna River.

#### 4.0 BURBOT SPAWNING IN THE SUSITNA RIVER BELOW DEVIL CANYON

Burbot spawn in the winter in areas of the Susitna River which include locations influenced by mainstem flow and temperature. There has been little information available on the locations, timing, or habitat requirements of burbot spawning.

Past studies indicate that burbot spawn in tributaries and sloughs of the Susitna River below Devil Canyon between November and February (ADF&G 1983b). According to residents at Alexander Creek (RM 10.1) and the Deshka River (RM 40.6), burbot migrate enmasse into these tributaries during late November and early December. Catches of burbot by the residents of these areas have reportedly been high during December and January but decrease substantially after January.

#### 4.1 Objectives

The specific objectives of the burbot (<u>Lota lota</u>) spawning studies during the 1982-1983 winter sampling season were:

- 1) Determine timing of burbot spawning;
- 2) Describe burbot spawning habitat.

#### 4.2 Methods

Documentation of the exact spawning location and timing of burbot is difficult because they are reported to spawn nocturnally under the ice (Morrow 1980). Therefore, data collected in this study could only be from areas suspected of having burbot spawning. Specimens were collected at these areas during one two-day sampling trip per month from December to February so that the time of spawning (incidence of post-spawning individuals) could be determined.

#### 4.2.1 Study site locations

The Deshka River was the primary study location (RM 40.6). Two sampling sites on the river were established, one at the mouth (TRM 0.0) and the other at a site two miles upstream (Figures 4-1 and 4-2). These locations had been sampled in previous winters and were chosen for their accessibility and high concentrations of burbot during the winter.

During the winter of 1982-83, a few burbot were also captured at other sites on the Susitna River between the Deshka River and Devil Canyon (Appendix Table C-1). The relative maturity of all burbot captured in this reach of river were examined in order to determine the timing and locations of burbot spawning.

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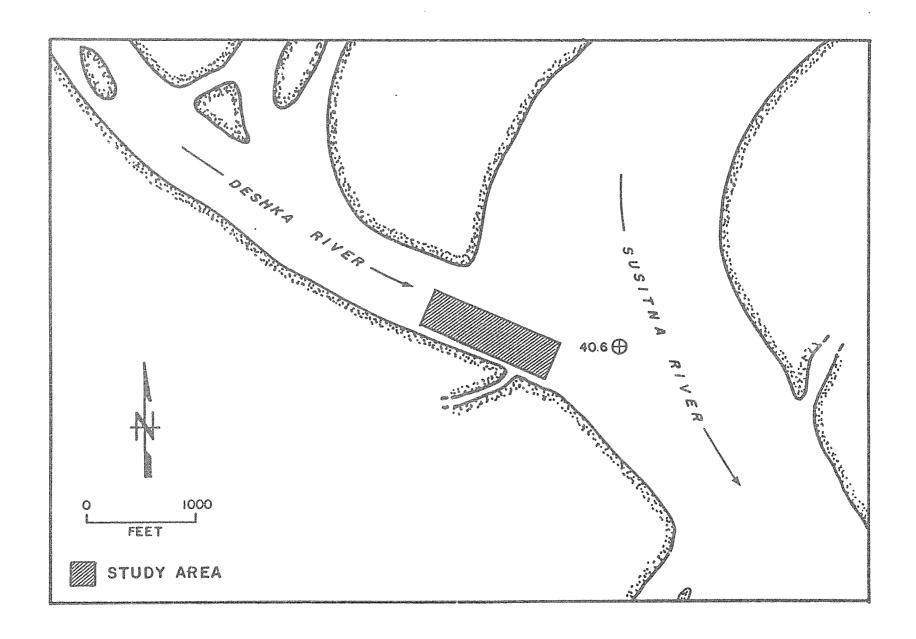


Figure 4-1. Suspected burbot spawning area at the mouth (TRM 0.0) of the Deshka River (RM 40.6).

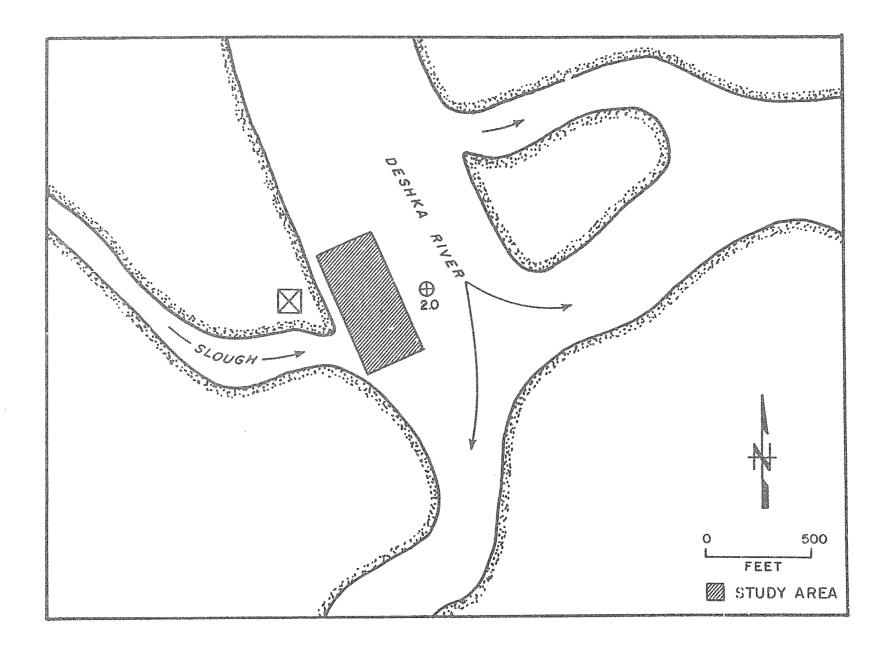


Figure 4-2. Suspected burbot spawning area at TRM 2.0 of the Deshka River (RM 40.6).

# 4.2.2 <u>Sampling techniques and determination of sexual</u> maturity

Trotlines and burbot sets, baited with fish, were used to capture at all sites according to the FY 1982 procedures manual (ADF&G 1982). All sampling gear was set through the ice; ice drilling was accomplished by use of a two man power auger.

All sampling mortalities during each sampling trip were necropsied to observe the development of gonads. Live fish were sacrificed to obtain a sample size of at least ten fish if there were not enough mortalities. Otoliths were removed for age determination. Sexual maturity or immaturity was determined by the size of the eggs or sperm sacs in comparison to gonads of other fish of similar length. Past data indicated that the majority of adult fish spawn each year and that the gonads noticeably begin to enlarge in August (ADF&G 1983b).

Ripe gonads were examined and then preserved for comparison with gonads collected during later surveys (Plate 4-1). External characteristics of gonads such as size, color and texture of egg and sperm sacs were documented. Internal characteristics, including the size and presence or absence of eggs in the egg sacs, were also recorded.

#### 4.2.3 Habitat measurements

The Deshka River sites (RM 40.6) were sampled once per month to determine physical and chemical characteristics of habitats utilized by

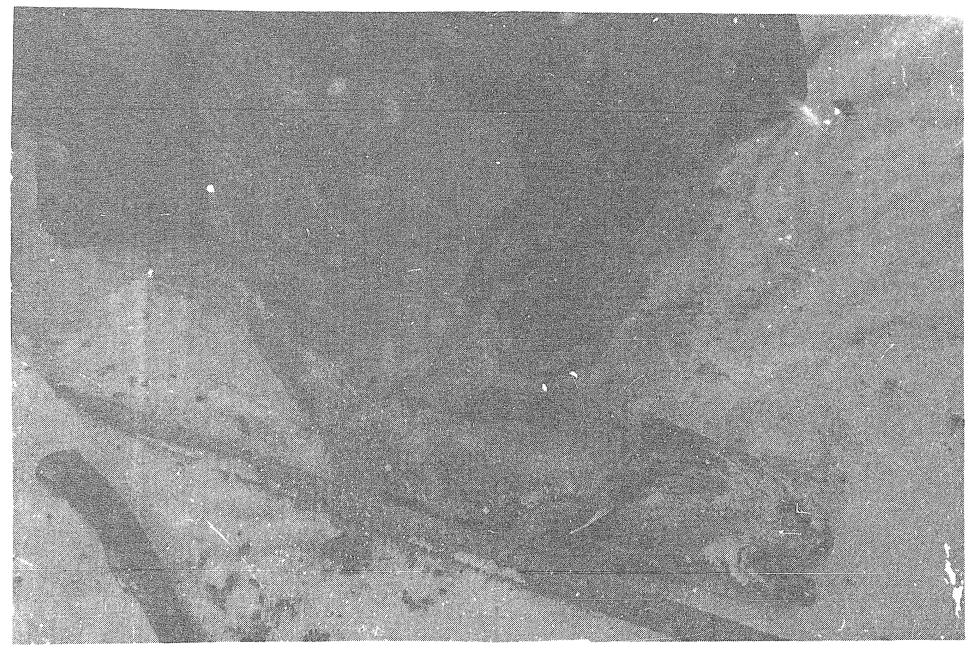


Plate 4-1. Necropsying a burbot to determine sex and relative maturity at the Deshka River (RM 40.6), mid-January, 1983.

burbot for spawning. Habitat parameters measured included ice thickness, water depth, under-ice water velocity, dissolved oxygen, specific conductance, pH, and water temperature. Specific data collection methodology and field experimental designs used in the collection of the above data are summarized in the FY 82 procedures manual (ADF&G 1982).

The sampling sites were also mapped (Figures 4-1 and 4-2).

#### 4.3 Results

#### 4.3.1 Habitat data

Habitat data collected at the above sites are listed in Tables 4-1 and 4-2.

Water depths in the study areas ranged from 2.2 to 9.8 feet ( $\bar{x}$  = 6.2 feet, n = 21), with under-ice water velocities ranging from 0.3 to 2.1 ft/sec. ( $\bar{x}$  = 0.8 ft/sec., n = 14). Water temperatures measured in the study area ranged from -0.3 to 0.7°C ( $\bar{x}$  = 0.1°C, n = 18).

## 4.3.2 <u>Sexual development</u>

Sexually ripe burbot were captured from early December, 1982 to mid-January, 1983 between Cook Inlet and Devil Canyon. During this time no spent burbot were captured. Spawned out burbot were first captured during a mid-February sampling trip to the Deshka River. All burbot

Table 4-1. Physical and chemical characteristics of suspected burbot spawning habitat at the mouth (TRM 0.0) of the Deshka River (RM 40.6).

DATE	SAMPLE	ICE THICKNESS (FT)	WATER DEPTH (FT)	WATER VELOCITY (FT/SEC)	DISSOLVED OXYGEN (MG/L)	SPECIFIC CONDUCTIVITY (UMHOS/CM)	рН	WATER TEMPERATURE (°C)	Notes: Sexual Condition of Burbot
821203	Α	· 8	5.9	606	15.6	69	6.3	-0.3	Pre-Spawning Burbot Milling
	В	1.7	7.3	•	14.8	117	6.5	-0.2	
	С	1.8	8.2	des	15.0	79	6.6	-0.3	
	D	1.3	6.5	600	12.2	67	6.7	-0.3	
830112	Α	1.5	4.5	0.6	10.6	58	6.3	0.7	Pre-Spawning Burbot Milling
030112	В	2.0	4.5	1.2	One	Opt .	ou.	***	
	c	1.8	7.5	0.7	10.2	58	6.1	0.5	
	D	1.8	9.8	0.6	10.1	58	6.1	0.3	
	Ē	1.8	9.0	0.6	10.2	58	6.1	0.3	
	F	1.9	7.5	0.7	4 <i>m</i>	alle	••	***	
	G	1.9	8.8	0.7	8.5	59	6.4	0.1	
	and the same of th	1.7	9.2	0.6	er-	neto	***	***	
830217	Α	1.9	4.7	eddy	NO	83	5.8	0.0	Post-spawning
	В	1.9	2.2	2.1	Name .	84	5.5	0.0	<b>V</b>
	č	1.9	5.0	000	Again	81	5.1	0.0	
	Ď	1.9	4.7	4460	GGe.	79	4.8	0.0	

<sup>- =</sup> Not sampled

Table 4-2. Physical and chemical characteristics of suspected burbot spawning habitat at TRM 2.0 of the Deshka River (RM 40.6).

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DATE	SAMPLE	ICE THICKNESS (FT)	WATER DEPTH (FT)	WATER VELOCITY (FT/SEC)	DISSOLVED OXYGEN (MG/L)	SPECIFIC CONDUCTIVITY (UMHOS/CM)	<u>рН</u>	WATER TEMPERATURE (°C)	Notes: Sexual Condition of Burbot
821203	A B C D	1.0 0.7 1.1 0.7	ess ess ess ess	*** *** ***	nos ens ensi ensi	-	etre etre etre	-	Pre-Spawning Burbot Milling
820311	A B C D	1.8 2.0 2.2 2.2 2.0	5.2 5.6 4.0 4.6 4.5	0.3 0.4 0.4 0.9	11.7 11.9 11.4 11.6 11.4	67 67 67 68 68	6.0 5.5 6.0 6.1	0.1 0.3 0.3 0.1 0.1	Post-Spawning

<sup>- =</sup> Not sampled

captured during this sampling trip and subsequent trips were either post-spawners or sexually immature (non-spawners in 1982-1983). Sampling locations and catch per unit effort of all burbot captured during the winter of 1982-1983 are listed in Appendix Table C-1.

Monthly examinations of sexually ripe burbot gonads showed that the size increased from early December to mid-January, then progressively decreased in size through March. The color of the egg and sperm sacs accordingly increased in intensity up to mid-January. The egg sacs changed from a light yellow color to a dark orange and the sperm sacs changed from a cream to a golden coloration. Similar color changes in egg and sperm sacs have been reported in sexually ripe burbot captured elsewhere in south central Alaska (Mike Stratton pers. comm.).

Eggs were examined each month to determine if spawning occurred.

Eggs were found in all enlarged (sexually mature) egg sacs examined during December and January. Only residual eggs were found in enlarged egg sacs of fish necropsied in February and March.

#### 4.3.3 Age, length, and sex composition

Analysis of the age composition and total lengths of 69 burbot caught during the winter of 1982-83 yield $^{\circ}$ d the following results. Ages ranged from age IV to age XII with ages V (21.7%) and VI (29.0%) burbot composing the two most frequently sampled age classes (Appendix Table

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C-2). Figure 4-3 illustrates the average length and range of lengths for each age class of Susitna River burbot sampled from December, 1982 to March, 1983.

Fifty-nine of the 69 burbot necropsied were sexually ripe or showed signs of having spawned during the winter of 1982-1983. Thirty-nine of the pre- or post-spawners were females, ranging in total length from 430-795 mm and encompassing age classes V to XII. The remaining 20 preor post-spawners were males, ranging in length from 424-780 mm and encompassing age classes IV to XI.

Ten sexually immature burbot were also examined. Seven were females ranging in length from 395 mm to 710 mm and age from IV to XII years. The three males ranged in length from 425-585 mm and age from IV to VII

4.4 <u>Discussion</u> where 3 0 for where planed

4.4.1 <u>Timing and location of spawning</u>

4.4.1 <u>Timing and location of spawning</u>

The Studies conducted during the winter of 1982-1983 found that burbot spawn in the Susitna River below Devil Canyon between mid-language. February. Results from the 1981-1982 studies had shown only that burbot spawn in this reach of the river prior to February (ADF&G 1983b).

> Since burbot spawn nocturnally under the ice, exact locations where burbot spawn in the Susitna and Deshka rivers have not been decermined.

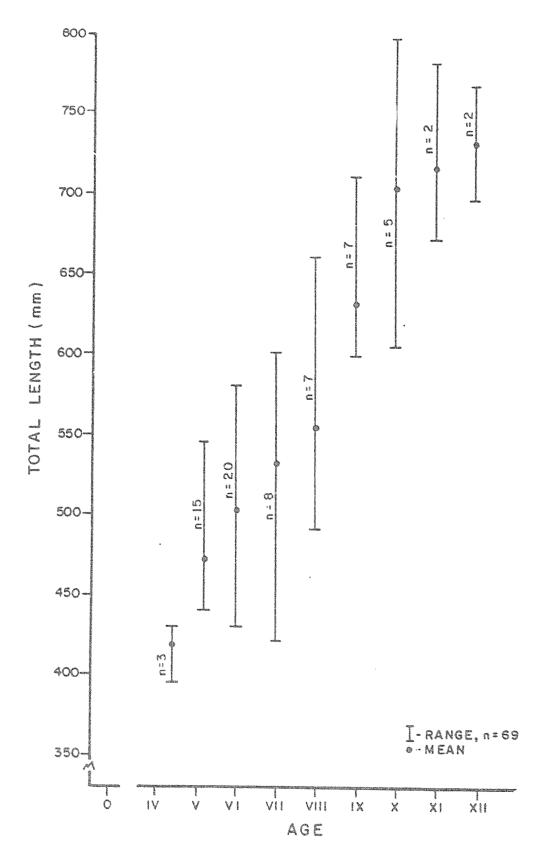


Figure 4-3. Age-length relationship for burbot captured in the Susitna River between Cook Inlet and Devil Canyon, December, 1982 through March, 1983.

However, by systematically sampling at a specific location over the winter (Deshka River), sexually ripe and spent fish were captured. Therefore, although actual spawning was not observed spawning probably did occur between the mouth and at least two miles upriver from the mouth.

The sites on the Deshka River where spawning was suspected is characterized with having slow to moderate flows and medium water depths, 2.2 - 9.8 feet (Tables 4-1 and 4-2). The Deshka River's water is stained with tannins reflecting the source from muskeg areas. Past studies have determined the substrate base at the mouth to be predominantely gravel/rubble which is often covered by several inches of silt (ADF&G 1981a). Although most data collected to date indicates that burbot spawn at tributary mouths such as the Deshka River and Alexander Creek (RM 10.1), radio telemetry data suggests that burbot may also spawn in the mainstem. Three of the five radio-tagged burbot known to be alive during the monitoring of winter 1981-1982 movements remained in the mainstem from January to February (ADF&G 1983b). Data collected during the 1982-1983 winter radio telemetry study also shows that burbot reside in the mainstem during the determined spawning period (see Section 5.0 of this report).

MacCrimmon (1959) suggests that a post-spawning dispersal occurs for feeding purposes. Substantial decreases in catch rates following spawning in late January indicate that a post-spawning dispersal may also occur in the Susitna River drainage.

Although most of the burbot captured during the winter 1982-1983 were at sites below the Chulitna confluence, several sexually ripe burbot were also caught above the confluence (Appendix Table C-3). No spawning sites have been located above the Chulitna confluence; however, data from 1982 suggests spawning occurs in sloughs (ADF&G 1983b). The sexually ripe fish captured in winter 1982-1983 at mainstem sites suggest that spawning may also occur in the mainstem.

#### 4.4.2 Age, length and sex composition

Although most of the burbot captured during the winter of 1981-1982 and 1982-1983 were sexually mature, several sexually immature adults were also captured (ADF&G 1981b; 1983b). These immature fish were all over 350 mm in length. Data from 1981-1982, however, indicate that male burbot could attain sexual maturity when they reach 310 mm in length and mature females were found that were 330 mm in length. Because the sexually immature fish were over the determined minimum spawning lengths, it appears that some burbot are nonconsecutive spawners in the Susitna River. Since the majority of the fish captured were sexually mature, it further appears that spawning of an individual fish probably occurs for several consecutive years before a non-spawning year.

Burbot have been captured in the Susitna River below Devil Canyon up to 905 mm in length and aged to XV years since the fall of 1981 (ADF&G 1983b, Appendix Table C-4). By pooling the 1981 to 1983 age-length data to increase the sample size, it appears that burbot below Devil Canyon

have a rapid growth rate up to age IV. After age IV, mean length data shows that the growth slows to about 40 mm a year.

Age-length data from 1982 suggests that burbot have a higher growth rate in the reach of river below the Chulitna confluence compared to the reach of river between the confluence and Devil Canyon (ADF&G 1983b). For a given age, the average mean lengths of fish below the confluence were consistently 10-15 mm greater than for fish above the confluence.

Using pooled age-length data, age-length relationships can be determined between male and female burbot in the Susitna River. Scott and Crossman (1973) reported females become significantly longer than males after age IV. This is not the case with Susitna River burbot. For the reach of river below the Chulitna River confluence, females tend to be larger than males only at ages IV and V, and then after age X. The same is true for the reach of river above the Chulitna River confluence, at least up to age IX; after this age, the sample size was too small to make any comparisons.

Age-length data findings in the Susitna River concur with Morrow (1980) that female burbot tend to live longer. The three fish aged in the Susitna River which were over 800 mm were females and comprised the three oldest age classes found, ages XIII to XV.

Although 1981 findings found that the sex composition was about 1:1 males to females, since then the ratio has been decreasing (ADF&G 1982). In 1982, the ratio decreased to 1:1.5 males to females and, in

the 1982-1983 winter work, the ratio had decreased to a 1:2.0 ratio (ADF&G 1983b, Appendix Table C-3).

Although no reason can be determined for the yearly differences in sex ratios between 1981 and 1982, the higher sex ratio recorded during the winter of 1982-1983 could be related to seasonal sampling. Sampling was conducted monthly from January to October in 1981 and 1982 and only from December to March in 1982-1983, which is the period of spawning.

Although Chen (1969, as cited by Morrow, 1980) indicated that males arrive at the spawning grounds first, the 1982-1983 Susitna River data suggests that females arrive first. Sex ratios at the Deshka River in December were 1:5.0, in January 1:1.5 and by February were 1:1.2 males to females. This ratio could explain the higher male to females ratio in comparison to 1981 and 1982.

### 4.4.3 Conclusions

The data presented provide information on the types of habitat conditions associated with spawning and provide information on the timing of burbot spawning in the Susitna drainage. Limited information on the burbot spawning in the reach of river above the Chulitna confluence suggests spawning may occur in areas directly affected by mainstem flow of the Susitna River. Substantial changes in discharge caused by the proposed hydro-electric project could affect substrate stability which could influence spawning success in this reach of the river. Further data on the precise locations and substrate used for spawning by this

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species, and an analysis of winter velocities and effects on substrate under incremental winter flow conditions, would provide the data needed for determining the probable effects of flow regulation on burbot reproduction.

#### 5.0 WINTER RADIO TELEMETRY INVESTIGATIONS OF RESIDENT FISH

#### 5.1 <u>Objectives</u>

In order to evaluate the impacts that may occur from the Susitna hydroelectric project and ultimately to develop mitigation strategies, information on the movements, spawning habitat, and overwintering habitat of important resident fish species is required. Overwintering habitat could be important factor affecting resident fish survival. The following objectives of the radio telemetry studies were set up to meet these requirements.

#### 5.1.1 Radio telemetry studies below Devil Canyon

The specific objectives of the rainbow trout (<u>Salmo gairdneri</u>) and burbot (<u>Lota lota</u>) radio telemetry studies below Devil Canyon during the 1982-83 winter sampling season were:

- 1) Identify rainbow trout and burbot overwintering habitat;
- 2) Determine when rainbow trout return to the tributaries and identify rainbow trout spawning habitat; and
- 3) Determine burbot spawning habitat and timing.

#### 5.1.2 Radio telemetry studies above Devil Canyon

The specific objectives of the Arctic grayling (Thymallus arcticus) radio telemetry studies above Devil Canyon during the 1982-83 winter sampling season were:

- Identify the overwintering habitat of Arctic grayling within 1) the proposed impoundment areas;
- 2) Determine Arctic grayling spawning habitat and timing within the proposed impoundment areas;
- Identify the overwintering habitat of Arctic grayling in the 3) Deadman Lake system; and
- Determine Arctic grayling spawning habitat and timing in the 4) Deadman Lake system.

To our knowledge, Arctic grayling have never before been radio-tagged.

5.2 Methods

#### 5.2.1 Radio Tags

Radio telemetry equipment used in this study was developed by the Smith Root Corporation in Vancouver, Washington. Equipment consisted of a low frequency (40 MHz) radio tracking receiver (Model RF-40) and scanner (Model SR-40), a loop antenna (Model LA-40) and 80 transmitters (Model P40-500L 3V). This equipment was also used in the study of adult anadromous species (ADF&G 1981c).

The transmitters used were cylindrical, encapsulated in plastic, and had a 17-cm external antenna. The transmitters measured 5.3 cm in length and were 1.6 cm in diameter. Each tag weighed approximately 13-gm dry weight. The power source for the transmitter was a three volt, lithium battery which has a life expectancy from 180 to 324 days, depending on the pulse rate. Different frequencies, between 40.600 and 40.750 MHz, and pulse rates, between 0.5 and 3 per second, were used to differentiate between the 80 radio tags. The radio tags were immersed in water for 48 hours and then tested for signal strength and frequency before they were implanted in fish.

#### 5.2.2 <u>Transmitter implantation</u>

Fish were collected by electroshocking, hook and line, trotlines, and hoop nets. No injured or lethargic fish were radio tagged. Each fish determined to be suitable for radio tag implantation was placed in a holding box and anesthetized with MS-222 (tricaine methane-sulfonate). After the fish were anesthetized, their lengths were measured to the nearest millimeter (fork length for rainbow trout and Arctic grayling and total length for burbot). Scales were taken from the rainbow trout for aging purposes. All species were tagged with Floy anchor tags. Based on personal communications with Carl Burger (USFWS) and experience

gathered from the 1981-82 radio telemetry studies, a minimum length for radio-tagging was selected for each species. Minimum lengths of rainbow trout, burbot and Arctic grayling to be radio tagged were 390mm fork length, 525mm total length and 370mm fork length, respectively. It was felt that fish smaller than these minimum sizes would not be able to tolerate the radio tags.

A transmitter was surgically implanted in the coelom using a procedure similar to that described by Ziebell (1973) (Plate 5-1). The surgical procedure was similar for all three species. A three to five cm incision was made on the midline of the ventral surface, slightly behind the pectoral fins and antibiotics (ampicillin and terramycin) sprinkled into the body cavity. The radio tags were inserted with the antenna toward the posterior end of the rainbow trout and burbot and toward the anterior end of the Arctic grayling. Care was taken to make sure the antennae were fully extended. Each incision was then closed with five to eight individual sutures of commercial silk, monofilament nylon, or monofilament fishing line. Burbot were implanted with 6-month tags, Arctic grayling with 9-month tags and rainbow trout with one or the other. Each fish was then placed into a live box and held upright until it regained its equilibrium. The fish were held overnight for The then checked and sutures were the implanted transmitter's signal was tested. Each fish was then released near where it had been captured.



Plate 5-1. Surgical implantation of a radio transmitter into a burbot at Mainstem Susitna (RM 84.1).

#### 5.2.3 Tracking

The fish were then radio tracked by boat, aircraft and snowmobile. Boat tracking proved adequate until mid October, when the formation of slush ice in the river prevented further boating. Winter aerial tracking was conducted from September 16, 1982 to April 30, 1983. Aerial tracking procedures were identical to the methods used and described by Adult Anadromous Investigations (ADF&G 1981c). Tracking was generally done twice per month during the fall and once per month during the winter. Depending on the weather, radio tracking flights covered the entire Susitna River from its mouth upstream to the confluence of the Oshetna River (RM 233.4). Selected tributaries were also periodically searched (Appendix Table D-1).

The following assumptions were made regarding radio-tagged fish which were suspected of having tag implantation injuries or a radio tag failure. A radio tagged fish was presumed injured if it exihibited rapid downstream movement shortly after tagging; or in the case of Arctic grayling if they passed over Deadman Creek Falls or were located downstream of Devil Canyon (RM 151.0). A radio tag failure in a fish was assumed if there was a sudden loss of the radio signal and no further reception was made thoughout the study area (RM 0.0 - RM 233.4).

Snowmobile tracking was conducted in March to pinpoint the exact location of radio tagged fish, to determine the fate of the fish, and to find out if the areas where the radio tagged fish were located in areas

where large concentrations of resident fish had gathered to overwinter (or in the case of burbot, to spawn).

#### 5.2.4 Habitat data collection

Data recorded during aerial radio tracking surveys included the date, location of the fish (to the nearest 0.1 mile) and general habitat characteristics (i.e., open lead, riffle, pool). During subsequent ground surveys in March, fish were located to within 30 square feet, and additional habitat data was recorded. These data included ice thickness, presence or absence of slush ice, water depth, water velocity, substrate types, and general water quality.

Maps were drawn and photographs were taken of the area where each radio-tagged fish was located.

#### 5.3 Results

#### 5.3.1 Rainbow trout below Devil Canyon

Between September 8 and October 15, 1982, 18 rainbow trout were captured and radio-tagged in the Susitna River downstream of Devil Canyon. Five were captured at the mouth of Indian River (RM 138.6), one in Slough 15 (RM 137.3), 10 at the mouth of Fourth of July Creek (RM 131.1), one in Slough 8A (RM 125.3), and one in the mainstem at RM 75.6. The fork lengths of the radio-tagged rainbow trout ranged from 410 to 550 millimeters.

Ten of the radio-tagged rainbow trout were implanted with 9-month transmitters in order to obtain information on pre-spawning behavior during the spring of 1983. However, the majority of the 9-month transmitters failed to function. The signals of seven 9-month tags terminated in less than two weeks and the eighth stopped transmitting within 30 days.

A summary of tracking data from the 10 remaining radio-tagged rainbow trout in the Susitna River between Cook Inlet and Devil Canyon from September, 1982 to April, 1983 is presented in Appendix Table D-3. Individual fish movements are plotted in Figures 5-1 and 5-2.

Throughout their reception life, four radio-tagged rainbow trout (numbers 600-.5, 600-1, 670-3, 680-1) exhibited minimal movements ranging

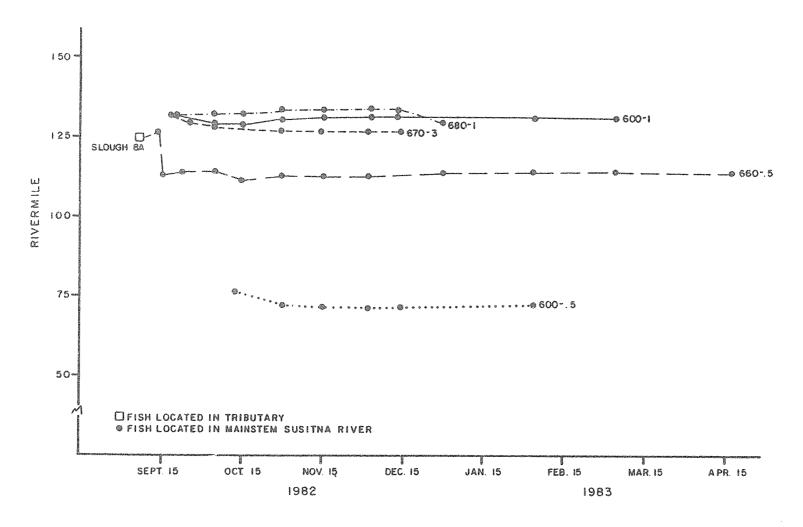


Figure 5-1. Movement of five radio-tagged rainbow trout in the Susitna River drainage below Devil Canyon, September, 1982 through April, 1983.

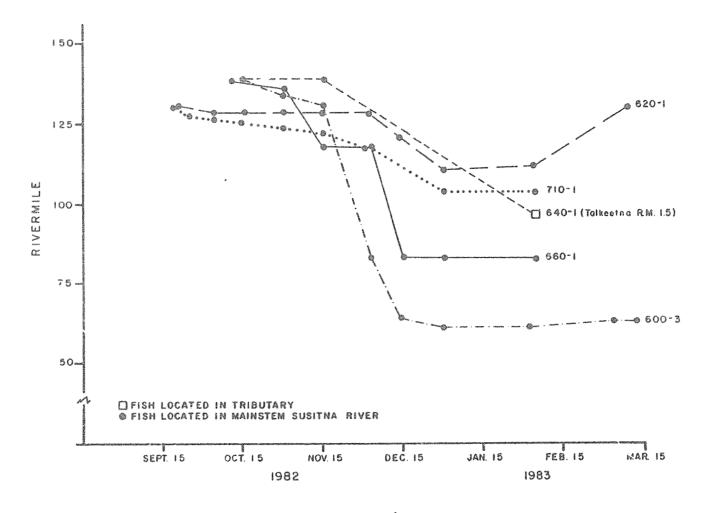


Figure 5-2. Movements of five radio-tagged rainbow trout in the Susitna River drainage below Devil Canyon, September, 1982 through March, 1983.

from 4.5 miles downstream to 1.6 miles upstream from their release sites (Figure 5-1).

Rainbow trout 620-1 remained within 3 miles of its tagging site (Fourth of July Creek, RM 131.1) for 2.5 months before migrating 20.1 miles downstream. After spending over one month in the vicinity of Gash Creek (RM 111.5), it moved upstream to RM 131.5 where it was last located on March 6, 1983 (Figure 5-2).

The remaining five radio-tagged rainbow trout (600-3, 640-1, 660-1, 660-.5, 710-1) migrated distances of 14.0 to 76.6 miles downstream from their release sites (Figure 5-1 and 5-2). All but one of these fish (640-1) overwintered in the mainstem Susitna River at their furthest downstream location.

Rainbow trout 640-1, located at the mouth of Indian River (RM 138.6) on November 15, 1982, was not re-located until February 4, 1983. This rainbow trout had migrated a minimum of 41.6 miles downriver and gone up the Talkeetna River to tributary river mile (TRM) 1.5.

On March 4 and from March 9 to 12, 1983, ground surveys were conducted to determine the status of four radio-tagged rainbow trout (600-1, 600-3, 620-1, 660-.5). No movement of these radio-tagged fish was detected during drilling with an ice auger in the vicinity of their simplest transmitter signal; therefore, their fate was not certain. However, rainbow trout 600-1 and 620-1 were located at RM 131.5 in 4.5 feet of water with an estimated velocity of 1 to 2 feet per second. It

is believed that rainbow trout 620-1 was alive at that time since it had recently moved upstream 20.1 miles. The other two rainbow trout (660-.5 and 600-3) were both located under ice and slush ice in 4 to 6 inches of water.

#### 5.3.2 <u>Burbot below Devil Canyon</u>

Eleven burbot were captured and radio-tagged at seven sites in the Susitna River below Devil (anyon between August 20 and October 15, 1982. Seven burbot were captured, radio-taged, and released at slough and mainstem sites between RM 101.2 and RM 139.5. Three burbot were radio-tagged and released at Sunshine Slough (RM 84.0). The remaining burbot was captured at Birch Creek Slough (RM 88.4); it was tagged and released at RM 84.1 due to unnavigable river conditions caused by newly formed slush ice which prevented return to Birch Creek Slough. Lengths of radio-tagged burbot ranged from 535 to 865 millimeters.

A summary of tagging and tracking data for all radio-tagged burbot are presented in Appendix Table D-3.

Winter movements of six radio-tagged burbot were monitored between December, 1982 and March, 1983. Limited data was collected on the remaining five burbot due to tagging injuries or radio tag failures.

Two of the six burbot that were tracked successfully during the winter of 1982-83 (600-1, 670-1) moved less than one mile from their release

sites. The other four burbot (710-3, 680-2, 640-2, 660-2) moved downriver 7.3, 11.4, 37.1, and (113.6 miles, respectively (Figure 5-3).

During a sampling trip conducted between March 9 and March 12, 1983, it was determined that burbot 670-1, 710-3, and 680-2 were alive. Ice augering in the vicinity of these radio-tagged fish at RM 82.5, 76.1, and 72.0 caused the radio-tagged burbot to move from 20 to 50 feet.

Burbot 670-1 and 680-2 were located in less than one foot of water with little or no velocity (Table 5-1). Burbot 710-3 was found in 15 feet of water with moderate velocity. Trotlines set in the vicinity of these radio-tagged burbot failed to recover the radio-tagged fish; however, 11 untagged burbot were captured at these sites.

#### 5.3.3 Arctic grayling above Devil Canyon

From late August through early October, 1982, thirty-seven Arctic grayling in the tributaries of the Susitna River above Devil Canyon were implanted with radio transmitters. Eight grayling were radio-tagged in Tsusena Creek (RM 181.3), 4 in Deadman Creek (RM 186.7), 6 in Watana Creek (RM 194.1), 13 in Kosina Creek (RM 206.8), and 6 in the Oshetna River (RM 233.4). Lengths of Arctic grayling selected for radio-tagging ranged from 370 to 415 millimeters.

A summary of tracking data for 15 radio-tagged Arctic grayling in the Susitna River drainage above Devi' Canyon is presented in Appendix Tabla D-4. Individual fish movements are presented in Figures 5-4 to 5-6.

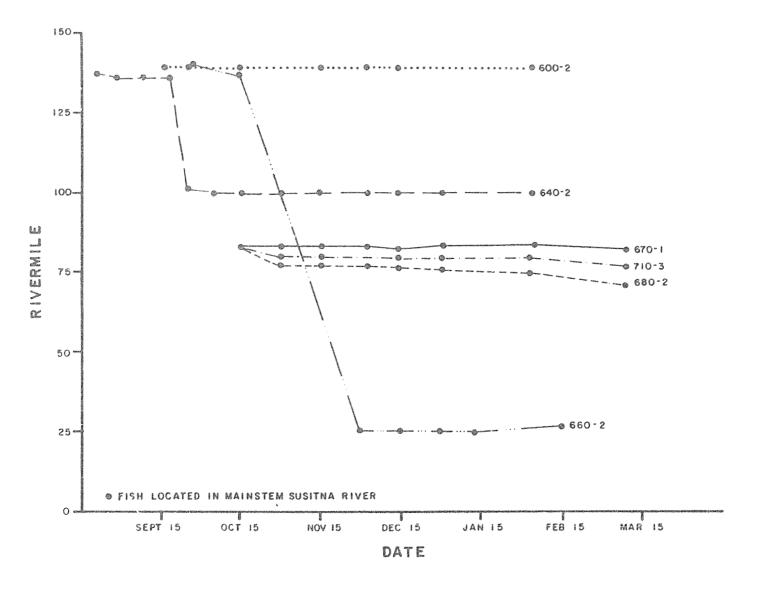


Figure 5-3. Movements of six radio tagged burbot in the Susitna River below Devil Canyon, September, 1982 through March, 1983.

Table 5-1 Physical and chemical habitat characteristics measured in the vicinity of radio-tagged burbot in the Susitna River during March, 1983.

R.M.	Geographic Code	Date	Ice Thickness <u>(ft)</u>	Water Depth (†t)	Water Velocity (ft/sec)	Dissolve Oxygen (mg/l)	d Specific Cond. (umhos/cm)	<u>pH</u>	Water Temperature (°C)	Comments
72.0	S23N05W35ACC	83.'03/11	4.2	4.4	0.3	ass to	223	7.2	-0.3	Location of radio-tagged burbot 680-2
76.1	\$23NO4W07ACC	83/03/11	3.0	15.0	2.5	12.1	206	7,4	-0.3	Location of radio-tagged burbot 710-3
82.5	S24NO5W22BBA	83/03/11	3,5	Approx. 1.0	tak		abitat measu o three feet he ice.			Location of radio-tagged burbot 670-1

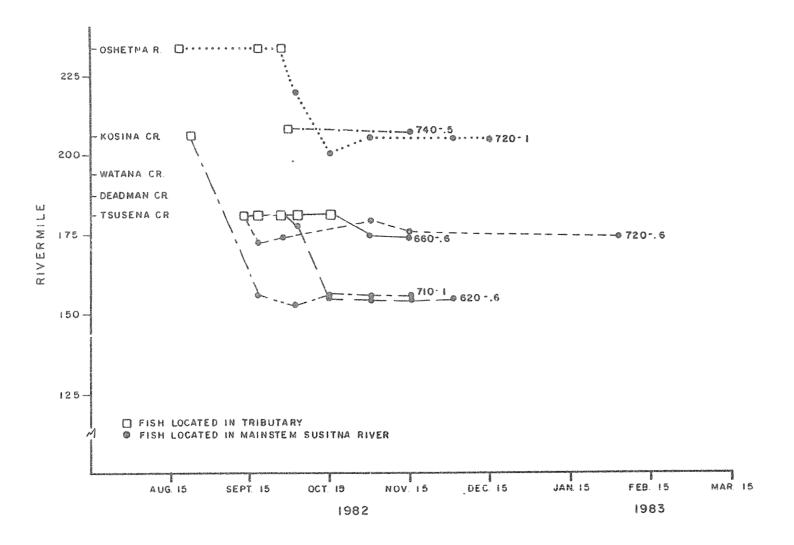


Figure 5-4. Movement of six radio-tagged Arctic grayling in the Susitna River drainage, Devil Canyon and above, August, 1982 through January, 1983.

