APPENDIX K

Evaluation of Arctic Grayling Spawning and Rearing Habitat and Notes on Salmon Spawning in the Impoundment Study Area of the Susitna River.

APPENDIX K

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CONTRIBUTORS

Aquatic Habitat and Instream Flow Studies (AH) Project Leader and Principal Contact	Christopher Estes
AH Fish Habitat Utilization Subproject Leader and Appendix Report Coordinator	Andrew Hoffmann
AH Impoundment Subproject Leader	Joe Sautner
Hydraulic Engineer	E. Woody Trihey
Data Processing Project Leader	Allen Bingham
Graphics	Sally Donovan Anne Reilly
Typing Staff	Peggy Skeers Loretta Channell
Editors	Christopher Estes Andrew Hoffmann Doug Vincent-Lang
Data Collection	Joe Sautner Mike Stratton Gene Sandone Jim Quinn
Data Analysis	Gene Sandone Joe Sautner
Text	Gene Sandone Joe Sautner

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ARCTIC GRAYLING

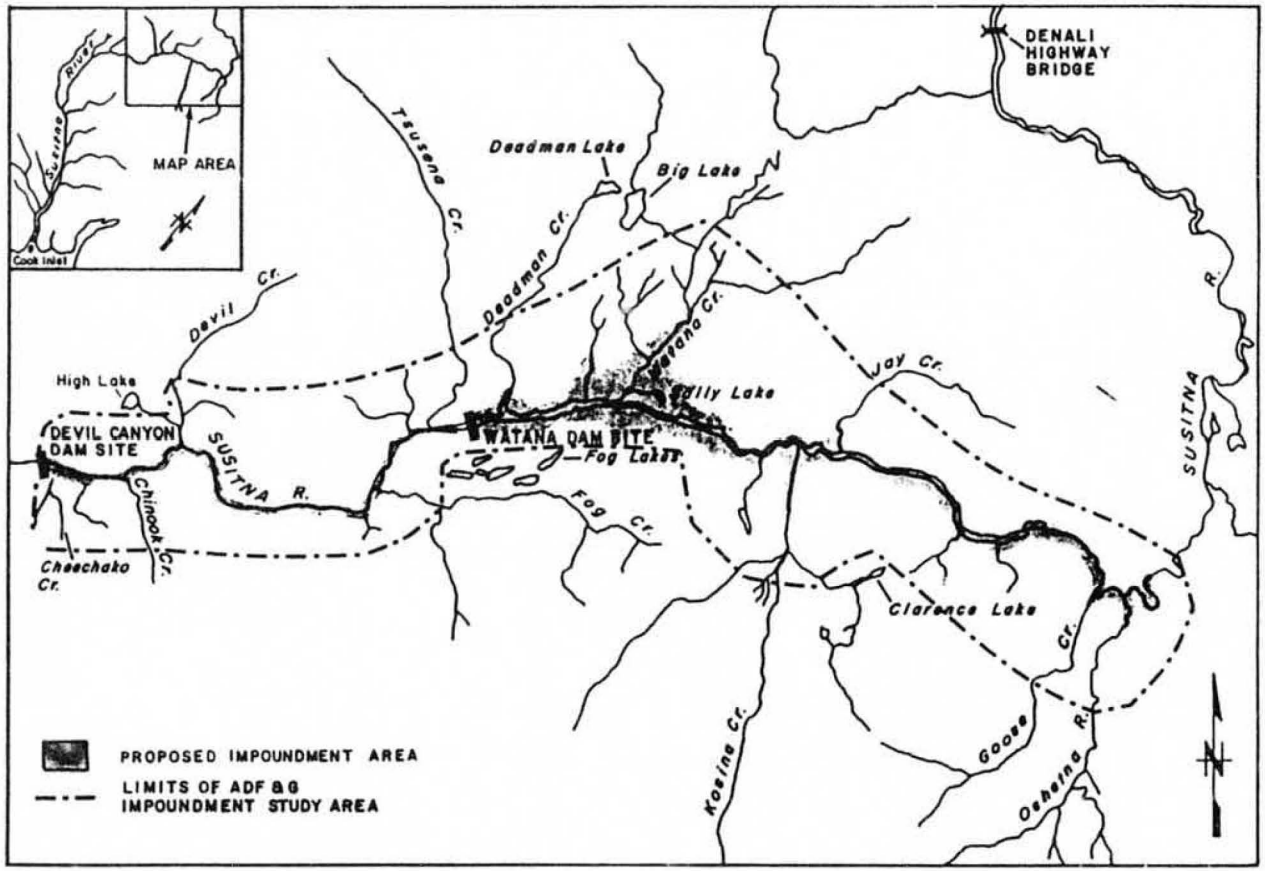
INTRODUCTION

The objective of this study was to document Arctic grayling, Thymallus arcticus, spawning and rearing habitats above and below the proposed impoundment elevation (PIE) within the eleven major tributaries of the impoundment study area (Appendix Figure K-1). Inundation of the lower reach of each of these streams below the PIE will result in the loss of existing lotic Arctic grayling spawning and rearing habitats. Therefore, the degree of continued spawning and rearing of Arctic grayling presently occurring in these streams will depend upon the quantity, quality, and availability of habitat above the PIE.

METHODS

Stream surveys were conducted above and below the PIE on eight of the 11 major tributaries within the impoundment study area during 1982. Three small, steep gradient tributaries, Cheechako Creek (RM 152.5), Chinook Creek (RM 156.8), and Devil Creek (RM 161.4) were not adequately surveyed due to time constraints and study priorities during the 1982 field season.* Therefore, these streams have been deleted from further

* A foot survey, conducted at the mouth of Cheechako Creek and along the lower mile of Devil Creek indicated that very few grayling were present in these locations. Habitat was assessed to be poor in the extreme lower reach of Cheechako Creek, while good to excellent habitat was identified in Devil Creek. During aerial surveys above and below the PIE, several fish passage barriers were observed in