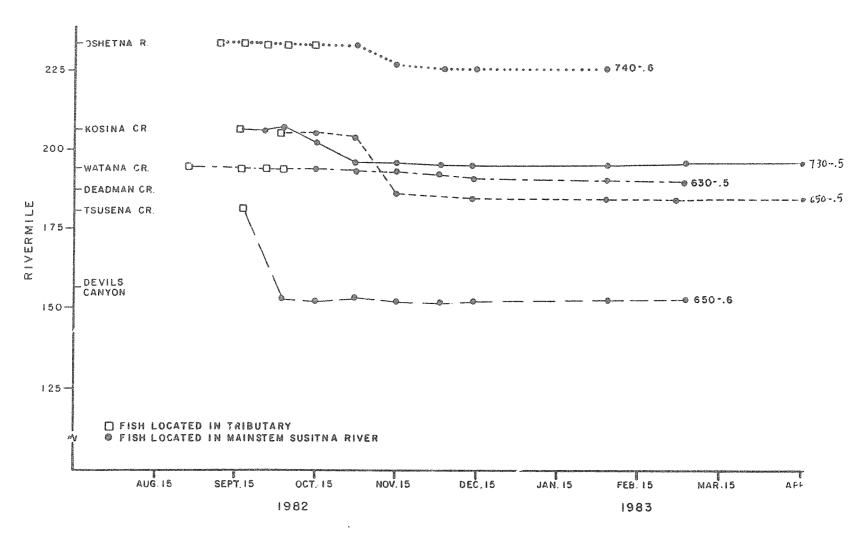


Figure 5-5. Movements of five radio-tagged Arctic grayling in the Susitna River drainage, Devil Canyon and above, August, 1982 through March, 1983.

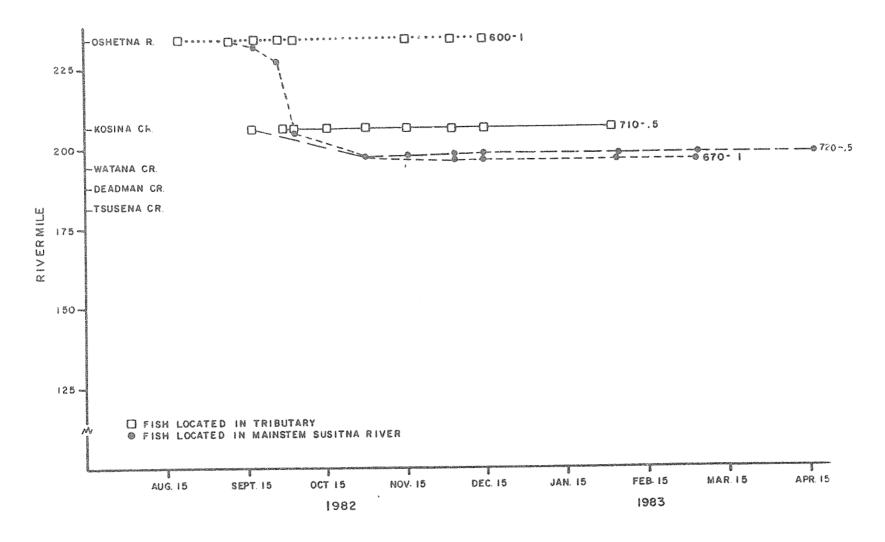


Figure 5-6. Movement of four radio-tagged Arctic grayling in the Susitna River drainage, Devil Canyon and above, August, 1982 through April, 1983.

Little or no data were obtained from the remaining 22 radio-tagged grayling due to an unexpected high rate of radio-tag failures (12) and assumed mortalities of radio-tagged fish (10).

Table 5-2 presents the timing of the Arctic grayling outmigration from tributaries above Devil Canyon into the mainstem Susitna. Based on the incidence of radio-tagged grayling located in tributaries during weekly and bi-monthly aerial surveys, most radio-tagged Arctic grayling entered the mainstem Susitna River in late September and early October. However, two radio-tagged grayling remained in the lower 0.5 miles of tributaries (600-1 in Oshetna River and 710-.5 in Kosina Creek) until December 14, 1982 and February 4, 1983, respectively.

After the radio-tagged grayling dropped out of the tributaries into the mainstem Susitna, most migrated downstream and overwintered in the mainstem. Downstream migrations in the mainstem Susitna ranged from 2.1 to 50.8 miles, with an average movement of 19.8 miles. Most fish reached their overwintering areas within 30 days and exhibited minimal movements during the winter months. However, three radio-tagged Arctic grayling (650-6, 710-1, and 720-1) did move upstream 1.0 to 5.5 miles to reach their overwintering areas during the early months of the winter.

A ground survey was conducted between March 1 and March 4, 1983 to determine the fate of six radio-tagged Arctic grayling whose signals were still being received (Appendix Table D-4). Five were located between RM 187.0 and RM 198.0 and the last was found in Devil Canyon at RM 153.1. By ice augering in the vicinity of the radio-tagged fish and

Table 5-2 Timing of radio-tagged Arctic grayling outmigration from tributaries into the mainstem Susitna River above Devil Canyon.

Tracking <u>date</u>	Total number radio-tagged	Number in tributaries	Percent in tributaries
9/18	12	12	100
9/27	12	10	83
10/2	15	7	47
10/15	15	5	33
10/30	15	2	13

observing habitat conditions, it was determined that two of the six fish were alive. Grayling 650-.6 was located at RM 153.1 in approximately two feet of water with an estimated velocity of 2 to 4 feet per second. The second live grayling was overwintering at RM 187.0 in a pool six feet deep with an estimated water velocity of less than 1 foot per second. The remaining four grayling were located in unfavorable habitats and presumed dead.

#### 5.4 Discussion

#### 5.4.1 Rainbow trout below Devil Canyon

Movements by 10 radio-tagged rainbow trout over the winter of 1982-83, were variable, ranging from 20.1 miles upriver to 76.6 miles downriver. Locations of radio-tagged rainbow trout throughout the winter suggests that mainstem reaches influenced by tributaries may be important overwintering areas for rainbow trout. Tributaries where radio-tagged rainbow trout resided for extended periods were Fourth of July Creek (RM 131.1), Lane Creek (RM 113.6), Gash Creek (RM 111.5), and Kashwitna River (RM 61.0). The location of rainbow trout 640-1 in the Talkeetna River indicates that overwintering may occur in the larger Susitna River tributaries as well.

Movements by both radio-tagged rainbow trout and Floy anchor tag rainbow recaptures during 1981-1982, indicated that rainbow trout inhabit relatively short reaches of the Susitna River. Localized migrations throughout winter 1982-1983 by four radio-tagged rainbow trout supports

1982 observations. Movements of less than 4.5 miles from release sites by these four rainbow trout (three near Fourth of July Creek and one near Montana Creek, RM 77.0) suggests that these fish tended to remain near the tributaries where they were originally tagged. Likewise, the radio-tagged rainbow trout that returned to the mouth of Fourth of July Creek, from a distance of 20.1 miles downriver, also exhibited homing behavior. In contrast, the other five radio-tagged rainbow trout migrated extensively downriver from their release sites. These rainbow trout were most active between mid-November and mid-January. This time period corresponds with the peak activity period of three radio-tagged rainbow trout in winter 1981-1982. After these five radio-tagged rainbow trout reached their downriver locations, their movements were localized. Termination of radio signals in February and March prevented determining whether these fish returned up-river prior to spawning.

#### 5.4.2 Burbot below Devil Canyon

By monitoring radio tagged burbot over the winters 1981-1982 and 1982-1983, it has been found that burbot concentrate in certain areas and migrate little during the winter in the Susitna River. Since burbot are winter spawners, and winter monitoring data has also shown that burbot utilize the mainstem Susitna more than was formerly believed during the assumed spawning period, it may be assumed that burbot probably spawn in the mainstem as well as tributaries and sloughs.

Although (Morrow 1980) indicates that burbot are generally sedentary, our monitoring data from the past two winters indicate that burbot

sometimes migrate to and from spawning grounds. Results from burbot catch data indicates similar finding and that the spawning movement is thought to begin during September in the Susitna River (ADF&G., 1983b).

Marine Marine

Until this winter, the duration of the migration and the timing of spawning was not known. Monthly surveys conducted during the winter of 1982-1983 however, have since determined that burbot spawn between mid-January and early February.

Monitored radio-tagged burbot over winter has shown that the pre-spawning migration apparently begins in mid-September and lasts to mid-January. Movement, that may be attributed to post-spawning behavior, begins in early February and lasts until mid-March.

Three of the six radio-tagged burbot in 1982-1983 and all four of the burbot in 1981-1982 showed a post-spawning movement. Although in both years the movement was slight (0.5 - 7.0 miles), in all cases but one, the movement was downriver. MacCrimmon (1959) reported that burbot in Lake Sincoe, Ontario, after sapwning in the lake, moved up into tributaries.

Ground surveys conducted after the spawning period (late February to mid-March) found that burbot inhabit areas of different depths and water velocities. In areas where the radio-tagged burbot were located, water depths ranged from only one foot to 15 feet and water velocities were as high as 2.5 feet per second (ADF&G 1983c). Although radio-tagged burbot inhabited areas of different flows and depths, it appeared that during

Control of

both years they were in areas of high conductivity. Since high conductivities often indicate areas of upwelling, it suggests that burhot prefer these areas.

The high catches of incidental burbot in areas where radio-tagged fish were over wintering, also suggests that burbot concentrate in specific areas to overwinter.

#### 5.4.3 Arctic grayling above Devil Canyon

Results obtained from radio-tagged Arctic grayling were extremely variable due to the high incidence of radio-tag implantation injuries and radio-tag failures. Since no previous Arctic grayling radio telemetry studies were known to have been undertaken, it was decided that only the largest grayling (greater than 370 mm) would be selected for radio-tagging. It appears that even with this size restriction that radio implantation was too stressful for some Arctic grayling. In future radio-tagging programs of Arctic grayling, it is recommended that a smaller diameter tag (maximum - 12mm) be used for implantation.

The high incidence of radio-tag failures (32 percent) that occurred within 15 days of the date that they were implanted was not anticipated. Field tests in which transmitters were immersed in water for 48 hours proved to be insufficient to determine whether transmitters would perform in the field. Decreasing water temperatures in September from 6°C to 0°C appear to be responsible for radio-tag failures. Future

tagging programs should subject transmitters to both water immersion and temperature tests.

Information on Arctic grayling movements and overwintering behavior were obtained from 15 radio-tagged Arctic grayling. The timing of downstream movement from tributaries into overwintering areas of the mainstem Susitna by radio-tagged Arctic grayling (late September - early October) was slightly later than the peak movement of the Arctic grayling into the Susitna, as indicated by a decline in hook and line catch per unit effort in tributaries during September (ADF&G 1983d). Likewise, the majority of Arctic grayling in the Chena, Goodpaster and Chatanika River systems migrate from tributaries in September (Armstrong 1982). Since 12 of the 15 successfully radio-tagged grayling were tagged in mid-September or later, it appears that these fish represented the end of Arctic grayling migration from tributaries to the mainstem.

The fall movement of all but two radio-tagged Arctic grayling into the Susitna River support the findings of 1981 and 1982 grayling sampling which showed a fall outmigration from tributaries to the mainstem (ADF&G 1983d). It appears that most Arctic grayling overwinter in the mainstem Susitna River, downstream of their respective tributaries. Once reaching the extent of their downstream migration, movements by radio-tagged grayling were minimal. Radio-tagged Arctic grayling overwintered between rivermile 153.0 and 226.0 with two apparent concentration, one being a 20 mile reach between Deadman Creek (RM 186.7) and Kosina Creek (RM 206.8) and the other between rivermiles

153.0 and 156.0 in Devil Canyon. During low flows in March, Arctic grayling were also utilizing areas within Devil Canyon for overwintering habitat. It is questionable whether the presence of a radio-tagged Arctic grayling in Kosina Creek and the Oshetna River well into the winter indicates overwintering in tributaries. These fish may have been dead or injured. Winter water levels in these tributaries are low and probably do not provide suitable overwintering habitat. Information concerning the overwintering habitat of Arctic graying in the Deadman Lake system is lacking due to tag failures and tagging injuries of the four grayling radio-tagged in Deadman Creek.

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Appendix A

Appendix B

Appendix C

Appendix D

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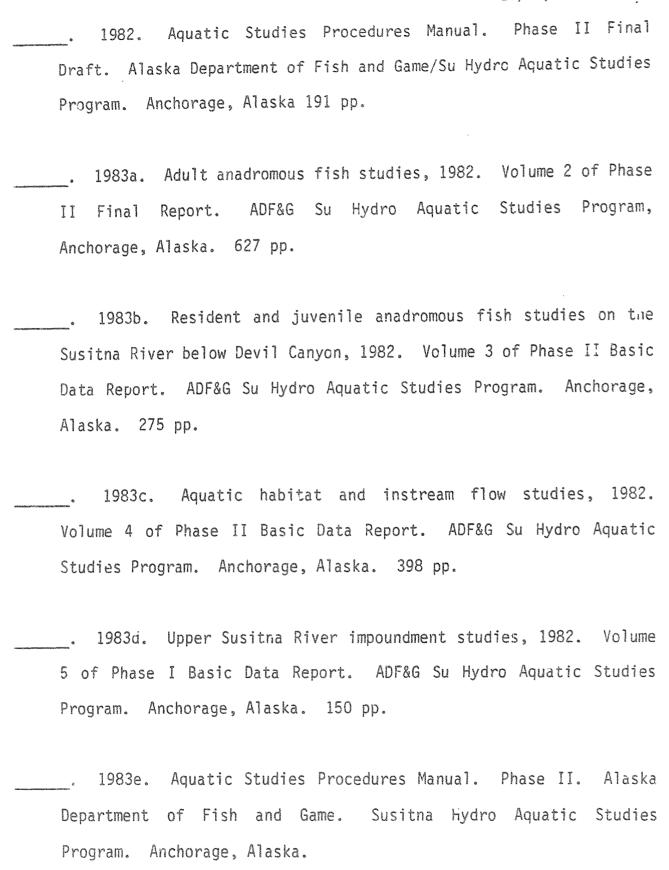
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### APPENDIX A .

Continuous Surface and Intragravel Temperatures

Appendix A consists of continuous temperature data collected by ADF&G for winter studies from August 1982 through May 1983. The data was collected using two different instruments, Omnidata DP212 recorders (datapods) and Ryan model J-90 thermographs. Datapods record both surface and intragravel temperatures while thermographs measure only surface water temperatures. Data from datapods are in Appendix tables A-1 through A-11 Ryan thermograph data are in Tables A-12 and A-13.

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			(April 1983 through May 1983)	A-87

Appendix Table A-1 Datapod intragravel and surface water temperature (C) data summary, at Slough 8A - Mouth, RM 125.4, Geocode S30N03W30BCD.

- AUGUST 1982 -

DATE		INTRAGRAVEL			SURFACE WATER		
	MIN	MEAN	XAM	MIN	MEAN	MAX	
820821	6.4	6.6	6.7	7.8	10.7	14.7	
820822	6.5	6.7	6.8	8.0	11.1	14.8	
820823	6.6	6.7	6.8	9.8	11.2	13.8	
820824	6.5	6.7	6.8	9.1	10.8	12.9	
820825	6.7	6.8	6.8	9.4	10.8	13.2	
820826	6.7	6.8	7.0	9.3	11.2	14.8	
820827	6.6	6.8	7.1	7.8	11.1	14.6	
820828	6.5	6.7	6.8	8.2	10.0	13.0	
820829	6.5	6.6	6.7	8.6	9.6	11.2	
820830	6.5	6.6	6.6	8.3	8.8	9.9	
820831	6.5	6.6	6.7	7.7	8.5	9.7	
ONTHLY VALUE	6.4	4529-8500-8500-8550-6500	7.1	7.7	eco-seo dianam em	14.8	

- SEPTEMBER 1982 -

DATE	I	NTRAGRAV	EL	SUE	SURFACE WATER		
ර්. කි. කි. කි. කි. කි. කි. කි. කි. කි. කි	m proposition composition dependence dependence described composition de $ m MIN$	MEAN	MAX  The second	MIN	MEAN	MAX	
820901	6.5	6.7	6.7	7.7	8.9	10.4	
820902	6.4	6.5	6.8	7.1	8.4	9.9	
820903	6.2	6.3	6.4	7.3	8.0	8.9	
820904	6.2	6.3	6.4	6.4	7.5	9.0	
820905	6.1	6.2	6.3	6.3	7.4	8.4	
820906	6.2	6.2	6.3	6.5	7.4	7 . 9	
820907	6.2	6.3	6.3	6.8	8.0	9.8	
820908	6.2		6.4	7.5	8.2	8.9	
820909	6.3	6.3	6.4	7.3	8.0	9.3	
820910	6.2	6.3	6.4	6.9	7.8	8.9	
820911	6.1	6.2	6.3	6.3		7	
820912	6.0	6.1	6.2	5.3		8.3	
820913	6.0	6.1	6.2	5.8	6.2	6.6	
820914	6.0	6.0	6.1	6.1	6.4	6.	
820915	6.0	6.0	6.1	6.3	7.0	8.	
820916	5.9	6.0	6.1	7.3	7.6	8.3	
820917	5.9	6.0	6.0	6.6	6.9	7.0	
820918	5.8	6.0	6.0	5.5	6.2	6.8	
820919	5.8	5.9	6.0	5.6	6.0	6.6	
820920	5.9	5.9	6.0	5.6	6.0	6	
820921	5.9	5.9	6.0	5.4	5.8	6	
820922	5.9	6.0	6.0	5.3	5.7	6	
820923	5.9	6.0	6.1	3.9	4.9	5.	
820924	6.0	6.1	6.1	2.9	4.2	5 . 4	
820925	6.1	6.2	6.3	3.4	4.4	5	
820926	6.3	6.3	6.4	4.6	5.0	5.4	
820927	6.3	6.4	6.4	4.8	5.2	6	
820928			6.5	2.9	3.9	4.	
820929	6.4	6.5	6.6	4.1	4.7	5 .6	
820930	6.4	6.5	6.5	4.5	5.2	6.0	
ONTHLY VALUE	5.8	6.2	6.8	2.9	6.5	10.	

- OCTOBER 1982 -

	•					
DATE		NTRAGRAV			RFACE WA	
an de		MEAN			MEAN	
821001	6.4	6.5	6.5	4.4	4.8	5.3
821002		6.5			4.4	
821003				3.1	4.0	5.2
821004				2.1		
821005				1.8		
821006			6.4			
821007		6.3			2.3	
821008		6.3			2.3	
821009		6.2		1.2	2.3	
821010	6.1		6.2	2.4		3.3
821011	6.0		6.1	.7	2.0	2.7
821012	6.0		6.1	.8	1.9	2 . 9
821013	5.9		6.1	.9	1.7	2.9
821014	5.8		6.0	1.5		4.
821015	5.8		5.9		2.0	
821016	5 6				1.5	
821017			5.7		1.9	
821018			5.6		1.9	
821019			5.6			
821020			5.6		1.9	
821021			5.5		1.5	
821022		5.4			1.5	
821023		5.3			1.6	
821024		5.2			2.2	
821025			5.1		the Q Lie	2.3
821030		COLORON STATE OF STREET			ens eno deri ent ena	2.4
821031		4.4			2.2	2.5
ONTHLY VALUE	4.2	5.8	6.5	.7	2.4	5.0

- NOVEMBER 1982 -

South W 1978 daile.	99 (750) (100) (100) (100) (100) (100) (100) (100) (100)	IN	ITRAGRAV	EL	SUE	RFACE WA	TER
DATE		MIN	MEAN	MAX	MIN	MEAN	MAX
821101		4.4	4.4	4.5	1 7	2.0	2.2
821101				4.6		2.0	-
821103				4.6	2.0		
821104				4.6	2.0		2.5
821105				4.7	2.1		2.6
821106				4.7	1.9		2.4
821107				4.7	1.9		2.2
821108		4.6	4.7	4.7	1.9		2.4
821109		4.6	4.6	4.7	1.7	2.0	2.3
821110		4.6	4.6	4.7	1.9	2.0	2.2
821111		4.6	4.6	4.7	1.7	2.0	2.1
821112		4.6	4.6	4.7	1.8	2.1	2.3
821113		4.6	4.6	4.6	1.6		2.1
821114		4.6	4.6	4.6	1.7		2.2
821115		4.6	4.6	4.6	1.7		
821116		4.5	4.6	4.6	1.8	2.2	2.6
821117		4.4		4.6	1.6	_	
821118			4.4		1.7		
821119		4.2		4.3	1.7	2.1	2.4
821120				4.3	. 2	2.0	2.6
821121			4.0	4.3	0.0	1.3	2.7
821122		3.9	4.0	4.2	1.0	1.8	2.7
821123		4.0	4.1	4.1	.8	. 2.0	2.8
821124		4.0	4.1	4.2	1.0	1.5	2.5
821125		4.0	4.1	4.1	.6	1.1	1.6
821126		3.9	4.0	4.0	.6	.8	1.0
821127		3.8	3.9	4.0	.6	. 8	1.0
821128		3.6	3.7	3.8	.7	. 8	.9
821129		2.5	3.2	3.7	0.0		2.6
821130		1.7	2.3	2.9	0.0	0.0	. 1
MONTHLY V	ALUE	1.7	4.3	4.7	0.0	1.7	2.8

- DECEMBER 1982 -

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DATE		INTRAGRAVEL				SURFACE WATER				
		MIN	MEAN	MAX	MIN	MEAN	MAX			
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821224		1	0.0	. 1	1	0.0	0.0			
821225		0.0	0.0	0.0	en , 1	0.0	0.0			
821226		-,1	0.0	.1	0.0	0.0	0.0			
821227		1	0.0	0.0	0.0	0.0	• 1			
821228		0.0	0.0	0.0	0.0	0.0	0.0			
821229		0.0	0.0	0.0	0.0	0.0	0.0			
821230		0.0	0.0	0.0	0.0	0.0	.1			
.821231		1	0.0	0.0	0.0	0.0	•			
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- JANUARY 1983 -

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830101	am , J	0.0	0.0	0.0	0.0	9
83 01 0 2	1	0.0	0.0	0.0	<.05	.1
83 01 03	1	0.0	0.0	0.0	0.0	0.0
830104	- 1	0.0	0.0	. l	0.0	0.0
83 01 0 5	1	0.0	0.0	1		0.0
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83 01 07	- 1	0.0	0.0	= 1	0.0	.1
830108	- 1	0.0	0.0	1	0.0	.1
830109	· 1	0.0	0.0	- 1		.1
83 01 1 0	1	0.0	0.0	- 1		.1
830111	- 1	0.0	0.0	-1	0.0	.1
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83 011 4	1	0.0	0.0	- 1		.1
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830116	- 1	0.0	0.0	0.0	0.0	.1
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830118	= 1	0.0	0.0	0.0	0.0	. 1
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83 01 20	-	0.0	0.0	- 1		0.0
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83 01 23	- 1	0.0	0.0	1	0.0	. 1
83 01 24	en . 1	0.0	0.0	- 1	0.0	0.0
830125		0.0	0.0	0.0	0.0	0.0
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83 01 27	au , 1	0.0	0.0	0.0	0.0	. 1
830128	400	0.0	0.0	0.0	0.0	. 1
83 129		0.0			0.0	
830130			0.0			
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- FEBRUARY 1983 -

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83 0 2 0 3		0.0	0.0	0.0	<.05	.1
830204	- 1	0.0	0.0	0.0	<.05	.1
83 0205	- 1	0.0	0.0	0.0	<.05	. J
830206	- 1	0.0	0.0	0.0	0.0	.1
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830209	1	0.0	0.0	0.0	0.0	e -
830210	- 1	0.0	0.0	0.0	0.0	
830211	- 1	0.0	0.0	0.0	0.0	
830212	1	0.0	0.0	0.0	0.0	
830213	· 1	0.0	0.0	0.0	0.0	
830214	1	0.0	0.0	0.0	<.05	•
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83 03 06		.1	.2	.3	.1	.1	.2
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830322				entrementale com care	.5	.6	.6
83 03 23			CONTRACTOR OF STATE O		.5	.6	.7
830324			Charles and the case	GH25H2/M25H23H2	.5	.6	.7
830325		COLD CONTRACT CHIS SEED	em ordered him end	ente ente elle elle uten	.6	.6	.7
83 03 26			and disputencing cop	WEG AND STORY COLD WATER	.6	.6	.7
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- APRIL 1983 -

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THE TE	MIN	MEAN	MAX	and different and all $N$	MEAN	MAX	
83 0401	නෙනුණුවල් සහ අවසිත් අලාල	economic annicam des	412-420-414 610-414	.6	.7	. 9	
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830404	cale dath and care care	5223 6839-6229 4029-6239	GRO 6256 1160 4510 4520	.7	.7		
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83 0407	The District of the State of th	and any any and any	CONTRACTOR AND AND ACTUAL	.7	1.0	1.5	
83 04 0 8	eco-eso-traven-e-to-	em em em em em	(0.35-200) (0.05-2014: 0.02)	.7	1.0	1.5	
83 040 9		GCC CER (012) (015)		.8	1.0	1.4	
83 041 0	estero eguan etalian estero estero	6050000000000	economica como estas como	.7	1.0	1.6	
83 041 1		espendent en sem	ens ann ann alla ens	.7	.9	1.2	
83 041 2		CO-COS-JAN CAN CAN	4115-3764-(Std-4516-4516	.7	.8	1.(	
83 0 4 1 3		CO-MARCH SUD-CO	and this thir time that	.8	1.0	1.6	
83 0 41 4	\$2,000 kB 100 kB 500 kB	603-207-600 600 600		.9	1.1	1.5	
83 041 5	400400 000 000 000 000	CLINES CONTROL AND		.8	1.0	1.4	
830416	ensemble ensemb	CONTRACTOR (CONTRACTOR)	CONTROL CONTROL	.8	1.1	1.6	
83 041 7		CONTROL CHARGE	Consulting Course (State Course	.9	1.2	1.7	
83 041 8	erzeen den die seen			.9	1.2	1.8	
83 041 9	\$555 GDG+G5CP-4550-4550	care consider care taxe		1.0	1.4	2.1	
830420	according to the state of the s			.8	1.5	2.5	
830421	dispersion dispersion distrib		CRES CRES CRESS CRESS	.9	1.6	2.9	
830422	\$1174 \$100 \$100 \$100 \$100		COLD COLD (COD TOD)	1.0	1.5	2.4	
83 0423	enco-4880 (0000 citro-Citro	400 GT 400 GT 400		1.1	1.4	2.1	
830424	12/20 6/200-46/20 66/20 46/20		COS-CIII) SEITO-CINES CUITO	1.2	2.0	3.5	
830425	\$553 ASSE 4573 ASSE \$150	CONTRACTOR CONTRACTOR	80 8/0 to 910 410	1.2	2.2	3.8	
83 0 4 2 6	5.50 - 0.50 - 1.50 - 1.50 - 1.50 - 1.50 - 1.50 - 1.50 - 1.50 - 1.50 - 1.50 - 1.50 - 1.50 - 1.50 - 1.50 - 1.50			1.2	2.2	4.0	
83 0427		6222-6222-6222-6222-6222		1.3	2.4	4.3	
830428	45000 40740 (0000) 60000 (0000)	COMPANIES AND AND ASSESSMENT OF THE PARTY OF	相互企业 化对应定义 经分配 经分配 化分配	1.6	2.1	4.2	
ONTHLY VALUE	का राज्यक हरा क	සන-මකණුම දක ආය	ರಜಾ-ತರ್ಮಾಯಾ- ಇದು ದಿಭಾ	.6	1.3	4.3	

Appendix Table A-2 Datapod intragravel and surface water temperature (C) data summary, at Slough 8A - Middle, RM 125.6, Geocode S30NO3W30BCD.

- APRIL 1983 -

		an once some som over som e	NO SED SED SED CALL CITO SED CALL			or and which each case on a con-	119 CEN CEO GA GA GEO GEO			
The A STREET		INTRAGRAVEL				SURFACE WATER				
DATE		MIN	MEAN	MAX	MIN	MEAN"	MAX			
era autoria espesaren era e	表现是一种的一种,我们是一种的一种,我们是一种的一种,我们是一种的人们是一									
83 0429 83 043 0		3.0 3.1	3.1 3.1	3.1 3.2	1.8	2.9	4.1 4.5			
MONTHLY	VALUE	3.0	40000 40000 10000 10000 10000	3.2	1.7	රෝග මානුදුන්වෙන් ඇය.	4.5			

- MAY 1983 -

can current ann can can can can can can can can can	1)	NTRAGRAV	TI	SU	SURFACE WATER			
DATE	MIN		MAX	MIN		MAX		
Mass අතර			o and anno some also and some come del	e ann each ann ann an a an ann		in Historica and annual and a section of the		
83 0 5 0 1	3.2	CONTRACTOR OF COME	3.2	4.4	emonth star and and	4.9		
830502	3.1	3.2	3.3	2.5	3.5	4.5		
830503	3.2	3.2	3.3	2.3	3.4	4.7		
830504	3.2	3.3	3.4	2.0	3.7	5.7		
83 0 5 0 5	3.3	3.3	3.4	1.8	3.7	6.1		
830506	3.3	3.3	3.4	1.4	3.7	6.5		
83 0 5 0 7	3.3	3.3	3.4	1.3	4.0	7.2		
830508	3.3	3.4	3.5	1.8	4.5	7.4		
83 0 5 0 9	3.4	3.5	3.5	2.1	4.5	7.2		
83 0 5 1 0	3.4	3.5	3.6	2.5	4.8	7.0		
83 0 5 1 1	3.5	3.5	3.6	2.7	5.2	8.0		
83 0 5 1 2	3.5	3.6	3.7	3.4	5.4	7.4		
830513	3.6	3.6	3.7	3.0	5.2	7.6		
83 0 5 1 4	3.6	3.6	3.7	2.8	4.7	7.1		
83 0 5 1 5	3.6	3.6	3.7	2.5	4.2	6.0		
830516	3.6	3.6	3.7	2.4	4.2	5.7		
83 0 51 7	3.6	3.7	3.7	2.7	4.2	5.9		
83 0 5 1 8	3.6	3.7	3.7	2.5	4.3	6.5		
830519	3.6	3.6	3.7	2.9	4.8	6.6		
83 0 5 2 0	3.6	3.7	3.7	3.0	5.5	8.0		
830521	3.6	3.7	3.8	3.4	4.9	7.0		
83 0 5 2 2	3.7	3.7	3.8	3.7	5.6	8.5		
830523	3.7	3.7	3.8	3.7	5.7	7.8		
830524	3.8	3.8	3.9	4.1	6.3	9.2		
83 05 25	3.8	3.8	3.9	3.8	6.5	9.2		
83 0 5 2 6	3.8	3.9	3.9	5.1	6.7	8.4		
83 0 5 2 7	3.8	3.9	4.0	4.4	6.3	8.3		
830528	3.8	3.9		4.5	7.0	9.8		
83 0 5 2 9			4.0	5.6	7.5	9.3		
83 0 53 0			4.2	6.7	8.3	9.7		
83 0 53 1	4.1	4.2	4.2	6.2	7.6	8.7		
MONTHLY VALUE	3.1	3.6	4.2	1.3	5.2	9.8		

- JUNE 1983 -

在1970年 1970年 1970								
		I	NTRAGRAV	EL	SUI	SURFACE WATER		
DATE		4810 CTC-520-6524-6500 I	The transfer was true to the sec	CON-SECUENCE SECUENCE SECUENCE				
		MIN	MEAN	MAX	MIN	MEAN	MAX	
				PROPERTY COLUMN TO THE STOP WAS A TOTAL		rie desembres des fils CT+ CN	P-601-6420-6200-6201-6201-6201-6201	
830601		4.0	4.1	4.2	6.5	7.9	9.9	
830602		4.0	ence despetials con Mich	4.1	5.9	THE SECOND CONTRACTOR SECOND	9.1	
MONTHLY	VALUE	4.0	non suid-suo suus suus	4.2	5.9	#42 600 dills 432 402	9.9	
							and the second s	

Appendix Table A-3 Datapod intragravel and surface water temperature (C) data summary, at LRX 29, RM 126.1, Geocode S30NO3W19DCA

#### - OCTOBER 1982 -

		INTRAGRAVEL				SURFACE WATER		
DATE						\$		
		MIN	MEAN	MAX	MIN	MEAN	MAX	
		0000 E38 GB - EEF ARD GD2	Unit the County Con Clark Co	n did div die der des des des des de		Elis del como elis esta esta esta esta esta	COLUMN COLUMN DE LA COLUMN COL	
821030		1.7	***************************************	1.9	, 2	and sub-sub-sub-sub-sub-sub-sub-sub-sub-sub-	.6	
821031		1.8	1.9	2.1	. 2	.5	.7	
MONTHLY	VALUE	1.7	ONE TO COLUMN	2.1	. 2	AND ALTONOUS CONTROL C	.7	

- NOVEMBER 1982 -

		211					
DATE	INTRAGRAVEL			SURFACE WATER			
	MIN	MEAN	MAX	MIN		MAX	
821101		1.9	2.0	2.1	.4	.5	.7
821101		1.7	1.9	2.0	.3	.4	.5
821103		1.7	1.8	1.9	.3	.5	.7
821104		1.5	1.7	1.8	0.0	.2	.3
821105		1.5	1.5	1.6	.2	.3	.4
821106		1.5	1.6	1.6	0.0	.2	. 4
821107		1.5	1.5	1.6	~ .1	<.05	_
821108		1.4	1.5	1.6	- L	\.UJ	.1 .3
821100		1.4	1.5	1.6		<.05	د. 3،
821110		1.4	1.5		1	\.U.)	
821111		1.5	1.5	1.5 1.6	. 2	**************************************	.3
821112		1.5	1.5	1.5	Case Charles Sing Care	600 - 204 402 - 205 403	
821113		1.5	1.5	1.5	STATE STATE STATE STATE	KIND STOP STOP STOP	64.5-COLD-6225-4508-523
821114		1.4	1.5	1.5	egraps-eggapostation distributions	day tem com our day	era le entre ettes ettes ette
821115		1.4	1.5	1.5	THE STREET, ST	CONTRACTOR CONTRACTOR	end also temp entre tem
821116		1.5	1.5	1.6	design design (date of the outpe	625-677 255 600 600	and the same of th
821117						CONTRACTOR CONTRACTOR CONTRACTOR	en a 2553 eres austrares
821118		1.6	1.6	1.7	2020-8750-6240-6240-6250	and the second cut	con a divida di ma di ma di ma
821119		1.6	1.6	1.7		CONTRACTOR CONTRACTOR	
821120		1.6	1.6	1.7	100 TO 40000 PETRO (10000 PETRO)		and professional desirements
821121		1	1.5	1.7		und benething	and the desired desired desired desired
		0.0	a.l	.4	CONTROL OF THE PROPERTY OF THE	CON CONTRACTOR CONTRACTOR	400 1-4220-4500 GHZ 6000 600
821122 821123		1	0.0	.2	One Otability state Copy	and and appropriate find	
		- 1	1	0.0	THE SHIP STOPS STEEL COME	CORPORATE STREET	CERTIFICATION CONTRACTOR
821124			0.0	0.0		CAS CAS CHIP CAS CHIP	era y error kann error erro
821125		1	0.0	0.0	essection conscions entre		030 000 000 000 000
821126		1	- 1	0.0			MAN & CONTROL OF COME STATE
821127			1	0.0	CONTROL CONTROL CONTROL OF CONTRO	100 CENTRAL PROPERTY	ALL DESCRIPTION OF THE PROPERTY SHAPE
821128		- 1	0.0	0.0			
821129		- 1	0.0	0.0		CATE OF THE PERSON WAS	Contraction (Constitu
821130		100 B	0.0	0.0	ours emb ours erre some	was even some date date	arted our est en
MONTHLY	VALUE	es 0 de	l.î	2.1	em	622 de 1627/01/2004 (6)120-02/20	.7

- DECEMBER 1982 -

DATE		INTRAGRAVEL				RFACE WATER	
	MIN	MEAN	MAX	MIN	MEAN	MA	
821201	en e	0.0	0.0	and contracting and	1860 400° 400° 400° 400°	100 1 50 150 500 to	
821202	1	0.0	0.0		COR 4127 CTD 5127 4124	ESTATUTE OF THE STATE OF	
821203	· 1	0.0	0.0	6200 ENG-6200-6100-6200	ementalistis	CONTRACTOR (CONTRACTOR)	
821204	- 1	0.0	0.0			CO-IN-CONTR	
821205	1	0.0	0.0		CONTRACTOR CONTRACTOR	62:00 60 CB	
821206	4320 Q	1	0.0			<b>4233</b> 1653 600 629	
821207	1	1	0.0		com electrical com com	CH (CH CH) CH)	
821208	- 1	··· 1	0.0	ence encourse and ence	em 624 C19-725 C13	CHES (220) 4229 (220)	
821209		1	0.0	4000 4000 4000 4000 4000	5710 5700 CES-0100 CES	63-18 <b>4</b> 13-645	
821210	1	1	0.0	ento semostro com tras			
821211	· 1		· . 1	SURE CONSTRUCTOR STORE SOME	\$10 100 \$10 \$10 \$10 F	COMPAND COMPAND	
821212	- 1	0.0	0.0		600 600 600 600 600 600 600 600 600 600 600		
821213	- 1	0.0	0.0		675 CER CER CER CER	4077 CERT ASSES ASSES	
821214	e . 1	0.0	0.0	200 MINGO GW 470	010 400 000 dis-600	4513 1509 (THE 4518	
821215	- 1	0.0	0.0	ento consento cheo ento	CONTROL CONTRO	cum 200 cm2 450	
821216	1	0.0	0.0	स्थान काळातास्य स्थान स्थान	CO CO CO CO	CONTRACTOR OF	
821217	0.0	0.0	0.0			end and denote	
821218	am 9 1	0.0	0.0	CONTRACTOR OF CONTRACTOR	extracted apen extraction	this sub-cub-cu	
821219	- 1	0.0	0.0		607-000 and 010-002	क्षांक व्यक्तकार कर	
821220	0.0	0.0	0.0	SECTION AND ADDRESS OF THE ADDRESS O	etan dan etan etan etan	em ma ma an	
821221	1	0.0	0.0	COMPANIES COMPANIES	and also other area	400 000 CON 000	
821222	··· . 1	0.0	0.0			0000 0000 0000 CM	
821223	0.0	0.0	0.0		note cresce	499 550 GED 653	
821224	0.0	0.0	0.0	section and the	452423-4202-610 (659	ere ent ent cr	
821225	0.0	0.0	0.0		C29-203-629-40-9391	CHRISTON	
821226	en . 1	0.0	0.0		853 408 410 HT 400		
821227	0.0	0.0	0.0	EXP #33 E32 400-483	0209 GEORGE STATE GEORGE GEORGE	ASS ASSESSED ON	
821228	0.0	0.0	0.0	2010 CAN-1110-1210 4520	4000-4000-4000-4512-4219	STORE STATE STATE OF	
821229		0.0		Approximation and		CHES PARTE PRINTED AND	
821230	0.0	0.0	0.0			ess director ess	
821231	0.0	0.0	0.0		ATTEN CONTROL		
ONTHLY VALUE	- 1	00	g post		ammo dizilio distripi dilitimi sibilice	2000 (\$220 (\$130) \$200	

- JANUARY 1983 -

	ংশালে একার নির্মাণ ব্যাসন স্বায়ের কার্যন্ত কৃষ্ণার হোটো ব্যায়ন ব্যায়ন ব্যায়ন ব্যায়ন ব্যায়ন ব্যায়ন ব্যায়					SURFACE WATER		
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down dawn a which the standard and a section of the	multiple Catalor College (Catalor Sanger Sanger Sanger Catalor Consequence (Catalor Sanger Sanger Sanger Sanger							
830101		- 1	0.0	0.0	FROM CONTRACTOR COSTO	මෙය කර නම කර මති මෙය කර නම කර මති	CONTRACTOR OF STREET	
830102		0.0	0.0	0.0	es expanser e		essertant stop of the state	
83 01 03		0.0	0.0	0.0	1000 THE CO. C. LEWIS CO.	13. C2-23-C7-23-C29	60 23 22 62 62 62	
830104		0.0	<.05	• 1		ED COM COOK COOK COOK SEEDS	600-000-000-000-000	
830105		0.0	0.0	.1			1900-1900 1900-1900-1900	
830106		0.0	<.05	.1	100 CON 100 CO			
83 01 07		0.0	<.05	.1			electr (SECH-COA) (SECH SECH	
830108		0.0	0.0	0.0	sin din din din d	220 40504211 423-545	and an antana	
830109		1	0.0	. 1	450 cm 450 cm		400-100 GTO GEO FED	
830110		0.0	<.05	0 1	emberg timens		AND WAS THE GAS CASE	
830111		0.0	<.05	.1	COR COR COR COR		THE PERSON WITH PERSON	
830112		0.0	0.0	0.0	entrance on Can			
830113		0.0		0.0	STATE OF THE PARTY	and the state of t		
830114		0.0	400 CONTROL 400 GA	0.0	COLUMN CONTRACTOR COLUMN COLUM		40 400 40 400	
830115		. L	0.0	•	alth cap cum and		esa embusia estr ava	
830116		1	<.05	.1	and distribution of the s			
830117		0.0	0.0	.1	61 13 61 60 60 60 60 60 60 60 60 60 60 60 60 60	ESS CENTRAL STATE STATE	200-200-200-200-200-	
830118		0.0	0.0	.1	CON-CED-1000-0000-0		0000 CO 1000 C	
830119		0.0	<.05	.1	C79 (22) 610 (28)	THE SECTION OF SECTION	512-570-610-270-610	
83 01 20		0.0	<.05	.1	#TTD 4557 0549 4230	1000 4000 4000 4000 4000 4000 4000 4000	600 CB CB 600 CB	
830121		0.0	<.05	.1				
830122		0.0	0.0	0.0	क्या व्यक्तका दक	The state of the s	Constitution of the Consti	
83 01 23		0.0	• 1	.1		olica esta esta esta esta esta esta esta est	STORAGO CHA STORAGO	
830124		0.0	<.05	.1	and the same of the			
830125		0.0	0.0	.1		en andre en en en en	227 U.S. 4500 GAD 4558	
83 01 26		0.0	<.05	.1	800 CENT 20 CEN		ence desir como ence como	
830127		0.0	•	.1			COS COS COS COS COS	
830128		0.0	.1	.1	0219 (015) 031D 2012	THE STREET STREET, STR	entitivelen elikaliselinih stunn	
830129			<.05		entil 400 100 chm	CITY ONLY WITH STEP STEP	4 19 CIP (ED-618-712)	
830130		0.0		0.0	man distribut dist			
830131		0.0	<.05	(b)	4142 WID WAS WITH		enes com remodistr éssis	
MONTHLY	VALUE	and \$ de	<.05	<b>3</b>	opin atti dissi selli	and the trade of the trade.	erro anti dici dili ang	

- FEBRUARY 1983 -

CES CASSES QUID SUA SUBSESSO COM CO	TO ACCO ACAD AT THE COMPANY AND ADDRESS ASSESSMENT						
DATE	ener referende franken franke til efter skriven franken franken franken franken franken franken franken franke		ITRAGRAVI			RFACE W	ATER
tipo direction also annique distributoristis uno etiplesto essa augestio sub-universo.	2004 (1882-4-1875-1884) (1884-1887) (1887-1884-1881) (1882-1884-1884)	MIN	MEAN	MAX	MIN	MEAN	MAX
		in manade, according on the Associate all their describe all the all t	es, et estes-envers, et control-richers, détaité débuille éléctris (%)	STATE CONTRACTOR STATE OF STAT	and the contract of the contra	# # 100 miles   10	Access (COT) Livering all the second company of the second company of the second company of the second company
830201		0.0	.1	.1	and one of the and and		42 vine 20 vine 100
830202		0.0	<.05	.1		GEO-SIGN 1923 SEE BES	4005 HERZEN HEZEN HEZEN HEZEN
830203		0.0	.1	.1	650 000 650 650 600		Clarente etterette etter
830204		0.0	.1	.1		cus and constant and	
830205		0.0	<.05	.1	ST 400-400 400-450	CONTROL CONTROL COM	CONTRACTOR OF STATES
830206		0.0	.1	.1		(2120-2111) (2111) (2111) (2111)	681433343345354535
830207		.1	.1	.1	883 625 E25 E25 E25		801639 SEC-039-1009
830208		. 1	.1	.1		OUR CIP CIP CIP CIP	CONTROL COMP. 22014/6520
830209		0.0	. 1	.1	STROTTO LED STE - NEO	CONTRACTOR CONTRACTOR	CONTRACTOR CATA SIZE
830210		0.0	<.05	.1	क्षांत वास्त्रवका ब्रह्म वास	and state state state	and a family distribution of the
83 0 2 1 1		0.0	.1	.1	days as the action degree as the	CONTRACTOR OF THE	embang annanan ans
830212		0.0	<.05	.1		CO-AND COLOCIA COLO	AND ALCOHOLOGICA COM
830213		0.0	0.0	0.0	4112-4213-1712-1712-4713		COLUMN CONTROL TERM
830214		0.0	0.0	0.0			and an experience of the
830215		0.0	0.0	0.0		and dispersional time	
830216		0.0	0.0	0.0		ens anders and eva	and the same and the
83 0 2 1 7		0.0	0.0	0.0	esing engagingens extended		ente dinaviantente dans
830218		0.0	0.0	0.0		625 GEO 6125 GEO 6130	
830219		0.0	0.0	0.0		1000 COOP \$150 COOP	කෘතික සහ සහ ජන
830220		0.0	.1	.1	CHANGE CONTRACTOR		CONTROL 650 650
830221		0.0	.1	.1	dece they alie desperate	THE WAY THE GOOD THE	ALINI-PERSONALISM PERSONALISM
830222		0.0	.1	.1			6004-6009-4903-75( ) state
830223		o de	. 1	.1	CD4000000000000	623/050 CON-0512 GOD	
830224		0.0	.1	.1	5002-5208 0200-0002-5753		C1 600-000 C211-010
830225		. 1	.1	.1		**************************************	ent eth eth eth dia
830226		0	.1	.1	6012-0105-213-012-4153	622-022-6210-4210-4510	
830227		o design	.1	.1			G161 (C15) 40 (04 (C15) 4 (C15)
830228		S) Symmyly	.1	9	447-479462 4479 CLT	COLUMN CONTRACTOR CONT	enterior direction cons
MONTHLY	VALUE	0.0	(a) 4/4	St. of the second	477334-275544-275754-425574-42550	and any and any and	entral (ECCO-ENTRO) military estima

- MARCH 1983 -

DATE			NTRAGRAV				SURFACE WATER			
VALL	STAN STATES S	MIN	MEAN	MAX	MIN	MEAN	MAX			
830301		. 1	.1	Queend Q		emp distribution distribution	2012-2015 4000-4009 120			
830302		.1	.1	9		4125 E225 CZE1ES2 (1629)	@223-@230-@3330 #5550 @8			
83 03 03		.1	.1	.1	with Cities and Gray	CEES CEES CEES CEES CEES	CHIN GEN CHINGING C			
830304		o proved	.1	.1	6722 4500 2763 654p 5543	\$25 \$20 CH CH CH CH	COLD STAN STAN STAN			
830305		.1	.1	.1			1100 EEST (1200 1200) E			
83 03 06		.1	.1	g-marg	GREE SELECTION STATE SELECT	and this envent and	CIN \$155 FFT 455 6			
83 03 07		.1	.1	-1	Anima anima anima anima anima		en en en en en en			
83 03 08		.1	.1		econ accompany days comp	600 600 600 600 600	4000 days (500 Clab &			
830309		• 1	.1		estative and a strain and a strain and a	ത്തെ അത്രക്ക മേ	eliza entre entre entre e			
830310		.1	.1	.1		and this are the are	1000 CER CER CER C			
830311	•	Speeds Speeds	.1	.1	Q000-0000-0000-0000-00100-00100	දකුළුවෙන් එකා රෝගි ලබන				
830312		.1	.1	1	THE COLD STREET, STREET,		entro-entro derro entro-e			
830313		0	.1	9		CAMPAN GENERAL SEC	20041241214134			
83 03 14		9	© Spaces	. 4		em top tal and em	em 200203-200 2			
83 03 1 5		.1	.1	.1	4000 - \$500 0000 0000 4000	day agg-day custant	60340354E2409-2			
83 03 16		. 1	.1		### ######## GEER C 78		enn ten ann ean e			
83 03 17		.1		9 4		622 652 924 654 <b>6</b> 54	emplicated empl			
830318		0.0	1	.1	CONTRACTOR CONTRACTOR					
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830320		9	. 1	.1		62002 (120 CE) (120 CE)	200 eng 200 eng 2			
830321			e comment	. 1	ens contribution con con	CONTRACTOR CONTRACTOR	424420 620-424 <u>6</u>			
830322		0.0	a desired	. 1		600-000 (NO 000 AN)	and the thirding			
83 03 23		.1		.1		enso enso com como como	ens ens tanden e			
830324		-1	0	.1	100 mm 100 mm	end-enty chinesia can	कारण व्याप्त बाह्य के विवस			
830325		.1	.1	.1		CONTRACTOR OF THE PERSON OF TH	623 <i>6</i> 23625626			
83 03 26		. 1	• 1	.1	en en 200 ma 619	CONTRACTOR CONTRACTOR	400 CO 400 CO			
830327		.1	.1	.1	600 CO 500 CO 600	ametro delle colo	4000 CEEP EST CEEP C			
83 03 2 8		.1	. 1	.1	con and an are des	ent dis ensemments	CIN ONE SCHOOL S			
830329		.1	.1	.1	400 Starting start start	come established com	em 612 em 605 s			
83 03 3 0		.1	.1	.1	CON CONTRACTOR AND	***************************************	සෙයා අයක ඇතුම උපද ය			
830331		0.0	e de	S) Spanned		ton ture one care case	empth empande			
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- APRIL 1983 -

BETTE CON THE PER CONTRACTOR CON A	TAZTISTI GTILLIN VINYO ATTONA ATTON ATTONA ATTONA ATTONA				nn onnio acess sectos estado atimo estado estado estado estado.		
DATE	en gemeen, acceptor, emeror, prosition, emeror, applicable, debble, (2) (2)		ITRAGRAVI		SU	RFACE W	ATER
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000101				4			
83 0 4 0 1		0.0	.1	.1		STORES CENTER CENT	ACC 1000 1000 1000 1000 1000 1000 1000 1
83 0 4 0 2		0.0	.1	.1	000 000 ESD 000 000	and the things are and	CHE-SEE CHE-SEE (TH
83 0 4 0 3		0.0	.1	.2	STEEP STEEP STEEP STEEP STEEP	\$150-\$100 align \$250-\$200	esta COS EUS COS: CO
83 0404		*	.1	e e	COMPANY OF THE PROPERTY OF THE PARTY OF THE	CONTRACTOR CONTRACTOR	
83 04 0 5				.1	ery production for Allen	AND AND AND AND AND	eine spile grin sind-fil
83 0 4 0 6		•	.1	.l		(11) TES (11) CAN CAN	CENTRAL GARAGE (S.
83 0407		• 1	.1	.1		COM CER (SEE CEE)	and our chouse of
83 040 8		.1	.1	.1			WITHOUT WAS STOLEN.
83 040 9		.1	.1	.1	क्षाक स्थान स्थान करने स्थान		
830410		.1	.1	.1		COLUMN (110) (1110) (1110)	emenden direkto d
83 041 1		.1	.1	.1		SUB-GEN SER FERRADO	CON 620 CONTRACT-0
83 041 2		. 1	.1	.1		410 410 CD CD CD	व्यानका व्यान व्यान व्यान
830413		e de de	.1	.1		60629626262	1000 ETTO (1700 (1804)
830414		.1	. 1	.1	क्षांस काल क्षात्र काल काल		
83 041 5		.1	.1	.1	CONTRACTOR CONTRACTOR	em the mount are	
830416		9	o de	.1		SERVICE SERVICE SERV	
83 041 7		9	.1	. 2	6000 4050 4000 4000 4050	100000000000	em 519 Gabasi
83 041 8		e grand	.2	.2	with and compared cus	400 800 800 800 470	000 000 000 000 000 000 000 000 000 00
83 041 9		.1		. 2	ence with emportal care	500 STATES (10) 600	emperatur satur etta: 4
830420		0.0	.1	. 4	emockio emocka	COM CERTAGES CERTAGES	can such days (this) (
830421		0.0	<.05	.1		909 SSS COST OF \$4550	622 522 E45 578 F
83 0422		0.0		St. Command	<b>400 400 770 400 400</b>	enso entre com resp. entre	CO CAP CAP CAP
83 0423		0.0	.1	. 1	emedia-emedia-em	CONTRACTOR STATE	6223 6238 6230 6231 F
830424		.1	.1	.1		the district day like	CONTRACTOR (CONTRACTOR)
830425		0.0	2	•	6000-4000		620 800 200 CS
83 0426		0.0	.1	.1			620 000 000 000 v
33 0427		.1	.1	.2	extraction dispersion	en am am an an	and annual con-
83 0428		•	016 2 SAB G105 2022 4224	.1			ence untille quite
ONTHLY V	ALUE	0.0	•	.2			900-E10 CID-510 b

Appendix Table A-4 Datapod intragravel and surface water temperature (C) data summary, at Slough 8A - Upper, RM 126.4, Geocode S30N03W20CDD.

- AUGUST 1982 -

CONTRACTOR			279 (277) 2120 CTO 6230 6230 6770 6770 6770	600 CD CTS 010 CD CD CD CD	and with this and any eight and				
		I.	NTRAGRAV	EL	SI	SURFACE WATER			
DATE		COLD EXPORTATION CON-	17.0 cm e 660 cm 1800 cm 600 cm 600		4500 expenses 4000 4	TO CHE WITH WITH COLOR TOWN STATE STATE STA	Persons and with 41 to cour		
		MIN	MEAN	MAX	MIN	MEAN	MAX		
	নি প্রক্রেম বিনারে ব্রাক্সের বিনার প্রকৃতি প্রকৃতি করে। ব্রাক্সের ব্রাক্সের ব্রাক্সের ব্রাক্সের ব্রাক্সের ব্রাক্স	ne-dalah-dalah mulai dalah dilah dalah	and distributions and the service and the serv	and and give the circ and sine sine	cann and ann can can man can and a	and while some and which shake street and	1916 CLT		
820821		4.7	4.7	4.8	5.0	6.3	9.4		
820822		4.7	4.8	4.8	4.9	6.1	9.3		
820823		4.7	4.8	4.8	5.6	6.4	7.7		
820824		4.7	4.8	4.8	5.4	6.3	8.5		
820825		4.7	4.8	4.8	5.5	6.3	8.6		
820826		4.7	4.8	4.9	5.5	6.5	9.7		
820827		4.7	4.8	4.9	4.9	6.0	9.2		
820828		4.8	4.8	4.9	5.1	6.0	8.2		
820829		4.8	4.9	4.9	5.6	6.0	6.5		
820830		4.9	4.9	4.9	5.7	5.9	6.4		
820831		4.8	4.9	4.9	5.5	5.8	6.7		
MONTHLY	VALUE	4.7	electron established disease	4.9	4.9	acas 40464600-0339 4058	9.7		

- SEPTEMBER 1982 -

DATE	I	NTRAGRAY	/EL	SUI	RFACE WA	ATER
්රේ බා ජා මිස් සංකෘත කරුණ සහ	MIN	MEAN	MAX	MIN	MEAN	MAX
820901	<i>i</i> . 9	4.0	5 0	<i>p</i>	AND ADDRESS OF THE PARTY OF THE	an Charles and Allendan Con
820902		4.9			6.2	
820903		4.9			6.3	
820904		4.9		5.9		
820905	4.9	4.9	5.0	5.5		
820906	4.9	5.0	5.0	5.2	6.0	6.8
820907	5.0	5.0	5.1	5.4		
820908	5.1	5.1 5.1	5.1	5.5	6.0	7.3
820909	5.1	5.2	5.2	5.5	5.9	6.5
820910	5.1	5.2	5.2	2.5	5.9	
820911	5.2	5.3	5.3	5.4	5.9	6.5
820912		5.3	5.3 5.3	5.1		6.2
820913			5.3 5.3	5.0	5.6	
820914		5.2	7.3 5.2	5.3	5.6	
820915		5.2		5.5	5.9	6.3
820916		5.3		5.7		7.7
820917		5.2		5.9		
820918	5.1	5.2		5.8		
820919	5.1		5.2		5.8	
820920	5.1		5.2		5.7	
820921	5.1	5.1	5.2		5.7	
820922	5.0	5.1	5.1	5.2	5.6	
820923	5.0	5.1	5.1	4.7		
820924		5.1	5.1	4.3	5.3 5.1	
820925	5.0	5.0	5.1	4.7	5.2	
820926		5.0	5.1	5.2	5.3	5.8
820927		5.0		4.9	5.3	5.8 6.0
820928	4.9			4.4	5.0	5.5
820929	4.9	4.9	5.0	5.0	5.3	5.9
820930		4.9		5.0		
MONTHLY VALUE	4.8	5.4	5.3	4.3	5.8	8.3

- OCTOBER 1982 -

DATE		NTRAGRAV		SUF	RFACE WA	TER
	MIN	MEAN	MAX	MIN	MEAN	MAX
821001	4.8	4.9	4.9	4.9	5.2	5.6
821002	4.8	4.8	4.9	4.7	5.2	5.1
821003	4.7	4.8	4.8	4.7	5.1	5.)
821004	4.7	4.8	4.8	4.4	4.9	6.0
821005	4.7	4.7	4.8	4.3	4.8	5.8
821006	4.6	4.7	4.8	4.3	4.8	5.4
821007	4.7	4.7	4.7	4.5	4.7	5.1
821008	4.7	4.7	4.7	3.9	4.6	5.5
821009	4.7	4.7	4.7	4.0	4.7	5.4
821010	4.7	4.7	4.7	4.4	4.7	5.1
821011	4.6	4.7	4.7	3.5	4.5	4.9
821012	4.6	4.7	4.7	3.6	4.3	4.8
821013	4.6	4.6	4.7	3.6	4.2	4.6
821014	4.6	4.6	4.7	3.5	4.2	5.2
821015	4.6	4.6	4.7	3.5	4.0	4.8
821016	4.6	4.6	4.7	3.9	4.1	4.3
821017	4.6	4.7	4.7	3.9	4.4	5.3
821018	4.6	4.6	4.7	3.9	4.2	4.8
821019	4.6	4.6	4.6	3.8	4.2	4.5
821020	4.6	4.6	4.7	3.9	4.2	4.7
821021	4.6	4.6	4.7	3.8	4.1	4.4
821022	4.6		4.6	3.8	4.1	4.4
821023		-	4.6	3.8	4.0	
821024	4.5	4.6	4.6	3.7	3.9	4.3
821025	4.5	***************************************	4.6	3 .6		3.8
MONTHLY VALUE	4.5	4.7	4.9	3.5	4.4	6.0

- MARCH 1983 -

DATE	I	NTRAGRAV	SURFACE WATER			
		MEAN	MAX	MIN	MEAN	MAX
830311	2.7	4200 4220 4000 5000 Taga	2.7	2.4		2.7
83 03 1 2	2.6	2.7	2.7	2.3		
830313			2.7	1.4		
83 03 14	2.5		2.7	1.3	_	
830315	2.6	6 (	2.7	1.3		
830316	2.5	2.6	2.7	1.4	2.5	
83 03 17	en 2	-	2.7	1.2	2.2	
83 03 1 8	2.4	2.5		1.0		
830319	2.4	- CP	2.7	1.0		
83 03 2 0	2.4	2.6	2.7	1.3	2.3	
830321			2.8	1.3	2.6	4.6
830322	2.4	2.5	2.7	1.0	2.0	4.3
830323	2.5	2.5	2.7	1.0	2.0	4.2
830324	2.5	2.5	2.7	1.0	2.0	4.6
830325	2.4	2.6	2.8	1.2	2.7	5.5
83 03 26	2.4	2.6	2.8	1.2	2.5	4.6
83 03 27	2.4	2.6	2.8	1.0	2.6	5.7
830328	2.4	2.6	2.9	1.3	3.1	6.0
83 03 2 9	2.4	2.6	2.9	1.1	3.0	6.0
83 03 3 0	2.4	2.6	2.9	1.1	3.0	6.0
830331	2.4	2.7	3.1	1.3	3.2	6.0
MONTHLY VALUE	2.4	2.6	3.1	1.0	2.5	6.0

- APRIL 1983 -

F) & CTT		NTRAGRAV	EL.	SUE	SURFACE WATER			
DATE	ous emens experience MIN	MEAN	una ano mo ano mara ara ana ana ana ana ana ana ana ana	VIIM	MEAN	MAX		
830401	2.5	2.7	3	2.3	3.5	6.0		
83 0 4 0 2	2.5	2.8	3.1	1.1	3.3	6.0		
83 0403	2.6	2.9	4.1	2.3	3.4	6.2		
83 0404	2.6	2.8	3.1	2.6				
83 0 4 0 5	2.5	2.7	3.0	2.6	3.7	5.5		
83 0 4 0 6	2.7	3.1	4.2	2.3	3.8	7.5		
830407	2.8	3.3	4.4	2.4	4.1	7.6		
83 040 8	2.8	3.6	4.3	2.3	4.0	7.5		
83 040 9	2.7	3.5	4.2	2.9	3.4	5.9		
83 041 0	2.7	3.2	4.3	2.7	4.1	7.2		
830411	2.7	3.5	4.2	2.7	3.6	5.6		
83 041 2	2.4	2.7	4.0	1.1	2.2	4.3		
83 041 3	2.4	2.7	4.0	1.4	3.5	6.1		
83 041 4	2.7	3.2	4.1	2.3	3.7	6.1		
83 041 5	2.7	3.2	4.1	2.8	3.4	5.9		
830416	2.8	3.5	4.4	2.3	4.3	6.1		
83 041 7	2.8	3.5	4.3	2.5	3.6	5.8		
83 041 8	2.7	3.2	4.1	2.6	3.5	5.6		
83 0 4 1 9	2.7	3.2	4.3	2.6	4.2	7.6		
83 04 2 0	2.8	3.6	4.5	2.4	4.3	7.8		
83 0421	2.9	4.0	4.7	2.4	4.6	9.0		
830422	3.1	4.3	4.6	2.7	5.1	7.6		
83 0423	3.0	4.1	4.4	2.5	4.2	6.1		
830424	2.8	3.6	4.5	2.3	4.2	9.4		
830425	2.8	3.5	4.4	2.3	4.2	8.9		
83 04 26	2.6	3.4	4.3	2.4	4.3	7.6		
83 0 4 2 7	2.5	2.9	4.1	2.4	4.4	7.3		
830428	2.5	4CB4500 5040 6040 4000	3.1	2.5	eng-atendum takh-takh	3.9		
830429	2.4	2.5	2.7	1.8	3.1	5.6		
83 043 0	2.3	2.5	2.7	1.5	3.0	6.5		
MONTHLY VALUE	2.3	3.2	4.7	1.1	3.8	9.4		

- MAY 1983 -

33 A 580 774		NTRAGRAV			RFACE WA	
DATE	MIN	MEAN	MAX	MIN	MEAN	MAX
02 0 5 0 1	2.2	0 /	0 /	1 0	0.7	go eng
83 0 5 0 1	2,3	-		1.3		
830502	2.2			1.7		
83 0 5 0 3	2.2			1.6		
830504	2.2	*		1.6		
83 0 5 0 5	2.3		2.5	1.7		
83 0 5 0 6	2.4	2.5	2.6	1.7		
83 0 5 0 7	2.4			1.7		
83 0 5 0 8	2.5			1.8		
83 0 5 0 9	2.4	2,5		2.0	3.1	5.4
83 0 5 1 0	2.5		2.7	2.0	3.0	5.3
830511	2.5	2.6		2.0		5.5
83 051 2	2.5			2.2	3.1	4.8
83 0 5 1 3	2.6			2.2		5.4
83 0 5 1 4	2.6			2.3		4.6
83 0 5 1 5	2.6	2.7	2.8	2.2	3.0	4.2
830516	2.6	2.7	2.9	2.2	3.0	4.3
830517	2.7	2.8	2.9	2.4	3.1	4.1
83 0 5 1 8	2.7	2.8	2.9	2.4	3.3	4.7
83 051 9	2.8	2.9	3.0	2.4	3.4	4.9
830520	2.8	2.9	3.0	2.4	3.6	5.7
830521	2.9	3.0		2.6	3.3	
830522	2.9	3.0	3.1	2.8		
830523	2.9	3.0	3.2	2.8	3.7	6.0
830524	2.9		3.3	2.8	3.9	
83 0 5 2 5	3.0			2.6		
83 0 5 2 6		3.1		3.1		
830527	3.0			2.8		5.8
830528		3.2			3.9	
830529			3.4		4.0	
83 0 53 0	3.2	3.2	3.3	3.3	3.0	5.0
83 0 5 3 1		3.2			3.9	
MONTHLY VALU	E 2.2	2.8	3.4	1.3	3.3	6.5

- JUNE 1983 -

CHEST CLUS 45000 47000 (CHEST CHEST 4500) 450	aran area (area	100 CH	UED COM COLO COM COM COM COM	s estats estats estato estato estato estato estato estato estato estato esta		200 eddy 1024 elizh elizh enin-siya enz	PERSONAL PROPERTY OF STREET AND STREET STREET		
		INTRAGRAVEL				SURFACE WATER			
DATE		em em em em em em		Secretaria de la composition della composition d	CENT - CE	no esperante en	POTEN COST COST COST		
		MIN	MEAN	MAX	MIN	MEAN	MAX		
4151×1100 1180×4110 4100 4100 4100 4100 41	CO COMO COMO COMO COMO COMO COMO COMO C	o data and mili dad day day	000 40 0000 000 600 600 600 600		175 days (570-1120 600) (1120 <b>6</b> 00) (1120 6	Properties de la competité des la competité de la competité des la competité des la competité des la competité de la competité des la co	Printer a man actual ac		
830601		3 .1	3,3	3.4	3.2	4.3	6.7		
830602		3.2	619-6254/374537-7-25	3.4	3.2		3.9		
MONTHLY	VALUE	3.1	ercep-dozon-dezin-dicin-dezin	3.4	3.2	ध्यक्षक पद्धान्त्रकारक पद्धान व्यवस्थ	6.7		

Appendix Table A-5 Datapod intragravel and surface water temperature (C) data summary at Slough 9, RM 128.7, Geocode S30NO3WO9DBC.

- AUGUST 1982 -

erro contento ento anto esto esto ento en			000 000 000 000 000 000 000 <del>0</del> 00	an an an arther or an a	ID CAND COM COM COM COM COM COM	THE SECURE SECURE SEC. 612 64	**************************************		
المشاه الإنجاز الاستراد		INTRAGRAVEL				SURFACE WATER			
DATE	ල ජනා අවසා නො මාද පැවැති ගොසලනා නො දෙසේ ගාල ඇස ගැ	MIN	MEAN	MAX	MIN	MEAN	MAX		
Name of the Association of the A	Grander (Coppe) (Acts) and the way ID Madder (Grand Acts) Acts (Grand Acts) (Grand Acts)	- entry-court-outer trains entry-	Million and Street and Million and Advance and Company						
820821		3.4	STEP THE PERSON STEP CHIS	3.7	5.1	and this constant flab	12.0		
820822		3.4	3.5	3.6	5.2	8.4	12.1		
820823		3.5	3.5	3.7	6.9	8.7	10.9		
820824		3.4	3.5	3.7	6.5	8.5	11.5		
820825		3.5	3.5	3.6	6.7	8.4	10.4		
820826		3.4	3.5	3.7	6.0	8.4	12.1		
820827		3.3	3.5	3.7	4.5	8.1	11.6		
820828		3.4	3.5	3.7	5.5	7.5	10.2		
820829		3.4	3.5	3.7	6.5	7.6	8.7		
820830		3.6	3.6	3.7	6.3	7.1	8.0		
820831		3.5	3.6	3.8	5.7	6.8	8.4		
MONTHLY	VALUE	3.3	6156 damper 19-0220 Hand	3.8	4.5	emanique que cua	12.1		

- SEPTEMBER 1982 -

The Articles and Articles and the Articles and Arti	COLUMNICATION STUTT COMPANY ACTION COLUMNICATION STUTTERS ACTION OF ST	II	TRAGRAV	Till	SUE	RFACE WA	ATER
DATE		MIN	MEAN	MAX.	m Company and the company and	MEAN	MAX
820901		3.5	3.6	3.7	6.3	8.0	10.6
820902		3.4	3.5	3.6	6.1	7.5	9.7
820903		3.4	3.5	3.6	6.2	7.1	8.0
820904		3.4	3.5	3.5	5.6	6.9	9.1
820905		3.4	3.5	3.5	5.3	6.4	7.7
820906			3.4	3.5	5.5	6.4	7.7
820907		3.4	3.5	3.5	5.7	6.8	8.3
820908		3.4	3.5	3.5	5.7	6.6	7.7
8209√9		3.4	3.4	3.5	5.6	6.6	8.2
820910		3.3	3.4	3.5	5.5	6.6	8.0
820911	•	3.3	3.4	3.4	5.0	5.9	7.1
820912		3.3	3.3	3.4	4.1	5.7	7.4
820913		3.3	3.4	3.4	4.9	5.7	6.7
820914		3.4	3.4	3.5	5.9	6.4	7.2
820915		3.4	3.5	3.6	6.4	6.8	7.5
820916		3.5	3.5	3.6	7.0	7.3	7.4
820917		3.4	3.5	3.5	6.2	6.6	7.1
820918		3.4	3.4	3.5	5.6	5.9	6.3
820919		3.4	3.4	3.5	5.5	5.6	5.9
820920		3.4	3.4	3.5	5.6	5.9	6.4
820921		3.4	3.5	3.5	6.0	6.3	6.7
820922		3.4	3.4	3.5	5.5	6.1	7.0
820923		3.4	3.4	3.5	4.4	5.1	6.4
820924		3.3	3.4	3.5	2.9	4.0	5.2
820925		3.3	3.4	3.5	3.3	4.2	4.9
820926		3.4	3.5	3.5	4.2	4.6	5.0
820927		3.4	3.5	3.5	4.5	4.8	5.5
820928		3.3	3.4	3.5	3.1	3.8	4.5
820929		3.4	3.5	3.5	4.0	4.4	5.0
820930		3.4	3.5	3.5	4.1	4.5	4.9
MONTHLY	VALUE	3.3	3.4	3.7	2.9	5.9	10.6

- OCTOBER 1982 -

And the case			TRAGRAV			FACE WA	
DATE	and the second s	MIN	MEAN	MAX	MIN	MEAN	MAX
821001		3.4	3 . 5	3.5	3.9	4.2	4.5
821001		3.4	3.4	3.5	3.6	3.9	4.5
821002		3.3	3.4	3.5 3.5	3.4	3.7	4.1
			3.3	3.4	2.9	3.2	3.8
821004		3.2	3.3	3.3	2.4	2.8	
821005		3.2			2.2	2.7	
821006		3.1	3.2	3.3		3.0	3.1
821007		3.2	3.3	3.3	2.8	3.0	3.4
821008		3.2	3.3	3.3	2.6		3.6
821009		3.2	3.2	3.3	2.4	2.9 3.2	3.5
821010		3.2	3.3		2.9	2.9	
821011		3.2	3.2	3.3	2.6 2.2	2.5	3.0
821012		3.1	3.2	3.2			3.0
821013		3.1	3.2	3.2	2.5	2.7	
821014		3.1	3.2	3.2	2.3	2.6	3.1
821015		3.1	3.1		1.7		2.8
821016		3.1	3.2	3.2	2.1	2.2	2.4
821017		3.1	3.1	3.2	2.2	2.6	3.3
821018		3.1	3.1	3.2	1.9	2.4	2.8
821019		3.1	3.2	3.2	2.1	2.5	2.7
821020		3.1	3.1	3.2	2.3		2.9
821021		3.0	3.0	3.2	1.6	1.9	2.3
821022		2.9	3.0	3.1	1.5	1.7	2.1
821023		2.9	3.0	3.0	1.4	1.6	1.8
821024		2.8	3.0	3.0	1.5	1.6	1.9
821025		2.8	2.9		1.4		1.7
821026		2.8	2.8	2.9	1.3		
821027		2.6	2.7	2.8	1.2	1.2	1.3
821028		2.5	2.6	2.7	1.0	1.2	1.2
821029		2.4				1.1	
821030			2.5				
821031		2.6	2.6	2.6	1.1	1 . 1	1.2
MONTHLY	VALUE	2.4	3.1	3.5	1.0	2.3	4.5

- NOVEMBER 1982 -

CHO-SELD-CHO-CHO-CHO-CHO-CHO-CHO-CHO-CHO-CHO-CHO		K12-G13-G131-G132-G220-G	no enoque en anoque en en	0 CECT-CHIS CRIS-40070-CENS 45101-CENS 4	meaner se	and and case and and	o estato estato atamp estato estato esta de estato estato	COLUMN TO SERVICE CONTRACTOR AND CON	
DATE			NTRAGRAV	400 4000		SURFACE WATER			
DAIL		MIN	MEAN	MAX		MIN	MEAN	MAX	
	alon ester elaik eliin erita-esta estat baha etian eliin	dents-cinies dends dents-sector d	rice-time dans desir dans-dass socie-das		E14 E15 612 612	linor and and any an	e manue entrus entrus entrus entrus con an entrus entrus	\$110 GMP (\$1.0 BMP 4570 GMP 5550)	
821101		2.6	2.6	2.7		1.2	1.3	1.6	
821102		2.7	2.8	2.8		1.6	1.8	2.1	
821103		2.8	2.8	2.8		1.4	1.7	2.1	
821104		2.8	2.8	2.9		1.6	1.8	2.1	
821105		2.8	2.8	2.9		1.5	1.7	2.0	
821106		2.8	2.8	2.9		1.4	1.5	1.8	
821107		2.7	2.7	2.8		1.3	1.3	1.4	
821108		2.6	2.7	2.7		1.2	1.3	1.3	
821109		2.6	2.7	2.7		1.2	1.3	1.4	
821110		2.7	2.7	2.7		1.4	1.5	1.5	
821111		2.6	2.6	2.7		1.1	1.3	1.5	
821112		2.6	2.7	2.8		1.5	1.6	1.9	
821113		2.8	2.8	2.8		1.6	1.8	2.0	
821114		2.8	2.8	2.9		1.7	1.9	2.2	
MONTHLY	VALUE	2.6		2.9		1.1	ধ্যাক ব্যায় মোন ক্ৰিট ব্যায়	2.2	

- MARCH 1983 -

CONTRACTOR	නැතපත්ව බව බව නව නම් අයා එය අතුරාව මොවාළ	and contract extension		ente entre entre entre extra entre entre	C009 6000 60794	TO SECURITY CON	මත ඉතිර මත ඉතර අතර අතර ඇත	eron esso con crancos colo esso	
DATE			NTRAGRAV	199320		SURFACE WATER			
		MIN	MEAN	MAX		MIN	YEAN	MAX	
	arian etidik dilah d	ena nas assesses este	AND		Active designation	inas depa-costi case da 26	ettin ettin ettin ettin ettin osta onen attavetti	n euro euro euro el proceso euro euro	
830318		3.2	· 经工程 · 经国际 · (1) (1) (1) (1) (1) (1)	3.3		2.3	CON 6445272 CM	3.0	
830319		3.1	3.2	3.3		1.6	2.2	3.0	
830320		3.2	3.2	3.4		1.9	2.4	3.3	
83 03 2 1		3.2	3.3	5.4		1.9	2.5	3.4	
830322		3.1	3.2	3.4		1.7	2.4	3.3	
83 03 23		3.1	3.2	3.4		1.7	2.3	3.3	
830324		3.2	3.2	3.4		1.8	2.4	3.3	
830325		3.2	3.3	3.4		2.0	2.7	3.6	
83 03 26		3.2	3.3	3.4		1.8	2.6	3.4	
83 03 27		3.1	3.3	3.4		1.6	2.4	3.4	
830328		3.2	3.3	3.4		1.8	2.5	3.7	
830329		3.2	3.3	3.4		1.7	2.6	3.8	
83 0 3 3 0		3.2	3.3	3.5		1.7	2.7	3.8	
830331		3.2	3.4	3.5		1.9	2.9	4.3	
MONTHLY	VALUE	3.1	4000 4050 6000 6000 4000	3.5		1.6	೯೧೨ cm cm chr chr	4.3	

- APRIL 1983 -

DATE		II	VTRAGRAV	SURFACE WATER			
DATE	AND PARTIES STORM	e e e e e e e e e e e e e e e e e e e	MEAN	ene carriera enerciare timo MAX enerciare carriera enerciare carriera enerciare carriera enerciare carriera en	MIN  was consistent constraint co	MEAN	MAX
83 040 1		3.2	3 . 4	3.5	1.9	3.0	4.3
830402		3.2	3.4	3.5	1.9	3.0	4.4
83 0403		3.2	3.4	3.5	1.9	3.0	4.4
830404		3.3	3.4	3.5	2.6	3.1	3.8
830405		3.3	3.4	3.4	2.5	3.0	3.6
83 0 4 0 6		3.3	3.4	3.5	2.4	3.3	4.5
83 0407		3.3	3.5	3.6	2.6	3.6	4.9
830408		3.3	3.5	3.6	2.5	3.5	4.8
830409		3.3	3.5	3.5	2.6	3.3	4.3
830410		3.2	3.4	3.5	2.0	3.2	4.7
830411		3.2	3.4	3.5	2.0	2.8	3.5
830412		3.2	3.3	3.5	2.1	2.7	3 . 5
830413		3.3	3.4	3.5	2.5	3.4	4.7
830414		3.3	3.5	3.5	2.8	3.5	4.5
83 041 5		3.3	3.5	3.5	2.5	3.3	4.
830416		3.3	3.4	3.6	2.8	3.7	5.(
83 0 4 1 7		3.3	3.5	3.6	2.4	3.5	4.
830418		3.3	3.5	3.5	2.4	3.4	4.
830419		3.4	3.5	3.6	3.1	3.9	5
830420		3.4	3.5	3.6	2.7	4.1	5.3
830421		3.4	3.5	3.6	2.8	4.3	5.
830422		3.4	3.5	3.6	3.2	4.2	5 .:
830423		3.4	3.5	3.6	3.4	4.3	5.0
830424		3.4	3.5	3.7	3.4	4.8	6.
830425		3.4	3.6	3.7	3.2	4.8	6.0
83 0 4 2 6		3.4	3.6	3.7	3.0	4.6	6
83 0 4 2 7		3.4	3.6	3.7	3.0	4.7	6.
830428		3.4	3.6	3.7	3.3	4.2	5.
830429		3.5	3.6	3.7	3.6	5.7	8.
830430		3.4	3.5	3.7	2.2	5.7	10.
ONTHLY	VALUE	3.2	3.5	3.7	1.9	3.8	10.4

- MAY 1983 -

And the same		io en	ITRAGRAV		SURFACE WATER			
DATE	Prilliand with the control of the co	MIN	MEAN	MAX		MEAN	MAX.	
830501		3.4	3.5	3.7	1.9	5.2	9.7	
83 0 5 0 2		3.4	3.5	3.5	3.4	5.1	7.6	
83 0 5 0 3		3.4	3.5	3.6	2.8	4.4	6.9	
83 0 5 0 4		3.4	3.5	3.5	2.1	4.4	7.8	
83 0 5 0 5		3.4		3.5	.6	2.1		
83 0 5 0 6		3.3	3.3	3.4	.2	.8	3.4	
83 0 5 0 7		3.1	3.1	3.3	0.0	.3	. 9	
83 0 5 0 8		2.8	3.0	3.1	0.0	.4	.9	
83 0 5 0 9		2.9			.6	3.4	7.1	
83 0 5 1 0		3 .3	3.5		2.1		7.7	
83 0 5 1 1		3.4	3.5	3.7	2.1	4.8		
83 0 5 1 2		3.4	3.5	3.8	2.7	4.9		
83 0 5 1 3		3.4	3.5		2.5	4.8		
83 0 5 1 4		3.4	3.5		2.8	4.9	8.5	
830515		3.4	3.5	3.7	2.5	4.6	7.2	
830516		3.3	3.5	3.7	2.2	3.8	6.0	
830517		3.4	3.5	3.5	1.7	3.6	5.9	
83 0 5 1 8		3.4	3.5	3.6	2.4	4.3	7.1	
830519		3.4	3.5	3.7	2.8	4.8	7.1	
830520		3.4	3.6	3.8	2.8		8.7	
830521		3.5	3.6	3.8	3,5	5.1	7.2	
830522		3.5	3.5	3.7	3.7	5.6	8.2	
830523		3.5	3.5	3.7	3.6	5.5	8.1	
830524		2.5	3.6	3.8	3.7	6.3		
830525		3.5	3.6	3.8	3.1	5.8		
830526		3.5	3.6	3.8	4.5			
830527		3.5	3.6	3.8	3.8			
830528		3.5	3.7	3.9	3.7	6.4	9.0	
830529		3.6				6.9		
83 0 5 3 0				4.2				
830531		3.9	4.0	4.2	7.7	8.1	8.5	
MONTHLY	VALUE	2.8	3.5	4.2	0.0	4.7	10.0	

- JUNE 1983 -

CONTRACTOR AND CONTRACTOR OF		COLO CIENTE CON CIENTO	Tak-day-day-fath ago day day	CONTRACTOR OF THE STATE OF THE	ALL RESPONSE SHIP THE PERSON STORES AND RESPONSE		THE SECOND COLUMN STREET SECONDS
		I	NTRAGRAV	EL	SUI	RFACE W	ATER
DATE		caster crops cu	CHA CHIN CHIN CHANGE CONTRACTOR CHIN			Lab than the augus some and and	grap 642 44 to 6720 1016 64 to 6260
		MIN	MEAN	MAX	YIN	MEAN	MAX
an antipopolis cui an an an		s desperator anno estimates acceptants	an financia an an an an an		THE SECTION OF THE THE CASE WAS THE		CC 400 CT+460 CD-CT0-CT0 CCC
830601		3.8	3.9	4.0	7.5	8.4	9.6
83 06 0 2		3.8	ens missans and program	4.0	8.0		8.9
MONTHLY	VALUE	3.8		4.0	7.5	CASE - CA	9.6
STOCK SERVICE AND ADDRESS OF THE PARTY OF TH	THE STORE AND ADDRESS OF THE PARTY AND ADDRESS OF THE PARTY.	name and annual	- MATERIA STATE OF ST	h film national areas of the constraint of the areas of	ETCHO-FEET STEEL STEEL ST. CO. CO. CO. CO. CO. CO. CO. CO. CO. CO		dan or or other teat death all and all of

Appendix Table A-6 Datapod intragravel and surface water temperature (C) data summary, at Slough 11, RM 135.7, Geocode S31NO2W3OADC.