Appendix Figure K-1. Proposed Susitna Hydroelectric impoundment study area, 1982.

discussion in this section of Appendix K. Investigations of the eight tributaries studied [Fog (RM 176.7), Tsusena (RM 181.3), Deadman (186.7), Watana (RM 194.1), Kosina (RM 206.8) and Jay (208.5) Creeks and the Oshetna River (RM 233.4)] were limited to the reach between the tributary mouth and a point five miles above the PIE on each stream. Evaluation of spawning and rearing habitats were based on stream gradient, substrate type, stream flow velocities and observations of Arctic grayling in each stream. Specifically, presence of preferred spawning habitat characteristics (gravel substrate and stream velocities ranging from 0.8 to 3.3 ft/sec (Tack 1973)) and/or observed use of habitat for spawning by grayling were the criteria used to identify spawning habitat. Based on previous observations, the presence of slow-flowing and backwater areas and/or observed young-of-the-year grayling (fry) were the criteria used to identify the presence of fry rearing habitat. Presence of juvenile and adult Arctic grayling indicated the presence of adequate rearing habitat for these life stages.

Data collection methods and detailed individual stream descriptions for the tributaries investigated are presented in the Procedures Manual (ADF&G 1982) and the Su Hydro Basic Data Report (ADF&G 1983: Volume 5).

Cheechako and Chinook creeks. One barrier, a large waterfall 0.5 miles above the PIE, was identified in Devil Creek. The inundation of barriers below the PIE on each stream by the proposed Devil Canyon Reservoir will not affect the present inaccessibility to the upper reaches of these streams by Susitna River fish. Spawning and rearing habitats above and below the PIE were not assessed within Cheechako, Chinook, and Devil creeks.

RESULTS

Arctic grayling adults, juveniles, and fry were observed scattered throughout the study reach of all tributaries investigated. Because Arctic grayling fry have been found to spend their first summer near their hatch site (Tack 1980), the observations of fry indicated that spawning had taken place above and below the PIE in all tributaries. Furthermore, all streams contained suitable habitat (gravel substrates and medium to slow stream velocities) assumed necessary for successful spawning throughout their surveyed length. Actual Arctic grayling spawning was not observed because of turbid water conditions during spring.