- AUGUST 1982 -

		wo em em em em em e		73.400 em	entro como como como como como como como co	- AND COOP-FOUR-BOOK STOR WAS GROWN COOP	Can strate at the protesting with	
DATE			NTRAGRAVI		SURFACE WATER			
	ika attik Culdukki dinir dikka didir sikka dika dikir dikka dika di	MIN	MEAN	MAX	MIN	MEAN	MAX	
820821		3.2	3.3	3.3	4.7	6.4	9.2	
820822		3.2	3.3	3.3	4.9	6.8	9.0	
820823		3.2	3.3	3.3	5.9	6.8	8.4	
820824		3.2	3.3	3.4	5.5	6.3	8.0	
820825		3.2	3.4	3.7	4.3	6.5	8.4	
820826		3.6	3.7	4.4	3.5	5.5	7.7	
820827		3.4	3.5	3.6	3.4	3.5	3.8	
820828		3.4	3.5	3.5	3.4	3.4	3.5	
820829		3.5	3.5	3.5	3.4	3.4	3.5	
820830		3.4	3.5	3.5	3.3	3.4	3.5	
820831		3.4	3.4	3.5	3.3	3.4	3.4	
MONTHLY	VALUE	3.2	ando-data-data-data-data	4.4	3.3		9.2	

- SEPTEMBER 1982 -

	AND		VTRAGRAV	El	SUI	RFACE WA	TER
DATE		MIN	MEAN	MAX	MIN	MEAN	MAX
820901		3.4	3.4	3.5	3 .3	3.4	3.5
820902		3.4	3.5	3.5	3.3	3.4	3.5
820903		3.4	3.5	3.5	3.3	3.4	3.5
820904		3.3	3.4	3.5	3.3	3.4	3.4
820905		3.3	3.4	3.5	3.3		3.4
820906		3.4	3.4	3.5	3.3	3.4	3 .4
820907		3.3	3.4	3.5	3.3	3.3	3.4
820908		3.4	3.4	3.5	3.3		
820909		3.3	3.4	3.5	3.3	3.4	3.4
820910		3.3	3.4	3.4	3.3		
820911		3.3	3.4	3.4	3.2		3 .3
820912		3.3	3.4	3.4	3.2		3 .4
820913		3.3	3 . 3	3.4	3.2	3.3	3.3
820914		3.3	3.3	3.4	3.2		3 .3
820915		3.3	3.4	3.4	3.2		3 .3
820916		3.3	3.4	3.4	3.2		3.4
820917		3.3	3.3	3.4	3.2		
820918		3.2	3.3	3.4	3.2		
820919		3.3	3.3	3.3	3.2		
820920		3.3	3.3	3.4	3.2		
820921		3.3	3.3	3.4	3.2	3.2	3.3
820922		3.2	3.3	3.4	3.2	3.2	3.3
820923		3.2	3.3	3.4	3.2	3.2	3 .3
820924		3.2	3.3	3.4	3.1	3.2	3 . 3
820925		3.2	3.3	3.3	3.1	3.2	3 . 3
820926		3.2	3.3	3.3	3.1	3.2	3 .:
820927		3.2	2.3	3.3	3.1	3.2	3 . 3
820928		3.2	3.3	3.3	3.1	3.2	3 . :
820929		3.2		3.3	3.1		3 .:
820930		3.2	3 .3	3.4	3.1	3.2	3 .:
MONTHLY	VALUE	3.2	3.4	3.5	3.1	3 .3	3.

- OCTOBER 1982 -

			ක්ත වෙරු කරල වෙතු අතුරු දෙනා වෙතු දිනක වෙරු කිරීම දුනක් කිරු අතිර කිරු වෙතු කිරු වෙතු කිරීම කිරීම කිරීම කිරීම ක				
DATE		NTRAGRAV		SURFACE WATER			
1762 1 13	MIN			MIN	MEAN	MAX	
The state of the s		eran-daran crant dalah dalah darah darah darah darah			සුව එවැනි ලෝක පොම පොම උතුව අවසා සම	- Goods Easte, do do doise, with stree	
821001		3.3			3.2		
821002			3.3		3.2		
821003			3.3		3.2		
821004		3.3			3.2		
821005		3.2		3.1			
821006			3.3	3.1			
821007		3.2			3.1		
821008			3.3		3.1		
821009		3.2			3.1		
821010			3.3		3.1		
821011	3.2	3.2	3.3	3.1			
821012	3.1		3.2	3.1		3.1	
821013	3.2	3.2	3.2	3.1		3.1	
821014	3.1	3.2	3.3	3.0		3.2	
821015	3.1	3.2	3.3	3.0		3.2	
821016	3.2		3.2	3.0		3.1	
821017	3.1	3.2	3.2	3.0		3.1	
821018	3.1	3.2	3.3	3.0		3.1	
821019	3.1	3.2	3.2	3.0		3.1	
821020	3.1	3.2	3.2	3.0	3.1	3.1	
821021	3.1	3.2	3.2	3.0	3.1	3.1	
821022	3.1	3.1	3.2	2.9		3.0	
821023	3.1	3.1	3.2		3.0		
821024	3.1	3.1	3.2	2.9	3.0	3.1	
821025		3.1	3.2	2.9	3.0	3.1	
821026			3.2		3.0		
821027	3.1	diverse see and and	3.2	2.9		3.0	
821030	2.9		3.0	2.8	ens emparatus ens	2.9	
821031	2.9	3.0	3.0	2.8	2.9	2.9	
MONTHLY VALUE	2.9	3.2	3.4	2.8	3.1	3.3	

- NOVEMBER 1982 -

DATE	I	NTRAGRAV	SU	SURFACE WATER			
DATE	$\overline{MIN}$	MEAN	MAX	MIN	MEAN	MAX	
821101	2.9	3.0	3.1	2.8	2.9	3.0	
821102	3.0	3.0	3.1	2.9	2.9	3.0	
821103	3.0	3.0	3.1	2.8	2.9	3.0	
821104	3.0	3.1	3.1	2.9	2.9	3.0	
821105	3.0	3.0	3.1	2.9	2.9	3.0	
821106	3.0	3.0	3.1	2.8	2.9	3.0	
821107	2.9	3.0	3.1	2.8	2.9	2.9	
821108	2.9	3.0	3.1	2.8	2.9	2.9	
821109	3.0	3.0	3.1	2.9	2.9	3.0	
821110	3.0	3.1	3.1	2.9	2.9	3.0	
821111	3.0	3.0	3.1	2.9	2.9	3.0	
821112	3.0	3.0	3.0	2.9	3.0	3.0	
821113	3.0	3.0	3.1	2.9	3.0	3.0	
821114	3.0	3.0	3.1	2.9	3.0	3.0	
821115	3.0	3.1	3.1	2.9	2.9	3.0	
821116	3.0	3.0	3.1	2.8	2.9	3.0	
821117	3.0	3.0	3.0	2.8	2.9	2.9	
821118	. 2.9	3.0	3.0	2.8	2.9	2.9	
821119	2.9	3.0	3.0	2.8	2.9	2.9	
821120	2.9	3.0	3.0	2.8	2.9	2.9	
821121	2.9	3.0	3.1	2.8	2.9	2.9	
821122	3.0	3.0	3.1	2.9	2.9	2.9	
821123	3.0	3.0	3.1	2.9	2.9	2.9	
821124	3.0	3.0	3.0	2.9	3.0	3 .(	
821125	3.0	3.0	3.1	2.9	2.9	2.9	
821126	3.0	3.0	3.1	2.9	2.9	2.9	
821127	3.0	3.0	3.1	2.9	2.9	2.5	
821128	3.0	3.0	3.1	2.8	2.8	2 . 9	
821129	3.0	3.0	3.0	2.8	2.9	2 . 9	
821130	3.0	3.0	3.1	2.9	2.9	2 .	
MONTHLY VALU	E 2.9	3.0	3.1	2.8	2.9	3.0	

- DECEMBER 1982 -

				මාත්තය සේවලේමේම ජනාගේ වන්නේවල පොලා වෙන සොලා වෙන පොලා වෙන පොලා වෙන සේවය සේවය අතුත් එක්ත් ජනය දෙවල ජනය කිරීම වෙන			
DATE	n are the case and all the same and the same	VTRAGRAV	TI		RFACE WA		
LISTA IL LA		MEAN	MAX				
821201	3.0	3.0	3.0	2.9	2.9	2.9	
821202	3.0	3.0	3.0	2.9			
821203	3.0		3.0		2.9		
821204	2.9	3.0	3.1	2.8			
821205	2.9	3.0	3.0	2.8		2.9	
821206	2.9	3.0	3.0		2.8		
821207	3.0	3.0	3.1		2.9		
821208	3.0	3.0	3.0	2.9			
821209	3.0	3.0	3.0	2.9		3.0	
821210	3.0	3.0	3.0	2.9			
821211	3.0	3.0	3.1	2.9			
821212	3.0	3.0	3.1		2.9		
821213	3.0	3.1	3.1	2.9			
821214	3.0	3.0	3.1	2.9		2.9	
821215	3.0	3.0	3.1	2.9			
821216	3.0	3.1	3.1		2.9		
821217	3.0	3.0	3.1		2.9		
821218	3.0	3.0	3.1	2.9			
821219	3.0	3.0	3.0	2.9		2.9	
821220	3.0	3.0	3.0	2.8		2.9	
821221	3.0	3.0	3.1		2.9		
821222	3.0	3.0	3.0		2.9		
821223	2.9	3.0	3.0	2.8			
821224	2.9	3.0	3.0	2.8	2.9	2.9	
821225	3.0	3.0	3.0	2.8	2.9	2.9	
821226	3.0	3.0	3.1	2.8	2.9		
821227	3.0	3.0	3.1	2.9	2.9	2.9	
821228	3.0	3.0	3.1	2.9	2.9	2.9	
821229	3.0	3.0	3.0	2.9	2.9	3.0	
821230	3.0	3.0	3.1	2.9	2.9	2.9	
821231	3.0				2.9		
MONTHLY VALUE	2.9	3.0	3.1	2.8	2.9	3 .0	

- JANUARY 1983 -

DATE	ගටම ස්ථාන ජනත ජාගත ගොඩ වෙන්ට අනුත තමන මෙන්ව නොව	**************************************	NTRAGRAV	EIL	SU	SURFACE WATER			
		MIN			MIN		MAX		
	and a series desire stands error, or a 4 sects along desire altern								
830101		3.0	3.0	3.1	2.9				
830102		3.0	3.1	3.1	2.9	2.9	2.9		
83 01 03		3.0	3.0	3.1	2.9		2.9		
830104		3.0	3.1	3.1	2.9				
830105		3.0	3.0		2.9				
83 01 06		3.0		3.1	2.8				
830107		3.0		3.1	2.8	2.9	2.9		
830108		2.9	3.0	3.0	2.8	2 . 8	2.9		
830109		2.9	3.0	3.0	2.8	2.8	2.9		
850110		2.9	3.0	3.0	2.8	2.8	2.9		
830111		2.9	2.9	2.9	2.8	2.8	2.8		
830112		2.9	2.9	3.0	2.8	2.8	2.8		
830113		2.9	400-400-400-400-400-400-400-400-400-400	3.0	2.8		2.8		
830114		3.0		3.0	2.8	en meantine en	2.8		
83 01 1 5		3.0	3.0	3.0	2.8	2.8	2.9		
830116		3.0	3.0	3.1	2.8	2.9	2.9		
830117		3.0	3.0	3.1		2.9			
830118		3.0	3.1	3.1	2.9	2.9			
830119		3.1	3.1	3.1	2.9	2.9	2.9		
830120		3.1	3.1	3.1	2.9		2.9		
830121		3.1	3.1	3.1	2.9				
830122		3.1	3.1	3.1		2.9			
83 01 23		3.0	3.1	3.1	2.8	2.9	2.9		
830124		3.1	3.1	3.1	2.8	2.9	2.9		
830125		3.1	3.1	3.1	2.8		2.9		
83 01 26		3.1	3.1	3.1	2.8		2.9		
83 01 27		3.1	3.1	3.1	2.9	2.9	2.9		
830128			3.1		2.9				
83 01 29		3.1		3.2		2.9			
830130				3.2					
830131		3.1			2.9				
MONTHLY	VALUE	2.9	3.1	3.2	2.8	2.9	3.0		

- FEBRUARY 1983 -

NO CONTRACTOR OF THE PROPERTY							
DATE		11	TRAGRAV	SUR	FACE WA	TER	
Ad L. L. Ling	TÜLÜR GESTÜ FESTÜ FEST AUT FASSIN GÜNÜF GESTÜ GEST GES	MIN	MEAN	MAX	MIN	MEAN	XAM
830201		2 1	2 1	2.0	2.0	0.0	0.0
830202		3.1			2.9 2.9		2.9 2.9
83 0 2 0 3		3.1	3.1	3.2 3.2	2.9	2.9	2.9
83 0 2 0 4		3.1	3.1		2.9	2.9	2.9
83 0 2 0 5		3.1	3.1 3.1	3.2 3.1	2.9	2.9	2.9
83 0 2 0 6		3.1	3.1	3.1	2.9	2.9	2.9
83 0 2 0 7		3.1		3.2	2.9	2.9	2.9
830208		3.1	3.2	3.2	2.9	2.9	2.9
830209		3.2	3.2	3.2	2.9	3.0	3.0
		3.1	3.2		2.9 2.9	3.0	3.0
830210		3.1	3.2	3.2	2.9 2.9	2.9	2.9
83 0 2 1 1		3.1	3.1	3.2	2.9		2.9
83 0 2 1 2		3.1	3.1	3.1			
830213		3.1	3.1	3.1	2.8	2.9	2.9
83 0 2 1 4		3.1	3.1	3.1	2.8	2.8 2.8	2.9
83 0 2 1 5		3.0	3.1	3.1	2.8		2.8
83 0 2 1 6		3.0		3.1	2.8		2.8
83 0217		3.0		3.1	2.8		2.8
830218		3.0		3.1		2.8	
830219		3.0	3.0	3.1	2.8		
83 0 2 2 0		3.0	3.0	3.1	2.8		
830221		3.0	3.0	3.1	2.8		
830222		3.0	3.0	3.1	2.8		2.9
830223		3.1	3.1	3.1	2.8		2.9 2.9
83 0224		3.1	3.1	3.1		2.8	
83 0 2 2 5		3.1	3.1	3.1	2.8		2.9
83 92 26		3.1	3.1	3.1	2.9		2.9 2.9
830227		3.1		3.1		2.9	
830228		3.1	3.1	3.2	2.9	2.9	2.9
MONTHLY	VALUE	3.0	3.1	3.2	2.8	2.9	3.0

- MARCH 1983 -

	egan egan esen einik elde shar otto Dibb eller		ITRAGRAV			FACE WA	
DATE	o della ella ella ella ella ella ella ell	MIN	MEAN	MAX	MIN	MEAN	
830301		3.1	3.1	3.1	2.9	2.9	2.9
830302		3.1		3.1	2,9		2.9
830303				3.2		2.9	2.9
830304		3.1	3.1	3.2	2.9	2.9	2.9
830305		3.1		3.2	2.9	2.9	3.0
830306		3.1	3.2	3.2	2.9	2.9	3.0
83 03 07		3.1	3.2	3.2	2.9	2.9	3.0
83 03 08		3.1			2.9	2.9	2.9
83 03 09		3.1	3.2	3.2	2.9	2.9	2.9
830310		3.1	3.1	3.2	2.9	2.9	2.9
83 03 1 1			3.1	3.2	2.5	2.9	2.9
83 03 1 2		3.1	3.1	3.2	2.9	2.9	2.9
830313		3.1	3.2	3.2	2.9	2.9	3.0
83 03 14		3.1	3.2	3.2	2.9	3.0	3.0
83 03 1 5		3.1	3.2	3.2	2.9	2.9	2.9
83 03 16		3.1	3.2		2.9	2.9	
83 03 17		3.2	3.2	3.2	2.9		
830318		3.2	3.2	3.2	2.9		
830319		3.2	3.2	3.2	2.9	3.0	3.0
830320		3.2	3.2	3.2	2.9	3.0	3.0
830321		3.1	3.2	3.2	3.0	3.0	3.0
830322		3.2	3.2	3.3	3.0	3.0	3.0
83 03 23		3.2	3.2	3 •3	3.0	3.0	3.0
830324		3.2	3.2	3.2	3.0	3.0	3.0
83 03 2 5		3.1	3.2	3.2	3.0		
83 03 26		3.2			3.0		
830327		3.2	3.2		~ ~ ~	2 0 0	3.1
830328		3.2				3.0	
830329			3.2		3.0		
83 03 3 0				3.3			
830331		3 . 2	3.3	3.3	3.0	3.1	3.2
MONTHLY	VALUE	3.1	3.2	3.3	2.9	3.0	3.2

- APRIL 1983 -

DATE	Il	NTRAGRA.V	EL	SUE	RFACE WA	TER
	MIN  Company of the state of th	MEAN	MAX	MIN	MEAN	MAX
830401	3.3	3.3	3.4	3.1	3.1	3.3
830402	3.3	3.3	3.4	3.1	3.2	3.3
83 04 0 3	3.3	3.3	3.4	3.1	3.2	3 .3
830404	3.2	3.4	3.4	3.1	3.2	3.3
83 0 4 0 5	3.2	3.3	3.3	3.1	3.1	3.2
820406	3.2	3.3	3.4	3.0	3.1	3.2
830407	3.2	3.3	3.4	3.1	3.2	3.3
830408	3.2	3.3	3.4	3.1	3.2	3.3
830409	3.3	3.3	3.4	3.2	3.2	3.3
83 041 0	3.3	3.4	3.4	3.2	3.2	3.3
830411	3.3	3.4	3.4	3.2	3.2	3.3
83 041 2	3.3	3.4	3.4	3.2	3.2	3 .3
830413	3.2	3.3	3.4	3.1	3.2	3.3
83 0 4 1 4	3.3	3.4	3.4	3.2	3.2	3 .3
83 0 4 1 5	3.3	3.4	3.4	3.1	3.2	3.3
830416	3.3	3.4	3.5	3.1	3.2	3.4
830417	3.3	3.4	3.5	3.2	3.3	3 .4
83 041 8	3.4	3.4	3.5	3.2	3 .3	3 .4
83 041 9	3.4	3.4	3.5	3.3	3.4	3.5
830420	3.4	3.5	3.6	3.3	3.4	3.5
830421	3.4	3.5	3.6	3.4	3.5	3.6
830422	3.5	3.5	3.6	3.4	3.5	3.6
830423	3.5	3.5	3.7	3.5	3.5	3.6
830424	3.5	3.6	3.8	3.5	3.6	3.8
830425	3.5	3.6	3.8	3.5	3.7	3.9
830426	3.6	3.7	3.9	3.6	3.8	3.9
83 0 4 2 7	3.6	3.7	3.9	3.6	3.8	4.(
830428	3 . 7	3.7	3.9	3.7	3.8	4.(
830429	3.6	3.7	3.8	3.7	4.4	6.4
830430	3.5	3.7	3.8	3.5	4.8	8.5
ONTHLY VALUE	3 . 2	3.5	3.9	3.0	3.5	8.2

- MAY 1983 -

できない 大田田 (1920年) 1月1日 (1920年) 1月2日 (1920年)	क्षा क्षा कारण ब्राह्म व्यापन व्यापन व्यापन व्यापन व्यापन व्यापन व्यापन व्यापन	T. I.	VTRAGRAV	EL	<del>-</del>	FACE WA	
DATE		MIN	MEAN	MAX	MIN		MAX
00 0 0 0 0		es e				, ,	ent seg
83 0 5 0 1		3.6	3.7	3.8	3.5		
83 0 5 0 2		3.6	3.7	3.8	3.7	5.4	7.4
83 0 5 0 3		3.6	3.7	3.8	3.7	5.4	7.4
830504		3.6	3.7	3.8	3.8		
830505		3.6	3.7	3.8	3.6		
83 0 5 0 6		3.6	3.7	3.8	3.7		
83 0 5 0 7		3.6	3.7	3 ., 8	3.7	4.9	8.5
830508		3.6	3.7	3.8	3.8	6.1	
83 0 5 0 9		3.6	3.7	3.9	3.8	6.4	8.8
83 0 5 1 0		3.7	3.7	3.8	3.8	6.6	9.0
830511		3.6	3.7	3.8	3.8	6.4	9.5
830512		3.7	3.7	3.8	3.9	5.7	8.3
830513		3.6	3.7	3.8	3.7	7.1	9.7
83 0 5 1 4		3.6	3.7	3.8	4.7	7.3	9.6
83 0 5 1 5		3.6	3.7	3.8	5.3	6.6	8.0
83 0 5 1 6		3.6	3.6	3.7	4.6	6.4	8.2
830517		3.6	3.6	3.7	5.3	6.3	7.6
83 0 5 1 8		3.6	3.6	3.7	4.9	6.2	7.7
83 0 5 1 9		3.5	3.6	3.7	4.1	6.7	9.1
830520		3.6	3.7	3.7	4.5	7.0	9.0
830521		3.6	3.7	3.7	4.1	6.5	7.7
830522		3.6	3.6	3.7	4.4	6.6	8.7
830523		3.6	3.6	3.7	4.0	6.4	
830524		3.6	3.7	3.7	3.8	5.2	7.6
830525		3.6	3.6	3.7	3.6	6.4	
83 0 5 2 6		3.6	3.7	3.7	4.2		
830527		3.6		3 - 7	3.9		
83 05 28		3.6		3.7		6.5	
830529		3.6				4.7	
83 0 53 0			3.6	3.7		5.9	
830531			3.6			6.7	
MONTHLY	VALUE	3.5	3.7	3.9	3.5	6.0	9.7

- JUNE 1983 -

	5-600-600 (000 000) (000 000) (000 000 000 000		TO THE STATE OF TH	日本 年本 中国 中国 日本	医牙头皮肤 医牙虫科 化甲烷甲烷 化甲烷	SON COLOR CONTRACTOR POR COLOR	) (日本 日本 日		
		INTRAGRAVEL				SURFACE WATER			
DATE		CATA MORNEOUS MORNANCE MORNANC	NEWS COMPANIES COMPANIES COMPANIES COMPANIES	NAMES OF STREET, STREE	STREET, STREET	AND -COURS STORE COLOR COLOR - COLOR - COLOR - COL	<b>学术。</b>		
		MIN	MEAN	XAM	MIN	MEAN	MAX		
	10 0 Unit 10 10 CO	CH-01129-40109 45949 45500 45149	CONTRACTOR	COMPONED COM	one teater cours that coop community first 4	STATE COMPANY WAS SEEN AND TO	はなる。ないないないないない。		
83 06 0 1 83 06 0 2		3.5 3.5	3.6	3.7 3.6	4.0 4.0	6.7	10.5		
MONTHLY	VALUE	3.5	ধারা-ভারতার্বাচিত ভারতার্ভার	3.7	4.0	are the second			

Appendix Table A-7 Datapod intragravel and surface water temperature (C) data summary, at Susitna River at Gold Creek, RM 136.8, Geocode S30N02W17CDD.

- OCTOBER 1982 -

DATE		NTRAGRA		SURFACE WATER		
ometo suo suo suo suo suo suo suo suo suo su	MIN	MEAN	MAX	MIN	MEAN	MAX
821013	02204000000000000000000000000000000000			.5		. 8
821014	@49-@38-@28-@22-@22-	ලක ඇතු ඇත දැන සහ	enterpolità sonti ello esta.	• 1	<.05	.6
821015	entinetten entrektionelen	design de la composition della	Gain-conn-scattering from	- 1	0.0	.1
821016		escens organism	6000-0000-800-6000-4100	1	0.0	0.0
821017	. 1	TOTAL CONSIDERATION STATE COMPA	.2		0.0	0.0
821018	. 1	- 19. - 18.	.3	1	0.0	0.0
821019	(8 m)	. 2	.2	1	0.0	0.0
821020	S Samuel	.2	.2	0.0	0.0	0.0
821021	0.0	.2	.3	1	0.0	0.0
821022	0.0	.1	. 2	1	- 1	0.0
821023	.1	.3	.5	1	0.0	0.0
821024	. 2	.5	.7	1	0.0	0.0
821025	.2	.4	.5	··· a 1	0.0	0.0
821026	.2	.3	.4	- 1	0.0	0.0
821027	.2	.3	.5	1	0.0	0.0
821028	.2	.5	.7	es . 1	0.0	0.0
821029	.3	.6	. 9	1	0.0	0.0
821030	**************************************	.3	.5	l	0.0	0.0
821.031	.3	.5	.6	6503 - 40s	0279 g db	0.0
ONTHLY VALUE	0.0	650-25-25-25-25-455	. 9	- 1	STATE STATE OF THE PROPERTY OF	. 8

- NOVEMBER 1982 -

DATE	I	NTRAGRAV	EL	SUI	RFACE WA	TER
	with wine state state state state state state at the $MIN$	MEAN	MAX	MIN	MEAN	MAZ
821101	.3	.5	.6		0.0	0.0
821102	.2	.3	.4	· 1	0.0	0.0
821103	a 2	.3	.4	1	0.0	0.0
821104	. 2	.3	.3	1	0.0	0.0
821105	. 2	.3	.3	1	0.0	0.0
821106	.2	.3	.4	- 1	0.0	0.0
821107	. 2	.3	.4	<b>~</b> . 1	1	0.0
821108	.3	.4	.4	l	0.0	0.0
821109	.4	.4	.5	1	0.0	0.0
821110	.3		5	1	0.0	0.0
821111	.3	.4	۰,5	w . l	0.0	0.0
821112	.4	.4	.5	- 1	0.0	0.0
821113	.4	.4	.5	<b></b> . 1	0.0	0.0
821114	.3	.4	.5	-1	0.0	0.0
821115	.3	.4	. 4	I	0.0	0.0
821116	.4	.4	.5	en • *	0.0	0.0
821117	.4	.6	. 8	1	0.0	0.0
821118	.6	. 8	1.2	1	- L	0.0
821119	.5	.7	. 8	1	0.0	0.0
821120	.5	.5	.6	1	0.0	0.0
821121	.5	.6	.7		1	0.0
821122	.5	.6	.7	- 1	0.0	0.0
821123	.4	.5	.5	- 1	0.0	0.0
821124	.4	.5	.5	1	0.0	0.0
821125	.3	.4	.5	-,1	1	0.0
821126	.4	.4	.5		0.0	0.0
821127	.4	.4	.5	1	0.0	0.0
821128	.4	.5	٠5	. 1	0.0	0.0
821129	· 4	.5	•5	- 1	0.0	0.0
821130	e 4	.5	.5		0.0	0.0
ONTHLY VALUE	. 2	.4	1.1		0.0	0.0

- DECEMBER 1982 -

20 8 822 m		NTRAGRAV				SURFACE WATER			
DATE	where we can be considered as the constant of	MEAN	MAX  THE STATE OF	MIN		MAX			
821201	.4	.5	.5		0.0	0.0			
821202	.4	.5	۰,5	1	0.0	0.0			
821203	.4	.5	.5	- 1	0.0	0.0			
821204	.5	.5	.7	- 1	0.0	0.0			
821205	.5	.6	.7	- · 1	0.0	0.0			
821206	•5	.6	.8	1	0.0	.1			
821207	٠.4	.5	.5	1	0.0	.1			
821208	.5	.5	.6	0.0	0.0	0.0			
821209	.4	.5	.6	··· . 1	0.0	.1			
821210	.4	.5	.6		0.0	.1			
821211	.3	.5	.6	1	0.0	. 1			
821212	.3	.4	.4	<b> 1</b>	. 1	. ]			
821213	.3	.4	.5	0.0	<.05	٥			
821214	.3	.4	.5	1	0.0	, 1			
821215	.3	.3	.4	1	<.05				
821216	.3	.5	.6	1	0.0	. ]			
821217	.3	.4	.5	em	0.0	. ]			
821218	.4	.4	۰,5	0.0	<.05	. 1			
821219	.3	.4	.5	estine & state	<.05	.1			
821220	.3	.3	.4	0.0	<.05				
821221	.3	.3	.5	0.0	0.0	60 .			
821222	.3	.4	.5	L	<.05				
821223	.4	.4	.5	1	0.0	e .			
821224	. 4	.4	.5	*** • I	0.0	0.0			
821225	.3	.4	.5	- 1	0.0				
821226	.3	.4	.5	- 1	0.0				
821227	.4	. 5	.5	*** • I	0.0	<b>a</b> •			
821228	.3	.4	.4	0.0	0.0	0.1			
821229		.4			0.0				
821230	.4	.5			0.0				
821231	<u>.</u> 4	۰,5	.5	and the state of t	0.0	0.			
ONTHLY VALUE	.3	.5	. 8	<b>1</b>	<.05	8			

- JANUARY 1983 -

DATE	II		SURFACE WATER			
		MEAN	MAX	MIN	MEAN	MAX
830101	.4	.5	.5	m , I	0.0	0.0
83 01 0 2	.4	.4	.5	1	0.0	. 1
83 01 03	.3	.4	.5	600 G	1	0.0
830104	.3	.4	.4	1	1	0.0
83 01 0 5	.2	.3	.4	ess o	1	0.0
83 01 06	.3	.4	.4	Case of	<b>~.1</b>	0.0
830114	.3	Co-received to	.4	em 6 1	ance despotate expression	0.0
830115	.3	.3	.4		- · 1	0.0
830116	.3	.4	.4	1	0.0	0.0
830117	.3	.3	.4	ema 6 dawerd	- · 1	0.0
83 01 1 8	.3	.4	.4	- 1	0.0	0.0
830119	.3	.4	.4	- 1	0.0	0.0
830120	.3	.3	٠4	- 1	l	0.0
830121	.3	.3	.4	1	1	0.0
830122	.3	.6	2.0	= .1	0.0	0.0
83 01 23	1.1	1.6	2.8		0.0	0.0
830124	.5	ero em em em em	3.9	1	1	0.0
830125	65730 65770 65770 65770 65770	CC 100 410 -010 400		- 1	- · 1	0.0
83 01 26		etto esso esso esso esto esto	cep Caracola and	- 1	0.0	0.0
830127	(100 - 1110 - 1110 - 1110 - 1110 - 1110 - 1110 - 1110 - 1110 - 1110 - 1110 - 1110 - 1110 - 1110 - 1110 - 1110	embrico (1944) (123)		1	0.0	0.0
830128	SECRETARISM SECRET		spinos decision principe decisions decisions	1	0.0	0.0
830129	### CONTRACTOR   C	ento de Pento entro de tras		1	0.0	0.0
830130	and and and their and	\$000 ALEST A	व्यक्त करण कार्य सामा क्रिक	1	0.0	0.0
830131	constant days days days	encrease quadrate, 4	\$200-0000-5000-4000-4000-	0.0	AND AND AND THE SAME	0.0
ONTHLY VALUE	. 2	COLUMN DUNCA	3.9	- 1	0.0	.1

Appendit Table A-8 Datapod intragravel and surface water temperature (C) data summary, at Slough 16B, RM 138.0, Geocode S31NO2W17AAA.

- AUGUST 1982 -

CONTRACTOR SERVICES SERVICES	THE THIN STATE COME COME COME COME COME COME COME COM	ರಾಜ್ಞಾನವಾ ನಡೆ ಮಾ	ema etta etta etta etta etta etta etta		data data esserana esse elemento es		6119 6120 6120 6120 6120 6120 6120 6120 6120		
DATE			NTRAGRAV		-	SURFACE WATER			
		MIN	MEAN	MAX	MIN	MEAN	MAX		
	1999 - CENTRA (CENTRA			O PODE AND AND AND ONE ONE STAR AND A	TETAT PERO CELIFORNI ALIAN ETATO ALIAN ETA	n-chin alian esta esta anto stara esta altr	A STATE STATE STATE STATE STATE STATE		
820821		4.8	5.5	6.7	4.3	5.9	9 2		
820822		4.7	5.7	6.9	4.2	5.9	9.0		
820823		5.6	6.2	6.8	5.5	6.4	8.0		
820824		5.4	6.2	7.4	5.1	6.3	8.7		
820825		5.9	6.5	7.5	5.5	6.7	9.0		
820826		5.9	6.5	7.6	5.5	6.8	9.1		
820827		4.6	5.9	7.4	3.9	5.7	8.7		
820828		4.7	5.6	7.0	4.5	5.6	7.8		
820829		5.3	5.9	6.7	5.0	6.0	7.1		
820830		5.5	5.8	6.2	5.3	5.9	6.7		
820831		5.6	5.8	6.3	5.2	6.2	8.0		
MONTHLY	VALUE	4.6	one-erlander althouse	7.6	3.9	ear air airtea ees	9.2		

- SEPTEMBER 1982 -

DATE	and desired transport and all all and all all all all all all all all all al	THE PARTY COME COME COME COME COME COME COME COME	ITRAGRAV		SUI	RFACE WA	TER
DALC	ත් මෙත කාල මෙත් කොර එමුව දැනීම මියට පාලම එක	MIN	MEAN	MAX	MIN	MEAN	MAX
820901		5.7	6.0	6.4	5.4	6.6	8.6
820902		5.5	5.9	6.4	4.9		8.6
820903		5.5	5.8	6.2	5.0	5.9	7.7
820904		5.2	5.6	6.0	4.6		7.9
820905		5.1	5.6	5.9	4.6		7.6
820906		5.3	5.6	6.0	5.0	5.7	6.6
820907		5.0	5.7	6.7	4.8	5.8	7.6
820908		5.1	5.5	5.9	4.8	5.4	6.2
820909		5.0	5.5	6.0	4.8	5.5	7.0
820910		5.0	5.5	6.0	4.6	5.5	6.9
820911		5.0	5.2	5.5	4.5	5.0	5.6
820912		4.4	4.9	5.4	3.9	4.8	6.3
820913		4.8	5.0	5.2	4.5	5.1	6.1
820914		5.0	5.2	5.3	5.0	5.5	6.4
820915		5.3	5.8	6.6	6.1	6.7	8.0
820916		6.4	6.6	6.8	6.7		7.9
820917		5.9	6.2	6.6	5.7		6.9
820918		5.5	5.7	6.0	5.5		6.6
820919			5.4	6. د	5.9		
820920		5.0	5.2	5.3	5.7		
820921		4.9	5.0	5.1		6.0	
820922		4.7	4.9	5.1	4.7		
820923		4.1	4.5	4.9		4.3	
820924		3.8	4.2	4.6	2.3	3.7	5.7
820925		3.7	4.2	4.5	2.7	4.2	5.8
820926		4.2	4.4	4.6	4.0	4.6	5.5
820927		4.3	4.5	4.8	3.6	4.6	6.3
820928		3.7	4.1	4.7	2.6	3.7	5.0
820929 820930		4.1		4.7	3.9		6.0
020730		4.4	4.6	4.9	4.0	4.8	6.1
MONTHLY	VALUE	3.7	5.2	6.8	2.3	5.4	8.6

- OCTOBER 1982 -

DATE	I	NTRAGRAV	SURFACE WATER			
ක්රියිකි. කි. කි.වි. ක්රියිකි වෙත්ත මහ මහ මහ කර කර කර කර		MEAN	MAX	MIN	MEAN	MAX
821001	4.4	4.6	4,8	3 .7	4.4	5.4
821002	4.1	4.5	4.8	3.6	4.3	5.6
821003	4.1	4.4	4.7	3.4	4.1	5.3
821004	3.5	3.9	4.5	2.3	3.2	4.7
821005	3.3	3.6	3.9		2.9	4.1
821006	2.9	3.3	3.7	2.0		4.2
821007	3.3	3.5	3.7	2.7	3.2	4.1
821008	3.4	3.6	3.9	2.0	3.3	4.5
821009	3.2	3.4	3.8	2.1	3.2	4.3
821010	3.5	3.7	4.0	3.1	3.5	4.
821011	3.3	3.5	3.9		3.0	3.7
821012	2.9	3.2	3.5	2.0	2.8	3 . !
821013	3.1	3.3	3.5	2.4	2.9	3 .4
821014	3.0	3.2	3.5	2.4	2.9	3.8
821015	3.0	3.1	3.5	2.3	2.6	3.3
821016	3.0	3.1	3.2	2.4	2.8	3.1
821017	3.0	3.2	3.6	2.2	3.0	3.8
821018	3.0	3.2	3.5	2.3	2.8	3 .4
821019	2.9	3.2	3.3	2.1	2.8	3.3
821020	3.1	3.2	3.4	2.5	2.8	3 . 5
821021	3.0	3.1	3.3	2.3	2.7	3 . 2
821022	2.6	3.0	3.4	2.0	2.7	3.4
821023	2.9	3.1	3.3	2.4	2.8	3 . 2
821024	3.0	3.2	3.5	2.5	2.9	3.6
821025	2.7		3.4	2.2	900 (DAG) 500 (DAG)	3.0
ONTHLY VALUE	2.6	3.5	4.8	1.9	3.1	5.6

Appendix Table A-9 Datapod intragravel and surface water temperature (C) data mmary, at Slough 19, RM 140.0, Geocode S. 10DBA.