The observation of fry, juvenile and adult Arctic grayling along with the identification of spawning and rearing habitats within the study reach on each tributary indicated that Arctic grayling of all life stages were supported throughout these reaches.

Large waterfalls located within the study reaches of Deadman and Tsusena Creeks presently prevent fish passage from the Susitna River to the spawning and rearing habitats located in upper reaches of these streams. The waterfall located in Deadman Creek would be inundated by the proposed Watana Reservoir, eliminating this fish passage barrier. However, the proposed Devil Canyon Reservoir will not inundate the waterfall above the PIE on Tsusena Creek but will limit the amount of available habitat below the waterfall. Potential spawning and rearing habitats above this barrier will remain unavailable. Likewise, the

proposed inundation of Fog, Watana, and Jay Creeks below possible hydraulic fish passage barriers may also limit the use of available habitat in each stream these barriers. A more complete discussion on fish passage barriers in the study area is presented in the ADF&G Basic Data Report, (ADF&G 1983: Volume 5).

DISCUSSION

All reaches of tributaries studied contained suitable spawning and rearing habitats above and below the PIE. However, the quality, quantity, and accessibility of these habitats varies considerably among and within streams above and below the PIE. Most notable changes within streams above and below the PIE occur on Deadman and Kosina Creeks where an abrupt change in stream gradient and a change in stream gradient pattern, respectively, changes the quality of the available spawning and rearing habitats (ADF&G 1983a). Habitat differences among streams are basically a function of stream gradient, discharge, substrate, and morphology.

Adult Arctic grayling are suspected to spawn* in the same section of river where they were hatched (Tack 1980) and have been shown to return to the same summer feeding station yearly (Schallock and Roguski 1967,

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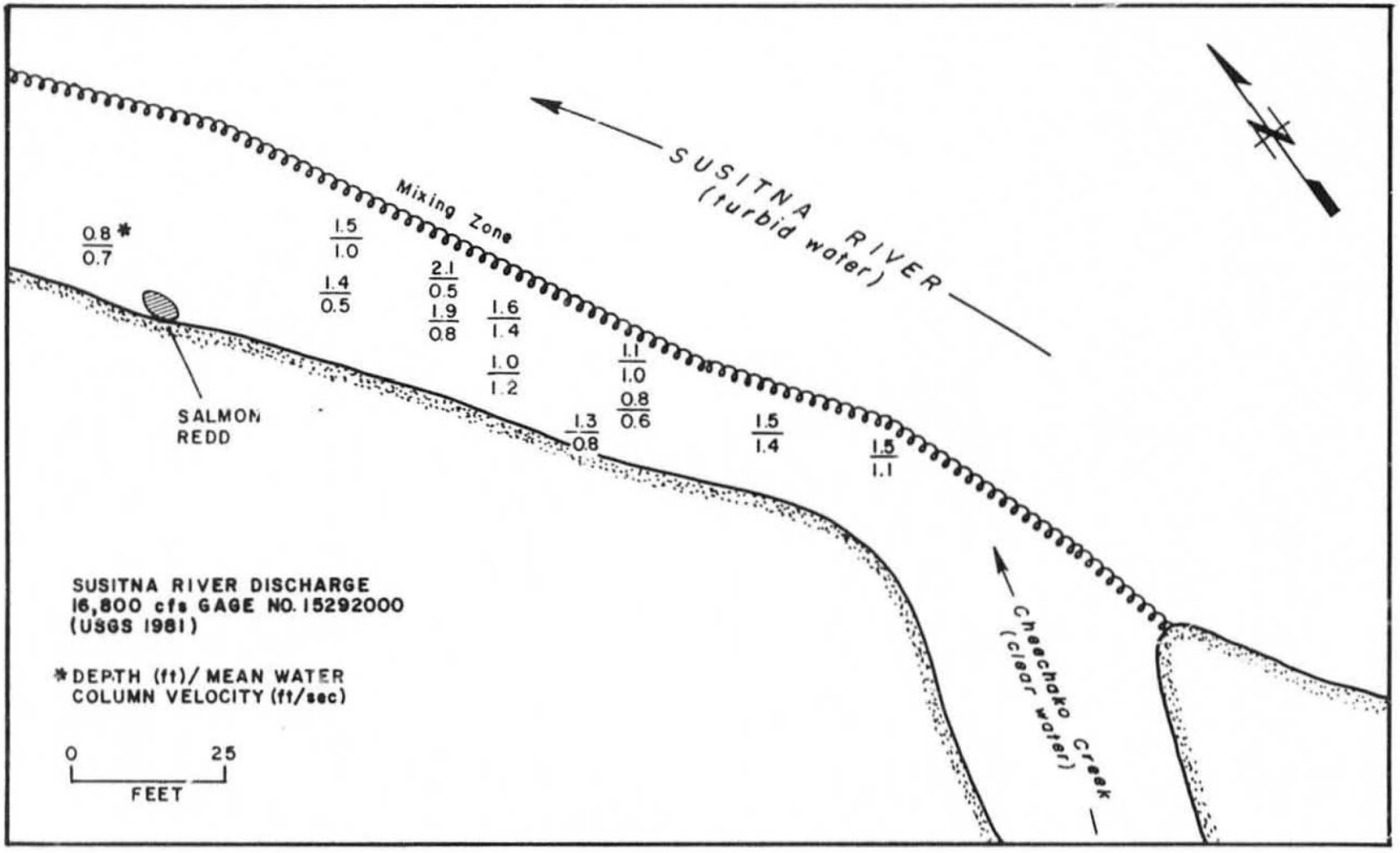
* Spring 1983 field studies located active grayling spawning areas. These data will be reported and compared to the information of this appendix in the FY84 ADF&G report.

ADF&G 1983a). Spawning and rearing habitats above and below the PIE on all tributaries surveyed are seasonally used by Arctic grayling which probably home to these specific areas each spring. However, after reservoir development, Arctic grayling which had homed to the reach of tributary below the PIE will be displaced. The suspected invasion and use of spawning and rearing habitats above the PIE by these displaced grayling will likely affect the grayling population presently homing to habitats above the PIE. Although these effects cannot be predicted at this time, the lotic habitats above the PIE cannot be considered as replacement habitat for habitat lost below the PIE.

SALMON

Cheechako and Chinook Creeks, located within lower Devil Canyon at RM 152.5 and 157.0, respectively, are the only tributaries of the Susitna River within the proposed impoundment areas presently known to be used by salmon for spawning. Although unconfirmed sightings of salmon have been reported near the mouth of Jay Creek, RM 208.5 (USFWS 1959), studies conducted by ADF&G during 1981 and 1982 (ADF&G 1981, 1983: Volume 2) have tentatively placed the upstream limit of the salmon migration in the Susitna River near the mouth of Chinook Creek, RM 157.0. The constricted river channel of Devil Canyon above Chinook Creek creates a fish passage velocity barrier which prohibits further upstream migration of fish.

ADF&G Su Hydro staff initially documented chinook salmon spawning within the Devil Canyon reach of the Susitna River in the glacial/clearwater mixing zones of Cheechako and Chinook Creeks on August 4 and 5, 1982, respectively (ADF&G 1983: Volume 2). On August 6, 1982, ADF&G Su Hydro Aquatic Habitat personnel measured streamflow velocities and depths associated with holding chinook salmon within the clear-water plume and mixing zone of Cheechako Creek (Appendix Figure K-2). Although actual spawning was not observed at this time, a semi-dewatered chinook salmon redd was observed along the water's edge approximately 150 feet downstream from the mouth of Cheechako Creek, indicating that spawning had taken place during a higher discharge period (ADF&G 1983: Volume 2).



Appendix Figure K-2. Chinook salmon holding area near the mouth of Cheechako Creek in the Susitna River at RM 152.4 (GC S32N01E33CCB) August 6, 1982.