- AUGUST 1982 -

CONTRACTOR COLOR CONTRACTOR CONTR	THE COLD STATE AND ADDRESS OF THE COLD STATE OF	THE STATE OF THE S	100 cm (125 Ca) Ca) cm (170 cm)	දැන දෙන දැන ගැනුණක එයා එක වන		CONTROL CONTRO	535 633 530 63 P 632 635 635 67 P	
DATE			NTRAGRAV		SURFACE WATER			
	1939 මගේ මගේ ගෙන ශ්ලේ ඇතුළුවන ලොකු ඇත. එලක යොලේ	MIN	MEAN	MAX	MIN	MEAN	MAX	
		hard-entering der the colonies desired desired alternative	maga-system market magazar durang situation statutal statutal	-eutra-eutra et : /- zone eutra azura eutra etatu	COLOR CONTROL	eligi di delata ettimi elikeline oun estem coun, evera		
820821		2.8	2.9	3.0	3.5	4.9	7.9	
820822		2.8	3.0	3.1	3.5	5.0	7.4	
820823		2.9	3.0	3.1	4.3	5.3	6.7	
820824		2.9	3.0	3.1	4.0	5.2	7.5	
820825		3.0	3.0	3.1	4.3	5.6	7.9	
820826		2.9	3.0	3.1	4.2	5.7	8.2	
820827		2.9	3.0	3.1	3.2	4.9	7.8	
820828		2.9	3.0	3.1	3.6	4.8	6.6	
820829		2.9	3.0	3.0	4.1	4.9	5.9	
820830		2.9	3.0	3.0	4.3	4.6	5.2	
820831		2.8	2.9	3.0	3.9	4.6	6.1	
MONTHLY	VALUE	2.8	5305 4325 VIII 4713	3.1	3.2	and to distribute and a 2000	8.2	

- SEPTEMBER 1982 -

The state of	Street,	NTRAGRAV	EL	SUF	RFACE WA	TER
DATE	once dessi candras and $MIN$	MEAN	**************************************	MIN	MEAN	MAX
820901	2.8	3.0	3.2	3.8	4.8	6.2
820902	2.8	3.0	3.1		4.7	
820903	2.9	2.9	3.0		4.6	
820904	2.9	2.9	3.0		4.6	
820905	2.9	3.0	3.0	3.6		
820906	2.9	3.0	3.1	3.8		
820907	2.9	3.0	3.2	4.0	5.2	
820908	3.1	3.1	3.2	4.2	4.9	5.8
820909	3.0	3.1	3.2	4.1	4.7	5.4
820910	3.0	3.1	3.1	3.8	4.4	5.5
820911	3.0	3.0	3.1	3.6		4.7
820912	2.9	3.0	3.1	3.4	4.0	5.3
820913	2.9	3.0	3.1	3.8		
820914	3.1	3.1	3.2	3.7		
820915	3.2	3.3	3.5	4.1	4.6	5.5
820916	3.5	3.6	4.2	4.3	4.7	5.6
820917	3.7	3.9	4.2	4.2	4.6	
820918	3.5	3.7	3.9	3.9	4.3	4.8
820919	3.5	3.5	3.7	3.9	4.1	4.4
820920	3.4	3.5	3,6	3.8	4.1	4.6
820921	3.4	3.5	3.6	3.7	4.1	4.6
820922	3.4	3.5	3.7	3.7	4.2	5.1
820923	3.2	3.4	3.6	3.4	3.8	4.7
820924	3.1	3.3	3.4	3.1	3.6	4.5
820925	3.1	3.2	3.5	3.1	3.6	4.2
820926	3.2	3.3	3.4	3.4	3.7	4.1
820927	3.2	3.4	3.6	3.5	3.8	4.6
820928	3.0	3.2	3.4	3.0		4.0
820929	3.2	3.4	3.6	3.4	3.7	4.3
820930	3.2		3.6	3.4	3.7	4.3
MONTHLY VALUE	2.8	3.2	4.2	3.0	4.2	7.4

- OCTOBER 1982 -

DATE	I	NTRAGRA	VEL	SURFACE WATER			
DATE	MIN	MEAN	MAX	MIN	MEAN	MAX	
	andouterates despited has an entire and the despite before contact action about	James machiners and annual activities of the desired and the second	mentan, samuring, edit miss Artifat Light state, edit seminet is being artifat Madeine va et				
821001	2012-040-040-040-040-040-040-040-040-040-04		CONTRACTOR CONTRACTOR	3.4	3.7	4.4	
821002		0004CD46D4000	100 CD 400 400 475	3.1	3.5	4.4	
821003	THE STREET STREET	and distracting the lasts	sto time consistent	2.9	3.5	4.4	
821004	AND AND AND AND AND	440-1514-0712-4310-1010		2.6	3.1	4.0	
821005	1000 CLO (100 TABLES 100 to	Constitution of the same	Separation and de-elementary	2.5	2.8	3.5	
821006	4650-4500-1000-4500-4500-1	Encoding and each than	SERVERO EN CONTRACTO	2.4	2.8	3.6	
821007	CHIP WING CONTROL	esta esta esta esta esta	4500-0000-0000-000	2.5	2.7	3.2	
821008	4559-4500-4550-1500-4550-	gurdina-ma timbuma	distriction of the registration of the	2.0	2.7	3.6	
821009		400-0000-0000-0000-000 <b>0</b>	10 mars 10 mars 47 mars 47 mars 10 mar	2.4	2.8	3.4	
821010	est day dig cap and	can then state that the	18/000-10/100-10/100-10/100-20/00	2.4	2.7	3.1	
821011	entra entra entra entra	*(ES) \$220 ESS CENT (ESS)	822-522-4122-622-522	2.5	2.8	3.4	
821012			UNIONALES COMO CARSONALES	2.2	2.3	2.9	
821013	4000 P 400 comin 4000 4000	State ettin ettin statu	CONTRACTOR OF THE PROPERTY OF	1.7	2.5	3.2	
821014	600-68-500-600-600-600-600-600-600-600-600-600	don-authorizador ann	ARROW ARROWS STATE OF THE PARTY	2.2	2.7	4.	
821015	600 CON SUP COD COD	CONTRACTO SIN CIN	COLUMN SECTION PROPRIOR	2.6	3.0	3.5	
821016	0200 distribution (0200 miles)	412-620-622-623-623-	400000000000000000000000000000000000000	2.0	2.4	2.9	
821017		enem suest un		2.0	2.4	3.3	
821018	\$	2577-2012-1218-1219-2579	40000 4000 4000 4000 4000	2.2	2.6	3.1	
821019	and with the contract	WORKERS WAS ASSESSED.		1.6	2.0	2.4	
821020			CONTRACTOR CONTRACTOR	1.6	2.0	2 .	
821021	-200-500-500 date	entre man com com com		1.9	2.3	2.6	
821022			distribution dist	1.9	2.1	2.5	
821023	00000 ATT ATT CONTROL	distriction and the contraction of the contraction	the same and all the same	2.1	2.2	2.4	
821024	emple et un en et district et un	Stein ettim etminettimation	Control of the Control	2.2	2.3	2.6	
821025	errors account of the Article Article		47000-47000-41000-40000-40000	2.2		2.6	
621029	2.0		2.1	1.2	distributions and	1.4	
821030	2.0	2.1	2.1	1.1	1.2	1.4	
821031	2.0	2.1	2.2	1.0	1.2	1.2	
MONTHLY VALUE	2.0	\$555-4550 \$000-455\$ \$100	2.2	1.0	2.5	4.0	

- NOVEMBER 1982 -

DATE	T	NTRAGRAV	EL	SUI	RFACE WA	TER
DALE	MIN	MEAN	MAX	MIN	MEAN	MAX
821101	2.1	2 2	2,2	and the state of	1.2	1.3
821102			2.3		1.2	
821103	2.1		2.2		1.2	
821104		2.0		1.0		
821105		2.0			<.05	
821106		1.9			.8	
821107		1.8			.8	9.
821108		1.7		.7		. (
821109		1.6		. 8		° .
821110			1.7	.7		. (
821111		1.7	1.7		<.05	
821112		1.7	1.8	.7	,9	
821113		1.7	1.8	.7	,9	1.0
821114	1.8	1.8	1.8	.8	.9	. (
821115		2.0	2.1	39		1.1
821116	2.0	2.0	2.1	1.1	1.3	1.4
821117	2.0		2.1	1.3		1.6
821118	2.0		2.1	1.3		1.6
821119	2.0	2.0	2.1	1.4	1.5	1.6
821120	1.8	1.9	2.0	.9		1.6
821121	1.6	1.7	1.3	.7		1.0
821122	1.6	1.6	1.6	.7		
821123	1.6		1.7		1.0	
821124	1.7	1.7	1.8		1.0	
821125	1.7	1.8		. 8		1.(
821126	1.7	1.7	1.8	.8	.8	
821127	1.6	1.7	1.7	.7	.8	. 8
821128		1.6			. 8	a s
ONTHLY VALUE	1.6	1.8	2.3	.7	1.0	1 . (

- JANUARY 1983 -

case and a supplies only case does some		enderen enderen ende			and size ener c	SITE-RECEIP (TONE-RESERVATION		
DATE		I	NTRAGRAVI	II		SU	RFACE WA	TER
	tion elitina elitin titus elitinaesia elitinaesia elitina elitinaesia.	MIN	MEAN	MAX		MIN	MEAN	XAM
			COLUMN AND A AND AND AND AND AND AND AND AND	as Ex. company, contract, et some, and reconstructed debriefs, after 1960 although an		PM (100) 1571 - 1000 - 1000	and Challes and Mister and Mister American and American	Production Colour School Spliger by Early Colour Spliger
830114		2.1		2.2		1.2	CHARLES CON CON	1.3
830115		2.0	2.2	2.3		1.2	1.3	1.5
830116		2.1	2.2	2.3		1.4	1.5	1.6
830117		2.1	2.3	2.5		1.5	1.8	2.2
830118		2.4	2.6	2.6		2.1	2.2	2.3
830, 9		2.5	2.6	2.6		2.1	2.3	2.4
830120		2.5	2.6	2.6		2.1	2.3	2.4
83 01 21		2.6	2.6	2.7		2.2	2.3	2.4
830122		2.6	2.7	2.8		2.3	2.5	2.6
83 01 23		2.6	2.7	2.8		2.4	2.6	2.6
830124		2.6	2.7	2.8		2.4	2.5	2.6
830125		2.6	2.7	2.8		2.4	2.5	2.5
83 01 26		2.6	2.7	2.7		2.4	2.5	2.5
83 01 27		2.6	2.7	2.8		2.4	2.5	2.6
83 01 28		2.5	2.7	2.8		2.0	2.4	2.6
83 01 2 9		2.5	2.6	2.6		2.2	2.3	2.5
830130		2.5	2.6	2.6		2.2	2.3	2.4
830131		2.5	2.6	2.6		2.1	2.3	2.4
MONTHLY	VALUE	2.0	CONTRACTOR CONTRACTOR	2.8		1.2	estado estado estado estado estado	2.6

- FEBRUARY 1983 -

DATE	11	NTRAGRAV	EL	SUI	RFACE WA	TER
	m MIN	MEAN	MAX	m MIN	MEAN	MAX
830201	2.4	2.5	2.6	2.0	2.2	2.3
83 0 2 0 2	2.4	2.5	2.6			
830203				2.1		
830204			2.6		2.2	
830205			2.6		2.2	
830206	2.4	2.5	2.5		2.2	
83 0 2 0 7		2.4		1.9	2.2	
830208	2.3	2.4	2.5	2.0		
830209	2.3		2.5	2.0	-	2.3
830210	2.3		2.5	2.0		2.2
830211	2.3	2.4	2.5	2.0	-	2.3
830212	2.3		2.5	2.1		
830213	2.3	2.4	2.5		2.1	
830214	2.3	2.4			2.2	
830215	2.3	2.4	2.4		2.2	
830216	2.2		2.4	2.1		
830217	2.2	2.3	2.4		2.2	
830218				2.0		
830219			2.3	1.9		
830220			2.3	1.8		
830221		2.1		1.8		-
830222		2.1		1.8		
830223		2.0			1.9	
830224			2.0	1.8		
830225			2.0		1.9	
83 0 2 2 6			2.0		1.9	
830227		1.9		1.7		1.8
830228		1.9		1.7		1.8
MONTHLY VALUE	1.7	2.3	2.6	1.7	2.1	2.4

- MARCH 1983 -

DATE		NTRAGRAV			RFACE WA	
LELE E FI	MIN	MEAN		MIN		MAX
83 03 01	1.7	1.8	1.9	1.6	1.7	1.8
830302	1.6	1.9	2.0	1.5	1.8	1.9
83 03 03	1.6	1.9			1.7	
830304	1.7	1.9	2.1	1.6	1.7	2.0
830305	1.6	1.7	1.9	1.6		
83 03 06	1.6	1.8	2.0	1.5	1.6	1.8
83 03 07	1.6	1.8			1.7	
83 03 08	1.6				1.7	
830309	1.5	1.8	2.0		1.7	
830310	1.6	1.8	2.0	1.5	1.7	1.8
830311	1.5	1.7	1.8	1.4	1.6	1.7
830312	1.5	1.6	1.8	1.4	1.5	1.7
83 03 13	1.5	1.7	1.9	1.4	1.6	1.8
830314	1.5	1.7	1.9	1.4	1.6	1.7
830315	1.5	1.6	1.8	1.3	1.5	1.6
83 03 16	1.5	1.7	1.9	1.4	1.6	1.7
83 03 17	1.5	1.7	2.0	1.4	1.6	1.8
830318	1.5	1.7	1.9	1.4	1.6	1.7
83 03 1 9	1.4	1.7	1.9	1.3	1.5	1.7
830320	1.4	1.6	1.9	1.3	1.5	1.7
830321	1.4	1.6	1.7	1.3	1.5	1.6
830322	1.4	1.7	1.8	1.3	1.5	1.6
83 03 23	1.4	1.7	1.8	1.3	1.5	1.6
830324	1.3	1.6	1.8	1.2	1.5	1.6
830325	1.3	1.5	1.8	1.3	1.4	1.7
83 03 26	1.3	1.	1.8	1.3	1.5	1.6
83 03 27			1.7	1.3	1.5	1.6
830328		1.6			1.5	
83 03 2 9			1.8			
830330			1.8		1.5	
83 <b>0331</b>	1.3	1.6	1.8	1.2	1.6	1.9
ONTHLY VALUE	1.3	1.7	2.1	1.2	1.6	2.0

- APRIL 1983 -

DATE	II	NTRAGRAV	ÆL.	SUI	RFACE WA	TER
2.5 දි. ද්. ජ්ර 25-020-038 සහ අතර පැත අතර ගැන නො නො නො නො නො 35-020-038 සහ අතර පැත අතර ගැන නො නො නො නො නො	MIN	MEAN	MAX	MIN	MEAN	MAX
830401	1 4	1	1 0	1 9		
830402		1.7			1.6	
830403		1.7			1.8	
83 0404	1.6	1.9	4 0 3	1.6		
83 040 5	1 5	1.8	2.1	1.4		
83 0 4 0 6	1 /	1.7	1.9	1.4		
83 0407	1.5	1.6	1.8	1.3		
830408	1.6	7.0	2.1	1.4		
83 040 9	1.6	2.0 1.9 1.8 1.9	2.5		2.1	
83 041 0	1.5	1.0	2.4	1.4	1.6	2.1
83 041 1	1.6	1.0	2.1	1.4	1.7	2.0
83 041 2	1 2 1 0	1.6	1.8	1.5	1.7	2.0
83 041 3		1.0	1.8	1.1	1.3	
830414		1.3		1.0	1.1	1.2
83 041 5		1.3		.9	de desert de la company de la	1.2
83 0416			1.4	. 9	1.1	1.2
83 041 7	1 2	1 %	1.64	. 9	1.1	
83 041 8	* * *	1.3	1.5	1.1		
830419				. 9		
830420		1.2			1.1	
830421	1.3	1.4			1.3	
830422	1.6	1.9	2.1		1.6	
83 0423	1.7	1.9	2.2		1.8	
830424	1.8	2.3	3.4	1.6		
830425		3.2	4.2	1.6		
83 0 4 2 6		3.7		2.5	3.5	5.0
830427		4.0		3.0 3.4	4.1	5.6
830428		3.5		3.5		5.8
830429		3.0		3.1		5.0
83 043 0		3.5		4.2		
MONTHLY VALUE	1.1	2.0	4.6	. 9	2.1	7.9

- MAY 1983 -

DATE		INTRAGRAVEL			SURFACE WATER			
	MIN	MEAN	MAX	MIN	MEAN	MAX		
අතර රැසුවේ අතර මෙවත් ප්රධාන අවසිට ප්රධාන අවසත් සම්බන් ක්රියා සම්බන් ද්රධාන ප්රධාන අත්වන ඇති ඇති		ann agus ghis-ainn-ainn aigne ainns fiact		රුදු දේශයේ වශයේ අතුයේ දේශයේ ප්රශ්න ප්රශ්න වෙනුව දේශයේ අති	The control of the second state of the second			
83 0 5 0 1	3.6	4.0	4.2	4.7	5.9	8.5		
830502	3.5	3.7	4.2	4.0	5.1	6.6		
83 0 5 0 3	2.9	3.3	3.7	2.8	4.5	6.4		
83 0 5 0 4	2.8	3.1	3.4	2.9	4.5	6.5		
83 0 5 0 5	2.6	3.0	3.3	2.7	4.4	6.7		
83 0 5 0 6	2.5	2.9	3.2	2.5	4.0	7.0		
830507	2.3	2.7	3.0	2.2	4.0	6.7		
830508	2.5	tion of	3.1	2.6	4.4	6.7		
83 0 5 0 9	2.3	2.7	3.1	1.6	3.4	5.3		
830510	2.3	2.6	2.8	2.1	3.8	6.1		
830511	2.3	2.7	2.9	2.5	4.4	6.4		
83 0 5 1 2	2.4	2.7	2.9	2.0	3.6	5.7		
830513	2.5	2.7	2.9	2.1	3.4	5.7		
830514	2.4	2.7	2.9	2.0	3.4	5.6		
830515	2.5	2.8	3.2	2.3	3.8	5.7		
830516	3.0	3.2	3.5	3.4	4.4	6.1		
83 0 5 1 7	3.1	CONTRACTOR CONTRACTOR CONTRACTOR	3.5	2.9	was man falls (sep class	4.2		
MONTHLY VALUE	2.3		4.2	1.6		8.5		

Appendix Table A-10 Datapod intragravel and surface water temperature (C) data summary, at Slough 21 - Mouth, RM 141.8, Geocode S31NO2WO2AAB.

- SEPTEMBER 1982 -

	ම අතුසු අතුරු	ক্ষা প্ৰয়োগ কৰে এক এক		ರ್ನಾ ದುರ್ವಹಣಾ ಕರ್ನಾ ದುನಿಮಾ ವರ್ಣವನ್ನಾತ		11) CING CHAN (15) CHAN (1	a 400 400 400 000 000 000 €		
DATE			NTRAGRAV		GP 4	SURFACE WATER			
	ක අත්ත අතුල ගැන බවුම දැකු අවස කිය නිස් අත්ත වර්ග ක	MIN	MEAN	MAX	MIN	MEAN	MAX		
			enco enno cumo como elem elem enco		COLO, ANDER ARTISLASTIC CONTRACTOR STORMS.	ES feed that they be a con-			
820917		3.7	6.7	7.4	6.6	6.9	7.5		
820918		5.2	5.8	6.8	4.7	5.7	6.6		
820919		3.6	4.4	5.4	4.3	5.0	7.1		
820920		3.6	3.7	3.7	4.5	5.0	5.6		
820921		3.6	3.7	3.7	4.4	4.9	5.8		
820922		3.6	3.7	3.7	3.5	4.4	5.3		
820923		3.6	3.6	3.7	2.6	3.4	5.2		
820924		3.6	3.6	3.7	2.3	3.2	4.9		
820925		3.6	3.6	3.7	2.6	3.4	4.7		
820926		3.6	3.7	3.7	3.2	3.6	4.3		
820927		3.6	3.6	3.7	3.0	3.8	5.0		
820928		3.6	3.7	3.7	2.4	3.1	4.2		
820929		3.6	3.7	3.7	3.3	3.7	4.8		
820930		3.6	3.7	3.7	3.4	3.8	5.1		
MONTHLY	VALUE	3.6	व्याच्यान्यास्थातः वर्गत्रमेषः स्ट्राह्माः स्ट्राह्माः	7.4	2.3	empo sautu ejano estas etano	7.5		

- OCTOBER 1982 -

DATE	I	NTRAGRAV	EL	SURFACE WATER .			
DAIC	MIN	MEAN	MAX	MIN	MEAN	KAM	
001001	2 (	eg eg	A =7	2 1	2 (	<i>i.</i> n	
821001			3.7		3.6		
821002			3.7		3.6		
821003		3.7			3.4		
821004		3.7			2.8		
821005		3.7		2.1			
821006		3.7			2.7		
821007	3 .6	3.7		2.3			
821008	3.6	3.6		1.5			
821009	3.6	3.6		1.5			
821010	3.6	3.7	3.7	2.5		3	
821011	3.6	3.7	3.7	1.2	2.6		
821012	3.6	3.7		1.6			
821013	3.6	3.7	3.7	1.7			
821014	3.6	3.7		1.8			
821015	3.6	3.7		1.1	1.6		
821016	3.6	3.6	3.7	1.5		2.	
821017	3.6	3.6	3.7	1.9		3.	
821018	3.6	3.7	3.7	1.5		2.	
821019	3.6	3.7	3.7	1.3	2.3	3 .	
821020	3.6	3.7	3.7	1.3	2.0	2.	
821021	3.6	3.6	3.7	.6	1.0	1.	
821022	3.6	3.6	3.7	.6	1.0	1.	
821023	3.6	3.6	3.7	.6	<.05	1	
821024	3.6	3.6	3.7	.3	1.1	1.	
821025	3.6	and Contain desirates	3.7	.7	600-000-000-000 COB	1	
821029	3.5	ensi-dentaliza enti-enti-	3.6	ه 5		1.	
821030	3.5	3.5	3.6	.3	.5	•	
821031	3.5	3.5	3.5		.6	1.	
ONTHLY VALUE	3.5	3.6	3.7	.2	2.2	4.0	

- NOVEMBER 1982 -

DATE		II	VTRAGRAV	EL	SUE	RFACE WA	TER
DATE	\$\$\\\\\\$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	MIN  MIN  MIN  MIN  MIN  MIN  MIN  MIN	MEAN	MAX		MEAN	MAX
821101		3.5	3.5	3.5	1.0	1.7	2.4
821102		3.5	3.5	3.5	1.8	2.3	
821103		3.5	3.5	3.5	.5	1.2	2.0
821104		3.5	3.5	3.5	1.4	1.8	2.6
821105		3.5	3.5	3.5	.8	1.5	2.1
821106		3.5	3.5	3.6	.2	.5	.8
821107		3.5	3.5	3.5	.1	.3	.6
821108		3.5	3.5	3.5	.3	.7	1.3
821109		3.5	3.5	3.5	1 . 1	1.6	2.0
821110		3.5	3.5	3.5	.6	1.3	1.9
821111		3.5	3.5	3.5	. 8	1.6	2.4
821112		3.5	3.5	3.5	1.6	1.9	2.5
821113		3.5	3.5	3.5	1.3	1.9	2.2
821114		3.4	3.5	3.5	.4	1.6	2.2
821115		3.4	3.5	3.5	.3	.8	1.2
821116		3.5	3.5	3.5	.1	.3	.5
821117		3.5	3.5	3.5	1	.1	.4
821118		3.5	3.5	3.5	0.0	.1	. 2
821119		3.5	3.5	3.5	0.0	.1	.3
821120		3.5	3.5	3.5	.3	.4	.8
821121		3.5	3.5	3.5	.7	1.1	1.5
821122		3.5	3.5	3.5	1.3	1.5	1.7
821123		3.4	3.5	3.5	1.4	1.9	2.2
821124		3.4	3.5	3.5	.7	1.6	2.2
821125		3.4	3.5	3.5	.6	.9	1.3
821126		3.4	3.5	3.5	.5	.8	1.2
821127		3.4	3.4	3.5	.6	1.1	1.6
821128		3.4	3.5	3.5	. 1	.4	.7
821129		3.4	3.5	3.5	.4	. 8	1.2
821130		3.4	3.5	3.5	. 2	.7	1.1
MONTHLY	VALUE	3.4	3.5	3.6	. 1	-	3.0

- DECEMBER 1982 -

574 8 2552 404		NTRAGRAV			RFACE WA	
DATE	NIM	MEAN		MIN		MAX
821201	3.4	3.5	3.5	9	.5	.9
821202	3.4	3.4	3.5	. I	<.05	.2
821203	3.4	3.5	3.5	1	<.05	.1
821204	3.4	3.5	3.5	0.0	<.05	.2
821205	3.5	3.5	3.5	.1	.4	. 9
821206	3.4	3.5	3.5	۰,5	.8	1.1
821207	3.4	3.5	3.5	1.1	1.6	2.1
821208	3.4	3.4		.7	1.6	2.1
821209	3.4	3.4	3.5	. 2	1.2	2.1
821210	3.4	3.4	3.5	<b></b> . 2	<.05	.3
821211	3.4			.1		. 8
821212		3.4		.3		
821213	3.4	3.4	3.5	. 8	1.2	1.6
821214	3.4	3.4	3.5	.5	1.0	1.6
821215	3.4	3.4		.6	1.3	
821216	3.4	3.4		.4	.9	1.3
821217		3.4		1.0		
821218	3.4	3.4	3.4	0.0	.3	1.2
821219	3.4	3.4		.1	.3	.6
821220		3.4		.1		
821221		3.4			<.05	
821222	3.4	3.4	3.4	1		
821223	3.4	3.4	3.4	0.0		3
821224	3.4	3.4		.1		.6
821225		3.4		.4		
821226		3.4		.6		
821227	3.4	3.4		1.2	1.5	
821228			3.4	.6		
821229		3.4		1.5		
821230	3.4			.9		
821231	3.4			.7	1.1	
MONTHLY VALUE	3.4	3.4	3.5	2	. 8	2.1

- JANUARY 1983 -

To A state		NTRAGRAV			FACE WAT	
DATE	MIN	MEAN	entre entre central destruction entre entr	MIN	MEAN	MAX
830101	3.4	3.4	3.4	1.2	1.5	1.8
830102	3.4	3.4	3.4	1.5	1.7	2.0
83 01 03	3.4	3.4	3.4	1.0	1.4	1.8
830104	3.4	3.4	3.4	1	.2	1.0
830105	3.4	3.4	3.4	1	<.05	.1
83 01 06	3.4	3.4	3.4	0.0	.1	.3
830107	3.4	3.4	3.4	500 P	.1	. 2
830108	3.4	3.5	3.5	0.0	.2	. 4
83 01 09	3.4	3.5	3.5	0.0	<.05	. 1
830110	3.4	3.4	3.5	0.0	<.05	. 1
830111	3.4	3.4	3.4	0.0	<.05	. 1
830112	3.4	3.4	3.5	0.0	.1	9 d
830113	3.4	**************************************	3.4	0.0	412 THE R. P. LEWIS CO., LANSING.	\$ @ 4
830114	3.4		3.5	.4		.6
830115	3.4	3.4	3.5	.4	.6	1.1
83 01 1 6	3.4	3.4	3.5	1.1	1.3	1.0
830117	3.4	3.4	3.5	.6	1.2	1.6
830118	3.4	3.4	3.4	.6	1.4	1.
830119	3.4	3.5	3.5	1.4	1.7	1.9
830120	3.4	3.5	3.5	.6	1.0	ه ۱
830121	3.4	3.4	3.5	.6	. 8	1.
830122	3.4	3.4		3	.3	æ .
83 01 23	3.4	3.5	3.5	-1	.3	
830124	3.4	3.5	3.5	.1	.5	9
830125	3.4	3.4	3.5	.3	.6	•
83 01 26	3.4	3.5	3.5	.5	1.0	1.
830127	3.4	3.5	3.5	.5	<.05	1.
830128	3.4	3.5	3.5	.8	1.2	1.
830129	3.4	3.5	3.5		. L	
830130	3.4	3.4	3.5	.1	.7	1 -
830131	3.4		3.5		1.6	
MONTHLY VALUE	3.4	3.4	3.5	-,3	.7	2

- FEBRUARY 1983 -

					_	
20 (200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 -	TI	VTRAGRAV		SUE	FACE WAS	CER
DATE	MIN where were were core were core were core were core were	MEAN	MAX	MIN	MEAN	XAM
83 0 2 0 1	3.4	3.4	3.5	1.3	1.7	2.3
830202	3.4	3.5	3.5	1.1	1.7	2.3
830203	3.4	3.5	3.5	1.4	1.7	2.1
830204	3.4	3.5	3.5	1.3	1.6	2.0
830205	3.4	3.4	3.5	1.3	1.7	2.4
83 0 2 0 6	3.4	3.4	3.5	. 8	1.5	2.4
83 0 2 0 7	3.4	3.4	3.5	1.0	1.9	2.8
830208	3.4	3.4	3.5	1 . 1	1.5	2.4
830209	3.4	3.4	3.5	go und	.4	1.4
83 021 0	3.4	3.4	3.5	0.0	.3	. 8
830211	3.4	3.4	3.5	0.0	. 2	e
830212	3.4	3.4	3.4	0.0	. 2	. 4
830213	3.4	3.4	3.5	• ****	.2	. 4
830214	3.4	3.4	3.5	. 2	.4	
83 0 2 1 5	3.4	3.4	3.4	.1	.3	. ć
830216	3.4	3.4	3.4	.2	.4	0 -
830217	3.4	3.4	3.4	.1	.5	e <sup>1</sup>
830218	3.4	3.4	3.4	. 4	.6	<b>a</b>
830219	3.4	3.4	3.4	.7	1.0	1.
830220	3.4	3.4	3.4	.5	1.1	1.
83 02 21	3.4	3.4	3.4	.9	1.4	2 .:
830222	3.4	3.4	3.4	.6	1.2	1.
830223	3.4	3.4	3.4	.4	<.05	1.
83 0224	3.4	3.4	3.4	1.1	1.7	2.
83 0225	3.3	3.4	3.4	.4	1.0	1.
830226	3.3	3.4	3.4	.4	1.1	2.
830227	3.3	3.4	3.4	.5	1.2	2.
830228	3.3	3.4	3.4	.8	1.8	3.0
MONTHLY VALUE	3.3	3.4	3.5	0.0	proced (b)	3.

- MARCH 1983 -

DATE		II	VTRAGRAV	EL	SUE	RFACE WA	TER
UAIC	882 455 455 455 455 456 455 456 456 456	MIN	MEAN	MAX	MIN	MEAN	MAX
83 03 01		2 2	2 4	2 4	1 0	2 0	2.6
830302		3.3 3.3	3.4	3.4 3.4	1.2	2.0	2.6
830303			3.4		.1	.9	1.5
830304		3.3	3.4	3.4	0.0	.3	.8
		3.3	3.4	3.4	a	.5	1.1
83 03 05		3.3	3.4		.3	.9	1.5
83 03 06		3.3	3.4	3.4	• 1	.8	1.6
83 03 07		3.4	3.4	3.4	.3	. 8	1.8
830308		3.3	3.4		0.0	.4	1.3
83 03 09		3.3	3.4		.1	.4	1.0
830310		3.3	3.4	3.4	.1	.7	1.5
830311		3.3	3.4	3.4	. 9	1.5	2.5
83 0 3 1 2		3.3	3.3	3.4	.7	1.7	3.3
830313		3.3	3.4		.5	1.3	3.3
830314		3.3	3.4		.4	1.3	
83 03 1 5		3,3	3.4	3.4	1.5	2.4	4.3
830316		3.3	3.4	3.4	.5	1.6	3.8
83 03 17		3.3	3.3	3.4	.3	1.2	3.6
83 03 1 8		3 . 3	3.3		.1	1.0	3.4
83 03 1.9		3.3	3.3		.1	. 9	3.0
830320		3.3	3.3	3.4	.5	1.5	3.8
830321		3.3	3.3	3.4	.4	1.7	4.3
830322		3.3	3.3	3.4	0.0	1.2	4.0
830323		3.3	3.3	3.4	3	1.1	3.7
830324		3.3	3.3		.2	1.7	4.4
830325		3.3	3.3		.7	2.0	
83 03 26		3.3	3.3	3.4	.2	1.3	3.9
830327		3.3	3.3	3.4	.3	1.4	4.4
830328		3.3	3.3	3.4	. 2	1.5	4.8
830329			3.3		0.0		
830330		3.3	3.3	3.4	0.0		5.1
830331		3.3	3.3	3.3	.3	2.4	6.3
MONTHLY	VALUE	3.3	3.3	3.4	0.0	1.3	6.3

- APRIL 1983 -

	The same same same same same same same sam	ou res outras senere videna sitema				
NGCC 4170; CLC 4070; AND 4070; ALC 4070; AND 4070; ALC 4	and the state of t	NTRAGRAV		SUR	FACE WA	TER
DATE	MIN     *********************************	MEAN	MAX	MIN	MEAN	MAX
830401	3.3	3.3	3.4	.2	2.0	6.2
83 040 2	3.3	3.3	3.4	.1	1.9	6.0
83 0 4 0 3	3.3	3.3	3.4	e	1.9	6.3
830404	3.3	3.3	3.4	1.3	2.6	4.2
83 0 4 0 5	3.3	3.4	3.4	1.2	2.7	5.0
83 0 4 0 6	3.3	3.4	3.4	1.3	3.3	7.3
83 0 4 0 7	3.3	3.4	3.4	1.1	3.1	8.4
83 0 4 0 8	3.3	3.3	3.4	. 9	3.0	6.8
830409	3.3	3.3	3.4	1.5	2.8	6.3
830410	3.3	3.3	3.4	.2	1.9	5.7
830411	3.3	3.3	3.4	0.0	1.1	2.7
83 0 4 1 2	3.3	3.3	3.4	.3	1.9	4.5
830413	3.3	3.3	3.3	1.3	3.0	6.3
830414	3.3	3.3	3.3	1.6	3.4	6.
83 041 5	3.3	3.3	3.3	.7	2.8	5 . :
83 0 4 1 6	3.3	3.3	3.4	2.0	3.8	7.0
830417	3.3	3.3	3.4	.6	2.5	5 .:
830418	3.3	3.3	3.3	. 8	3.1	6 .
83 0 4 1 9	3.3	3.3	3.3	1.8	4.0	8
830420	3.3	3.3	3.4	1.5	4.1	8.
83 0 4 2 1	3.3	3.3	3.4	1.3	4.6	10.
830422	3.3	3.3	3.4	1.7	4.1	7.
830423	3.3	3.3	3.4	2.5	4.3	7
830424	3.3	3.3	3.4	2.5	5.1	10.
830425	3.3	3.3	3.4	2.0	5.0	10.
830426	3.3	3.3	3.4	1.5	4.8	10.
83 04 27	3.3	3.3	3.4	1.5	4.8	10.
830428	3.3	3.3	3.4	1.9	3.8	8.
830429	3.3	3.3	3.4	3.0	4.9	8.
83 0 43 0	3.3		3.4	1.6	4120 (2000) (2000) (2000)	4.
ONTHLY VALUE	3.3	3.3	3.4	0.0	3.3	10.

Appendix Table A-11 Datapod intragravel and surface water temperature (C) data summary, at Slough 21 - Upper, RM 142.0, Geocode S32NO2W36CCC.

- AUGUST 1982 -

DATE		INTRAGRAVEL SURFAC					
	MIN	MEAN	MAX	MIN	MEAN	MAX	
820821	3.7	3.7	3.8	4.0	5.4	7.9	
820822	3.7	3.7	3.8	3.9	5.2	7.6	
820823	3.7	3.7	3.8	4.8	5.5	6.9	
820824	3.7	4.0	4.4	4.6	5.6	7.6	
820825	3.9	4.1	4.6	4.8	5.9	8.1	
820826	3.9	4.2	4.6	4.9	6.0	8.3	
820827	3.8	4.1	4.6	3.9	5.4	8.3	
820828	3.8	4.0	4.3	4.2	5.2	7.1	
820829	3.8	4.0	4.2	4.6	5.2	6.2	
820830	3.9	4.0	4.1	4.7	5.1	5.5	
820831	3.8	4.0	4.3	4.5	5.2	6.7	
MONTHLY VALUE	3.7	enus (Into-1652) (Into Cale)	4.6	3.9	400° 400° 400° 400° 400°	8.3	

- SEPTEMBER 1982 -

end-end-end end end end end end end end end end	নাবেক-বাৰ্থানেক বিন্তান ব্যৱস্থাত অব্যাহক আন্ত্ৰাক কৰিবকৈ বিন্তান কৰিবকৈ কৰিবকৈ	aca waxaa aa ca ca 11	TRAGRAV	EL	SUR	FACE WA	TER
DATE	s, person annon con transporter de l'anno anno anno anno anno anno anno anno	MIN	MEAN	MAX	MIN	MEAN	MAX
000001		2 0		. 3	4.6	5 /	6 0
820901 820902			4.0 4.0			5.3	
820903			4.0			5.1	
820903			4.0			5.0	
820905		3.8				4.9	6.3
820905		3.8		4.0		4.9	5.8
820907		3.8		4.1	4.4		7.2
820908		3.8	3,9	4.0	4.4		5.9
820909		3.8		4.1	4.4		6.5
820910		3.8	3.9	4.0	4.2		6.2
820911		3.8	3.8	3.9		4.4	
820912		3.7	3.8	3.9		4.3	
820913		3.8	3.8	3.9	4.1		
820914		3.8	3.8			4.8	
820915				6.0		5.9	
820916				7.5		7.9	
820917			6.8		6.9		
820918			5.0		5.1		
820919			4.2		4.2		5.1
820920			4.2	4.5	4.2	4.6	5.3
820921		3.9	4.2	4.4	4.0	4.5	5.2
820922		3.8	4.1	4.5	3.7	4.4	5.4
820923		3.5	3.8	4.4	2.8	3.7	5.1
820924		3 .3	3.7	4.4	2.5	3.4	4.9
820925		3.4	3.8	4.2	2.6	3.5	4.5
820926		3.7	3.9	4.1	3.4	3.7	4.2
820927		3.7	3.9	4.3	3.2	3.8	4.7
820928		3.5	3.7	4.0	2.5	3.2	4.0
820929		3.7	3.9	4.2	3.3	3.7	4.5
820930		3.8	4.0	4.3	3.4	3.9	4.8
MONTHLY	VALUE	3,3	4.2	7.5	2.5	4.7	8.2

A-72

- OCTOBER 1982 -

6-416-418-418-418-418-418-418-418-418-418-418		VTRAGRAV			RFACE WA	
DATE		MEAN	MAX	MIN	MEAN	MAX
821001	3 . 8	3.9	4.1	3.4	3.7	4.2
821002			4.2		3.6	
821003			4.2	3.0	3.5	4.5
821004	3.5		4.1	2.4	3.0	4.3
821005	3.4		3.9		2.8	
821006	3.4			2.3	2.9	3.8
821007	3.5		3.8	2.6	2.9	3.5
821008	3.4	3.6	3.9	2.1	3.0	
821009	3.3		3.9	2.2	3.0	3.7
821010	3.5	5.6	3.9	2.8	3.1	3 . 5
821011	3.3		3.8	2.0	2.8	3 .4
821012	3.4	3.6	3.8	2.4	2.8	3.3
821013	3.5	3.6	3.7	2.4		
821014	3.5	3.6	3.9		2.9	3.6
821015	3.4	3.5	3.7	2.2		
821016	3.5	3.5	3.7	2.3		
821017	3.5	3.6	3.9	2.5		
821018	3.5	3.5	3.7	2.3		
821019	3.4	3.6	3.8	2.2		
821020	3.4	3.5	3.6	2.2		
821021	3.3	3.5	3.5	2.0		
821022	3.4	3.5	3.6	2.0		2 .
821023	3.3	3.5	3.5	2.0		2.
821024	3.3	3.5	3.6	1.8		
821025	3.3	Company Color (Color Color	3.5		400 400 400 400 CM	2.
821029	3.3		3.5		and support and drive	
821030	3.2				1.9	
821031	3.3	3.4	3.5	1.7	2.0	2
MONTHLY VALUE	3.2	3.6	4.2	1.6	2.7	4.