Subsequent surveys on Cheechako and Chinook Creeks during August, 1982 indicated that salmon used only a small portion of the habitat above the mouth on each stream. Several fish passage barriers within Cheechako and Chinook Creeks prevented salmon access to the upper reaches of these streams. Most of the lower reach on each stream was characterized by turbulent, high velocity whitewater areas and spawning habitat appeared to be limited.

Additional investigations are planned FY 84 in the Devil Canyon area of the Susitna River to further document the extent of salmon movement above the Devil Canyon dam site, RM 152.0.

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Appendix K: Evaluation of Arctic Grayling Spawning and Rearing Habitat and Notes on Salmon Spawning in the Impoundment Study Area of the Susitna River.

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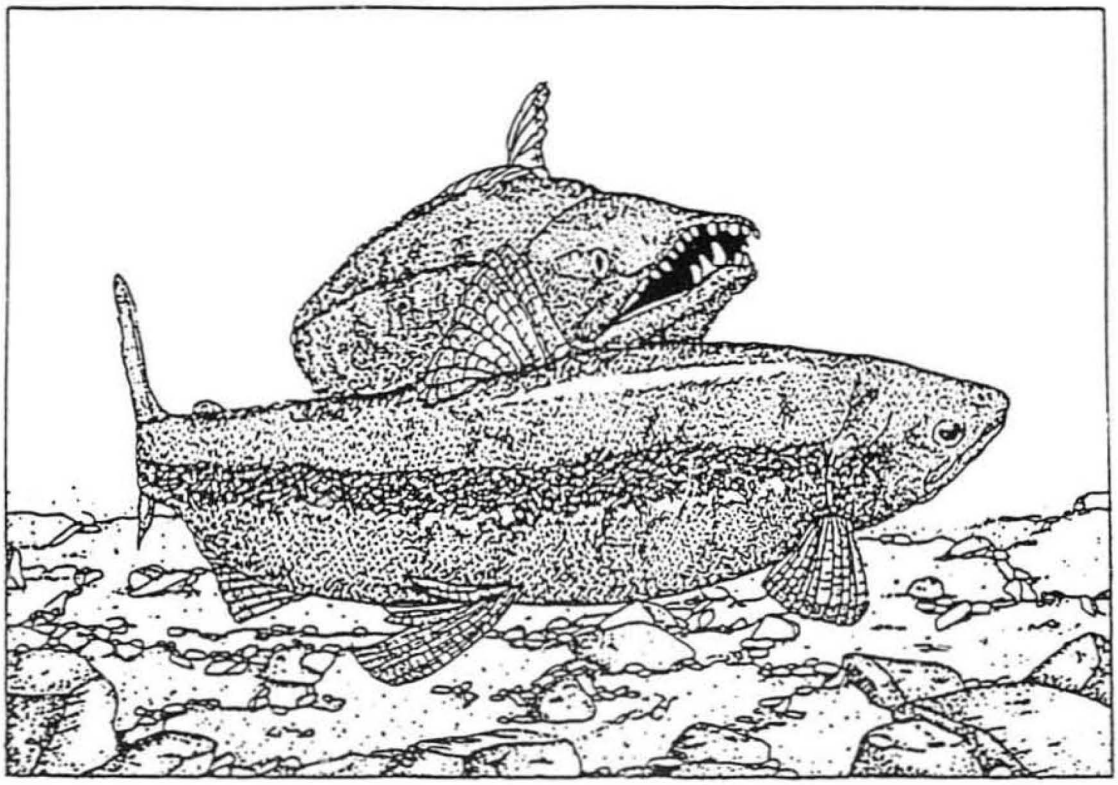

SUSITNA HYDRO AQUATIC STUDIES
PHASE II REPORT

Synopsis of the 1982
Aquatic Studies and Analysis of
Fish and Habitat Relationships

— APPENDICES —

by

ALASKA DEPARTMENT OF FISH AND GAME
Susitna Hydro Aquatic Studies
2207 Spenard Road
Anchorage, Alaska 99503

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