- NOVEMBER 1982 -

DATE	(1995) - All the Called Mark Mark Called Access Assistance of		NTRAGRAV	EL	SUE	RFACE WA	TER		
DA L C	্য ব্যাস বালে ব্যাস করে করে করে ব্যাস বালে ব্যাস	MIN	MEAN	MAX	MIN	MEAN	MAX		
821101		3.4	3.5	3.6	1.9	2.3	2.6		
821102		3.5		3.8	2.3	2.6	3.0		
821103		3.3	3.5	3.6	1.7	2.2	2.6		
821104		3.4	3.5	3.7	2.1	2.5	2.9		
821105		3.3	3.5	3.6	1.8	2.2	2.6		
821106		3.1	3.2	3.4	1.5	1.8	2.2		
821107		3.2	3.2	3.4	1.6	1.9	2.1		
821108		3.2	3.3	3.4	1.6	1.9	2.1		
821109		3.3	3.5	3.5	2.0	2.3	2.6		
821110		3.3	3.4	3.5	1.7	2.2	2.5		
821111		3.3	3.5	3.6	1.9	2.3	2.7		
821112		3.4	3.5	3.6	2.1	2.5	2.8		
821113		3.3	3.5	3.6	2.1	2.5	2.7		
821114		3.2	3.5	3.5	1.7	2.4	2.6		
821115		3.1	3.3	3 . 4	1.6	2.0	2.3		
821116		3.1	3.2	3.4	1.3	1.7	2.0		
821117		2.9	3.0	3.2	Presents Spreads	1.5	1.8		
821118	•	2.9	3.0	3.1	1.1	1.4	1.6		
821119		2.9	3.0	3.1	1.2	1.4	1.6		
821120		3.0	3.1	3.2	1.3	1.5	1.8		
821121		3.1	3.2	3.4	1.7	1.9	2.2		
821122		3.2	3.3	3.4	1.9	2.2	2.3		
821123		3.3	3.4	3.5	2.1	2.4	2.6		
821124		3.3	3.4	3.5	1.7	2.2	2.6		
821125		3.2	3.3	3.4	1.7	1.9	2.2		
821126		3.2	3.3	3.4	1.6	1.9	2.2		
821127		3.2	3.3	3.4	1.8	2.0	2.4		
821128		3.0	3.2	3.3	1.4	1.7	1.9		
821129		3.0	3.2	3.3	1.6	1.9	2.1		
821130		3.0	3.1	3.3	1.6	1.8	2.0		
MONTHLY	VALUE	2.9	3.3	3.8	1.1	2.0	3 .0		

- DECEMBER 1982 -

<b>7</b> እል ምዊን		NTRAGRAV			RFACE WA	
DATE	- space of the white of the space of the sp		MAX	MIN  MIN		MAX www.co.co.co.co.co
821201	3.0	3.2	3.3	1.4	1.8	2.0
821202	2.9	3.0	3.2		1.4	
821203	2.8	2.9	3.1		1.2	
821204		3.0		1.0		
821205		3.1			1.6	
821206	3.0	3.2	3.3	1.5	1.7	
821207	3.1		3.5	1.7	2.0	
821208		3.4			2.1	
821209		3.3			2.0	
821210	2.9			.8		
821211	3.0	3.1	3.3	1.1	1.4	
821212	3.0	3.2		1.4		
821213	3.1		3.3		1.9	
821214			3.3	1.5	1.9	
821215	3.1	3.2	3.4	1.6	2.0	2.3
821216	3.0	3.1	3.3	1.4		2.0
821217	3.1		3.4	1.7	2.0	2.2
821218		3.0	3.3		1.5	
821219	2.9	3.0	3.1		1.5	
821220	2.9	3.0	3.2	1.1		1.7
821221	2.7		3.0	. 8	1.1	1.5
821222	2.7	2.9	3.0	. 9	1.1	
821223	2.7				1.2	
821224	2.8	2.9	3.0	1.1	1.3	1.6
821225	2.9	3.0	3.1	1.3	1.5	1.6
821226	2.9	3.0	3.2	1.3	1.6	1.9
821227	3.1	3.2	3.3	1.7	1.9	2.2
821228	2.9	3.1	3.3		1.8	2.1
821229	3.2	3.3	3.3	2.0	2.1	2.3
821230				1.7	2.1	2.3
821231	3.1	3.1	3.2	1.6	1.9	2.2
MONTHLY VALUE	2.7	3.1	3.5	.8	1.6	2.4

- JANUARY 1983 -

DATE	I	NTRAGRAV	EL	SU	RFACE WA	TER
	MIN	MEAN	MAX	MIN	MEAN	MAX
						CHAIR CHAIR CHAIR CANA CONT.
830101	3.1		3.3		2.1	
83 01 02	3.2		3.4	1.9		2.3
830103	3.1		3.3	1.7		
830104		3.0		l.1	1.5	1.9
830105		2.8		. 9	1.2	1.5
830106		2.7		. 8		1.3
83 01 07	2.6		2.9	.7	1.0	1.2
830108		2.8	2.9	. 9	1.2	1.4
830109	2.6	2.7	2.9	.9	1.0	1.2
83 01 1 0		2.7		.7	<.05	1.2
830111		2.7	2.8	. 8	1.0	1.3
830112	2.7	2.8	2.8	1.0	1.2	1.3
83 01 1 3	2.7	Cipcipcus-modits	2.9	.9	COMP-COMP-STORY COSTS: COMPA	1.2
830114	2.8		3.0	1.5	4000-0010-0000-0000	1.7
83 0 1 1 5	2.7	3.0	3.1	1.4	1.6	
83 01 16	3.0	3.2	3.3		2.0	2.2
830117	3.1		3.3		2.0	2.2
830118	3.1	3.3	3.4		2.1	
830119	3.2	3.3	3.4	2.1		
83 01 20			3.3	1.7		2.3
830121		3.2	3.3	1.6		2.1
830122	2.7	3.0	3.2	.9		1.8
83 01 23	2.7	3.0	3.1	.9		
830124	2.7	3.0	3.2		1.6	
830125		3.0			1.6	
830126			3.3	1.3		2.1
830127			3.3	1.6		2.1
830128	3.1	3.2	3.3	1.8	2.0	2.3
830129	2.8	3.0	3.2	1.0	1.5	2.0
830130	2.9	3.1	3.2	1.4		2.1
830131	3.2	3.3	3.4	1.9		2.6
MONTHLY VALUE	2.5	3.0	3.4	.7	1.6	2.6

- FEBRUARY 1983 -

DATE	11	NTRAGRAV	L	SURFACE WATER		
	where the construction of the construction $MIN$	MEAN	MAX	MIN	MEAN	MAX
830201	3.2	3.3	3.5	2.1	2.4	2.6
830202	3.2			1.9		
830203	3.2			2.0		
830204	3.2	3.3		1.9		
830205	3.1	3,2	3.4	2.0	_	
830206	3.0			1.8		
83 0 2 0 7	3.1	3.3		1.7		
830208	3.1	3.2	3.4	1.8		2
830209	2.7		3.2	1.1	1.6	
830210	2.6	2.8	3.1	1.0		2.0
830211	2.6	2.7	2.9	1.1	1.4	1.0
830212	2.6	2.6	2.8	.9		1.
830213	2.6	2.7	2.8	1.0		1
830214	2.6	2.7	2.8	1.1	1.3	1.
830215	2.6	2.7	2.8	, 9	1.2	1 .
830216	2.6	2.7	2.8	1.1	1.2	1.
83 0 2 1 7	2.6	2.6	2.7	.9	1.0	1 .
830218	2.6	2.6	2.8	.8	1.0	1.
830219	2.7	2.9	3.1	1.3		1.
830220	2.7	3.0	3.2	1.4	1.9	2 .:
830221	2.9	3.1	3.4	1.7	2.1	2
830222	2.8	3.0	3.3	1.6	2.0	2.
830223	2.9	3.0	3.2	1.5		2.:
830224	2.9	3.1	3.4	1.7		2.
830225	2.8	3.0	3.3	1.5	1.9	2.
83 0 2 2 6	2.9	3.1	3.3	1.5	1.9	2.
830227	2.9		3.4	1.6		2.
830228	3.0		3.5	1.8	2.3	2.
ONTHLY VALUE	2.6	3.0	3.5	. 8	1.8	2

- MARCH 1983 -

And the second second second desired desired second	en accessariori esceri ettera competitita filmit efetib t	क्राण श्रीपत व्याप्त स्वाप्त स्वाप्त स्वाप्त स्वाप्त स्वाप्त स्वाप्त स्वाप्त	is the dia on the coem dia	e coste auto contrata della coste coste coste	NOT THE WORLD STORY OF THE PARTY OF THE PARTY OF	DESCRIPTION OF THE PROPERTY OF	
DATE			VTRAGRAV		SURFACE WATER		
engen and and an engineers of the second		MIN	MEAN	MAX	MIN		MAX
830301		3.0	3.2	3.4	1.8	2.3	2.7
830302		2.8	3.0	3.3	1.3	1.8	2.3
83 03 03		2.6	2.8	3.0	1.2	1.4	1.8
830304		2.6	2.8	3.0	1.1	1.4	1.8
83 03 05		2.7	2.9	3.1	1.2	1.6	2.0
83 03 06		2.6	2.8	3.1	1.1	1.6	2.1
83 03 07		2.7	2.9	3.2	1.3	1.7	2.2
830308		2.5	2.7	3.0	.9	1.3	1.9
830309		2.3	2.6	3.0	.7	1.1	1.8
830310		2.5	2.7	3.0	1.0	1.4	1.9
830311		2.7	2.9	3.3	1.5	1.8	2.4
830312		2.8	3.0	3.4	1.6	2.0	2.7
836313		2.7	3.0	3.4	1.4	1.9	2.8
830314		2.7	3.0	3.4	1.4	1.9	2.7
830315		2.9	3.2	3.7	1.9	2.4	3.3
830316		2.8	3.1	3.5	1.5	2.1	3.1
830317		2.7	3.0	3.5	1.4	1.9	2.9
830318		2.6	2.9	3.5	1.3	1.9	2.9
830319		2.6	2.9	3.4	1.2	1.7	2.7
830320		2.8	3.0	3.5	1.4	2.0	3.0
830321		2.7	3.0	3.6	1.5	2.1	3.1
830322		2.6	2.9	3.6	1.4	1.9	3.1
830323		2.7	2.9	3.5	1.3	1.8	2.9
830324		2.7	3.0	3.6	1.3	2.1	3.1
830325		2.8	3.1	3.7	1.5	2.2	3 .3
830326		2.7	3.0	3.6	1.4	2.0	3.0
83 03 27		2.7	2.9	3.7	1.4	2.0	3.1
830228		2.6		3.7		2.0	
830329		2.6	3.0	3.8		1.9	
83 03 3 0			3.0			2.0	
83 03 3 1		2.7	3.1	3.9	1.5	2.3	3.7
ONTHLY VA	LUE	2.3	2.9	3.9	.7	1.9	3.7

- APRIL 1983 -

regione agreement film at time datum earch er vide from a datum earch er vide film in film at the state film a	The state of the s	INTRAGRAVEL			FACE WA	TER
DATE	MIN	MEAN	MAX	MIN	MEAN	MAX
830401	2.6	3.1	3.9	1.5	2.3	3.7
83 040 2	2.7	3.1	3.9	1.5	2.2	3.7
830403	2.7	3.1	4.0	16	2.2	3.7
830404	3.0	3.2	3.6	2.1	2.7	3 . 2
83 0405	2.8	3.2	3.8	1.9	2.7	3.6
83 0406	2.9		4.6	2.1	3.0	5.1
83 0 4 0 7	2.9	3.5	4.8	2.0	3.0	5.4
830408	2.8	3.4	4.3	2.0	3.0	4.5
83 040 9	3.1	3.4	4.2	2.2	2.8	4.4
83 041 0	2.7	3.2	3.9	1.7	2.4	3,7
830411	2.7	3.0	3.5	1.5	2.1	2.7
83 041 2	2.8	3.1	3.6	1.8	2.3	3.6
83 041 3	2.9	3.2	4.0	1.9	2.6	3 .9
83 0 4 1 4	3.0	3.4	4.4	2.3	3.0	
83 0 4 1 5	2.9	3.3	3.8	2.2	2.8	3.6
830416	3.0	3.5	4.3	2.4	3.1	
830417	2.7	3.2	3.9	1.8	2.7	
830418	2.9	3.3	4.0	2.2	2.8	4.1
83 041 9	3.1	3.6	4.7	2.5	3.3	5 .
830420	3.2	3.8	4.6	2.4	3.5	5
830421	3.4	4.0	5.2	2.6	3.8	6.
830422	3.5	3.9	4.7	2.9	3.8	5.
830423	3.5	3.9	4.6	3.1	3.8	4.
83 0424	3.4	4.1	5.7	2.9	4.3	7.
83 0425	3.3	4.2	5.6	2.7	4.3	6.
83 0426	3.3	4.1	5.5	2.7		
83 0 4 2 7	3.2	4.2	5.6	2.7		
830428	3.5	3.9		3.0		
830429		4.2		3.7		
83 0 4 3 0	3.3	4.2	5.7	2.8	4.1	7.
MONTHLY VALUE	2.6	3,6	5.7	1.5	3.2	7.

- MAY 1983 -

		29 410 655 420 Wh 420 610 415				
DATE	II sama rangangs	NTRAGRAV	EL	SUE	(FACE WA	TER
MEL I. LI	MIN	MEAN	MAX	MIN	MEAN	MAX
83 0 5 0 1	3.2	4.3	5.7	2.8	4.5	7.3
830502	4.0	4.3	5.1	4.1	4.7	5.9
830503	.4	3.2	5.0	.1	3.0	5.7
830504	.5	1.3	3.3	0.0	. 8	3.0
83 0 5 0 5	2.7	3.8		2.4		6.1
83 0 5 0 6	3.4	4.2		3.0	4.1	
83 0 5 0 7	3.5	4.7	7.0	3.0	4.7	
83 0 5 0 8	3.6	4.8	7.3	3.4	4.9	8.3
83 0 5 0 9	4.0	5.0	7.5	3.9	5.2	8.2
83 0 5 1 0	4.1	5.0	7.1	4.1	5.2	7 . 9
83 0 5 1 1	3.9	5.1	7.4	3.8	5.3	
83 0 5 1 2	4.3	5.2	6.4	4.3		6.9
83 0 5 1 3	4.2	5.4	8.0	4.2	5.7	9.3
830514	4.3	5.3	7.2	4.3		7 . 9
83 0 5 1 5	4.1	5.1	6.6	4.1		7 .:
830516	3.2	4.9	7.0	2.9		
830517	4.1	4.8	5.8	4.2	5.0	
830518	3.8	4.9	6.3	3.8	5.1	6.
830519	3.9	4.9	6.3	3.9	5.2	7.1
830520	3.8	5.1	6.8	3.8	5.3	7.0
830521	3.9	4.9	6.5	3.9	5.1	7 .
830522	4.1	5.1	7.2	4.2	5.3	
83.0523	4.1	5.1	6.9	4.1	5.3	7 .
830524	3.9	5.3	7.2	3.9	5.5	7.
830525	3.5	5.0	7.0	3.3		
830526	4.2	5.0	6.6	4.3		7 .
830527	3.8	4.9	6.6	3.7	5.0	7.
83 0 5 2 8	3.0				5.4	
830529		5.3		3.8		
830530			7.8			
830531	7.2	7.5	7.8	7.6	7.9	8.
MONTHLY VALUE	.4	4.8	8.0	0.0	5.0	9.

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#### - OCTOBER 1982 -

CONTRACTOR	য়ালে পতে। বেল্লোমার্কে ব্যক্ত প্রয়োগবারে উচ্চতারার ব্যক্ত ব্যক্ত ব্যক্ত ব্যক্ত ব্যক্ত ব্যক্ত ব্যক্ত ব্যক্ত	ويتناه والمنه	terre turn flak finn erm som som som som finn flat finn som som er flat er flat er flat finn som som som flat f	والمنافقة والمنا
TIME	DAYS 1 - 8	DAYS 9 - 16	DAYS 17 - 24	DAYS 25 - 31
PERIOD	MIN MEAN MAX	MIN MEAN M	AX MIN MEAN MAX	MIN MEAN MAX
CONTRACTOR		ංධාන අතර ආත්ර වර්ත ආයා කරන ලබා කිරීම කරන අතුල ආර්ථ සහ ඇති කරන	elle alle cur ditte Cur evin elle elle elle elle elle elle elle el	والمرافقة
0001 - 0600	emente em		(1999)	
0601 - 1200		septemanan emelephan eme	with the this time of the time	යි මහිත අනුගත වෙනවා සහ සහ අනුත අනුත අනුත අනුත අනුත අනුතු සහ සහ සහ අනුතු අනුතු අනුතු අනුතු අනුතු අනුතු අනුතු අනුතු
1201 - 1800		s emergentation emenorated expense	2000-000 4000-0000 4000-0000 4000-0000 4000-0000 4000-0000 4000-0000 4000-0000	The state of the s
1801 - 2400	entropies entrope entropies entropies entropies	a comparate to the first contain and the		<ul><li>(1) 金田 (日本) (日本) (日本) (日本) (日本) (日本) (日本) (日本)</li></ul>
DAILY VALUE	(4.7) - (1/10-41)20-42)20 - (4.2) - (4	D RESPONDENCES CONTRACTORES CONTRACTOR	elineano una entre ante entre	ල කොදෙයන්න සහ පෙර සොර කොමෙන ගත ඇත මෙන ගත
మర్ము మెం ముంద ఈ				
0001 - 0600	Citie desputate talah asas salah asah Asah asah salah		estados especialmentos estados	ම කාලයන්නෙක් සහ සහ කොසොන්නෙ යා යා වෙන වන වන
0601 - 1200	ensumental de maria en esta esta esta esta esta esta esta esta	services and an analysis are in	ಕರ್ಮನಾಗಿ ಕರ್ನಾಪಾಗಿಸುವ ಮಾಡಿ ಮಾಡಿದ್ದಾರೆ. ಹಾಗೆ ಅವರಿಗೆ ಮಾಡಿದ್ದಾರೆ.	್ರಾಂ ಕಾರ್ಯವಾಗು ಕ್ರಮ ಕ್ರಾಂ ಕ್ರಾ ಕ್ರಾಂ ಕ್ರಾ ಕ್ರಾ ಕ್ರಾ ಕ್ರಾ ಕ್ರಾ ಕ್ರಾ ಕ್ರಾ ಕ್ರಾ
1201 - 1800	emeno diverso em emeno em	3		ক ব্যক্তব্যার ব্যাস
1801 - 2400	en de cours de espesion de la compesso e		CONTRACTOR OF CO	The analysis and the second control of the s
DAILY VALUE		o encourante en encourant o encou	+ (2005) 425日 - (3125-4225-4225) - (3125-4225-4225-4225-4225-4225-4225-4225-4	po entreten epito entreten epito princepa dem com entre entre
0001 - 0600	tillegipenheld and tillegipenheld colored its a	entranservan entranserva	නොයන නොක්තුවන්න කත කත්තම දැන	AND
0601 - 1200	ence during one and any any and any and	s enderskapped and allower and all		The state of the s
1201 - 1800	and the second s	e and any any are a section of the any	THE CONTRACTOR OF THE CONTRACT	
1801 - 2400		9 emerge emenge emegen gen em en		### ##################################
DAILY VALUE	and the first and an area are an area are and are	A CONTRACTOR COMPANY COMPANY COMPANY		THE PROPERTY OF THE PROPERTY O
0001 - 0600	south and the the south of the south		- AND SALES - AND	25 (400-4000-000 )
0601 - 1200		9 000452429 40045048949 400400	3 (UDD-CDD)	
1201 - 1800		p «« "Mutandan and-and-andan and-and	e desse conse consecutar conse and a consecutar consecu	2007 AND COLOR AND
1801 - 2400	emelinenta emplantarion emperatorion			
DAIL' VALUE	Sim Garage and County and the Alexanda		(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	and a supplicating at 4000 to 4000 along 4000. And to 4000 along 4
0001 - 0600			phartis memberatum gradustin and assertance	end and the control of the control o
0601 - 1200	application on devaluate of the septiment of the septimen		e esso entre entre estat e	THE CONTROL OF THE PARTY OF THE
1201 - 1800	evaluation en	ත සේ කිරෙනත්ත කිරීමේ සමා කරන	a diseases and a company of the composition of the company of the	125 mad all pains which are all the different
1801 - 2400		de anothernous assertes to any assert	and the contract of the contra	and and all the companies and an analysis and an and an and and an and an and an
DAILY VALUE			සු අතර පතර පතර පතර සහ අතර	
0J01 - 0600	ಕ್ಷಣ್ಣ	D CONTRACTOR OF THE CONTRACTOR OF CONTRACTOR	20 EUR 4553 CHRISTING AUTO 4553 KHT 4550 CHRISTING 4550 4550 4550 4550 4550 4550 4550 455	යන කොරගයක් අතුර අතුරු කුණු ඇත. කුණු ඇත ඇත. -
0601 - 1200	was eminated that with dispersal films and dispersal in the control of the contro	ny ampandra any ankadiana any any any	20-4509-1209	1.5 1.5
1201 - 1800			and the state of t	- 1.5 1.5 1.5
1801 - 2400	THE CONTROL CO	to designate the state of the s	and the second s	- 1.5 1.6 1.7
DAILY VALUE	and extring and sub-sub-sub-sub-sub-sub-sub-sub-sub-sub-	EN CONTRACTORISMA CONTRACTOR CONTRACTORISMA CONTRAC	promodule statestures state. Sure statestate state states state	as 1,5 casas 1.7
0001 - 0600	emerical designation designation and a second contraction of the contr			1.5 1.5 1.6
0601 - 1200	and constraints and the experience and constraints	m and an and the second and an and the second and an analysis	Generalis desperations and amountained and annual continues	- 1.6 1.6 1.6
1201 - 1800	contributives and appearing the contribution	and the control of th	reperted and appearance of the control of the contr	1.5 1.5 1.6
1801 - 2400		\$1	Desirem and desirements and desirements and the contractive	- 1.5 1.5 1.6
DAILY VALUE			කුණක් කාර්ත්ත කාර්ත්ත කාර්ත්ත කරන කාර්ත්ත කරන	1 . 1 . 1
on annual of Okti				
0001 - 0600		The proposition of the state of		
0601 - 1200	etronistativem etronistative emberor, e	EN CHESPASSIA COMPANIES CO	क्ष स्थान	- MONTHLY VALUE
1201 - 1800	omenican carameteris and a	th measure the transfer of the second	ne despetata and despetation a	
1801 - 2400		nd the control of the	20 and 1870	. 1,5
DAILY VALUE			en e	
was a said of Y Cala U En	100 Mary 100	- The state of the	Agent differences over a significant control over a giftigligation.	

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		MOVERDER WAS IN THE WAS THE WA		DI කුතු ගැන්නේ : නැත
TIME PERIOD	DAYS 1 - 8 MIN MEAN MAX	DAYS 9 = 16 MIN MEAN MAX	DAYS 17 - 24 MIN MEAN MAX	DAYS 25 - 31 MIN MEAN MAX
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	1.6 1.7 1.7	1.6 1.6 1.7 1.7 1.8 1.9	1.8 1.9 1.9	1.9 2.0 2.0 1.8 1.8 1.9
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	2.3 2.4 2.5 2.6 2.6 2.7 2.2 2.4 2.5 2.2 2.4 2.5 2.2 2.4 2.7	2.0 2.1 2.1		1.7 1.8 1.9
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	1.9 2.0 2.0 1.8 1.9 1.9 2.0 2.1 2.2 2.0 2.1 2.2 1.8 2.0 2.2	1.6 1.7 1.8 1.6 1.7 1.7 1.8 2.0 2.1 2.0 2.0 2.0 1.6 1.8 2.1	1.8 1.8 1.8 1.8 1.9 2.0 2.0 2.0 2.0 2.0 2.0 2.1 1.8 1.9 2.1	1.8 1.9 1.9 1.8 1.8 1.9 1.8 1.9 1.9 1.8 1.8 1.9 1.8 1.8 1.9
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	2.2 2.2 2.2 2.2 2.3 2.4 2.3 2.4 2.4 2.1 2.1 2.2 2.1 2.2 2.4	2.0 2.0 2.0 2.0 2.0 2.0 2.2 2.2 2.2 2.1 2.1 2.2 2.0 2.1 2.2		
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	1.9 2.0 2.1 2.1 2.1 2.2 2.3 2.4 2.4 2.0 2.1 2.3 1.9 2.1 2.4	2.0 2.1 2.1 2.0 2.0 2.1 2.2 2.2 2.2 2.0 2.1 2.2 2.0 2.1 2.2	1.7 1.7 1.8 1.9 2.0 2.0	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	1.9 1.9 1.9 1.8 1.9 1.9 1.9 1.5 1.9 1.9 1.9 1.9 1.8 1.9 1.9	2.2 2.2 2.2 2.2 2.3 2.4 2.4 2.4 2.5 2.0 2.1 2.2 2.0 2.2 2.5	1.9 2.0 2.1 2.1 2.1 2.2 2.1 2.1 2.2 2.1 2.1 2.2 1.9 2.1 2.2	
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	1.9 1.9 1.9 1.9 1.9 1.9 1.8 1.8 1.9 1.8 1.8 1.8	2.0 2.0 2.0 2.0 2.1 2.2 2.1 2.1 2.2 2.1 2.1 2.1 2.0 2.1 2.2	2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2	1000 (10
0001 - 0600 0601 - 1200	1.7 1.8 1.8 1.6 1.7 1.8	1.9 2.0 2.1 1.9 1.9 2.0	2.2 2.2 2.2 2.2 2.2 2.2 2.2	MONTHLY VALUE
1201 - 1800 1801 - 2400 DAILY VALUE	1.5 1.6 1.6 1.6 1.7 1.7 1.5 1.7 1.8	1.9 2.0 2.0 2.0 2.0 2.1 1.9 2.0 2.1	2.1 2.1 2.1 2.1 2.1 2.2 2.1 2.2 2.2	1.5 1.9 2.7

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TIME PERIOD	DAYS 1 - 8 MIN MEAN MAX	DAYS 9 - 16 MIN MEAN MAX	DAYS 17 - 24 MIN MEAN MAX	DAYS 25 - 31 MIN MEAN MAX
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	2.1 2.1 2.1 2.1 2.2 2.2 2.1 2.2 2.2	1.9 2.0 2.1 2.2 2.2 2.3 2.2 2.3 2.3	2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	2.1 2.1 2.1 2.0 2.1 2.1 2.0 2.0 2.1 2.0 2.1 2.2 2.0 2.1 2.2	1.8 1.8 1.9 1.8 1.9 2.0 1.8 1.9 1.9 1.9 1.9 1.9 1.8 1.9 2.0	2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	1.5 1.8 2.0 1.9 2.0 2.1 1.9 2.0 2.0 2.0 2.0 2.0 1.5 1.9 2.1	1.9 2.0 2.0 2.0 2.0 2.0 2.0 2.1 2.2 2.0 2.0 2.1 1.9 2.0 2.2	2.0 2.0 2.1 2.0 2.0 2.0 2.0 2.1 2.1 2.0 2.0 2.0 2.0 2.0 2.1	2.4 2.4 2.5 2.5 2.6 2.6 2.2 2.4 2.6 2.1 2.1 2.2 2.1 2.4 2.6
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	1.9 2.0 2.0 2.0 2.0 2.1 1.9 2.0 2.1 1.9 2.0 2.0 1.9 2.0 2.1	2.0 2.1 2.1 2.2 2.2 2.2 2.1 2.2 2.2 2.2 2.2 2.2 2.0 2.2 2.2	2.0 2.1 2.1 2.0 2.1 2.1 2.0 2.0 2.1 1.6 1.7 1.9 1.6 2.0 2.1	2.1 2.2 2.2 2.1 2.2 2.2 2.0 2.1 2.1 2.1 2.1 2.1 2.0 2.1 2.2
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	2.0 2.0 2.1 .0 2.1 2.1 2.0 2.1 2.1 2.1 2.1 2.1 2.0 2.1 2.1	2.1 2.1 2.1 2.0 2.0 2.1 1.9 2.0 2.1 1.8 1.9 2.0 1.8 2.0 2.1	1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7	2.0 2.1 2.2 2.0 2.0 2.0 2.0 2.0 2.0
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	2.1 2.1 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2	1.9 2.0 2.0 1.8 1.9 2.0 1.9 1.9 2.0 1.9 1.9 2.0 1.8 1.9 2.0	1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7	2.0 2.0 2.0
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2	1.9 2.0 2.1 2.0 2.0 2.0 2.0 2.1 2.2 2.0 2.1 2.1 1.9 2.0 2.2		1.7 1.7 1.7
0001 - 0600 0601 - 1200	2.2 2.2 2.2 2.2 2.2 2.2	1.8 1.8 1.9 1.8 1.9 1.9	1.7 1.7 1.7 1.7 1.7 1.7	MONTHLY VALUE
1201 - 1800 1801 - 2400 DAILY VALUE	2.1 2.2 2.2 2.2 2.2 2.2 2.1 2.2 2.2	1.9 1.9 1.9 1.9 2.0 2.1 1.8 1.9 2.1		1.5 2.0 2.6

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TIME PERIOD	DAYS 1 - 8 MIN MEAN MAX	DAYS 9 - 16 MIN MEAN MAX	DAYS 17 - 24 MIN MEAN MAX	
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	### CETT CETT CETT CETT CETT CETT CETT C	
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	2.0 2.0 2.0 2.2 2.3 2.3 2.0 2.1 2.2 1.9 2.0 2.1 1.9 2.1 2.3	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5		තොරු කිර දැක දැක. කරන දැක
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	1.8 1.9 2.0 1.8 1.9 2.0 1.9 2.0 2.0 1.5 1.7 1.9 1.5 1.9 2.0	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	CODE	(120 日本の
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	කොදෙන ගැන කොට දැන කොට	සත වර්ත්ය සහ පරිත දැන සහ පරිත සහ සහ පරිත සහ පරිත සහ සහ පරිත සහ පරිත සහ පරිත සහ සහ පරිත සහ පරිත සහ සහ පරිත සහ පරිත සහ සහ පරිත සහ සහ සහ පරිත සහ සහ පරිත සහ සහ සහ සහ සහ සහ පරිත සහ
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	CODE	6.13 400 400 400 400 400 400 400 400 400 40
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1.5 1.5 1.5 1.5 1.5 1.5 	COLD	CENTRO CONTROL   CONTROL CON
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	######################################	### ##################################	අතරුල්ල ලුලුල මට අතර ලැබු දැන දැන ඇත.
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5		ප්‍රත්‍රය ක්ෂාව සහ ප්‍රත්‍රය සහ ප්‍රත්‍ය සහ සහ ප්‍රත්‍ය සහ ප්	MON'THLY VALUE and the state of the state o

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ensemp dan dan eno dan dan ensemblem ensemb	රුතු අතර අතර අතර අතර දින්න එක්ක වනුදු ඇත. එකර ඇත. එකර වන වන වන			स्थान-काक क्षेत्राच महिन्द्र-बार्यन स्थापन स्थापन नामक स्थापन कामक स्थापन स्थापन स्थापन स्थापन स्थापन स्थापन स्थापन
TIME	DAYS 1 - 8	DAYS 9 - 16	DAYS 17 - 24	DAYS 25 - 31
PERIOD	MIN MEAN MAX	MIN MEAN MAX	MIN MEAN MAX	MIN MEAN MAX
		රාගල අතුරු අතුරු අතුරු අතුරු අතුරු අතුරු දැනුම විසින විසින අතුරු ඇත. ඇත. අතුරු අතුරු අතුරු ඇත. එක	archino cuito (com esco, esco, esco, esco esco (com com esco (com sua cam soto cum sul	
0001 - 0600	encides describe expensively encountries	ब्याप्तराहार क्रांक क्या व्याप्त क्रांक क्रांक क्रांक क्रांक व्याप्त व्याप्त व्याप्त	announced assume the construction and the construct	1.6 1.6 1.7
0601 - 1200	emerinativano dido emerina emp emerina emp	CONTRACTOR	encontraction time and time time time and time time time time time time time time	1.4 1.6 1.8
1201 - 1800			Companies anni Companies Companies Companies Companies Companies Companies Companies Companies Companies Compa	2.1 2.3 2.5
1801 - 2400			ADMINISTRAÇÃO DE TOTO DE ARREST DE TOTO ARREST DE T	1.7 1.9 2.1
	ethtudiomidikanidika. asta tiiskuamerina enre-enina etmi-enna	SARDE PRINTED APPLICATION AND ACTION APPLICATION ACTION AC		1.4 1.9 2.5
DAILY VALUE	THE CONTRACTOR STATE STA	CONTRACTOR OF STATE STATE OF STATE S	Control of the contro	1.4 1.7 2.7
0001 - 0600	Actual and and actual	entropico-sermente entro entro entro entro entro entro	ක්රය අතුර අතුර අතුර අතුර අතුර අතුර අතුර අතුර	1.3 1.4 1.5
0601 - 1200	දැවැතුව දැවැත්ව දැවත සිටුවතුම මහය සැවැතුව සිටුව ද		Till-seide seems seems seems seem seem seem seem	1.4 1.6 1.9
			1.9 2.0 2.0	2.1 2.3 2.5
1201 - 1800	emotion and emotion and out the man	ಕರ್ಮಾದವಾ ಧರ್ಣದಾದಿ ಧರ್ನಾ ದರ್ವಾಧರಾ ಭರ್ಗು ಪರ್ವಾಧರಾ ಭರ್ಗು ಮಾಡಿ		
1801 - 2400	elego despositivação despondes elego despondes de se elego de como de		1.5 1.6 1.8	1.6 1.8 2.0
DAILY VALUE	ente delle same come entre	economica entra	1.5 2.0	1.3 1.8 2.5
0001 0600		000-000-000-000-000-000-000-000-000-00	1.2 1.2 1.2	1.4 1.5 1.6
0001 - 0600	come company come de c	ACCURATION OF STATE O		
0601 - 1200	CONTRACTOR OF CONTRACTOR CONTRACT	<ul><li>金数は一般などのできます。</li><li>金数などのできます。</li><li>金数を表現を表現を表現を表現を表現を表現を表現を表現を表現を表現を表現を表現を表現を</li></ul>	1.2 1.3 1.5	
1201 - 1800		विकार स्थापन विकार करें हैं कि स्थापन करें के स्थापन कर के स्थापन कर के स्थापन कर कर के स्थापन कर कर के स्थापन कर कर के स्थापन कर	1.6 1.8 1.9	2.1 2.4 2.6
1801 - 2400	enterocutaro espesaciones espesaciones		1.2 1.4 1.7	1.6 1.8 2.0
DAILY VALUE	CUS GEORGEO COMPANIO	අතුව ක්රමාණ කරනු සහ කරනු අත්ත කරනු අතර අතර අතර අතර	1.2 1.4 1.9	1.1 1.8 2.6
				1 2 1 2 1 /
0001 - 0600	ಕಾಣ ಮುಗ್ಗಳನ್ನು ಭಾಗ್ರವಿಕ್ ಪ್ರಮುಖ ಮುಗ್ಗಳನ್ನು ಪ್ರವೀತಿ ಪ್ರವೀತ ಪ್ರವೀತಿ ಪ್ರವೀತ ಪ್ರತೀತ ಪ್ರವೀತ ಪ್ರತಿ ಪ್ರವೀತ ಪ್ರವೀತ ಪ್ರವೀತ ಪ್ರವೀತ ಪ್ರವೀತ ಪ್ರವೀತ ಪ್ರವೀತ ಪ್ರವೀತ ಪ್ರವೀತ	කාන අතර	1.2 1.2 1.2	1.3 1.3 1.4
0601 - 1200			1.4 1.5 1.6	1.4 1.6 2.0
1201 - 1800	distribution disempenature experiencement		1.9 1.9 1.9	2.4 2.5 2.6
1801 - 2400	HER-THROUGH CEN CENTRACTORS WERE STORED	स्मान कारण कारण स्थाप कारण स्थाप	1.5 1.6 1.8	1.7 1.9 2.1
DAILY VALUE	ಕಾರಿ ಮಾನವಾಧವಾ ಕುರ್ಚವಾಧಿಕಾಗುತ್ತಿ ಅಮರವಾಧನ್ನು ಮಾ	######################################	1.2 1.6 1.9	1.3 1.8 2.6
గుర్వి మీ, మరిం చేలునే చేసు. 19 ఈ చించినమే <sup>1</sup> ల్ నగారే				
0001 - 0600	CHARACTER CONTRACTOR CONTRACTOR CONTRACTOR	AND COLOR OF THE C	1.3 1.4 1.4	1.1 1.2 1.4
0601 - 1200	ALTERNATIVE ALTERNATIVE ATTENDED TO THE STATE ATTENDED ATTENDED	CONTRACTOR	1.2 1.5 1.8	1.4 1.7 2.0
1201 - 1800			2.0 2.0 2.1	2.6 2.7 2.9
1801 - 2400		and deputed on the state of the	1.5 1.7 1.9	1.5 1.9 2.3
				1.1 1.9 2.9
DAILY VALUE	and desirations and sob-sinciple acciding 200 400	ಕರಣ ಯಾಗ್ರೀಯ ಕರ್ಮ ಮಾಂತನಗಾ ನನಗ ಸಂಗತ್ತಿ ತರ್ಯಾಯಾ ಕರ್ಮ	1.2 1.7 2.1	Ast to 7 de 7
0001 - 0600		STREETS AND COLORS OF THE STREETS OF THE STREET OF THE STR	1.2 1.2 1.2	1.0 1.1 1.2
0601 - 1200		CENTRAL COMPANY COMPAN	1.2 1.4 1.5	1.4 1.6 1.9
1201 - 1800		AND OUR PARTY AND	1.9 2.0 2.1	2.5 2.5 2.5
1801 - 2400	to desirate condes addess condes as	#ENTER SECURITY CONTROL SECURITY SECURI	1.6 1.7 1.9	1.5 1.9 2.1
DAILY VALUE	वार्यक्र स व्यक्त	the special control of	1.2 1.6 2.1	1.0 1.8 2.5
0001 - 0600	දහා අතුත අතුත කොට පැවැත්කෙන් මත අතුත ඇත. ඇත. ඇත. ඇත. අතුත ක	######################################	1.2 1.2 1.2	1.2 1.2 1.3
0601 - 1200			1.2 1.5 1.7	
1201 - 1800		CERTIFICATION COMP. CERTIFICATION CERTIFICAT	2.0 2.1 2.1	
1801 - 2400	Curama and and an analysis and an analysis	CONTRACTOR	1.5 1.7 1.9	1.6 2.0 2.4
DAILY VALUE	name antimization can to properties state-type date and	व्यक्षणकरविष्याक व्यक्त विकासक स्थाप व्यक्त व्यक्त व्यक्त व्यक्त व्यक्त	1.2 1.6 2.1	1.2 2.2 3.2
			1 0 1 0 1 0	
0001 - 0600	entransfortun entrentranska entrentranska		1.2 1.2 1.2	deriver mind and anti-spin cold and exploses and east and the seas
0601 - 1200	emplementation and sub-cut-cuts con-cut-sub-cut-	designation with the design of the district of		MONTHLY VALUE
1201 - 1800			2.0 2.2 2.4	CON COURT TOTAL CONTROL CONTRO
1801 - 2400	endergen endergen erreinere erreinere en		1.7 1.8 2.0	1.0 3.2
DAILY VALUE	THE CHARGE SERVICE SERVICES SE	and an	1.2 1.7 2.4	
DELLLI VELLUE		and divine any James	is 8 day - is 4 day - 19	

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		CLLLIAN CONTROL CONTRO		linguis are for the first first and first are for first first first first first first
TIME	DAYS 1 - 8	DAYS 9 - 16	DAYS 17 - 24	DAYS 25 - 31
PERIOD		MIN MEAN MAX	MIN MEAN MAX	MIN MEAN MAX
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	1.3 1.5 1.7 1.5 1.9 2.6 3.0 3.2 3.4 2.1 2.5 2.9 1.3 2.3 3.4	2.3 2.5 2.7	2.1 2.5 2.8 2.9 3.5 4.1	3.1 3.4 3.8 3.6 4.7 5.7 8.6 8.9 9.1
0001 - 0600	1.2 1.6 1.9	1.3 1.6 2.0	1.9 2.0 2.1	2.3 2.8 3.4
0601 - 1200	1.4 1.9 2.5	2.1 2.5 3.0	2.5 3.3 4.3	3.0 4.4 5.9
1201 - 1800	2.9 3.1 3.2	3.6 3.8 3.9	5.1 5.3 5.5	7.8 8.8 9.5
1801 - 2400	2.2 2.5 2.9	2.0 2.7 3.3	3.8 4.2 4.5	5.0 6.1 7.5
DAILY VALUE	1.2 2.3 3.2	1.3 2.6 3.9	1.9 3.7 5.5	2.3 5.5 9.5
0001 - 0600	1.3 1.5 1.9	1.6 1.7 1.7	3.1 3.3 3.5	2.6 3.0 3.6
0601 - 1200	1.4 2.0 2.7	1.9 2.5 3.1	3.3 4.0 4.8	3.2 4.6 6.5
1201 - 1800	3.0 3.2 3.4	2.9 3.1 3.2	5.5 5.7 5.9	9.0 9.3 9.8
1801 - 2400	2.1 2.4 2.7	1.9 2.1 2.2	4.0 4.6 5.2	5.1 6.3 7.8
DAILY VALUE	1.3 2.3 3.4	1.6 2.3 3.2	3.1 4.4 5.9	2.6 5.8 9.8
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	2.1 2.1 2.1 2.2 2.5 2.8 2.4 2.8 3.0 2.2 2.2 2.3 2.1 2.4 3.0	2.0 2.0 2.0 2.3 2.6 3.2 3.0 3.1 3.3 2.3 2.7 3.0 2.0 2.6 3.3	2.2 2.6 3.3 2.7 3.7 4.9 6.1 6.3 6.5 4.7 5.2 5.7 2.2 4.5 6.5	2.9 3.2 3.6 3.6 4.7 6.0 6.8 7.1 7.3
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	2.1 2.2 2.2 2.2 2.5 3.0 3.0 3.1 3.3 2.5 2.7 2.8 2.1 2.6 3.3	2.2 2.2 2.3 2.4 3.1 4.0 4.0 4.3 4.5 3.4 3.5 3.6 2.2 3.3 4.5		
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	2.0 2.1 2.3 2.2 2.7 3.2 3.5 3.8 4.0 3.0 3.2 3.5 2.0 3.0 4.0	2.4 2.7 3.0 2.9 3.3 3.7 4.0 4.1 4.3 2.9 3.3 3.6 2.4 3.3 4.3		# # # # # # # # # # # # # # # # # # #
0001 - 0600	2.4 2.5 2.6	2.3 2.5 2.6	3.8 4.1 4.5	600 9800 600 400 400 400 400 400 400 400 400 4
0601 - 1200	2.5 3.0 3.5	2.9 3.6 4.2	3.9 4.6 5.3	
1201 - 1800	3.6 3.8 4.0	3.7 4.0 4.2	6.0 6.1 6.3	
1801 - 2400	2.9 3.2 3.5	3.0 3.3 3.5	4.9 5.3 5.8	
DAILY VALUE	2.4 3.1 4.0	2.3 3.3 4.2	3.8 5.1 6.3	
0001 - 0600	2.1 2.4 2.8	2.3 2.5 2.7	3.5 4.0 4.5	MONTHLY VALUE and consists of the constant of
0601 - 1200	2.8 3.1 3.5	2.8 3.7 4.7	4.1 5.0 6.0	
1201 - 1800	3.6 3.8 4.0	4.6 5.0 5.2	8.3 9.0 9.7	
1801 - 2400	2.9 3.1 3.4	3.1 3.4 3.8	4.8 6.1 7.8	
DAILY VALUE	2.1 3.1 4.0	2.3 3.6 5.2	3.5 6.0 9.7	

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TIME PERIOD	DAYS 1 = 8 MIN MEAN MAX	DAYS 9 - 16 MIN MEAN MAX		
0001 - 0600	Case dissipative (in the contraction)         4000 dissipative (in the contraction)         4000 dissipative (in the contraction)           Case dissipative (in the contraction)         4000 dissipative (in the contraction)         4000 dissipative (in the contraction)           Case dissipative (in the contraction)         4000 dissipative (in the contraction)         4000 dissipative (in the contraction)           Case dissipative (in the contraction)         4000 dissipative (in the contraction)         4000 dissipative (in the contraction)	.5 .5 .6	42 .1	1.1 1.2 1.3
0601 - 1200		.5 1.1 1.9	1 .8 2.3	1.2 3.1 5.6
1201 - 1800		2.4 2.8 3.2	2.0 2.5 2.9	4.9 6.3 7.2
1801 - 2400		6 .1 .9	.2 .5 .9	1.3 1.9 2.8
DAILY VALUE		6 1.1 3.2	4 .9 2.9	1.1 3.1 7.2
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	(中国 (成立	5 .1 .8 1.4 2.3 2.9 63 .1 6 .7 2.9	111 .6 1.8 2.8 2.9 3.4 3.6 1.2 1.4 1.8 1 1.6 3.6	.6 .7 1.0 1.0 2.7 4.9 4.7 6.1 6.9 1.3 1.9 2.8 .6 2.9 6.9
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	2 . 7 3 . 3 3 9 1 . 0 1 . 2 1 . 4 1 . 0 and constant time	.0 .3 .6 .0 .4 .6 .0 .5 5	.9 .9 1.0 1.3 2.6 4.3 3.4 4.4 5.0 .8 1.4 2.2 .8 2.4 5.0	.6 .7 .9 1.0 2.9 5.3 4.7 6.1 6.9 1.2 1.9 2.8 .6 2.9 6.9
0001 - 0600	.4 .5 .6	666	.6 .6 .6	1.0 1.0 1.0
0601 - 1200	.8 1.4 1.9	.2 .8 1.5	1.0 2.5 4.2	1.9 3.3 4.5
1201 - 1800	1.6 2.0 2.3	1.2 1.6 1.9	3.8 4.8 5.4	4.0 4.7 5.1
1801 - 2400	1.1 1.2 1.3	.5 .6 .9	.9 1.6 2.3	2.2 2.4 2.8
DAILY VALUE	.4 1.3 2.3	6 .7 1.9	.6 2.4 5.4	1.0 2.8 5.1
0001 - 0600	.4 .7 .9	.1 .3 .4	.4 .5 .6	1.9 1.9 2.0
0601 - 1200	.4 1.0 1.3	.1 1.2 2.8	1.4 3.0 4.6	2.2 3.1 4.2
1201 - 1800	1.9 2.2 2.4	2.4 3.3 3.9	4.3 5.7 6.6	4.2 4.6 4.8
1801 - 2400	.7 .9 1.2	.9 1.3 1.7	1.4 1.9 2.5	1.3 2.0 2.9
DAILY VALUE	.4 1.2 2.4	.1 1.5 3.9	.4 2.8 6.6	1.3 2.9 4.8
0001 - 0600 0601 - 1200 1201 - 1800 1801 - 2400 DAILY VALUE	.3 .4 .4 .6 1.7 2.6 2.9 3.9 4.4 .9 1.4 1.9 .3 1.8 4.4	.6 .7 .9 1.1 2.2 3.4 2.3 3.2 4.11 .3 .91 1.6 4.1	1.6 2.6 3.2 4.0 4.3 4.7	4.2 5.9 6.9 .9 1.6 2.4
0001 - 0600	.3 .4 .6	10 .0	1.6 1.7 1.8	1123 EXCENSION COMP 6724 6725 1727 (NITH 6722 6725 6725 6725 6725 6725 6725 6725
0601 - 1200	.3 1.3 2.6	.7 1.7 2.4	1.9 2.6 3.4	
1201 - 1800	2.8 4.0 5.2	2.0 2.4 2.6	3.6 4.0 4.2	
1801 - 2400	.3 1.0 1.8	.9 1.1 1.4	1.6 2.0 2.6	
DAILY VALUE	.3 1.7 5.2	1 1.3 2.6	1.6 2.6 4.2	
0001 - 0600	421	.6 .6 .7	1.4 1.5 1.6	
0601 - 1200	.6 1.7 2.9	1.2 2.3 3.6	1.6 2.9 4.9	
1201 - 1800	2.3 3.1 3.6	2.8 3.7 4.2	4.5 6.2 7.2	
1801 - 2400	.8 1.2 1.5	.4 1.1 1.9	1.4 2.0 2.7	
DAILY VALUE	4 1.4 3.6	.4 1.9 4.2	•	

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TIME PERIOD	MIN MEAN MAX	MIN MEAN MAX	DAYS 17 - 24 MIN MEAN MAX	MIN MEAN MAX
0001 - 0600		त्राहरू स्थान प्रस्तान प्रस्तान प्रस्तान प्रस्तान प्रस्तान प्रस्तान स्थान स्	හා සහ යෝ කණ යෝ මත මත මත වන වන වන කණ කණ කණ සහ මත මත සහ	(\$100 MIN 1950 MIN 1 
0001 - 0000 $0001 - 1200$	.5 .7 .8 1.7 3.6 5.8		Automortomortopopis koja sama-karantikio algin algorista minja dan kalinda kal	
201 - 1800	4.2 5.6 6.8		CONTROL COME UNITE AND ACCUPATION COME OF THE PROPERTY COME	enstrome dispersion — Sens data since note — since densioning data
801 - 2400	2.3 2.7 3.1		CONTROL GRAPHEN WER STEMPORT TON COST STEPPORT AND	end white come some discussion state and discussion dome
DAILY VALUE	.5 3.2 6.8	earn-datan data - data-datah datah	শ্বনত একান্যান্ত্ৰক বিশ্বন কৰা প্ৰথম একান্যান্ত্ৰক প্ৰথম কৰা	क्रामा व्यक्ति
0001 - 0600	2.0 2.1 2.1	ಪರ್ವವಾಗಿ ಕ್ರಾಂತ್ರ ಕ್ರೀಕ್ರಿ ಕ್ರಾಂತ್ರ ಕ್ರಾಂತ್ರ ಕ್ರೀಕ್ರಿಸಿ ಕ್ರಾಂತ್ರ ಕ್ರೀಕ್ರಿಸಿ ಕ್ರಾಂತ್ರ ಕ್ರೀಕ್ರಿಸಿ ಕ್ರಾಂತ್ರ ಕ್ರೀಕ್ರಿಸಿ ಕ್ರಿಸಿ ಕ್ರೀಕ್ರಿಸಿ ಕ್ರಿಸಿ	තොමන් කරන්න කරන සහ සහ සහ සහ සහ සහ සහ	The same and the s
1601 - 1200	2.6 3.5 4.6		distribution distribution and the state of t	දනා දැන ගෙන යන සහ දෙන දෙන දෙන දෙන
201 - 1800	4.0 4.6 5.0	\$100 (100 (100 (100 (100 (100 (100 (100	සාකානයකය කලා ලකුම සහා නැහැ ලෙසා සහදු <i>ක</i> ලා පතුව උතල	සහ ප්රතිවේඛන ප්රතිව සහ
1801 - 2400 DAILY VALUE	2.0 2.4 2.9 2.0 3.2 5.0		සහ - වියාල දැන්න ද	encolume contra entre contra en
NAA1 A6AA	1.9 1.9 2.0			
0001 - 0600 0601 - 1200	1.9 1.9 2.0 2.3 3.1 4.2	AND CONTROL OF THE CO		STEET CORPORATION CORP CORP CORP CORP CORP CORP CORP CORP
1201 - 1800	21 .0	designation of the control of the co	### (12.00 #### (12.00 ##### (12.00 ##### (12.00 ###### (12.00 ###################################	
.801 - 2400		4200-1220-1220 (1230-1220-1230) (1230-1220-1220-1220)	enconstructes and the statement and encourse con-	annere dan and any any any and and any and any
AILY VALUE	2 1.6 4.2	ರವಾಯಾವಿದ್ದಾರ್ ಭರ್ಚಿಯ ಮುಂದು ಚಿತ್ರ ಮಾರ್ಯವಾಗುವು	අතාප්රත්වලක් අතුර අතුර අතුර අතුර අතුර කරන අතුර විසින් අතුර විසින් අතුර	මෙන්නේ පාත කාල පත්ව මෙන් කල ගත මේ පමණ මේ.
001 - 0600	emineratementen emineratemen emitemen	THE PROPERTY OF THE PROPERTY O	वामान्यक्रकाकेन्सक संस्थानसम्बद्धाः थामानसम्बद्धाः स्थाप	ರಾಜಯಾಗಿಯಾಗುವುದು ಮನ್ನು ಕುರ್ಯಕ್ಷವಾಗಿ ನರತ ಕುರ್ನಾಟಗಳು
601 - 1200	meaning company as as defining		entimetrikalingung eine Sigan dimin enter enter delimin dinappenden	
201 - 1800	2 .8 1.3	काळ्याळेत्रीक काळ कृत्ये सम्भवतात व्यक्ति व्यक्तिसात व्यक्ति	engentarios engentarions engentarions	AND SECTION OF SECTION
801 - 2400	.9 1.0 1.3	ರಾರ್ವವಾಸವಾಗಿಯು ಕಾರ್ವವಾಗವಾಗಿ ಮುಂದಾಗಿ ಮಾ	CONTRACTOR ACTION ACTIO	අත (ස්පාලක්ක සිතින සිතින දැන ඇත. අතර
DAILY VALUE		නැතැපත්ත්වයක නැත නැත නැත නැත නැත නැත දැක් නැත	මරයකාරයක අතුය - ජන අතරකරණය - a ත අතරකරණ සැප	අත අතර අතර අතර අතර අතර අතර අතර අතර අතර අ
0001 - 0600	.9 .9 .9	and established and established and established and	Although the time of time of the time of time	ধ্যক চন্তামত কামত কামত কামত কামত কামত কামত কামত
601 - 1200	1.3 2.4 3.6	තියන් රටක සිටින සිටින සිටින දැන්න සිටින සිට සිටින සිටින සි	\$	THE RESIDENCE CONTRACTOR CONTRACT
.201 - 1800 .801 - 2400	4.3 4.7 4.9 1.4 2.0 2.8			
AILY VALUE	.9 2.5 4.9	enter-digregate enter ente des enter	A THE COLOR STATE AND A STATE	
001 - 0600	1.0 1.1 1.2	ක්සාක්ෂණය බවා කොදෙනු මාන අතුම කඩ කඩ කඩ ගැන	१०)-व्यक्रकाव ब्रह्म आप ब्रह्म ब्रह्म ब्रह्म अपन ब्रह्म व्यक्त	ন্যায় চলমেটে ব্যৱহান ক্ৰীয়েক্ট ব্যৱহান ক্ৰীয়েক্ট ব্যৱহান কৰ্মায় কৰিছেল ব্যৱহান কৰ্মায়
601 - 1200	1.4 2.9 4.4		emontheresta esta esta esta esta esta esta esta	
201 - 1800	3.9 4.5 4.8	9000-0502-0008.	නිකරුත්ත කොල්වේ මෙම ක්රම ක්රම දෙන කොල්වේ මෙම දෙන කොල්වෙන	ಪ್ರಕಾಣದಾಗಿದ್ದಾರೆ. ಆಭ್ಯಕ್ತದಾ ಕೊಂದು ಮುಮಾಲ್ ಪ್ರ
801 - 2400	1.3 1.9 2.6	The contract of the contract o	annen and an and and an	construction and specific spec
AILY VALUE	1.0 2.6 4.8	0000° 4000°	ගැන්වන්වන ගැන ජන එක අත අත අත යන ජන	ක් ලේක්වර් මෙම අදහා අතුත් ක්රම අදහා අතුම කුලා දුරුම ගැන
001 - 0600	.9 1.1 1.2	യമാണ്യത്തെ അത് ഒട്ടുക മാത്ര ലോട്ട വേരും വേന്നം കാരും	व्याक वार्यक्री वीरक व्याक	ंब हेटलेट्डाक रोडाता-ब्यारण
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#### APPENDIX B

Incubation Habitat:

Data collected within standpipes and at adjacent surface water locations.

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Appendix B consists of raw data (Appendix Tables B-5 to B-8) and corresponding summary tables (Appendix Tables B-1 to B-4). Summary tables preced the raw data tables in this Appendix for ease of reference. These data were collected by ADF&G personnel during two sampling periods (April 15-18 and April 29-May 2) in spring, 1983. In the summary tables, sampling periods are referred to as "first" and "second", respectively.

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Appendix	Table	8-8
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Appendix Table 8-1 Summary of intragravel and corresponding surface water quality data collected along the left bank of specific sites in sloughs 8A, 9, 11 and 21 during early (April 15-18) and late (April 29-May 2) sampling periods in spring, 1983.

		Sampling	Slough			Intr	gravel W	later				Surface W	later	
<u>Slough</u>	Site	Period	<u>Bank</u>	Variable	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N
Slough 8A	Α	Early	Left	Dissolved Oxygen	4.0	4.3	4.6	0.2	10	7.4	9.5	10.5	1.0	10
	A	Late	Left	Dissolved Oxygen	4.0	ų . ų	4.6	0.2	10	10.5	11.1	11.3	0.3	10
	Α	Early	Left	Water Temperature	2.0	2.3	2.5	0.2	10	2.0	2.4	3.0	0.384	10
	Α	Late	Left	Water Temperature	3.0	3.6	5.8	0.8	10	4.2	4.6	5.0	0.245	10
	Α	Late	Left	Specific Conductance	236	254	258	6	10	178	183	188	3.0	10
	A	Early	Left	pH	7.2		7.3	E00 400	10	7.1		7.3	see eto	10
	Α	Late	Left	pH	6.4		6.6	ms 421	5	6.4		6.8	***	5
Slough 9	В	Early	Left	Dissolved Oxygen	5.5	6.2	6.8	0.4	10	9.0	9.5	10.0	0,3	10
**	В	Late	Left	Dissolved Oxygen	5.3	6.0	6.6	0.5	10	10.4	10.7	10.9	0.1	10
	С	Late	Left	Dissolved Oxygen	1.3	3.3	6.4	27	3	8.0	8.1	8.2	0.1	3
	В	Early	Left	Water Temperature	3.0	3.9	4.9	0.6	10	5.0	5.2	5.4	0.129	10
	В	Late	Left	Water Temperature	3.5	4.0	4.5	0.3	10	6.0	6.3	6.5	0.204	10
	С	Late	Left	Water Temperature	4.0	4.1	4.2	0.1	3	5.2	5.6	6.2	0.513	3
	В	Late	Left	Specific Conductance	201	217	236	15	10	153	157	163	3.0	10
	С	Late	Left	Specific Conductance	218	242	257	21	3	192	196	198	3.0	3
	В	Early	Left	pH	6.5		7.0	** **	10	6.5		7.0	Nº 10	10
	В	Late	Left	рН	6.2		6.4	to sis	5	5.9		6.3	ann rea	5
Slough 11	Α	Early	Left	Dissolved Oxygen	7.4	7.9	8.4	0.3	10	11.3	11.5	11.6	0.1	10
•	Α	Late	Left	Dissolved Oxygen	6.7	7.1	7.5	0.3	10	10.9	11.1	11.2	0.1	10
	В	Early	Left	Dissolved Oxygen	6.2	9.0	10.5	1.1	10	9.8	10.2	11.0	6.4	10
	В	Late	Left	Dissolved Oxygen	8.1	8.9	9.2	0.3	10	10.8	11.1	11.3	0.2	10
	Α	Early	Left	Water Temperature	2.5	2.8	3.0	0.1	10	3.0	3.1	3,2	0.103	10
	Α	Late	Left	Water Temperature	3.5	4.7	7.2	1.0	10	7.5	7.8	8.2	0.271	10
	8	Early	Left	Water Temperature	2.0	2.1	2.2	0.1	10	2.0	2.0	2.0	0.000	10
	3	Late	Left	Water Temperature	3.5	. 4.0	4.5	0.4	10	6.0	6.1	6.2	0.097	10
	Α	Late	Left	Specific Conductance	245	260	268	6	10	241	245	247	2	10
	В	Early	Left	Specific Conductance	258	268	271	L)	8	198	262	285	25	9
	Α	Early	Left	рН	7.1		7.3	Eu 400	10	7.1		7.2	ear e	10
Slough 21	Α	Early	Left	Dissolved Oxygen	2.3	6.1	6.9	1.4	10	6.2	8.5	9.4	1.1	10
-	Α	Late	Left	Dissolved Oxygen	6.7	7.0	7.4	0,2	9	7.3	9.2	10.2	1.1	9
	Α	Early	Left	Water Temperature	2.5	3.0	3.5	0.3	10	2.5	4.5	5,5	1.047	10
	Α	Late	Left	Water Temperature	2.5	2.9	4.0	0.5	9	2.5	4,8	6.8	1.571	9
	Α	Late	Left	Specific Conductance	236	242	248	4	9	245	251	262	5	9
	Α	Early	Left	· pH	6.6		7.1		10	6.6		7.2	669 sale	10
	A	Late	Left	рН	6.6		6.8	100 510	5	6.6		6.8	24	5

Appendix Table B-2 Summary of intragravel and corresponding surface water quality data collected along the right bank of specific sites in sloughs 8A, 9, 11 and 21 during early (April 15-18) and late (April 29-May 2) sampling periods in spring, 1983.

		Sampling	Slough			Intra	gravel W	later				urface W		
Slough	Site	Period	Bank	Variable	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N
Slough 8A	Α	Early	Right	Dissolved Oxygen	4.2	5.0	9.2	1.5	10	10.2	11.1	11.6	0.4	10
	Α	Late	Right	Dissolved Oxygen	4.4	4.9	7.9	1.1	10	11.3	11.4	11.6	0.1	10
	Α	Early	Right	Water Temperature	0.4	1.8	2.0	0.5	10	0.3	0.5	1.8	0.478	10
	Α	Late	Right	Water Temperature	2.2	2.9	3.2	0.3	10	2.0	3.7	4.5	0.696	10
	Α	Late	Right	Specific Conductance	215	246	255	11	10	164	179	184	6	10
	A	Early	Right	рН	7.2		7.3	400 600	10	7.1		7.3	604 449	10
	Α	Late	Right	рН	6.7		6.8	AL A-4	5	6.6		6,8	eta ama	5
Slough 9	Α	Early	Right	Dissolved Oxygen	3.7	4.9	6.7	0.9	10	9,3	9.6	9.8	0.2	10
	Α	Late	Right	Dissolved Oxygen	7.1	8.8	10.8	1.3	10	10.9	11.0	11.0	0.1	10
	Α	Early	Right	Water Temperature	4.1	4.3	5.2	0.4	10	5.1	5.3	5.3	0.070	10
	Α	Late	Right	Water Temperature	3.5	4.0	5,0	0.5	10	5.8	6.0	6.2	0.133	10
	Α	Late	Right	Specific Conductance	128	156	186	19	10	146	153	156	3	10
	Α	Early	Right	рН	6.8		7.1		10	6.8		7.0	492 499	10
	Α	Late	Right	рН	6.2		6.6		5	6.3		6.8	en de	5
Slough 11	В	Early	Right	Dissolved Oxygen	9.5	10.0	10.8	0.4	10	9.8	10.3	10.6	0.2	10
_	В	Late	Right	Dissolved Oxygen	9.4	9.8	10.4	0.3	10	10.3	10.8	11.0	0.2	10
	C	Early	Right	Dissolved Oxygen	1.3	4.9	11.2	4.5	4	11.0	11.6	12.4	0.6	4
	C	Late	Right	Dissolved Oxygen	1.1	4.3	10.2	4.1	4	10.5	10.6	10.8	0.1	4
	В	Early	Right	Water Temperature	1.8	2.1	2.2	0.1	10	1.8	2.0	2.2	0.094	10
	В	Late	Right	Water Temperature	3.5	4.2	4.8	0.4	10	5.2	5.7	6.2	0.357	10
	C	Early	Right	Water Temperature	2.2	2.4	2.5	0.1	Ų	1.8	1.9	2.0	0.100	lş.
	C	Late	Ri ght	Water Temperature	4.0	4.7	5.2	0.6	4	5.2	5.4	5.5	0.173	L.
	В	Early	Right	Specific Conductance	267	273	280	5 .	10	267	269	271	2	10
	C	Late	Right	Specific Conductance	159	191	234	35	4	232	239	245	5	l4
	В	Early	Right	pН	6.8		6.8	aa ee	1	6.3		6.3		1
	C	Early	Right	pH	6.2		6.4	re so	4	6.3		6.4		ų
Slough 21	A	Early	Right	Dissolved Oxygen	5.0	7.6	8.8	1.1	10	9.5	9.8	10.0	0.2	10
-	A	Late	Right	Dissolved Oxygen	7.3	7.7	8.4	0.4	10	10.3	10.5	10.6	0.1	10
	Α	Early	Right	Water Temperature	4.0	4.4	5.0	0.3	10	5.2	5.2	5.2	0.000	
	Α	Late	Right	Water Temperature	3.8	4.1	4.5	0.3	10	6.8	7.1	7.5	0.207	
	Α	Late	Right	Specific Conductance	174	201	216	16	10	238	243	248	3	10
	Α	Early	Right	рН	6.9		7.1	NAM 6495	10	6.7		7.2		10
	Α	Late	Right	рН	6.8		6.8	800 BOS	5	6.7		6.9	"the sales	5

Appendix Table B-3 Summary of intragravel and corresponding surface water quality data collects at specific sites in sloughs 8A, 9, 11 and 21 during early (April 15-18) and late (April 29-May 2) sampling periods in spring, 1983.

		Sampling			In	tragravel	Water				rface Wat		
lough	Site	Period	Variable	Min	Mean	Max	3D	N	Min	Mean	Max	SD	N
lough 8A	Α	Early	Dissolved Oxygen	4.0	4.6	9.2	1.1	20	7.4	10.3	11.6	1.1	20
	Α	Late	Dissolved Oxygen	4.0	4.6	7.9	0.8	20	10.5	11.2	11.6	0.2	20
	Α	Early	Water Temperature	0.4	2.0	2.5	0.5	20	0.3	1.4	3.0	1.0	20
	Α	Late	Water Temperature	2.2	3.2	5.8	0.7	20	2.0	4.1	5.0	0 7	20
	Α	Late	Specific Conductance	215	250	258	10	20	164	181	188	5	20
	Α	Early	pH	7.2		7.3	the the	20	7.1		7.3	eu 105	2(
	Α	Late	рH	6.4		6.8	400 Mgs	10	6.4		6.8	only day	1(
lough 9	Α	Early	Dissolved Oxygen	3.7	4.9	6.7	0.9	10	9.3	9.6	9.8	0.2	1(
	Α	Late	Dissolved Oxygen	7.1	8.8	10.8	1.3	10	10.9	11.0	11.0	0.1	1
	В	Early	Dissolved Oxygen	5.5	6.2	6.8	0.4	10	9.0	9.5	10.0	0.3	1
	В	Late	Dissolved Oxygen	5.3	6.0	6.6	0.5	10	10.4	10.7	10.9	0.1	1
	С	Late	Dissolved Oxygen	1.3	3.3	6.4	2.7	3	8.0	8.1	8.2	0.1	
	Α	Early	Water Temperature	4.1	4.3	5.2	0.4	10	5.1	5.3	5.3	0.1	1
	Α	Late	Water Temperature	3.5	4.0	5.0	0.5	10	5.8	6.0	6.2	0.1	1
	В	Early	Water Temperature	3.0	3.9	4.9	0.6	10	5.0	5.2	5.4	0.1	1
	В	Late	Water Temperature	3.5	4.0	4.5	0.3	10	6.0	6.3	6.5	0.2	1
	C	Late	Water Temperature	4.0	4.1	4.2	0.1	3	5.2	5.6	6.2	0.5	
	A	Late	Specific Conductance	128	156	186	19	10	146	153	156	3	1
	В	Late	Specific Conductance	201	217	236	15	10	153	157	163	3	1
	C	Late	Specific Conductance	218	242	257	21	3	192	196	198	3	
	Ä	Early	рН	6.8	- V 100	7.1	was two	10	6.8		7.0	***	1
	A	Late	pH	6.2		6.6	NO to	5	6.3		6.8	KA 145	
	В	Early	pH	6.5		7.0	om to	10	6.5		7.0	mie 60	1
	B	Late	pН	6.2		6.4	dare trip	5	5.9		6.3	ces em	
ough 11	Α	Early	Dissolved Oxygen	7.4	7.9	8.4	0.3	10	11.3	11.5	11.6	0.1	1
	A	Late	Dissolved Oxygen	6.7	7.1	7.5	0.3	10	10.9	11.1	11.2	0.1	200
	В	Early	Dissolved Oxygen	6.2	9.5	10.8	1.0	20	9.8	10.3	11.0	0.3	2
	B	Late	Dissolved Oxygen	8.1	9.3	10.4	0.6	20	10.3	10.9	11.3	0.2	į
	č	Early	Dissolved Oxygen	1.3	4.9	11.2	4.5	4	11.0	11.6	12.4	0.6	
	č	Late	Dissolved Oxygen	1.1	4.3	10.2	4.1	4	10.5	10.6	10.8	0.1	
	Ă	Early	Water Temperature	2.5	2.8	3.0	0.1	10	3.0	3.1	3.2	0.1	
	Ä	Late	Water Temperature	3.5	4.7	7.2	1.0	10	7.5	7.8	8.2	0.3	
	Ŝ	Early	Water Temperature	1.8	2.1	2.2	0.1	20	1.8	2.0	2.2	0.1	
	В	Late	Water Temperature	3.5	4.1	4.8	0.4	20	5.2	5.9	6.2	0.3	
	C	Early	Water Temperature	2.2	2.4	2.5	0.1	4	1.8	1.9	2.0	0.1	
	č	Late	Water Temperature	4.0	4.7	5.2	0.6	4	5.2	5.4	5.5	0.2	
						268	6	10	241	245	247	2	
	A	Late	Specific Conductance	245	260 270	280 280	5	18	198	265	287 285	17	
	В	Early	Specific Conductance	258			35		232	· 239	285 245	1 / 5	
	C	Late	Specific Conductance	159	191	234		4		733		2	
	A	Early	pH	7.1		7.3	#12 Up	10	7.1		7.2	404 MH	•
	В	Early	pH	6.8 6.2		6.8 6.4	ero eta	1	6.3 6.3		6.3 5.4	en 10	
	C	Early	pH	6 7		5 U	ete ass	4	h 4		~ ZL	## NA	

### Appendix Table B-3 (Continued)

		Sampling			In	tragravel	Water			Su	rface Wate	er	
Slough	Site	Period	Variable	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N
Slough 21	A A A A A	Early Late Early Late Late Early Late	Dissolved Oxygen Dissolved Oxygen Water Temperature Water Temperature Specific Conductance pH pH	2.3 6.7 2.5 2.5 174 6.6 6.6	6.9 7.4 3.7 3.5 221	8.8 8.4 5.0 4.5 248 7.1 6.8	1.4 0.5 0.8 0.7 24	20 19 20 19 19 20	6.2 7.3 2.5 2.5 238 6.6 6.6	9.1 9.9 4.8 6.0 247	10.0 10.6 5.5 7.5 262 7.2 6.9	1.0 1.0 0.8 1.6	20 19 20 19 19 19

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Appendix Table B-4 Summary of intragravel and corresponding surface water quality data collected in sloughs 8A, 9, 11 and 21 during early (April 15-18) and late (April 29-May 2) sampling periods in spring, 1983.

	Sampling			Intrag	ravel Wat	er				rface Wat		
Slough	Period	Variable	Min	Nean	Max	SD	N	Min	Mean	Mex	SD	N
Slough 8A	Early	Dissolved Oxygen	4.0	4.6	9.2	1.1	20	7.4	10.3	11.6	o o comp	20
	Late	Dissolved Oxygen	4.0	4.6	7.9	0.8	20	17.5	11.2	11.6	0.2	20
	Early	Water Temperature	0.4	2.0	2.5	0.5	20	0.3	1.4	3.0	1.0	20
	Late	Water Temperature	2.2	3.2	5.8	0.7	20	2.0	4.1	5.0	0.7	20
	Late	Specific Conductance	215	250	258	10	20	164	181	188	5	20
	Early	pН	7.2		7.3	<b>~</b>	20	7.1		7.3	40. 609	20
	Late	pН	6.4		6.8	Apply Stan	10	6,4		6.8	200 000	10
Slough 9	Early	Dissolved Oxygen	3.7	5.6	6.8	0.9	20	9.0	9.6	10.0	0.2	20
	Late	Dissolved Oxygen	1.3	6.9	10.8	2.3	23	8.0	10.5	11.0	1.0	23
	Earl·	Water Temperature	3.0	4.1	5.2	0.5	20	5.0	5,2	5.4	0.1	20
	Late	Water Temperature	3.5	4.0	5.0	0.4	23	5.2	6.1	6.5	0.3	23
	Late	Specific Conductance	128	194	257	39	23	146	160	198	14	23
	Early	pH	6.5		7.1	C\$6. 4539	20	6.5		7,0	****	20
	Late	рН	6.2		6.6	stay depo	10	5.9		6.8	me 40	10
Slough 11	Early	Dissolved Oxygen	1.3	8.5	11.2	2.2	34	9,8	10.8	12.4	0.7	34
	Late	Dissolved Oxygen	1.1	5.1	10.4	2.2	34	10.3	11.0	11.3	0.2	34
	Early	Water Temperature	1.8	2.3	3.0	0.4	34	1.8	2.3	3.2	0.5	34
	Late	Water Temperature	3.5	4.3	7.2	0.7	34	5.2	6.4	8.2	1.0	34
	Early	Specific Conductance	258	270	280	5	18	198	265	285	17	19
	Late	Specific Conductance	159	240	268	87	14	232	243	247	4	14
	Early	рН	6.2		7.3	vice new	15	6.3		7.2	NON RIA	15
Slough 21	Early	Dissolved Oxygen	2.3	6.9	8.8	1.4	20	6.2	9.1	10.0	1.0	20
-	Late	Dissolved Oxygen	6.7	7.4	8.4	8,5	19	7.3	9.9	10.6	1.0	19
	Early	Water Temperature	2.5	3.7	5.0	0.8	20	2.5	4.8	5.5	0.8	20
	Late	Water Temperature	2.5	3.5	4.5	0.7	19	2.5	6.0	7.5	1.6	19
	Late	Specific Conductance	174	221	248	24	19	238	247	262	6	19
•	Early	pH	6.6		7.1	ano van	20	6.6		7.2	6er 889	20
	Late	рН	6.6		6.8	000 top	10	6.6		6.9	mar and	10

Appendix Table B-6 Intragravel and corresponding surface water quality measurements collected in Slough 8A (RM 125.9, Geographic Code S30N03W30BCD) of the Susitna River during two sampling periods (April 15-18 and April 29-May 2) in spring, 1983.

and the appropriate of	tima dinas din	ANTONO TO CONTRACT CONTRACTOR	CA CO 817-011-12-140-0	INT	RAGRAVE	তে পাঁড় ক্ষাৰ কৰে কৰে পাঁড় পাঁড় বিচাৰ পাঁড়	an a	SURFA	CE WAT	E B
SITE	SAMPLING DATE	Bank Sponch	pH	WATER TEMP(C)		SPEC.COND. (umhos/cm)			(mg/1)	SPEC.COND. (umhos/cm)
A	830417	LEFT	7.3	2.0	4.4	AND NOTICE P	7.3	2.0	10.4	<b>610 6150</b> 10
A	830417	LEFT	7.2	2.0	4.2	ear eaptive	7.3	2.2	9.2	AND COMPANY
A	830417	LEFT	7.2	2.2	4.3	co moun	7.3	2.0	10.5	49 coms
A	830417	LEFT	7.2	2.2	4.5	ON-SHARES	7,2	2.5	7.4	ROW UNIT AREA
A	830417	LEFT	7.2	2.5	4.6	con correct	7.3	2.5	9.5	SUL SEPERF
Α	830417	LEFT	7.2	2.5	4.4	de-c.nink	7.3	2.2	10.4	way trained at
A	830417	LEFT	7.2	2.5	4.2	epo rosiorio	7.2	2.2	9.5	CO-CHIPM
A	830417	LEFT	7.2	2.5	4.3	earn debreefs	7.3	3.0	8.4	en arrive
A	830417	LEFT	7.2	2.5	4.3	Con-House	7.2	3.0	9.4	raw demesa
A.	830417	LEFT	7.2	2.5	4.0	erga sometim	7.1	2.0	10.2	GUO-4705-NOTO
A	830417	RIGHT	7.2	.4	9.2	estabelesades	7.3	.3	11.3	car decrees
A	830417	RIGHT	7.2	1.8	4.5	6m #2-40	7.2	.3	11.4	CONTRACTOR OF THE PERSON OF TH
A	830417	RIGHT	7.3	1.8	4.8	COS MONTON	7.3	.3	11.3	eags 4th-halls
A	830417	RIGHT	7.2	2.0	4.4	sice ettalieth	7.2	.3		gin dies #
A	830417	RIGHT	7.2	1.8	4.5	40.60	7.2	.3	11.2	elitr disorates
A	830417	RIGHT	7.2	2.0	4.8	ean eng-470	7.2	.3	11.6	on second
A	830417	RIGHT	7.2	1.8	4.6	el9 (e)16	7.2	.3	11.4	SB-RM-IVI
A	830417	RIGHT	7.2	2.0	4.2	este Gunerali	7.1	. 8	10.8	609-448-529
A	830417	RIGHT	7.2	2.0	4.4	and explana	7.1	.5	10.2	ego-Envelor
A	830417	RIGHT	7.2	2.0	4.4	69 61909	7.2	i.8	10.6	019-869-609
A	830501	LEFT	0.4	5.8	4.3	236	6.4	5.0	10.5	178
A	830501	LEFT	6.4	3.8	4.6	255	6.5	5.0	11.C	181
A	830501	LEFT	6.4	3.8	4.3	252	6.6	4.5	11.2	181
A	830501	LEFT	6.5	3.2	4.3	257	6.8	4.5	10.9	188
A	830501	LEFT	6.6	3.2	4.4	257	6.8	4.5	11.3	184
A	830501	LEFT	450 to 000	3.2	4.4	257	67h 126-929	4.5	11.3	184
Α	830501	I.EFT	Myr. gentrag	3.0	4.3	258	eths haro water	4.5	11.3	181
A	830501	LEFT	<b>Girento</b>	3.2	4.5	257	STOTE System (CIQN	4.5	11.3	184
A	830501	LEFT	this governo	3.2	4.4	257	Distances	4.5	11.2	184
A	830501	LEFT	Ap eman	3.2	4.0	2 57	60% Associate	4.2	11.2	186
A	830501	RIGHT	6.7	2.2	7.9	215	6.5	2.0	11.3	164
A	830501	RIGHT	6.8	2.8	4.6	249	6.8	3.5	11.3	183
Α	830501	RIGHT	6.7	2.8	4.6	249	6.8	3.5	11.3	183
A	830501	RI GHT	6.8	2.8	4.5	249	6.6	3.8	11.4	181
A	830501	RIGHT	6.8	3.0	4.7	248	6.7	3.8	11.3	181
A	830501	RIGHT	Size tribular	2.8	4.5	249	620 651/102	3.2	11.3	184
A	830501	RIGHT	Alternatives	3.2	4.6	246	elatir Notice espen	3.8	11.4	181
A	830501	RIGHT	MA KIB/178	3.0	4.4	251	dis-sparse oils	4.2	11.5	179
A	830501	RIGHT	Sp.415-03	3.2	4.6	250	4504 S220 USD	4.2		179
A	830501	RIGHT	Con terroria	3.0	4.4	255	min entropy	4.5	11.3	181

Appendix Table B-0 Intragravel and corresponding surface water quality measurements collected in Slough 9 (RM 129.2, Geographic Code S30N03W09DCB) of the Susitna River during two sampling periods (April 15-18 and April 29-May 2) in spring, 1383.

				INT	RAGRAVE	The case case to the case of t		SURF	ACE WAT	ER
SITE	SAMPLING DATE	SLOUGH BANK		WATER	D.O.	SPEC.COND. (umhos/cm)	pH		(mg/1)	SPEC.CGND. (umhos/cm)
A	830418	RIGHT		4.2	3.7	enco esponensio Anno esponensio escola enco especial per oppositoro entre estre estre estre especialmente entre estre es	6.9	5.2	9,4	echniculus echniculus
A	830418	RIGHT		4.4	4.0	star-disease	7.0	5.3	9.8	0.941560
A	830418	RIGHT			4.7	ena convito	7.0	5.2	9.8	40-09-3%
A	830418	RIGHT	6.8		4.1	Sport Charlespor	6.9	5.3	9.6	essi-andress
A	830418	Right	6.8		4.9	89-919-11P	6.8	5.3	9.7	cas armata
A	830418	RIGHT	6.9		5.1	<b>6</b> -c-monge	6.8	5.1	9.8	Reprofessors
A	830418	RIGHT	6.8		5.1	AND MODER	6.8	5.3	9.3	Apple Grand Color
Α	830418	RIGHT	6.9		5.4	SEC-SECURIO	7.0	5.3	9.4	en um de
A	830418	RIGHT	6.8		5.4	GR-MNRGS	6.8	5.3	9.5	con ensure
A	830418		7.0		6.7	ech colonia	6.9	5.3	9.7	to does
A	830502	RIGHT	6.4		7.1	184	6.3	6.0	10.9	1 46
A	830502	RIGHT	6.2		7.7	152	6.3	5.8	10.9	1 56
A	830502	RIGHT	6.5	4.2	7.2	1 86	6.8	6.0	11.0	155
A	830502	RIGHT	6.6	4.5	8.0	171	6.5	6.0	11.0	155
A	830502	RIGHT	6.6	3.5	8.6	158	6.4	5.8	11.0	156
A	830502	RIGHT	No estab	3.8	10.8	128	0.0 10100	6.0	10.9	151
A	830502	RIGHT	this collection	3.8	9.8	147	SEP GROUP	6.2	10.9	154
A	830502	RIGHT	*15 400 410	3.5	9.5	158	distrings with	6.2	10.9	154
A	830502	RIGHT	EUR HENTHON		10.4	141	gas siderans	6.0	11.0	155
A	830502	RIGHT	en en	5.0	9.3	136	No con we	6.0	11.0	150
В	830418	LEFT	6.8	3.0	5.5	40 404B	6.8	5.0	9.3	Con Western
В	830418	LEFT	6.5	4.0	5.8	an-disease	6.5	5.3	10.0	ase mester
В	830418	LEFT	6.8	4.3	6.7	OR SHARM	6.8	5.2	9.2	draw reso-form
В	830418	LEFT	6.6	4.9	6.1	dis present	6.6		9.6	na airea
В	830418	LEFT	6.8	3.8	6.4	695 eriordib	6.8	1		Qu-terrale
В	830418	LEFT	7.0	3.1	6.8	por une que	7.0	5.1		69 (664)
В	830418	LEFT	6.8	3.9	6.3		6.8	5.2	9.6	ga esente
В	830418	LEFT	6.7	4.1	6.3	ducone	6.7	5.4	9.6	609 (S20-68F)
В	830418	LEFT	6.7	4.6	6.1	g2b mondila	6.7	5.4	9.4	egy according
В	830418	LEFT	6.8	3.8	6.4	(PFF-cold-eccile	6.8	5.2	9.7	con essentido
В	830502	LEFT	6.3	3.5	5.7	227	6.2	6.0	10.7	155
В	830502	LEFT	6.4	4.0	5.4	236	6.3	6.0	10.7	155
В	830502	LEFT	6.2	4.5	5.5	233	5.9	6.2	10.5	163
В	830502	LEFT	6.2	4.5	5.3	236	6.3	6.2	10.7	158
В	830502	LEFT	6.3		5.8	221	6.2	6.5	10.7	156
B	830502	LEFT		3.8	6.6	203	******	6.2	10.4	163
В	830502	LEFT	New Aggresian	3.8	6.3	203	so se se	6.5	10.7	153
B	830502	LEFT	40 -		6.4	206	ezrona dak	6.2	10.8	158
В	830502	LEFT	100-1	4.0	6.1	206	miss errordate	6.5	10.9	156
В	830502	LEFT		4.2	6.6	201	50-60-629	6.5	10.6	1 56
C #	83 0 5 0 2	LEFT	*****		6.4	218	partition.		8.2	192
C *	83 0 5 0 2	LEFT		4.2			6910740	5.5		
C n	830502	LEFT	600 eN0000	4.0	2.3 1.3	257	49 68 49		8.0 8.0	197
U ~	030302	PEL I	KIN-MUMON	4.0	1.3	250	40 00 40	3.2	0.0	198

<sup>\*</sup> This site was actually located in Slough 9B (see Figure 3).

Appendix Table B-7 Intragravel and corresponding surface water quality measurements collected in Slough II (RM 135.3, Geographic Code S31NO2W19DDD) of the Susitna River during two sempling periods (April 15-18 and April 29-May 2) in spring, 1983.

				Inti	RAGRAVE			SURF	ACE WAT	ER
SITE	SAMPLING DATE	SLOUGH BANK	pit	WATER TEMP(C)		5PEC.COND. (umnos/cm)	рĦ	WATER TEMP(C)	D.O. (mg/l)	SPEC.COND. (umhos/cm)
A	830417	LEFT	7.3	2.8	7.8	Bus dismants	7.2	3.2	11.6	era endrare
A	830417	LEFT	7.2	3.0	7.4	Col elizanti	7.1	3.2	11.3	Other enterents
A	830417	LEFT	7.1	2.8	8.4	and facilities	7.1	3.2	11.4	689-969-669
A	830417	LEFT	7.1	2.8	7.8	apa entres	7.1	3.2	11.3	and district
A	830417	LEFT	7.1	2.5	7.8	en exculs	7.1	3.2	11.5	89 (04)
A	830417	LEFT	7.2	3.0	7.3	est-proving	7.1	3.2	11.4	*Course
A	830417	LEFT	7.2	2.8	7.6	019-017-112	7.2	3.0	11.4	eah-extreme
A	830417	LEFT	7.2	2.8	8.3	664-480-000	7.2	3.0	11.5	discretion fails
A	830417	LEFT	7.2	2.8	8,2	GO TIOTES	7.2	3.0	11.6	and constants
A	830417	LEFT	7.1	3.0	7.5	600 STA-60D	7.2	3.0	11.6	aspectation
A	830430	LEFT	ani-smile in	4.8	6.7	260	600-000-0-M	7.8	11.2	244
Α	83 043 0	LEFT	OS GRAGO	5.0	7.4	262	400 100-600	7.5	11.2	246
A	83 043 0	LEFT	en perme	4.0	6.7	264	######################################	7.5	11.1	246
A	830430	LEFT	994859	4.0	7.0	267	elevante-cita	7.5	10.9	2 46
A	830430	LEFT	860 625 MED	3.5	7.5	268	4040-03	7.8	21.1	244
A	830430	LEFT	69-61-086	4.5 .	7.3	263	410-110-00-	7.8	11.1	247
A	830430	LEFT	entente	4.8	7.2	257	May elected	8.0	ll.l	246
A	830430	LEFT	és arrist	4.8	7.3	257	40 100-00	8.0	11.2	243
A	830430	LEFT	dar führtiga	4.8	7.3	257	<b>60-67-63</b>	8.2	11.0	241
A	830430	LEFT	68# 6x05/45	7.2	6.9	245	are 190-1000	8.2	99.2	241
В	830415	LEFT	42 Harrists	2.2	9.3	64 9990	escontain dich	2.0	10.0	sea entor
В	83 041 5	LEFT	eten etaanoste	2.0	9.3	en) 620-650	644-001-029	2.0	10.2	198
B	83 041 5	LEFT	60 500	2.0	8.8	271	us es erb	2.0	10.0	285
В	830415	LEFT	164 640464	2.0	9.0	265	ED	2.0	10.1	26 9
B	83 041 5	LEFT	68×60×30	2.0	8.8	267	4474-0075-0007	2.0	9.8	267
В	830415	LEFT	sio espesa	2.2	9.3	271	BUT BUT COLD	2.0	10.2	26 9
В	830415	LEFT	60 0900	2.0	6.2	258	*******	2.0	9.8	267
В	83 041 5	LEFT	****	2.2	9.5	271	\$10°-LEBPESH	2.0	10.4	267
B	830415	LEFT	88151.09	2.2	10.5	26 9	AND SCHOOL SERVI	2.0	10.6	26 9
8	83 041 5	LEFT	675-29-29	2.2	9.5	26 9	eurice san	2.0	11.0	26?
B	83 041 5	RIGHT	6.8	2.0	9.8	267	6.3	2.0	9.8	267
В	830415	RIGHT	90 <del>cla</del> 30	2.0	10.0	271	sub-sub-tion	2.2	10.6	267
В	830415	RIGHT	eliza anes sires	2.2	9.5	26 9	200 602 656	2.0	10.2	267
В	83 041 5	RIGHT	ects epolysis	2.0	9.6	267	espt-ent/460	2.0	10.6	271
В	830415	RIGHT	WP SHICK	1.8	10.8	271	each sect-state	1.8	10.4	26 9
В	83 041 5	RIGHT	678 C2+463	2.0	10.5	273	900-989-1086	2.0	10.4	269
В	830415	RIGHT	da mess	2.2	10.1	276	oge elie-cer	2.0	10.5	271
В	830415	RIGHT	em sterios	2.2	9.6	276	40.40-40	2.0	10.2	267
В	830415	RIGHT	50 MESS	2.2	10.1	278	eta ese-tua	2.0	10.1	267
В	830415	RIGHT	600 542 613	2.2	9.7	280	gu 40 64	2.0	10.2	271
В	830429	RIGHT	an eraca	4.0	9.7	Strander out	Connection (com	5.8	10.3	nus sittera
В	830429	RIGHT	gre 801200	4.5	9.4	P25.059-999	500 50 4 100	5.2	10.5	649 010-450
В	830429	RIGHT	and deposits	3.8	9.5	600-4001000	601102100	5.2	10.8	eges con with
В	830429	RIGHT	con extreme	4.2	10.1	offer Arrivelian	ECF GEN-WICH	5.5	10.9	GCF FIRE SIDE
В	830429	RIGHT	MIT REPORTED	4.5	10.4	and otherwise	#itr ### 40#	5.2	11.0	ras saveteda

Appendix Table B-7 (Cont).

				INT	ragrave	L		SURF	CE WAT	er
SITE	SAMPLING DATE	SLOUGH BANK	pH	YATER TEMP(C)	D.O. (ng/l)	SPEC.COND. (unitos/cm)	pli		-	SPEC.COND (umhos/cm
8	830429	RIGHT	449 MINUS	4.5	9.9	anga ataka dalay samanan amandan Carolina (dan atak dan anaka capana Anga dan akita	ern eine Gerrater abrada dels bots eine ern eine Erik	6.2	10.8	City Constitution City Strategy and Constitution
В	830429	RIGHT	cube scottants	4.8	9.8	Rea diskusjih	too dibinista	5.8	10.9	esean-Gro
В	830429	RIGHT	80. MO-15	4.0	9.6	\$20 HOL-170	40.0040	6.0	10.7	49-20-09
В	830429	RIGHT	Qua serient	4.0	9.6	675-1000-029	Approximate ASS	5.8	10.9	gas weeks to
a	830429	RIGHT	60 40-09	3.5	9.6	ALER-ONS-1939	Elo elli-qilli	5.8	11.0	CA-1840M
В	830429	LEFT	60.600	3.8	9.0	elan-annecan	alla elittratic	6.0	8.01	quadra. 30
В	830429	LEFT	dio AVPATO	4.0	9.0	Object accommission	NOS-17th NOS	6.0	11.1	ggg-vegentivité
В	830429	LEFT	ess wares	<b>4.5</b>	8.6	dita Grivina	Sparyth vice	6.2	ll.l	elyth epphagage
B	830429	LEFT	MONTH OF THE	4.0	8.6	400-0150009	#ID #25-#ID	6.0	11.0	Ca realist
3	830429	LEFT	gradenties.	4.5	8.1	404 denotes	2000FF 460	6.0	11.1	CONTRACTOR OF THE PERSON AND ADDRESS OF THE PERSON ADDRESS OF THE PERSON AND ADDRESS OF THE PERSON
B	830429	LEFT	64-F27000	4.0	9.0	atius geethaliss	49.679.925	6.0	11.1	500 Gen #159
В	836429	LEFT	See #099530	4.2	8.9	the title title	20.00	6.2	11.3	ass demilio
B	830429	LEFT	par substitute	3.5	9.2	and electric	and of their	6.2	11.2	699-487- <sup>603</sup>
B	830429	1.EFT	Mile CAPPANIA	3.5	9.0	400-400-cm	ap emon	6.0	10.9	saa exelle
В	830429	LEFT	em ann cub	3.8	9.2	********	619-09-60	6.0	11.3	<b>CH-109/64</b>
C	830417	RIGHT	6.4	2.5	11.2	000-000 PCS	6.4	2.0	11.4	the water
C	830417	RIGHT	6.3	2.5	4.8	ting-money.	6.3	1.8	11.0	are emelle
C	630417	RIGHT	6.3	2.5	2.3	642 consists	6.3	1.8	11.6	860, 35 5 5 <sup>60</sup>
C	830417	RIGHT	6.2	2.2	1.3	ditte daze veda	6.3	1.8	12.4	the use the
Ç	830430	RIGHT	100 400 440	0	10.2	206	gus (10-101)	5.5	10.8	245
C	830430	RIGHT	distribution of the same	4.5	3.6	234	num profession	5.2	10.7	238
C	830430	RIGHT	800 Tabada	5.2	2.3	159	CONTRACTOR	5.2	10.6	241
C	83 043 0	RICHT	ES-179760	5.2	1.1	166	040-0179	5.5	10.5	232

Appendix Table B-8 Intragravel and corresponding surface water quality measurements collected immediately below the mouth of Slough 21 (RM 142.0, Geographic Code S31N02W02AAA) of the Susitna River during two sampling periods (April 15-18 and April 29-May 2) in spring, 1983.

				INT	RAGRAVE	L.		SURFA	ACE WAT	ER
SITE	Sampling Date	SLOUGH BANK	pli	WATER TEMP(C)	D.O. (mg/l)	SPEC.COND. (umhos/cm)	pH	WATER TEMP(C)	D.O. (mg/l)	SPEC.COND (umhos/cm
A	83 041 6	LEFT	7.1	2.8	2.3	фору стратер Странический странический стра	7.?	2.8	6.2	des technique
Α	83 041 6	LEFT	7.0	2.5	6.5	Talla Militrattia	6.8	2.5	6.5	cole arrivoto
A	830416	LEFT	6.9	3.0	6.8	Cito-Davidia	6.7	4.0	8.3	40-20 <del>-00</del>
A	830416	LEFT	6.6	3.0	6.9	ONO ePE-ARM	6.5	5.0	8.8	rup danish.co
A	830416	LEFT	6.7	3.2	6.0	SER MATERIA	6.7	5.0	8.8	esp-arstrova
A	830416	LEFT	6.7	3.2	6.7	estratrion	6.7	4.5	8.6	BLE-1001-FFF
A	830416	LEFT	6.7	3.0	6.5	ellin-tra process	6.7	5.0	8.7	CD-400-025
A	83 041 6	LEFT	6.7	3.0	6.6	eas agestes	6.7	5.2	9.4	\$66+EE+010
A	830416	LEFT	6.8	3.0	6.5	mile with bath	6.8	5.2	9.3	gio siguira
A	83 041 6	LEFT	6.7	3.5	6.7	especialisms	6.7	5.5	9.4	Sale-Accovan-
Α	830416	RIGHT	7.1	4.0	7.4	ess esectors	7.2	5.2	9.6	acts servering
A	830416	RIGHT	7.1	4.0	7.5	646 NEW MICH.	7.1	5.2	9.8	OR BEST
A	83 041 6	RIGHT	7.1	4.0	7.7	este cuerane	/.1	5.2	10.0	en manes
A	830416	RIGHT	7.1	4.5	8.6	and workers	7.1	5.2	9.8	en cumo
A	830416	RIGHT	7.0	4.5	7.7	800 Storedia	7.1	5.2	9.7	age war-life
Α	830416	RIGHT	7.0	4.5	5.0	ette Branton	7.1	5.2	9.5	Alone contrastion
A	830416	RIGHT	7.0	4.5	8.8	Give 428 White	7.1	5.2	9.8	age dos die
A	830416	RIGHT	7.1	4.5	8.4	NA CONTR	7.1	5.2	9.8	and opposite
A	830416	RIGHT	7.1	4.5	8.2	aggre destroyleds	6.9	5.2	10.0	esta estatuida
A	830416	RIGHT	6.9	5.0	6.8	Supe SWEETING	6.7	5.2	9.7	sign wire little
A	830501	LEFT	6.7	2.5	6.7	239	6.6	2.5	7.3	245
A	830501	LEFT	6.8	2.5	7.1	245	6.6	2.5	7.7	248
A	830501	LEFT	6.8	2.8	7.4	242	6.6	5.0	9.4	254
A	830501	LEFT	6.6	3.0	7.1	241	6.8	5.2	9.8	252
A	830501	LEFT	6.7	2.5	7.0	239	6.8	4.0	8.7	262
٨	83 0501	Left	THE WATER	2.5	7.0	248	000 man 000	4.8	9.8	255
Λ	830501	Left	econ spiceways	2.0	6.9	246	A446.6000 4005	6.8	9.7	245
A	830501	LEFT	-	3.2	6.9	243	200 45h 000	6.0	10.1	251
A	830501	LEFT	ego elumbro	4.0	6.9	236	A4 500 100	6.5	10.2	250
A.	830501	RIGHT	6.8	4.5	7 . 3	216	6.8	7.5	10.5	240
A	830501	RIGHT	6.8	4.0	7.4	212	6.9	7.2	10.5	238
A	830501	RIGHT	6.8	3.8	7.5	213	6.8	7.0	10.5	244
A	83 05 01	RIGHT	6.8	4.0	7.6	206	6.7	7.0	10.5	239
A	830501	RIGHT	6.8	4.2	7.6	210	6.7	7.2	10.5	242
A	830501	RIGHT	90 s.mire	4.5	7.7	208	Shirt and	7.0	10.5	244
Ā	83 0501	RIGHT	(Starting Co.)	4.0	8.3	174	special desirables	7.0	10.6	244
A	830501	KIGHT	the extresi	3.8	7.9	275	Cyto-sure-1800	7.0	10.5	244
A	830501	RIGHT	***	3.8	8.4	113	Caretean	6.8	10.5	248
A	830501	RIGHT	#152 (SIN #11#	4.0	7.6	211	- dy teur stir	6.8	10.3	248

### APPENDIX C

Burbot winter catch data and age, length, and sex data.

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Appendix Table C-1. Burbot catch per unit effort (CPUE) at selected fish habitat (SFH) sites in the Susitna River between Cook Inlet and Devil Canyon, December, 1982 to March, 1983.

Location	RM/TRM	Date(s) Sampled	Method of Capture	Numbers of Fish Captured	(CPUE)
Deshka River	40.6/0.0	12/2 - 12/3	Trotline Burbot Set Trotline Burbot Set	22	1.69
Deshka River	40.6/0.0	12/2 - 12/3		1	0.50
Deshka River	40.6/2.0	12/2 - 12/3		13	2.17
Deshka River	40.6/2.0	12/2 - 12/3		1	0.50
Deshka River	40.6/0.0	11/11 - 1/12	Trotline	10	1.25
Deshka River	40.6/2.0	1/10 - 1/12	Trotline	8	
Deshka River	40.6/0.0	2/16 - 2/17	Trotline	19	2.70
Deshka River	40.6/0.0	2/16 - 2/17	Burbot Set	1	1.00
Indian River	138.6/0.0	1/27 - 1/29	Trotline	1 2	0.17
Mainstem	136.7	12/19 - 12/24	Trotline		0.08
Mainstem	76.1	3/10 - 3/11	Trotline	5	1.00
Mainstem	72.0	3/11 - 3/12	Trotline	6	1.50

Appendix Table C-2 Burbot age-length relationships on the Susitna River between Cook Inlet and Devil Canyon, December 1982 to March 1983.

	Cook Inlet t	o Chulitna C	onfluence	Chulitna Cor	ofluence to D	evil Canyon	Cook Inlet to Devil Canyon					
Aye (Years)	Total No. of fish Sampled	Mean length (mm)	Range of lengths (mm)	Total No. of fish Sampled	Mean length (mm)	Range of lengths (mm)	Total No. of fish Sampled	Percent Frequency	Moan length (mm)	Range of lengths (mm)		
)	49	DEF	609	to	ing.	629	tu	***	case	May .		
audico.	Alle	now.	em.	de	do	MASS	Co.	rist .	***	**		
	881	AGER	500	•	009	eco	NO	0:29	1529	900		
C. C	eine	MG/2	sur-	Miles	400	4004	ena	den	lato .	•		
١٧	3	417	395-430	•	100	7208	3	4.4	417	395-430		
J	15	472	440-545	993	509	649	15	21.7	472	440-545		
/ I	19	503	430-580	1	470	on-	20	29.0	502	430-580		
/11	7	525	420-600	- Constitution of the Cons	585	en-	8	11.6	532	420-600		
/111	7	554	490-660	**	40	rie .	7	10.1	554	490-660		
I X	6	625	598-710	1	660	ese	7	10.1	630	598-710		
K	5	703	604-795	gun	***	Adla	5	7.3	703	604-795		
K I	2	725	670-780	469	409	ACH	2	2,9	725	670-780		
(11	2	730	695-765	Sin .	des	49	2	2.9	730	695-765		
TOTAL	66	584	395-795	3	572	470-660	69	100.0	зc	395-795		

<sup>1/</sup> Total length in millimeters.

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Appendix Table C-3. Relative spawning maturity of burbot captured in the Susitna River between Cook Inlet and Devil Canyon, December, 1982 to March, 1983.

Condition of <u>Gonads</u>	Length <sup>1</sup>	Age	Date <u>Captured</u>	Area of <u>Capture</u>	River/Tributary Mile/River Mile
Sex - Male					
ripe	424	5 5	12/3	Deshka R.	40.6/0.0
ripe	425		12/3	Deshka R.	40.6/0.0
immature	425	4 5 4 5 7	3/12	Mainstem	72.0
ripe	427	5	1/12	Deshka R.	40.6/0.0
ripe	430	<b>4</b> ,	12/3	Deshka R.	40.6/0.0
ripe	445	5	1/12	Deshka R.	40.6/0.0
ripe	465	) T	12/3	Deshka R.	40.6/0.0
ripe	492		12/3	Deshka R.	40.6/0.0
ripe	498	6 5 7	1/12	Deshka R.	40.6/0.0
ripe	535	5	1/12	Deshka R.	40.6/0.0
ripe	540	/	1/12	Deshka R.	40.6/0.0
immature	545	5	3/12	Mainstem	72.0
ripe <sub>.</sub>	580	5 8 7	12/3	Deshka R.	40.6/0.0
immature	585		1/29	Indian R.	138.6/0.0
ripe <sub>.</sub>	725	10	1/11	Deshka R.	40.6/0.0
spent	420	7	2/17	Deshka R.	40.6/0.0
spent	435	5 5 6	2/17	Deshka R.	40.6/0.0
spent	440	þ	2/17	Deshka R.	40.6/0.0
spent	500	6	2/17	Deshka R.	40.6/0.0
spent	515	6	2/17	Deshka R.	40.6/0.0
spent	630	9	3/11	Mainstem	76.1
spent	660	9	3/11	Mainstem	76.1
spent	780	11	3/11	Mainstem	76.1

Total number males, 23.

 $<sup>^{1}</sup>$  Total length in millimeters.

Appendix Table C-3 (Continued).

Condition of Gonads	Length <sup>1</sup>	Age	Date <u>Captured</u>	Area of Capture	River/Tributar Mile/River Mil
Sex - Female					
immature	395	<b>4</b> 6	1/11	Deshka R.	40.6/2.0
ripe	430	6	12/3	Deshka R.	40.6/2.0
ripe	440	6	12/3	Deshka R.	40.6/2.0
ripe	440	5 6	12/3	Deshka R.	40.6/2.0
immature	440		12/3	Deshka R.	40.6/2.0
ripe	460	6	12/3	Deshka R.	40.6/2.0
ripe	461	6	1/12	Deshka R.	40.6/0.0
ripe	<i>4</i> 65	5	12/3	Deshka R.	40.6/0.0
ripe	470	6	12/20	Mainstem	136.7
ripe	471	6	12/3	Deshka R.	40.6/0.0
ripe	474	6 5 7	12/3	Deshka R.	40.6/2.0
ripe	488	5	12/3	Deshka R.	40.6/2.0
ripe	490	7	12/3	Deshka R.	40.6/2.0
immature	495	5	1/12	Deshka R.	40.6/2.0
ripe	510	5	12/3	Deshka R.	40.6/2.0
immature	525	6	1/12	Deshka R.	40.6/0.0
immature	535	5	3/12	Mainstem	72.0
ripe	543	6	12/3	Deshka R.	40.6/0.0
ripe	550	5 5 6 5 6 8 6	12/3	Deshka R.	40.6/2.0
ripe	550		1/12	Deshka R.	40.6/0.0
ripe	550	6 7	1/12	Deshka R.	40.6/2.0
ripe	552		12/3	Deshka R.	40.6/2.0
ripe	555	8	12/3	Deshka R.	40.6/0.0
ripe	568	6	1/11	Deshka R.	40.6/2.0
ripe	570	6	12/3	Deshka R.	40.6/0.0
ripe	578	7	12/3	Deshka R.	40.6/0.0
ripe	580	6	12/3	Deshka R.	40.6/0.0
ripe	598	9	12/3	Deshka R.	40.6/0.0

 $<sup>^{\</sup>mathrm{1}}$  Total length in millimeters.

Appendix Table C-3 (Continued).

Condition of Gonads	Length <sup>1</sup>	<u>Age</u>	Date <u>Captured</u>	Area of <u>Capture</u>	River/Tributary Mile/River Mile
Sex - Female					
ripe ripe ripe ripe ripe ripe ripe immature immature spent spent spent spent spent spent spent spent	600 600 604 610 615 626 695 710 765 470 490 490 515 590 660 670 765 795	7 8 10 9 10 12 9 12 6 8 8 6 9 8 11 10	1/11 1/12 12/3 12/3 12/3 12/3 3/12 3/12	Deshka R. Deshka R. Deshka R. Deshka R. Deshka R. Mainstem Mainstem Deshka R. Deshka R. Deshka R. Deshka R. Deshka R. Mainstem Deshka R. Mainstem Mainstem	40.6/2.0 40.6/0.0 40.6/0.0 40.6/0.0 40.6/2.0 40.6/0.0 72.0 72.0 40.6/0.0 40.6/0.0 40.6/0.0 40.6/0.0 40.6/0.0 76.1 40.6/0.0 76.1 72.0

Total number of females, 46

<sup>&</sup>lt;sup>1</sup> Total length in millimeters.

Appendix Table C-4 Burbot age-length relationships by sex on the Susitna River between Cook Inlet and Devil Canyon, February 1981 to March 1983.

		Cook Inle	t to Chi Tuence	ulitna	Chulitna Devil	Conflue Canyon		Cook Inle	t to Dev	il Canyon	Both Sexe	s: Cook Ir	let to	Devil Cany
Age		Total No. of fish	Mean length	Range of length		length	length	Total No. of fish	Mean length	Range of length	Total No. of fish	Precent	Mean length	Range of length
<u>Years)</u>	Sex	Sampled_	(mm)	(mm)	Sampled	(mm)	<u>(mm)</u>	Sampled	<u>(mm)</u>	(mm)	Sampled_	Frequency	(mm)	<u>(mm)</u>
	1	5	99	85-115	2	108	102-114	7	102	85-115		••	099	
	1	5	189	168-205	1	110	950	6	175	168-205	70	140	***	ero-
distribution of the state of th	1	1	180	Ma		**	***	1	180		629	**	460	•
5 G	M	Łş.	355	295-400	3	334	322-353	7	346	295-400	13	5.0	339	238-400
	F	2	289	238-340	Ĺţ	351	330-398	6	331	238-398				
Į.	М	10	404	303-450	1	415	•	11	405	303-450	30	11.6	418	303-490
	F	16	422	355-490	3	447	430-460	19	425	355~490				
	M	26	448	370-550	7	457	390-530	33	450	370-550	62	24.0	453	365-550
	F	21	466	365~535	8	432	378-482	29	457	365~535				
	М	12	497	430-555	6	490	440-575	18	495	430-575	47	18.2	492	394-580
	F	23	496	430-580	6	471	394~525	29	491	394-580				
	M	6	534	420-614	6	546	468-600	12	540	420-614	28	10.9	523	418-614
	F	12	517	418-600	Lį.	489	469-510	16	510	418-600				
90.00	М	9	585	513-672	2	581	515-647	11	585	513-672	33	12.8	568	456-672
	F	17	563	456-660	5	546	480-600	22	559	456-660				
(	М	£ş.	638	572-680	2	615	570-660	6	631	570-680	17	6.6	615	500-710
	F	8	615	556-710	3	585	500-675	11	607	500-710				
	Μ	3	658	600-725	-	***	**	3	658	600-725	11	4.3	662	555-795
	F	7	659	555-795	1	690	-	8	663	555-795				
	Μ	3	670	609-780	1	780	N/O	4	697	609-780	8	3.1	697	609-780
	F	2	690	670-710	2	703	665-740	4	698	665-740				
4	M	2	697	654-740	••	~	79	2	697	654-740	6	2.3	725	654-790
	F	3	721	695-765	1	790	480	4	739	695-790				
	F	1	900		~	•	-	1	900	**	1	0.4	900	-
IV	F	1	815	-		-	-	1	815	-	1	0.4	815	~
1	F	1	804	-	49	~	**	1	804	-	1	0.4	804	600
TAL		204	535	85-900	68	497	102-790	272	537	85-900	258	100,0	616	238-900

<sup>| =</sup> Immature, sex not identified

M = Male

F = Female

<sup>1/</sup> Total length in millimeters.

### APPENDIX D

Winter radio telemetry data on burbot, rainbow trout, and Arctic grayling.

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			<u>age</u>
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Appendix	Table D-4	Summary of tagging and tracking data for radio-tagged Arctic grayling in the proposed impoundment area of the Susitna River drainage above Devil Canyon, August, 1982, to April, 1983	D-5

Trib, slough, lake surveyed (distance surveyed (in miles)	# Surv Sep Oct	Nov Dec	2 month int <u>Jan</u> <u>Feb</u>	ervals <u>Mar</u> <u>Apr</u>	Trib, slough, lake surveyed (distance surveyed (in miles)	# Surv Sep Oct	eys/by 2 m Nov Dec	onth inte Jan Feb	rvals <u>Mar</u> <u>Apr</u>
Cook Inlet to Devils Canyon		2		1	Cook Inlet to Devils Canyon (Cont) Whiskers Creek (4.0)	<u>)</u>			1
Alexander Creek (7.0) Yentna River (10.0)		2		7	Slough 6a (complete)				1
Deshka River (6.0)	1	2	1	•	Gash Creek & Lake (complete)				1
Kroto Slough (complete)	9	1	•		Slough 8a (complete)				
Willow Channel (complete		i4	1	2	Slough 9 (complete)				1
Kashwitna River (5.0)				1	Fourth of July Creek (3.0)	3	1		ese d
Montana Creek (3.0)		1			Unnamed lake, drains into Four of July Creek 4 mi upstream	th			
					from its mouth (complete)				1
Rabideux Creek (2.5)		2			Indian River (10.0)	3	1		2
Sunshine Slough (complete)		2		100	Miami Lake (complete)				1
Birch Creek Slough (complete)		1			Proposed Impoundment Area:				
Talkeetna River (20.0			1	1	Tsusena Creek (4.0,	5			
Larson Lake (complete)				1	Deadman Creek (14.0)	5	1		7
Sheep River (5.0)				1	Deadman Lake (complete)	1	1		
Clear Creek (12.0)				1	Watana Creek (E.Fork-8.0)	l.	1		
Fish Creek (complete)				1	Kosina Creek (6.0)	ξŧ	3	1	2
Chulitna River (20.0)				1	Clarence Lake (complete)		-	a	.1
Byer Lake (complete)				1	Oshetna River (4.0)	l.	3	1	2

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Appendix Table D-2 Summary of tagging and tracking data for radio-tagged rainbow trout in the Susitna River between Cook inlet and Devil Canyon, September 1982 to April 1983.

														***************************************	THE PROPERTY AND ASSESSMENT OF THE PARTY OF	**************************************	OUT THE BOOK OF THE PARTY OF	editalendes of the same and the same		MATERIA CONTRACTOR OF PRESENTATION OF PRESENTA	Participate Commercial		DIRECTOR ENGINEERS
	en asia yering	Capt	ure Data	1982	mentus. Madeus																		
									7	racking	Data: D	ate trac	ked, loc	ation an	d riverm	ile							
Radio Fre- gueno	y Length <sup>a</sup>	/ <u>A9</u> :	e <u>Date</u>	Date Tagged	River-	Date Released	10 P	Т4 В	Sept 15 <u>B</u>	22 P	25 P	P	0CT 15 P	30 P	Nov 15 P	2 P	Dec 14 P	30 P	Feb 4 P	P	Mar 9 P	12 5	Apr 19 P
600	5 410	-	10/13	10/14	77.0	10/15							76,5	72.0	72.0	72.0	72.0	NS	73.5	NS	NS	NC	NC
601-1	508	7	9/19	9/20	131.0	9/21				131.0	130.5	129.5	129.5	131.0	131.0	131.0	131.5	NC	131.1	131.5	131.5	131.5	NS
600-3	443	6	10/9	10/10	138.6	10/11							138.0	134.8	131.0	83.5	64.0	62.0	62.0	63.0	63.0	63.0	NC
620-1	445	6	9/19	9/20	13:.1	9/21				130.4	129.1	128.0	120.0	128.4	128.4	128.0	121.5	111.0	112.0	NS	131,5	NC	NS
540-1	448	***	10/9	10/10	138.6	10/11							138.6	NS	138.2	NS	NS	NS	97.0 <u>b</u> /	NS	NS	NC	NC
660	5 435	6	9/7	9/8	125.3	9/9	125.5	126.1	112.8	113.5	113.5	113.5	111,5	112.5	112.5	112.5	113.4	113.4	113.4	113.1	113.1	113.1	113.1
660-1	423	sa	10/9	10/10	138.6	10/11							138,6	135.5	118.0	117.8	83.0	83.0	83.0	NS	NS	NC	NC
670-3	440	6	9/18	9/19	131.1	10/20				NS	129.6	128.8	129.0	127.0	127.0	127.0	126.6	NS	NS	NS	MS	NC	NS
680-1	445	98	9/18	9/19	131.1	9/20				130.9	131.0	131.0	132,5	132.5	132.5	132.5	129.5	130.0	HC HG	пē	NS	NC	NS
710-1	440	~	9/18	9/19	131.1	9.'20				130,6	127.7	128.0	126.0	124.8	123.2	118.5	NS	104.0	103.5	NS	NS	NC	NS

 $\frac{a}{b}$ Fork length in millimeters Talkeetna River, The 1.5

Note > P = Tracked by plane or helicopter
B = Boat survey
5 = Snowmobile survey
NC = Not checked
NS = No signal

Appendix Table D-3 Summary of tagging and tracking data for radio-tagged burbot in the Susitna River between Cook Inlet and Devil Canyon, August 1982 to April 1983.

	40x500	Capture	<u> Data, 19</u>	82										
						- E	racking	Data: Da	ate trac	ked, loc	ation and	<u>i riverm</u>	ile	
W <sup>**</sup> # #					exceptioning elitabrish of establish	AUG	QQQQAQ YYMAN SANISIN NIFE	Principal Company of the Company of	Phrt Mit o Marsual And Andrews (Andrews Press	SEPT	医电子性 医甲状状体 化氢硫酸氢硫 医甲状状腺 医甲状腺 医甲状腺 医甲状腺 医甲状腺			MINT-Suppopulation, ship
Radio Fre- quency	Lengti	na/Date	Date Tagg∘d	River- Date <u>Mile Released</u>	22 <u>P</u>	`26 <u>P</u>	28 <u>B</u>	2 B	5 B	9 P	15 <u>B</u>	18 <u>B</u>	22 <u>B</u>	25 P
600-2	660	9/14	9/15	139.5 9/16								139.6	139.6	139.6
610-2	584	8/18	8/19	101.2 8/20	101.2	101.2	100.0	99.5	98.7	91.0	NC	NC	NC	NS
630-2	865	9/10	9/11	103.0 9/13							103.0	101.0	96.7	92.7
640-2	570	8/19	8/20	137.3 9/21	137.3	137.3	136.9	136.9	136.9	136.9	136.9	136.9	NS	101.0
660-2	715	9/19	9/20	139.5 9/21									NC	139.6
660-3	607	9/19	9/20	135.7 9/21									135.7	135.7
670-1	580	10/13	10/13	83.7 10/15										
670-2	565	10/13	10/13	83.7 10/15										
680-2	535	10/13	10/13	83.7 10/15										
710-3	615	10/13	10/13	83.7 10/15										
740-3	667	9/19	9/20	129.2 9/21									128.1	128.0

 $<sup>\</sup>frac{a}{}$ Total length in millimeters

Note - P = Tracked by plane or helicopter

B = Boat survey
S = Snowmobile survey
NC = Not checked

NS = No signal

Capture	Data.	1982
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month of the state																	
	Tracking Data: Date tracked, location and rivermile																
Radio						MELLOOM RESPONSE REPORT	OCT	avicar-s-rivatulinimelleari	NOV	station (color) system who de to wolve	Di	EC	rtika (Militarin (Militarin (I.)) - Historia (Militaria (II))	FEB	MAI	}	APR
Fre-	Lengtl	Date	Date <u>Tagged</u>	River- Mile Re	Date eleased	l. P	15 P	30 P	15 P_	2 P	14 P	19 <u>S</u>	30 P	4 P	<u>4</u> <u>P</u>	12 5	19 P_
600-2	650	9/14	9/15	139.5	9/16	139.6	139.6	NS	139.6	139.6	139.6	NC	NC	139.6	NS	NC	NS
610-2	584	8/18	8/19	101.2	8/20	5.0	NS	NS	- Presi	umed dead	d, out to	Cook	Inlet -				
630-2	865	9/10	9/11	103.0	9/13	80.0	50.0	NS	NS	NS	พร	NS -	Presumme	dead,	out to	Cook	Inlet -
640-2	570	8/19	8/20	137.3	9/21	100.0	100.0	NS	100.0	100.0	100.0	NC	100.0	100.0	NS	NS	NS
660-2	715	9/19	9/20	139.5	9/21	136.0	135.3	NS	26.0	26.0	26.0	NC	26.0	27.0	NS	NC	NC
660-3	607	9/19	9/20	135.7	9/21	135.7	135.3	135.3	135.3	135.3	135.3	135.3	- Dead, 1	located	in 2"	of wat	er-
670-1	580	10/13	10/13	83.7	10/15		83.5	83.6	83.0	83.0	82.5	NC	83.0	83.0	82.5	82.5	NC
670-2	565	10/13	10/13	83.7	10/15		83.5	NS	-NS	NS	NS	NS	- Presume	d tag f	ailure	Oliv	
680-2	535	10/13	10/13	83.7	10/15		83.0	77.5	77.5	77.5	77.0	NC	76.0	75.0	72.0	72.0	NC
710-3	615	10/13	10/13	83.7	10/15		83.2	80.0	80.0	NS	79.5	NC	79.0	76.0	76.1	76.1	NC
740-3	667	9/19	9/20	129.2	9/21	128.0	NS	NS	NS	NS	NS	NS	- Presumed	i tag f	ailure	***	

Note - P = Tracked by plane or helicopter
B = Boat survey
S = Snowmobile survey
NC = Not checked
NS = No signal

 $<sup>\</sup>frac{a}{1}$ Total length in millimeters

ORAFT WINTER REPORT 10/20/83

Appendix Table D-4 Summary of tagging and tracking data for radio-tagged Arctic grayling in the proposed impoundment area of the Susitna River drainage above Devil Canyon, August 1982 - April 1983. All fish were captured by hook and line.

	Capti	re Data, 1	982		Tracking Data: Date tracked, location and river mile; Susitna River mile/Tributary								y River m	River mile			
						#John Wilder Hall of Market State St	Sept		OCT			Nov	Dec		Feb	Mar	Apr
Radio Fre- guency	Length (mm)	Date <u>Captured</u>	Location (tributary <u>rivermile)</u>	Date <u>Tagged</u>	Date Keleased	16 P	18 P	27 P	2 P	15 <u>P</u>	30 <u>P</u>	15 <u>P</u>	2 P	-14 <u>P</u>	<u> </u>	3-4 <u>C</u>	19 <u>P</u>
600-1	375	8/18	Oshetna(1,7)	8/19	8/20	ИС	233.4 /1.2	0 /1.2	233.4 /1.2	NS	NS	233.4 /0.2	233.4 /0.2	233.4 /0.2	NS	NS	NS
6206	375	9/10	Tsusena(1,5)	9/11	9/12	181.3 /1.5	181.3 /1.5	181.3 /1.5	177.5	154.0	154.5	154.5	154.5	NS	NS	NS	NS
6305	395	8/24	Watana (East Fork B.O)	8/25	8/26	194.1 /8.0	194.1 /8.0	194.1 /8.0	194.1 /8.0	194.1	193.5	193.5	193.0	192.0	192.0	191.8	NS
6505	375	9/30	Kosina(1.6)	10/1	10/2		~	**	***	206.1	205.0	187.5	NS	186.7	186.7	187.0	187.0
6506	380	9/10	Tsusena(1.5)	9/11	9/12	T/1.5	T/0.7	NS	153.0	153.0	154.0	153.8	153.8	153.6	153.1	153.1	NS
6606	375	9/8	Tsusena(1.5)	9/9	9/10	T/1.5	1/0.7	1/0.1	T/0.0	1/0.0	174.5	174.5	NS	NS	NS	NS	NS
670-1	395	9/7	Oshetna (0,7)	9/8	9/9	NC	232.5	227.5	206.3	NS	NS	192.5	191.5	191.5	191.5	190.9	NS
7105	375	9/28	Kosina(1.6)	9/29	9/30	~	~	e#-	206.4 /1.0	206.4 /0.8	206.4 /0.8	206.4 /0.5	206.4 /0.5	206.4 /0.5	206.4 /0.5	NS	NS
710-1	385	8/22	Kosina(4.0)	8/23	8/24	NC	156.0	NC	153.0	156.0	156.0	156.0	NS	NS	NS	NS	NS
7205	380	9/15	Kosina(1.6)	9/16	9/17	**	206.4 /1.6	NS	NS	NS	197.0	198.0	198.5	198.5	198.5	198.0	198.0
7206	390	9/10	Tsusena(1.5)	9/11	9/12	1/1.5	172.5	174.0	NS	NS	179.5	176.6	NS	NS	175.0	NS	NS
720-1	395	8/18	Oshetna(1.7)	8/19	8/20	NC	233.4 /1.7	233.4 /1.7	220,0	201.8	205.5	206.0	206.0	206.0	NS	NS	NS
7305	370	9/15	Kosina(1.6)	9/16	9/17		206.4 /1.6	206.4 /1.4	206.4 /1.4	202.0	196.5	197.0	197.0	197.0	198.0	197.5	197.5
7405	390	9/30	Kosina(1.6)	10/1	10/2	-	-	•	1/1.6	NS	NS	206.8	NS	NS	NS	NS	NS
7406	390	9/7	Oshetna(0,7)	9/8	9/9	NC	233.4 /1.0	233.4 /1.0	233.4 /1.0	233.4 /0.0	233.4	228.0	226.7	226.7	226.7	NS	NS

a/Fork length

Note - P = Tracked by plane or helicopter G = Ground survey NC = Not checked NS = No signal